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MEMO

DATE: April 24, 2018

TO: Chris Pomeroy, SUN Airport Manager

FROM: Greg Dyer, Jviation

CC:

RE: SUN Tower Replacement Alternatives Analysis Summary

MEMO:

From 2013-2015, the airport completed a $35 million Federal Aviation Administration (FAA) Airport Improvement Program (AIP) funded capital development project. This multi-year, multi-phased project was necessary to address a non-standard Runway Safety Area (RSA) at the airport and to meet a Congressional mandate that all Part 139 airports have a compliant RSA by the end of calendar year 2015. While the RSA was made fully compliant with FAA design standards per the intent of the Congressional mandate, due to the airport's location in a mountainous valley and limited space, several Modification to Standards (MOS) were approved by the FAA to address other standards issues to allow the airport to operate in its current condition. One such MOS is a non-standard runway Object Free Area (OFA) on the east side of the runway. The OFA is penetrated by the airport security fence, Highway 75, and the ATCT. As part of the MOS approval process for the OFA MOS, the FAA is requiring relocation of the ATCT by the year 2023.

The recently updated Friedman Memorial Airport Master Plan includes a preliminary analysis of five possible ATCT replacement sites. The analysis in the master plan considers a traditional tower structure only. Over the course of the past few years however, evolution in the use of technology as a replacement for ATCT has become a viable option for Friedman Memorial Airport Authority (FMAA) to consider. Specifically, automation processing speed and digital camera technology have improved to the point that it is now possible to replace an ATCT with a set of cameras to create a "virtual" tower facility using Digital Tower Technology (DTT).

To this end, FMAA has tasked Jviation, Inc. to analyze ATCT replacement strategies available to airport management and FMAA. Options include a legacy tower option (sticks and bricks facility), and FAA Next Generation (NextGen) DTT. The analysis includes an assessment of general timelines, costs, steps, uncertainties and opportunities. The goal of the study process is to provide FMAA information so that an initial direction can be established by the Board in moving forward with ATCT replacement.

Following is a summary of the options for discussion with FMAA.

LEGACY ATCT OPTION

The cost estimate for a replacement, legacy ATCT facility was based on a site near the Terminal Building footprint as identified in the 2017 draft Friedman Memorial Airport Master Plan as site 1. Site 1 is located on the south side of the terminal building. The estimate and initial planning is based on the needs for site 1, however the planning was kept general enough that the cost estimate is applicable for essentially any of the sites possible on the airport. The primary variable siting is the location relative to the airport - the closer the structure is to the mid-point of the runway and the closer it is to the runway, the less tall it has to be. Site 1 appears to be optimal.

The cost estimate assumes an approximate 80' total structure height at site 1. If another site was chosen, the basic site preparation work and infrastructure costs would be the same, but if the location relative to the runway was more challenging, a taller tower would generate increased costs.

The process to construct a legacy ATCT facility would be a 3-5 year project. While the actual construction would take 6-9 months, the siting study, engineering, connectivity to telecommunications and IT, and the project management process would results in a 3-5 year timeline based on consultant team experience with similar sized facilities.

The specific final siting requirements are a product of an FAA tower siting process that can be quite extensive. The full process can become complex and expensive, however with the consultants' experience, there is confidence the process will not require the entire spectrum of possibilities.

The largest cost component of the traditional tower is the tall structure, but there is a sizable component that comprises the necessary tower equipment and project management necessary to equip normal operations and to achieve FAA acceptance at the conclusion of the project.

There are other considerations to consider with a new legacy tower option. Tall ATCTs are not efficient buildings from an architectural standpoint. They typically are much taller than any other buildings nearby, are unique in terms of building codes, present fire-life-safety challenges, and are costly to maintain. They serve their purpose, but they are awkward from nearly any other cost or community design perspective.

DIGITAL TOWER TECHNOLOGY OPTION

There is an appeal of being able to avoid the costs of a tall ATCT with an alternative that is more flexible in terms of location and more practical accommodating and protecting the people inside. As a result, several companies prototyped non-conventional ATCT facility configurations. In the past ten years, several European airports have participated in live trials for DTT prototypes. However, the initial airports included in these efforts are very low traffic volume airports, far below Friedman Memorial Airport activity.

The early successes at small airports have allowed the various vendors to learn and innovate, and the current DTT environment includes a prototype installation in the United States at Leesburg, VA. This facility has been in a test phase for nearly two years and is expected to become fully certified and operational in the next 18-24 months. A DTT project at Ft. Collins-Loveland airport in Colorado is in the early stages of development, and perhaps most significantly, a DTT installation has been fully certified for use at the Budapest, Hungary airport which notably served 13 million passengers in 2017.

Because DTT solutions are not yet fully certified and implemented in the U.S. air traffic control system, there are variables for the Friedman Memorial Airport Authority to consider. The FAA is working to develop a baseline of requirements regarding human factors and certification steps, along with establishing a qualified vendor list. They are using the prototype efforts underway at Leesburg and Ft. Collins to define the requirements. The uncertainties of how the requirements could evolve, and the yet-to-be completed certification process could cause some requirement "creep". However the information we currently have regarding these processes (William E. Payne & Associates) is the most up-to-date knowledge available.

Another variable is the human factors discussion around this emerging technology. There are many innovative ideas being proposed as more people imagine how the technology could be developed. It is possible enhanced capabilities could become available and even be perceived as essential. While this evolution would be a move upwards, it could create additional cost. The FAA's general approach is to keep some enhancements in the form of "add on" options instead of required elements, but this is an area that could change.

Some of the enhancements could be the addition of an infra-red camera for night-time surveillance of the airport or enhanced digital processing of the camera feeds to highlight items for controller attention.

There are four primary vendors offering DTT solutions for air traffic control towers today. They are:

- SaabSensis
- SeaRidge
- Frequentis
- Kongsberg

At least two others are emerging. The basic components of the systems are similar - a camera array to provide visual surveillance and the other elements from the FAA's tower equipment list to fulfill the other functions of the tower (radio communications/weather information/administrative).

The general cost projection indicates the combined cost of the DTT equipment and the other required equipment, plus a one-story facility to house the operation, will be slightly less than the cost of a legacy ATCT facility.

Table 1 below includes a summary of costs related to the traditional ATCT replacement and the DTT solution paths.

TABLE 1 – SUN AIR TRAFFIC CONTROL TOWER REPLACEMENT OPTIONS - COST ESTIMATE COMPARISON

TRADITIONAL ATCT			DIGITAL TOWER SYSTEM	
ATCT and Base Building	2,406,718		Airfield Infrastructure	895,375
Site Work	214,831		Digital Tower Facility Building	651,854
Air Traffic Control Equipment	445,000		Camera Surveillance System	668,000
Fees (Tower Design and General Conditions)	849,289		ATCT Minimum Equipment List	375,000
Contingency	361,008		Communications and Power	115,000
			Contingency (20%)	612,846
			Fees (Facility Design and General Conditions)	364,915
Total	4,276,846		Total	3,682,990
ADS-B	359,000		ADS-B	359,000

Source: William E. Payne & Associates

ADS-B AIRCRAFT SURVEILLANCE

FMA is not currently covered by radar coverage close to the airport. Generally, radar coverage ends at 13,000 feet MSL. This gap in radar coverage means Salt Lake City Air Route Traffic Control Center (ARTCC) has to use procedural separation for aircraft near FMA causing delays and efficiency problems. Remedying this situation would enhance not only efficiency, but it would give the controllers a more complete ability to monitor inbound aircraft positions and anticipate the relative proximities of aircraft. This improved situational awareness would add to the safety redundancies at FMA. It would therefore be desirable to address the issue of radar gaps during the same timeframe as replacing and enhancing the ATCT.

Current technology offers alternatives to address these radar gaps. The most flexible surveillance method to accurately pinpoint aircraft locations is called Automatic Dependent Surveillance-Broadcast (ADS-B).

While there are several technical options to address this problem including legacy radar and wide-area multilateration, each would carry significant cost. Initial analysis of ADS-B coverage indicates one additional sensor located on or near SUN would enhance the surveillance to a degree that would meet all air traffic control needs. (The closest existing ADS-B sensor is in Jerome, ID).

The costs of an ADS-B installation solution are included in **Table 1**. They are included in the costs of the project for the purposes of this analysis. However, it is a separate item and ideally should be addressed whether the FMAA selects a legacy ATCT or a DTT system.

TIMELINE

The required timeline for either option is similar, approximately 3-5 years. Since the 2023 requirement in the FAA Modification-to-Standards is five years away, this means a decision on which option to pursue should be made by this fall to begin the process.

Another important factor in timing is the currently-under-consideration FAA Reauthorization bill (H.R. 4). Paragraph 510 of this bill authorizes the FAA to pursue two DTT facility installations at airports with existing Federal Contract Towers. Regardless of whether FMAA chooses a traditional tower path or a DTT facility path, continued coordination and communication with the FAA's Airports District Office and FAA Headquarters will be critical. It is important that SUN be identified as one of the two facilities allowed in the legislation as a DTT facility, and regardless of how well the replacement effort goes, thorough partnership with the FAA Airports District Office is an essential component to allow them to optimize FAA funding and planning support to the Friedman Memorial Airport.