CHAPTER 4

ALTERNATIVES DEVELOPMENT AND EVALUATION

4.1 INTRODUCTION

This chapter presents potential development concepts for Southwest Wyoming Regional Airport (RKS or Airport) that are supported by reasoning, an analysis of alternatives, and development recommendations. The alternatives and development concepts presented in this chapter are based on data collected in the first three chapters of this master planning effort and are primarily focused on airfield and aircraft parking improvements at RKS addressing safety and capacity and considering the Airport's sustainability focus categories. This chapter is intended to facilitate discussion about the advantages and disadvantages of these development concepts and alternatives that are needed to meet forecasted demand at RKS and ultimately identify a conceptual development plan (CDP).

4.2 ASSUMPTIONS

The following presents some assumptions established prior to development of these alternatives to accommodate existing and future demand at RKS through the 20-year planning period.

- ***Assumption One: Recommended improvements must comply with local, state, and federal regulations.*** The Airport will be developed and operated in a manner that is consistent with local ordinances and codes, federal and state statutes, federal grant assurances, and Federal Aviation Administration (FAA) regulations.
- ***Assumption Two: Role of the Airport.*** The Airport will continue to serve as a facility that accommodates regional commercial passenger service activity, along with general aviation activity and a small amount of military aviation activity.
- ***Assumption Three: Airfield design aircraft.*** The size and type of the critical design aircraft that utilize RKS and their associated design standards are used as the basis for the layout of associated airport facilities.
    - Runway 9/27 is intended to be used by both the commercial service aircraft and business jet type aircraft that operate at RKS. The existing critical design aircraft for this runway is the CRJ-200, which is a commercial service type aircraft with an Airport Reference Code C-II. The future critical design aircraft identified through the projections of aviation demand is an ARC C-III aircraft, represented by the ERJ-175. This indicates that this runway should be planned and designed using Runway Design Code (RDC) C-III-2400 criteria. For a description of ARC and RDC see Chapter 3, *Facility Requirements*.
    - Runway 3/21 is designed to be used primarily by smaller GA aircraft. The existing critical design aircraft for this runway is a family grouping of B-II aircraft types represented by the Cessna 208 Caravan and Swearingen Metroliner. The future critical design aircraft is also a family grouping of B-II types represented by the Cessna 408 SkyCourier. This indicates that this runway should continue to be designed using RDC B-II-VIS dimensional criteria.
- ***Assumption Four: Runway Length.*** No improvements are needed to the existing lengths of Runway 9/27 and Runway 3/21; however, existing runway length should be maintained.

- ***Assumption Six: Taxiway design.*** The design of the taxiway system is in accordance with Federal Aviation Administration (FAA) standards, with each taxiway and taxilane being independently evaluated based on the Taxiway Design Group (TDG) of the critical types intended to use each surface. This includes narrowbody aircraft types that are projected to conduct operations at RKS in the future.
- ***Assumption Seven: Approaches.*** RKS is designed to accommodate the safe and efficient operation of aircraft in all weather conditions. This indicates that Runway 9/27 should be maintained with instrument approach guidance capabilities and to accommodate the forecasted operations under most weather conditions.
- ***Assumption Eight: Efficient and targeted development.*** Since the amount of accessible landside development area at any airport is at a premium, planning should occur for future airport development to make the most efficient use of the available area for aviation-related activities, including GA facilities and passenger terminal facilities. Aviation use areas should be developed to be compatible with surrounding land uses.

4.3 GOALS AND OBJECTIVES FOR DEVELOPMENT

Accompanying these assumptions are several goals and objectives, which have been established for purposes of directing the plan and establishing continuity in the future development of RKS. These goals and objectives consider several categorical considerations relating to the needs of RKS, both in the short-term and long-term. These goals and objectives focus on the reservation of current available land for future aeronautical and non-aeronautical use, addressing nonstandard Runway Safety Area (RSA) and Runway Object Free Area (ROFA) encroachments, taxiway system concept improvements, improvements to existing aircraft parking apron safety and capacity, improvements and expansion of current sustainable features including solar energy and direct air capture, relocation of the ARFF facility, and development of additional large and small aircraft storage hangars.

The following goals and objectives will be used to guide the preparation of this Airport Master Plan and direct the future expansion of RKS:

- Plan and develop RKS to be capable of accommodating the future needs of the City of Rock Springs, Sweetwater County, and the surrounding service area.
- Create a land use plan that maximizes current available land for aeronautical and non-aeronautical development alike.
- Program the continued maintenance of runways and taxiways.
- Plan to accommodate the forecasted aircraft fleet safely and efficiently with the facilities needed to accommodate existing and projected demand.
- Program the construction of facilities when demand is realized. The primary potential facilities improvements under consideration include the construction of additional hangar facilities, improvement of existing pavement conditions, and realignment of taxiway geometry to meet design standards.
- Enhance the self-sustaining capability of RKS and ensure the financial feasibility of airport development.
- Improve upon and expand the sustainable development potential at RKS.

4.4 AIRFIELD RECOMMENDATIONS

The airfield recommendations summarized in this section were developed to accommodate future airfield demand as described in **Chapter 3**. Since the Airport does not require significant changes to the existing airfield configuration or the Runway Design Code (RDC), airfield recommendations are based on confirmation of the existing airfield layout and include improvements necessary to meet current FAA design standards. Design standards considered in the evaluation of the airfield layout that require improvements are runway safety area (RSAs), Runway Object Free Areas (ROFAs), and taxiway configuration. Existing Modifications to Standards (MOS) are also reviewed.

MODIFICATIONS TO STANDARDS

MOS refer to noted deviations from the FAA design standards or guidelines that are set for the varying components of an airport. The FAA has established a process for the initiation, revision, coordination, and management of MOS applicable to airport design. RKS currently has four MOS. Three of the MOS pertain to ROFA penetrations and the fourth relates to the elevation of the Runway 3/21 precision approach path indicator (PAPI). As part of the preparation of the alternatives, the Denver Airports District Office (ADO) was contacted about how to address these MOS understanding the topographical challenges surrounding the airfield that limit development options. Since the level of fill and grading needed to relocate infrastructure like Airport Road/County Route 10 around the ROFA would exceed the financial feasibility of such effort, direction was given to formally re-apply for new MOS for these conditions. The following summarizes the effort that would be needed to submit a MOS for these conditions.

The FAA approves MOS on factors present at the time of the project implementation. These factors include risks to safety and opportunities to mitigate which are subject to change over time. FAA Order 5300.1G, *Modifications to Agency Airport Design, Construction, and Equipment Standards* provides guidance on the duration of approved MOS. Previously, MOS required resubmittal and re-approval every five years. The most recent guidance replaces the five-year MOS re-submittal provision with a five-year status update reporting provision. The purpose of requiring a status update every five years is to ensure that airports remain aware of the existence of previously approved MOS and nonstandard conditions, monitor the residual risk resulting from the application of the MOS conditions to determine if additional measures are necessary and to focus attention on identifying avenues to correct nonstandard conditions by means of capital improvement planning. The process for applying for an MOS is outlined in FAA order 5300.1G, *Modifications to Agency Airport Design, Construction, and Equipment Standards*. Submitting MOS requests is completed through the FAA web-based airport data information portal or ADIP. There are three components of an MOS which are justification, alternatives, and acceptable level of safety. The justification is a statement that highlights the needs and benefits of the item under consideration. Alternatives cover what aspects impede conformance with the standards set in place. Finally, the acceptable level of safety describes how the reduction in safety is not significant to airport operation. Once submitted to the FAA the MOS goes through various levels of review and if approved an approval letter is delivered to the airport. Once approved it is the airports responsibility to update their airport layout plan to show the approved modifications to airport design standards.

RUNWAY SAFETY AREA IMPROVEMENTS

RSA's must be clear of all objects to reduce the risk of damage to airplanes and injury to passengers and crew if an aircraft veers off or overruns the runway surface during takeoff or landing. Only objects that are fixed by function are allowed in the RSA such as lights, signs, or antennas. If these are placed in the RSA, the objects must be placed on a frangible base, meaning they can break away easily on impact without causing severe damage to an airplane. Currently, three ends of the runways at RKS have perimeter roads that enter their RSAs. Development concepts that correct these conditions are presented in **Figures 4.1, 4.2, and 4.3**. At the approach end of Runway 27, **Figure 4.1** illustrates the relocation of the perimeter road around the RSA boundary on the north, east, and south sides. For the approach end of Runway 9, **Figure 4.2** illustrates the relocation of the perimeter road to outside of the RSA boundary on the north side only. **Figure 4.3** illustrates the relocation of the perimeter road around the west side of the RSA boundary at the approach end of Runway 3.

There are several terrain and existing infrastructure challenges associated with relocating the perimeter road segments out of the RSAs. These conditions at each runway end were discussed with FAA and WYDOT staff on November 27, 2023, and are summarized below:

- The perimeter road segment in the RSA at Runway 27 would require some minor grading on the north side to relocate the road and could be achieved by using millings from a future paving project.
- Relocating the perimeter road outside the RSA at Runway 9 would be substantially more challenging as it would require significant grading, a substantial retaining wall, and gas lines would also need to be moved. It's important to note that the road that encroaches the RSA at Runway 9 is below the runway grade and is already located very close to the fence line and County Road 370; relocating this road segment would be challenging. There is currently a MOS for the perimeter road and fence within the ROFA at Runway 9. Given the terrain challenges, the FAA indicated that they are willing to explore the possibility of issuing a MOS for the perimeter road in the RSA in this location or potentially considering an operational control (e.g., install a hold short sign with requirement to call 122.8 to pass through RSA).
- The perimeter road encroachment into the RSA at Runway 3 would also be challenging to correct as there is a steep drop off that would require a large amount of fill. The FAA indicated they are also willing to explore the potential for a MOS or operational control in this location.

Preliminary engineering and grading analysis would be needed to determine the scope of earth moving and costs required to correct these conditions. Pending direction from FAA, cost estimates for projects to correct these conditions will be included in the CDP and project list; however, the preferred option would be to apply for MOS in these areas.

LEGEND

- EXISTING FENCE
- AIRPORT PROPERTY
- RSA — RUNWAY SAFETY AREA (RSA)
- ROFA — RUNWAY OBJECT FREE AREA (ROFA)
- BRL — BUILDING RESTRICTION LINE (FROM ALP)
- FUTURE ROADWAY
- ROADWAY ENCROACHES RSA
- ROADWAY ENCROACHES ROFA
- FUTURE FENCE

0 300 600 Feet

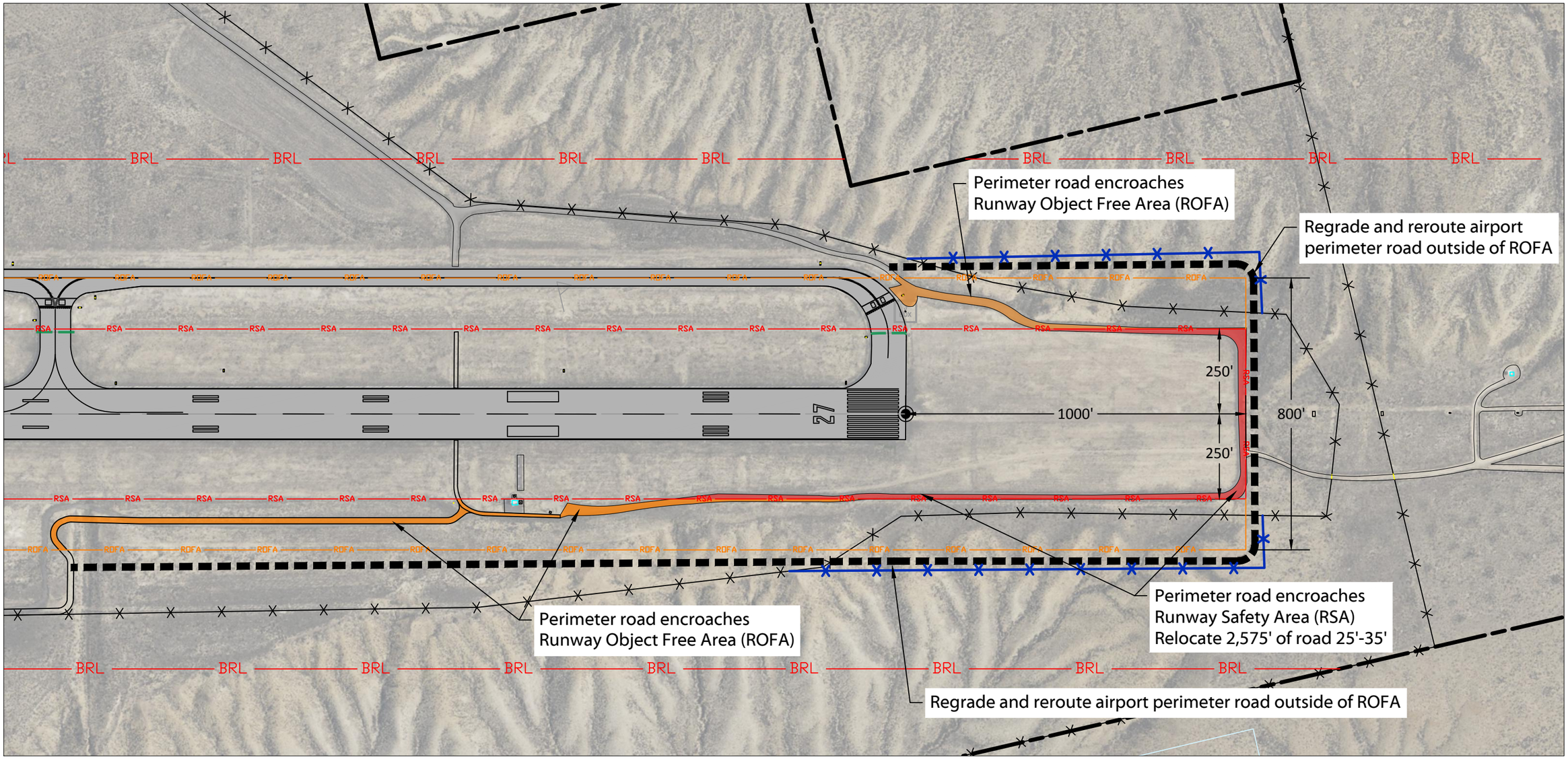

FIGURE 4.1

Relocation of Perimeter Road - Approach End Runway 27

LEGEND

- EXISTING FENCE
- AIRPORT PROPERTY
- RSA — RUNWAY SAFETY AREA (RSA)
- ROFA — RUNWAY OBJECT FREE AREA (ROFA)
- BRL — BUILDING RESTRICTION LINE (FROM ALP)
- FUTURE ROADWAY
- ROADWAY ENCROACHES RSA
- ROADWAY ENCROACHES ROFA

0 200 400 Feet

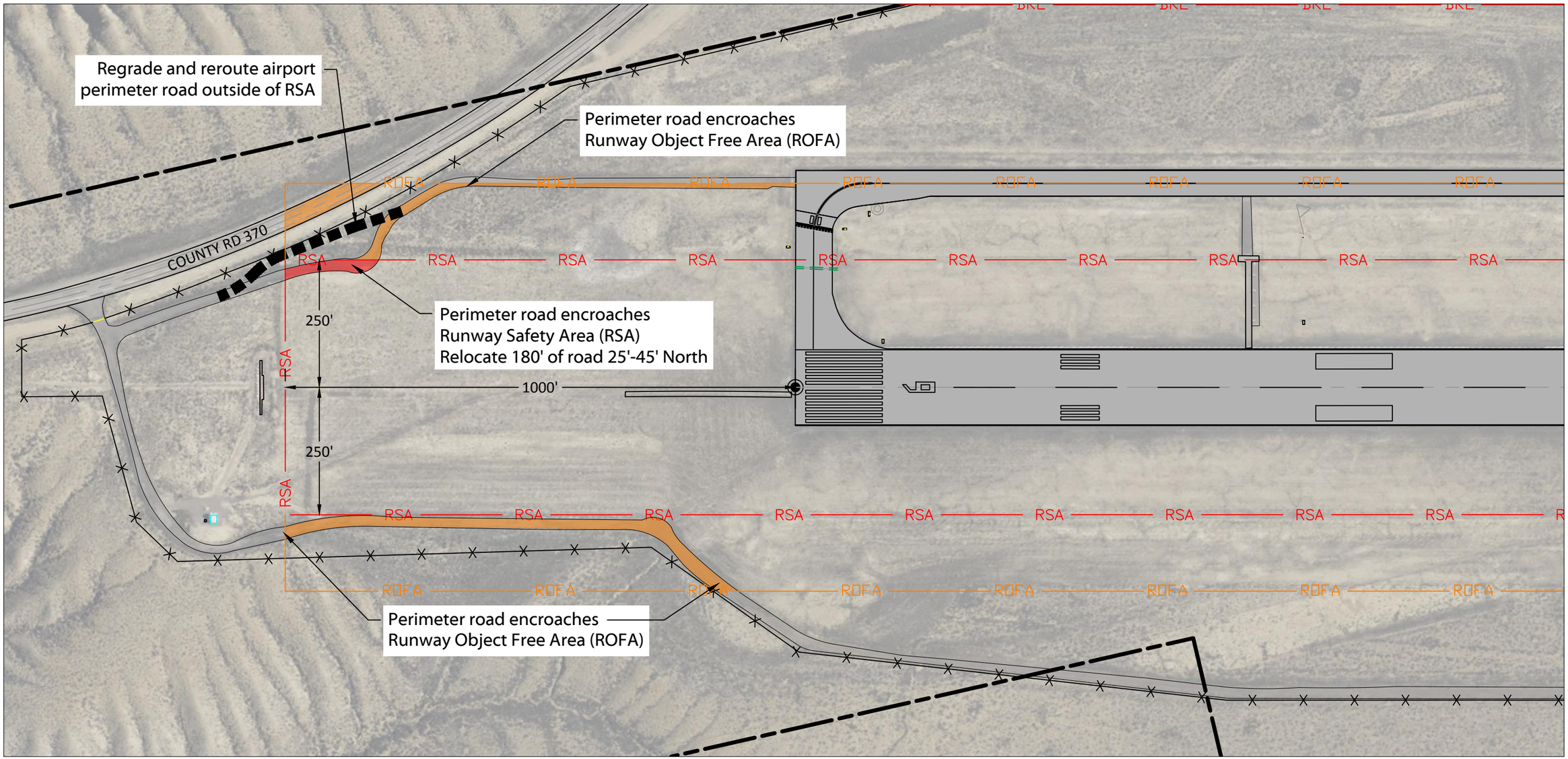

FIGURE 4.2

Relocation of Perimeter Road - Approach End Runway 9

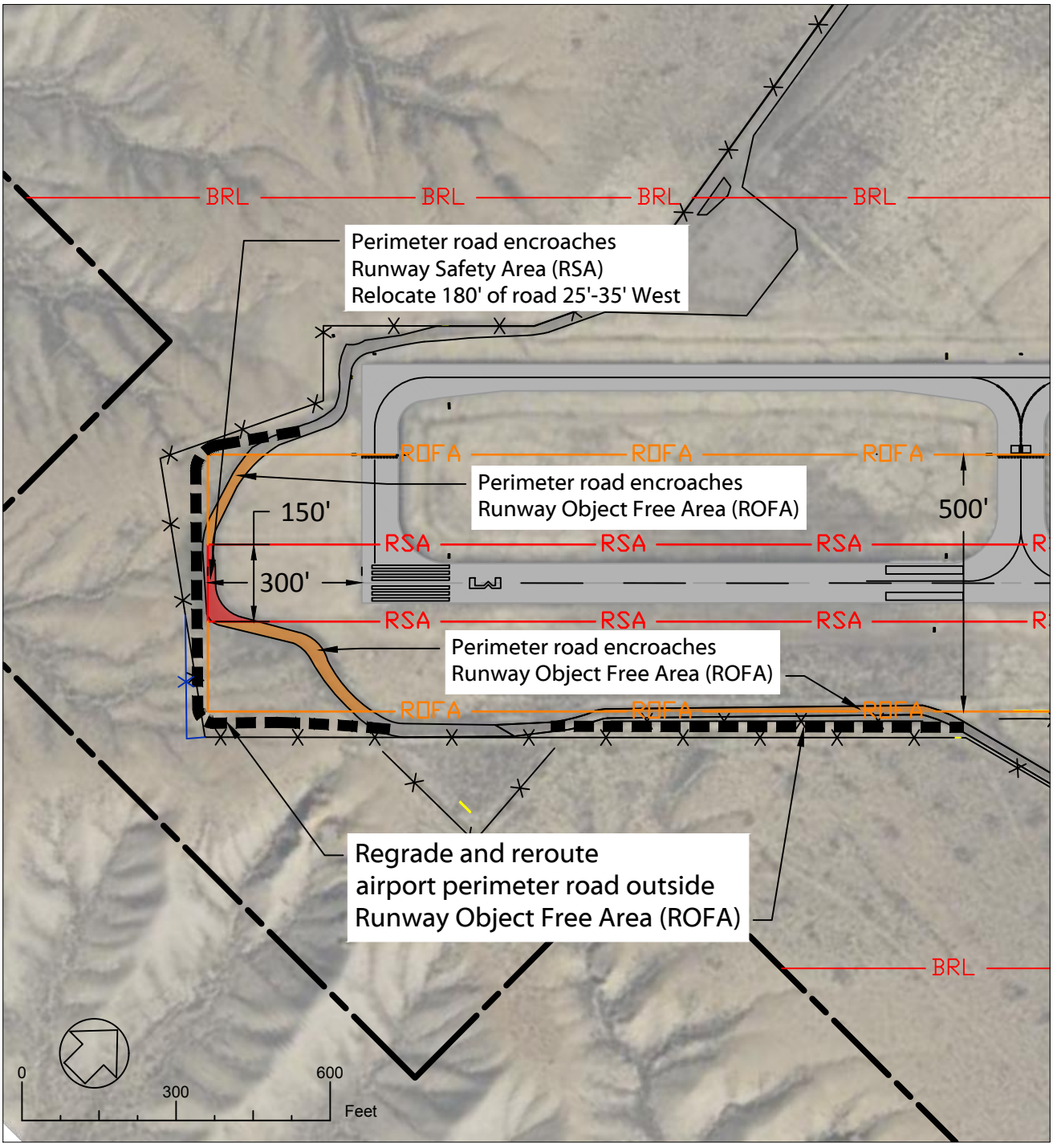

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FIGURE 4.3
Relocation of Perimeter Road Approach End Runway 3

Southwest Wyoming Regional Airport

TAXIWAY IMPROVEMENTS

This section focuses on the proposed changes to the Taxiway System to eliminate direct access between an aircraft parking apron and a runway as well as improving the geometry of intersections to better meet FAA standards and to enhance safety. These improvements are intended to increase the safety and efficiency of the airfield along with minimizing the potential for an unintentional runway incursion.

Taxiway A, F, and D

Figure 4.4 summarizes the proposed improvements to the taxiway system at RKS for Taxiway A, Taxiway D, and Taxiway F. Taxiways D and F provide taxi routes for aircraft utilizing Runway 3/21. Currently there is no full-length parallel taxiway for Runway 3/21, which means pilots must taxi with additional turns, increasing the potential of a wrong turn, when transiting between the aprons and the approach end of Runway 3. To reduce pilot confusion while navigating this taxi route, removal of the north most portion of Taxiway F along with the Taxiway A3 connector while connecting Taxiway D and F to provide a full-length parallel taxiway for Runway 3/21 is proposed.

As also shown in **Figure 4.4**, connector Taxiway A2 provides direct access from Runway 9/27 to the terminal apron. When considering the landing characteristics and required landing roll of the current and existing critical aircraft, relocation of A2 to the west is most favorable. Landing simulations were conducted for both the CRJ-200 and EMB- 175 which suggested that the A2 turnoff, when relocated to the west, would be able to be used when aircraft are landing on Runway 27 for a more immediate runway turnoff instead of having to go to the end of the runway.

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LEGEND

- FUTURE AIRFIELD PAVEMENT
- AIRFIELD PAVEMENT TO BE REMOVED
- EXISTING FENCE
- AIRPORT PROPERTY
- BRL — BUILDING RESTRICTION LINE (FROM ALP)

0 200 400 Feet

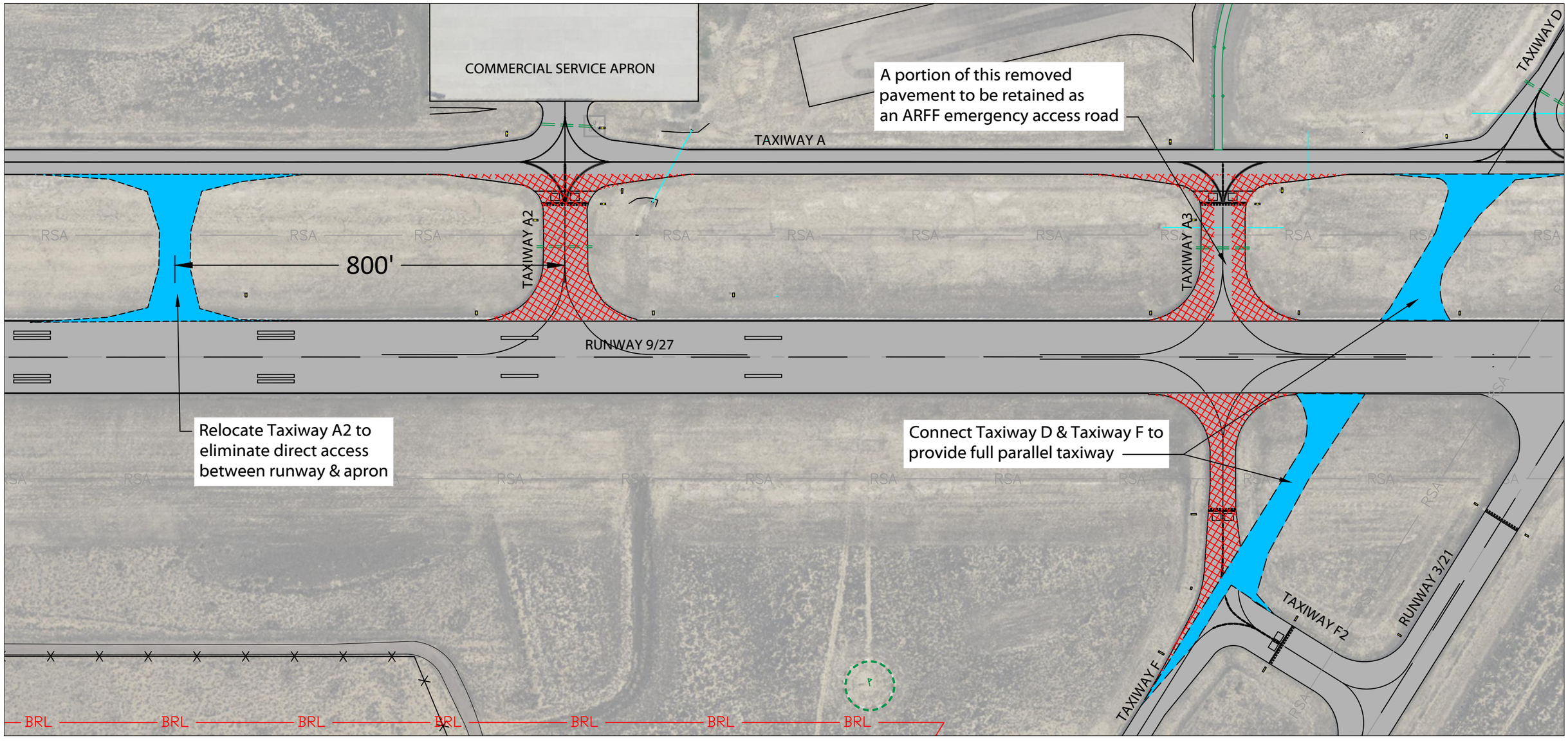

FIGURE 4.4

Taxiway A, D and F Improvements

Southwest Wyoming Regional Airport

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Taxiway C

The current alignment of Taxiway C also provides direct access between Runway end 21 and the GA apron. In addition, the geometry where the taxiway intersects Runway 3/21 is nonstandard and should be a 90-degree angle to improve visibility when pilots are holding short of the runway to confirm it is clear of traffic. To correct this non-standard airfield condition, **Figure 4.5** shows removal of the existing Taxiway C connector at the approach end of Runway 21 and reconfigures its routing so Taxiway D can be extended and connect to the threshold of Runway 21 perpendicularly at a 90-degree angle.

As shown in **Figure 4.5**, there is a small portion of the ROFA that RKS does not own that contains an off-airport private access road that should be considered when the airport reapplies for MOS. The justification for this MOS is similar to the existing MOS at RKS pertaining to roads. This private access road is at a lower elevation than the end of the runway and relocation of this road outside of the ROFA would not substantially enhance safety. This condition will be reassessed when the survey data collection, which is a Master Plan component, is complete.

LEGEND

- FUTURE AIRFIELD PAVEMENT
- AIRFIELD PAVEMENT TO BE REMOVED
- FUTURE ROADWAY
- FUTURE FENCE
- FUTURE TAXIWAY SAFETY AREA (TSA)
- FUTURE TAXIWAY OBJECT FREE AREA (TOFA)
- EXISTING FENCE
- AIRPORT PROPERTY
- RUNWAY OBJECT FREE AREA (ROFA)
- RUNWAY SAFETY AREA (RSA)
- BUILDING RESTRICTION LINE (FROM ALP)

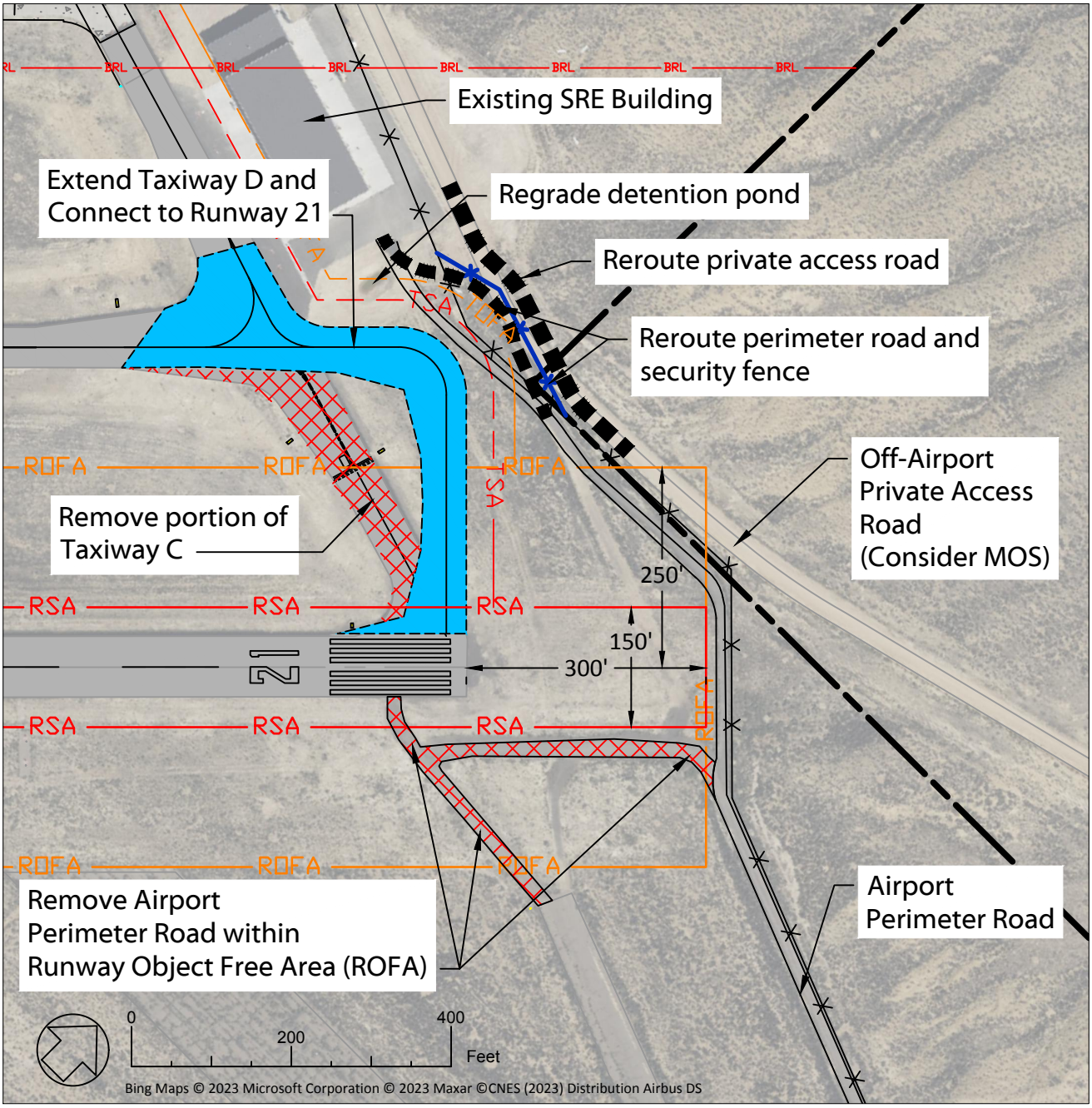

FIGURE 4.5
Extend Taxiway D and Connect to Runway 21

Southwest Wyoming Regional Airport

4.5 AIRCRAFT PARKING ALTERNATIVES

Aircraft parking is essential to the operation of an airport as it allows space for based and itinerant aircraft to be parked, secured, maintained, refueled, and deiced. Options to park aircraft range from a temporary location on an apron, a designated apron tiedown location for small aircraft, or a covered hangar. It is typically desired that aircraft based at an airport have covered protection offered by a hangar. RKS offers large hangar space, small hangar space, and apron locations for based and itinerant users; however, apron area and covered parking options are limited. Additional aircraft parking through expanded apron area and the development of new hangars is needed to meet the increase in traffic that has been forecasted. The following presents the initial alternatives that have been developed to increase aircraft parking area at RKS through the expansion of existing apron area and the construction of additional hangars.

General Aviation Parking Apron Improvements, Community Hangars, and ARFF Relocation

Alternatives for general aviation parking improvements, future community hangars, and ARFF relocation have been combined because of the proximity of these facilities in the GA apron area.

Additional apron area is needed to accommodate the fleet mix of aircraft types anticipated to conduct operations at RKS in the future. This includes a wide range of aircraft types from small single- and twin-piston engine types to the largest business jet types such as the Bombardier Global 7500 and the soon to be certified Gulfstream G800. **Figure 4.6** and **Figure 4.7** present similar expansions of the GA apron to accommodate additional aircraft parking. This proposed expansion of apron area focuses on additional pavement to the south and west of the existing GA apron. Additional apron pavement expansion is also illustrated to the north on both alternatives to accommodate the construction of two additional large community hangars to support Sweetwater Aviation Fixed Base Operator (FBO) itinerant aircraft parking operations.

The primary difference between the GA apron alternatives is the location of the future ARFF facility. The current ARFF facility is located on the GA apron and is equipped with two back-in bays capable of housing the existing ARFF vehicles. Relocation of the ARFF facility will allow for necessary improvements to accommodate the larger ARFF vehicles that will replace the current fleet. Additionally pull through bays in the new facility would allow quicker response and refill times during emergencies. Alternative 1 in **Figure 4.6** shows a future ARFF facility to the west of the future Part 145 Repair Station and south of the fuel farm. Alternative 2 in **Figure 4.7** locates the future ARFF facility on the west side of the SRE building. The primary benefit of the location of the ARFF building in Alternative 1 (preferred) is that it is in an area that is not well suited for other types of facilities, such as hangars. The primary benefit of collocating the ARFF facility with the existing SRE building in Alternative 2 is that it is located inside the security fence. Either option could be designed for ARFF trucks to pull through, eliminating the need to back in. Both options are located in areas where the response time would remain under three minutes.

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LEGEND

- FUTURE AIRFIELD PAVEMENT
- FUTURE BUILDINGS
- TOFA — ADG II TAXILANE OBJECT FREE AREA
- TOFA — ADG III TAXILANE OBJECT FREE AREA
- AIRPORT PROPERTY
- ROFA — RUNWAY OBJECT FREE AREA (ROFA)
- BRL — BUILDING RESTRICTION LINE (FROM ALP)
- EXISTING BUILDINGS

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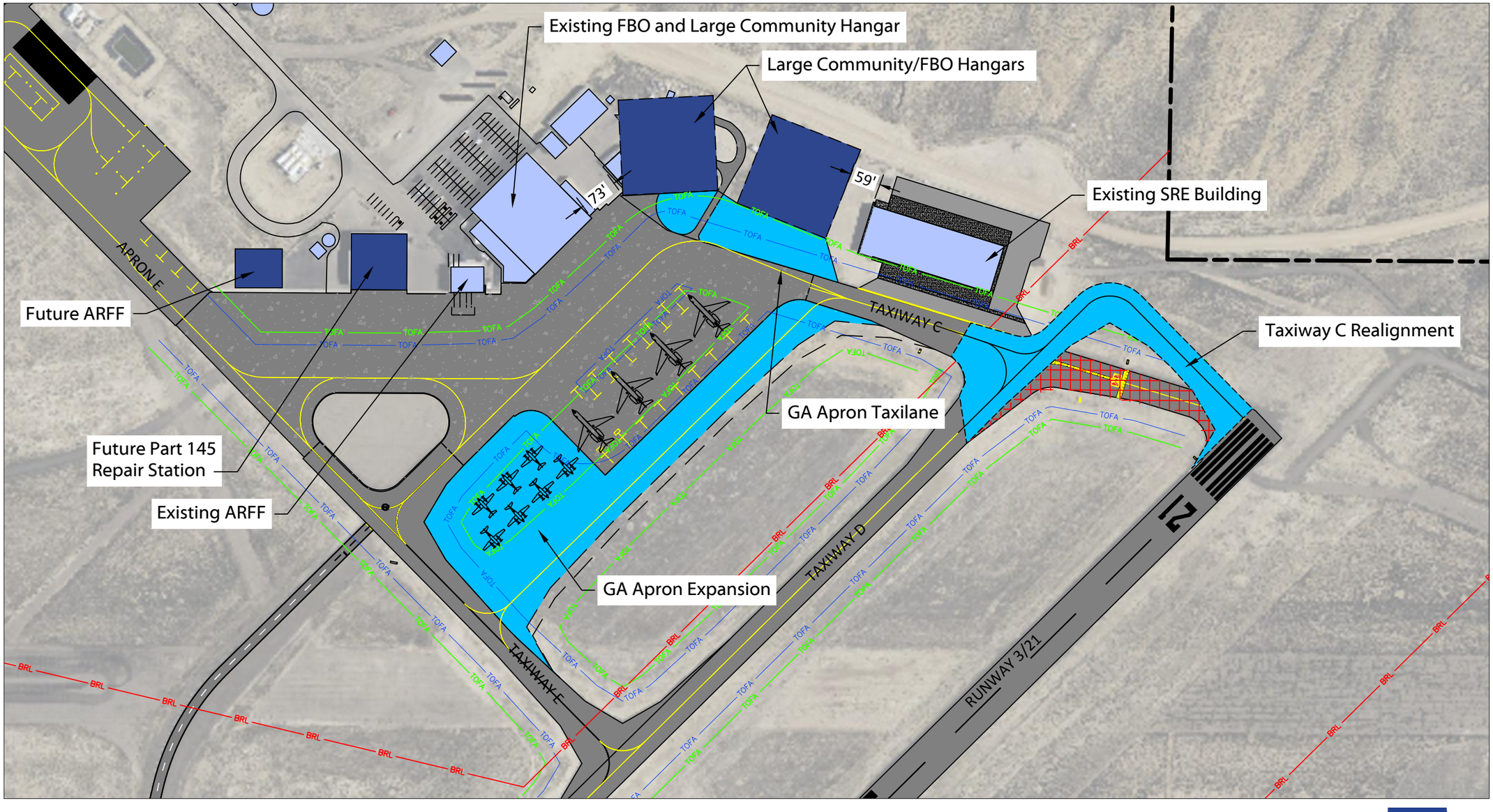

FIGURE 4.6

GENERAL AVIATION APRON EXPANSION AND ARFF RELOCATION - ALTERNATIVE 1

LEGEND

- FUTURE AIRFIELD PAVEMENT
- FUTURE BUILDINGS
- TOFA — ADG II TAXILANE OBJECT FREE AREA
- TOFA — ADG III TAXILANE OBJECT FREE AREA
- AIRPORT PROPERTY
- ROFA — RUNWAY OBJECT FREE AREA (ROFA)
- BRL — BUILDING RESTRICTION LINE (FROM ALP)
- EXISTING BUILDINGS

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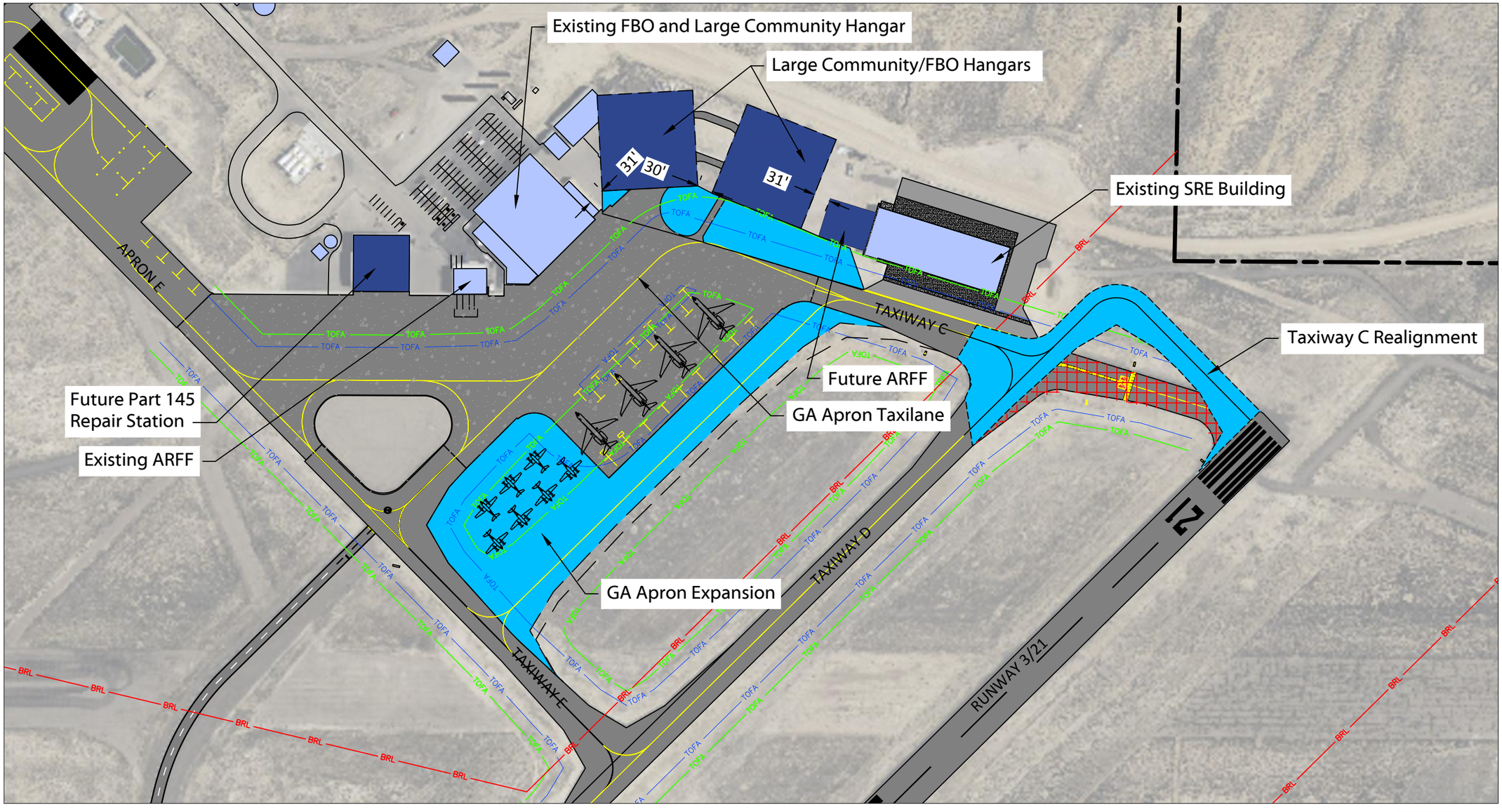


FIGURE 4.7

GENERAL AVIATION APRON EXPANSION AND ARFF RELOCATION - ALTERNATIVE 2

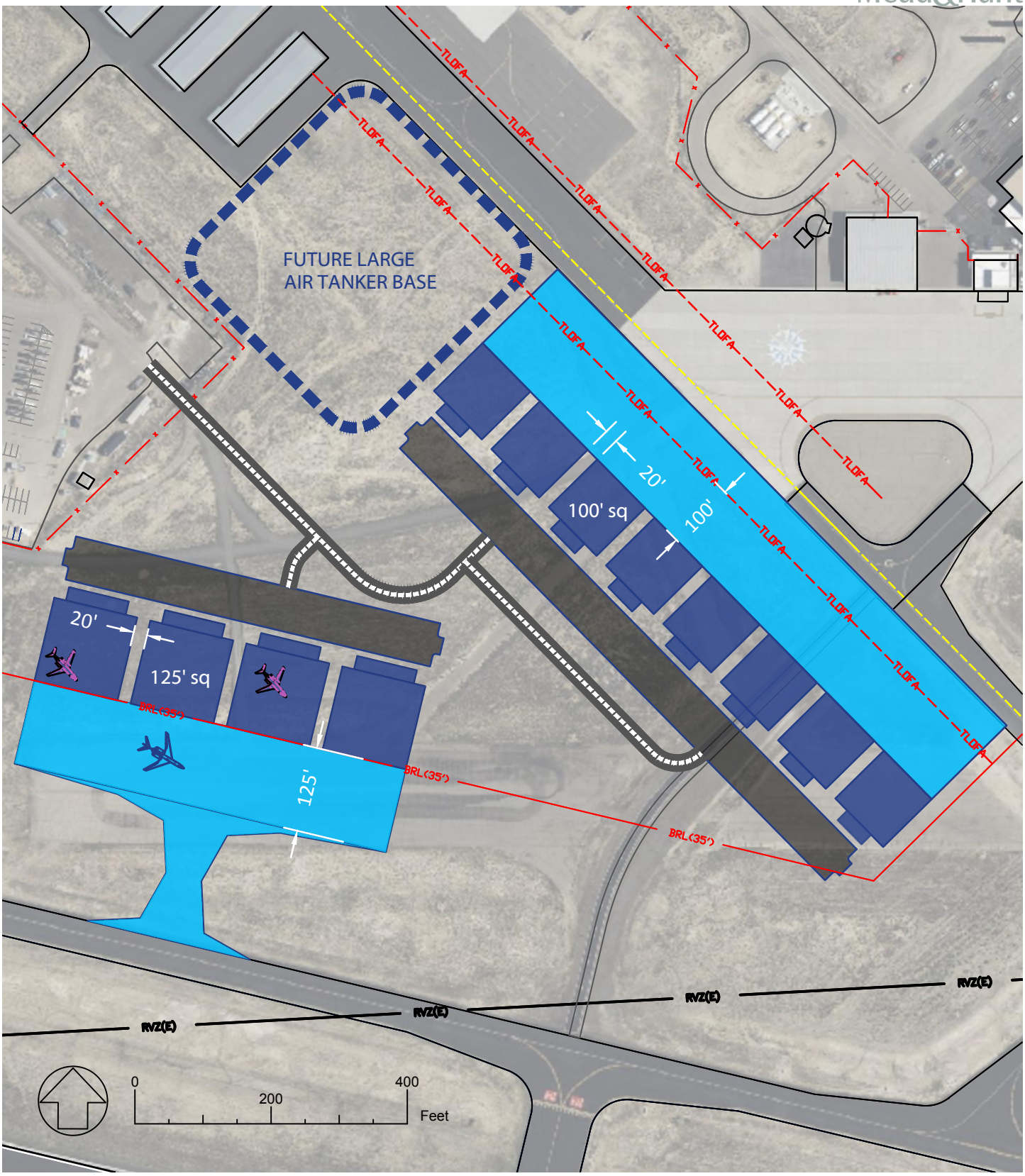


FIGURE 4.8

Large Hangar Development Area - Alternative 1

Large Hangar Development Alternatives

Concerning covered parking for business jet aircraft types, two alternatives have been prepared for large hangar development at RKS. Both alternatives construct hangars to the east of the existing terminal building. Alternative 1, shown in **Figure 4.8**, presents a large hangar layout that provides space for eight 100 foot by 100 foot hangars adjacent to Apron E. Included in this layout is four 125-foot by 125-foot hangars adjacent to Taxiway A. Alternative 2, shown in **Figure 4.9**, presents a large hangar configuration with eleven 100-foot by 100-foot hangars adjacent to Apron E. Access would be provided to these hangars by two taxilanes. Alternative 2 also proposes the construction of an additional 100 foot by 100-foot hangar accessed via Taxiway A as well as three 125-foot by 125-foot sized hangars.

Alternative 1 (**Figure 4.8**) offers a linear hangar layout, simplifying and reducing the cost of utility installation. For the group of hangars near Taxiway A, Alternative 1 accommodates four hangars, each measuring 125 foot by 125 foot. For these hangars Alternative 2 (**Figure 4.9**) presents some limitations. For instance, due to space constraints, one of the hangars near Taxiway A in Alternative 2 must be downsized to 100 ft by 100 ft. Airport staff has indicated that they have received interest from multiple developers in the 125 foot by 125 foot size hangars and would like to reserve space for as many of this size hangar as possible.

When considering the 100 foot by 100 foot hangars near Apron E in both alternatives, Alternative 1 accommodates 8 hangars, whereas Alternative 2 accommodates 11 hangars in two rows. A drawback of Alternative 1 is the north-facing hangars, which pose challenges during winter at RKS due to snow accumulation and limited sunlight. To make Alternative 1 viable for year-round use, additional infrastructure such as heated concrete and strategic snow removal may be necessary.

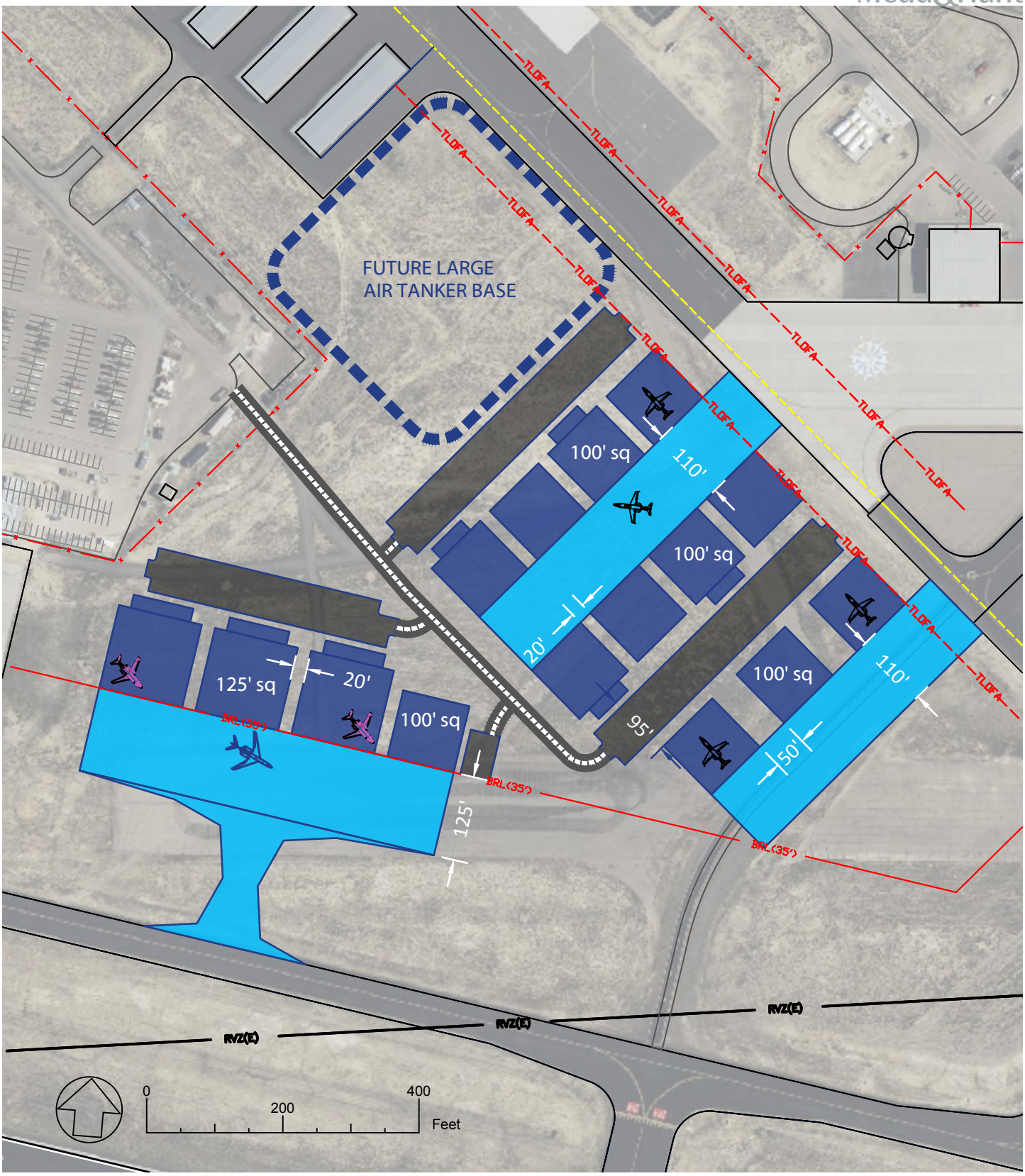


FIGURE 4.9
Large Hangar Development Area - Alternative 2

Southwest Wyoming Regional Airport

Small Hangar Development Option

In addition to providing area for more large aircraft hangars, more small aircraft hangars are needed to accommodate single- and twin-piston engine types. Land adjacent to Apron E near the existing T-hangar area offers a development area to expand small aircraft hangars. **Figure 4.10** presents an option to construct and place hangars in this area. As shown in the graphic, a variety of 50 foot by 50 foot, 60 foot by 60 foot, and 70 foot by 70 foot hangars can be configured in this area at the west end of Apron E. Apron E is also expanded to provide access in this development option. This taxilane configuration provides the layout structure for development in this area and provides some flexibility for the width of hangars in this area.

FIGURE 4.10

Small Hangar Development Concept

Southwest Wyoming Regional Airport

4.7 RECOMMENDED CONCEPTUAL DEVELOPMENT PLAN

Based on analysis of the development concepts and alternatives presented in this chapter and input from Airport staff, the recommended conceptual development plan (CDP) illustrated in **Figure 4.11** was developed. The recommended CDP will be presented to the Study Committee for review and comment and also shared at the public open house on January 31, 2024. Following incorporation of comments, if necessary, a revised CDP will be prepared along with a project list and planning level cost estimates for the recommended improvements. The project list and cost estimates will be used to develop the Financial Implementation Analysis in **Chapter 5**.

In addition to the development concepts presented in this chapter, there are several other recommendations illustrated on the CDP related to land acquisition and land swap, and pavement improvement projects that will be incorporated into the Master Plan project list and resulting Capital Improvement Plan (CIP). These are described below.

Land Acquisition/Land Swap Areas

There are several areas of land currently owned by the Rock Springs Grazing Association (RSGA) that are recommended for future acquisition and associated areas on Airport property that are shown as land swap areas on the CDP. Ideally, the land swap areas could be exchanged with the Grazing Association for the land acquisition areas. The primary intention of the acquisition areas is for the Airport to obtain ownership control of areas in RPZs that are currently only controlled through avigation easements. At the east end of the airport there is also a triangle proposed for acquisition that would expand the adjacent future non-aeronautical development area.

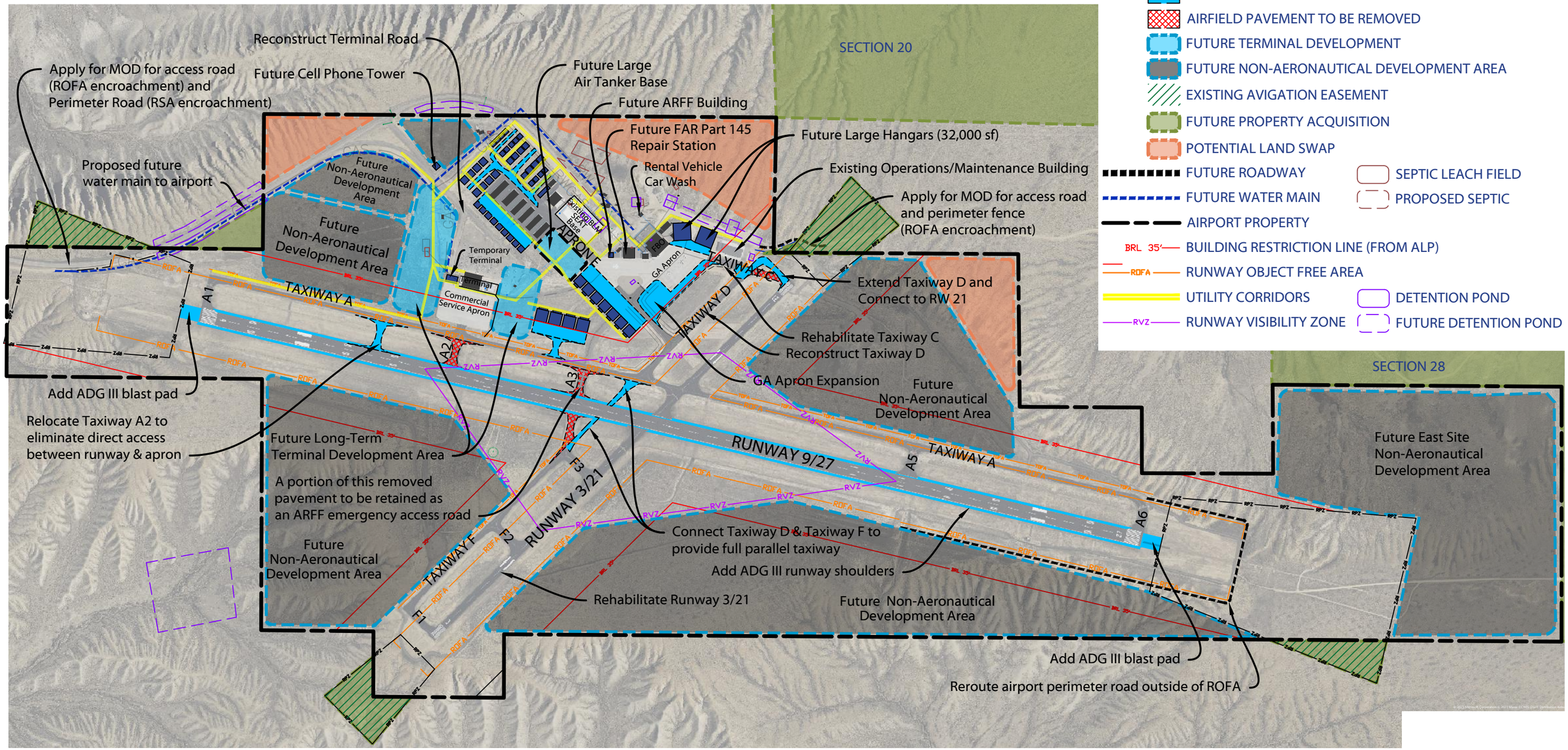
Areas of land in Sections 20 and 28 that are owned by the Bureau of Land Management (BLM) are also illustrated as potential acquisition areas on the CDP. If acquired, these areas of land would be used for non-aeronautical purposes to support self-sustainability of the airport.

Pavement Improvement Projects

Based on the results of the Airfield Pavement Evaluation and Strategy Report (see **Appendix E – Pavement Conditions Survey**), the following improvement projects are noted on the CDP and will be incorporated into the Airport's CIP.

- Reconstruct Taxiway D (as soon as practical)
- Rehabilitate Taxiway C (in the four-to-five-year time frame)
- Rehabilitate Runway 3/21 (in the five-to-six-year time frame)
- Reconstruct the existing Terminal Rd. (as soon as practical)
- Continue regular maintenance and repair on Runway 9/27.

Pavement improvement projects for pavements not included in the Pavement Conditions Survey will also be incorporated into the CIP.



LEGEND

- FUTURE BUILDING
- FUTURE AIRFIELD PAVEMENT
- AIRFIELD PAVEMENT TO BE REMOVED
- FUTURE TERMINAL DEVELOPMENT
- FUTURE NON-AERONAUTICAL DEVELOPMENT AREA
- EXISTING AVIGATION EASEMENT
- FUTURE PROPERTY ACQUISITION
- POTENTIAL LAND SWAP
- FUTURE ROADWAY
- FUTURE WATER MAIN
- AIRPORT PROPERTY
- BRL 35' — BUILDING RESTRICTION LINE (FROM ALP)
- ROFA — RUNWAY OBJECT FREE AREA
- UTILITY CORRIDORS
- RVZ — RUNWAY VISIBILITY ZONE
- SEPTIC LEACH FIELD
- PROPOSED SEPTIC
- DETENTION POND
- FUTURE DETENTION POND

0 1000 2000 Feet

FIGURE 4.11
CONCEPTUAL DEVELOPMENT PLAN

Southwest Wyoming Regional Airport

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