DEVELOPMENT ALTERNATIVES

7

TABLES

FIGURES

CHAPTER SEVEN

DEVELOPMENT

This chapter brings together many of the previous elements of this airport master plan in order to identify the development options that will best meet the needs of Cedar City Regional Airport (CDC), the community, and align with the strategic vision of the airport sponsor. Each of the facilities described in Chapter 4, Airside and Landside Inventory, were analyzed in Chapter 6, Facility Requirements, to determine if any improvements are needed in order to safely and efficiently accommodate the forecasted activity levels discussed in Chapter 5, Forecast of Aviation Activity, or to meet new or updated standards developed and adopted by the Federal Aviation Administration (FAA) or other regulatory agencies.

The following approach was used to identify and evaluate each of the potential development options:

- Identification of alternative ways to address facility requirements.
- Evaluation of the alternatives, individually and collectively, to develop a thorough understanding of the strengths, weaknesses, and implications of each option.
- Potential alternatives were refined after being presented to the technical advisory committee (TAC), community advisory committee (CAC), and to the public for discussion and feedback.
- Selection of the preferred alternative by the airport sponsor.

7.1. Introduction

The alternatives analysis evaluates various development options to address the needs of the airport sponsor and users. This chapter brings together many of the previous elements of this airport master plan to aid in determining a development strategy. Previous chapters outlined the existing airport structures and pavements, current and future operational levels, and airport deficiencies. This chapter integrates that background information to formulate a plan for development.

As established in Chapter 6, Facilities Requirements, the airport complies with FAA design standards for the current and future conditions. Therefore, priorities include siting an airport traffic control tower (ATCT), infrastructure needed for access to development areas, land use planning, hangar development, and other support infrastructure. Additionally, the alternatives include consideration of how the airport will integrate with the proposed Utah Army National Guard facility on the northwest side of the airport.

Generally, the alternatives analysis begins by identifying development solutions starting with the most restrictive development options to ensure those elements are planned appropriately before moving on to more flexible support facilities. Some elements, such as apron and hangar development, are an extension of the existing land use and do not necessarily require a formal alternatives analysis. A key objective of this chapter is to confirm and refine the proposed land use depicted on the airport layout plan (ALP).

Public involvement is an essential component of the airport master planning process. The alternatives described in this chapter were presented to stakeholders, including the technical advisory committee, community advisory committee, and the public, at an open house event. Feedback was gathered through these meetings to help understand what was important to the community which aided in refining alternatives. Ultimately, the sponsor determines the preferred alternatives for airport development.

7.2. Runway Alternatives

Runways are the most critical components of airport infrastructure, serving as the primary surfaces for aircraft takeoff and landing operations. The design must accommodate the current and future need while adhering to regulatory requirements. This section identifies the strategic planning considerations for the airport's runways. It focuses on their capability to support existing traffic and allow future growth. It discusses the potential of runway extensions, the impact of a changing fleet mix, and the importance of preserving areas for aeronautical use.

7.2.1. Runway 2/20

As identified in the facility requirements chapter, Runway 2/20 meets the needs for the existing and future airport condition. Previous planning efforts have preserved the option for an ultimate runway extension to 10,000 feet, which is being retained with this plan. Given the transitioning fleet of commercial airlines, and the potential for expanded service at CDC, protecting for a future runway to accommodate larger aircraft is justified. Additionally, a runway extension would accommodate the U.S. Forest Service (USFS) very large air tankers (VLAT) which occasionally operate at the airport. Current very large air tanker operations are weight limited due to the pavement strength and length of the runway. While there are no plans to base a very large air tanker at CDC, protecting for a future runway extension remains a strategic consideration.

7.2.2. Runway 8/26

Runway 8/26 is not eligible for federal funding due to the sufficient wind coverage provided by the primary runway. Runway 8/26 was reconstructed in 2019 using local and state funds and continues to be maintained with such funds. The future of the runway remains an ongoing discussion between the city and state. Having recently been reconstructed, Runway 8/26 has a projected useful life of 20 years with proper maintenance from the time it was reconstructed. Nonetheless, as the pavement ages, the maintenance necessary to uphold its integrity throughout its useful life will become progressively more costly. At some point decommissioning Runway 8/26 may become more desirable than locally funding the maintenance.

The current runway configuration at CDC presents operational challenges. The division of eastern hangar development into north and south sections created operation and developmental inefficiencies. During meetings with stakeholders, it was noted that concurrent use of Runway 8/26 while Runway 2/20 is active does occur on occasion and can unexpectedly affect the flow of operations on Runway 2/20. The primary users of Runway 8/26 include Southern Utah University (**SUU**) helicopter students and several tenants with aircraft based near Runway 26. The Southern Utah University helicopter flight department avoids the use of Runway 8/26 as much as possible and indicated their operations would be unaffected by the decommissioning of the runway.

An evaluation was conducted to compare decommissioning the runway versus self-funding its maintenance, as detailed in Table 7.1. The financial impacts and developmental constraints associated with maintaining the runway pose significant challenges to the airport's long-term financial sustainability. Therefore, decommissioning the runway ranks highest in the evaluation. While maintaining Runway 8/26 offers some convenience, this benefit is limited and adds operational complexity for most users. Consequently, the convenience aspect was rated a 3 out of 4.

Overall, decommissioning the runway appears a financially prudent option However, given the current pavement is in good condition, an immediate decision is unnecessary. Should the city decide to no longer support the crosswind runway, it is important the area be maintained as aeronautical use. The development alternatives proposed in this study incorporate a phased approach, assuming the runway will be converted into a taxiway in the mid- to long-term planning period.

Table 7.1: Runway 8/26 Evaluation Matrix

Evaluation Criteria	Decommission Runway	Maintain Runway
Financial Impact	4	1
Development Opportunity	4	1
Ground Operations	4	2
Runway Crossings	4	1
User Convenience	2	3
Total	**18**	**8**

Poor	Fair	Good	Excellent
1	2	3	4

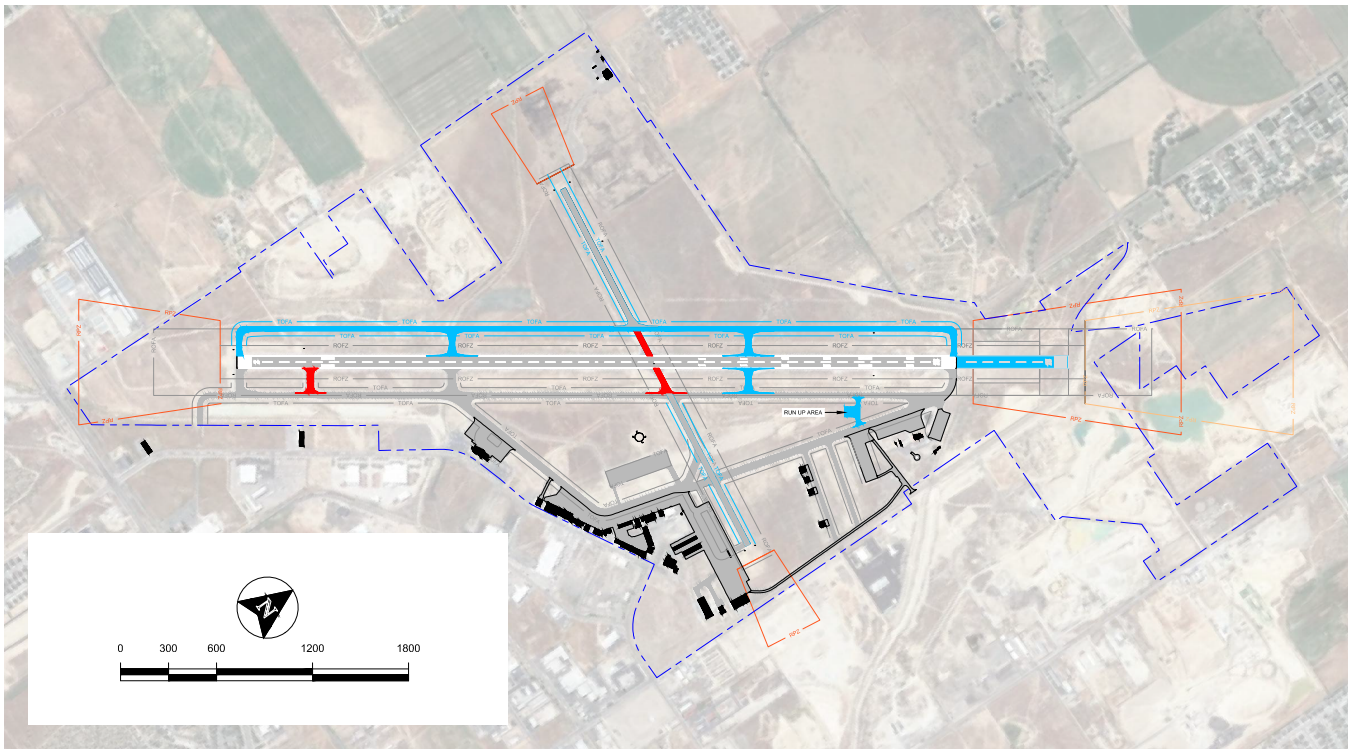
7.3. West Side Taxiway Access

The west side of the airport has been protected for ultimate hangar development in previous planning studies, and that approach is carried forward in this study. Additionally, the Utah National Guard has plans to construct an army aviation support facility off airport property, to the northwest. Although agreements and planning are still underway, the airport needs to plan for the integration of this facility via taxiway access that will integrate with future development of the area.

Because taxiways are regulated by FAA design standards, it is prudent to protect the space needed so development does not encroach on the potential taxiway. Therefore, a full-length parallel taxiway on the west side of Runway 2/20 is included as a development option to preserve the space and provide a conceptual idea of the layout. Ultimately, the buildout of the taxiway will be based on a phased approach, being built in sections as access to the west side of the airport becomes necessary.

Figure 7.1 presents the ultimate runway and taxiway condition of the airport, including the primary runway extension, full parallel taxiway for west side access, and the conversion of the crosswind runway into a taxiway. Design standards dictate the primary runway cannot have a taxiway crossing in the middle third, therefore the proposed taxiway connectors and crossings remain outside of the middle third for the future and ultimate runway length to ensure FAA compliance. Additionally, the layout includes elements being carried forward from the previous airport layout plan including the removal of Taxiway Connector D2, and a run-up area near the Runway 20-end. This layout will be used throughout the rest of the alternatives analysis to ensure the ultimate layout will not be impacted by planned development, and to ensure appropriate access is provided for all development areas of the airport.

Figure 7.1: Ultimate Runway and Taxiway Layout



LEGEND

- AIRPORT BOUNDARY
- ROFA — RUNWAY OBJECT FREE AREA
- ROFZ — RUNWAY OBJECT FREE ZONE
- TOFA — TAXIWAY OBJECT FREE AREA
- RPZ — RUNWAY PROTECTION ZONE
- RPZ — FUTURE RPZ
- EXISTING PAVEMENT
- PROPOSED PAVEMENT
- EXISTING BUILDING
- PAVEMENT REMOVAL

Source: Ardurra

7.4. Airport Traffic Control Tower Alternatives

A preliminary airport traffic control tower (ATCT) siting was completed as part of this master plan and is a requirement of the FAA to be depicted on the ALP for consideration of development. The FAA recommends a three to five acre plot for siting. Once the airport has applied for an airport traffic control tower and funding has been secured, the FAA will conduct a separate siting study to finalize the location. Because of the large footprint needing to be preserved for an airport traffic control tower, it influences how other development is planned, and therefore is a key consideration for development alternatives.

The FAA guidance for siting an airport traffic control tower is found in FAA Order 6480.4B, *Airport Traffic Control Tower Siting Process*, which outlines criteria to consider for each potential airport traffic control tower site. The criteria are listed in terms of emphasis, in descending order. The analysis performed for this master plan is not a technical siting analysis and did not thoroughly investigate the siting criteria for each location. For this analysis, the criteria were used as guidance to determine six preliminary locations, with the preferred three identified on the airport layout plan for a future technical siting study. The criteria are listed as follows:

1. Limit impacts to instrument approach procedures.
   - The site should not adversely impact any current or planned instrument approach procedures or penetrate any safety areas or protected airspaces.

2. Limit impacts to communication, navigation, and surveillance equipment.

3. Visibility Performance Requirements
   - The tower must have an unobstructed view of all movement areas (e.g., runways, and taxiways).
   - An air traffic controller must be able to detect an object on all surfaces at least 95.5% of the time.
   - The minimum line of sight angle should be equal to or greater than 0.80 degrees.

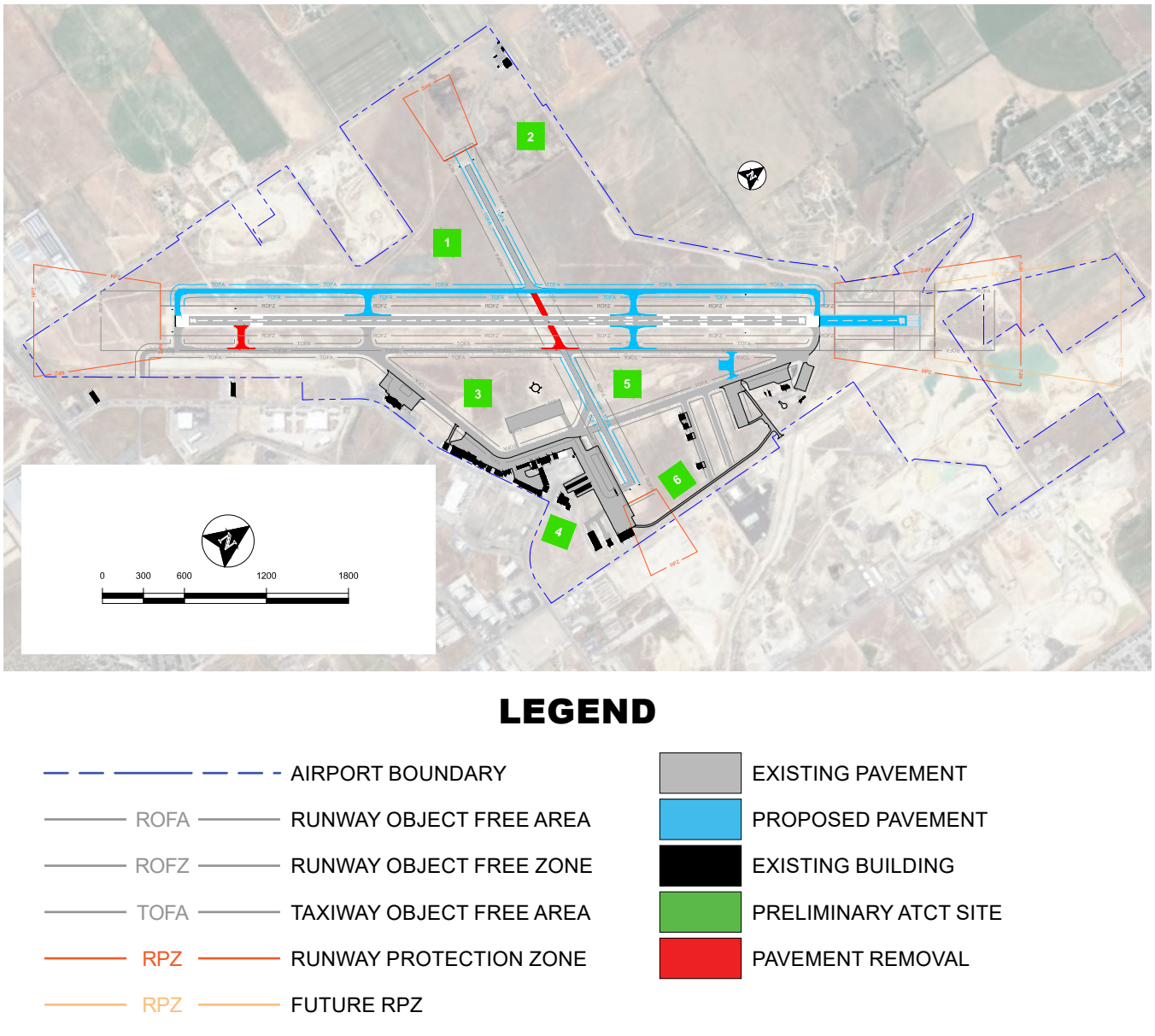
4. Operational Requirements
   - The tower must be orientated where the primary operational view avoids direct glare or indirect glare off other surfaces. The first choice is to have it facing north or alternately east, or west, or finally south.
   - Visibility of all airport surfaces should be considered.

5. Economic Considerations.
   - Considerations such as tower height, land use planning, utilities and cabling, site access, and security should be considered.

7.4.1. Preliminary Site Selection

Figure 7.2 depicts the location of the preliminary tower locations. The area east of the commercial terminal was discussed as a potential tower location. However, it was determined it could hinder any future terminal expansion. Consequently, stakeholders agreed that location was not a feasible option for a tower and was removed from consideration.

Figure 7.2: Preliminary Airport Traffic Control Tower Sites



Source: Ardurra

7.4.2. Preliminary Site Evaluation

Following the guidance in FAA Order 6480.4B, *Airport Traffic Control Tower Siting Process*, six preliminary sites were identified and analyzed. Using the FAA's Air Traffic Control Visibility Analysis Tool, a preliminary height evaluation was conducted for each tower site. This height analysis does not consider line of sight for any existing or planned development. Therefore, heights are subject to change with a subsequent technical analysis. As depicted in Table 7.2, the closer the tower is to the runway, the taller it must be to ensure the same level of visibility a shorter tower would have if it were situated further away. This is to maintain an unobstructed line of sight for the entire runway and controlled movement areas at the airport.

In addition to height, the evaluation included impacts to Part 77 surfaces, ground access, impacts to infrastructure, environmental considerations, and cost using a high-level estimation. Each site was ranked on its performance meeting each criterion on a scale from 1 to 4, with 1 being poor and 4 being excellent. Table 7.2 provides a summary of comparison for the sites, and identifies sites 2, 4, and 6 to be carried forward to the airport layout plan.

Table 7.2: Airport Traffic Control Tower Evaluation Matrix

Evaluation Criteria	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6
Tower Height	92 feet	78 feet	67 feet	27 feet	56 feet	46 feet
Minimum Eye Level	1	1	2	4	2	3
Part 77	1	3	2	4	2	4
Ground Access	2	4	1	4	1	2
Infrastructure	1	2	1	3	1	2
Environmental	3	3	3	3	3	3
Cost	1	2	1	3	1	2
Total	**9**	**15**	**10**	**21**	**10**	**16**

Poor	Fair	Good	Excellent
1	2	3	4

7.4.3. Selection of Preferred Sites

A secondary assessment was completed for consideration during the FAA's technical siting assessment, with site 4 being the preferred site, as depicted in Table 7.3. All three locations will be identified on the airport layout plan.

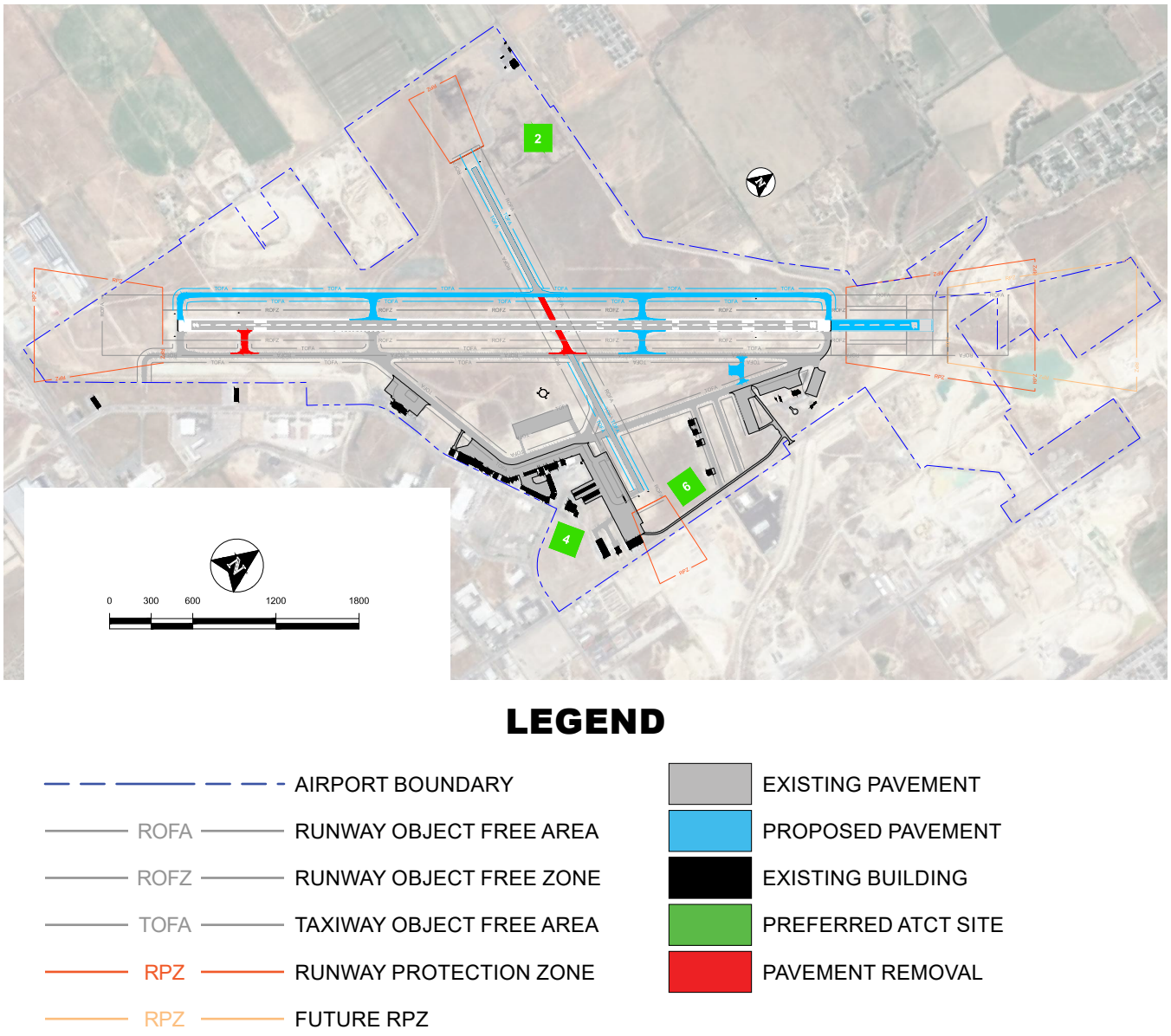
Table 7.3: Secondary Airport Traffic Control Tower Site Assessment

Evaluation Criteria	Site 2	Site 4	Site 6
Impacts to Development	**Poor location regarding primary traffic pattern, very tall height requirement.**	**May be subject to height requirements based on existing facilities. Impacts ultimate hangar development area.**	**May be subject to height requirements based on existing facilities. Impacts prime, near-term hangar development area.**

Poor	Fair	Good	Excellent
1	2	3	4

Figure 7.3 depicts the preferred tower sites that will be identified on the airport layout plan for future technical analysis by the FAA.

Figure 7.3: Preferred Airport Traffic Control Tower Sites



Source: Ardurra

7.5. Hangar Development

Although the number of hangars at CDC meets the state plan objective, both this master plan and the *2020 Utah Aviation Development Strategy* identify CDC as being deficient due to the hangar waiting list. As identified in the forecast, the number of based aircraft at CDC is expected to increase from 100 in 2022 to 136 by 2042.

There is space available at CDC that has long been protected for hangar development and will be carried forward as such, albeit with changes to the layout. Once a property has been designated for aeronautical use and hangar development, there is flexibility in how the area is built out, which is largely determined by the developer's needs.

Industry and regional trends have indicated an increase in the development of large maintenance, repair, overhaul (MRO) and fixed base operator (FBO) facilities being established at airports. Because of the prime real estate available at CDC, and the economic growth being experienced, a large area previously identified for general aviation hangars is now being looked at for a potential future FBO/MRO facility with larger hangars to accommodate business and corporate aircraft.

In conjunction with hangar development is the growing concern for public vehicle parking. Therefore, the hangar layouts identify associated vehicle parking for use in those areas. Figure 7.4 depicts an overview of the ultimate hangar development areas, and Figure 7.5 focuses on the near to mid-term planning period with a more detailed conceptual layout of the primary hangar area. The conceptual hangar area shown in Figure 7.5 is expected to be large enough to accommodate all additional forecasted based aircraft over the 20-year planning period if the airport traffic control tower is not located on that site. The following are important design elements that should be considered during the design and implementation of hangars and infrastructure in this area:

Airspace

Full implementation of the buildout is not possible if Runway 8/26 remains active because buildings would penetrate the Part 77 transition surface. The large FBO/MRO hangar is sited to the north to enable near-term development compatible with Runway 8/26. Figure 7.5 shows the 30-foot building restriction line (BRL). Buildings inside of the building restriction line closer to Runway 8/26 would need to be progressively shorter to comply with Part 77 requirements.

Vehicle Access

Currently, there is no public access to the future hangar development area. Tenants and users must access a gate (either off Airport Road adjacent to the Bureau of Land Management (BLM) apron or within the T-hangar areas) and drive along a vehicle service road (VSR) parallel to Airport Road inside the airport's fence. The concept in Figure 7.5 proposes a public road into the area, enabling hangar development with public parking and access on one side of the building.

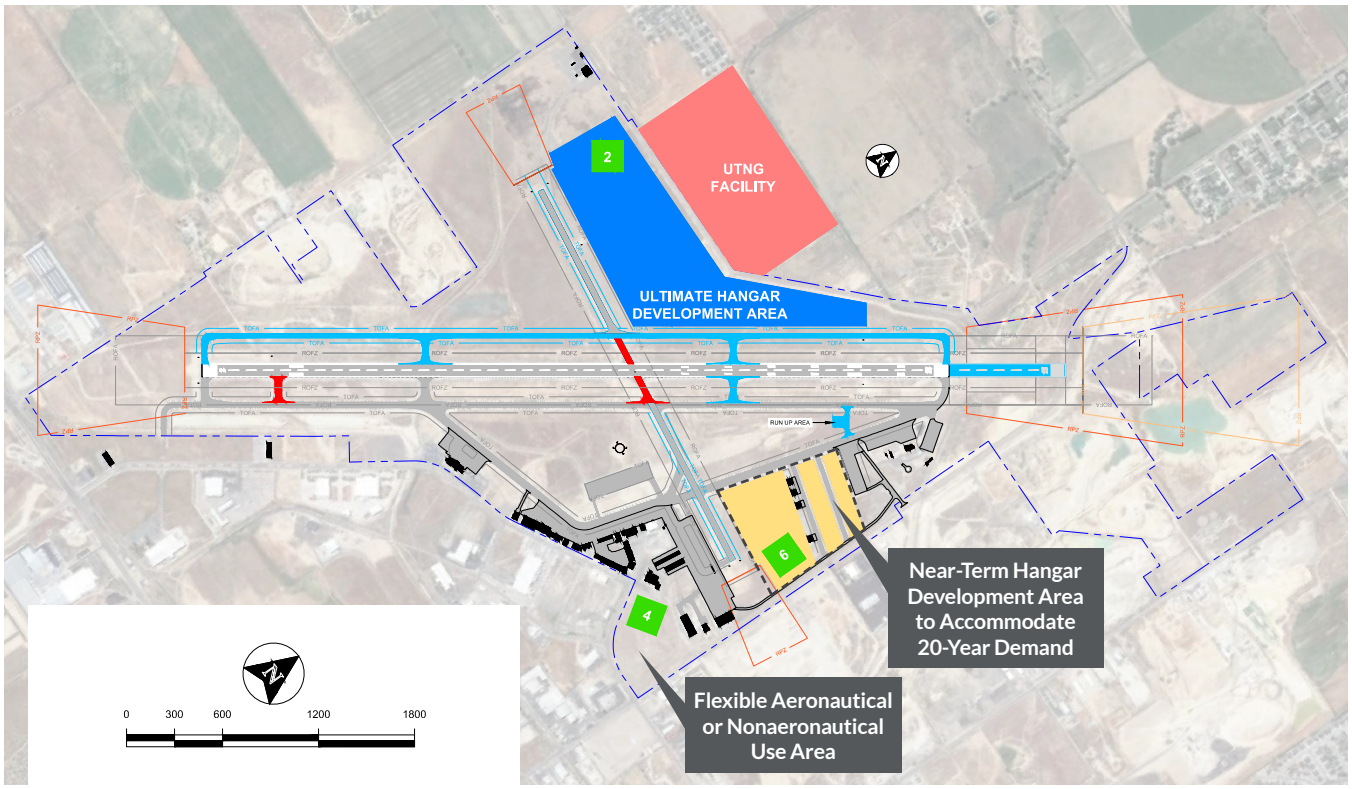
The key to this plan is ensuring fuel trucks have a route between the current FBO and the Bureau of Land Management apron. Currently, they use the vehicle service road parallel to Airport Road. Introducing a public road into the development area would sever this vehicle service road with a security fence, necessitating two electric gates (one on each side) to allow fuel trucks to move efficiently to the Bureau of Land Management apron, as they cannot use public roads. To compensate, the study proposes a vehicle service road parallel to Taxiway C, outside the object-free area, which would be highly advantageous but can only be implemented after Runway 8/26 is decommissioned. Future planning should consider the drainage requirements of the proposed vehicle service road and its impact on existing stormwater retention areas.

There are various ways to configure the hangar development area to accommodate hangars of different sizes and allow public access. The concept developed in this study maximizes the number of hangars by replacing public roadways and parking areas. Depending on demand, this plan can be adjusted to include more public roadways and parking areas.

The southeast corner of land, where airport traffic control tower Site 4 is located, was previously planned for corporate hangar development of medium sized box hangars. Considering the hangar development area on the north side of Runway 8/26 is now planned to accommodate all sized general aviation aircraft through the planning period and includes plans to bring in public road access, the southeast corner may be better suited for a non-aeronautical revenue generating use. This area benefits from visibility and roadway access via Kitty Hawk Drive and North Airport Road, making it suitable for a variety of future uses. Therefore, the following recommendations are made for this area:

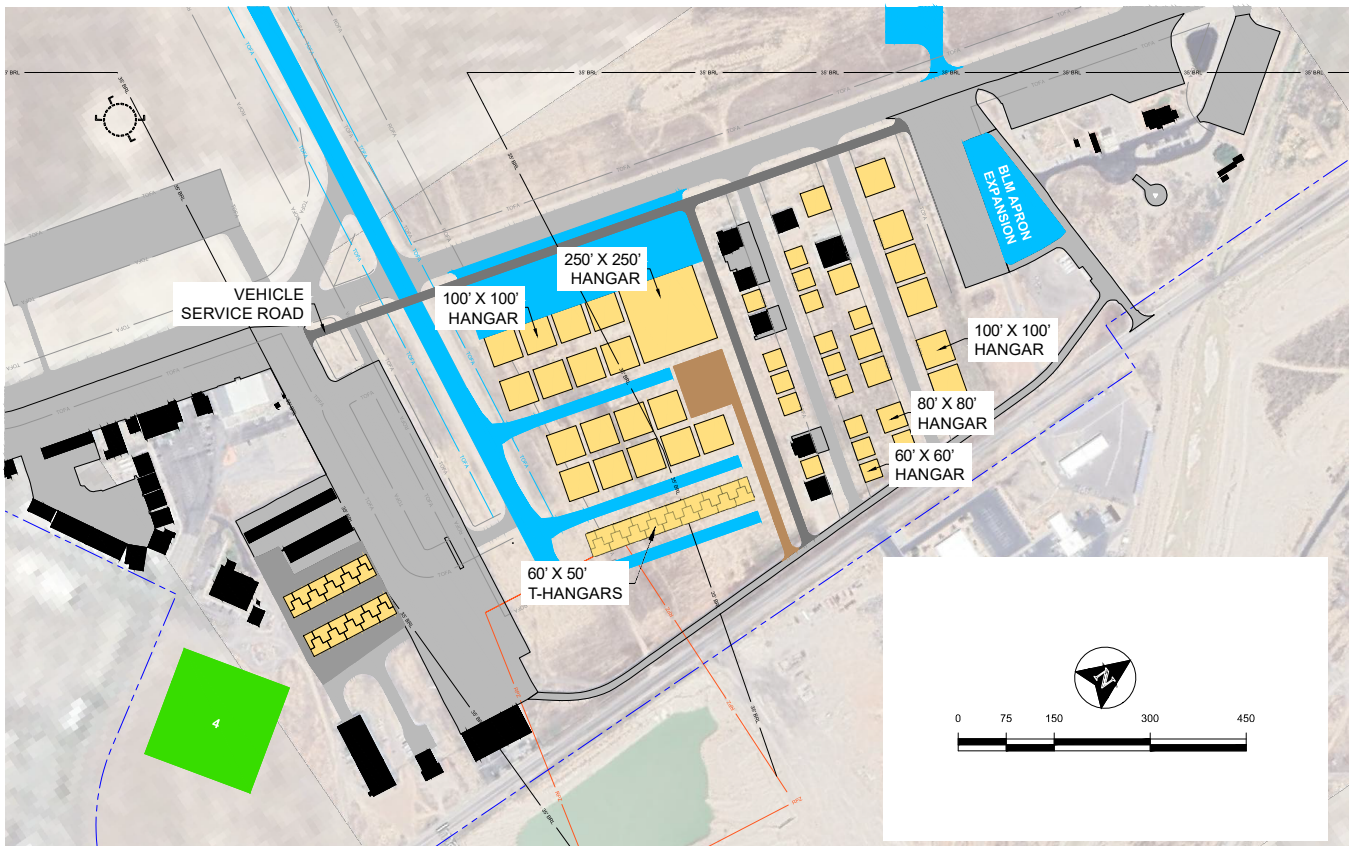
- Preserve the land that may be needed for an airport traffic control tower site – do not lease or allow development of that site until the FAA determines the final airport traffic control tower site.
- If the site is not selected for the airport traffic control tower, consider developing the outer portion (closest to the road) with non-aeronautical uses. Consideration should be given to developing the inner portion with aeronautical uses. This area may be a mixed-use area supporting both aeronautical and non-aeronautic functions should the opportunity and need arise.

Figure 7.4: Ultimate Hangar Development Layout



Source: Ardurra

Figure 7.5: Primary General Aviation Hangar Area Layout



LEGEND

- AIRPORT BOUNDARY
- ROFA — RUNWAY OBJECT FREE AREA
- TOFA — TAXIWAY OBJECT FREE AREA
- RPZ — RUNWAY PROTECTION ZONE
- BRL — BUILDING RESTRICTION LINE
- EXISTING PAVEMENT
- PROPOSED PAVEMENT
- EXISTING BUILDING
- PROPOSED BUILDING
- POTENTIAL ATCT SITE
- PROPOSED ROAD AND PARKING

Source: Ardurra

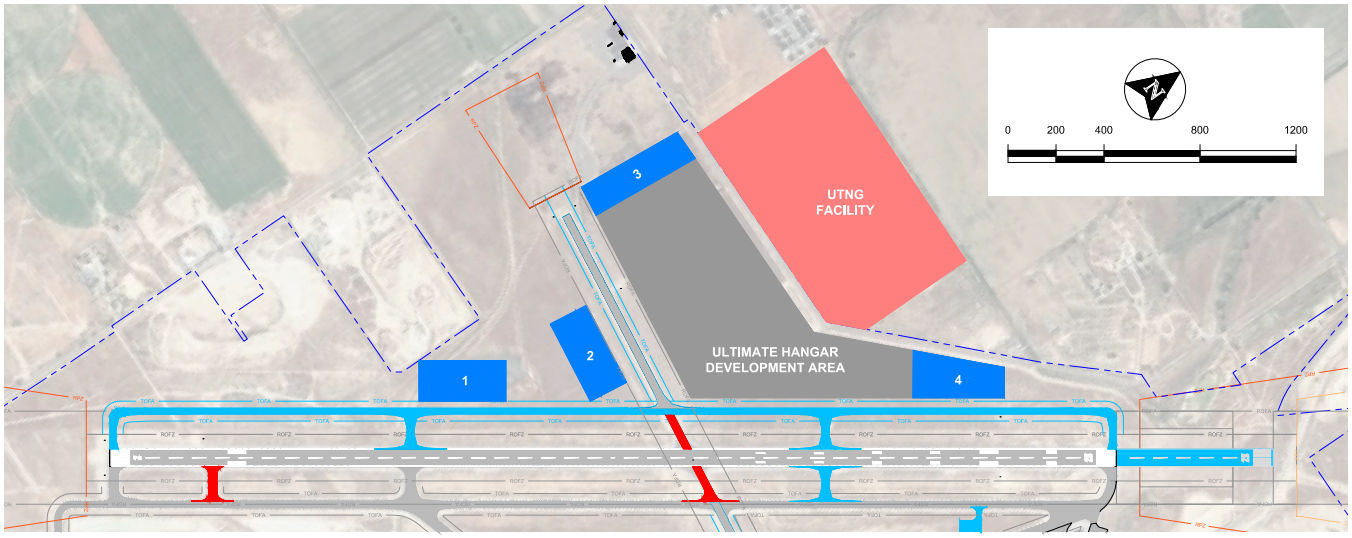
7.6. Aircraft Tiedowns

The number of tiedowns and apron is sufficient for based General Aviation and transient aircraft. However, during the fire season, there are occasions when additional agency aircraft are needed to support the firefighting effort. The Color Country Interagency Fire Center does not have excess space to park these aircraft, therefore, additional aircraft are staged on the transient apron, or the helicopter parking area. This puts a mild seasonal constraint on the transient apron, and logistically incumbers the agency aircraft, as they are parked away from the base. Therefore, it is recommended that an area is preserved for additional apron to accommodate large aircraft parking adjacent to the fire center apron, as depicted in Figure 7.5.

7.7. Cargo Apron and Processing Center

The city-owned facility used by FedEx is sufficient for today's small cargo feeders that connect from CDC to larger regional facilities such as those at Salt Lake International Airport. However, due to new development occurring near the airport, including at the Iron Springs Inland Port, there is potential for significant growth in air cargo. The level of air cargo that could be expected and would be the next step up from regional feeders would likely include use of Boeing 737 sized aircraft that would connect to larger cargo hubs. To serve that level of air cargo activity, an area of approximately six acres may be needed to accommodate a cargo processing apron and facility. Figure 7.6 presents potential sites for a future cargo operating area that could support large aircraft and an associated sorting facility.

Figure 7.6: Cargo Apron Development Alternatives



Source: Ardurra

An evaluation matrix was developed to determine the most suitable location, presented in Table 7.4.

The matrix criteria included taxiway access, for which every location would need some extension for access. Location 1 scored best for this criteria based on the ease at which it could be connected to the existing airfield, as well as be integrated into the ultimate development.

Public road access is a critical component for cargo operations, which will enable large trucks ease of access to and from the apron. Locations 3 and 4 scored the highest on this criterion as they are located directly off the existing road.

Table 7.4: Cargo Apron Evaluation Matrix

Evaluation Criteria	Site 1	Site 2	Site 3	Site 4
Taxiway Access	4	2	1	3
Public Road Access	2	2	4	4
Impact to Existing Infrastructure	4	4	4	3
Implementation Feasibility	4	4	1	3
Total	**14**	**12**	**10**	**13**

Poor	Fair	Good	Excellent
1	2	3	4

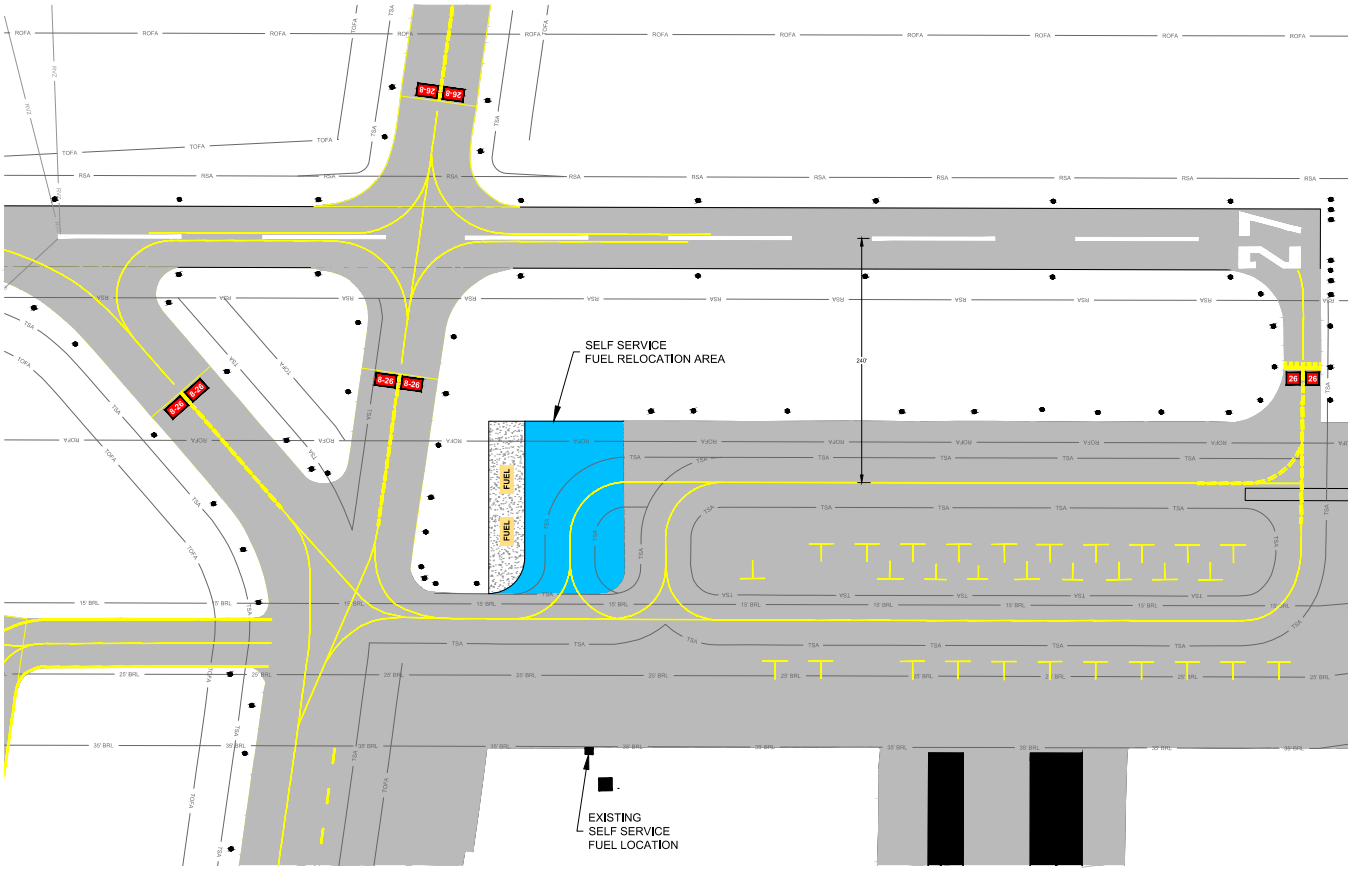
7.8. Support Facilities

This master plan evaluated and proposed strategic improvements to infrastructure elements, including the relocation of the self-serve fuel station and the adjustment of the airport beacon. These enhancements are aimed at optimizing operational efficiency, safety, and overall functionality of the airport.

7.8.1. Aircraft Fuel Facility Alternatives

The relocation of the self-serve fuel station was a recommendation in previous planning efforts and has been confirmed through this master plan. The current location has proven to be inefficient and can hinder the maneuvering of aircraft in and around the parking apron. By relocating the fuel station to a more strategic position, it will be better situated to support the existing operations, and positioned to support the continued growth as development occurs around the airport. Figure 7.7 identifies the location for the relocated fuel tanks.

Figure 7.7: Recommended Self-Service Fuel Station Location



Source: Ardurra

7.8.2. Airport Beacon

In 2018, the airport beacon was replaced with a taller beacon remaining in the same location. However, subsequent development at the airport has obscured the beacon from certain locations around the airport. To address this issue, it is recommended the beacon remain in its current position but be heightened further to ensure visibility from all directions and altitudes within the vicinity of the airport. Maintaining the beacon in its existing location and increasing its height is a cost-effective solution. This approach avoids the need for significant infrastructure changes or the complexities associated with relocating the beacon. Instead, the focus can be on extending the structure to ensure it rises above any obstructions caused by recent development.

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