

SECTION 5 - ALTERNATIVES ANALYSIS

5.1 INTRODUCTION

This section presents development alternatives for satisfying the facility requirements described in Section 4 of this report, as well as requirements generated as part of the user input process, including the Business Development Workshop and tenant/user surveys. The content includes recommendations for improvements in airfield facilities, airfield capacity, GA facilities, an analysis of evaluation criteria, and an overview of airport land use compatibility with the surrounding environs, including the National Park Service lands.

The overall goal of the Alternatives Analysis is to provide a balanced airport complex that not only satisfies projected airport demand, but also successfully integrates with the community in which it lies.

5.2 LAND USE EVALUATION

A briefing with the National Parks Service (NPS) was conducted on July 24, 2012 in order to determine the compatibility of any future Airport development with the NPS lands surrounding the Airport, and to assess impact of airport development on NPS lands and facilities. The result of the meeting was that any proposed airport development should not encroach upon existing NPS lands, especially those located directly east and southeast of the Airport.

In addition to the NPS briefing, the consultant team received input from representatives of the San Antonio River Authority, which is the oversight agency of the San Antonio River. Their input indicated that any proposed airport development should have serious consideration for the close proximity of the San Antonio River. Further, the Airport should be especially mindful of the recent river improvements, the goal of which is to restore the river bank and its environs to a natural riparian state.

In 2004, an archaeological evaluation was conducted of the Airport grounds. The purpose of the evaluation was to determine where archaeologically significant areas are located, including the presence of unmarked graves from the historic Paupers Cemetery. This evaluation determined certain areas on airport property have been cleared for development, and have been deemed "safe". These areas include areas which may be recommended for future airport development as part of this Alternatives Analysis. A Memorandum of Understanding between the COSA Aviation Department and the Texas Historical Commission (THC) has indicated the areas of the Airport which have been cleared for construction activity without prior notification to the THC, as well as areas which require THC notification prior to construction. This agreement is included in **Appendix C** of this report.

5.3 ALTERNATIVES DEVELOPMENT PROCESS

The process for formulating and refining airport development alternatives consists of assessing the future airport requirements, and generating several alternatives that satisfy those requirements, such as upgrading airfield standards, providing additional runway capacity or additional runway length, as well as requirements for GA facilities, such as hangar storage space, aircraft apron space, terminal space, and aircraft support facilities. The process results in the generation of alternatives which, in an unconstrained environment, could satisfy future airport requirements.

The output of the process is presented as follows: airfield alternatives, airfield alternatives evaluation, GA alternatives, GA alternatives evaluation, and overall airport development plan, which combines the preferred elements of the airfield and GA alternatives.

5.4 AIRFIELD ALTERNATIVE DESCRIPTIONS

This section presents the alternatives that were generated to satisfy the various airfield facility requirements. Four general airfield alternatives were identified during the alternatives development process, and were expanded to various different scenarios for each general alternative.

- **Alternative 1: Upgrade Airfield Standards**
 - 1A: Upgrade Airfield Standards (> $\frac{3}{4}$ Mile Visibility Minimums)
 - 1B: Upgrade Airfield Standards (< $\frac{3}{4}$ Mile Visibility Minimums)
 - 1C: Upgrade Airfield Standards (Relocate Runways)

- **Alternative 2: Runway Extension**
 - 2A: Extend Runway 32
 - 2B: Extend Runway 14
 - 2C: Extend Runway 27
 - 2D: Extend Runway 9

- **Alternative 3: Runway Realignment**

- **Alternative 4: Airfield Capacity Enhancement**
 - 4A: Parallel Runway 14L-32R
 - 4B: Parallel Runway 9R-27L

5.4.1 AIRFIELD ALTERNATIVE 1: UPGRADE AIRFIELD STANDARDS

The overall goal of Alternative 1 is to upgrade the airfield standards from a current ARC of B-I to B-II. This upgrade provides greater separation between the runways and parallel taxiways, as well as increasing the size of Runway Protection Zones (RPZ) to more safely and effectively serve aircraft types that are in approach category B or in ADG II. Table 2.1 in Section 2 indicates the aircraft classifications for determining the ARC. Examples of B-II aircraft are the Beechcraft King Air 200 or the Cessna Citation 550.

Airfield alternative 1 generated three sub-alternatives, which are described below.

5.4.1.1 Airfield Alternative 1A

Alternative 1A, shown in **Exhibit 5.1**, addresses the issue of airfield design standards. These standards mainly pertain to the separation distance between runways and taxiways. Currently, the Airport consists of a mixture of B-I and B-II design standards and separations. Alternative 1A presents a uniform upgrade to B-II airfield standards for both runways, with runway/taxiway separations of 240 feet. A separation of 240 feet permits instrument approaches with visibility minimums of greater than $\frac{3}{4}$ mile. Currently, the two instrument approach procedures at the Airport have visibility minimums of 1 mile. This alternative also expands the RPZs to greater dimensions to adequately serve larger aircraft that are now using the Airport more frequently than in the past.

In addition to the modifications to airfield dimensions, this alternative also provides a new taxiway connection on the west side of Runway 14, which connects the threshold of Runway 14 to Taxiway C. This new connection permits more efficient aircraft circulation, especially for those aircraft located on the western portion of the airfield wishing to access Runway 14, eliminating a runway crossing. Currently, aircraft from the western portion of the airfield must cross Runway 14-32 in order to reach Runway 14.

5.4.1.2 Airfield Alternative 1B

Alternative 1B, shown in **Exhibit 5.2**, addresses the issue of airfield design standard in a similar fashion as Alternative 1A. However, this alternative provides greater runway/taxiway separation at 300 feet, and larger RPZs, which permit instrument approaches with visibility minimums of less than $\frac{3}{4}$ mile. This alternative requires larger RPZs on the approach ends of Runway 14 and Runway 9 as depicted in Alternative 1A, and also provides 2 larger RPZs on the Runway 27 and Runway 32 approach ends.

A desired Airport improvement, based on user input and survey feedback, is the implementation of a precision instrument approach. Instrument approaches with precision minimums of less than $\frac{3}{4}$ mile require the largest of RPZs. This alternative also provides the taxiway connection to Runway 14 from the west as shown in Alternative 1A.

5.4.1.3 Airfield Alternative 1C

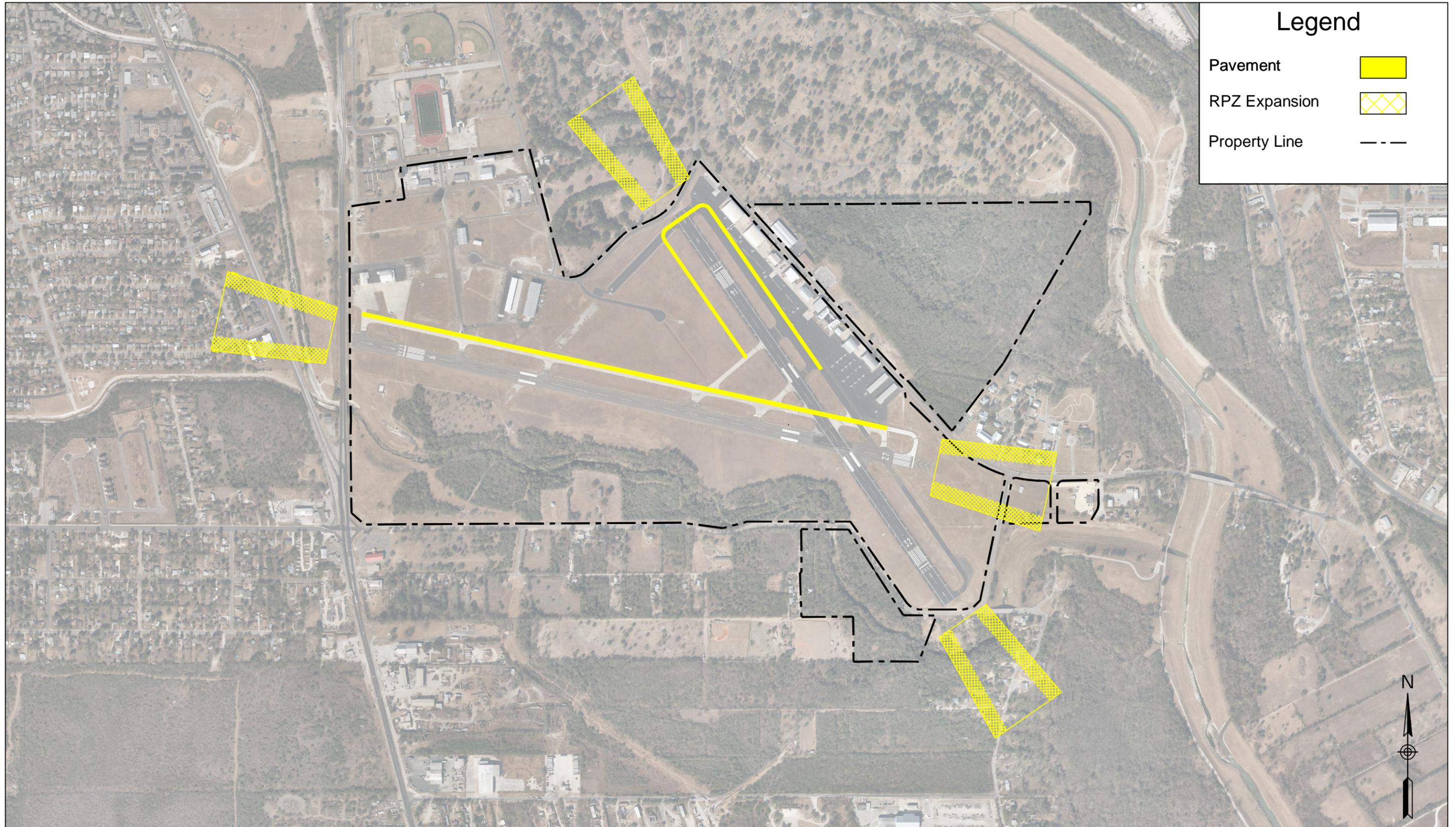
Alternative 1C addresses the issue of airfield design standards by relocating both runways to achieve a 300-foot runway-taxiway centerline separation while keeping Taxiways Alpha and Delta in their current alignments. Both relocated runways are shown with lengths matching the existing runways, with the Runway 9 and Runway 14 ends shifted accounting for runway end siting criteria. This alternative is shown in **Exhibit 5.3**.

5.4.2 AIRFIELD ALTERNATIVE 2: EXTEND RUNWAYS

Alternative 2 addresses the issue of future runway length. According to the runway length requirements analysis in Section 4 of this report, the current maximum runway length of 5,000 feet will accommodate all small aircraft less than 12,500 pounds. It also indicates that for 75 percent of large aircraft weighing less than 60,000 pounds, operating at 60 percent useful load, a runway length of 5,500 feet is recommended.

5.4.2.1 Corporate Jet Range Analysis

Historical data for aircraft operations and itinerant IFR operations at the Airport indicates the majority of aircraft are small aircraft, but there are, in fact, larger aircraft that utilize the Airport on occasion. In order to supplement the runway length analysis, aircraft manufacturer specifications were consulted in order to determine theoretical maximum range for a selection of corporate jets likely to operate from the Airport, given 5,000 feet of runway. Three different aircraft types of varying sizes were selected for this analysis. They are listed below along with representative pictures in **Exhibit 5.4**.



Legend

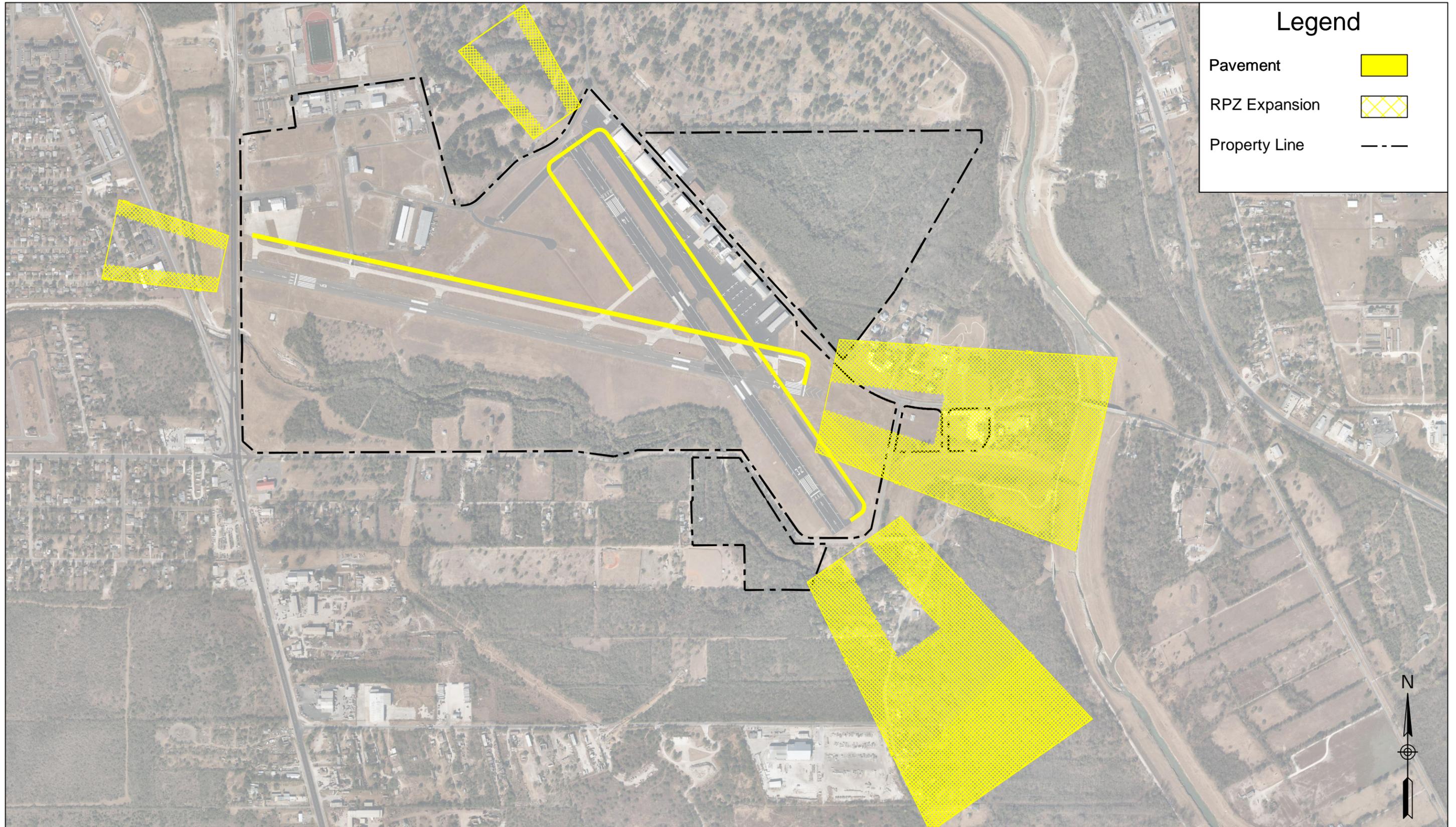
Pavement	
RPZ Expansion	
Property Line	

Scale: 1" = 800'

Exhibit 5.1



Airfield Development Alternative 1A - Upgrade to B-II Standards >3/4 Mile



Legend

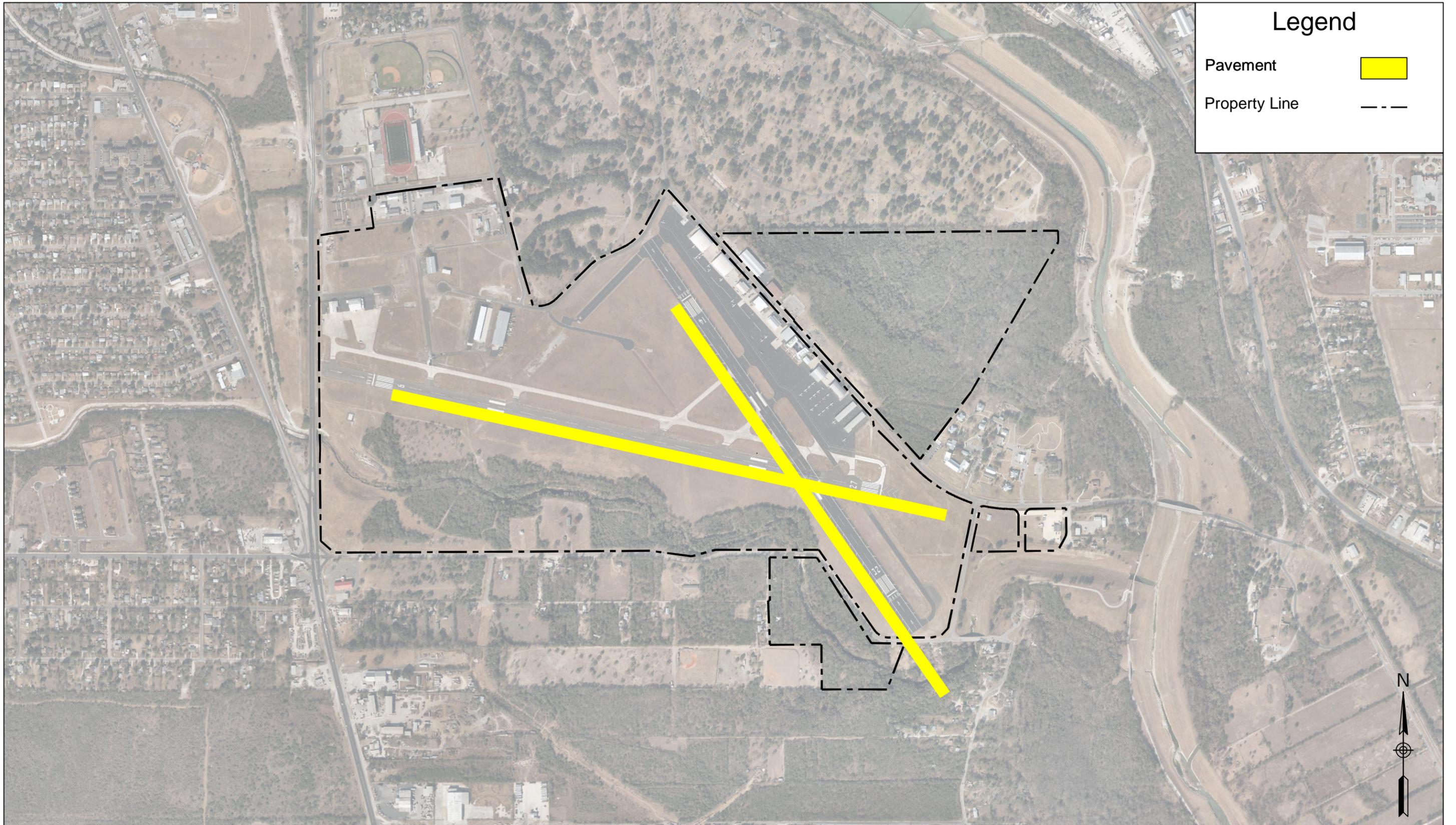
Pavement	
RPZ Expansion	
Property Line	

Scale: 1" = 800'

Exhibit 5.2



Airfield Development Alternative 1B - Upgrade to B-II Standards < 3/4 Mile



Scale: 1" = 800'

Exhibit 5.3



Airfield Development Alternative 1C - Upgrade to B-II Standards - Shift Runways

Exhibit 5.4 Corporate Jet Example Aircraft

- Cessna Citation CJ2 – Small Corporate Jet



Image Source: Cessna Aircraft Company

- Bombardier Challenger 300 – Midsize Corporate Jet



Image Source: Google Images

- Gulfstream G550 – Large Corporate Jet



Image Source: Stinson Municipal Airport Staff

According to data from the aircraft manufacturers, the Airport's current runway length of 5,000 feet can accommodate fairly long stage lengths for each of these aircraft, and even accommodating the maximum range for the Citation CJ-2 series and the Challenger 300. The ranges for these aircraft, given criteria such as Maximum Gross Take-off Weight (MTOW), sea level altitude, and International Standard Atmosphere (ISA) temperature, are shown below in **Table 5.1**.

Table 5.1 - Corporate Aircraft Ranges and Take-Off Distances

Aircraft Type	Maximum Range (nautical miles)	Take-off Distance Required ⁽¹⁾ (ft)
Cessna Citation CJ-2	1,613	3,360
Bombardier Challenger 300	3,065	4,810
Gulfstream G550	6,750	5,910

Notes:

(1) Assumptions:

- Maximum Take-off Weight
- Sea Level Altitude
- ISA Temperature

Source: Cessna Aircraft Company www.cessna.com (accessed June 1, 2012)
Bombardier Aerospace www.bombardier.com (accessed June 1, 2012)
Gulfstream Aircraft www.gulfstream.com (accessed May 30, 2012)

According to manufacturer data, the current runway length of 5,000 feet will adequately accommodate many small and midsize corporate aircraft to the full extent of their range. Additional runway length would be required to accommodate the largest of corporate aircraft types to their full range, such as the G550; however, they currently do, and will continue to operate from the Airport with shorter stage lengths.

To completely assess the viability of Alternative 2, it was expanded into four sub-alternatives, each involving an extension to one runway end. Each runway end is shown in Alternatives 2A-2D with an initial extension to 6,000 feet and a potential ultimate length of 7,500 feet. These alternatives are shown in **Exhibit 5.5 through Exhibit 5.8**.

5.4.2.2 Airfield Alternative 2A

Alternative 2A involves the extension of Runway 32 to 6,000 feet, with a potential ultimate length of 7,500 feet (Exhibit 5.5). This alternative has the following requirements and potential impacts/issues:

- Channelization of Six Mile Creek
- Acquisition of NPS property southeast of the Airport
- Road Relocations
 - Ashley Road
 - Espada Road
- Final approach issues with Interstate 410 power transmission lines

5.4.2.3 Airfield Alternative 2B

Alternative 2B involves the extension of Runway 14 to 6,000 feet, with a potential ultimate length of 7,500 feet (Exhibit 5.6). This alternative requires a significant amount of land acquisition, as well as mitigation of impacts associated with construction in the San Jose Burial Park. The 7,500-foot length runway would also require the relocation of March Avenue and certain businesses along that road.

5.4.2.4 Airfield Alternative 2C

Alternative 2C involves the extension of Runway 27 to 6,000 feet, with a potential ultimate length of 7,500 feet (Exhibit 5.7). This alternative would require the acquisition of the Mission Developmental Center (MDC), as well as the relocation of Mission Road and portions of Ashley Road. If the 7,500-foot length option is exercised, the Runway 27 end would be located in the San Antonio River bank area.

5.4.2.5 Airfield Alternative 2D

Alternative 2D involves the extension of Runway 9 to 6,000 feet, with a potential ultimate length of 7,500 feet (Exhibit 5.8). This alternative would have the following requirements and impacts/issues:

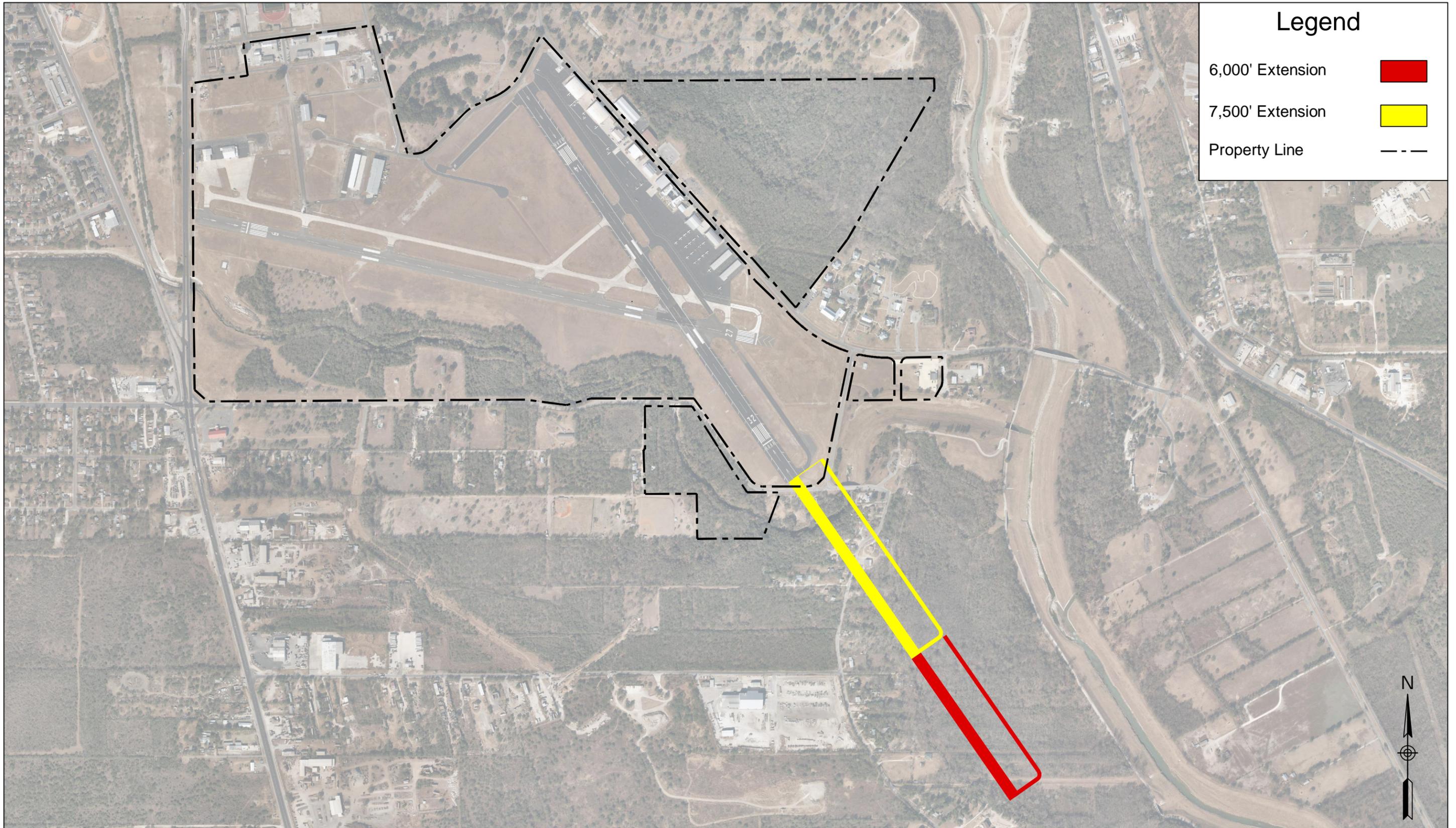
- Channelization and/or realignment of Six Mile Creek
- Major Road Relocations
 - Roosevelt Avenue
 - South Flores Street
- Business Relocation
- Residence Relocation
- Significant Land Acquisition

5.4.3 **AIRFIELD ALTERNATIVE 3: REALIGNED RUNWAY 15-33**

5.4.3.1 Airfield Alternative 3

This alternative involves the construction of a new runway oriented in a northwest-southeast direction to replace Runway 14-32. The new runway will be rotated clockwise from the existing Runway 14-32 such that the new alignment will result in a designation of Runway 15-33. The primary features of this alternative are meeting ADG II standards, obtaining a runway length of at least 5,000 feet, and gaining space for GA facilities development in the area that Runway 14-32 currently occupies. This alternative represents the ultimate recommended development plan from the previous master plan, and is currently depicted on the existing airport layout plan as an ultimate condition. This alternative also depicts options for runway lengths of 6,000 feet and 7,500 feet.

Some of the issues with Alternative 3 include major land acquisition, multiple road realignments, including Ashley Road, Braubach Street, and Rilling Road, and the channelization of Six Mile Creek. In addition, the 5,000 and 6,000-foot runway options have potential final approach complications with the power transmission lines along Interstate 410. The 7,500-foot runway option would also require realignment or bridging of Interstate 410, as this runway length results in a crossing of the interstate. This alternative is shown in **Exhibit 5.9**.



Legend

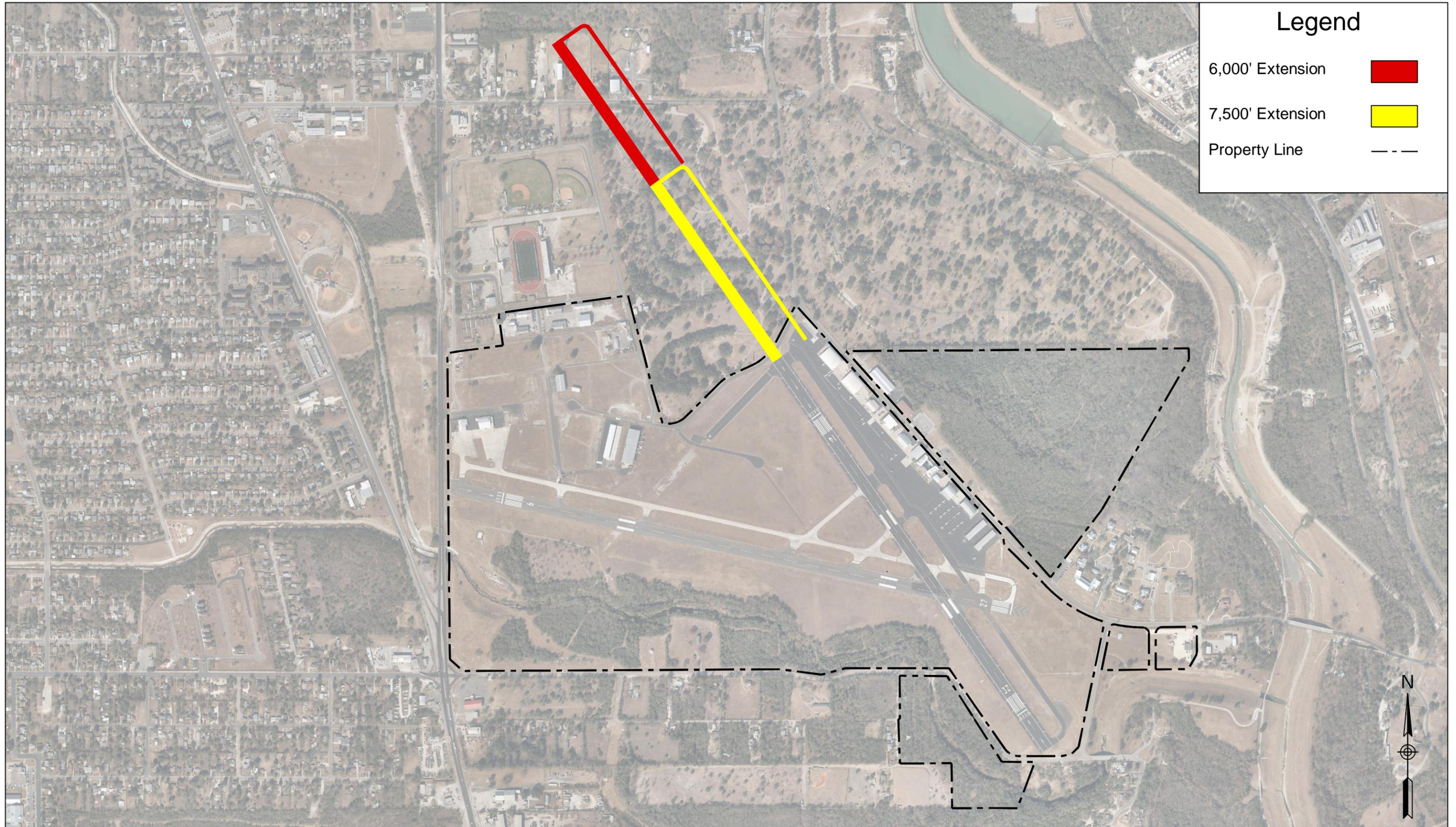
6,000' Extension	
7,500' Extension	
Property Line	

Scale: 1" = 800'

Exhibit 5.5



Airfield Alternative 2A - Extend Runway 32



Legend

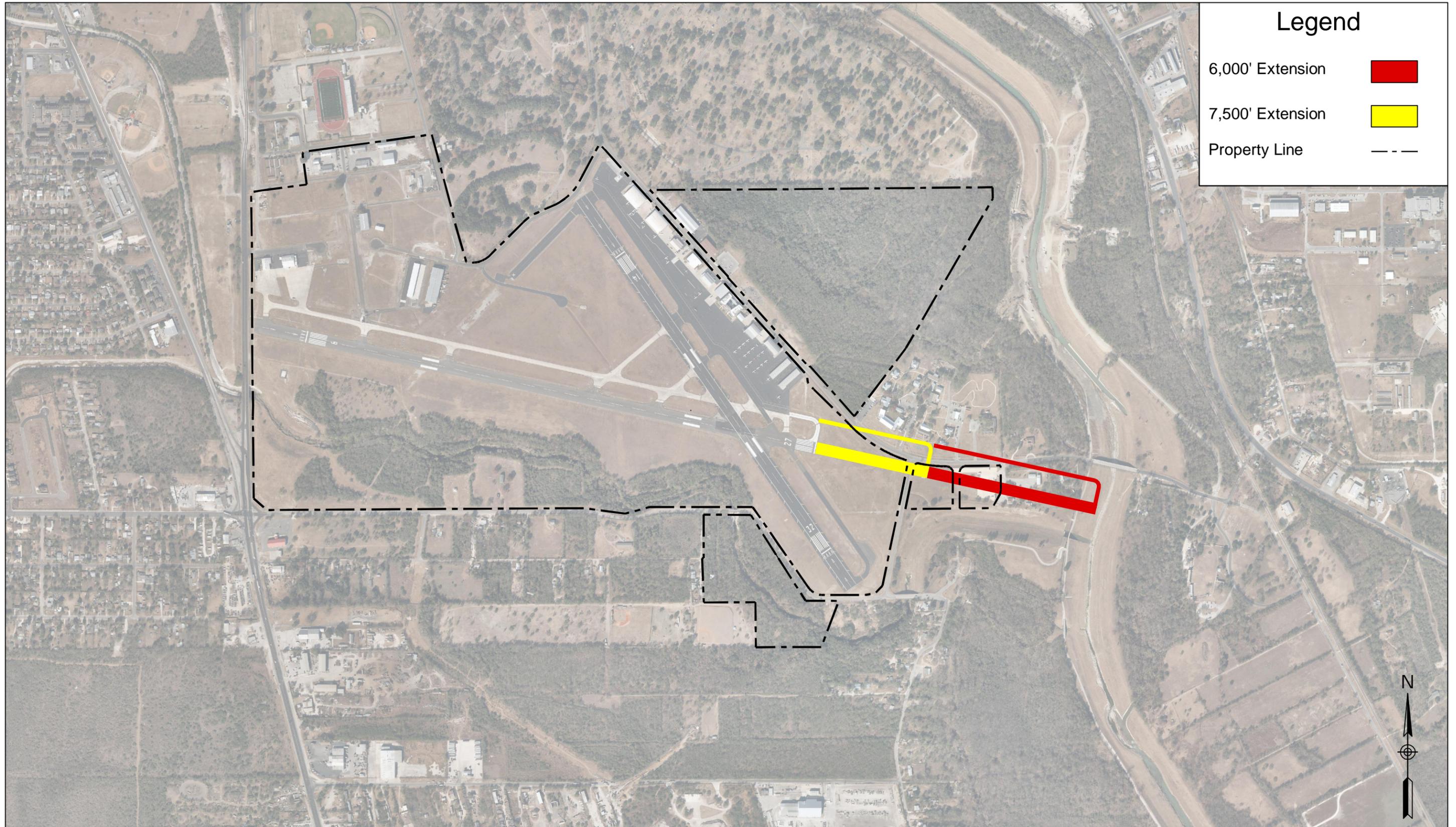
6,000' Extension	
7,500' Extension	
Property Line	

Scale: 1" = 800'

Exhibit 5.6



Airfield Alternative 2B - Extend Runway 14



Legend

6,000' Extension	
7,500' Extension	
Property Line	

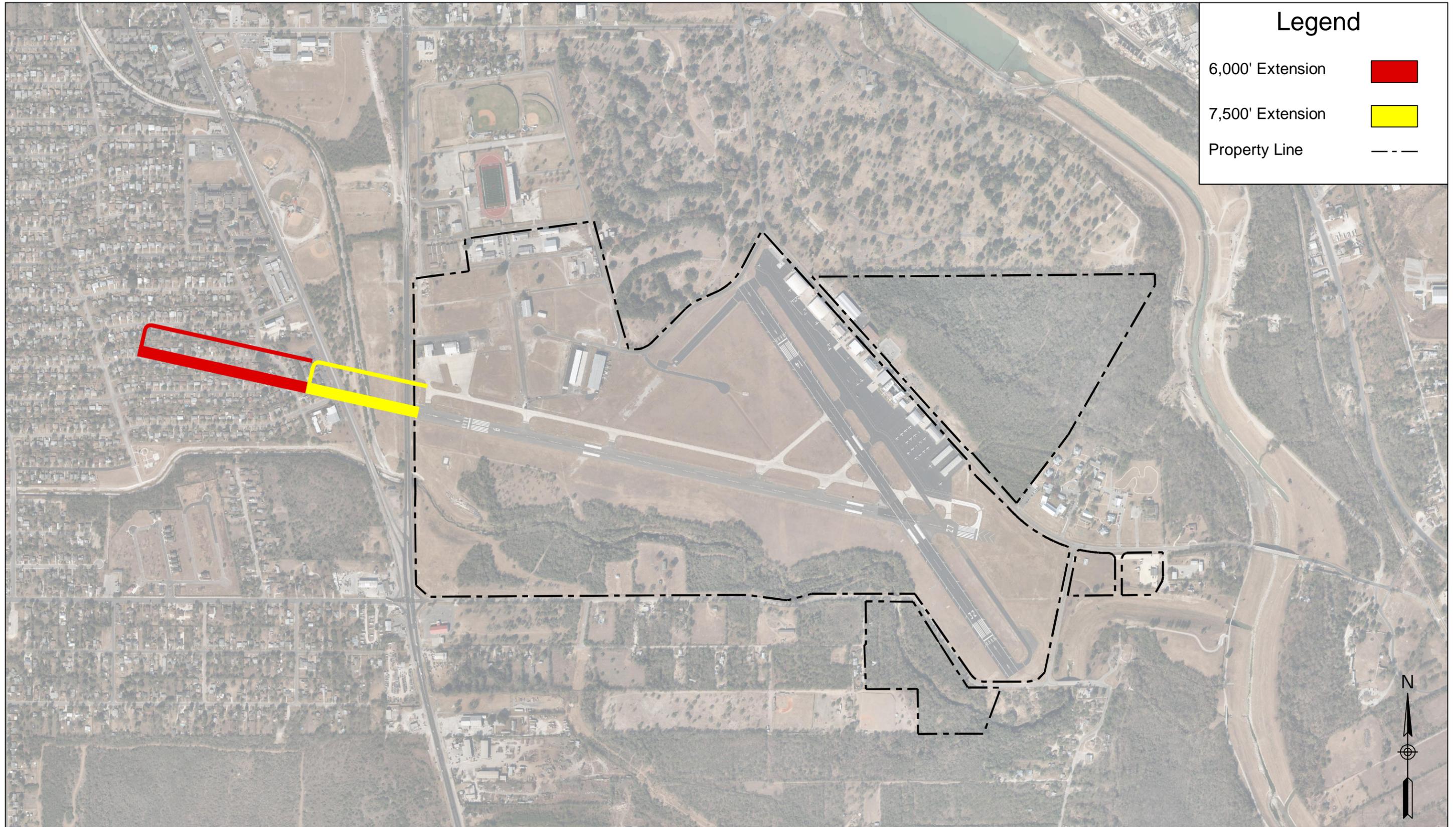


Scale: 1" = 800'

Exhibit 5.7



Airfield Alternative 2C - Extend Runway 27

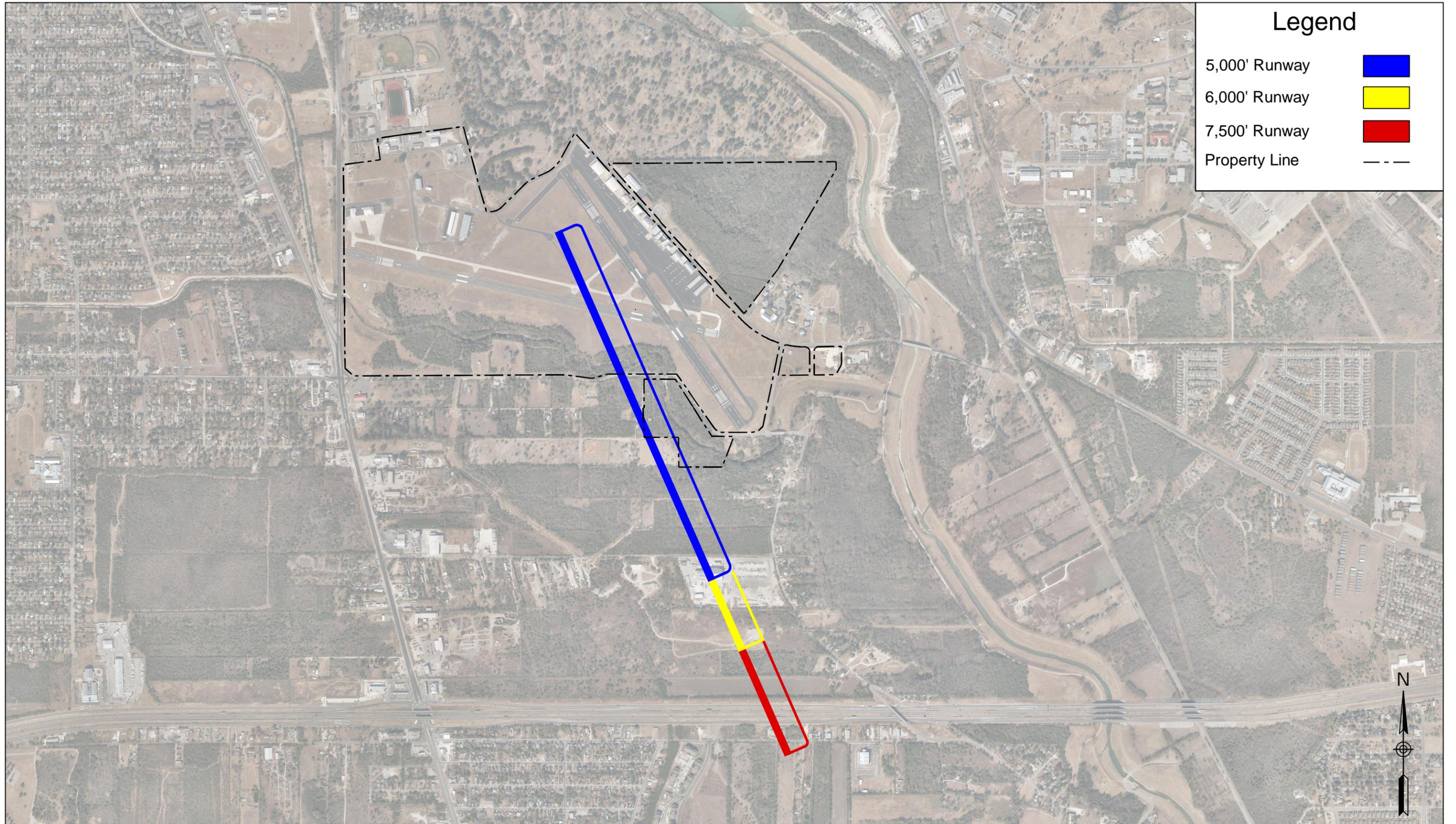


Scale: 1" = 800'

Exhibit 5.8



Airfield Alternative 2D - Extend Runway 09



Legend	
5,000' Runway	
6,000' Runway	
7,500' Runway	
Property Line	

Scale: 1" = 1200'

Exhibit 5.9



Airfield Alternative 3 - Construct Realigned Runway 15-33

5.4.4 AIRFIELD ALTERNATIVE 4: ADDITIONAL RUNWAY CAPACITY

This alternative involves the construction of a third runway in order to provide additional capacity, especially for flight training activities. Two sub-alternatives were generated for this alternative; each one provides a parallel runway to either existing Runway 9-27 or Runway 14-32.

5.4.4.1 Airfield Alternative 4A

Alternative 4A provides a southeast-northwest runway that parallels the existing Runway 9-27. This runway is located to the west of the existing Runway 9-27. This new runway is shown at 4,900 feet, and would require the channelization of Six Mile Creek, significant property acquisition, and would require long taxi times for aircraft trying to reach the existing airport facilities. Additionally, the resulting “V”-shaped configuration on the southeast portion of the airport is not ideal for runway safety. This alternative is shown on **Exhibit 5.10**.

5.4.4.2 Airfield Alternative 4B

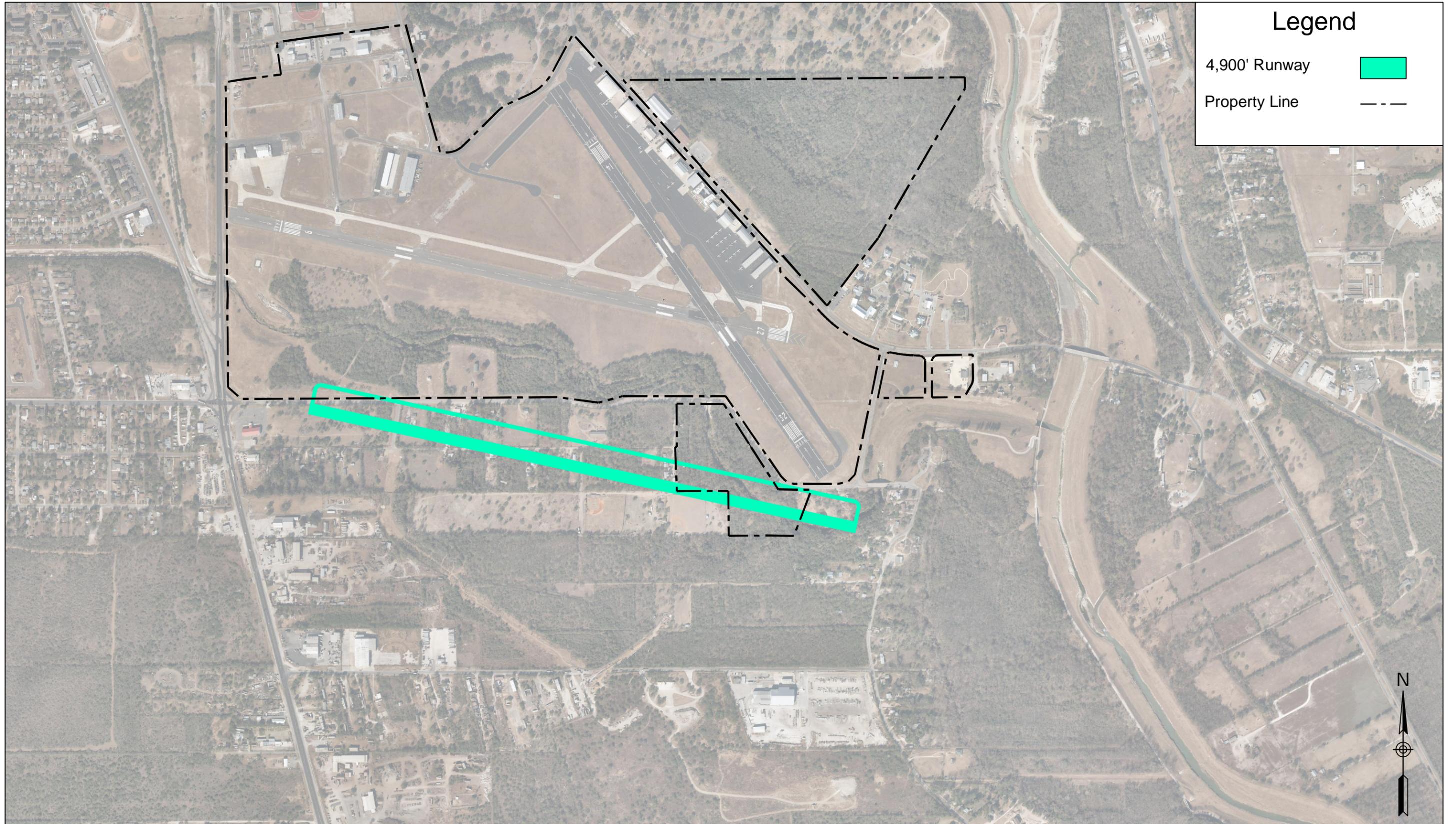
Alternative 4B provides an east-west runway that parallels the existing Runway 14-32. This runway will be located to the south of the existing Runway 14-32, and is shown at 6,000 feet. The requirements and some potential impacts of this alternative are listed below:

- Significant property acquisition
- Ashley Road relocation
- Newly constructed ATCT would require relocation
- Creation of new runway intersection
- Six Mile Creek Channelization
- Potential final approach issues with Interstate 410 power transmission lines
- West general aviation development would require relocation
- Harlandale Memorial Stadium would be located under the final approach to the new runway

Alternative 4B is shown on **Exhibit 5.11**.

5.5 AIRFIELD ALTERNATIVES EVALUATION

The alternatives generation process resulted in the preceding four general airfield alternatives and associated sub alternatives. Each of these alternatives presents an improvement intended to satisfy an airfield facility requirement or a user need, however, not all of them are completely feasible. This section presents an evaluation of the alternatives against a set of criteria such as operational effectiveness, implementation difficulty, operational safety, environmental factors, and economic feasibility. The criteria are defined below. The ranking system for each criterion is described in the evaluation matrix in **Table 5.2**.



Legend

4,900' Runway

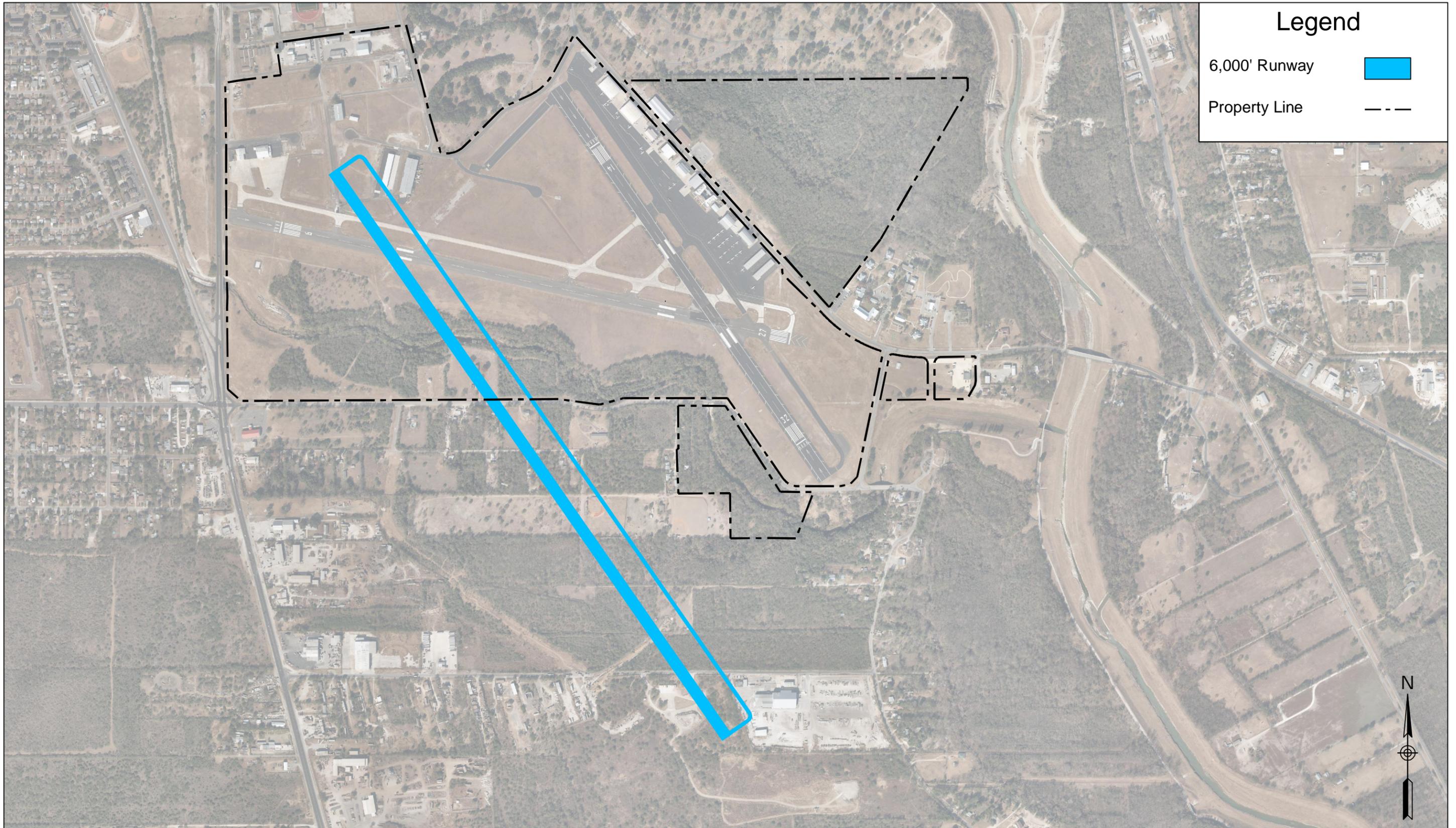
Property Line

Scale: 1" = 800'

Exhibit 5.10



Airfield Alternative 4A -Construct Additional Runway 09R-27L



Scale: 1" = 800'

Exhibit 5.11



Airfield Alternative 4B -Construct Additional Runway 14R-32L

5.5.2 EVALUATION CRITERIA

5.5.2.1 Operational Effectiveness

- **Ability to Meet General Aviation Demand**
The proposed alternative should be able to accommodate existing and projected future aviation demand. This demand should be accommodated in both airfield capacity as well as facility capacity, such as GA facilities and airport support facilities.
- **Meets ARC B-II Geometric Requirements**
The proposed alternative should meet the geometric and spacing requirements for ARC B-II on at least Runway 9-27.
- **Safety and Efficiency of Aviation Operations**
The proposed alternative should provide for the safety of aircraft operations, including both on the ground and on approach/departure. In addition to safety, the alternative should ensure that aircraft operations occur as efficiently as possible, with overall airfield connectivity and minimal taxi times.
- **Acceptability to Airport Users**
The proposed alternative should be acceptable and attractive to a wide range of airport users, including pilots, passengers, tenants and staff.
- **Aircraft Ground Movements**
The proposed alternative should allow for efficiency in aircraft ground movements and circulation about the airfield.
- **Vehicular Ground Access**
The proposed alternative should provide efficient access for vehicles trying to access the Airport and its facilities, primarily those along Mission Road and other airport tenants.

5.5.2.2 Implementation Difficulty

- **Roadway Relocations**
The proposed alternative should not require or should minimize the relocation of roads.
- **Land Acquisition**
The proposed alternative should minimize the amount of land acquisition required and should focus on using as much airport-owned land as possible.
- **Six Mile Creek Relocation/Channelization**
The proposed alternative should not require the relocation or channelization of Six Mile Creek, which runs parallel along the south property line of the Airport.
- **Existing Business/Structure Relocation**
The proposed alternative should minimize the relocations of existing businesses and/or structures.

- **Leasehold Impacts**

The proposed alternative should not create any adverse impacts on existing leaseholds.

5.5.2.3 Landside Facility Expansion

- **Airport Development Potential**

The proposed alternative should provide increased airport development potential than what is currently available as the Airport exists today, and be flexible to incremental growth. It should also have the potential to attract new business and foster expansion of existing businesses.

5.5.2.4 Environmental Impacts

- **Impact to Residential Areas**

Given the Airport's proximity to residential areas to the west, the proposed alternative should not create any new impacts to existing residential areas.

- **Impact to Missions**

Since the Airport is located close to the San Antonio Missions, any proposed alternative should not create any new impacts to the Missions.

- **Consistency with Area Plans**

The proposed alternative should be compatible with existing and future land use plans for the area surrounding the Airport.

5.5.2.5 Development Costs

The following evaluation criteria pertain to the level of cost associated with each alternative. Ideally, each alternative should have low costs associated with each of the following criteria:

- **Airfield/Runway Construction**
- **Roadway Relocation**
- **Facility Relocation**
- **Land Acquisition**
- **Environmental Mitigation**

Table 5.2 - Airfield Development Alternative Screening Matrix

Screening Criteria	Airfield Alternatives ⁽¹⁾									
	1A	1B	1C	2A	2B	2C	2D	3	4A	4B
Operational Effectiveness										
Ability to Meet Aviation Demand	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Meets ARC B-II Geometric Requirements	Y	Y	Y	N	N	N	N	Y	Y	Y
Acceptability to Users	I	I	I	I	I	I	I	I	I	I
Safety and Efficiency of Air Operations	I	I	NC	NC	D	NC	NC	D	I	D
Airfield Ground Movements	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Vehicular Ground Access	NC	NC	D	NC	NC	D	D	D	NC	NC
Implementation Difficulty										
Roadway Relocations	NC	NC	M	M	H	H	H	H	H	H
Six Mile Creek Relocation/Channelization	N	N	Y	Y	N	N	Y	Y	Y	Y
Land Acquisition Required	N	N	Y	Y	Y	Y	Y	Y	Y	Y
Existing Business/Structure Relocation Required	N	Y	N	Y	Y	Y	Y	Y	Y	Y
Leasehold Impacts										
None			✓	✓	✓	✓	✓	✓	✓	
West Ramp Area										M
East Ramp Area	M	H								
Environmental Impacts										
Impact to Missions	NC	NC	INC	INC	INC	INC	NC	D	INC	INC
Impact to Residential Areas	NC	NC	INC	INC	NC	INC	INC	INC	INC	INC
Consistent with Area Plans	Y	Y	Y	N	N	N	N	N	N	N
Landside Facility Expansion										
Airport Development Potential	M	L	L	H	M	L	L	M	M	M
Development Costs										
Airfield/Runway Construction	L	L	H	H	H	M	H	H	H	H
Roadway Relocation	L	L	M	M	L	M	H	M	M	H
Facility Relocation	L	M	L	L	L	L	L	L	H	H
Land Acquisition	L	L	M	H	H	H	H	H	H	H
Environmental Mitigation	L	M	H	H	H	H	H	H	H	H
Legend	INC - Increased		Y – Yes				L – Low			
	NC – No Change		N – No				M – Moderate			
	D - Decreased		I – Improved				H – High			
Notes:										
(1)	Alternatives 2A through 2D and 3 were evaluated at the 6,000 foot runway length option.									

Source: Kimley-Horn and Associates, Inc. 2012

5.5.3 ALTERNATIVES EVALUATION

The evaluation of the airfield alternatives determined that while all of the proposed alternatives address facility requirements and would benefit the Airport in some way, many alternatives also contain significant environmental, cost, and implementation impacts that could drastically reduce their feasibility. The following discussion highlights the rationale behind the alternatives evaluation.

Alternatives 1B and 1C were discarded after evaluation for reasons of inconsistency with local plans, environmental impacts, and cost of implementation. The proposed dimensions of the large RPZ required with Alternative 1B would require significant land acquisition off the end of either Runway 32 or Runway 27, and would impact land owned by the National Park Service and the San Antonio River Authority. Alternative 1C would entail a very high cost of construction in order to obtain separation standards, and would also impact environmentally sensitive zones located on the Airport, such as the Pauper's Cemetery.

Alternative 2A, 2B, and 2D were entirely discarded due to significant environmental, accessibility, land acquisition, and cost impacts. Alternative 2C, however, was retained for further discussion and evaluation (see Section 5.9, Post Planning Horizon and Ultimate Improvements). All of the sub-alternatives within Alternative 2 required costly land acquisition, and many infringed upon environmentally sensitive areas, including Six Mile Creek, National Park Service land, burial parks, and the San Antonio River. In addition to the development impacts, an ultimate length of 7,500 feet was not deemed necessary in light of the runway length supplemental analysis performed in Section 5.4.2.1.

Alternative 3 was discarded altogether due to significant costs associated with construction and land acquisition. Though it was recommended as an ultimate improvement in the previous master plan, it is not recommended in this plan due to the changed economic climate and changed general aviation demand from ten years ago.

Alternatives 4A and 4B, which involved construction of a third runway, were discarded due to significant environmental, cost, land acquisition, accessibility, and area planning factors. Although they provided additional airfield capacity, the impacts and costs associated with acquiring large amounts of land and constructing an additional runway were deemed too great to warrant further consideration as viable development options.

5.5.3.1 Shortlisted Alternative

Airfield Alternative 1A was retained after the evaluation process. Alternative 1A is an upgrade of airfield design standards to an ARC of B-II with instrument approach visibility minimums of greater than $\frac{3}{4}$ mile. This upgrade would be accomplished by shifting taxiways in order to achieve runway/taxiway separation of 240 feet, as well as increasing the size of the Runway Protection Zones, but modified so that only Runway 9-27 is upgraded to B-II, and Runway 14-32 remains at B-I standards.

This modified airfield alternative was used as a basis for the development of GA alternatives. These alternatives, including land use alternatives and site plan alternatives are presented in the following section.

5.6 GENERAL AVIATION ALTERNATIVES

The following discussion focuses on potential GA development options for the Airport. The proposed development options include areas for GA facility development, including aircraft storage hangars, aircraft apron areas, FBO and terminal facilities, airport maintenance, and vehicular parking. This section also presents improvements to airport ground access, and suggested areas for non-aeronautical business development on airport property. The proposed development options emphasize the development of land currently owned by the Airport first, and indicates potential areas for land acquisition if needed that would best suit GA requirements.

The proposed development is spatially arranged around the selected airfield alternative identified in Section 5.5.2.1. The list below includes the categories of GA development addressed in the GA alternatives.

- **General Aviation**
 - Hangars
 - Apron Space
 - FBO / Terminal
 - Vehicular Parking
- **Non-Aeronautical Business Development**
 - Non-Aviation Commercial Development
 - Museums
 - Recreational Areas
- **Airport Support**
 - Fuel Storage
 - Airport Maintenance
 - Customs and Border Protection

The remainder of this section is organized in the following manner: GA Land Use Alternatives are described first, followed by an evaluation of those alternatives. Three different GA Site Plan Alternatives are presented thereafter. Finally, the overall preferred airport development plan is presented, which combines the features of the preferred land use and site plan alternatives, and the preferred airfield alternative.

5.6.1 GA LAND USE ALTERNATIVES

The following GA Land Use Alternatives depict potential locations of GA facility land use and non-aeronautical facility land use. GA facilities include those described above, including hangars, apron space, vehicular parking, and FBOs. Non-aeronautical facility land use is being explored because the Airport is interested in using some of its existing property, that is not well-suited for aeronautical (i.e. hangars, aprons, airfield facilities) development, for non-aeronautical development. An increasingly important issue for airports, especially GA airports, is diversification of revenue sources, and non-aeronautical development on airport property provides a potential new revenue source. Compatible, non-aeronautical land uses can also help the Airport in harmonizing with its community.

Non-aeronautical development could include commercial uses, such as hotels, restaurants, and museums, as well as non-commercial uses, such as recreational areas, nature trails, and access to the nearby San Antonio River.

5.6.1.1 GA Land Use Alternative 1: Northern Airport Vicinity Development

GA Alternative 1 provides for the development of facilities in the northern vicinity of the Airport. The areas proposed for development include the infield area located between Runway 14-32 and Runway 9-27, and the large area located west of Echo Street and east of Roosevelt Avenue. These development areas would be suited for hangar development, FBO development, apron space, and airport support facilities.

This alternative also provides for non-aeronautical development on airport property in the vacant land east of Mission Road, and on the northeast corner of Roosevelt Avenue and Ashley Road. This alternative is shown on **Exhibit 5.12**.

5.6.1.2 GA Alternative 2: Southern Airport Vicinity Development

GA Alternative 2 provides for the development of facilities in the southern vicinity of the Airport. The area includes the land located south of Runway 9-27, west of Runway 14-32, and north of Ashley Road. Any aviation development in this area which requires airfield access, such as hangars, apron space, or FBO facilities, would require significant environmental mitigations with the presence of Six Mile Creek in this area. This alternative also provides for non-aeronautical development in the vacant land east of Mission Road. This alternative is shown on **Exhibit 5.13**.

5.6.2 GENERAL AVIATION LAND USE ALTERNATIVES EVALUATION

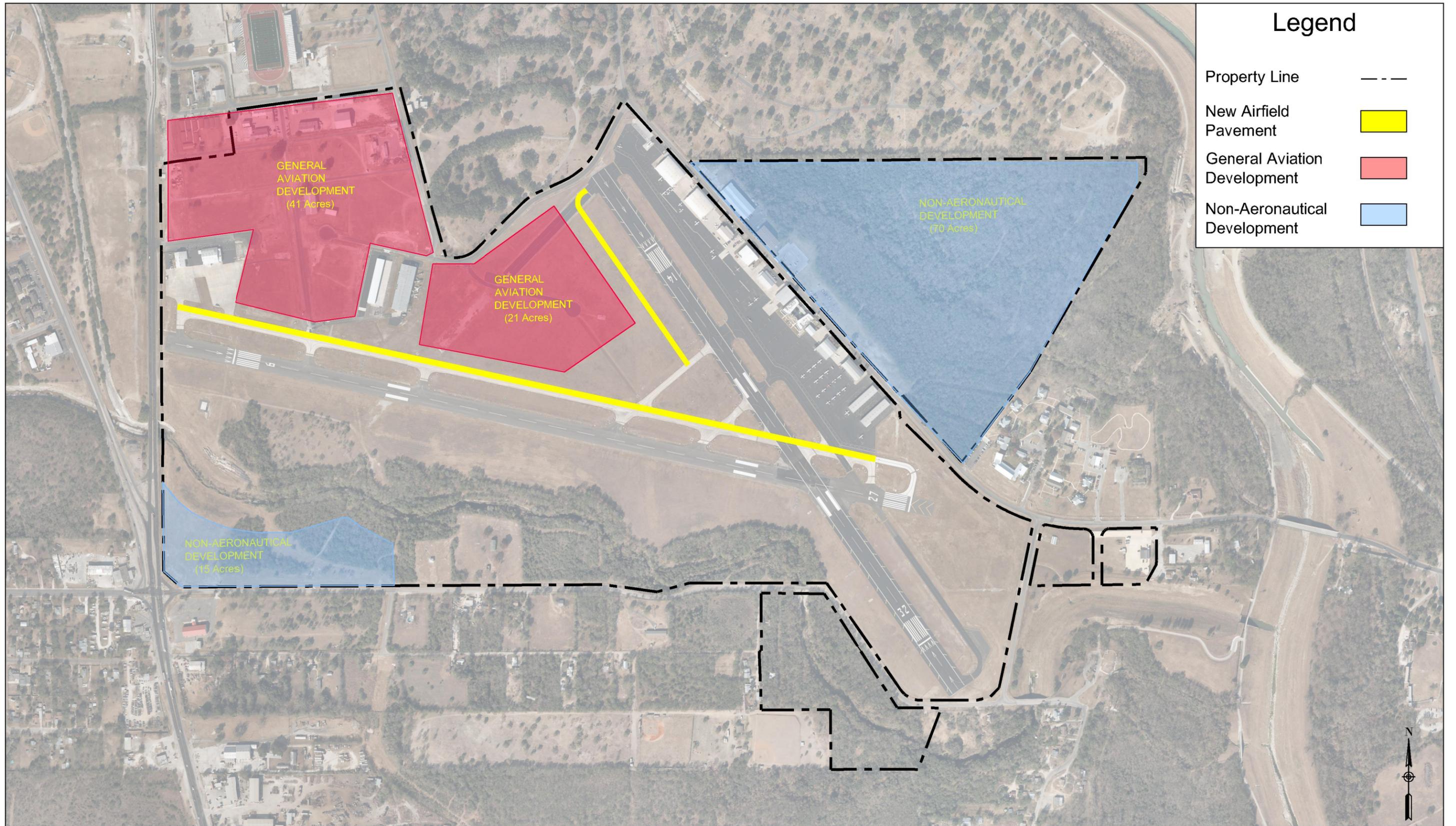
In a similar fashion as with the airfield development alternatives, the GA alternatives were evaluated against the same criteria as described in Section 5.5.

GA Land Use Alternative 2 was discarded from further consideration because of significant cost and environmental impacts associated with the channelization of Six Mile Creek.

GA Land Use Alternative 1 was retained because it requires minimal land acquisition, and provides a large area for immediate facility development, such as hangars, apron space, airport support, and parking.

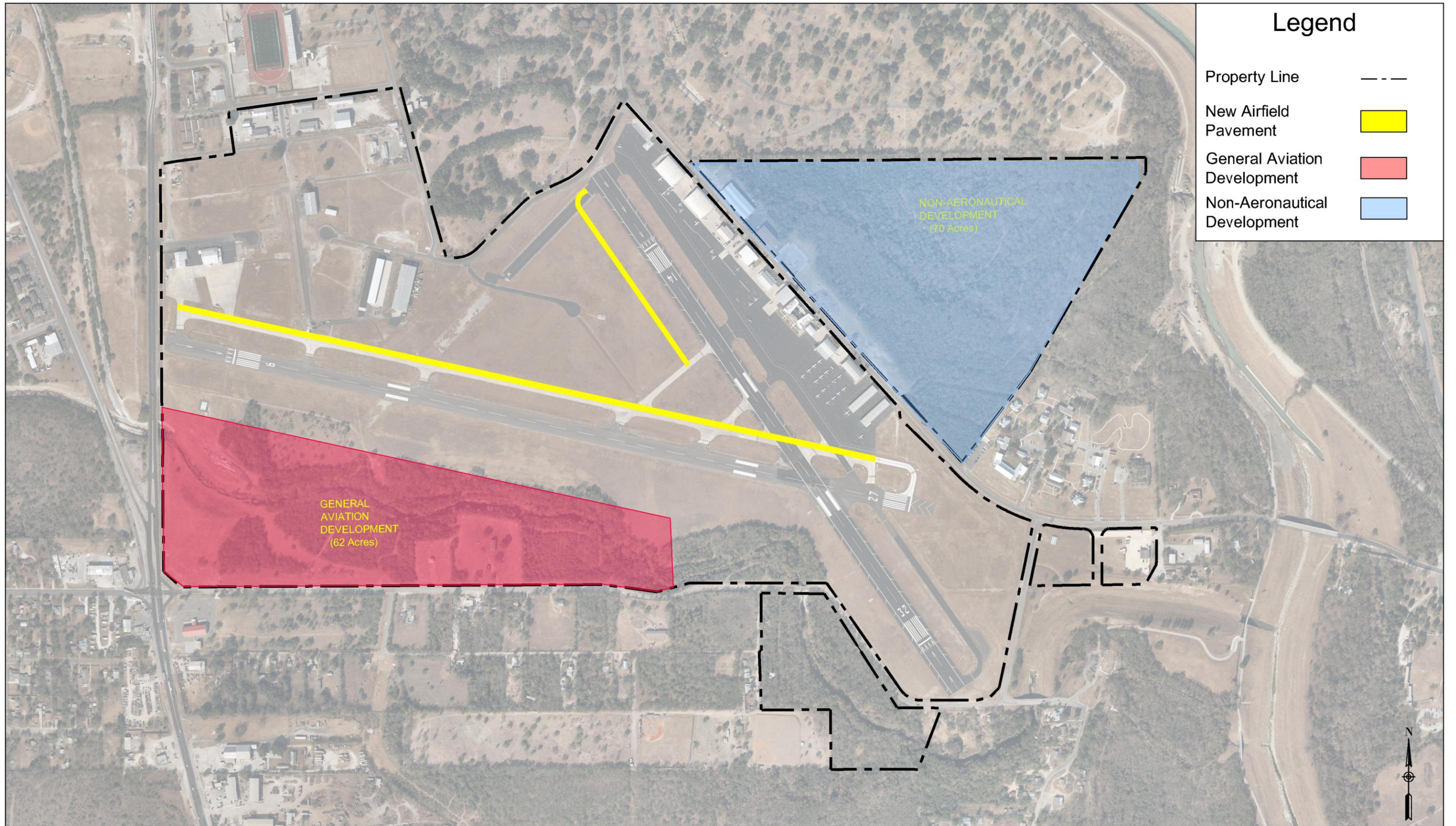
5.6.2.1 Shortlisted Land Use Alternative

GA Land Use Alternative 1 was used as the land use strategy for the spatial placement of GA facilities to meet GA facility requirements as well as provide for non-aeronautical facility development. GA site plan alternatives using GA Land Use Alternative 1 are provided in the next sub-section.



General Aviation Land Use Alternative 1 - Northern Vicinity Development

Exhibit 5.12



5.6.3 GENERAL AVIATION SITE PLAN ALTERNATIVES

The following section describes three different alternatives for GA site development at the Airport. Each alternative was developed around the facility requirements below in **Table 5.3**. The alternatives are intended to use as much of airport-owned land as possible, with minimal land acquisition. Common features of each alternative include the addition of an access parkway, connecting Roosevelt Avenue to Mission Road and providing roadway access to GA development. Another common feature is the provision of space for a potential future relocation of the existing Civil Air Patrol (CAP) facility. During the process of developing site plan alternatives, Airport staff indicated discussions had begun between the Airport and CAP about the relocation of their facility. As a result, the CAP's preliminarily chosen site is depicted on the site plan alternatives. Vehicular parking is not depicted on these alternatives, and will be added to the airport development plan.

Table 5.3 - General Aviation Facility Requirements

Facility Type	PAL 4 Requirement
Additional Conventional Hangar Area Required	121,600
Additional T-Hangars Required	61
Additional Total Apron Area Required ⁽¹⁾	101,950
Additional FBO Apron Area Required ⁽²⁾	321,600

Notes:

- (1) Inclusive of all apron types, both FBO and Non-FBO
- (2) Includes only the deficiency in FBO apron space
- All areas in square feet

Source: Kimley-Horn and Associates, Inc. 2012

5.6.3.2 GA Site Plan Alternative 1

This alternative focuses on providing T-hangars and conventional hangar space in the northwest portion of the Airport, between 96th Street and 99th Street. Additional apron space is provided immediately adjacent to the existing west ramp. A premier FBO facility and FBO hangar is also provided with direct access to Taxiway Delta. Airport support facilities, such as a fuel farm and new airport maintenance facility, are also provided. A parallel taxilane to the existing Taxilane D2 is also provided, which increases connectivity between Taxiway D and the northern part of the proposed GA area. This alternative is shown in **Exhibit 5.14**.

5.6.3.3 GA Site Plan Alternative 2

This alternative provides some of the same features as Alternative 1, but in a different spatial arrangement. T-hangars are provided in two different locations, one cluster is located next to the existing Ocotillo T-hangars, and the other located further north, closer to Roosevelt Avenue. Overall, more apron space is provided. Individual corporate style hangars are provided, and instead of a large common ramp area as shown in Alternative 1, individual aprons are provided for each hangar. An airport maintenance facility and fuel farm are also provided. As with Alternative 1, a premier FBO site is provided, but with a larger apron area. A parallel taxilane to Taxilane D2 is also provided. This alternative is shown in **Exhibit 5.15**.

5.6.3.4 GA Site Plan Alternative 3

This alternative also provides many of the same features as the previous alternatives in a different spatial arrangement. A parallel taxiway to Taxiway D2 is provided, which allows two-way access to a large common apron area in the northern portion of western airport vicinity. Surrounding this common apron area are conventional hangars of varying sizes. T-hangars are provided on both sides of the existing Ocotillo T-hangars, with easy access to and from Taxiway Delta. T-hangars are also provided along the existing Taxiway D2. This alternative provides a premier FBO site in the area between Runway 9-27 and Runway 14-32, commonly referred to as the "center sod". This alternative is shown in **Exhibit 5.16**.

A comparison of the three site plan alternatives is provided below in **Table 5.4**.

Table 5.4 - Comparison of General Aviation Site Alternatives

Functional Area	Alternative 1	Alternative 2	Alternative 3
Apron Space	393,000	483,000	573,000
Conventional Hangar Space	110,000	129,000	138,000
T-Hangars	48	48	60
Notes:			
- All hangar and apron space shown in square feet.			

Source: Kimley-Horn and Associates, Inc. 2012

5.6.4 **PREFERRED GA SITE PLAN ALTERNATIVE**

The preceding GA site plan alternatives were presented to Airport staff for their input and recommendations. Site plan alternative 3 was recommended by staff as the preferred alternative for GA facility development with minor modifications. This alternative was combined with the selected airfield alternative to produce the overall airport development plan (ADP), described in the next section.

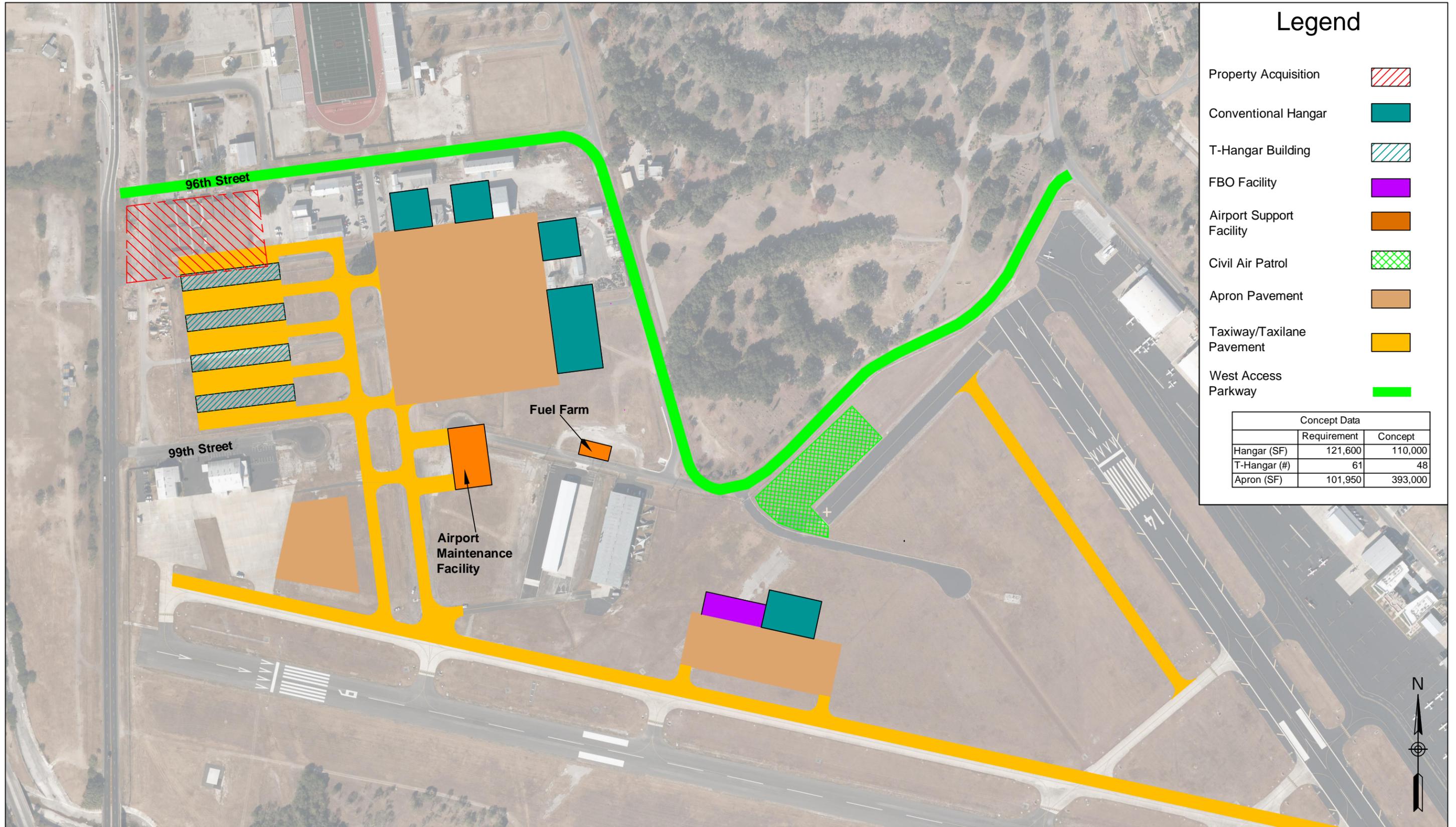
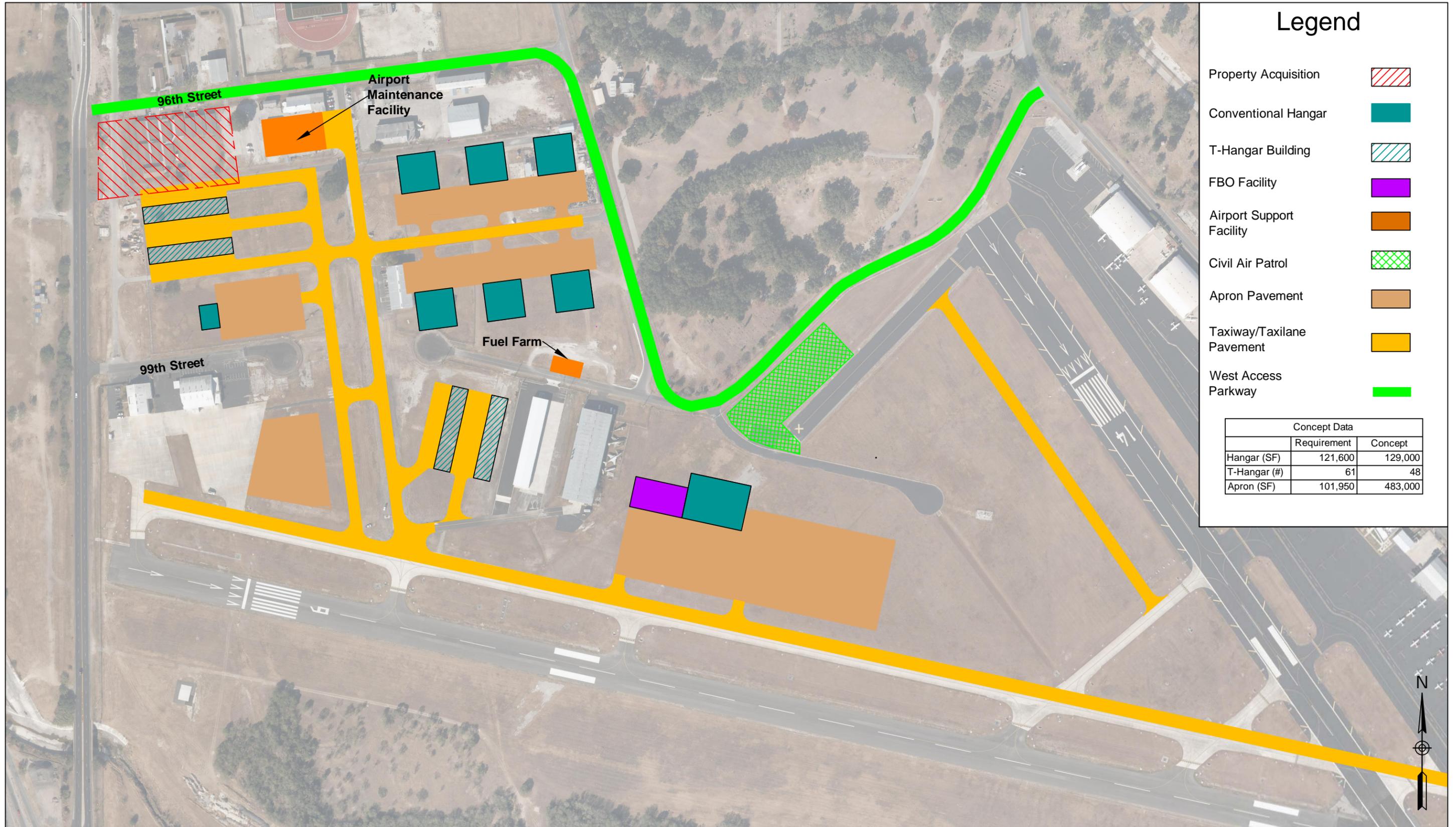


Exhibit 5.14

General Aviation Site Plan Concept 1



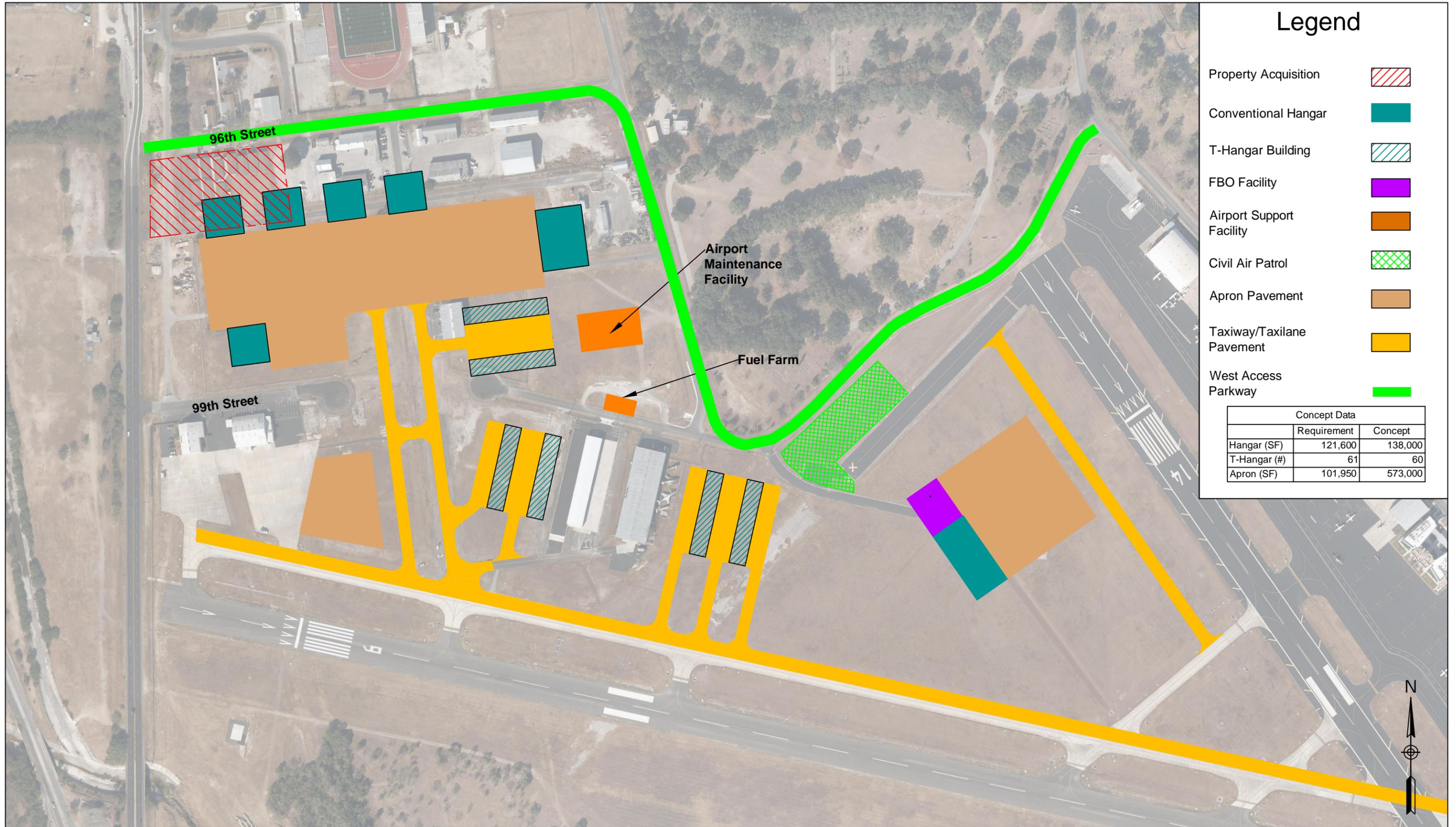
Scale: 1" = 300'



Exhibit 5.15

General Aviation Site Plan Concept 2

Stinson Municipal Airport
Master Plan Update



Scale: 1" = 300'

Exhibit 5.16

General Aviation Site Plan Concept 3

5.7 AIRPORT DEVELOPMENT PLAN (ADP)

The preferred airfield and general aviation development alternatives were combined to produce an overall Airport Development Plan. The features of the ADP are described below, and the overall ADP is depicted in **Exhibit 5.17**. These improvements were selected based on input from the PAC, the Business Development Workshop, airport users, public information open houses, and Airport staff.

The improvements recommended in this ADP will be phased and implemented as demand warrants. For the purpose of cost estimating, the overall ADP phasing is considered and incorporated into the Implementation Plan section of this report.

5.7.1 AIRFIELD IMPROVEMENTS

Airfield Alternative 1A was retained as the preferred airfield development. This alternative provides for the following:

- Upgrade of airfield design standards to ARC B-II for Runway 9-27
 - Taxiway/runway separation of 240 feet
 - Larger RPZs
- New parallel taxiway connection to Runway 14 from existing Taxiway Charlie, providing access to Runway 14 from the western airport facilities without having to cross Runway 14-32.
- Construction of an additional taxiway which will parallel the existing Taxiway D2.

5.7.2 GENERAL AVIATION IMPROVEMENTS

The preferred GA development combines the features of GA Land Use Alternative 1, GA Land Use Alternative 3, and a modified GA Site Plan Alternative 3 into a single overall GA development alternative. The features of this alternative are highlighted below:

- Box hangar and apron construction in the area north of 99th Street and south of 96th Street, between Echo Street and Roosevelt Avenue.
- Construction of additional apron space east of the existing west ramp area.
- Paving of existing grass island on existing west ramp.
- Acquisition of a small parcel of land on the corner of Roosevelt Avenue and 96th Street.
- Nested T-Hangar construction in the vacant areas to the east and west of the existing Texas Air Museum³¹.
- Development of a premier FBO site in the area currently between Runway 14-32 and Runway 9-27.

One of the features common to all three GA Site Plan alternatives was the planned location of a new CAP Facility on the west side of the Runway 14 threshold. Based on discussions with Airport staff after the alternatives development process, that particular location is no longer being considered for the CAP.

³¹ Assumes that the ATCT is relocated from its current location atop the terminal building.

5.7.3 ACCESS/AESTHETIC IMPROVEMENTS

- Roadway access improvements in the northern airport vicinity, including a new continuous road linking Roosevelt Avenue and Mission Road, beginning at the current intersection of 96th Street and Roosevelt Avenue.
- Closure of the existing L.C. Amos Jr. (formerly 97th Street) intersection at Roosevelt Avenue.
- Signage improvements, including strategically placed monument signs to provide the Airport with a new entrance, and directional signage to improve way finding within the airport environs.

5.7.4 NON-AERONAUTICAL BUSINESS DEVELOPMENT

- Site preparation of a 15-acre area of land located on the northeast corner of Roosevelt Avenue and Ashley Road for future development of non-aeronautical businesses.

Example site plans were produced for the non-aeronautical land use areas to show possible developments on Airport-owned land. These concepts are example in nature, and are included in **Appendix D** of this report.

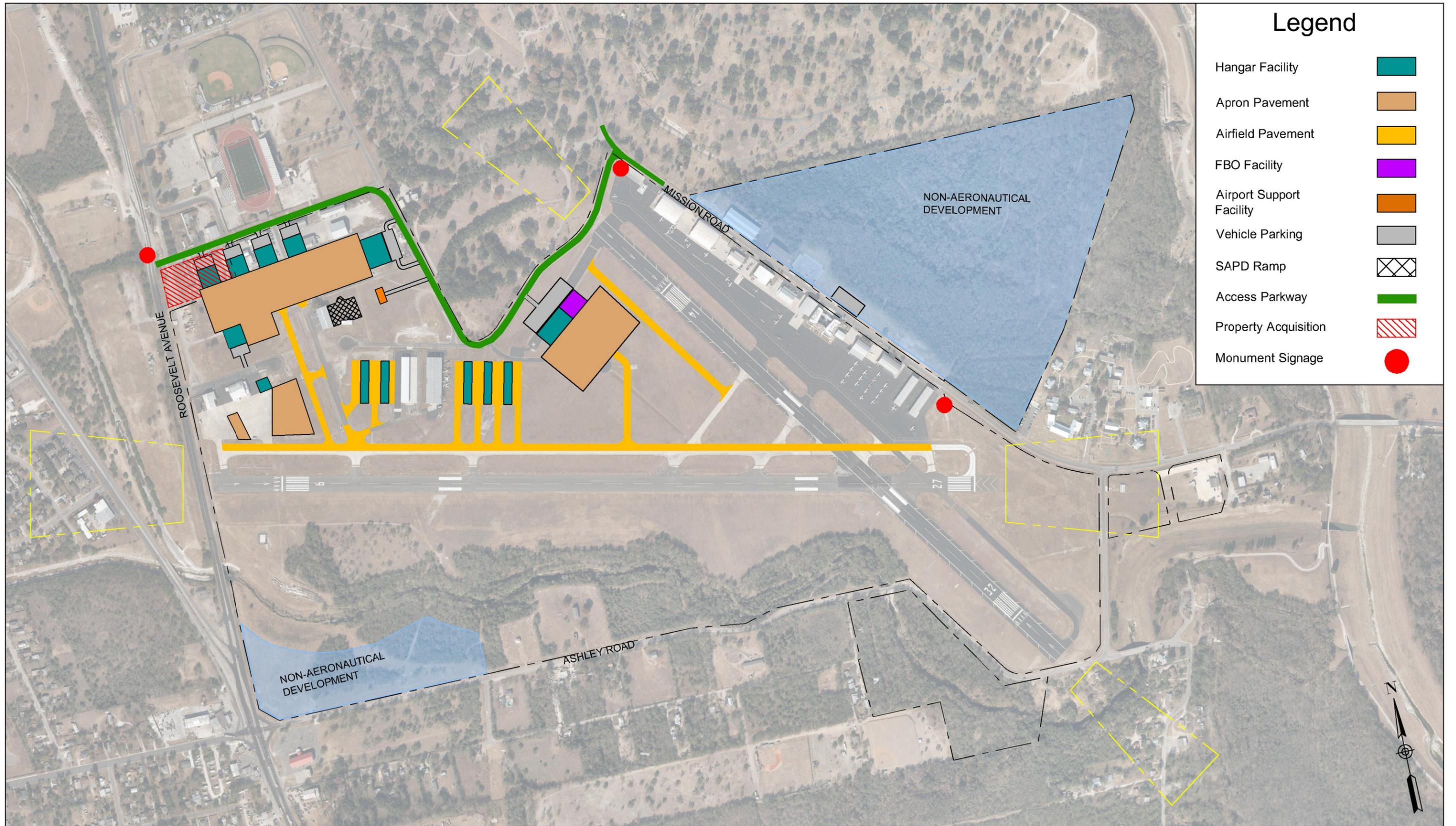
A description of project phasing for the implementation of the Airport Development Plan is provided in Section 6 of this report.

5.8 MISSIONS NATIONAL HISTORICAL PARK EVALUATION

The San Antonio Missions National Historical Park (MNHP), a unit of the NPS, is located east and southeast of the Airport. The park was established in 1978, consists of approximately 819 acres, and has been designated by the NPS as a historic site of national significance by Public Law 95-629 on November 10, 1978, to provide for the preservation, restoration, and interpretation of the Spanish Missions of San Antonio. The MNHP follows the San Antonio River and incorporates properties around the early Spanish settlements of Mission Nuestra Senora de la Purisima Concepcion de Acuna (Concepcion), Mission San Jose y San Miguel de Aguayo (San Jose), Mission San Juan Capistrano (San Juan), and Mission San Francisco de la Espada (Espada). The latter two missions are located closest to the Airport.

Mission San Juan is located ¾-mile east of the Airport and the San Antonio River, along Mission Road. Mission Espada is located 1.25 miles southeast of the Airport, along the west side of the San Antonio River. The Espada Aqueduct, a water supply channel dug by the early Spanish settlers to supply water to the missions, is the closest of the mission sites to the Airport, approximately ¼-mile to the southeast. The dam is still functioning, diverting water from the San Antonio River into the Espada Acequia. The missions were originally established in the 18th century. Both Mission San Juan and Mission Espada are listed on the National Register of Historic Properties (NRHP), as is Mission Parkway, and all have been designated as having national significance. The Espada Aqueduct is also listed on the NRHP, and in addition, has been designated a National Historic Landmark. These resources are also protected under Section 4(f) of the Department of Transportation Act of 1966.

NPS manages park resources based on cooperative agreements it has entered into with the Archdiocese of San Antonio, the Texas Parks and Wildlife Commission, and the San Antonio Conservation Society. While NPS manages and operates the park, the missions themselves are still owned by the Archdiocese of San Antonio, and religious services and activities are still conducted at these facilities. Besides the religious uses of the missions, NPS preserves, restores, and interprets the Spanish missions for the benefit and enjoyment of present and future generations. The park has developed instructional modules



Scale: 1" = 600'



Exhibit 5.17

Airport Development Plan

Stinson Municipal Airport
Master Plan Update

on the cultural and natural heritage of the missions, which are experienced by approximately 30,000 students each year.³² Other uses of the park include hiking, biking, bird watching, and nature walks.

In 2010, the NPS initiated a Boundary Study and Land Protection Plan for the MNHP. The purpose of the NPS Boundary Study is to examine the historic significance and association of features and land areas adjacent to the existing MNHP boundary and the potential for including areas determined to have historic significance within the park's boundary. The initial study areas for the Boundary Study included areas abutting the Airport, some of which is owned by the City of San Antonio, in the area of Mission San Juan and the Espada Aqueduct. After meeting with the NPS in 2010 to discuss concerns the Aviation Department had over these areas, the NPS agreed not to target these areas for inclusion within the MNHP boundary. However, the Aviation Department is committed, as an outgrowth of coordination initiated with the NPS during the Environmental Assessment for the extension of Runway 9-27 in 2007, to ensuring aviation-related development in areas adjacent to the MNHP is compatible with existing and future planned park uses.

In July 2012, the Aviation Department and the consultant team met with representatives of the NPS to discuss proposed development being studied as part of the master plan update and to get an update on the Boundary Study and NPS plans for portions of the MNHP in close proximity to the Airport. Issues of potential concern to the NPS are primarily related to increased noise and overflights of the MNHP. The proposed elements of the ADP would have the potential to increase flights at the Airport if more aircraft are based in the proposed hangar facilities. However, the ADP does not contemplate increasing the capabilities of the Airport to accommodate larger aircraft, so any increase in operations would largely occur by aircraft types already operating at the Airport.

The proposed non-aeronautical development located east of Mission Road abuts NPS property on the east. The Aviation Department has committed to ensuring any stormwater runoff from the Airport would be controlled on-site and would not impact the existing acequias to the east and south of the property. Potential plans for this portion of the MNHP include biking and hiking trails connecting the missions along the San Antonio River. Thus, any proposed development in this area should be compatible with these potential MNHP uses.

In general, the proposed ADP should be compatible with existing and planned uses of the MNHP. The Aviation Department and the NPS are both committed to continuing communication with each other to ensure, to the extent possible, the goals and objectives of each entity are understood and not in conflict with each other.

³² *Strategic Plan for San Antonio Missions National Historical Park, October 1, 2000-September 30, 2005*, National Park Service, April 2000.

5.9 POST PLANNING HORIZON & ULTIMATE IMPROVEMENTS

The planning horizon for this master plan update spans approximately 20 years from 2012. The airport development plan, as described in the previous section, identifies all development as “future” development, meaning it is intended to occur during the 20-year planning horizon. Development outside of this 20-year period will be referred to as “ultimate” improvements.

An airport improvement explored in significant detail throughout this alternatives development process was the potential extension of Runway 9-27 to 6,000 feet from its current length of 5,000 feet. The extension would occur on the Runway 27 end, going east. The alternatives evaluation determined there would be several impacts from this action, including road relocation, business relocation, and impacts to environmentally sensitive areas such as the San Antonio River and San Antonio Missions. Additionally, it was determined the Airport currently does not and is not projected to have the air traffic demand to warrant an extension as part of this airport master plan update.

However, it is very well possible airport demand may change over time, such that the critical aircraft may change, and the operations of the critical aircraft could require a longer runway length than 5,000 feet. Should this change occur, a runway extension would be considered in significant detail for its benefits and costs. In light of this acknowledgement of possible future demand, a 1,000-foot extension will be depicted on the Airport Layout Plan (ALP) as an ultimate condition. It should be noted, however, no runway extension is being considered or programmed to occur as a result of this master plan update.