Chapter 5 -

ARFF Relocation Analysis

EXECUTIVE SUMMARY

Sonoma County Airport's (STS) Aircraft Rescue and Firefighting (ARFF) facility is located immediately north of the passenger terminal building. Planned expansion of the terminal and associated facilities cannot occur until the ARFF building is relocated. Additionally, the ARFF facility has reached the end of its useful life, is undersized, and needs to be expanded to accommodate additional vehicle bays and associated parking areas. As a part of the update of the STS's Airport Layout Plan (ALP) alternative sites for a replacement ARFF building were evaluated. This Executive Summary summarizes the factors used to identify and evaluate possible sites for a replacement ARFF facility.

STS is currently classified as ARFF Index B, which means the Airport meets the standards to accommodate regular use (i.e., five daily departures) by aircraft as large as the Boeing 737-700 and less frequent use by larger aircraft. The updated forecasts prepared as part of this ALP update anticipate that this ARFF Index will accommodate the airline aircraft expected to use STS during the 20-year planning period.

Requirements and Siting Criteria

FAA advisory circulars and federal regulations provide standards and guidance for planning, designing, and constructing an ARFF facility. The new facility will be designed to be consistent with these standards and regulations to facilitate the duties of personnel, expedite the movement of equipment, and provide ready access to materials and supplies. The following factors were considered when siting the new ARFF Facility:

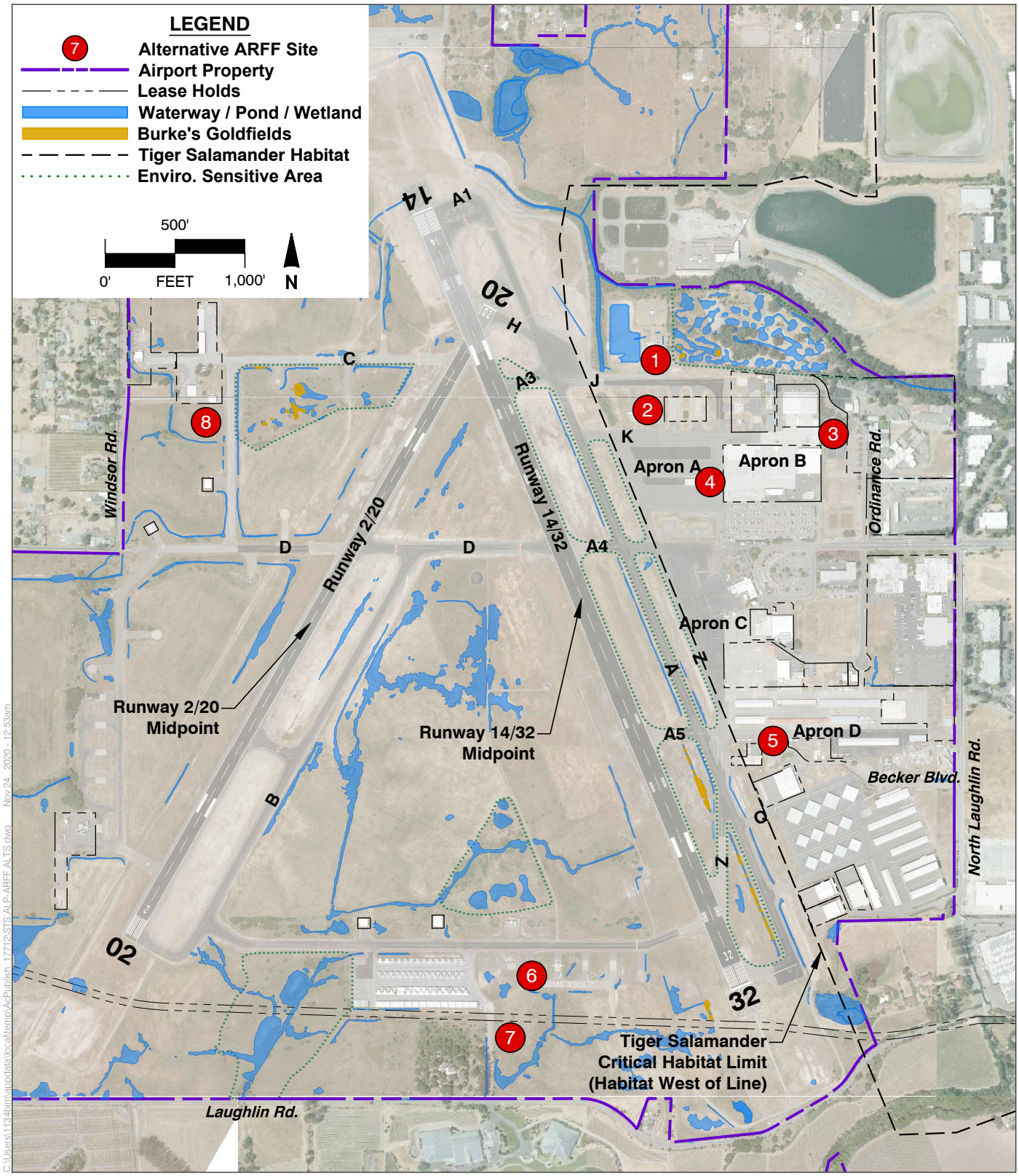
- **Airside Access and Response Time:** The preferred site should allow adequate response time to various airfield locations, as determined by federal regulations.
- **Impact on Facilities and Operations:** The preferred site should not significantly impact airport operations as well as existing and future facilities. A primary goal of this relocation is to enable terminal expansion.
- **Environmental Impacts:** The preferred site will have limited impacts to airfield areas that contain habitat for several special-status species and classes of wetlands.
- **Airport Observation:** The preferred site should provide ARFF staff a view of the airfield from the facility.
- **ATCT Line of Sight:** The preferred site should not interfere with Air Traffic Control Tower (ATCT) line of sight to aircraft movement areas.

- **Proximity to Operations Staff Primary Work Area:** The preferred site should ideally be located near to where the Airport's operations staff spend most of their time. STS does not have dedicated ARFF crews; ARFF services are provided by the Airport's operations staff. Proximity improves efficiency in staff utilization.
- **Landside Access:** The preferred site should ideally be located near a security fence line so visitors (e.g., delivery trucks) may access when needed. Because visitors are infrequent, this is a useful, but not essential, factor.
- **Ability to Serve as a Joint-Use Facility:** Selection of the preferred site should consider the operational and financial benefits to the Airport to jointly operate an ARFF / fire station with the Sonoma County Fire District.

Eight preliminary sites for ARFF relocation were identified. Each site has limits or constraints due to either airside access, landside access, available land, utilities, or environmental impacts. **Figure 5-1** shows the preliminary sites, location of water/wetlands, and environmentally sensitive areas.

- **Alternative 1** is west of the Cal Fire base, north of Taxiway J, and south of the Remote Transmitter/Receiver (RTR) site.
- **Alternative 2** is near the site designated on the 2013 ALP between Taxiways J and K. Alternative 2 shifts the ARFF facility east to a location that will not block line of sight between the ATCT and aircraft on Taxiway J holding at Taxiway A.
- **Alternative 3** is on the east end of Apron B adjacent to existing Fixed Base Operator (FBO) hangars.
- **Alternative 4** is north of the footprint for the proposed ultimate passenger terminal and northwest of long-term public Parking Lot B.
- **Alternative 5** is on the south side of Apron D east of the Sonoma County Sheriff's helicopter facility.
- **Alternative 6** is in the south quadrant on the old hard stand positions east of Apron F.
- **Alternative 7** is in the south quadrant south of Apron F.
- **Alternative 8** is in the west quadrant with Taxiways C and D providing airside access.

Figure 5-1: ARFF Preliminary Alternative Sites



Preliminary Analysis

The eight ARFF site alternatives were evaluated based on the site requirements described above. For site evaluation purposes, costs associated with the actual ARFF facility design and construction are expected to be relatively equal for all proposed sites. Significant cost variables for specific sites are utility access and interference with FAA facilities. Other variable cost drivers are landside access, environmental mitigation, and grading and drainage.

Alternative Site 1

Initial analysis was favorable for Site 1, as it appeared to offer advantages over other locations: an undeveloped pocket of land that will likely not accommodate other uses, lack of conflicting facilities nearby, limited impacts to airport operations and terminal expansion, a clear view of the airfield and appropriate access times, and easily accessible for operations staff. However, the proximity to the RTR tower array required further analysis and represented unanticipated costs. The FAA requested a draft Obstruction Evaluation/Airport Airspace Analysis (OE/AAA) study be submitted. One significant component of that effort was a shadow study report with preliminary analysis of impacts to RTR transmission. The shadow study determined the proximity Alternative 1 to the RTR will interfere with transmission signals. This study also showed that moving the ARFF slightly in this general location does not prevent interference with the RTR. The ARFF facility height is fixed by function, so lowering the building and vehicle bay is not an option.

Following receipt of the shadow study, the FAA's Operations and Engineering Support Group (OESG) responded with a meeting to discuss a feasibility study proposal for RTR modification. The FAA provided order of magnitude costs for addressing ARFF impacts to the RTR facility that addressed two scenarios: raising of the RTR antennas and relocating the facility to a new site. The most likely cost for raising the antennas was estimated to be about $1.7 million with a low estimate of $1.3 million and high estimate of $2.6 million. A new RTR site had a most likely cost of $3.6 million, with low and high costs estimated to be $2.7 and $5.4 million, respectively. The FAA cost estimates were based upon several assumptions:

- STS would be responsible for managing all design and construction activities. These costs are not included in the estimates presented above.
- The costs do not include FAA's overhead costs for labor and expenses.
- The costs do include the costs of providing RTR signal coverage during construction.
- There is a high degree of uncertainty over the technical requirements and constraints on the new facility until a formal feasibility study is conducted by the FAA.

Costs associated with RTR modification, coordination with FAA, and an uncertain timeline and construction date make Alternative 1 a less attractive option than Sites 4 and 8.

Alternative Site 8

Site 8 was retained for consideration because it is the best of the sites not on the east side. Costs beyond the general costs for site design and construction of Site 8 include water and sewer access and California Tiger Salamander mitigation costs. There were two west quadrant wastewater service options: extension of a sewer line from the east side of the Airport or installation of a septic system. There were two west quadrant domestic water service options: extension of a water main and use of a well and onsite water storage tanks.

Even if well and septic systems can be used, providing sewer and water service is estimated to cost over $1 million at Site 8. Any Airport project not limited to existing pavement will be considered to have impacted the California tiger salamander's habitat. Therefore, development of this site will require mitigation. Mitigation will consist of payment of a per acre mitigation fee of $32,000 per acre.

For this analysis, the onsite septic system paired with the onsite well and storage tanks is selected for planning cost estimates. The significant increase in costs associated with water main and sewer line connections, combined with the inconvenience for operations staff to access from the east side building area, likely make Site 8 unfeasible.

Alternative Site 4

Site 4 likely has the lowest development costs and least potential for delay. Environmental processing will be relatively simple compared to Sites 1 and 8 since this site is located on existing pavement. This makes it both less expensive to build and less subject to delay. The primary drawbacks are impacts to Apron A and potential constraints to ground service equipment. The impacts to Apron A are judged to be the most significant impact. As air service expands, Apron A will need to be modified to accommodate increased spaces designated for overnight and unscheduled maintenance parking for airline aircraft. Adjacent FBOs are seeking additional apron area for their use. There are no adjacent alternative sites for these uses.

As the ARFF analysis occurred, analyses for the near-term terminal footprint, aircraft parking positions, and the ultimate terminal footprint were refined. The analysis indicated requirements for Apron A to accommodate additional airline parking positions for remain overnight (RON) or maintenance positions away from the terminal in the near term. The proposed concept is to add pavement to the former helicopter parking positions, immediately north of the current airline parking positions, and the area between Taxiways J and K. This additional pavement allows for some flexibility on Apron A and reopens the potential to develop the ARFF facility on Apron A without severely impacting existing general aviation, the FBO, or the ultimate terminal facilities.

Three variations on Site 4 permit evaluation of different configurations of Apron A and associated taxilanes. Each Apron A alternative utilized the anticipated 2040 footprint of the passenger terminal. The terminal design accommodates six gate positions in one row. This configuration eliminates 5 push-back tiedown positions for single-engine aircraft and 10 taxi-through positions sized for piston and smaller turboprop twin-engine aircraft. These reductions occur independent of the location of the ARFF facility. Small shifts in the location and configuration of the ARFF facility optimize the space available for aircraft parking in each apron alternative.

Recommended Site

After refined analysis of the ultimate terminal footprint, gate positions, and impacts on general aviation parking, it was determined Apron A will accommodate an ARFF facility. After consideration of the strengths and weaknesses of each alternative, Site 4 on Apron A has been selected as the preferred site. The principal weakness of Site 4 is its impact to the ultimate terminal and general aviation parking on Apron A. This is judged to be less significant than its attributes:

- Site 4 is located in the east-side core area with access to existing facilities, which makes it efficient for operations staff, who serve as the ARFF staff.
- Site 4 offers minimal environmental impacts.
- Site 4 can be used for a joint-use ARFF / fire station.
- Site 4 does not constrain future passenger terminal development.
- Site 4 has a low impact on airport and aircraft operations.

Site 4 will be added to the ALP and the layout and orientation will continue to be refined so the proposed ARFF facility is compatible with future terminal and parking expansion.

INTRODUCTION

The ARFF facility is located immediately north of the passenger terminal building. Planned expansion of the terminal and associated facilities cannot occur until the ARFF building is relocated. Additionally, the ARFF facility has reached the end of its useful life, is undersized, and needs to be expanded to accommodate additional vehicle bays and associated parking areas. This study evaluates alternative sites for a replacement ARFF building as a part of the update of the ALP and concludes with a future preferred site.

A previous ARFF relocation study was completed in 2010. The study analyzed a site west of Cal Fire between Taxiways J and K. The 2010 ARFF Study results led to a site plan that assumed that local fire district response vehicles and staff would be collocated with the ARFF facility. Preliminary siting analysis in this study considers ARFF requirements such as location, response, and impact on operations for airport functions; its ability to serve as a site for collocated fire services was not initially considered. However, a collocated facility may be revisited once a preferred site is found that satisfies airport requirements.

The 2013 ALP designates a site for the future ARFF facility west of Cal Fire between Taxiways J and K. FAA OE/AAA from 2018 (ASN 2018-AWP-1500 through 1503-NRA) and input from ATCT staff concluded that to place an ARFF building at this location interferes with line of sight between the ATCT and aircraft taxiing on Taxiway J and holding at Taxiway A. To evaluate alternative locations and other potential sites, an ARFF siting study was made a part of this ALP update.

ARFF FACILITY REQUIREMENTS AND SITING STANDARDS

FAA Advisory Circular 150/5210-15A (AC 5210-15A) and the Code of Federal Regulations Title 14, Part 139 (Part 139), provide standards and guidance for planning, designing, and constructing an ARFF facility. The new facility will be designed to be consistent with standards in AC 5210-15A and Part 139 to “facilitate the duties of personnel, expedite the movement of equipment, and provide ready access to materials and supplies.”

Classification Index

The design requirements for an ARFF facility depend on the ARFF Index rating, as outlined in AC 5210-15A. The ARFF Index rating is based on the length of the longest air carrier aircraft averaging at least five daily departures. The implication is that the longer the aircraft, the more passenger seats on board, and the more firefighting resources that are needed to respond to an incident.

- Index B: This index Includes aircraft at least 90 feet but less than 126 feet long. Index B requires one or two response vehicles, depending on the amount of water or foam production carried by all vehicles is at least 1,500 gallons.
- Index C: This index includes aircraft at least 126 feet but less than 159 feet long. Index C requires two or three response vehicles, depending on the amount of water or foam production carried by all vehicles is at least 3,000 gallons.

The FAA's Airports Facility Directory currently classifies STS as ARFF Index B. STS currently has the appropriate ARFF equipment to accommodate Index B operations. The following analysis looks to confirm the current and future ARFF classification at STS.

The most common air carrier aircraft using STS today and throughout the planning period are shown in **Table 5-1** with their respective lengths. This table shows the same aircraft fleet mix from Table 2-28 in the Forecast Chapter. Schedules from STS during the peak month of 2019 show more than five daily departures by the CRJ-900 and E175. Operations by these aircraft confirm the existing ARFF classification as Index B.

Table 5-1: Aircraft Lengths for ARFF Index

Aircraft	Length	ARFF Index
CRJ-200	87.8'	A
CRJ-550	76.3'	A
CRJ-700	76.3'	A
CRJ-900	118.8'	B
E170-200	98.1'	B
Q400	107.8'	B
MRJ 90	117.5'	B
E175-E2	106.2'	B
B737-700	110.3'	B
B737-800	129.5'	C

Source: Lengths from FAA-Aircraft-Char-Database-v2-201810

Forecasts show growth in operations by the Boeing 737-700 and 737-800 at STS. The 737-800 is classified as ARFF Index C. Operations by this aircraft may reach five daily departures over the planning period. Forecasts approved by the FAA (August 2021) show 13 operations by air carrier aircraft daily at STS in 2028. As of December 2021, the fleet mix at STS is fluid with operations by regional jets and narrow-body aircraft, including the 737-800. STS should be prepared to reclassify to ARFF Index C should the 737-800 or larger aircraft reach an average of 5 daily departures.

Airside Access and Response Time

For a Part 139 commercially certificated airport the standard firefighting response time is three minutes from the time of the alarm for at least one ARFF vehicle to reach the midpoint of the farthest runway serving commercial aircraft to begin application of the extinguishing agent. All other ARFF vehicles must reach this same point within four minutes. This response time should include an allotment for ARFF personal to dress into firefighting gear and enter vehicles. Both runways serve commercial aircraft at STS. Therefore, for each alternative, the response time was calculated to the midpoint of the most distant runway. Other points on the airfield are also included for reference.

Impact on Facilities and Operations

Siting to relocate an ARFF should consider how the facility will interact with airport operations as well as existing and future facilities. A primary goal of this relocation is to enable terminal expansion. Therefore, the new location must not be in a place where the ARFF will limit near-term and ultimate terminal expansion. ARFF siting should also consider airport operations in its vicinity. The optimal location will be where aircraft operations will not interfere with ARFF response. Likewise, locating the new facility where ARFF operations do not limit airport operations, aircraft movement, and facilities such as FBOs and aprons is important.

Facility Requirements

AC 5210-15A provides the standards for an ARFF station and square footage recommendations. Requirements for four functional areas are described below: vehicle bays, an ARFF building, the ARFF vehicle apron, and parking lot.

Vehicle Bays

The length, width and height of vehicle bays is established by using the dimensions of the largest existing or anticipated new truck with the minimum parking clearances. Proper sizing of the ARFF vehicle bays will provide operational flexibility, a clear margin of safety, and space to undertake minor maintenance tasks for each truck. These ARFF vehicle standard clearances are guidance minimums:

- At least 6 feet between the vehicle and walls
- 8 feet between vehicles parked side by side
- 5 feet between vehicles parked end to end
- 5 feet between vehicle and stall bay doors.

These separation distances are minimums, so clearances will be at least this much and can be expanded by up to 20 percent for local considerations. The recommendation is for each equipment bay to be 50 feet long and 19 feet wide. The standard ceiling clearance above the ARFF vehicle work platform is at least 7 feet. The dimensions used for this planning study for the vehicle bays is 50 feet long by 60 feet wide. This provides space for three bays which would allow the Airport to move up to Index C in the future. The actual design will be refined prior preparation of the environmental review documents and architectural design. It is also possible that the ARFF facility will become a joint-use facility with the Sonoma County Fire Protection District.

Building

AC 5210-15A includes standards for office space, crew quarters, training rooms, and other spaces. Variables that determine the size of the facility include the number of firefighters expected to be on shift at any one time and the size and type of vehicles occupying the equipment bays. To reduce the footprint of the facility, rooms or offices may be on a second floor. Facility dimensions and layout will be refined during the design phase. Based on FAA Guidance, an ARFF facility staffed with three firefighters requires approximately 3,600 square feet of office, dormitory, and common use space.

Based on guidance listed above, the height of the facility is to be, at a minimum, 24 feet above finished grade. This is based on the vehicle height plus requirements for work platform clearance above the ARFF vehicle. For planning and airspace analysis purposes, the total height above ground of the ARFF facility is 28 feet. This will provide a margin to account for unforeseen design issues, roof equipment, or changes in ground elevation for grading or drainage requirements.

Vehicle Apron

The vehicle apron where ARFF vehicles stage is ideally large enough to allow the longest vehicle to turn around to back into any bay of the station. To allow this mobility, guidance indicates an extension of the apron from the doors to the taxiway object free area (TOFA) at least equal to one length of the longest vehicle if sited next to a taxiway. Apron width must be at least equal to the distance between the outermost left and right vehicle bay door openings plus 3 feet on each side.

The visibility limitations to the rear of a typical ARFF vehicle can make backing into an equipment bay difficult. Typically, backing requires additional personnel to guide the driver. Drive-through bays with additional vehicle apron space allow ARFF vehicles to pull straight through the bays, which eliminates the need to back into the bay. This design requires more area for pavement but provides more efficient operations and increases the operational safety and flexibility of the station.

Alternatives in this evaluation include maneuvering room to support drive-through bays. The evaluated designs accommodate staging areas and circulation paths to remain clear of any adjacent TOFAs.

ARFF Employee Parking

The space allocated for employee parking includes the parking stalls, circulation, walkways, and buffering areas. The design recommended for employee parking area accommodates two duty shifts plus spaces for visitors. The 2010 ARFF Study shows 11 parking spaces for staff and visitors.

ARFF Facility Recommendations

This study recommends a new ARFF site footprint includes:

- **Vehicle Bays:** Three bays for ARFF vehicles (3,000 square feet)
- **ARFF Building:** Administrative offices, meeting rooms, bathrooms, kitchen, day room, and equipment storage (3,600 square feet)

- **ARFF Vehicle Aprons:** Staging apron (3,150 square feet) and drive-through bay apron (6,800 square feet)
- **Employee Parking:** Lot for ARFF staff with 8 parking spaces and space for vehicle circulation (2,100 square feet).

This Analysis identifies layouts for the ARFF describing general building orientation, vehicle access, and how this may affect neighboring facilities and airport operations. Specific facility designs will be completed after alternatives are evaluated and a site is selected.

Utility Access

All proposed sites have access to electrical and telecommunications. Access to water and sewer utilities may prove to be prohibitive to south and west quadrant alternative development. The south and west quadrants currently lack access to water and sewer. The General Aviation Development Chapter provides an overview of estimated costs associated with bringing water and sewer to each general location. Generally, well and septic installation is quicker and less expensive for alternatives in the south and west quadrants, as opposed to extending the water or sewer mains from North Laughlin Road.

South quadrant wastewater service options:

- Extension to the main sewer line on North Laughlin Road. This is the most expensive method, with an estimated cost of $2.0 to $2.3 million and does not include environmental review, mitigation, and connection fees.
- Construction of an onsite septic system, which is estimated to cost $350,000 to $450,000. The lower cost for a septic system significantly improves the feasibility of developing an ARFF facility in the southern quadrant.

West quadrant wastewater service options:

- Extension of a sewer line to the sewage treatment facility. This is the most expensive method, with an estimated cost of $1.7 to $2.0 million, and does not include environmental review, mitigation and connection fees. This cost estimate represents greater uncertainty than for the similar connection to the southern quadrant due to the need for directional boring under airfield pavement.
- Construction of an onsite septic system, which is estimated to cost $350,000 to $450,000.

South quadrant domestic water service options:

- Extension of a water main from North Laughlin Road. This is the most expensive method, with an estimated cost of $1.5 to $1.8 million. This does not include environmental review, mitigation, and connection fees.
- Use of an onsite well with storage tanks to provide both water for both domestic use and fire protection. Well installation and drilling are estimated to cost $400,000 to $500,000. This does not include costs for filtration, storage tanks, and environmental review.
- Use of an onsite well for domestic water and connection to the Sonoma County Water Agency (SCWA) aqueduct for fire protection. This is the least expensive option since it does not require storage for fire suppression tanks. However, a Finding of Necessity and subsequent agreement with SCWA would be required by the developer.

West quadrant domestic water service options:

- Extension of a water main from North Laughlin Road. This option is the most expensive, estimated to be $1.5 to $1.8 million plus environmental review, mitigation, and connection fees.
- Use of an onsite well with storage tanks to provide both water for both domestic use and fire protection. Well installation and drilling are estimated to cost $400,000 to $500,000, plus costs for filtration, storage tanks, and environmental review.

Environmental Impacts

The airfield contains habitat for several special-status species (California Tiger Salamander and the Burke's Goldfield) and classes of wetlands (i.e., waters of the U.S.). These areas are illustrated in **Figure 5-2** below. Potential impacts to these species and wetlands are evaluated for each of the alternative ARFF sites. Relocation of ARFF facilities is not explicitly listed in Order 1050.1F as qualifying for a Categorical Exclusion (CATEX) for compliance with the National Environmental Policy Act (NEPA). Sites with significant impacts to wetlands or special-status species will require an Environmental Assessment (EA). Consultation with the ADO will be required to determine if the selected site requires preparation of a CATEX or EA.

Other Site Selection Considerations

These factors are also considered for ARFF relocation, as outlined in Section 2-3 of AC 5210-15A:

- Airport Observation: Provide ARFF staff the widest possible view of the airfield from the facility.
- ATCT Line of Sight: Avoid placing the facility where it will interfere with ATCT line of sight to aircraft movement areas.
- Proximity to Operations Staff Primary Work Area: Locate the site near to where the Airport's operations staff spend most of their time. STS does not have dedicated ARFF crews; ARFF services are provided by the Airport's operations staff. Proximity improves efficiency in staff utilization.
- Landside Access: Locate facilities where they are typically located, at the security fence line so visitors (e.g., delivery trucks) may access when needed. Because visitors are infrequent, this is a useful, but not essential, factor.
- Ability to Serve as a Joint-Use Facility: Consider the operational and financial benefits to the Airport to jointly operate an ARFF / fire station with the Sonoma County Fire District.

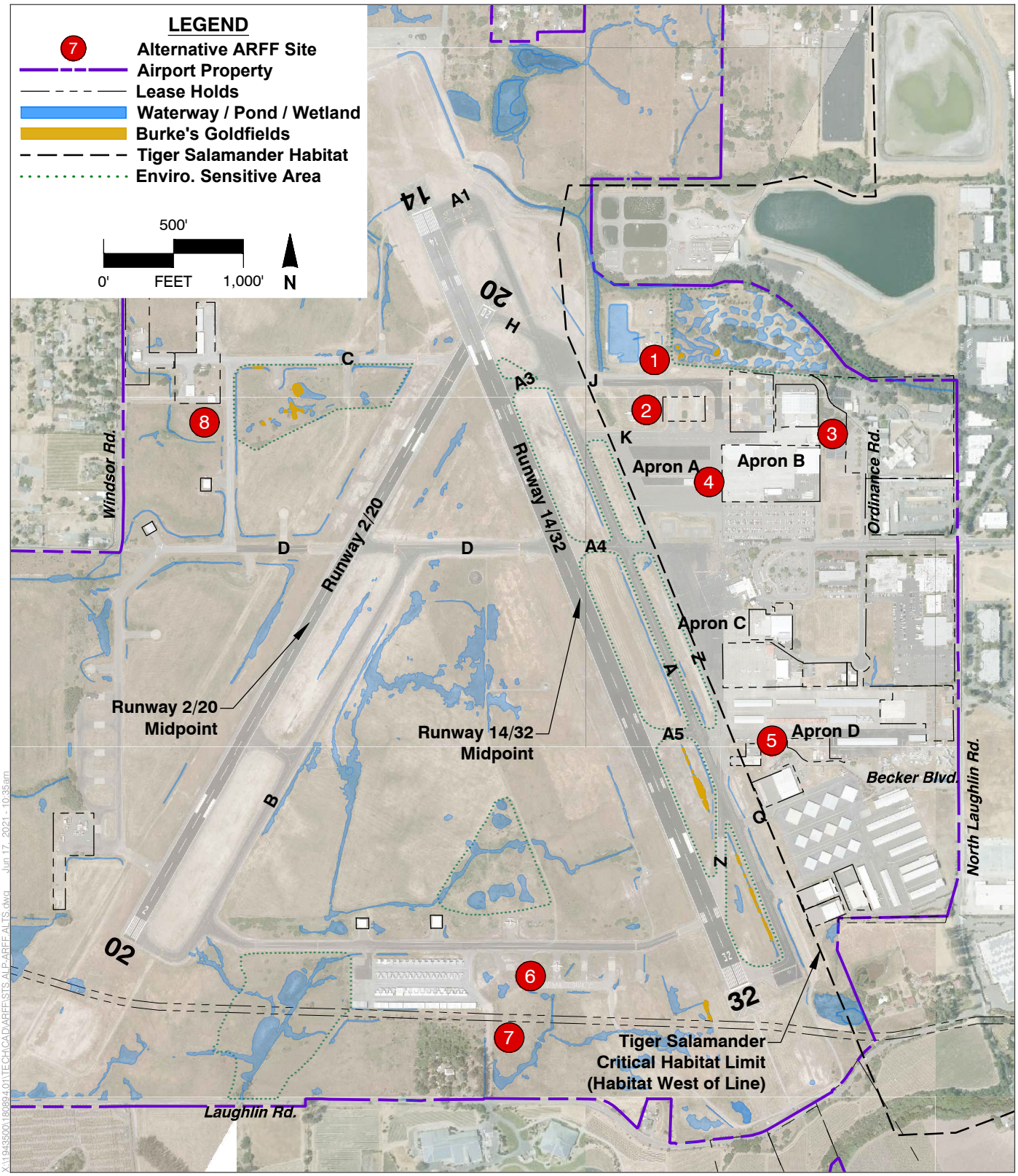
ARFF ALTERNATIVE SITES

Eight preliminary sites for ARFF relocation were identified. Each site has limits or constraints due to either airside access, landside access, available land, utilities, or environmental impacts. **Figure 5-2** shows the preliminary sites, location of water/wetlands, and environmentally sensitive areas.

- **Alternative 1** is west of the Cal Fire base, north of Taxiway J, and south of the Remote Transmitter/Receiver (RTR) site. This site may block RTR transmission and interfere with communication between the ATCT and aircraft on Taxiway A.

- **Alternative 2** is near the site designated on the 2013 ALP between Taxiways J and K. Alternative 2 shifts the ARFF facility east to a location that will not block line of sight between the ATCT and aircraft on Taxiway J holding at Taxiway A. An OE/AAA analysis in 2019 concluded that this location would interfere with communication between the ATCT and aircraft on Taxiway A.
- **Alternative 3** is on the east end of Apron B adjacent to existing Fixed Base Operator (FBO) hangars. An ARFF facility in this location would conflict with aircraft operations at the FBOs, which may affect ARFF response times.
- **Alternative 4** is north of the footprint for the proposed ultimate passenger terminal and northwest of long-term public Parking Lot B. Alternative 4 would reduce parking capacity for aircraft on Apron A and potentially constrain the ultimate terminal and area for storage of ground service equipment.
- **Alternative 5** is on the south side of Apron D east of the Sonoma County Sheriff's helicopter facility. The Alternative 5 site is constrained by existing facilities and Becker Boulevard. The site has the potential to interfere with aircraft operations on Apron D.
- **Alternative site 6** is in the south quadrant on the old hard stand positions east of Apron F. Site 6 provides immediate airside access to Taxiway E but is limited by the lack of utilities such as water and sewer service.
- **Alternative site 7** is in the south quadrant south of Apron F and has the benefit of limited environmental impact compared to Site 6. Site 7 is limited by the lack of utilities such as water and sewer service.
- **Alternative 8** is in the west quadrant with Taxiways C and D providing airside access. This site is also limited by lack of existing utilities. Road improvements to Windsor Road may also be required to provide adequate landside access.

Figure 5-2: ARFF Preliminary Alternative Sites

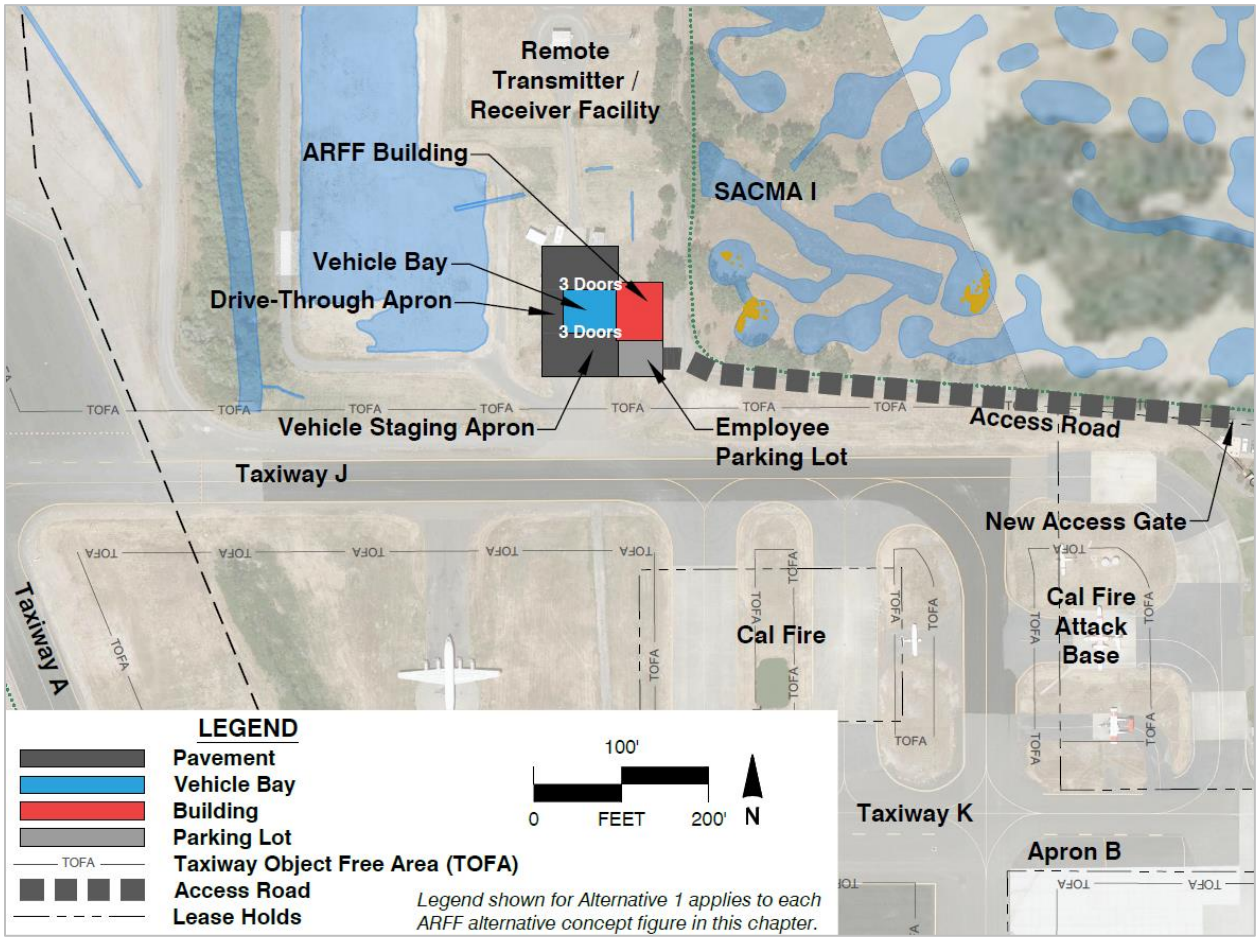


ARFF Alternative 1: Remote Transmitter/Receiver Site

Alternative 1 is located north of Taxiway J and south of the RTR facility site. The RTR antenna array relays air traffic control radio communications to aircraft using STS. **Figure 5-3** illustrates Alternative 1 for a conceptual ARFF facility with building orientation, parking, and road access.

Alternative Site 1 was initially selected because the site appeared to offer advantages over other locations: an undeveloped pocket of land that will likely not accommodate other uses, lack of conflicting facilities nearby, and low impact on airport and aircraft operations. However, the proximity to the RTR tower array required further analysis and unanticipated costs, which are included in this section.

Figure 5-3: ARFF Alternative 1 Concept – RTR Site



Airfield Access, Response Times and Joint Use

The Alternative 1 site has unrestricted views of the terminal area and the central portion of the airfield, but trees are likely to obscure views of the approach ends of Runway 14 and Runway 20. Access to the airfield is via Taxiway J, then Taxiway A to reach the runways.

The distance from Alternative 1 to the center of Runway 2/20 is 4,700 feet. Using a typical response time of 45 seconds for fire crews to dress in protective clothing, mount vehicles, and exit the facility, an ARFF truck needs to maintain an average of 24 miles per hour to reach the midpoint of this site within three minutes. It would be difficult to operate a joint-use facility at this site. Structural fire trucks would need to pass through a secure gate. It would take time for the gate to open, and the driver of the truck would be required to wait until it closed before proceeding. This would be a significant delay in responding to emergencies outside of the Air Operations Area (AOA).

Impact on Terminal and Operations

Alternative 1 is not located on or near the near-term or ultimate terminal footprint. This location will not impede terminal expansion over the next 20 years.

Alternative 1 relocates the ARFF facility away from the existing terminal apron and FBO facilities, reducing the likelihood of interference with aircraft operations. Interference is possible when Cal Fire aircraft use Taxiway J. However, this is restricted to times with aircraft firefighting activity.

Modifying RTR Antennas

The Alternative 1 site was initially favored due to location on the airfield and the low impact on operations, but the proximity to the RTR facility was a concern. When the proposed site was presented to the FAA with questions on impacts to the RTR transmission and communications, the FAA requested a draft OE/AAA study be submitted. One significant component of that effort is a shadow study report with preliminary analysis of impacts to RTR transmission. An additional site (Alternative 1B) was identified closer to the RTR towers with the intention of possibly being located under the radio transmission signals.

The shadow study determined the proximity of both Alternative 1A and 1B to the RTR will interfere with transmission signals. This study also showed that moving the ARFF slightly in this general location does not avoid interference with the RTR. The ARFF facility height is fixed by function, so lowering the building and vehicle bay is not an option.

Following receipt of the shadow study, a call with the FAA's OESG was proposed to discuss feasibility to raise or relocate the RTR towers to accommodate either site 1A or 1B. During this call, the OESG stated:

- There are three frequencies at the RTR: ground, clearance, and local. All of these are transmitters, and the receivers are on the ATCT cab. At least two antennas would need to be raised: ground main and ground standby.
- Any feasibility studies related to RTR modification would be done under a reimbursable agreement. OESG was not confident whether the existing structures could be altered or if new structures would be required.
- Relocating the towers on the new ARFF building is a possibility. This scenario requires continuous access to equipment and antennas by operations staff. The OESG recommended to have an ARFF building designed with a communication room with separate access and new ducts to connect to ATCT for this scenario.
- OESG indicated they were planning to upgrade the RTR antennas soon, but no specific date was provided.

If Alternative 1 is a viable site, the next step will be for OESG to perform a feasibility study to determine the costs, and initial design for RTR modification. OESG staff indicated they will likely be able to develop a reimbursable agreement within 90 days. FAA staff prefers to schedule design and construction projects three years out and would not be able to schedule this design any earlier than two years. FAA staff also indicated that it would be possible to utilize an accredited consulting firm to perform the design and construction under FAA supervision.

Facility Requirements

The site provides sufficient area for the building, parking, drive lanes, vehicle staging, and room to maneuver beside and behind the station for pull-through access to the vehicle bays.

Access to this site would be via Ordnance Road, which terminates east of the Cal Fire facility. A new access road is proposed to extend from the Cal Fire parking lot to the ARFF site, using the same alignment as an abandoned service road. This will require shifting the fence that currently runs along the center of this abandoned road to the north about 10 feet. The fence would remain on the paved section of the old road. This would avoid impacting the adjacent SACMA wetlands mitigation area.

For this access road to be a public-use road, it will need to be fenced on both sides. The northern side would prevent entry to the SACMA wetlands area. The southern fence would prevent entry to the airfield operations area. To be acceptable, the southern fence must remain outside of the TOFA for Taxiway J. However, using the current alignment, the location of the southern fence would penetrate Taxiway J's TOFA on the eastern half of this taxiway. Therefore, it would not be possible to create a publicly accessible road to this site. Access would need to be provided via a service road inside the airfield operations area.

The service road represents a potential penetration to the Taxiway J TOFA. Along Taxiway J, the TOFA is set at 93 feet from the taxiway centerline to meet standards for Airplane Design Group III. The eastern third of the service road would fall within the TOFA. However, this taxiway is almost exclusively used by Cal Fire's fire attack aircraft. The dominant fire attack aircraft is the S-2T, but Cal Fire now also uses the Lockheed C-130. Both aircraft can be accommodated operationally despite the TOFA penetration.

The proposed access road is a secure road with an electronically operated gate in the existing fence on the west side of Cal Fire's parking lot. The secure service road would follow the same alignment as the previously evaluated public road, without a southern fence penetrating the TOFA. Signs would be placed to alert operations staff using this road that vehicles need to maintain separation from aircraft taxiing on Taxiway J. New operations staff would also receive this instruction prior to being permitted to drive in the airfield operations area, and Cal Fire would also receive these instructions to include them in their site-specific operating instructions for pilots.

Alternative 1 is located near existing utilities and water and sewer mains. The only utility costs associated with this concept are for local connections. There is no significant cost impact for utility extensions.

Environmental Impacts

This site includes portions of a paved hard stand used to park military aircraft during World War II and an abandoned service road. The balance is non-native grassland. It appears that the facility could be constructed without impacting areas where protected species are known to exist. However, even though the site is not within the designated critical habitat for the California tiger salamander, it is within the animal's range. Payment of mitigation fees is expected to be required. Because of impacts to the California tiger salamander, Alternative 1 sites would likely require an EA. No impacts to wetlands are expected.

ARFF Alternative 1 Overview

Alternative 1 provides these advantages:

- The site takes advantage of an undeveloped parcel of land that is unlikely to accommodate other uses.
- The site does not constrain future airport facility development.
- The site has low impact on airport and aircraft operations.

Alternative 1 provides these disadvantages:

- The site creates interference with RTR facility and radio transmission relay from the ATCT to aircraft on Taxiway A, requiring relocation or the raising of existing tower antennas.
- High potential for delay from coordination with FAA on moving or raising RTR facility.
- Landside access will have modest biological impacts. It is expected that it will be possible to obtain needed permits.
- The access road will not be completely independent of aircraft operations on Taxiway J.

ARFF Alternative 2: Taxiway J / Apron A

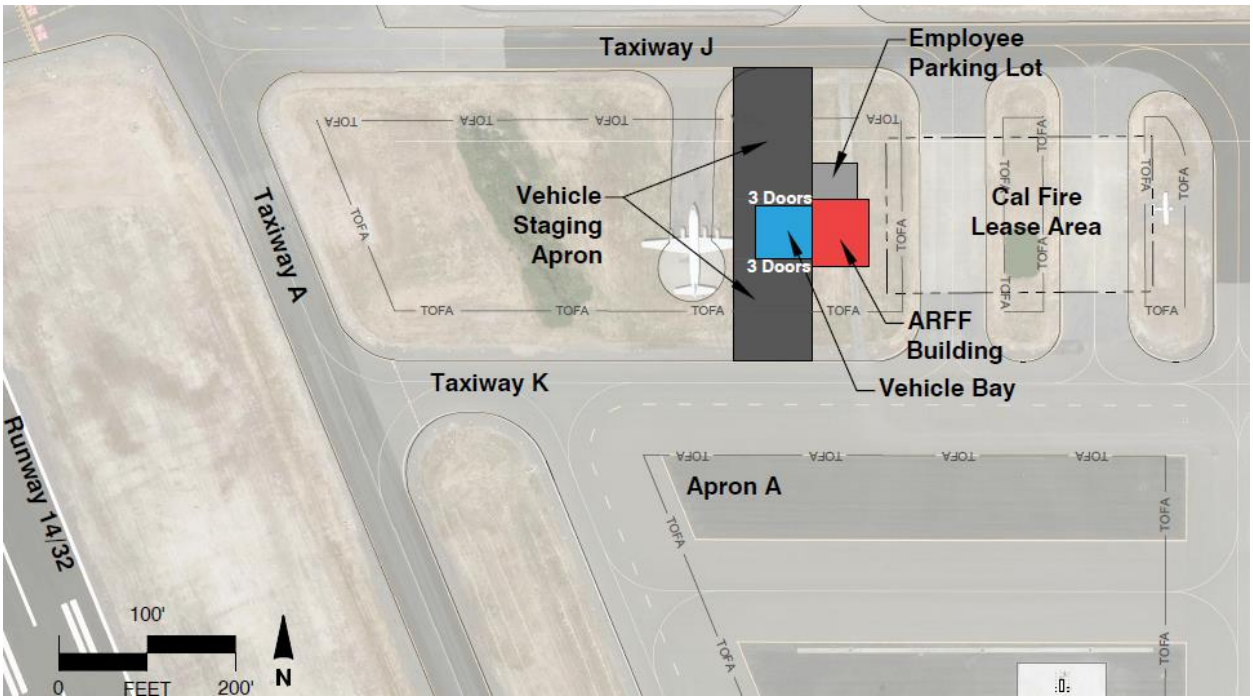
The 2013 ALP designates a site between Taxiways J and K and east of Cal Fire for the replacement ARFF building. The FAA OE/AAA from 2018 (ASN 2018-AWP-1500 through 1503-NRA) and input from the ATCT staff concluded that an ARFF building at this location interferes with the line of sight between air traffic control and aircraft taxiing on Taxiway J and holding at Taxiway A. Tech ops staff also indicated the original site blocks RTR transmissions to aircraft operating on Apron A.

For this analysis, Alternative 2 is proposed in the same general location but shifted approximately 200 feet to the east. This places the ARFF facility as far east as possible while avoiding the Cal Fire leasehold and the TOFA area for adjacent taxiways. This location also provides line of sight from the ATCT to the Taxiway J hold position at Taxiway A. **Figure 5-4** illustrates Alternative 2 with a proposed building orientation, vehicle bays, and parking areas. This location does not provide direct landside access and will require ARFF staff to cross active airfield pavement to access.

Airfield Access, Response Times, and Joint Use

This site has unrestricted views of the northern terminal area and the central portion of the airfield. Trees are likely to obscure views of Runways 14 and 20 approach areas. Access to the airfield is via Taxiway J or Taxiway K and then Taxiway A to reach the runways. The distance from Alternative 2 to the midpoint of Runway 2/20 is 4,000 feet. Using a typical response time of 45 seconds for fire crews to dress in protective clothing, mount vehicles, and exit the facility, an ARFF truck needs to maintain an average of 20 miles per hour to reach the midpoint within three minutes. It would be difficult to establish this as a joint-use facility. Structural fire trucks would need to exit the AOA via taxiways and pass through a gate. This would be significant source of delay in responding to emergencies.

Figure 5-4: ARFF Alternative 2 Concept – Taxiway J / Apron A



Impact on Terminal and Operations

Alternative 2 is not located on or near the near-term or ultimate terminal footprint. This location will not impede terminal expansion over the next 20 years.

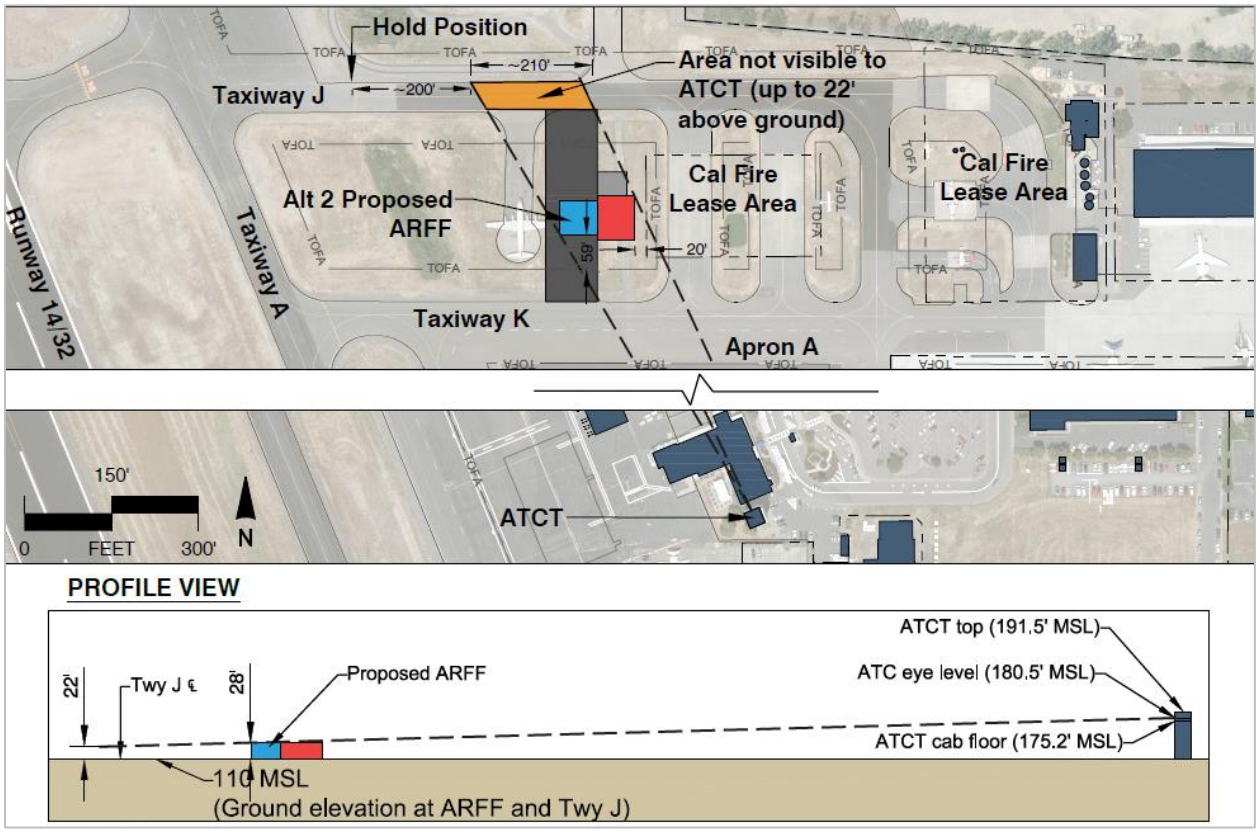
Alternative 2 relocates the ARFF facility away from the existing terminal apron. There is potential for interference with GA and FBO activity on Taxiway K and when Cal Fire aircraft use Taxiway J. Alternative 2 is not impacted by existing facilities but siting the facility outside the TOFA of the Cal Fire taxilane to the east of the proposed site is necessary.

Tower Shadow Study

Preliminary conversations with ATCT staff indicated the Alternative 2 site may be acceptable if the ARFF location from the ALP is shifted to the east as proposed. ATCT staff indicated that clear line of sight between the ATCT and the Taxiway J hold position to Taxiway A must be clear. Moving the facility to the east accomplishes this. However, line of sight between the ATCT and Taxiway J remains blocked for a portion of Taxiway J. This section details this analysis and the ATCT staff response and opinion on the Alternative 2 ARFF site.

The Alternative 2 ARFF facility is offset 20 feet from Cal Fire's leasehold. The top of the ARFF building is 28 feet above ground. The ATCT controller eye level was determined from the Brelje & Race 2018 survey of the cab floor and adding 5 feet (the finished floor of ATCT cab is at 175.2 feet mean sea level, and eye level equals 180.2 feet mean sea level). **Figure 5-5** shows the line-of-sight shadow on Taxiway J from the ATCT and the plan and profile views of the viewshed from the ATCT to Taxiway J. The Alternative 2 ARFF facility would block an area over 200 feet long on Taxiway J and obscure any object up to 22 feet on the Taxiway J centerline.

Figure 5-5: ARFF Alternative 2 – ATCT Line of Site



Discussions with ATCT management staff indicated they do not object to the location of Alternative 2. The ATCT will have clear line of sight to the hold position on Taxiway J, plus about 200 feet before this hold position. The ATCT staff indicated Taxiway J is almost exclusively used by Cal Fire aircraft and small aircraft rarely use this. However, FAA's Operations and Engineering Support Group staff indicated that the revised location will still likely block RTR transmissions to aircraft operating on Apron A.

This site would require the same type of RTR antenna modifications described in Alternative 1. Therefore, it would also suffer the same schedule uncertainties and high costs.

Facility Requirements

The Alternative 2 site provides sufficient area for the ARFF facility and room to maneuver beside and behind the station for pull-through access to the vehicle bays. The building, parking area and staging areas are outside the TOFAs for Taxiways J and K. They are also outside the aircraft-specific TOFA for C-130s. This location does not provide direct landside access. This will require ARFF staff to cross active airfield pavement to access.

Alternative 2 is near existing utilities on the east quadrant. The only utility costs will be for local connections.

Environmental Impacts

This site includes portions of a paved hard stand used to park military aircraft during World War II, and the balance is non-native grassland. It appears that the facility could be constructed without impacting wetlands or areas of protected species' habitat. The Alternative 2 site would likely require a CATEX or focused EA for NEPA compliance, because of limited biological impacts.

ARFF Alternative 2 Overview

Alternative 2 provides these advantages:

- The site offers direct access to Taxiways J and K.
- The site provides adequate response times and surveillance of the terminal area and majority of the airfield.
- The probability of interference with aircraft operations is low.

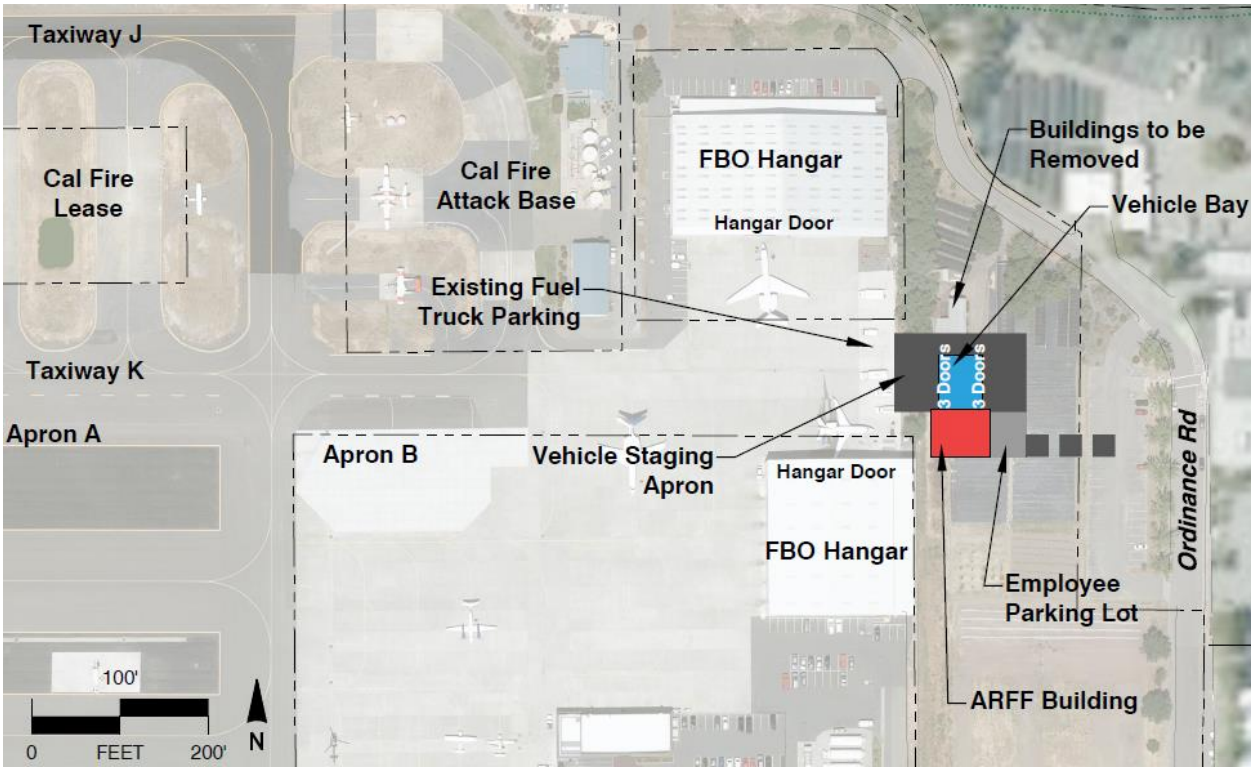
Alternative 2 provides these disadvantages:

- The lack of direct landside access will require staff to cross active airfield.
- High potential for delay from coordination with FAA on moving or raising RTR facility.
- The site represents a partial line of sight obstruction of Taxiway J from the ATCT.

ARFF Alternative 3: FBO North / Apron B

Alternative 3 is on the east side of Apron B, between Kaiser Air hangars at the east end of the FBO apron. **Figure 5-6** illustrates a conceptual ARFF facility in this location with proximity to existing lease areas and hangars. An access road connects the ARFF parking lot to Ordnance Road via the North County Detention Center's parking lot. Six spaces are eliminated by this connection.

Figure 5-6: ARFF Alternative 3 Concept – FBO North / Apron B



Airfield Access, Response Times, and Joint Use

The Alternative 3 site has restricted views of the airfield and terminal area. Access to the airfield is via Taxiway K and then Taxiway A to access the runways. Located on the eastern edge of the apron, the site's distance to the midpoint of Runway 2/20 via Taxiway K, Taxilane Z, and Taxiway A4 to Taxiway D is approximately 5,100 feet. Assuming 45 seconds of response time for firefighters suiting up and mounting vehicles, the ARFF vehicle needs to average 26 miles per hour. This would be one of the better sites for a joint-use facility. Structure fire trucks could exit directly to a public street.

Aircraft on Taxiway K and activity on Apron A and Apron B are likely to interfere with ARFF vehicles and limit response times. It is unlikely an ARFF vehicle could make the Runway Safety Area (RSA) at the approach end of Runway 2 in under three minutes without undue risks associated with maneuvering around aircraft on the FBO aprons.

Impact on Terminal and Operations

The Alternative 3 site is not located near the near-term or ultimate terminal footprint. This location will not limit terminal expansion over the next 20 years. However, ARFF vehicles traveling form the facility to the airfield may be constrained by commercial aircraft maneuvering on Taxiway K or Apron A.

Alternative 3 will impact the FBO and aircraft operations. Kaiser Air hangar doors open onto the apron that fronts on the paved area for staging of the ARFF vehicles. Aircraft being towed in and out of these hangars are likely to block the ARFF station access to the airfield.

The proposed ARFF vehicle apron also displaces the fuel truck parking space. ARFF vehicle routing between the facility and the airfield may interfere with Cal Fire operations when aircraft are in active firefighting operations.

Facility Requirements

The Alternative 3 site is constrained by existing facilities, located between FBO hangars and Apron B. The proposed ARFF facility will need to be setback from the apron to avoid FBO facilities and lease areas. In this concept, the vehicle apron is shifted back from the existing apron edge to prevent ARFF vehicles from blocking aircraft using the FBO hangars. Alternative 3 requires more detailed site design to potentially fit into the allotted area. Ample space appears to be available to allow for the building, parking, drive lanes, vehicle staging, and room to maneuver beside and behind the station for pull-through access to the vehicle bays. Landside access for Alternative 3 is from Ordnance Road east of the site.

Alternative 3 is located near existing utilities and water and sewer mains. The only utility costs associated with this concept are for local connections.

Environmental Impacts

The proposed site includes buildings, pavement, and formerly farmed areas. Constructing the facility without impacting wetlands or areas where protected species are known to exist appears possible. The Alternative 3 site would likely require a CATEX or focused EA for NEPA compliance, because of limited biological impacts.

ARFF Alternative 3 Overview

Alternative 3 provides these advantages:

- Landside access via Ordnance Road
- Access to water and sewer utilities

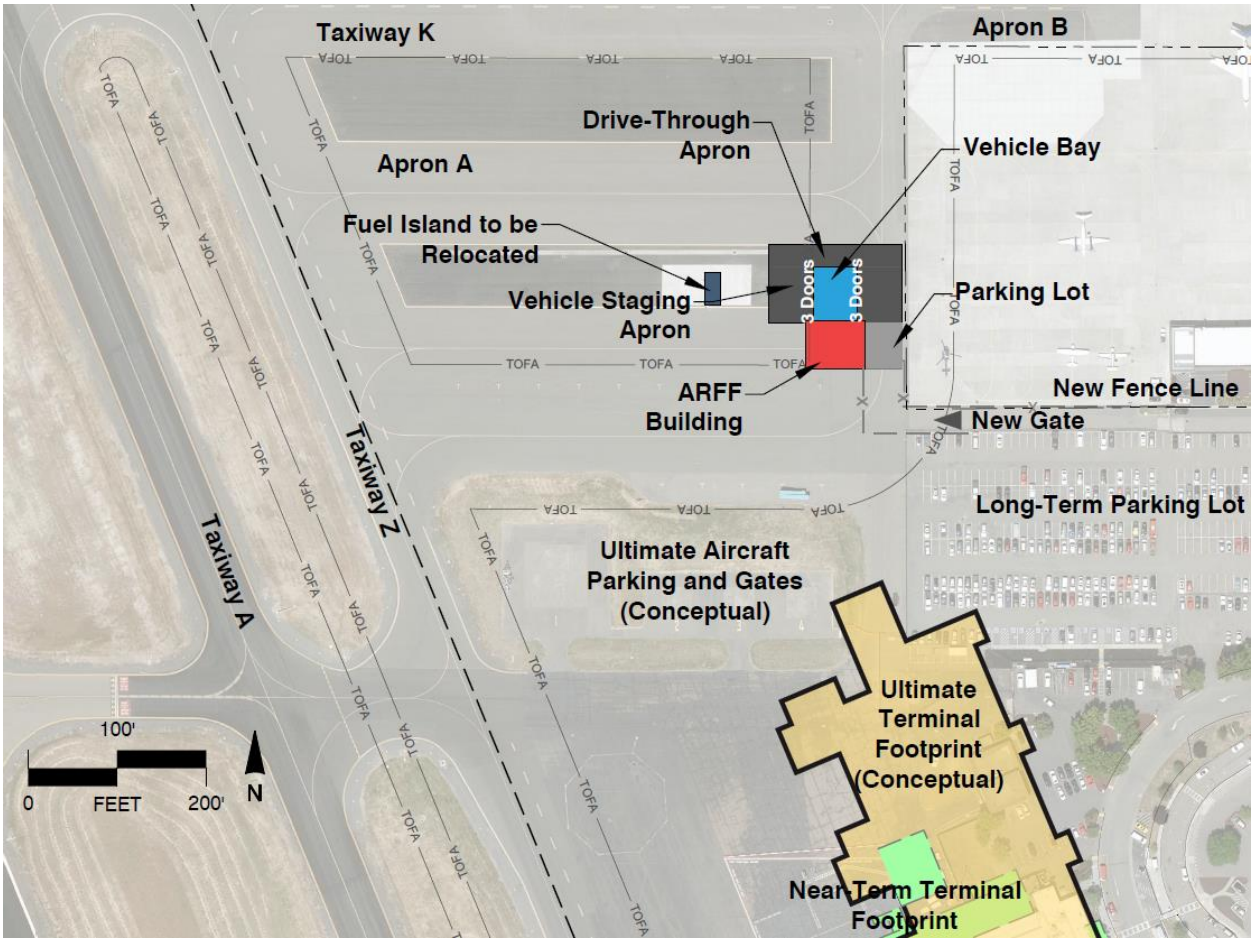
Alternative 3 provides these disadvantages:

- Negative impact on FBO aircraft operations and facilities.
- Slowest response time to Runway 2/20 midpoint and end of runways.
- Potential for interference with response route and time by aircraft operations between ARFF site and airfield
- Limited surveillance of airfield.

ARFF Alternative 4: North Terminal

ARFF Alternative 4 is north of the proposed ultimate passenger terminal footprint and northwest of the long-term public parking lot. **Figure 5-7** illustrates a conceptual facility layout and relationship to existing aprons and vehicle parking. The footprint of the conceptual ultimate terminal facility and its associated parking apron is included to show its relationship to Alternative 4.

Figure 5-7: ARFF Alternative 4 Concept – North Terminal



Airfield Access, Response Times, and Joint Use

Similar to other alternative sites near Apron A, this site has unrestricted views of the terminal area and the central portion of the airfield. Trees obscure views of the Runway 20 approach area. Access to the airfield requires crossing the Apron A tie down area. The distance to the center of Runway 2/20 is 3,650 feet. Assuming 45 seconds of response time for firefighters to suit up and mount vehicles, to reach the center of Runway 2/20 in under three minutes the ARFF vehicle needs to average 18 miles per hour. The potential exists for conflicts with ground service equipment when initially leaving the ARFF facility. If a joint use facility was constructed, the proposed design would allow fire trucks to exit via a public road without passing through a gate.

Impact on Terminal and Operations

This alternative has several negative impacts on airfield operations. Alternative 4 eliminates space available for transient aircraft, remain overnight (RON) positions, or mechanical airline positions on Apron A. This also impacts Apron B and FBO operations. Some apron impacts could be reduced if Apron A was expanded to include the area proposed for Alternative Site 2 between Taxiways J and K.

Near-Term Terminal Impacts

Alternative 4 ARFF has the greatest potential to impact terminal facilities. The near-term terminal footprint has been established for construction and is shown on **Figure 5-8**. A row of five conceptual parking position envelopes is also shown. The nearest aircraft parking position to Alternative 4 is 275 feet south. At this location, the ARFF will not impact aircraft parking positions, aircraft movement, and ground service equipment. The ARFF site may limit RON or mechanical positions north of the terminal, but these may be positioned elsewhere on Apron A.

Ultimate Terminal Impacts

Alternative 4 may have an impact on the ultimate terminal facility. An ultimate conceptual terminal footprint based on forecasts for year 2040 enplanements and operations is included in **Figure 5-9**. This footprint is based on long-term enplanement projections. In this concept, parking positions may wrap around the terminal and be located south of the ARFF facility. The terminal wing located closest to the ARFF would likely contain baggage sorting, and this area will need to be accessed by ground service equipment. The modest impact on areas accessed by ground service equipment can be mitigated by refinements to the terminal footprint. The terminal design used in these alternatives is conceptual, not a hard design. RON positions required beyond the seven gate positions will need to be located elsewhere on Apron A and not adjacent to the terminal. If Alternative 4 is considered a viable site, how this relates to the terminal area and redesign of Apron A will be evaluated further.

Figure 5-8: ARFF Alternative 4 – Near-Term Terminal

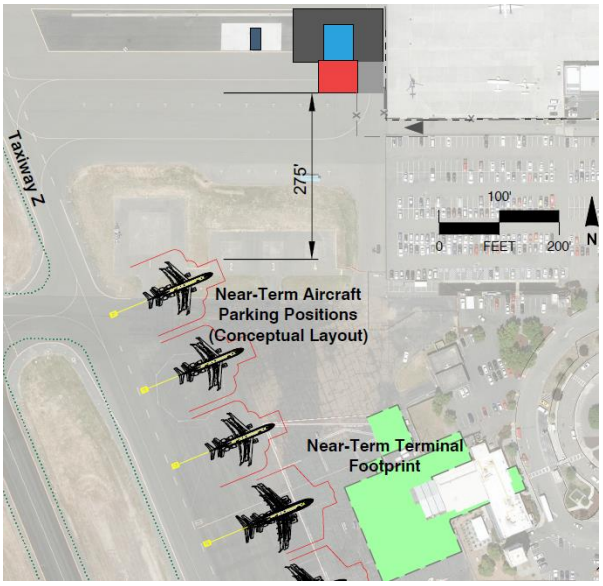
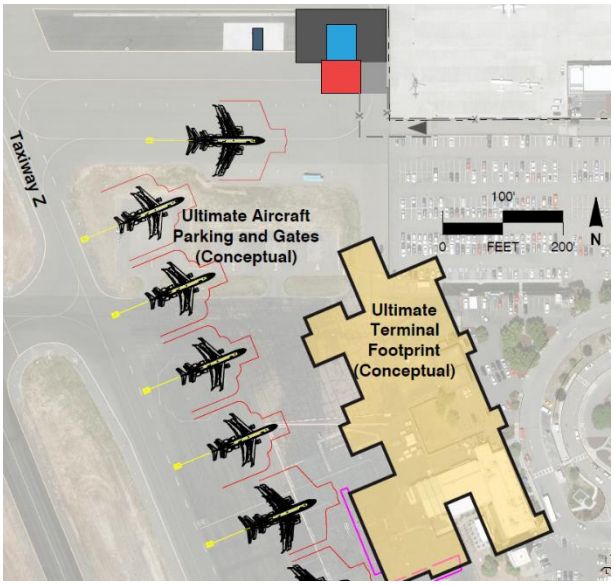


Figure 5-9: ARFF Alternative 4 – Ultimate Terminal



Facility Requirements

Alternative 4 provides space for the ARFF building, auto parking, drive lanes, vehicle staging, and room to maneuver around the station to provide access to the vehicle bays. This location is accessible via the unnamed road that provides access to Kaiser Air's offices. The publicly accessible portion of this road is extended about 300 feet to the west. The existing security gate relocates to a point just past the ARFF facility's parking lot. The perimeter fence is extended along the north side of this road.

Like other sites on the east quadrant, Alternative 4 is near existing development with established utility access. The only utility costs will be for local connections with no significant cost impact for utility extensions.

Environmental Impacts

The proposed footprint is located on a paved site, which means no significant environmental impacts are anticipated. The Alternative 4 site would likely require a CATEX or focused EA for NEPA compliance, because of limited impacts. Expansion of Apron A is not considered to be a connected action. Relocation of the ARFF facility is expected to occur within the next five years (by 2026).

ARFF Alternative 4 Overview

Alternative 4 provides these advantages:

- Best response time to Runway 2/20 midpoint
- Centrally located site with direct access to the terminal
- Access to water and sewer utilities
- Low environmental impacts.

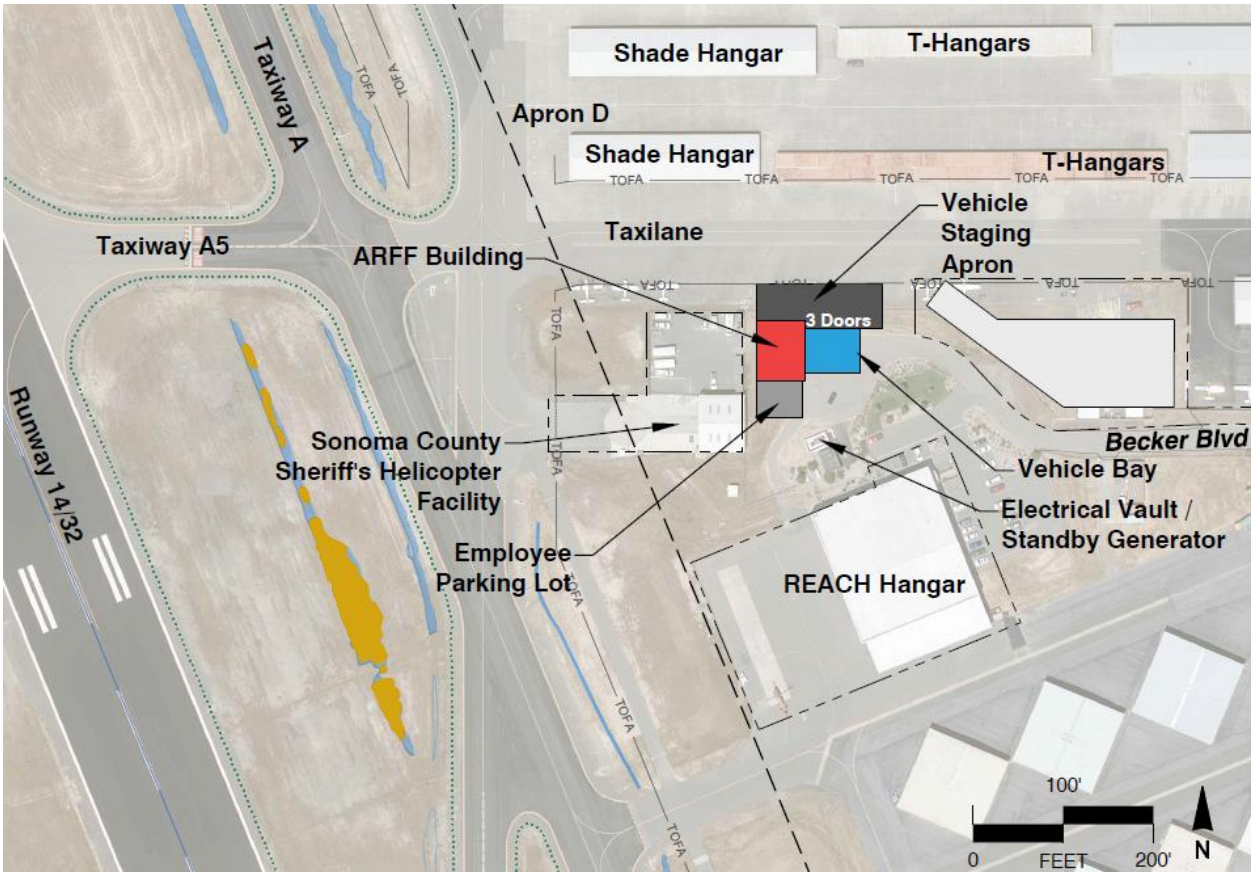
Alternative 4 provides these disadvantages:

- Impacts to general aviation parking capacity on Apron A
- Potential to limit terminal expansion and constrain auxiliary terminal functions.
- Impacts to FBO operations

ARFF Alternative 5: Apron D

ARFF Alternative 5 is located on the south side of Apron D, east of the Sonoma County Sheriff Helicopter Unit's facility. **Figure 5-10** shows a conceptual layout for this site. This alternative is constrained and has a 5-foot elevation drop across the site, which would be a design issue. Additionally, use of the site blocks access to the Sheriff's parking lot.

Figure 5-10: ARFF Alternative 5 Concept – Apron D



Airfield Access, Response Times, and Joint Use

Alternative 5 site has restricted views of the airfield and terminal area, blocked by shade hangars to the north and the Sheriff's facility and FBOs to the south. Redevelopment of Apron D may eliminate the shade hangars and provide line of sight to the north airfield. Access to the airfield is direct from Apron D to the Taxiway A5 intersection with just one turn needed to access Taxiway A.

Distance to the midpoint of Runway 2/20 is 4,550 feet. Assuming 45 seconds of response time for firefighters to suit up and mount vehicles, to reach the center of Runway 2/20 in under three minutes, the ARFF vehicle needs to average 23 miles per hour. There is probability that aircraft on Apron D plus FBO activity may interfere with ARFF vehicles and reduce response times. A joint-use facility at this site would be severely constrained. Depending on the design, structure fire trucks would need to depart down one of Apron D's taxilanes and then pass through a gate, or on Becker Boulevard if terrain issues are resolved. This would represent a significant delay in response time.

Impact on Terminal and Operations

Alternative 5 is not located near the ultimate terminal footprint and will not limit terminal expansion over the next 20 years.

The Alternative 5 site is constrained by existing facilities and Becker Drive and has the potential to interfere with operations on Apron D. Several aircraft tie-down positions along the south edge of Apron D become displaced to create the vehicle apron staging areas in front of the station. The Apron D taxilane passes in front of the Alternative 5 site, and ARFF vehicles will use this taxilane to access the airfield. Aircraft on this taxilane during an ARFF call may cause congestion and limit response time. Redevelopment of Apron D, as proposed in General Aviation Development, may alleviate these concerns.

Leasehold areas adjacent to the site may be impacted during construction and revision of parking areas. In this concept, the Becker Boulevard cul-de-sac needs to be redesigned since a portion of this is allocated to the new ARFF facility. The Alternative 5 site blocks entry to the Sheriff's parking lot and impacts access to the REACH facility.

Facility Requirements

The site does not allow for pull-through access to the vehicle equipment bays. The need for the ARFF vehicles to back into the vehicle bays may increase congestion on Apron D. The site is also constrained by existing facilities. Reconfiguration of the ARFF employee parking and the building layout beyond the conceptual layout may be needed to accommodate Sheriff's and REACH facility access and Becker Drive turnaround.

Alternative 5 is located near development with access to existing utilities on the east quadrant. The only utility costs associated with this concept are for local connections with no significant cost impact for utility extensions.

Environmental Impacts

Alternative 5 is located on previously disturbed land and most of the site is currently paved. Anticipated environmental impacts are low. The Alternative 5 site would likely require a CATEX or focused EA for NEPA compliance, because of limited biological impacts.

ARFF Alternative 5 Overview

Alternative 5 provides these advantages:

- Landside access via Becker Drive
- Access to water and sewer utilities
- Proximity to other emergency response facilities.

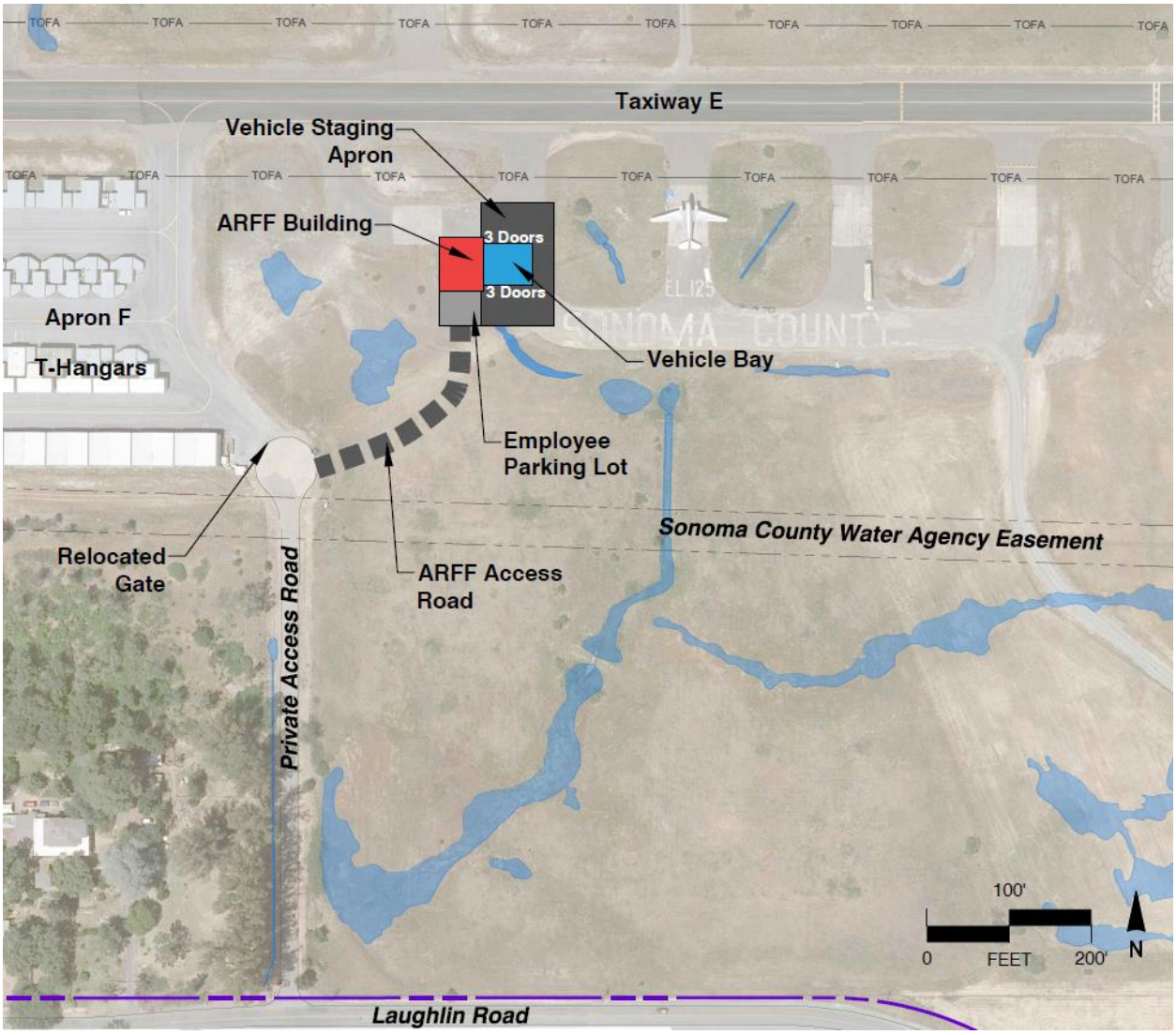
Alternative 5 provides these disadvantages:

- The site is constrained by existing facilities and significant grade change.
- The site requires redesign of Sheriff's facility parking lot and Becker Drive cul-de-sac.
- The site has limited surveillance of the airfield.
- Aircraft operating on Apron D may interfere with the ARFF response.
- The site does not allow for pull-through access to the equipment bays.

ARFF Alternative 6: South Hard Stands

ARFF Alternative 6 is in the southern quadrant of STS on the old military hard stand sites east of Apron F. The balance of the site is in undeveloped and includes jurisdictional wetlands. **Figure 5-11** shows a conceptual layout for this site with proximity to existing facilities, access, and vehicle parking.

Figure 5-11: ARFF Alternative 6 Concept – South Hard Stands



Airfield Access, Response Times, and Joint Use

The Alternative 6 site has unrestricted views of the airfield, except for the approach end of Runway 2, which is obstructed by Apron F hangars. Access to the airfield is via Taxiway E to either Runway 14/32 or 2/20.

The distance from Alternative 6 to the center of Runway 2/20 is 5,450 feet. Using a typical response time of 45 seconds for fire crews to dress in protective clothing, mount vehicles, and exit the facility, an ARFF truck needs to maintain an average of 28 miles per hour to reach the midpoint of Runway 2/20 within 3 minutes. A joint-use facility at this site would have the benefit of direct access to a public street. However, the location is more distant from non-aviation industrial development east of the Airport.

Impact on Terminal and Operations

Alternative 6 is on the south quadrant and not near the terminal area, which means this location will not impede terminal expansion over the next 20 years. Alternative 6 is east of the hangar banks on Apron F and south of Taxiway E. This location does not interfere with or limit aircraft movement. However, an ARFF facility on this site will reduce the efficiency of airport operations staff who provide the ARFF services. The longer drive time from the east side core area to Site 6 will reduce the hours available for operations and maintenance activities.

Facility Requirements

The Alternative 6 site is unrestricted by other STS facilities. The facility will need to be set back from the Taxiway E TOFA to provide wingtip clearance from taxiing aircraft to the ARFF vehicle staging area. Sufficient area is available for the required ARFF facility functions including room to maneuver beside and behind the station for pull-through access to the vehicle bays. Access to the site occurs via the exiting access road that connects to Laughlin Road. The security gate is currently located midway along this access road and needs to be shifted to the cul-de-sac to allow public access to the ARFF facility.

Sewer and water service are unavailable leading to a substantial cost to extend sewer and water to this site, as discussed in the Utility Access section above. There is an option for well drilling to supply domestic water and an onsite septic system, which reduces costs for these utilities.

Environmental Impacts

The site includes paved areas associated with the hardstands and the balance vegetated. The unpaved portion includes a jurisdictional wetland, considered to be habitat for the endangered Burke's Goldfields, and Tiger Salamander critical habitat. Because of these habitat areas, Alternative 6 will require the preparation of an EA for NEPA compliance. Obtaining necessary permits from the Army Corps of Engineers and Regional Water Quality would require documentation that there were no feasible alternative sites with lower impacts on wetlands.

ARFF Alternative 6 Overview

Alternative 6 provides these advantages:

- This site has no constraints from existing facilities.
- The site does not impact airport operations or existing facilities.
- Landside access is via Laughlin Road.

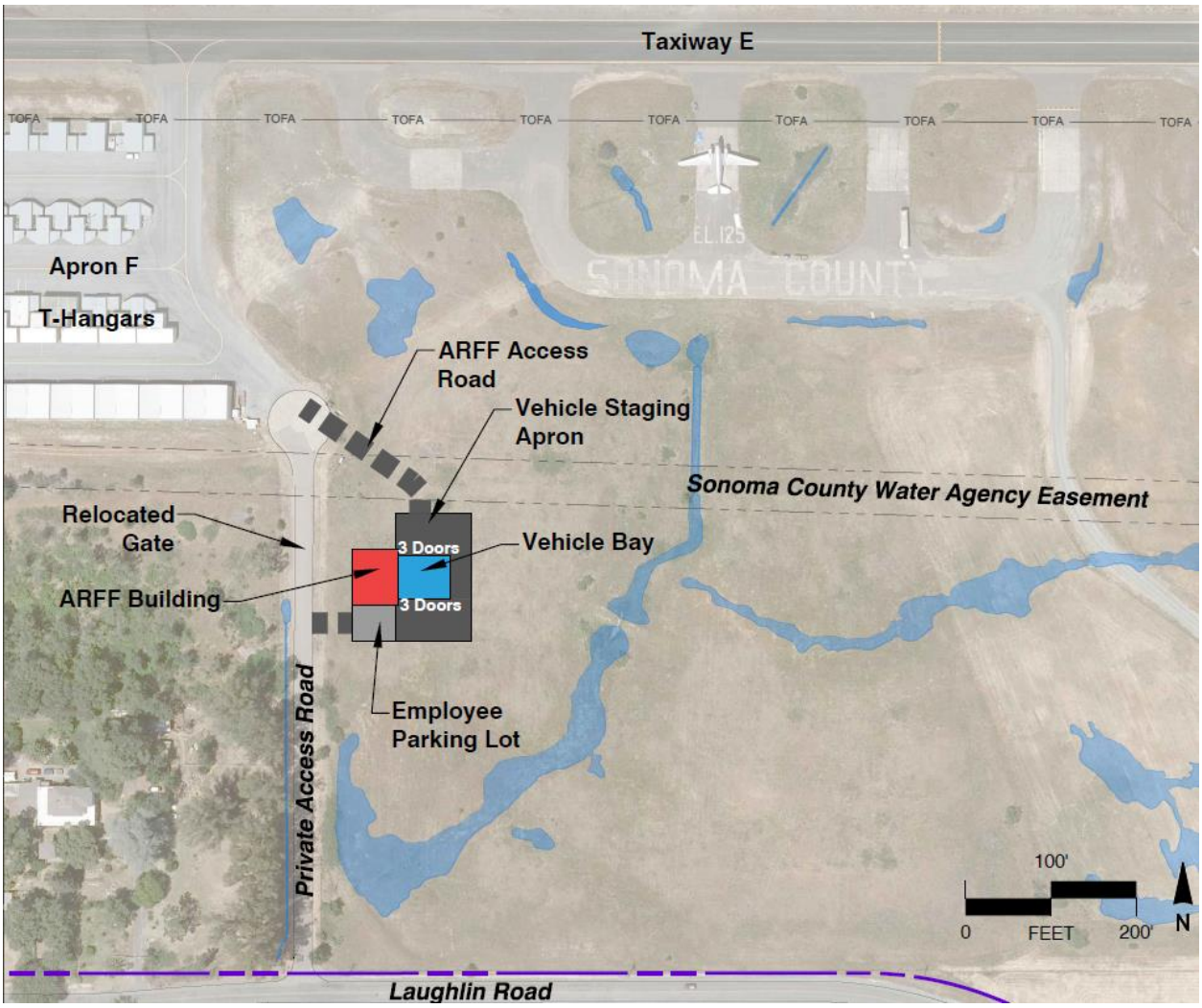
Alternative 6 provides these disadvantages:

- Lack of direct access to water and sewer utilities.
- Potential significant biological impacts and it may be difficult to obtain needed permits.
- Site is not as convenient as east quadrant sites for operations staff to access.

ARFF Alternative 7: Apron F

ARFF Alternative 7 is south of Apron F. Site 7 offers a benefit of reduced environmental impact compared to Site 6. **Figure 5-12** shows a conceptual layout for this site with proximity to existing facilities, access, and vehicle parking. Like Site 6, this location is not developed. The only utility available at this site is electricity, and the cost to extend sewer and water to this site is substantial.

Figure 5-12: ARFF Alternative 7 Concept – Apron F



Airfield Access, Response Times, and Joint Use

The Alternative 7 site is obstructed by Apron F hangars that lead to semi-restricted views of the airfield. Access to the airfield is via either Apron F taxilane or a new service road, to Taxiway E, to either Runway 14/32 or 2/20. The distance from Alternative 7 to the center of Runway 2/20 is 5,150 feet. Using a typical response time of 45 seconds for fire crews to dress in protective clothing, mount vehicles, and exit the facility, an ARFF truck needs to maintain an average of 26 miles per hour to reach the midpoint of Runway 2/20 within three minutes. As with Alternative Site 6, this site has the advantage of direct access to a public street and the disadvantage of a somewhat remote location.

Impact on Terminal and Operations

Alternative 7 is on the south quadrant and not near the terminal area. This location will not impede terminal expansion. Alternative 7 is southeast of the hangar banks on Apron F. The ARFF facility would not itself impact aircraft movement. However, ARFF vehicles accessing the airfield via Apron F taxilane may interfere with general aviation operations there. Additionally, as noted in Alternative 6, an ARFF site in the southern quadrant will increase the amount of time operations staff spend driving from the east-side core area. This will reduce the hours that they are available to perform their operations and maintenance activities.

Facility Requirements

The Alternative 7 site provides sufficient area for the building, parking, drive lanes, vehicle staging, and room to maneuver beside and behind the station for pull-through access to the vehicle bays. Access to the site is via Laughlin Road and the exiting access road. The security gate is currently located midway along this access road and needs to be shifted to the cul-de-sac to allow public access to the ARFF facility.

Sewer and water service are not available at this site. As discussed in the Utility Access section above, an option to extend sewer and water to this site comes with substantial costs. A less expensive option for water and sewer is to incorporate an onsite septic system and a well to supply domestic water.

Environmental Impacts

This site is currently undeveloped and falls within designated tiger salamander critical habitat. The site is near jurisdictional wetlands considered to be habitat for the endangered Burke's Goldfields. Without data on how drainage patterns would be affected, it is not possible to know whether use of this site would impact the hydrology of the nearby wetlands. Because of its impacts to tiger salamander critical habitat, Alternative 7 will require the preparation of an EA for NEPA compliance. Obtaining necessary permits will require demonstration that no feasible alternative with lower biological impacts exists.

ARFF Alternative 7 Overview

Alternative 7 provides these advantages:

- Greenfield site with no constraints from existing facilities
- Does not impact aircraft operations or existing facilities
- Landside access via Laughlin Road.

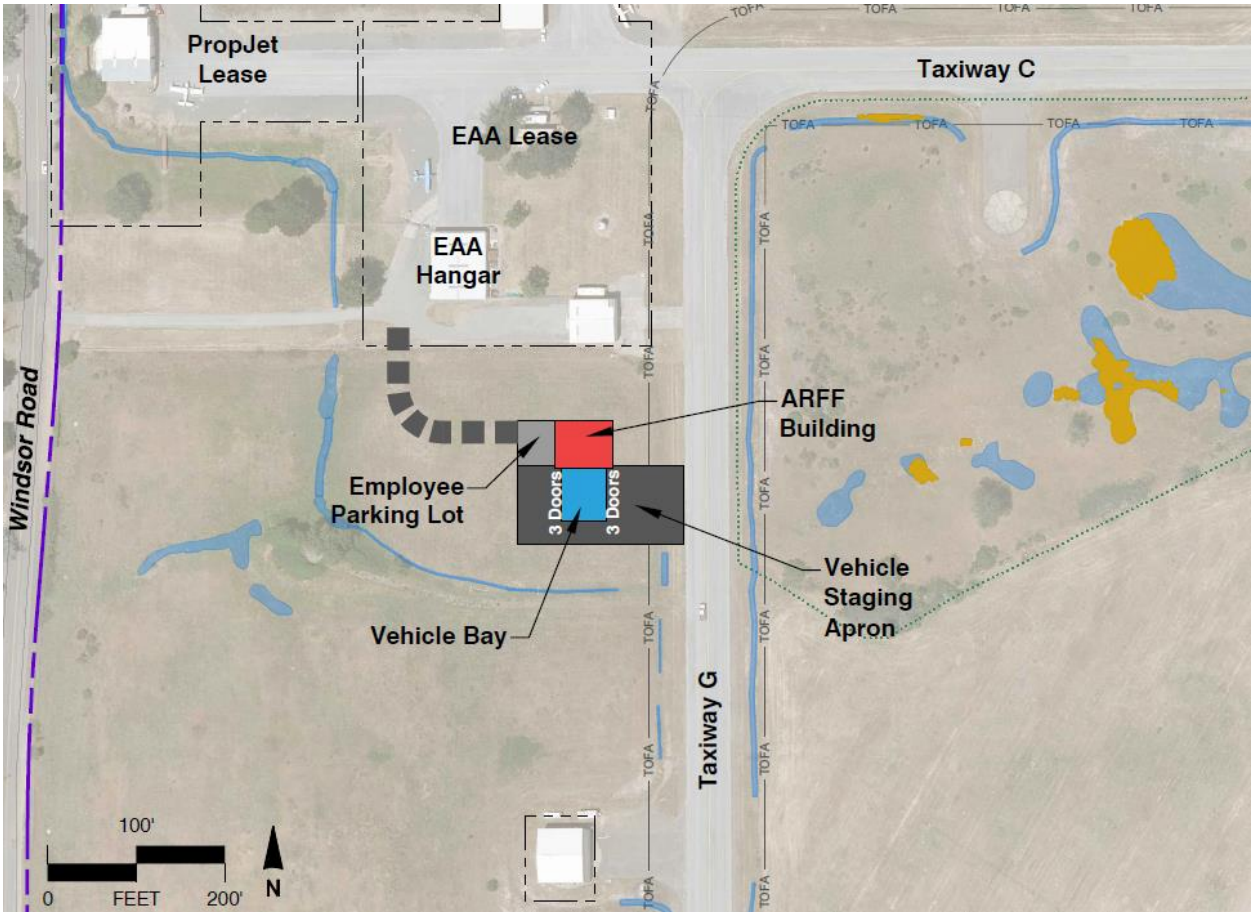
Alternative 7 provides these disadvantages:

- Lack of direct access to water and sewer utilities
- Site is not as efficient as east quadrant sites for operations staff to access.
- Site has significant biological impacts and may be hard to obtain permits.

ARFF Alternative 8: West Quad

The Alternative 8 site is on the west quadrant of STS near the EAA building and the old gun club and between scattered GA hangars. **Figure 5-13** shows a conceptual layout with Taxiways C and G providing airside access. Like Sites 6 and 7, sewer and water service is not readily available. Landside access is from Windsor Road to the west; however, road improvements may be required to provide adequate access.

Figure 5-13: ARFF Alternative 8 Concept – West Quad



Airfield Access, Response Times, and Joint Use

The Alternative 8 site has unrestricted views of the airfield and terminal area. Access to the airfield is via either Taxiway C or G to Runway 14/32 and 2/20. For Site 8 only, response time analysis is calculated to the midpoint of Runway 14/32, since this is farther from Alternative 8 than the midpoint of Runway 2/20. The distance from Alternative 8 to the center of Runway 14/32 is 3,750 feet. Using a typical response time of 45 seconds for fire crews to dress in protective clothing, mount vehicles, and exit the facility, an ARFF truck needs to maintain an average of 19 mph to reach the Runway 14/32 midpoint within 3 minutes. A joint-use facility at this site would have the advantage of direct access to a public street. However, the location is more distant from non-aviation industrial development east of the airport.

Impact on Terminal and Operations

Alternative 8 is on the west quadrant and not near the terminal area. This location will not impede terminal expansion over the next 20 years. Alternative 8 is south of isolated hangars on undeveloped land. This location does not interfere or limit aircraft movement. As with Alternatives 6 and 7, this site is distant from the east-side core area where operations staff spend most of their workdays. An ARFF facility on this site will increase the driving time for operations staff and reduce their availability for their other duties.

Facility Requirements

The Alternative 8 site is a greenfield site unrestricted by other STS facilities. Sufficient area is available for the required ARFF facility functions including room to maneuver beside and behind the station for pull-through access to the vehicle bays. Access to the site occurs via Laughlin Road and the exiting access road. The security gate is currently located midway along this access road and needs to be shifted to the cul-de-sac to allow public access to the ARFF facility.

Sewer and water service are not available leading to substantial cost to extend sewer and water to this site, as discussed in the Utility Access section above. There is an option for well drilling to supply domestic water and an onsite septic system, which reduces costs for these utilities.

Environmental Impacts

The site is currently undeveloped. The site lies within designated tiger salamander critical habitat. No wetlands would be directly impacted by development on this site. However, delineated wetlands are located adjacent to this site. Development of this site is not anticipated to affect the Burke's Goldfields' site across Taxiway G because of the barrier that the taxiway provides. Because of tiger salamander habitat area, Alternative 8 will require the preparation of an EA for NEPA compliance.

ARFF Alternative 8 Overview

Alternative 8 provides these advantages:

- Greenfield site with no constraints from existing facilities
- Does not impact airport operations or existing facilities
- Landside access via Windsor Road.

Alternative 8 provides these disadvantages:

- Lack of direct access to water and sewer utilities
- Potentially significant environmental impacts.
- Site is not as efficient as east quadrant sites for operations staff to access.

ARFF ALTERNATIVE EVALUATION

For the preferred ARFF site, alternative evaluation is based on the site meeting requirements listed in the ARFF Facility Requirements and Siting Standards section above. After initial evaluation, the categories of indirect costs and delays to implementation were added to the matrix. These summarize the significant barriers to approval of the site, design, and construction. For site evaluation purposes, costs associated with the actual ARFF facility design and construction are expected to be relatively equal for all proposed sites. Significant cost variables for specific sites are utility access and interference with FAA facilities. Other variable cost drivers are landside access, environmental mitigation, and grading and drainage.

Along with variable cost impacts, delays to implementation should be considered when selecting a site. Delays associated with FAA coordination for RTR redesign, Army Corps of Engineers permitting of wetland impacts, EA and approval time, relocating Airport facilities, and providing utility access are considered variables that influence the ARFF design and construction timeline.

Some factors are more critical to site selection than others. For a site to be considered viable it must avoid or mitigate impacts to these factors:

- Interference with NAVAIDS/Equipment: A site that interferes with a NAVAID or other equipment necessary for the safety of aircraft operations would be unacceptable.
- Wetlands: The key state and federal resource agencies are expected to consider any impacts to wetlands to be an impact on the endangered Burke's goldfields. These agencies are unlikely to issue necessary approvals/permits for projects that impact Burke's goldfields, if other viable alternatives exist.
- Staffing Efficiency: Because of major inefficiencies in staff utilization, sites outside of the eastside terminal area would pose an unacceptable burden on Airport staff resources.
- Impacts to Apron A: Apron A is used by general aviation aircraft for transient parking, fueling and access to a major FBO, and for airline aircraft RON and unscheduled maintenance purposes. Demand will increase as airline flights and passenger gates expand. There are no alternative sites to accommodate these GA and airline needs. A further constraint to Apron A could limit airline service and transient general aviation use. An alternative that constrains Apron A should only be considered if there are no other viable alternatives.

Table 5-2 presents an alternative matrix with the siting requirements. Each alternative has either an impact on existing facilities, impact on operations, major design hurdles, or a combination of these.

Table 5-2: ARFF Comparison Matrix

Location	Component	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7	Alt 8
		RTR	Taxiway J - Apron A	FBO North-Apron B	North Terminal	Apron D	South Hard Stands	Apron F	West Quad (EAA)
Airfield Access and Response Times	Distance to Rwy 2/20 Midpoint	4,700'	4,000'	5,100'	3,650'	4,550'	5,450'	5,150'	3,750' [2]
	Avg MPH to Reach 2/20 Mid in 3 min[1]	24	20	26	18	23	28	26	19 [2]
	Direct Access to Taxiway	Yes	Yes	No - Apron	No - Apron	Yes	Yes	No - Apron	Yes
	Surveillance of the Airfield	Yes	Yes	Limited	Yes	Partial	Yes	Limited	Yes
	Joint-Use Facility	Poor Access	Poor Access	Good Access	Good Access	Poor Access	Fair Access	Fair Access	Fair Access
Impact on Terminal Area Facilities	Interference with ATCT Line of Sight	None	Non-Mvnt. Area	None	None	None	None	None	None
	Interference with NAVAIDs/Eqpmt	RTR Interference	RTR Interference	None	None	None	None	None	None
	Impacts to Other Facilities	None	Apron Expansion	FBOs	FBOs, Apron	Apron D + Sheriff	None	None	None
	Impacts to Terminal Expansion	None	None	None	None	None	None	None	None
	Impacts to Operations	None	Significant - Apron A	Significant - Apron B	Significant – Apron A	Significant - Apron D	None	Apron F	None
ARFF Facility Requirements	Adequate Space for Facility Layout	Yes	Yes	Constrained	Yes	Constrained	Yes	Yes	Yes
	ARFF Vehicle Staging Area	Yes	Yes	Yes	Yes	Limited	Yes	Yes	Yes
	Pull Through ARFF Bays	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
	Landside Access - Staff/Visitor Access	Via Gate	Via Gate	Yes	Yes	Yes	Yes	Yes	Yes
	Operations Staff Efficiency Impact	Good Access	Good Access	Good Access	Good Access	Good Access	Poor Access	Poor Access	Poor Access
Environmental Impacts	Wetland Impacts	None	None	None	None	None	Yes	Potential	Potential
	Tiger Salamander Impacts	Non-Critical Habitat	None	None	None	None	Yes	Yes	Yes
	Burke's Impacts	None	None	None	None	None	Yes	Potential	Potential
	NEPA Document	EA	CE or Focused EA	CE or Focused EA	CE or Focused EA	CE or Focused EA	EA	EA	EA
Utility Access	Water	Yes	Yes	Yes	Yes	Yes	No	No	No
	Sewer	Yes	Yes	Yes	Yes	Yes	No	No	No
Other Impacts	Indirect Costs (Order of Magnitude)	Major - RTR Modification	Major - RTR Modification	FBO Impacts	Apron and FBO Impacts	Major - Sheriff, Topo, Becker Rd. Impacts	Major - Utl Access and Bio Impacts	Major - Water and Sewer Access	Major – Water and Sewer Access
	Delays to Implementation (From Indirect Impacts)	Significant - FAA	Significant - FAA	Resolving FBO Impacts	Resolving Apron and FBO Impacts	Major – Ex. Facility Redevelopment	Major – Utl Extension and Bio	Major – Utl Extension and Bio	Major – Utl Extension and Bio

Meets Requirements Impact Major Impact

Notes:
1 Response time includes 45 seconds for ARFF personnel to dress in emergency suits and enter vehicle.
2 Midpoint of Runway 14/32 is farthest midpoint of air carrier runway for Site 8.
CE: Categorical Exclusion
EA: Environmental Assessment
ACOE: Army Corps of Engineers
RTR: Remote Transmitter/Receiver

[THIS PAGE INTENTIONALLY BLANK]

Sites Eliminated from Consideration

Based on the preceding evaluation, the ARFF alternatives listed in **Table 5-3** were eliminated from further consideration. The most significant factors were impacts to communication facilities, inefficiencies in operations staff utilization, potential for conflicts with taxiing aircraft, and major environmental impacts.

Table 5-3: ARFF Alternatives Eliminated from Consideration

Alt	Major Issues
Site 2	• Presents constraints and congestion on Apron A while requiring modification or relocation of RTR facilities, and the associated schedule and cost uncertainties make this alternative nonviable.
Site 3	• Creates complications with existing operations and facilities. • Poses a high potential for conflicts with airfield access.
Site 5	• Requires significant grade change and is constrained by existing facilities • Requires redesign of Sonoma County Sheriff's facility parking lot and Becker Drive cul-de-sac.
Site 6	• Impacts Burke's goldfields habitat. • Produces inefficiencies by requiring long driving time from east-side core area by operations staff.
Site 7	• Is located in hangar area, with potential conflicts to taxiing aircraft. • Produces inefficiencies by requiring long driving time from east-side core area by operations staff. • Is setback from airfield with constrained visibility of Runway 2/20.

ARFF Alternatives for Further Consideration

Initial evaluation reveals the best locations for the replacement ARFF facility are Sites 1, 4, and 8. While all have undesirable features and impacts, they are the best of a limited range of choices. Although cost is always an important consideration, the best sites are operationally robust, have limited or no impacts on other aviation facilities or uses, and have limited environmental impacts. These desired characteristics make Sites 1, 4, and 8 superior to the others initially considered.

The general costs to construct an ARFF facility are assumed to be relatively equal for the three finalist sites. The basic costs include design and construction of the building, staging aprons, auto parking and extension of utilities from adjacent sites. Alternatives 1 and 8 have costs beyond these general estimates for California Tiger Salamander mitigation, plus RTR modification, and utility access. Planning-level cost estimates were prepared for California Tiger Salamander mitigation, modification of the RTR antennas for Site 1, and provision of water and sewer service to Site 8 are provided below.

Alternative Site 1

Alternative 1 has the major advantages of being close to the east-side core area and utilizing an area not allocated to another aviation use. Its principal complication is the uncertainty of the time and cost it will take to design and modify the RTR facility. Its environmental impacts are minor, and it will represent small mitigation costs.

The FAA OESG provided guidance and planning level cost estimates for RTR modification using available data from similar FAA projects and the proposed budget for a feasibility study. It is stressed these are estimates, estimated conservatively for this study to provide a worst-case cost estimate.

The FAA provided order of magnitude costs for addressing ARFF impacts to the RTR facility in an April 20, 2021, email to Jon Stout, STS Airport Manager. These cost estimates addressed two scenarios: raising of the RTR antennas and relocating the facility to a new site. The most likely cost for raising the antennas was estimated to be about $1.7 million with a low estimate of $1.3 million and high estimate of $2.6 million. A new RTR site had a most likely cost of $3.6 million, with low and high costs estimated to be $2.7 and $5.4 million, respectively. The FAA cost estimates were based upon several assumptions:

- STS is responsible for managing all design and construction activities. These costs are not included in the estimates presented above.
- The costs do not include FAA's overhead costs for labor and expenses.
- The costs do include the costs of providing RTR signal coverage during construction of the facilities.
- There is a high degree of uncertainty over the technical requirements and constraints on the new facility until a formal feasibility study is conducted by the FAA.

Costs associated with RTR modification, coordination with FAA, and an uncertain timeline and construction date make Alternative 1 a less attractive option. Initially Alternative 1 was favored based on location and lack of impact on airfield operations. However, the high estimated costs, the lack of clarity on timing and schedule, and coordination with the FAA make this site unfeasible. The Sites described below may offer similar benefits without modifying a major communication facility.

Alternative Site 8

Site 8 was retained for consideration because it is the best of the sites not on the east side. Site 8 requires capital improvements for water and sewer utilities. It has the side benefit that utility development may help fund infrastructure to support general aviation development on the west quadrant. Even if well and septic systems can be used, providing sewer and water service would cost over $1 million at Site 8. Unlike Sites 6 and 7, Site 8 will not be able to access the aqueduct for fire protection water and will require additional water storage for fire protection. Any Airport project not limited to existing pavement will be considered to have impacted the California tiger salamander's habitat. Therefore, development of this site requires mitigation. Mitigation will consist of payment of a per acre mitigation fee of $32,000 per acre.

Costs beyond the general costs for site design and construction of Site 8 include water and sewer access and California Tiger Salamander mitigation costs. There were two west quadrant wastewater service options: extension of a sewer line from the east side of the Airport or installation of a septic system.

- Extension of a sewer line to the sewage treatment facility is the most expensive method, with an estimated cost of $1.7 to $2.0 million. The estimate does not include environmental review, mitigation, and connection fees. This cost estimate represents greater uncertainty than for the similar connection to the southern quadrant due to the need for directional boring under airfield pavement.
- Construction of an onsite septic system is estimated to cost $350,000 to $450,000.

Two west quadrant domestic water service options consist of extension of a water main and use of a well and onsite water storage tanks.

- Extension of a water main from North Laughlin Road is the most expensive, estimated to be $1.5 to $1.8 million plus environmental review, mitigation, and connection fees.
- To use an onsite well with storage tanks to provide water for both domestic use and fire protection, well installation and drilling are estimated to cost $400,000 to $500,000, plus costs for filtration, storage tanks, and environmental review.

For this analysis, the onsite septic system paired with the onsite well and storage tanks is selected for planning cost estimates. Site 8 also requires California Tiger Salamander mitigation costs based on the facility footprint in the habitat area. Payment of mitigation fees is expected to be required. The significant increase in costs associated with water main and sewer line connections, combined with the inconvenience for operations staff to access from the east side building area, likely make Site 8 unfeasible.

Alternative Site 4

Site 4 likely has the lowest development costs and least potential for delay. Environmental processing will be relatively simple compared to Sites 1 and 8 since this site is located on existing pavement. This makes it both less expensive to build and less subject to delay. The primary drawbacks are impacts to Apron A and potential constraints to ground service equipment. The impacts to Apron A are judged to be the most significant impact. As air service expands, Apron A will need to be modified to accommodate increased spaces designated for overnight and unscheduled maintenance parking for airline aircraft. Adjacent FBOs are seeking additional apron area for their use. There are no adjacent alternative sites for these uses.

As the ARFF analysis occurred, analyses for the near-term terminal footprint, aircraft parking positions, and the ultimate terminal footprint were refined. The analysis indicated requirements for Apron A to accommodate additional airline parking positions for remain overnight (RON) or maintenance positions away from the terminal in the near-term. The proposed concept is to add pavement to the former helicopter parking positions, immediately north of the current airline parking positions, and the area between Taxiways J and K. This additional pavement allows for some flexibility on Apron A and reopens the potential to develop the ARFF facility on Apron A without severely impacting existing general aviation, the FBO, or the ultimate terminal facilities.

Three variations on Site 4 permit evaluation of different configurations of Apron A and associated taxilanes. Each alternative below impacts Apron B and FBO operations, specifically Kaiser Air ramp utilization. Each Apron A alternative utilized the anticipated 2040 footprint of the passenger terminal. The terminal design accommodates six gate positions in one row. This configuration eliminates 5 push-back tiedown positions for single-engine aircraft and 10 taxi-through positions sized for piston and smaller turboprop twin-engine aircraft. These reductions occur independent of the location of the ARFF facility. Small shifts in the location and configuration of the ARFF facility were made to optimize the space available for aircraft parking in each apron alternative.

Apron A Alternative 1

In this alternative (**Figure 5-14**) the ARFF facility has pull-through bays for the ARFF vehicles. Access to the facility is via the public road that passes in front of Kaiser Air's general aviation terminal. The ARFF's offices and auto parking lot are located north of the vehicle bays. The fuel island remains in its present location but is modified to permit fueling only on one side. The size of the southernmost aircraft parking box is reduced. This eliminates three to four parking positions for midsized general aviation aircraft. The parking box for larger general aviation aircraft remains in its present configuration.

The undeveloped area between Taxiways J and K is paved to provide four spaces for airline RON or unplanned maintenance. Placing these four airline parking positions away from the terminal is undesirable but judged to be acceptable. Paving of this area requires conversion of an open ditch to a culvert. This ditch segment is classified as a jurisdictional wetland.

Apron A Alternative 2

In this alternative (**Figure 5-15**) the RON and unscheduled maintenance positions for airline aircraft are arrayed as an extension of the six gate positions expected to exist in the next 5-7 years. This is optimum for airline aircraft but reduces space on the existing Apron A for parking general aviation aircraft. The existing large aircraft parking box decreases substantially from 61,500 square feet to 27,000 square feet. This reduces the parking capacity for larger corporate jets by about three aircraft. The existing fueling island remains in its present location with fueling on both sides of the island. Parking for smaller aircraft in the row associated with the fueling island is reduced to about two aircraft. This alternative creates two rows of parking for general aviation aircraft between Taxiways J and K. These rows accommodate aircraft as large as medium corporate jets. Depending upon the size of the aircraft, these two rows can serve from 9 to 15 aircraft. Paving of this area requires conversion of an open ditch to a culvert. This ditch segment is classified as a jurisdictional wetland.

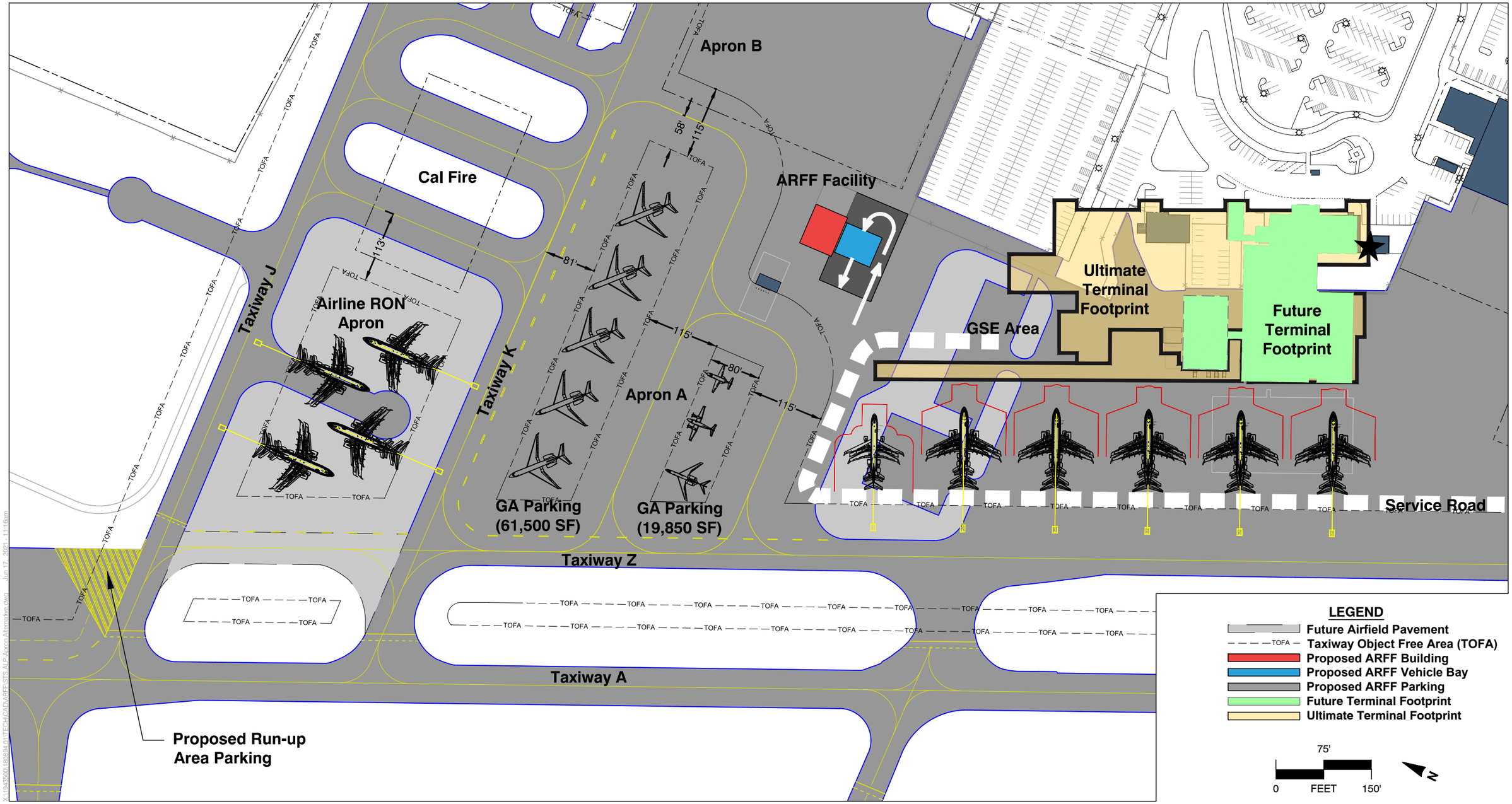
In this alternative the ARFF facility shifts further south than in Apron A Alternative 1. ARFF vehicles have to back into the parking bays; the facility is not designed with pull-through bays. This site reduces the amount of space north of the terminal available for ground service equipment. The exit route for ARFF vehicles also is used by ground service equipment. The ARFF facility's offices and auto parking lot are located east of the vehicle bays. Road access is via the public road that serves Kaiser Air. The gate and fencing on the access road are moved to the east to allow vehicle access to the ARFF parking lot.

Apron A Alternative 3

Apron A Alternative 3 (**Figure 5-16**) includes elements of the first two alternatives. The northern and mid-apron parking boxes remain in the current configuration. The undeveloped area between Taxiways J and K are configured to accommodate four airline RON or unscheduled maintenance positions. The location of the ARFF facility is similar to Apron A Alternative 1. ARFF vehicles need to back into their bays. In this version, the ARFF vehicle bays are shifted about 20 feet north of the associated office. This allows the bays to be aligned with the apron service road while keeping the present alignment of the public road that provides access to Apron A. The auto parking lot utilizes a portion of the long-term parking lot.

This alternative also illustrates a possible joint-use layout. Two bays are added at the east end of the building for use by fire trucks or general maintenance on other airport vehicles. The fencing and gate associated with the public access road need to be extended to the west. The new configuration permits the fire trucks to exit via this road without passing through a gate.

Figure 5-14: ARFF Site 4 - Apron A Alternative 1

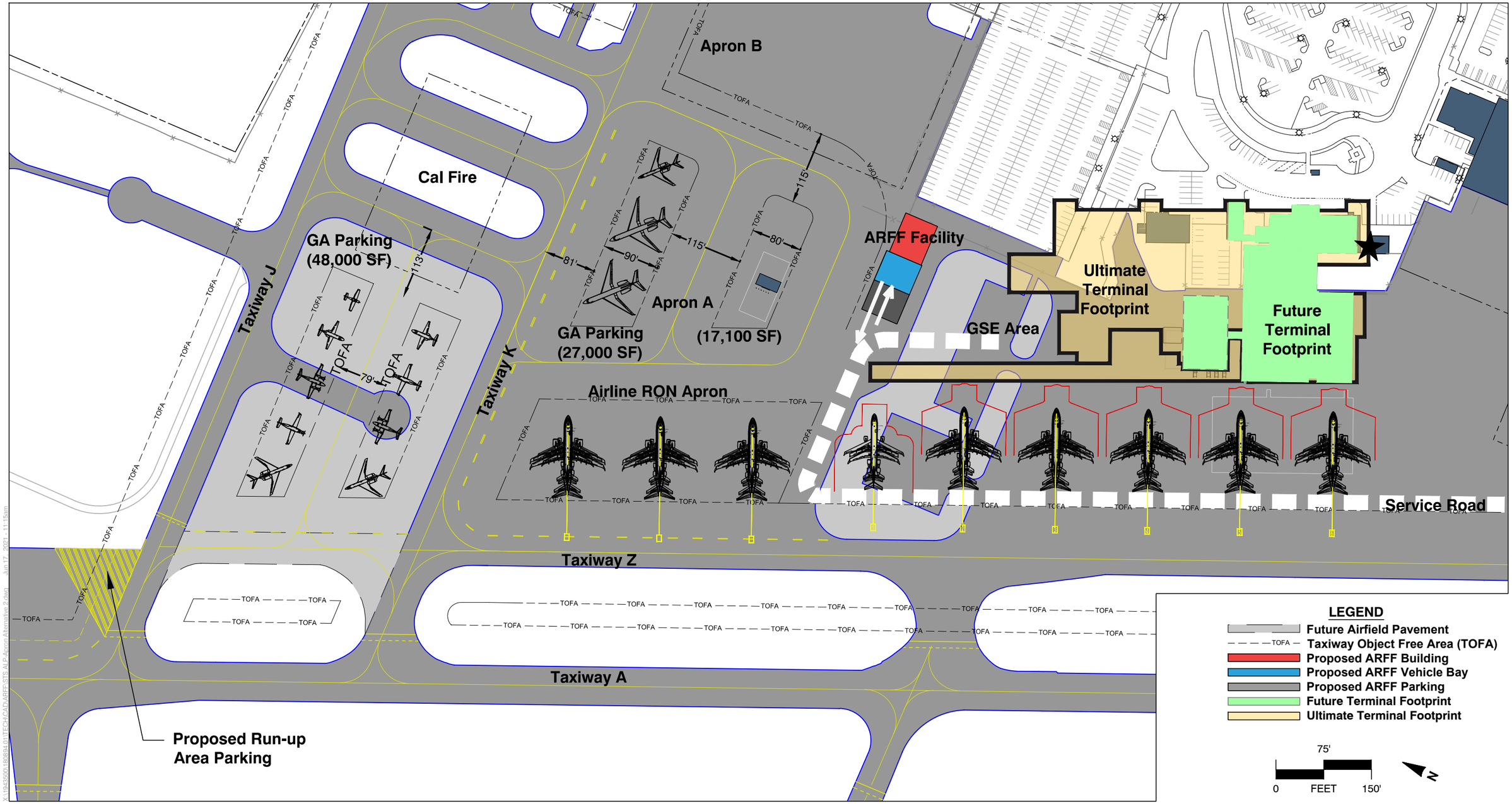


X:\1943500\189894.01\TECH\CAD\ARFF\STS ALP Apron Alternative.dwg Jun 17, 2021 - 11:18am

Prepared By:
Mead & Hunt
www.meadhunt.com

Airport Layout Plan Update
Charles M. Schulz
Sonoma County Airport

Figure 5-15: ARFF Site 4 - Apron A Alternative 2

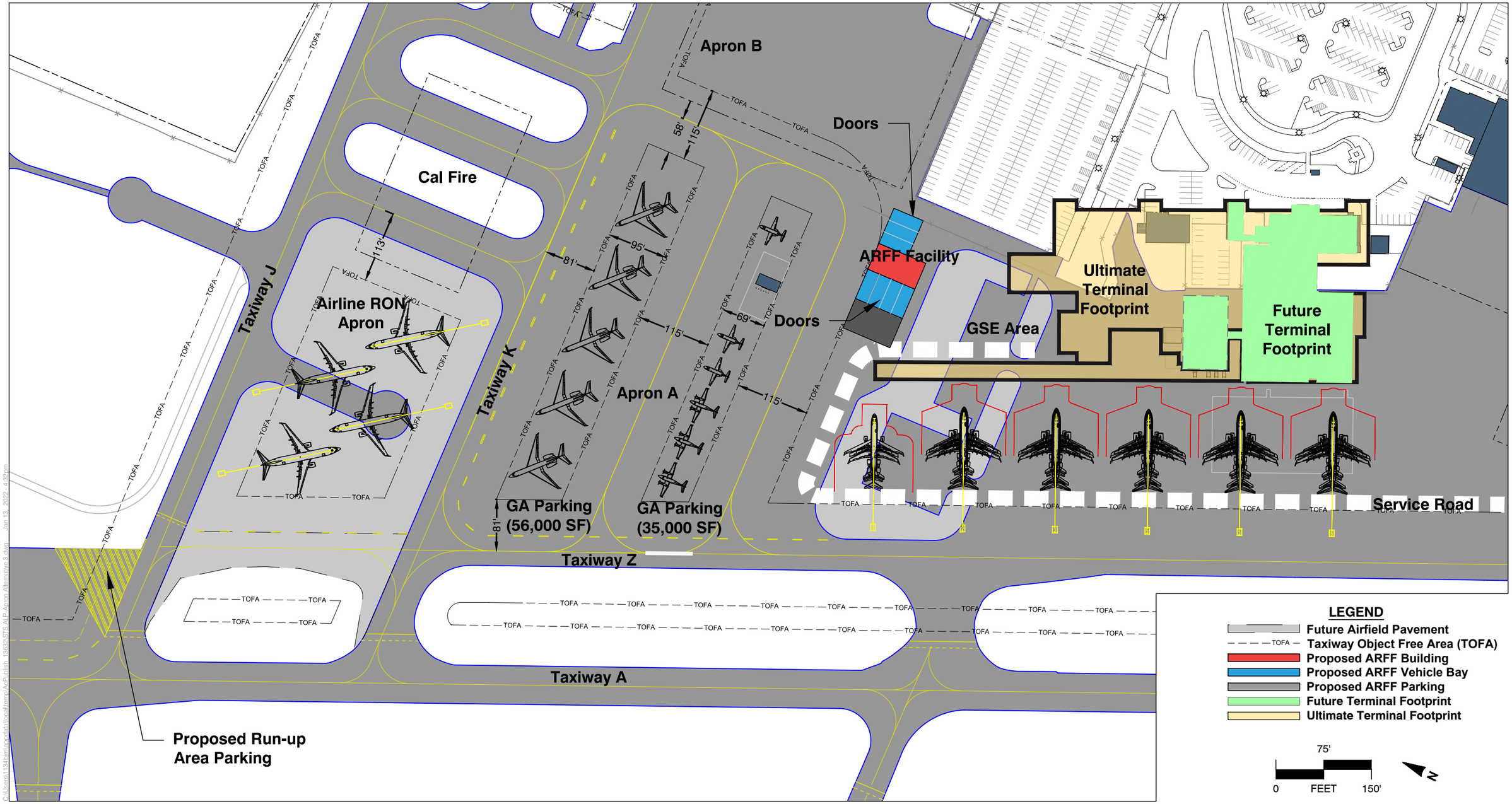


X:\1943500\198894101\TECH\CAD\ARFF\SITE A\LP Apron Alternative 2.mxd Jun 17, 2021 - 11:15am

Prepared By:
Mead & Hunt
www.meadhunt.com

Airport Layout Plan Update
Charles M. Schulz
Sonoma County Airport

Figure 5-16: ARFF Site 4 - Apron A Alternative 3



C:\Users\1134\Documents\Local\temp\Ac-Publish_13632\STS_ALP_Apron Alternative 3.dwg, Jan 13, 2022 - 4:32pm

Prepared By:
Mead & Hunt
www.meadhunt.com

Airport Layout Plan Update
Charles M. Schulz
Sonoma County Airport

[THIS PAGE INTENTIONALLY BLANK]

Recommended Site

After refined analysis of the ultimate terminal footprint, gate positions, and impacts on general aviation parking, it was determined Apron A will accommodate an ARFF facility. After consideration of the strengths and weaknesses of each alternative, Site 4 on Apron A has been selected as the preferred site. The principal weakness of Site 4 is its impact to the ultimate terminal and general aviation parking on Apron A. This is judged to be less significant than its attributes:

- Site 4 is located in the east-side core area with access to existing facilities, which makes it efficient for operations staff, who serve as the ARFF staff.
- Site 4 offers minimal environmental impacts.
- Site 4 can be used for a joint-use ARFF / fire station.
- Site 4 does not constrain future passenger terminal development.
- Site 4 has a low impact on airport and aircraft operations.

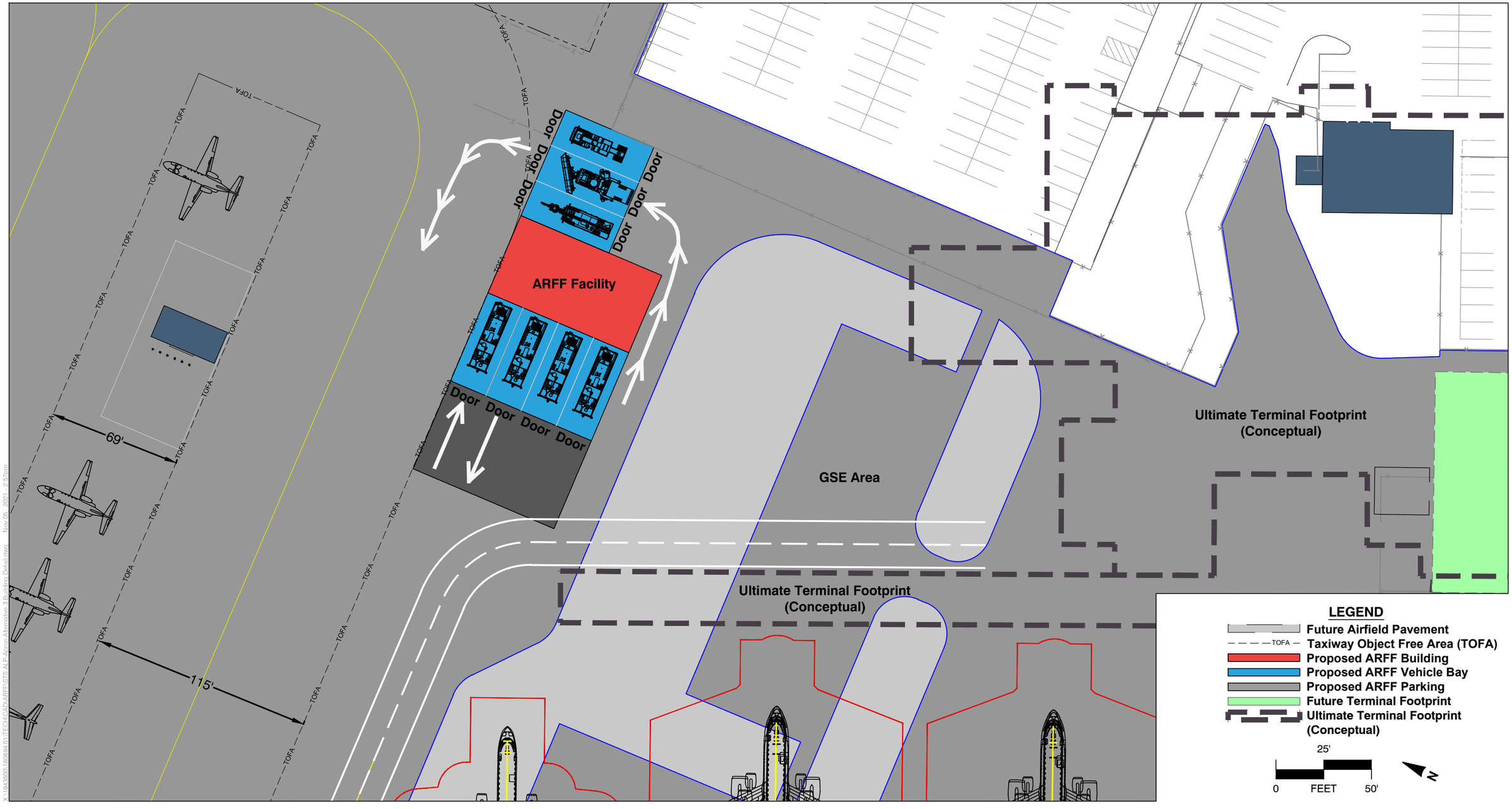
Apron A Alternative 3 is selected as the preferred design for ARFF Alternative 4 due to the following advantages:

- It has the least impact on general aviation parking capacity.
- It provides 4 RON and unplanned maintenance spaces in reasonable proximity to the terminal.
- It retains the ability to serve as a joint-use ARFF / fire station.
- Its environmental impacts are identical with the other two.

Figure 5-17 shows a more detailed site layout for the preferred location. The future ARFF facility will be added to the ALP at this location. The Site 4 - Apron A Alternative 3 layout and orientation will continue to be refined so the proposed ARFF facility is compatible with future terminal and parking expansion.

[THIS PAGE INTENTIONALLY BLANK]

Figure 5-17 : ARFF Site 4 - Apron A Alternative 3



X:\19\43500\189894.01\TECH\CAD\ARFF\STS ALP-Apron Alternative 3 Building Detail.dwg Nov 05, 2021 - 2:57pm

Prepared By:
Mead & Hunt
www.meadhunt.com

Airport Layout Plan Update
Charles M. Schulz
Sonoma County Airport

[THIS PAGE INTENTIONALLY BLANK]