

5.0 ALTERNATIVE ANALYSIS

The purpose of this chapter is to present and evaluate the comprehensive planning issues and alternatives associated with the future configuration of Central Colorado Regional Airport (AEJ or Airport). This chapter considers the facility demand requirements that were previously determined in **Chapter 4, Facility Requirements**.

This alternatives analysis recognizes input received during previous chapters of this Master Plan, the Planning Advisory Committee (PAC), Airport staff, and the public. Recommendations on individual issues identified in **Chapter 4** are provided, and descriptions of alternatives that warrant further consideration are presented throughout this chapter.

5.1 Development Goals

Realistic development goals are identified in this planning effort to reflect the role of AEJ in the national and state aviation systems and the community. These goals are developed with consideration of both the short- and long-term requirements and include the interests of airport users and the surrounding community. These development goals include the following:

- Provide effective guidance for the future development of AEJ through the preparation of a logical development program that provides a realistic vision to meet future aviation-related demand.
- Conduct analysis that identifies financially feasible projects that maximize use of the limited space available while meeting current and future needs of the community.
- Continue adherence to federal, state, and local design standards and compatible land use.
- Airport development should remain compatible with the surrounding community and the environment on and off airport property.
- Future development alternatives should be developed based upon the most efficient and cost-effective methods that meet the needs of existing and future airport users and the surrounding community.

5.2 Airside & Landside Alternatives

In this chapter, facility requirements that were identified in **Chapter 4** are further evaluated to determine the best strategy to meet the needs of airport users and the community. The alternatives for these facilities have been examined to determine the most efficient and cost-effective method to develop the projects. The alternatives evaluated in this chapter include:

- Crosswind Runway
- Land Acquisition
- North Apron Expansion and General Aviation (GA) Development
- South GA Area Development

5.3 Evaluation Criteria

The following criteria provide the basis of evaluation for each alternative identified in this chapter:

- **Operational Criteria** – the ability to accommodate current and forecasted aircraft, visitors, and vehicles
- **Economic Criteria** – an estimate of costs to provide a basis for comparison of each alternative, as well as the Airport’s ability to fund the improvements
- **Environmental Criteria** – identify thresholds for environmental review, assessments, and permits, where appropriate
- **Feasibility Criteria** – tangible and intangible factors that affect the Airport’s ability to implement certain development projects
- **Compatibility Criteria** – the level of compatibility with existing and future needs of the Airport and the community

5.4 Crosswind Runway

The current runway configuration, 15/33 does not provide adequate wind coverage per FAA guidance (see **Section 2.9.1**) and local pilots note frequent and strong crosswinds. Development of a crosswind runway to address this issue is shown on AEJ’s current airport layout plan (ALP) as ultimate development. Discussions about including a crosswind or emergency runway within the planning period for this Master Plan or depicting it as ultimate improvement outside the 20-year planning period were discussed with the public, PAC, and in local pilot meetings.

Constructing a crosswind runway, as shown in **Figure 5-1**, was evaluated against the specific criteria identified in **Section 5.3**. It was determined that an emergency runway is not feasible per FAA regulations as a runway constructed on a federally obligated airport is required to meet FAA standards.

5.4.1 Operational Criteria

As described in **Section 2.9.1**, Runway 15/33 does not meet the FAA-recommended 95 percent crosswind coverage for all weather conditions for 10.5-knot and 13-knot crosswinds. The addition of a crosswind runway would alleviate this shortfall and meet the needs of existing and future pilots. However, it is important to note that AEJ is a non-towered airport and the alignment of the crosswind with the primary runway could create potential traffic conflicts. In addition, aircraft operating at AEJ are not required to have or use radios, further increasing the potential for traffic conflicts between aircraft operating on the main and the crosswind runways at the same time.

5.4.2 Economic Criteria

AEJ does not qualify for FAA funds to construct or maintain a crosswind runway due to higher funding priorities in the national airport system. Federal funding is not available for the purchase of land for constructing a crosswind runway at AEJ, even if it were of higher priority. Consequently, AEJ is responsible for securing funds to acquire land, construct, and maintain a crosswind runway.

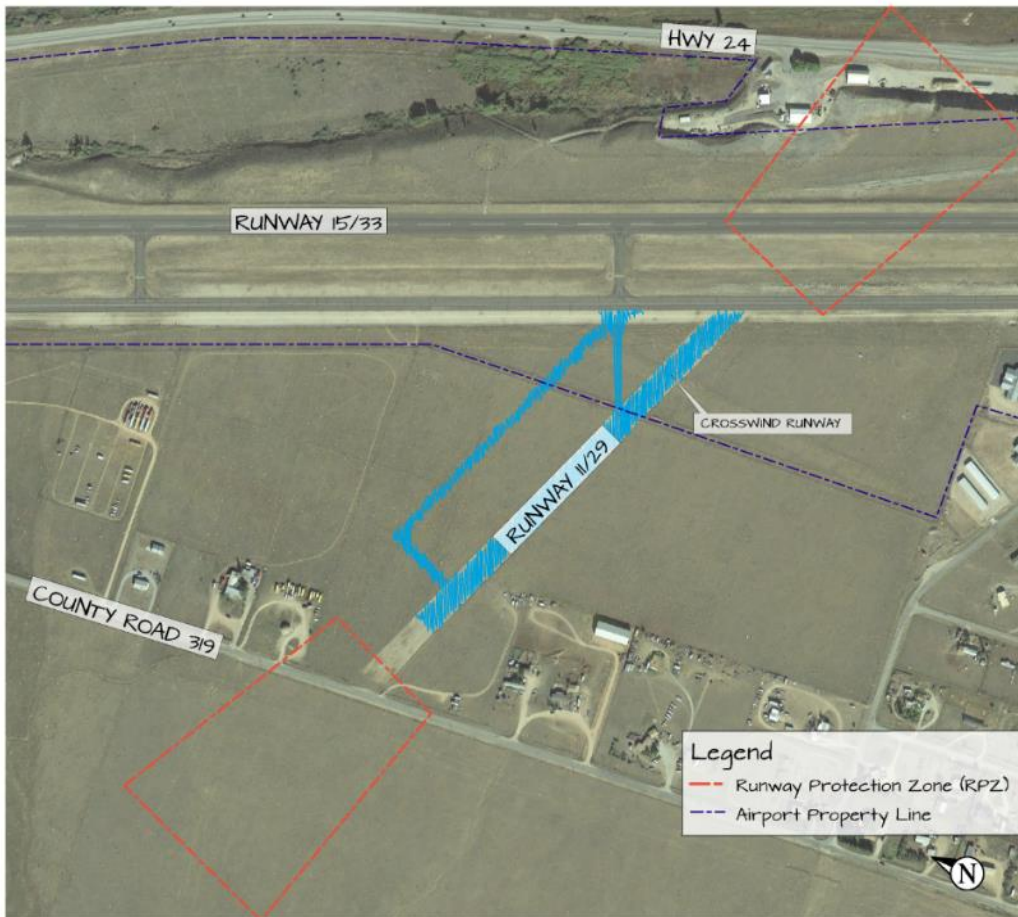
5.4.3 Environmental Criteria

Given the proximity of adjacent residential land use, construction of the crosswind runway requires evaluation of potential socioeconomic effects, noise, lighting, and compatible land use. In *Land Use Compatibility and Airports, a Guide for Effective Land Use Planning*, the FAA indicates that residential land uses are generally considered to be incompatible with airports, specifically due to the noise incompatibility associated with airport environs. Land acquisition is also required to accommodate the runway protection zones (RPZ).

5.4.4 Feasibility Criteria

The primary challenge associated with constructing a crosswind runway at AEJ is that both County Road 319 (CR 319) and U.S. Highway 24 (US-24) would be located within the RPZs, as shown in **Figure 5-1**. As noted in the FAA's September 27, 2012 memorandum, *Interim Guidance on Land Uses within a Runway Protection Zone*, transportation facilities, including public roads/highways, are incompatible land uses and are not to be introduced into an RPZ. This guidance exists as the purpose of an RPZ is to protect persons and property on the ground from aircraft that may experience problems while approaching or departing a runway.

FIGURE 5-1 – CROSSWIND RUNWAY CONCEPT



Note: Not to scale
Source: Jviation

5.4.5 Compatibility Criteria

Given the location of CR 319 and US-24 within each RPZ, a crosswind runway would require FAA evaluation and approval of compatible land use. As it is unlikely the FAA would grant approval for the roadways within the RPZs, rerouting or tunneling a portion of CR 319 and US-24 may be required. While FAA approval may be granted for the location of CR 319 within the RPZ, it would be highly unlikely to gain FAA approval that would allow a major U.S. Highway, US-24, to be located within the RPZ.

5.4.6 Recommendation

As noted in the evaluation criteria, the primary challenge associated with constructing a crosswind runway at AEJ is the project cost without federal funding. The FAA has stated that approval for modification of standards to allow the RPZs to encompass portions of CR 319 and US-24 is unlikely. Therefore, it is recommended that the crosswind runway not be included within the planning period or ultimately.

These constraints were discussed during the Airport Master Plan – Planning Advisory Committee Meeting on July 13, 2015, and the decision was made to eliminate the crosswind runway at this time.

5.5 Land Acquisition

The function of compatible land use, its impact on surrounding land uses, and how AEJ land uses may be impacted by adjacent land uses must be considered for the benefit of all parties. Chaffee County and AEJ have authority over airport land uses and can ensure compatible land use through the fee simple purchase of adjacent airport land. In *Land Use Compatibility and Airports, a Guide for Effective Land Use Planning*, the FAA notes that to meet the current and future needs and continue to contribute to local and regional economies, it is the airport's responsibility to acquire sufficient land for airport expansion and future aeronautical development.

In addition to complying with federal requirements to control land uses adjacent and near AEJ, the Town of Buena Vista must comply with federal grant assurances. Such assurances require a federally-obligated airport sponsor to act to preserve its rights and powers over the airport (see Federal Grant Assurance No.5, Preserving Rights and Powers). Existing through-the-fence (TTF) agreements with adjacent land owners may limit the town's ability to control its rights and powers and consideration should be given to purchasing neighboring properties to eliminate any non-compliant TTF agreements.

The acquisition of a five-acre parcel, located just south of the existing terminal area would expand a constrained development area at AEJ (**Figure 5-2**) and bring a portion of the existing airport protection overlay district into AEJ's control, ensuring land use compatibility. The parcel has access to water, sewer, and electricity. The current owner of the property has informed AEJ they are interested in selling the property.

Acquisition of a 0.74-acre parcel east of U.S. Highway 285 would provide AEJ complete ownership of the Runway 33 Runway Protection Zone (RPZ) with exception to the portion which overlies the

highway. Land ownership of this parcel enables AEJ to protect the underlying portion of the approach from obstructions and incompatible land use. This small parcel is a part of an existing 125.08 acres valued at \$89,643 which belongs to a private local owner¹.

A privately-owned parcel east of Runway 33, valued at \$105,391 includes a portion of the Runway 15/33 runway object free area (ROFA)². The BRL also extends into this parcel. Acquisition of a 9.73-acre portion of this parcel would ensure conformity with current federal requirements to maintain control over object free areas as well as protecting 14 CFR Part 77 surfaces from private development within the BRL.

Three privately owned parcels located west of Runway 15/33 and just north of the recently acquired (July 27, 2015) Carpenter parcels are also of interest to AEJ. The three parcels, currently zoned as “Industrial,” would provide an area for future aeronautical development (**Figure 5-2**). The acquisition of this land will also eliminate an existing TTF that does not comply with current federal requirements and align a portion of the existing airport overlay district with land use compatibility.

5.5.1 Operational Criteria

Acquisition of the six parcels, totaling approximately 78 acres, would expand AEJ’s constrained terminal area and eliminate the TTF agreement, thereby bringing the airport into compliance with the FAA’s policy regarding TTF access. It would ensure compatible land use and provide an opportunity for future aeronautical development beyond this 20-year planning period.

5.5.2 Economic Criteria

The acquisition of these parcels is eligible for federal funding. The amount paid for the land must be fair market value if federal funding is used, as determined per 49 CFR Part 24, Uniform Relocation Assistance and Real Property Acquisition for Federal and Federally-Assisted Programs.³

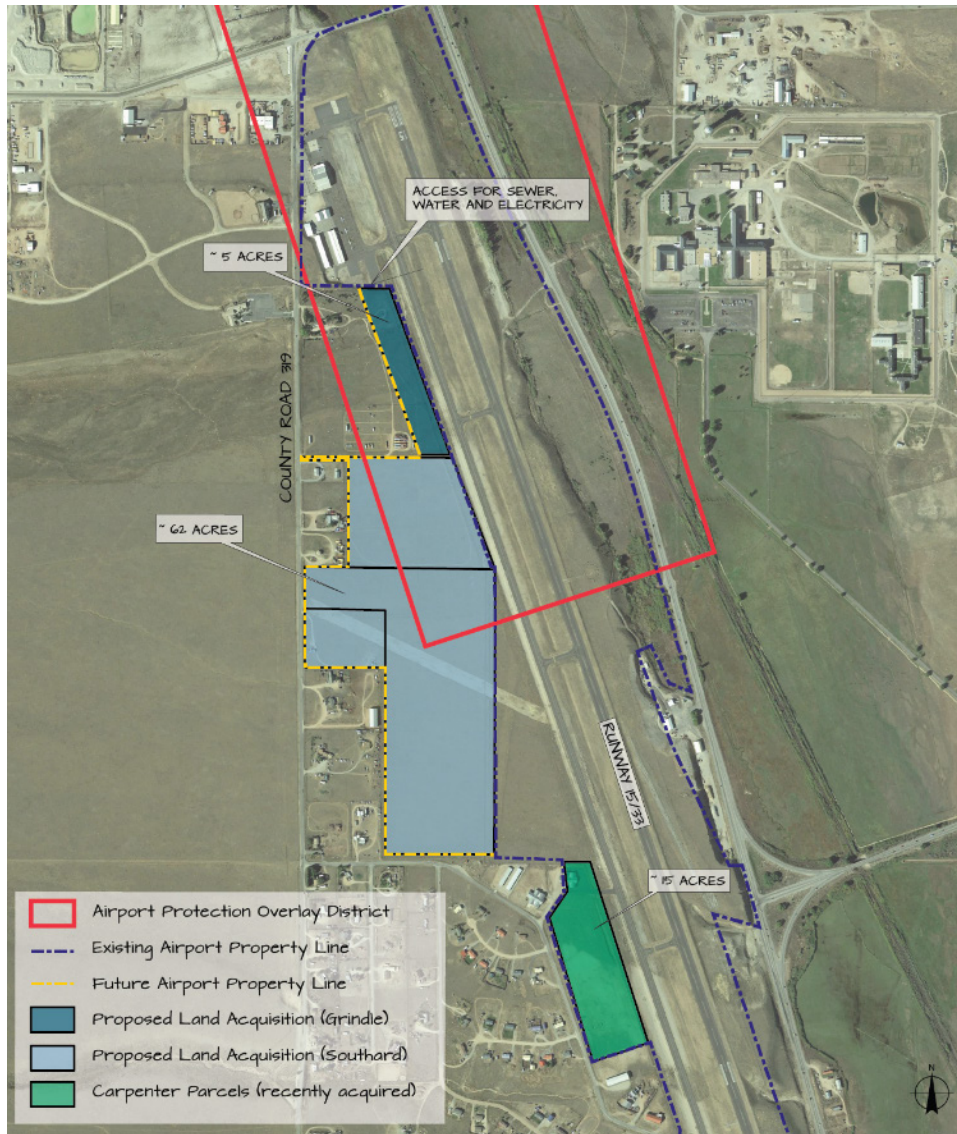
The Town of Buena Vista retained a firm to conduct an appraisal report on various parcels, including the three parcels totaling 62 acres (**Figure 5-2**). The appraisal valued for the three parcels is \$1,551,000. The appraisal did not evaluate the other parcels (approximately 16 acres) and it is recommended that AEJ conduct a second appraisal prior to acquiring the property and to comply with 49 CFR Part 24.

¹ Mosby, B. (Ed.). (n.d.). Chaffee County Assessor. Retrieved December 16, 2016, from http://qpublic6.qpublic.net/qpmap4/map.php?county=co_chaffee&layers=parcels parcel_sales roads&mapmode

² Mosby, B. (Ed.). (n.d.). Chaffee County Assessor. Retrieved December 16, 2016, from http://qpublic6.qpublic.net/qpmap4/map.php?county=co_chaffee&layers=parcels parcel_sales roads&mapmode

³ http://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title49/49cfr24_main_02.tpl

FIGURE 5-2 - FUTURE LAND ACQUISITION FOR AERONAUTICAL DEVELOPMENT



Note: Not to scale
Source: Jviation

5.5.3 Environmental Criteria

Based upon the data collected in **Section 2.12** of this document, no significant environmental impacts are anticipated for the purchase of the vacant property. The purchase would follow guidelines established in FAA AC 150/5700-17, *Land Acquisition and Relocation Assistance for AIP Projects*. The appropriate level of environmental review and compliance is required before any future development.

5.5.4 Feasibility Criteria

Purchase of these parcels is dependent on the willingness to sell by the current land owners and availability of funds from the FAA, State, and Sponsor.

5.5.5 Compatibility Criteria

Given the location of these parcels, acquisition of this land eliminates a TTF agreement and creates a connection between the existing north terminal area and the proposed south GA development area, while also providing additional space to meet future aeronautical development needs.

5.5.6 Recommendation

It is recommended that, upon availability of funding, AEJ purchase the five-acre parcel in the near-term for expansion of the terminal area. Purchase of the 0.74-acre parcel for RPZ protection, and the 9.73-acre parcel for maintaining property within the ROFA and BRL is also recommended. The other parcels are recommended for purchase towards the end of the planning period to reserve space for future aeronautical development outside this planning period, and protect surrounding land use. Specific development requirements and design will be determined at the time of development.

5.6 North Apron Expansion and GA Development Alternatives

As described in **Section 4.4.1**, the existing north GA apron area becomes constrained during the high-volume summer months. When the tiedown area is fully occupied with temporary based aircraft there is limited space for transient aircraft. Furthermore, the existing 20 tiedowns are located within the taxiway safety and object free areas, and do not meet current FAA design standards.

The future apron configuration should be planned and designed so it meets the following criteria.

- Address all applicable FAA standards for taxiway setbacks and tiedown areas.
- Maintain transient aircraft parking as close as possible to the FBO/terminal.
- Provide visible transient parking and FBO facilities for pilots who are arriving at AEJ.
- Allow flexibility to accommodate different mixes of aircraft types.
- Minimize transient operations near based aircraft hangars.
- Expand vehicle parking to accommodate additional visitors, patrons, and persons.

Furthermore, while there is adequate hangar space for existing based aircraft, examination of facility requirements determines that additional hangars will need to be constructed as demand warrants throughout the planning period (2015-2035). Hangars serve a variety of purposes (storage, maintenance, etc.), therefore, not all existing hangar capacity is available for future aircraft storage. Two alternatives for apron expansion were explored in this analysis. A reconfigured tiedown area and additional hangar space in the north apron and GA area are described in **Sections 5.6.1, 5.6.2 and 5.6.3**.

5.6.1 Common Elements within North Apron Expansion and GA Development Alternatives

Taxiway Fillets, Connectors, & Safety Areas

As noted in **Section 4.3.2**, AEJ's existing taxiway does not meet FAA taxiway design group (TDG) 2 standards due to the location of aircraft tiedowns within the taxiway safety area, and taxiway

connectors that do not meet fillet design standards. Existing taxiway connector A-5 is not compliant with current FAA design standards because it provides direct access from the tiedown apron to the runway (**Section 0**). The North Apron Expansion Alternatives 1 and 2 are designed to meet AEJ's ADG¹ II/TDG 2 requirements and current fillet standards presented in FAA AC 150/5300-13A², and shown in **Figure 5-3** at taxiway connector A-4. Estimated costs are shown in **Table 5-1**.

FIGURE 5-3 - FAA TAXIWAY DESIGN GROUP (TDG) 2 FILLET DESIGN REQUIREMENTS



Note: Not to scale
Source: Jviation

Remove Direct Access from Apron to Runway 15/33

Taxiway connector A5 is not compliant with current FAA design standards due to the direct access it provides from the tiedown apron to the runway. FAA established indirect runway access as part of their program to reduce runway incursions.³ Both Alternatives 1 and 2 for North Apron Development Area show demolition of existing taxiway connector A5 to eliminate direct access between the apron and Runway 15/33 and show its relocation between the proposed future and ultimate transient parking aprons. Estimated costs are shown in **Table 5-1**.

Airport Access and Parking

The pavement in the existing auto parking area, west of the terminal, is in poor condition. Both North Apron Development Area alternatives propose pavement rehab of the existing parking lot, and single direction ingress/egress. As determined in **Chapter 4, Facility Requirements**, an additional 22 vehicle parking spots are needed by 2035. Both Alternatives 1 and 2 supply these

¹ ADG – Aircraft Design Group

² FAA AC 150/5300-13A, *Airport Design*, Table 4-5 Standard Intersection Details for TDG 2.

³ Runway incursion - any occurrence involving the incorrect presence of an aircraft, vehicle, or person on the protected area of a surface designated for the landing or takeoff of aircraft.

needed parking spaces. Currently, 16 spaces are located on the far west side of the paved terminal parking lot and eight spaces are located to the west of the Twin Peaks hangar in the gravel parking lot, which should be paved during rehabilitation of the existing paved parking lot. Estimated costs are shown in **Table 5-1**.

Hangars

Airport management has indicated that there is currently demand for additional hangar storage, specifically to accommodate larger aircraft in box (executive) hangars. As noted in **Section 4.4.3**, it is expected that an additional 34,010 square feet of hangar storage space will be required by 2035, and that new hangars should be constructed throughout the planning period as demand warrants. Due to the limited space available for hangar construction at the north end of the Airport, the majority of future hanger development is proposed in the South GA area. Estimated costs are shown in **Table 5-1**.

5.6.2 North Development Area Alternative 1 – Transient and GA Aircraft Parking

North Development Alternative 1, illustrated in **Figure 5-4**, provides approximately 18,200 square yards of additional transient apron space. The existing layout of facilities combined with AEJ's property boundary limits apron development options. The available space was optimized to accommodate additional apron by infilling the open space between the existing apron and parallel taxiway, adding approximately 16,000 square yards.¹ This option includes concrete transient power in/power out parking positions, accommodating up to 10 B-II aircraft, like turboprops and smaller corporate jets, or fewer large aircraft (e.g. mid-sized corporate jets) if required.² An expansion of approximately 2,200 square yards to the existing north transient apron is also included. Ultimately, this alternative provides an additional 15,600 square yards of apron, with power-out parking for up to eight additional B-II aircraft.

This alternative reconfigures the existing tiedowns outside of the TDG 2 taxilane safety and object free areas to meet current FAA standards. This reconfiguration provides 18 tiedowns for B-II aircraft with an additional six new tiedowns on the south – for a total of 24. Alternative 1 also proposes construction of one 80' x 100' hangar, and one 100' x 100' hangar to offer an additional 18,000 square feet of hangar space.

5.6.3 North Development Area Alternative 2 - Transient Apron and GA Aircraft Parking

North Development Alternative 2, shown in **Figure 5-5**, provides 18,400 square yards of additional apron space. As in Alternative 1, the open space between the existing apron and parallel taxiway is

¹ This additional pavement and parking area maintains compliance with 14 CFR Part 77 – Safe, Efficient Use, and Preservation of the Navigable Airspace, including transitional surfaces, <http://www.ecfr.gov/cgi-bin/text-id?rgn=div5&node=14:2.0.1.2.9>.

² The area per parking position is generic per FAA design guidance; actual layout may differ depending upon specific aircraft. Factors such as the configuration of the parking apron, the location of the runways, taxiways, buildings and other facilities, will affect the actual parking layout for each apron, as well as the space required for each parking position.

**Central Colorado Regional Airport
Master Plan Update**

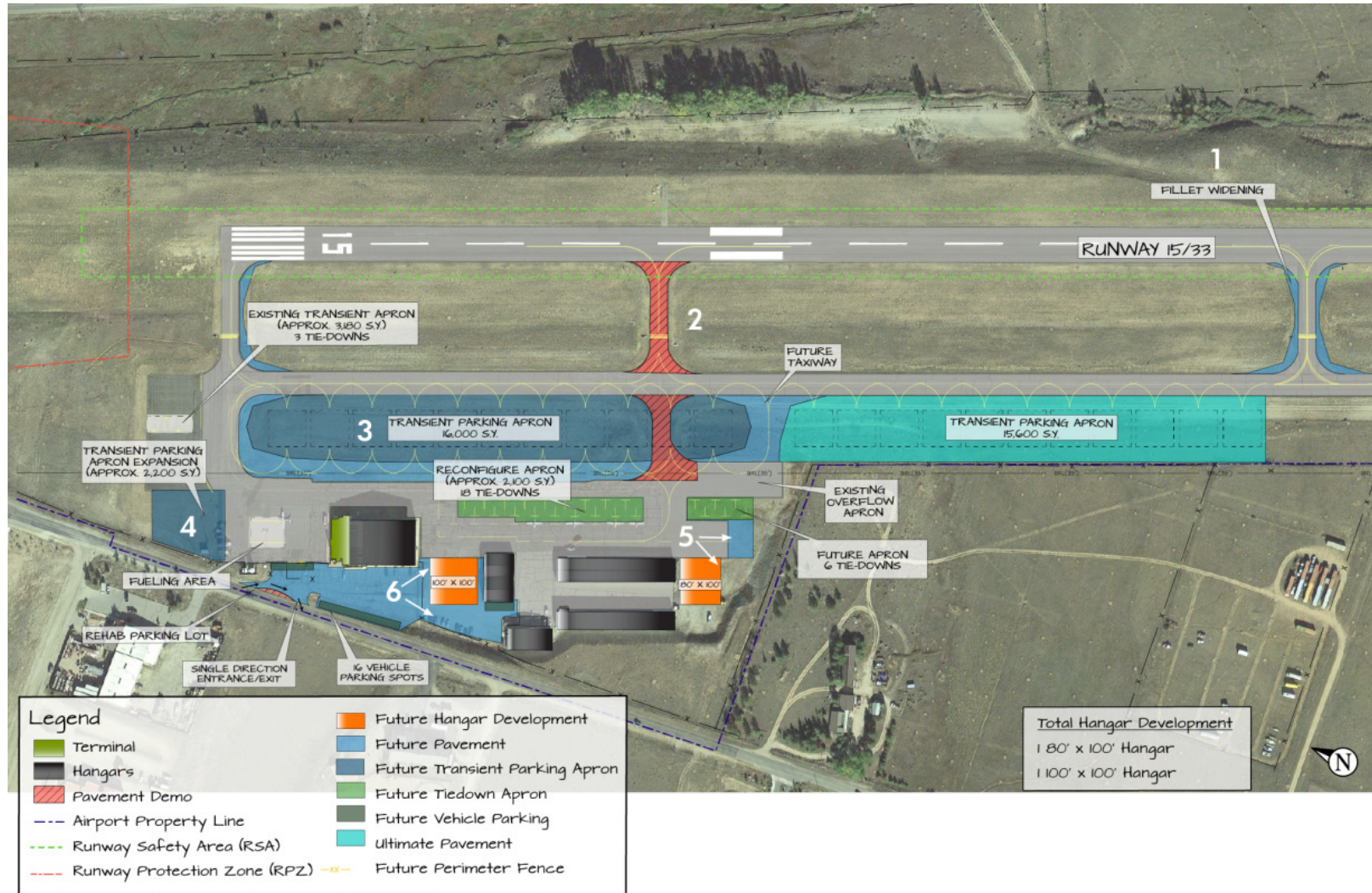
infilled, providing an additional 16,000 square yards of additional concrete transient apron space for power in/power out parking, accommodating up to 10 B-II aircraft or fewer large aircraft.¹ An expansion of approximately 2,400 square yards to the existing north transient apron is also included. Ultimately, this alternative provides an additional 15,600 square yards of apron, with power-out parking for up to eight additional B-II aircraft.

Alternative 2 reconfigures the existing non-standard tiedown area by relocating the tiedowns outside of the taxilane safety and object free areas to meet current FAA standards for TDG 2 taxilane safety areas and taxiway object free areas. The reconfiguration of the tiedown apron can accommodate 18 tiedowns. Alternative 2 also provides six T-hangars (2,850 total square feet), four box hangars (8,000 total square feet) and one 120' x 120' box (executive) hangar (14,400 square feet) for a total of 25,250 additional square feet of hangar space.

¹ This additional pavement and parking area maintains compliance with 14 CFR Part 77 – Safe, Efficient Use, and Preservation of the Navigable Airspace, including transitional surfaces, <http://www.ecfr.gov/cgi-bin/text-idx?rgn=div5&node=14:2.0.1.2.9>.

Central Colorado Regional Airport
Master Plan Update

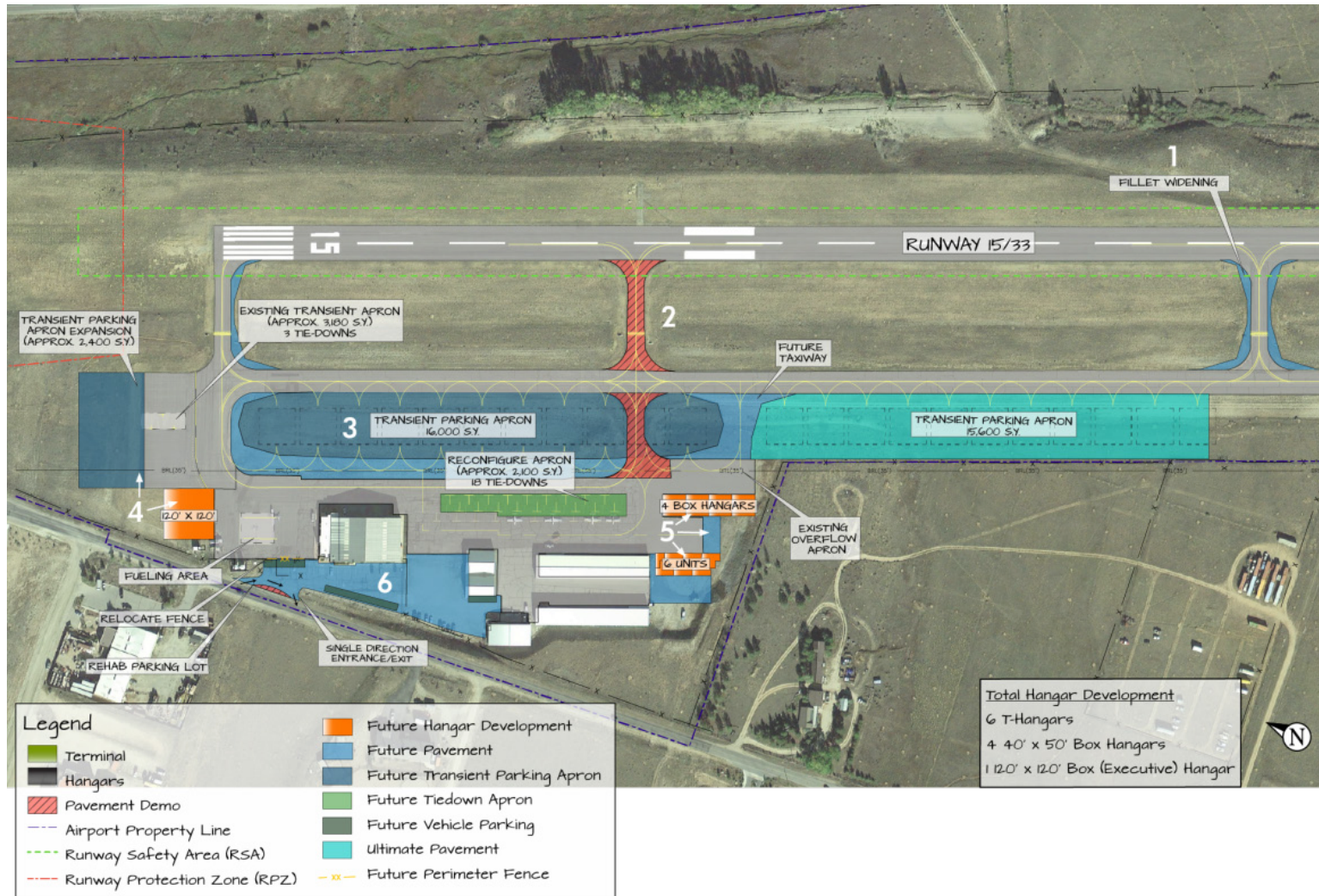
FIGURE 5-4 - NORTH DEVELOPMENT AREA ALTERNATIVE 1 – TRANSIENT APRON & GA PARKING



Notes: Reference numbers on figure correspond with project costs in Table 5-1
Not to scale
Source: Jviation

Central Colorado Regional Airport
Master Plan Update

FIGURE 5-5 - NORTH DEVELOPMENT AREA – TRANSIENT & GA PARKING ALTERNATIVE 2



Notes: Reference numbers on figure correspond with project costs in **Table 5-1**

Not to scale

Source: Jviation

5.6.4 Cost Summary

Table 5-1 details the costs for each alternative.

TABLE 5-1 – COST SUMMARY: NORTH DEVELOPMENT AREA – TRANSIENT & GA PARKING

Reference No. ^{/a/}	Item ^{/b/}	Alternative 1 ^{/b/}	Alternative 2 ^{/b/}
1	Taxiway Fillets	\$850,000	\$850,000
2	Taxiway A5 Demolition	\$140,000	\$140,000
3	Transient Parking Apron	\$5.5M	\$5.5M
4	North Apron Expansion	\$410,000	\$2.8M
5	South Apron Expansion	\$1.4M	\$2.1M
6	Access Road & Parking Area Expansion	\$2.1M	\$800,000
	TOTAL:	\$10.4M	\$12.2M

^{/a/} Reference No. corresponds with Alternative 1 and Alternative 2 items in **Figure 5-4**, and **Figure 5-5**, respectively.

^{/b/} Ultimate development not included.

Source: Jviation

5.6.5 Evaluation Criteria Summary

Table 5-2 details the evaluation criteria for each alternative. Different components of each alternative can be combined as needed to fit actual demand.

TABLE 5-2 – NORTH DEVELOPMENT AREA ALTERNATIVES COMPARISON MATRIX

Evaluation Criteria	Alternative 1	Alternative 2
Operational		
– Total New T-Hangars	0	6
– Total New Box Hangars	2	5
– Tiedowns	24	18
– Additional Transient Apron (SY)	18,200	18,400
– Future Transient Parking Spaces	9-11	9-11
– Ultimate Transient Apron (SY)	15,600	15,600
	Meets aviation demand forecasts for local based aircraft parking and storage requirements as well as vehicle and other facility needs.	
Economic	The cost summary provided in Table 5-1 includes hangar development which is typically funded by third-party developers. The remainder of development costs would be funded via the Airport Improvement Program (AIP) (entitlement funding and discretionary funding if available), CDOT, and Sponsor funding.	
Environmental	No significant environmental impacts anticipated. Appropriate level of environmental review will be required. Will not alter on or off-airport land use.	
Feasibility	Funding for apron development and reconfiguration of access and parking must be available. Hangar construction is dependent upon third party developers and demand.	
Compatibility	Reconfigures existing apron to meet FAA design guidelines, expands hangar storage per demand, and meets	Reconfigures existing apron to meet FAA design guidelines, expands hangar storage per demand, and meets transient parking

**Central Colorado Regional Airport
Master Plan Update**

Evaluation Criteria	Alternative 1	Alternative 2
	transient parking needs. Provides 6 additional tiedowns but location may be better served for hangars. The 100' x 100' hangar is located on existing high altitude testing staging area which may cause issue during testing.	needs. The box hangars and T-hangars on south apron is optimal for AEJ's layout. Hangar units lend to increased revenue opportunity. Retains staging area for high altitude testing with northern 120' x 120' hangar development.

Source: Jviation

5.6.6 Preferred Alternative

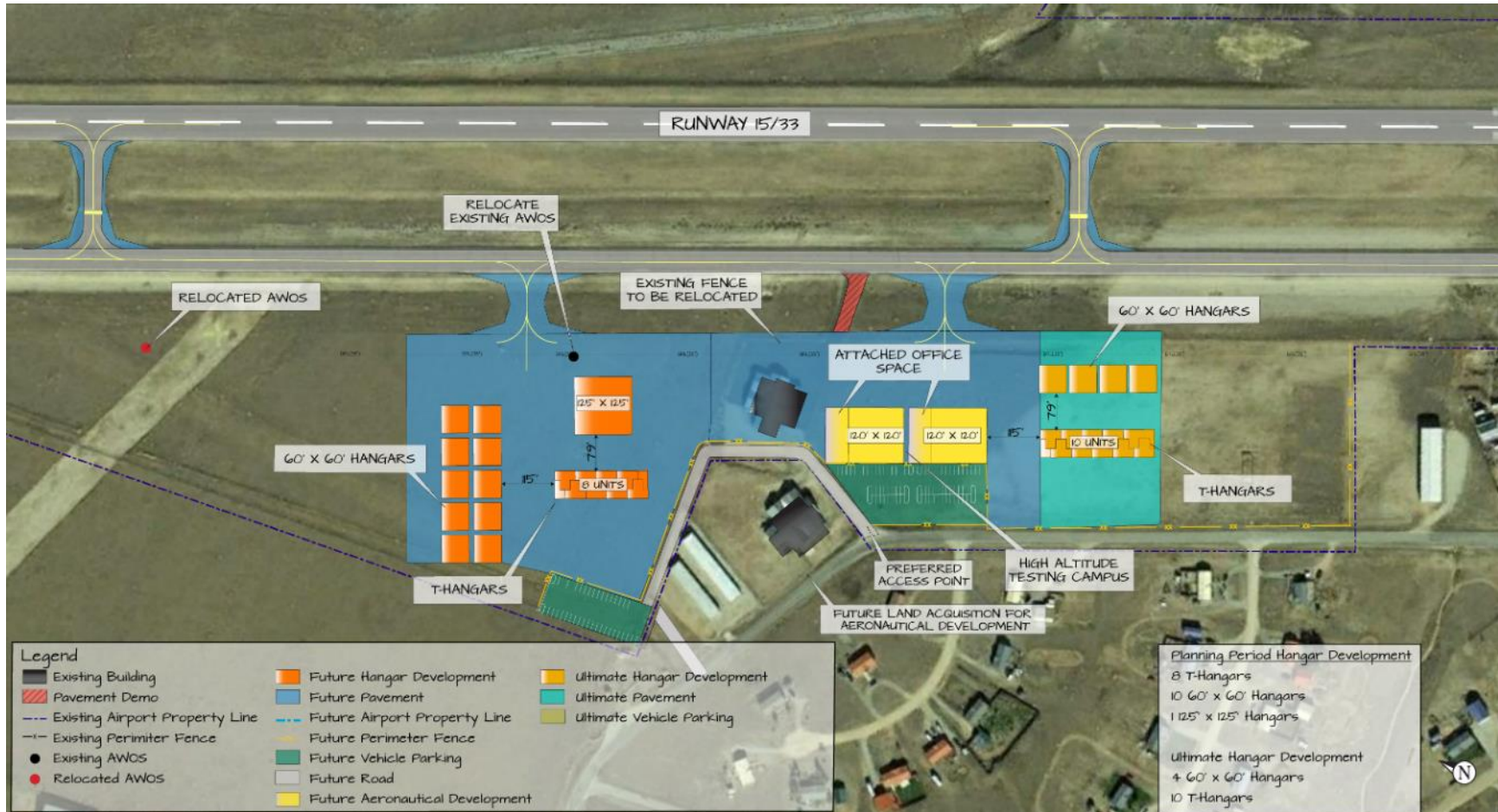
The Sponsor's preferred North Apron Expansion and GA Development Alternative is Alternative 2. Estimated cost for Alternative 2 is approximately \$12.2 million with the inclusion of hangars. However, hangar construction is typically at the developer's expense. The cost of Alternative 2 without hangar development is \$7.2 million.

5.7 South GA Area Development Alternatives:

Two alternatives were identified and evaluated for development in the South GA area. Both alternatives provide a mix of box hangar and T-hangar development and the ability to construct a high-altitude testing campus within the planning period (2015-2035), see **Figure 5-6** and **Figure 5-7**.

Central Colorado Regional Airport
Master Plan Update

FIGURE 5-6 - SOUTH GA AREA DEVELOPMENT ALTERNATIVE 1

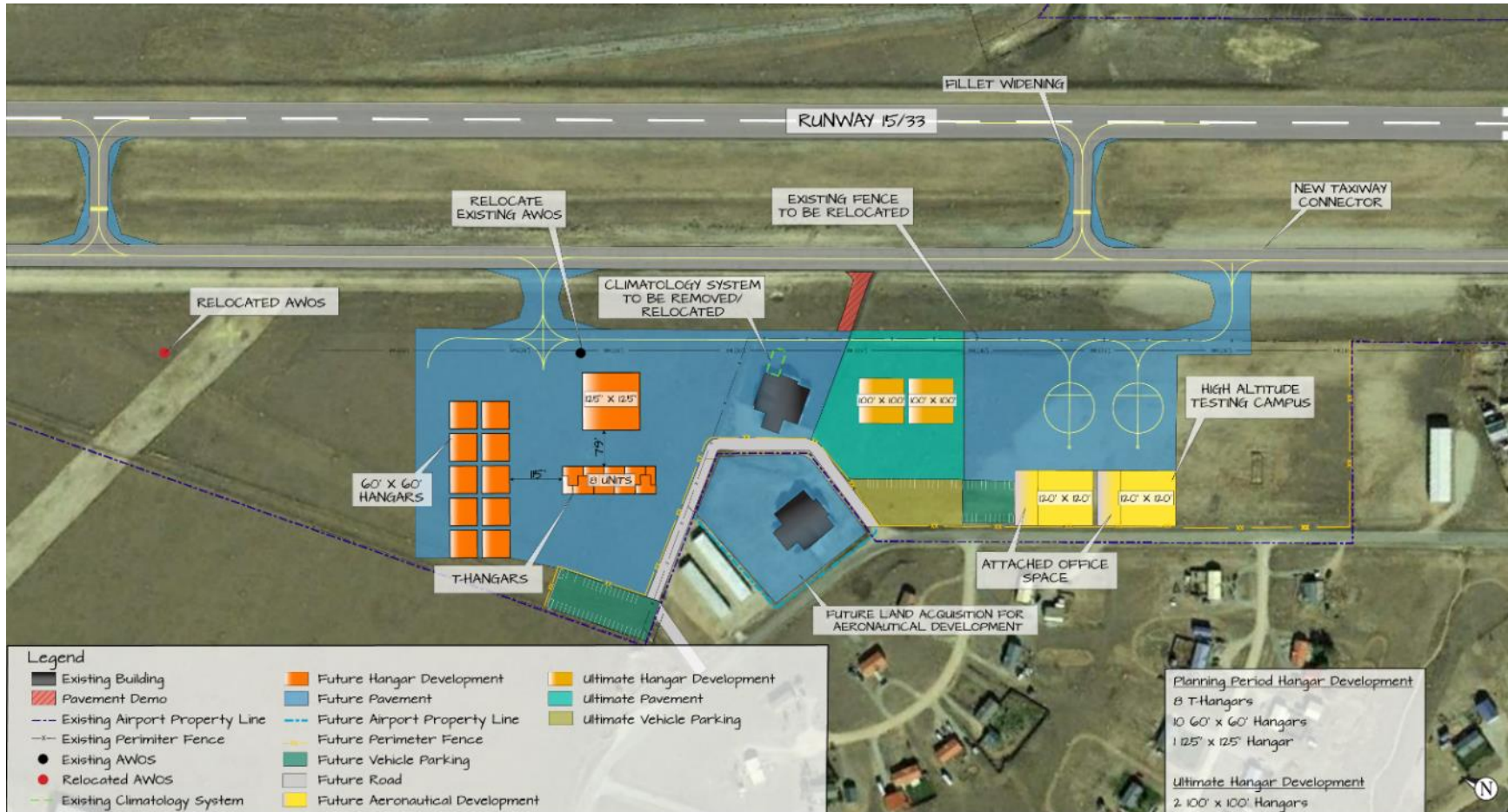


Note: Not to scale

Source: Jviation

Central Colorado Regional Airport
Master Plan Update

FIGURE 5-7 - SOUTH GA AREA DEVELOPMENT ALTERNATIVE 2



Note: Not to scale
Source: Jviation

5.7.1 Hangars

Following the recommendation in **Chapter 4, Facility Requirements**, AEJ acquired the TTF hangar as well as the adjacent Carpenter parcels (located northwest of Runway 33) in July 2015. With the purchase of these parcels, AEJ assumes ownership of the TTF box hangar, which is approximately 10,500 square feet with storage capacity for up to six aircraft, while also securing approximately 15 acres of land for future aeronautical development. The procurement of this property provides space for future box hangar development that can specifically meet current demand for larger aircraft storage space, as indicated by AEJ. The South GA Area Alternatives 1 and 2 include future and ultimate hangar development proposals which are outlined in **Table 5-3**.

TABLE 5-3 - SOUTH GA HANGAR PROPOSED DEVELOPMENT COMPARISON

South GA Area Alternative 1			
Aircraft Storage Type	Future Hangar Development	Ultimate Hangar Development	Total Hangar Development
T- hangar	8	10	18
60' x 60' Hangar	10	4	14
125' x 125' Hangar	1	0	1
Total SF	68,725	23,900	92,625

South GA Area Alternative 2			
Aircraft Storage Type	Future Hangar Development	Ultimate Hangar Development	Total Hangar Development
T- hangar	8	0	8
60' x 60' Hangar	10	0	10
100' x 100' Hangar	0	2	2
125' x 125' Hangar	1	0	1
Total SF	59,225	20,000	79,225

Source: Jviation

5.7.2 High-Altitude Testing Campus

South GA Area Alternatives 1 and 2 include a high-altitude testing campus consisting of two 120' x 120' box hangars with attached offices. Both alternatives propose construction of the campus within the 20-year planning period. As helicopters are the typical test aircraft, Alternative 2 provides two helicopter parking spots. Developing the campus within the planning period depends upon interest by the companies performing the testing, and their willingness to fund the improvements. Construction in the south GA area will allow the testing companies to be isolated from everyday operations in the north terminal area, with Alternative 2 providing the most isolation within the planning period.

5.7.3 Automated Airport Weather Station (AWOS) Relocation

Due to the proposed hangar development, the existing AWOS will need to be relocated in South GA Area Alternatives 1 and 2. **Figure 5-6** and **Figure 5-7** illustrate the AWOS relocation approximately 1,000 feet west of the runway center line, and north of the development area.

5.7.4 Land Acquisition

Both alternatives propose the acquisition of an adjacent parcel with an existing storage building due to its proximity to the south GA area and for future aeronautical use.

5.7.5 Summary

TABLE 5-4 – SOUTH GA AREA DEVELOPMENT ALTERNATIVES COMPARISON MATRIX

Evaluation Criteria	Alternative 1	Alternative 2
Operational	Exceeds aviation demand forecasts for aircraft storage requirements and provides adequate access and parking needs.	
Economic ^{a/}	Alternative 1 is estimated to cost \$24.4M. Hangar development is typically funded by third party developers.	Alternative 2 is estimated to cost \$26.3M. Hangar development is typically funded by third party developers.
Environmental	No significant environmental impacts anticipated. Appropriate level of environmental review will be required. Will not alter on or off-airport land use.	
Feasibility	If approved by the FAA, funding for apron development must be available. Hangar construction is dependent upon third party developers.	
Compatibility	Expands the developable area of AEJ beyond the north terminal area and utilizes the recently purchased Carpenter property. Creates a high-altitude testing campus which would reduce congestion on the main north apron but would still share GA apron space. Allows for growth beyond the planning period.	Expands the developable area of AEJ beyond the north terminal area and utilizes the recently purchased Carpenter property. The high-altitude testing campus is segregated from future GA development due to ultimate development layout. This layout allows isolation from everyday GA activity and provides two helicopter parking spots. Highly compatible with long term use and growth.

^{a/} Costs do not include ultimate development.

Source: Jviation

5.7.6 Preferred Alternative

The Sponsor’s preferred South GA Area Alternative is Alternative 2 as it provides an ideal layout for the high-altitude testing campus while allowing for expansion of aircraft storage in larger hangars. Estimated cost for Alternative 2 is approximately \$26.3 million (cost without hangar development is approximately \$8.8 million).

5.8 SRE Building

AEJ does not currently have a dedicated SRE building and construction of a dedicated building is recommended within the planning period to protect the Airport's investment in SRE and other equipment. Opportunities to construct an SRE building within the North GA area are limited due to it being a prime development area for hangars and other aviation related facilities, the need for additional apron space, and the restrictive grading on the south side of the existing apron. FAA AC 150/5220-18A, *Buildings For Storage and Maintenance of Airport Snow and Ice Control Equipment and Materials*, provides guidance on SRE building locations and size in **Chapter 2, Building Siting Requirements** as follows:

2-1. LOCATION.

a. Siting Factors. The location of the building must address, at a minimum, the following safety details.

(1) The building must be sited in such a manner that activities associated with the facility—in particular, egress/ingress by snow clearing crews, employees, and deliveries—do not interfere with fire lanes used by the airport rescue and fire fighting (ARFF) service or hamper aircraft taxiing operations.

(2) In order to reduce wear and tear of equipment and slow responses, the site must provide snow clearing crews with direct access to taxiways and runways instead of using perimeter roads or circuitous routes to reach runways and taxiways.

(3) The site must emphasize the mitigation of runway incursions by eliminating the need for employee, private and service vehicles to cross runways or taxiways to reach the building.

(4) The site must take into consideration its affect on other existing facilities, such as cargo facilities and fueling areas. When the operating efficiency of the snow crews is not impaired, the building location should avoid existing and future revenue-producing areas, such as ramps and hangar areas.

b. Expansion Capabilities – Land Tract and Building. The land tract designated for the building should be large enough to accommodate future building expansions and employee parking. Furthermore, the design of the building should anticipate a 10- to 15-percent future growth with respect to personnel space and snow equipment parking.

2-2. BUILDING ORIENTATION.

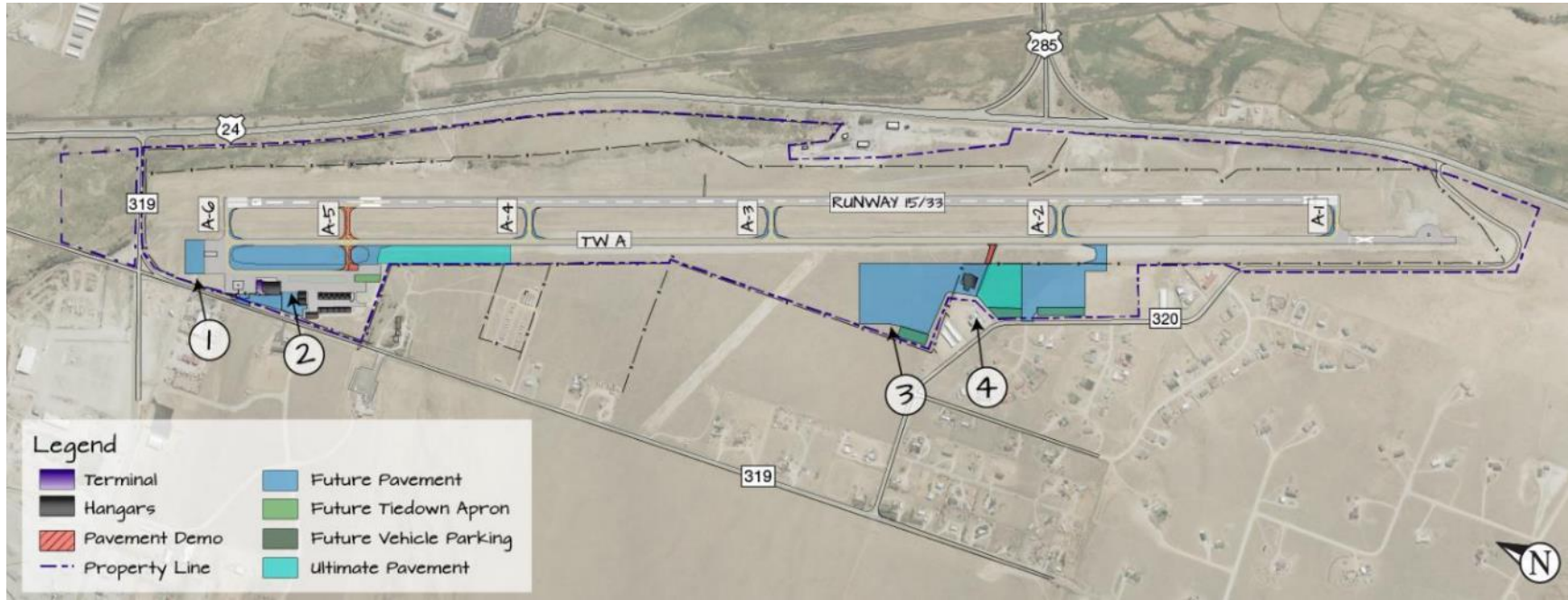
a. Siting. In those instances where options for building orientation are available, it is preferable for buildings having all entrances for snow equipment on one side to have the entrance(s) parallel and downwind (leeward side) to the prevailing winter winds.

AEJ's SRE building size has been determined using standard FAA calculations for pieces and type of equipment to be stored, annual operations, snowfall, and the type and amount of pavement at the airport. FAA Advisory Circular (AC) 150/5220-18A, *Buildings for Storage and Maintenance of Airport Snow and Ice Control Equipment Materials*, was used to calculate the minimum square

footage to satisfactorily store the equipment. The calculation resulted in approximately 3,000 square feet which includes circulation space as well as deicer and sand storage areas. In evaluating possible locations for a future SRE building, four locations were identified as shown in **Figure 5-8**. Options 1 and 2 propose placement and new construction of an SRE building in the North Development area. Option 1 provides space for an approximate 3,000-square-foot SRE building located west of the existing transient parking apron and north of the existing fueling area. Option 2 affords a 3,000-square-foot SRE building, located north of the Twin Peaks hangar and south of the terminal building. Options 3 and 4 locate the SRE building in the south GA development area. Option 3 provides space for a 3,000-square-foot SRE building west of the future transient apron expansion, and Option 4 positions the building south of the proposed land acquisition and west of the recently purchased TTF. Option 4 proposes using an existing 10,000-square-foot building, currently used for storage. Depending on the condition of this building, it may be suitable for reuse as SRE and equipment storage.

Central Colorado Regional Airport
Master Plan Update

FIGURE 5-8 - SRE BUILDING LOCATION OPTIONS



Note: Not to scale
Source: Jviation

5.8.1 Evaluation Criteria Summary

TABLE 5-5 – EVALUATION CRITERIA SUMMARY MATRIX

Evaluation Criteria	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Operational	Each alternative meets the space requirements for existing equipment and planned equipment within the planning period.			
Economic	\$1.2M	\$1.2M	\$1.8M	\$1.4M
Environmental	No significant environmental impacts anticipated. Appropriate level of environmental review is required. Will not alter on or off-airport land use.			
Feasibility	Associated costs for Alternatives 1 through 4 are subject to availability of FAA grant funding. Funding may not become available for several years. Per federal guidelines, Alternative 4 would only be eligible			
Compatibility	Location requires expansion of apron for access to airfield. Places SRE at end of existing terminal area and doesn't take away from future hangar development.	Location not preferred as space is currently used as staging area for high altitude testing. Doesn't meet short-term needs but meets long-term development plan when high altitude testing moves to south GA area.	Location requires access to airfield as area is not currently developed. Doesn't meet short-term needs but meets long-term development plan when high altitude testing moves to south GA area. The existing building in Alternative 4 is oversized for current and projected needs.	

5.8.2 Preferred Alternative

The Sponsor's preferred SRE Alternative is Alternative 1 as it provides an ideal location, and is able to be implemented in the nearest timeframe. The estimated cost for Alternative 1 is approximately \$1.2 million.

5.9 Miscellaneous Improvements

Alternatives for the following miscellaneous improvements were not evaluated as they are improvements that are either completed or not completed – other options do not exist. **Chapter 6, Capital Improvement Program (CIP)**, details the phasing and cost of each item.

5.9.1 Runway 15/33 and Taxiway A Rehabilitation

As noted in **Chapter 3, Facility Requirements**, routine maintenance to extend the pavement life of Runway 15/33 and Taxiway A is recommended. North Apron Expansion Alternatives 1 and 2 include runway and parallel taxiway rehabilitation.

5.9.2 General Aviation Apron Rehabilitation

The existing general aviation apron pavement is in poor condition and is recommended for rehabilitation as discussed in **Chapter 4, Facility Requirements**.

5.9.3 Medium-Intensity Approach Lighting System with Sequenced Flashers (MALSF)

As described in **Chapter 4**, visibility minimums at AEJ may be reduced by one-half mile for the existing Runway 33 instrument approach procedure by installing a MALSF. Consequently, a MALSF is recommended for installation on Runway 33 to improve the usability of the airport during low visibility conditions.

5.9.4 Airfield Lighting

As described in **Chapter 4**, Runway 15/33 is currently equipped with a medium intensity runway lighting (MIRL) system that is in fair condition and was installed in 1996. The existing MIRL system should be replaced during the early to mid-portion of this planning period (2020–2025).

Runway ends do not have runway end identifier lights (REIL). The 2012 CDOT Aviation System Plan recommends that both runway ends be equipped with REIL in the near-term.

It is recommended that the medium intensity taxiway lighting (MITL) system on the parallel taxiway and connectors be replaced at the end of its useful life, which is anticipated to be towards the early to mid-portion of this planning period (2020 – 2025).

5.9.5 Relocate Fence

The existing perimeter fence in the South GA development area should be relocated to include the outer boundary of the recently purchased Carpenter parcels.

Within the main auto parking lot, the portion of the fence located northwest of the terminal building should also be relocated to the edge of the aircraft parking apron to maximize the available space for vehicle parking.

5.9.6 SRE and Other Equipment

AEJ's 1987 Ford L-8000 dump truck 200, 2003 International 7400 snow plow and 1998 Caterpillar IT28B front-end loader are all considered to be in fair condition. The replacement of both plow trucks is recommended in the mid- to late planning period (2020-2035) for AEJ to maintain operations during periods of inclement weather.

Equipment is also needed for foreign object debris (FOD) removal, as it is currently collected manually by staff. As indicated by Airport management, the current airport maintenance equipment used to maintain vegetative areas on Airport property, including a small tractor and a brush hog, are both in poor condition. Purchase of a sweeper attachment for FOD removal and a replacement mower are recommended early in the planning period (2015-2020). Airports such as Denver International Airport (DIA) offer used airport maintenance equipment for free or reduced cost to other airports, which may be an option for AEJ to replace some of their current maintenance equipment at relatively low cost.

5.9.7 Fuel Storage Improvements

The Airport should maintain the existing above-ground fuel storage tanks (ASTs).

5.10 Summary

The preferred alternatives presented above will be incorporated into AEJ’s future airport development plan, which will be reflected on the Airport Layout Plan (ALP). Detailed cost analysis and phasing will be discussed in **Chapter 6, Financial Implementation**. **Table 5-6** summarizes the recommended improvements for the planning period (2015-2035).

TABLE 5-6 – RECOMMENDED IMPROVEMENTS SUMMARY

Facility/Infrastructure Improvement	Improvements Evaluated/Recommendations	Planning Period Time Frame
Land Acquisition	Purchase six adjacent parcels and reserve land for future aeronautical development	When funding becomes available
SRE Building ^{/a/}	SRE Building	2015-2020
General Aviation Apron Rehabilitation	Rehabilitate apron to extend useful life	2015-2020
Relocate Fence	Relocate fence around Carpenter parcels and in vehicle parking lot	2015-2020
Runway 15/33 & Taxiway A Rehabilitation and Airfield Lighting	<ul style="list-style-type: none"> – Rehabilitate runway and taxiway pavement to extend useful life; Replace MITL^{/b/} – Install REILS^{/c/} at both runway ends – Replace MIRL^{/d/} 	2015-2025
North Apron Expansion & General Aviation Development Alternative 2	Expand existing apron and construct hangars as dictated by demand	2015-2025
Taxiway Fillets and Remove Direct Access to Runway	Construct fillets on taxiway connectors to meet TDG ^{/e/} 2 standards and relocate taxiway connector A-5	2020-2025
Upgrade SRE & Other Equipment	<ul style="list-style-type: none"> – Replace 2 plow trucks – Purchase sweeper attachment – Replace mower 	2020-2025
Airport Access and Parking	<ul style="list-style-type: none"> – Rehab pavement in main auto parking lot – Expand existing parking in the main auto lot – Reconfigure airport access for single direction ingress/egress – Pave gravel parking lot and expand existing parking 	2020-2025
South GA Area Development Alternative 2	<ul style="list-style-type: none"> – Construct new apron and taxiway connectors – Expand hangar development area as demand dictates – Construct high altitude testing campus 	2020-2035 (as dictated by demand)
MALSF ^{/f/}	Install MALSF on Runway 33 end	2025-2035

Notes: ^{/a/}SRE – Snow Removal Equipment
^{/b/}MITL – medium intensity taxiway lights ^{/c/}REILS – runway end identifier lights
^{/d/}MIRL – medium intensity runway lights
^{/e/}TDG – taxiway design group
^{/f/}MALSF – medium intensity approach lighting system with sequenced flashers
Source: Jviation