ATTACHMENT #1

MEMO

TO: Patricia deLaBruere
JNU Airport Manager

DATE: May 5, 2015

FROM: Catherine Fritz, AIA
JNU Airport Architect

RE: ARFF Project Formulation

The Airport Board's funding authorization on February 11, 2015, allowed staff to set up the Capital Improvement Project (CIP) account and begin planning and scoping for the Aircraft Rescue & Fire Fighting (ARFF) project. FAA has scheduled funding in FFY15 to purchase a new ARFF vehicle and to begin design work to consider needed modifications to the existing ARFF apparatus bays to house it. Recently, I began preparing documents to purchase the new truck, and I reviewed the existing apparatus bays in detail. During this process, several important issues arose that provide multiple options for moving forward. The process of selecting and procuring a new ARFF truck is discussed herein, and several options for modifying the existing building to accommodate existing and future ARFF equipment are discussed.

1. Background.

Applicable Federal Aviation Administration (FAA) Advisory Circulars (AC) for initial planning of this project are noted below. Additional Advisory Circulars may also have relevance, and will be incorporated as the project proceeds.

- AC 150/5220-10E Guide Specification for ARFF Vehicles
- AC 150/5210-15A ARFF Station Building Design
- AC 150/5100-14E Arch, Eng, & Planning Consultant Services for Airport Grant Projects

The existing ARFF station is combined with Glacier Valley Fire Station and was constructed in 1979-80. The ARFF apparatus bay and associated areas are separated from other portions of the building by a secure fence on the exterior and a secure wall on the interior. The ARFF program currently uses two aircraft emergency vehicles that are dedicated full time to airport service: Engine A-1 is an Oshkosh Striker 1500 manufactured in 2003, and Engine A-2 is an Oshkosh T1500 manufactured in 1993.

2. ARFF Vehicle Procurement.

AC 150/5220-10E outlines the ARFF vehicle procurement process.

The first step of the vehicle selection process is to determine the ARFF vehicle need. Engine A-2 is currently 22 years old. The AC states that the average service life of an ARFF vehicle is 10-12 years. ARFF mechanic, Scott Reid, reports that Engine A-2's age makes it difficult and costly to get parts. For example, the vehicle has a manual roof turret that relies on bearings that wear out with use. Since the parts are obsolete, replacement bearings have to be individually made to order. This can take three or more months to receive and cost $6,000-$8,000. The current bearings are at the end of their useful life need to be replaced. Other components in need of replacement include the water pump (est. $10,000) and tires (est. $20,000).

Another aspect of the age of Engine A-2 is the engine efficiency and emissions output. New ARFF trucks are built for faster acceleration on a lighter weight body. They burn less fuel per gallon and meet contemporary EPA air emissions standards.

Step 2 is to determine the ARFF Airport Index in accordance with CFR Part 139.315. Juneau International Airport (JNU) has been operating under Index B for many years, but with recent increases in operations by Delta Air Lines, as well as increases in aircraft size that service Juneau by both Delta Air Lines and Alaska Airlines, the airport is close to needing to meet Index C requirements. Therefore, the purchase of a new ARFF vehicle should be made in accordance with Index C.

JNU currently meets its ARFF fleet configuration requirement for Index C through the use of two trucks, each with 1,500 gal. water capacity (total 3,000 gal.), and with each truck carrying the required minimum dry chemical. FAA identifies two ways to meet the requirements of Index C in 139.317:

- Three vehicles --
  (i) One vehicle carrying the extinguishing agents of either; 1) 500 lbs. of sodium-based dry chemical, halon 1211, or clean agent; or 2) 450 lbs. of potassium-based dry chemical and water with a commensurate quantity of AFFF to total 100 gal. for simultaneous dry chemical and AFFF application; AND

  (ii) Two vehicles carrying an amount of water and the commensurate quantity of AFFF so the total quantity of water for foam production carried by all three vehicles is at least 3,000 gal.

~OR~

- Two vehicles --
  (i) One vehicle carrying the extinguishing agents of at least 500 pounds of sodium-based dry chemical, halon 1211, or clean agent and 1,500 gallons of water and the commensurate quantity of AFFF for foam production; AND

  (ii) One vehicle carrying water and the commensurate quantity of AFFF so the total quantity of water for foam production carried by both vehicles is at least 3,000 gallons.

Maintaining and operating three ARFF vehicles rather than two will be more costly for the airport, therefore, the two-vehicle option is preferred. Index C requires at least two trucks to respond to an incident, so there is no difference in operational staffing between a 3,000 gal. truck and a 1,500 gal. truck.

Step 3 in the vehicle selection process is to determine appropriate firefighting agents by type and quantity for the specific vehicle system for the applicable Index per FAA Part 139 Airport Certification requirements. Both of JNU's existing ARFF vehicles carry 1,500 gallons of water and PKP (potassium bicarbonate) chemical; both are Class 4. A new ARFF vehicle is also proposed to be Class 4.

The final vehicle procurement step is to determine the specific vehicle requirements based on information gathered in Steps 1 thru 3. Given JNU Airport's current needs and expected short-term growth that will increase the ARFF Index to level C, a Class 4 ARFF vehicle is needed. JNU proposes to meet Class 4 requirements with either a new 1,500 gallon water/Aqueous Film-Forming Foam (AFFF) fire suppression system with a complementary 450 min. pound dry chemical (PKP) or a new 3,000 gallon water capacity with same AFFF fire suppression system.

The primary advantage of a 1,500 gal. truck is a lower initial purchase cost. The primary advantage of the 3,000 gal. truck is that it provides a larger quantity of water and chemical immediately at the site of an incident. This is an important feature as aircraft size and associated passenger loads become greater. Additionally, the configuration of Capital City Fire & Rescue's community operations means that incident back up (beyond required ARFF personnel) may not be immediately available due to other community incidents, thereby increasing the importance of having equipment with more agent at the site. The 3,000 gal. truck was recommended in FAA Certification & Safety Inspector Matthew Stearns' 12.23.14 report.

Once the specific ARFF vehicle type is selected, the specification to purchase the equipment can be made, using procurement methods that meet both FAA and City & Borough of Juneau requirements.

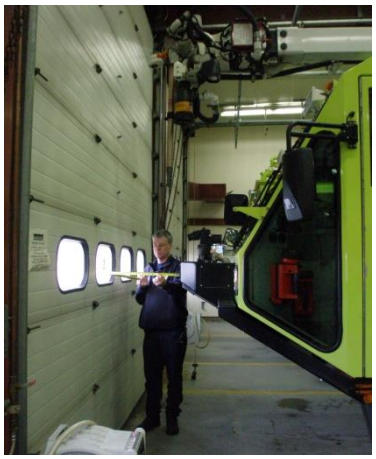
3. Building Design Criteria.

The existing ARFF apparatus bay is approximately 3,000 sq. ft. in size (39 ft. length x 73 ft. width). There are four bays, each with 14 ft. wide overhead door openings.

The characteristics of the ARFF vehicles are the primary design criteria for the apparatus bays of the ARFF station. Chapter 3 of AC 150/5210-15A, *Station Elements* provides design guidance. The number of vehicle bays generally depends on the ARFF index, plus one bay for light maintenance and washing. Other considerations may impact the total number of bays, including the need for a reserve ARFF truck.

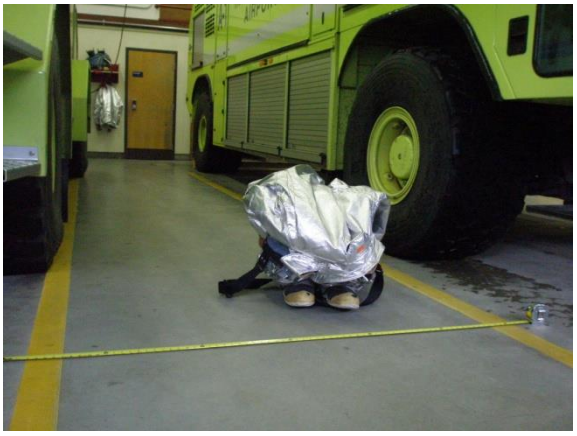
The size of each vehicle bay is prescribed by the AC. As noted in section 3-2., "Proper sizing of ARFF vehicle bays will provide operational flexibility, a clear margin of safety and space to undertake minor maintenance tasks for each truck." The existing ARFF apparatus bay clearances are noted below, along with AC minimum design criteria. Note that each engine has components that extend beyond its frame (e.g., ladders and mirrors) that project into the required clearances and are not considered in the measurements below. While it is possible to improve the minimum existing clearance between trucks by moving Engine A-1 to an adjacent bay (leaving an open bay between trucks), this would create clearance problems into the existing tank storage room and would require relocation of the carbon monoxide exhaust system.

	Clearance of truck to door	Clearance of truck to walls	Clearance between parked trucks	Vertical clearance to obstructions
AC Design Criteria	5'	6'	8'	7'-0"
Engine A-1 (33'-4" length)	2'	44" (to rear wall)	6'	5'-9"
Engine A-2 (30'-0" length)	4'	8' (to side wall) 5' (to rear wall)	6'	4'-7"



Left: ARFF staff measures existing clearances for Engine A-1.

Below: Clearances between trucks and vertical ceiling do not meet AC requirements.



Based on the two-vehicle fleet configuration, the specifications of two sizes of ARFF trucks are noted below. The manufacturer used for illustrative purposes is Oshkosh Striker series. The Striker 4x4 carries 1,500 gal. of water, and the Striker 6x6 carries 3,000 gal. of water. The actual new vehicle that is procured through a competitive process may vary slightly from the noted dimensions.

	Truck Length	Truck Width	Truck Height	Min. Apparatus Bay Length w/ clearances
Striker 4x4 (1,500 gal)	426" (35'-6")	120" (10') w/out rear view mirrors	140" (11'-8") 150" (12'-6") w/ high reach turret	46'-6"
Striker 6x6 (3,000 gal)	475" (39'-7")	120 " (10')	140" (11'-8")	50'-7"

Regarding apparatus bay doors, the AC states, "The standards for the smallest installed vehicle bay door are 19 feet in width and 18 feet in height." There is a provision to allow doors as small as 16 ft. x 16 ft. as appropriate (for specific ARFF vehicles). All of the doors to JNU's ARFF station are 14 ft. wide by 16 ft. high. The door widths cannot be cost effectively increased due to the building's structural system layout and under-slab drain system.

The existing apparatus bays do not meet minimum clearances for safety and operation of existing trucks. The Striker 4x4 noted above could fit within an existing bay, but would not meet clearance. The Striker 6x6 is too long to fit in the existing building unless there are modifications made.

4. Other Design Considerations.

Siting of an ARFF facility is a critical issue for long-term airport needs. The AC emphasizes important access issues, including the need for immediate, straight access to the airfield network, and the use of an unimpeded access route. The existing ARFF station location has many desirable characteristics, but given current design criteria, an alternate site or alternate apparatus bay orientation to the airfield may be desirable.

Storage for turnout gear (Personal Protective Equipment) is required at or near the ARFF vehicles. A minimum of 10 sq. ft. per firefighter is required. Currently, the space that is dedicated to gear storage impedes on required clearances.

The FAA encourages high performance building design and sensitivity toward sustainable design issues. The existing ARFF station would benefit from energy efficiency measures such as increased building insulation, new overhead doors, and consideration of new lighting, heating and ventilation systems.

5. Options to Address Current Needs.

Option 1: Purchase a new ARFF truck to meet the requirements of Index C without immediately meeting all the AC clearances, and simultaneously design a renovation to the existing ARFF station that will address all of the deficiencies of the apparatus bays. The approximate cost of replacing the ARFF apparatus bays (for planning purposes only) equals $1.8 million (3,600 sq. ft. x $500/sq. ft.). If the new ARFF truck is a Striker 4x4 or similar, it will likely fit in the existing apparatus bay, but be non-conforming with regard to clearances. Actual dimensions of the selected ARFF truck are needed to verify the feasibility of this option. If the new ARFF truck is a Striker 6x6 or similar, temporary modifications to at least one of the existing apparatus stalls would be needed.

Advantages include:

- The ARFF vehicle purchase could be made immediately, independent of the schedule for building modifications.
- Replacement of ARFF apparatus bay would address more facility deficiencies than Options 2 and 3, and provide improved long-term facility for current and future equipment needs.
- If a 3,000 gal. truck is purchased, it provides operational advantages discussed in 2. above, including meeting FAA certification recommendations

Disadvantages include:

- Existing inadequate clearances will remain until renovation of the apparatus bay is complete.
- Requires larger future AIP grant (not currently scheduled in ACIP) for reconstruction of ARFF apparatus bays.
- Temporary modifications to house a 3,000 gal. truck in the existing building will cost approximately $20, 000 - $40,000 (rough estimate for planning purposes only).
- Replacement of ARFF apparatus bays will require temporary vehicle facility during construction.

Option 2: Purchase a new 1,500 gal. ARFF truck to meet the requirements of Index C; add a new vehicle bay along the south side of the existing building to house it. The expansion would need to be at least 20’ wide by 50’ long to accommodate a truck such as the Striker 4x4.

Advantages include:

- Ability to provide appropriate clearances around new ARFF vehicle.
- Ability to design to contemporary energy standards.
- Site allows drive-thru design feature.
- Construction could be done with minimal disruption to existing operations.

Disadvantages include:

- May not meet FAA approval due to excess number of total apparatus bays.
- Does not address deficiencies in existing apparatus bay for current or future equipment.
- Existing internal airport roadway on south side of building may be impacted.

Option 3: Purchase a new 3,000 gal. ARFF truck to meet the requirements of Index C; add a new vehicle bay along the south side of the existing building to house it. The expansion would need to be at least 20’ wide by 55’ long to accommodate a truck such as the Striker 6x6.

- Same Advantages and Disadvantages noted in *Option 2*, except that costs will be approximately 10% higher for larger, new construction along south side of existing building. The 3,000 gal. truck is approximately 10% more costly than the 1,500 gal. truck, depending on a wide range of variables related to the specific features needed.

6. Summary.

The ACIP was recently modified to proceed with purchase of a new ARFF truck in the current fiscal year, and to fund design that will modify the existing ARFF building to house the new truck. Funding for construction of building modifications has been scheduled for FFY16. A Request for Proposals to select a design team is ready to issue.

Based on the analysis herein, staff is working with FAA to secure the grant that will allow the ARFF truck to be purchased.

copy: Chief Rich Etheridge, Capital City Fire/Rescue
Captain Keith Walker, Capital City Fire/Rescue