



## CHAPTER FOUR: ALTERNATIVES





## **Chapter Four**

# **ALTERNATIVES**

Prior to defining the recommended development program for Laughlin/Bullhead International Airport, it is important to consider development potential and constraints at the airport. The purpose of this chapter is to consider the actual physical facilities which are needed to accommodate projected demand and meet the program requirements as defined in Chapter Three, Facility Requirements.

In this chapter, a number of airport development alternatives are considered for the airport. For each alternative, different physical facility layouts are presented for the purposes of evaluation. The ultimate goal is to develop the underlying rationale which supports the final recommended master plan development concept. Through this process, an evaluation of the highest and best uses of airport property is made while considering local development goals, physical and environmental constraints, and appropriate federal airport design standards.

Any development proposed by a Master Plan evolves from an analysis of projected needs. Though the needs were determined by the best methodology available, it cannot be assumed that future events will not change these needs. Therefore, to ensure flexibility in planning and development to respond to unforeseen needs, some of the landside alternatives consider the maximum development potential of airport property.

The alternatives presented in this chapter have been developed to meet the overall program objectives for the airport in a balanced manner. Through coordination with the Planning Advisory Committee (PAC), the public, and the Mohave County Airport Authority (MCAA), the alternatives (or combination thereof) will be refined and modified as necessary to develop the recommended development concept. Therefore,

the alternatives presented in this chapter can be considered a beginning point in the development of the recommended concept for the future development of Laughlin/Bullhead International Airport. Input from the general public and members of the PAC will be necessary to define this concept and the resultant capital improvement program.

### **NO-BUILD ALTERNATIVE**

In analyzing and comparing the advantages and disadvantages of various development alternatives, it is important to consider the consequences of no future development at Laughlin/Bullhead International Airport. The "no-build" or "do-nothing" alternative essentially considers keeping the airport in its present condition and not providing for any type of expansion or improvement to the existing facilities (other than general airfield and terminal building maintenance projects, tenant-defined projects, and any other miscellaneous projects beyond the MCAA's purview and control). The primary result of this alternative, as with any growing air transportation market, would be the eventual inability of the airport to satisfy the increasing demands of the airport service area. The potential growth of activity at Laughlin/Bullhead International Airport is partially a function of the growing gaming/resort activities in Laughlin, Nevada and the growing economy and population of the regional area.

The analysis of facility needs indicated needs for airfield, commercial airline terminal area, aircraft storage, and access needs resulting from existing demand and projected demand. Based upon coordination with existing airlines serving the airport, additional runway length is needed in the short term to alleviate departure payload restrictions. While improvements have been made recently to the functional areas of the airline terminal building and additional automobile parking areas are being constructed in 2008, growth in commercial airline passengers will require additional function space



within the terminal as well as additional gates and second level boarding. Additional aircraft storage area is needed to accommodate based aircraft.

Following the no-build alternative would not allow for any of these improvements discussed above. Following the no-build alternative would not support the private businesses that have made considerable investments at Laughlin/Bullhead International Airport. As these businesses grow, the airport will need to be able to accommodate the infrastructure needs of new hangars, expanded apron, and automobile parking needs. Each of the businesses on the field provides jobs for local residents, inject economic revenues into the community, and pay taxes for local government operations.

Even if the no-build alternative is chosen, the airport would still need to be maintained in a safe condition. This would require continual maintenance to paved areas and even replacement over time. As a federally funded airport, the MCAA is obligated to maintain the federal investment made in the airport.

The MCAA is charged with the responsibility of developing aviation facilities necessary to accommodate aviation demand and to minimize operational constraints. Flexibility must be programmed into airport development to assure adequate capacity should market conditions change unexpectedly. While these objectives may not be all-inclusive, they should provide a point of reference in the alternatives evaluation process.

In essence, the no-build alternative is inconsistent with the long-term goals of the MCAA, FAA, and Arizona Department of Transportation – Aeronautics Division (ADOT), which are to enhance local and interstate commerce. This alternative, if pursued, would affect the long-term viability of the airport and its services to the City of Bullhead City and Town of Laughlin.

## **AIRFIELD CONSIDERATIONS**

The airfield issues to be considered in this analysis are summarized on **Exhibit 4A** and more fully below. These issues are the result of the findings of the Facility Requirements evaluations and include input from the PAC and MCAA.

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### **Exhibit 4A**

#### **AIRFIELD PLANNING CONSIDERATIONS**

- Extend Runway 16-34 1,000 feet south
- A parallel runway for small aircraft use
- Provide three additional exit taxiways
- Precision instrument approach to Runway 34
- Provide for the precision obstacle free zone (OFZ) to Runway 34
- A medium intensity approach lighting system with runway alignment indicator lights (MALSR) to Runway 34




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## **RUNWAY EXTENSION**

Based upon coordination with existing airlines serving Laughlin/Bullhead International Airport, up to 8,500 feet of length is needed on Runway 16-34 to eliminate existing payload restrictions and increase range. Presently, Runway 16-34 is 7,500 feet long.

Runway 16-34 can only be extended to the south. Highland Wash, Bullhead Parkway, and the need to maintain a perimeter service road around the north end of the runway limits any potential extension to the north. In fact, the Runway 16 threshold was relocated 500 feet south in 2007 to provide adequate runway safety area (RSA) beyond the Runway 16 end.



A 1,000-foot extension of Runway 16-34 to the south is currently under environmental review. As required by FAA regulations, an Environmental Assessment (EA) is presently being conducted to determine compliance with the *National Environmental Policy Act* (NEPA). This 1,000-foot extension is shown on **Exhibit 4B**. The RSA beyond the extended Runway 34 end will cross an unnamed wash south of the airport. A Section 404 permit application is currently being developed for the fill that will be placed in this unnamed wash. Once extended 1,000 feet south, any further extension of Runway 16-34 is unlikely, given the location of the planned Laughlin Ranch Boulevard.

## EXIT TAXIWAYS

Airfield capacity and efficiency is enhanced with a sufficient number of properly spaced exit taxiways. The Facility Requirements analysis indicated the need for up to three additional exit taxiways. **Exhibit 4B** depicts these three additional taxiways. Each taxiway is designed as a high speed exit. This design allows the aircraft to exit the runway at a higher speed when compared with a perpendicular (right angle) exit. This reduces runway occupancy time. Two of these exits are placed near mid-field. The third exit is properly spaced for landings by large aircraft on Runway 16.

## PARALLEL RUNWAY

The current airfield plan for Laughlin/Bullhead International Airport includes a parallel runway west of Runway 16-34 for use by small general aviation aircraft. A parallel runway for small general aviation aircraft maximizes airfield capacity as large and small aircraft are segregated and simultaneous operations can occur at the airport. While the airfield capacity analysis in Chapter Three indicated that a parallel runway may not be needed during the planning period of this Master Plan, a parallel runway will continue to be planned at Laughlin/

Bullhead International Airport. This reserves the property south and west of the airport for this ultimate use and also allows the City of Bullhead City to continue to properly plan appropriate land uses adjacent to the airport that are compatible with this ultimate use.

**Exhibit 4B** depicts the development of a 4,700-foot long, 75-foot wide parallel runway located 700 feet west of the Runway 16-34 centerline per FAA design standards. This parallel runway would be served by a parallel taxiway located 240 feet east of the parallel runway. This is the placement of the parallel runway recommended by the previous Master Plan and shown on the currently approved Airport Layout Plan (ALP) drawing.

The parallel runway will require the acquisition of approximately 70 acres of land on the west and south sides of the airport. This land acquisition is needed to support the actual construction of the runway and protect the RSA, object free area (OFA), and runway protection zone (RPZ) beyond each runway end.

**Exhibit 4B** also depicts a relocated perimeter service road. The construction of the parallel runway and extension of Runway 16-34 to the south will require that the perimeter service road be located outside the RSA and OFA of each runway.

## PRECISION INSTRUMENT APPROACH

As detailed in Chapter Three, Facility Requirements, future facility planning should include lowering approach minimums to the extent practicable. Ultimately, it would be preferable to provide landings to Category I minimums – one-half mile visibility and 200-foot cloud ceilings at Laughlin/Bullhead International Airport. Due to terrain features to the north, a precision approach is most likely only feasible from the south to Runway 34.



A precision instrument approach to Runway 34 could either be developed utilizing the satellite-based Global Positioning System (GPS) or through the installation of the ground-based instrument landing system (ILS) at the airport. In either case, a precision instrument approach utilizing GPS or the ILS requires consideration of FAA design standards and the addition of new approach lighting.

**Exhibit 4B** depicts the addition of a medium intensity approach lighting system with runway alignment indicator lights (MALSR). The MALSR is required to lower visibility minimums below three-fourths of a mile.

FAA design standards specify that a precision instrument approach has a larger RPZ than currently provided at the airport. **Exhibit 4B** depicts this larger RPZ beyond Runway 34 and the acquisition of approximately 35 acres of land to protect the RPZ from incompatible development.

The FAA also requires that the precision obstacle free zone (POFZ) remain clear during precision instrument approach operations when the reported cloud ceiling is less than 250 feet and/or visibility is less than three-fourths statute mile and an aircraft is on approach within two miles of the runway threshold. The POFZ would be located beyond Runway 34 and is 200 feet long and 800 feet wide centered on the runway centerline. To ensure no aircraft are located within the POFZ, the hold apron at the Runway 34 end would need to be located east of Taxiway A as shown on **Exhibit 4B**.

### LANDSIDE ALTERNATIVES

While the airfield is comprised of facilities where aircraft movement occurs – runways, taxiways, ramps – other “landside” functions occur outside of this area. The primary functions to be accommodated landside at Laughlin/Bullhead International Airport include commercial airline facilities, air cargo/air freight

facilities, general aviation public terminal facilities, aircraft storage hangars, aircraft parking aprons, transient helicopter parking, airport maintenance, airport rescue and firefighting (ARFF) facilities, and automobile parking and access. The interrelationship of these functions is important to defining a long range landside layout for aviation uses at the airport. Runway frontage should be reserved for those uses with a high level of airfield interface, or need of exposure. Other uses with lower levels of aircraft movements or little need for runway exposure can be planned in more isolated locations.

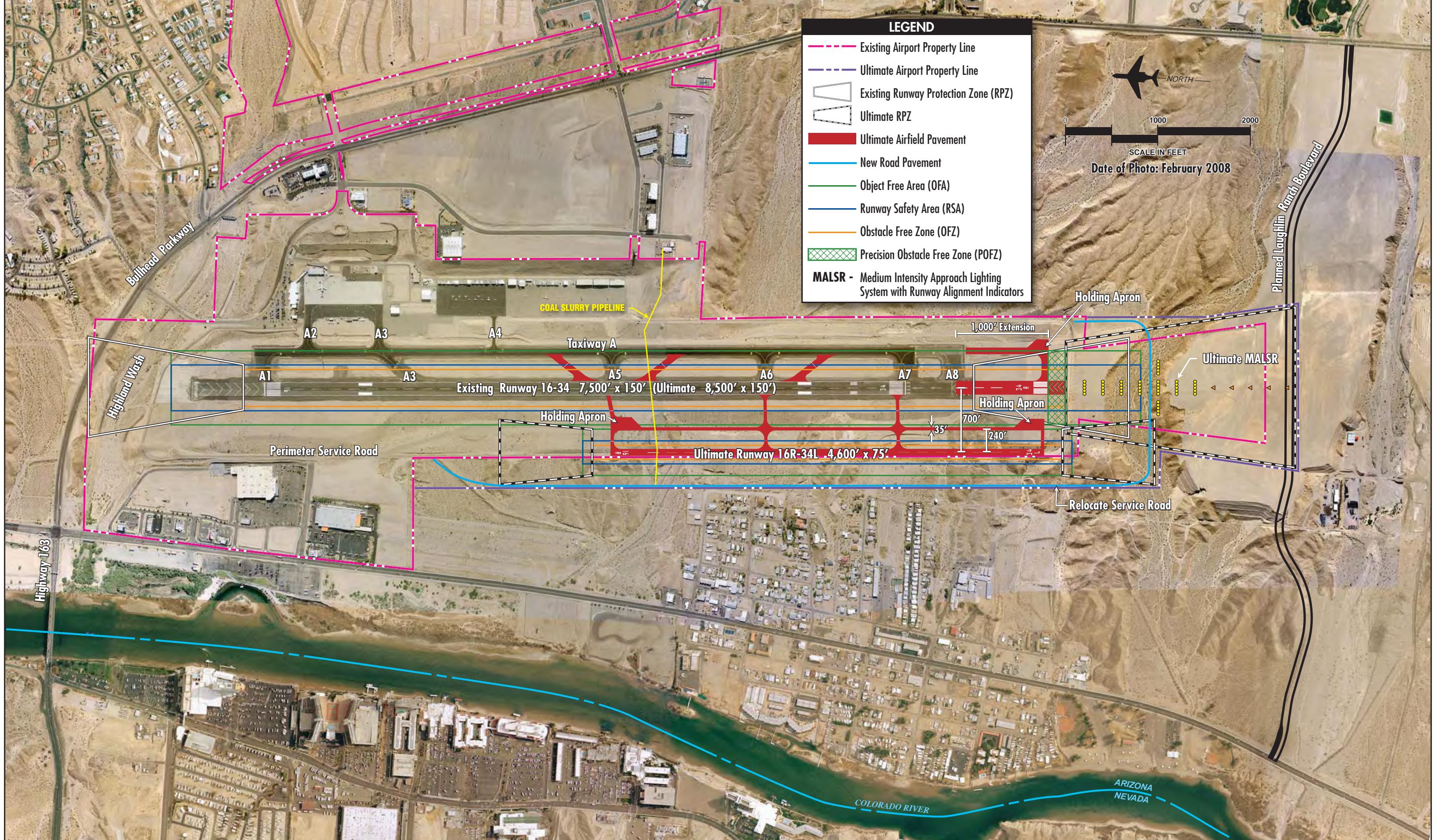
### **COMMERCIAL AIRLINE AND AIR CARGO FACILITIES**

Commercial airline terminal functions at Laughlin/Bullhead International Airport are provided in two separate single-level buildings located in the northeast portion of the airport. The main terminal building provides space for ticketing, airline operations, checked baggage screening and make-up, secure screening, rental cars, airport administration, and Transportation Security Administration (TSA) offices. Bag claim is located outside the terminal along a covered patio area. This building was renovated and expanded in 2007.

Departure functions are contained in a second separate building located southeast of the main terminal building. Access to this building is via a covered secure walkway. This building provides access to the departure gates, hold rooms, and vending/snack bar. All aircraft boarding is ground level through aircraft stairs.

In 2008, the public parking area was being expanded and rehabilitated. Following construction, a total of 476 parking spaces will be available for public parking and rental cars.

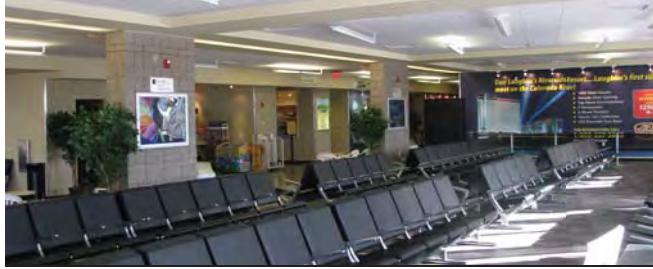
As shown on **Exhibit 4C**, the facility requirements analysis revealed a number of needs for the





#### **Exhibit 4C COMMERCIAL AIRLINE AND AIR CARGO PLANNING CONSIDERATIONS**

- Second level aircraft boarding
- Larger departure holdrooms
- Seven total departure gates
- Enclosed baggage claim with display devices
- Larger ticketing areas
- Larger passenger screening areas
- Additional retail/food service areas
- Approximately 900 total parking spaces
- Provide a dedicated Air Cargo/Air Freight facility



terminal building to handle existing and increased commercial airline operations and passengers. Second level boarding is needed due to the mix of large transport aircraft that currently serve the airport. Passenger convenience and comfort are diminished through boarding outside on stairs. Disabled passenger loading proves difficult with a requirement to utilize a lift for these passengers.

As commercial activity grows, up to seven departure gates will be needed. Presently, there is space for parking three transport-sized aircraft near the departure building. Some additional area is available within the departure facility for additional hold room seating; however, this facility would need to be expanded to accommodate seven departure gates.

Within the main terminal area, larger ticketing areas and passenger screening areas are needed. Presently, very little space is available for passenger circulation and queuing when two large charter flights depart at the same time. The addition of scheduled passenger flights could increase peak passenger levels and further constrain these areas. An enclosed bag claim

area with mechanical display devices will be needed as passenger levels grow to segregate airline bags and ensure the convenience and comfort of the traveling public. Ideally, all terminal functions should be located within a single building.

Two alternatives can be considered for meeting long range commercial airline terminal needs: 1) Expand or construct a new terminal building along the existing terminal apron; and 2) move airline terminal building to a different location.

FAA Advisory Circular 150/5360-13, *Planning and Design Guidelines for Airport Terminal Facilities*, identifies a number of basic considerations that affect the location of a terminal building. The primary considerations include the following:

- 1. Runway configuration:** The terminal should be located to minimize aircraft taxiing distances and times, and the number of runway crossings. The existing terminal site is located east of Runway 16-34 adjacent to parallel Taxiway A. Each runway end can be accessed easily along the parallel taxiway without crossing the runway.
- 2. Access to transportation network:** The terminal should be located to provide the most direct/shortest routing to the regional roadway network. The existing terminal is located with direct access to Bullhead Parkway which provides connections to Highway 95 and other regional arterial roadways; although, the northerly exit from the terminal area can be blocked by high water in the Highland Wash.
- 3. Expansion potential:** The long range viability of the terminal is dependent upon the ability of the site to accommodate expansion of the terminal beyond forecast requirements. The configuration of the existing terminal site prevents any meaningful expansion. The terminal apron cannot be expanded to the south due to the location of existing general

#### **Alternatives**



aviation hangars and the development of the planned air cargo/air freight building. While the apron area can be expanded to the west for aircraft parking only, the building restriction line limits the westerly expansion of the main terminal building to less than 100 feet west of its existing location. Expansion to the north is limited by terrain features, the Highland Wash, and available airport property. Expansion to the east is limited by terrain features and available airport property.

Current MCAA facility planning includes the development of an air cargo/air freight building south of the existing departure facility. Presently, air cargo operators are located on the west side of the terminal apron area inside the perimeter security fencing. Delivery vehicles, as well as the customers of the air cargo/air freight operators, must be escorted through the fence and cross the apron area used by airline aircraft. For security and safety reasons, the air cargo/air freight operations are planned to be moved to the east side of the terminal apron, south of the departure facility. This will eliminate the need for vehicles to access the apron area as public access will be provided from Aston Drive. There is presently no other location on airport property available for the development of the air cargo/air freight facility.

#### **4. FAA Geometric Design Standards:** The existing terminal site does not impact any FAA design standards.

**Exhibit 4D** depicts an alternative for development of a new commercial terminal area along the existing north apron to meet projected long term needs. This alternative creates a linear departure concourse along the east edge of the apron. The main terminal core, where ticketing and bag claim take place, is placed near the north end of the concourse. This allows for the maximum construction of automobile

parking east of the terminal building and Aston Drive. Aston Drive is integrated into the terminal circulation roadway to maintain access to the air cargo/air freight building. Access to the terminal circulation roadway is developed off of Laughlin View Drive. Due to the location of the terminal, Laughlin View Drive would no longer extend across Highland Wash to the north. The apron is expanded to the north and west to accommodate aircraft parking and circulation.

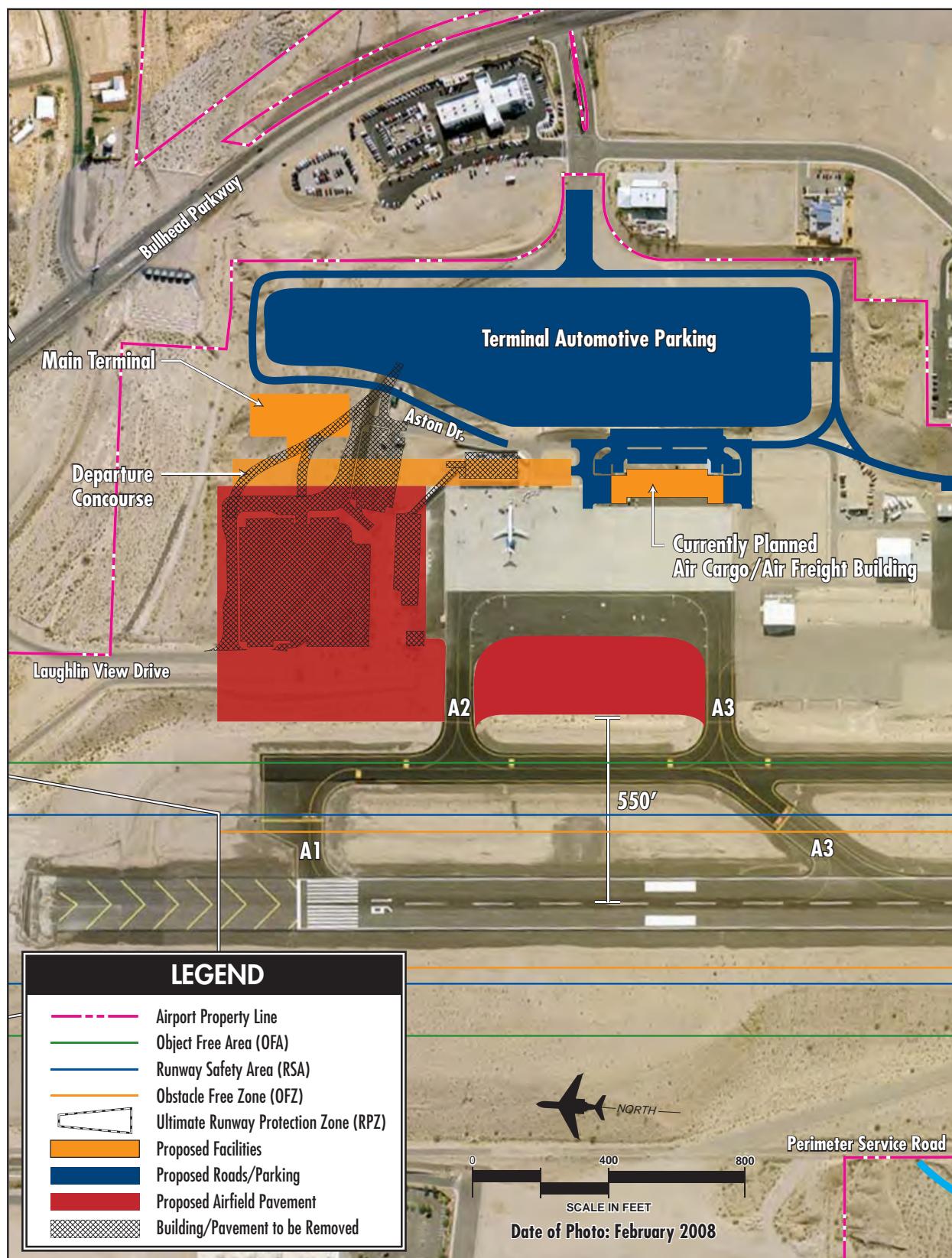
Due to physical constraints, this alternative maintains automobile parking within 300 feet of the terminal building. During high alert periods, the Transportation Security Administration (TSA) has required that unattended vehicles remain outside this radius. Should this rule be implemented with this alternative, much of the public parking area would be closed.

While this concept technically meets projected long term needs in this master plan, this proposed development represents the maximum area that can be developed in the northeastern portion of the airport. Growth beyond those levels projected in this master plan could not be accommodated at the site without affecting planned facilities. The departure concourse could be expanded to the south, but only with the removal of the planned air cargo/air freight building. There is no other area on the existing airport site to accommodate air cargo/air freight. Significant earthwork would also be necessary to accommodate the surface automobile parking lot shown in this alternative. Due to these constraints, alternatives to develop a replacement terminal site at the south end of Runway 16-34 are considered.

**Exhibit 4E** depicts the development of a new terminal site on the south end of the runway. This area is currently off airport property and would require land acquisition. Approximately 300 acres of land are shown for acquisition. This is land currently managed by the State of Arizona Land Department.



**Exhibit 4D  
NORTH TERMINAL BUILDING ALTERNATIVE**



**Alternatives**



The entire 300 acres of land would not be needed for long range terminal needs. Portions of this land, particularly along Bullhead Parkway, are reserved for non-airfield access revenue support parcels. This area could be developed similar to the Airport Center which is located on the west side of the airport. FAA approval would be needed prior to developing that portion of the airport for non-aviation commercial/industrial uses.

A single terminal building with a single departure pier extending to the west is shown on **Exhibit 4E**. The departure pier concept is used at many commercial service terminal buildings. It allows for expansion as new gates are needed. However, it requires that the initial terminal building be located to accommodate projected long term pier configuration. In the case of Laughlin/Bullhead International Airport, this could initially increase development costs as the terrain rises to the east, which would require extensive earthwork as the terminal would be constructed at higher elevations above the runway and parallel taxiway. An advantage of this configuration is that both sides of the concourse are utilized for boarding, which maximizes development costs.

This alternative also reserves an area south of the proposed terminal location for long term air cargo/air freight functions. The relocation of the passenger terminal functions would allow the existing commercial terminal area to be redeveloped for general aviation uses. Facility planning should include segregating general aviation and commercial airline/air cargo activities.

**Exhibit 4F** depicts an alternative layout for the commercial terminal functions in the southeast portion of the airport. In contrast with Alternative A, the passenger terminal building is located closer to the Runway 34 end and is preceded by the air cargo/air freight area. The departure concourse is constructed in a north/south orientation. This concept has easy expansion potential on either end. The advantage for Laughlin/Bullhead International Airport is that this terminal design

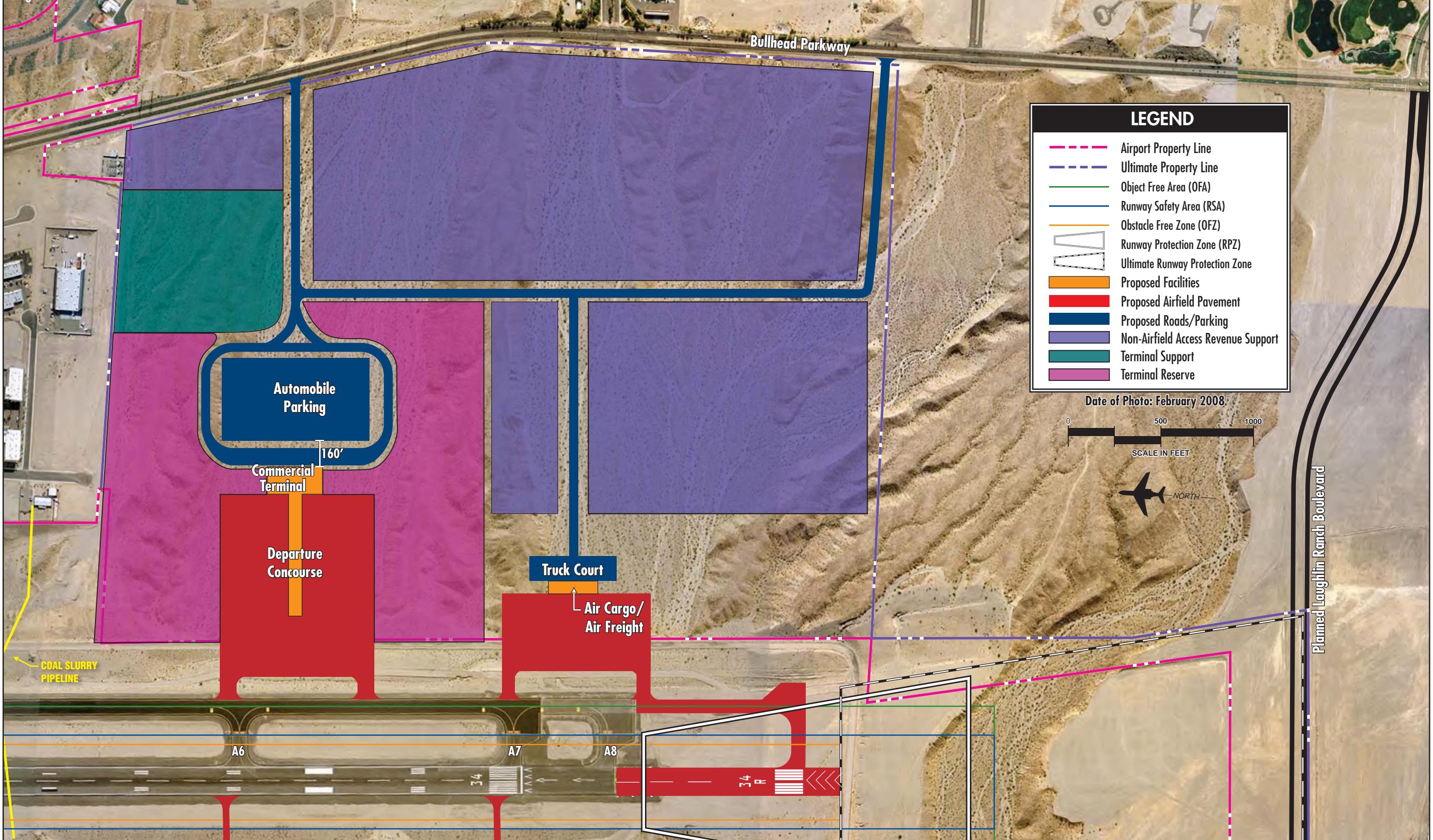
can be constructed closer to the runway which may reduce development costs due to the terrain features in this area. In this alternative, the terminal would be constructed closer to the runway and taxiway elevation. However, only one side of the departure concourse is used for boarding. Similar to Alternative A, area is reserved for terminal support functions such as rental cars. Area not required for airline and air cargo/air freight uses is reserved for non-airfield access revenue support.

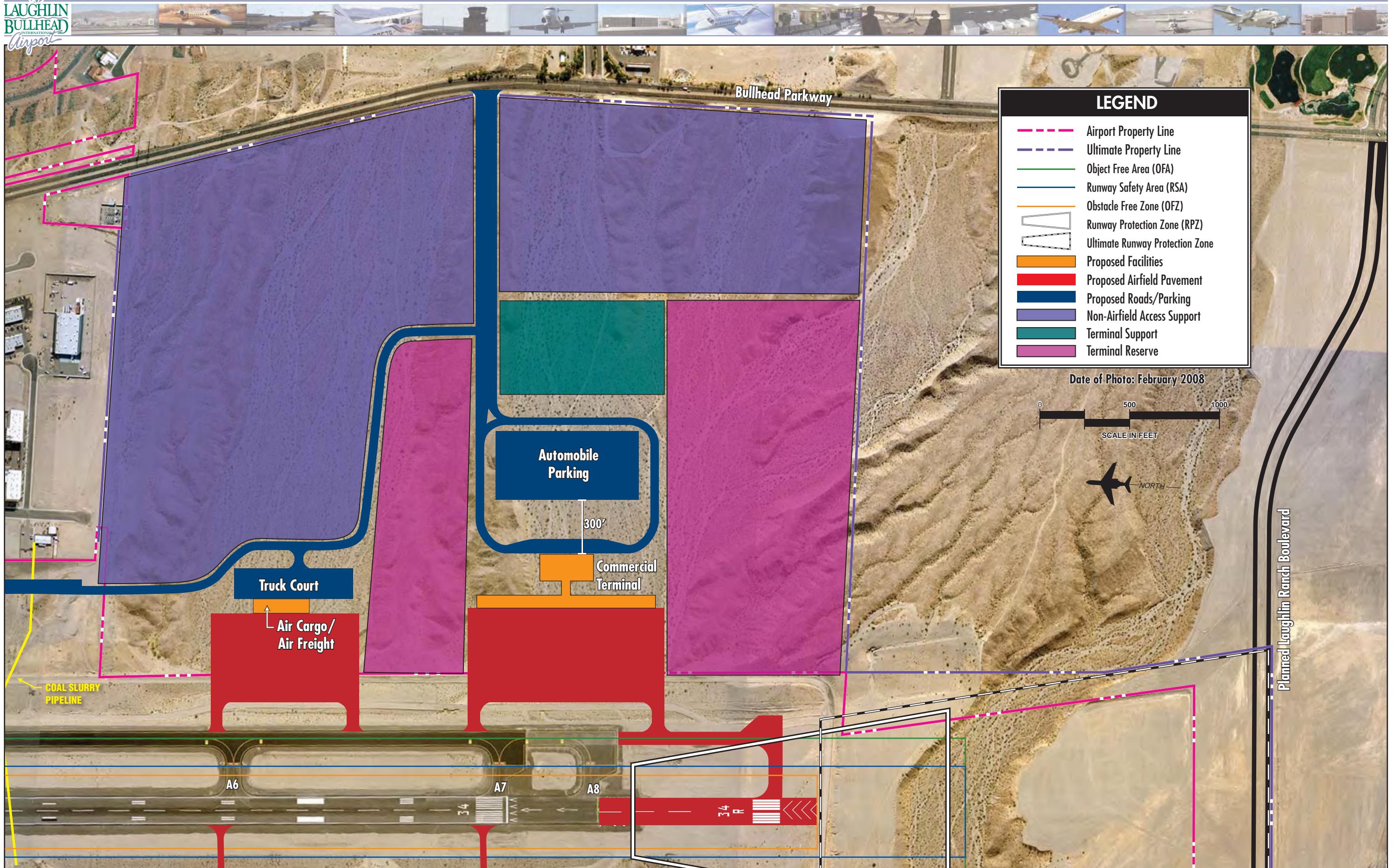
Alternative C is depicted on **Exhibit 4G**. This alternative utilizes a similar terminal configuration as Alternative B. However, the terminal is constructed in the northwest section of the new acquisition area. This allows for maximum terminal expansion to the south. The roadway network provides for two connectors to Bullhead Parkway, which surrounds non-airfield access revenue support panels. Air cargo/air freight is reserved at the south end of the existing general aviation apron area.

Following the events of September 11, 2001, the Transportation Security Administration (TSA) implemented rules that limited unattended vehicles within 300 feet of the terminal building. Alternative B places the parking area 300 feet from the terminal. Alternative A and Alternative C maintain the public parking closer to the terminal for passenger convenience. In high alert periods, parking may be limited in Alternatives A and C to comply with TSA requirements.

For all three alternatives, advantages of developing a new terminal in this new area include:

- Continued direct access to Bullhead Parkway.
- Sufficient area to expand beyond long term forecast needs.
- Sufficient area to consolidate terminal support functions such as rental cars.
- Sufficient area to provide automobile parking in a single lot.
- This location is along the existing parallel taxiway serving Runway 16-34.





**Exhibit 4F**  
**SOUTHEAST LANDSIDE ALTERNATIVE B**



**Exhibit 4G**  
**SOUTHEAST LANDSIDE ALTERNATIVE C**



## GENERAL AVIATION AND SUPPORT FACILITIES

**Exhibit 4H** summarizes the general aviation and support facility planning considerations. The following describes these planning considerations in more detail.

### Public Terminal Facilities

While a public terminal building is not specifically required for general aviation, a public terminal provides some benefits. It provides a central gathering point for air travelers. A terminal building can provide a pilots' lounge and flight planning area. A terminal building sometimes houses a restaurant which is an attractive quality for an airport. Terminal buildings can provide leaseable space for aviation-related businesses desiring to be located on an airport. A 3,000 square-foot public use general aviation terminal is planned to be constructed and operated privately at Laughlin/Bullhead International Airport. This building is planned to be located along the general aviation apron as shown on **Exhibit 4J**.

Two alternatives can be considered for meeting long range general aviation terminal buildings needs. First, the planned general aviation terminal can remain in its currently planned site. Second, one of the existing commercial airline terminal buildings could be renovated and used for general aviation terminal building functions once commercial airline activity is relocated to the south. Each of these alternatives will be discussed in greater detail in the following sections.

### Commercial General Aviation Activities

This essentially relates to providing areas for the development of facilities associated with aviation businesses that require airfield access. This includes businesses involved with (but not limited to) aircraft

### Exhibit 4H

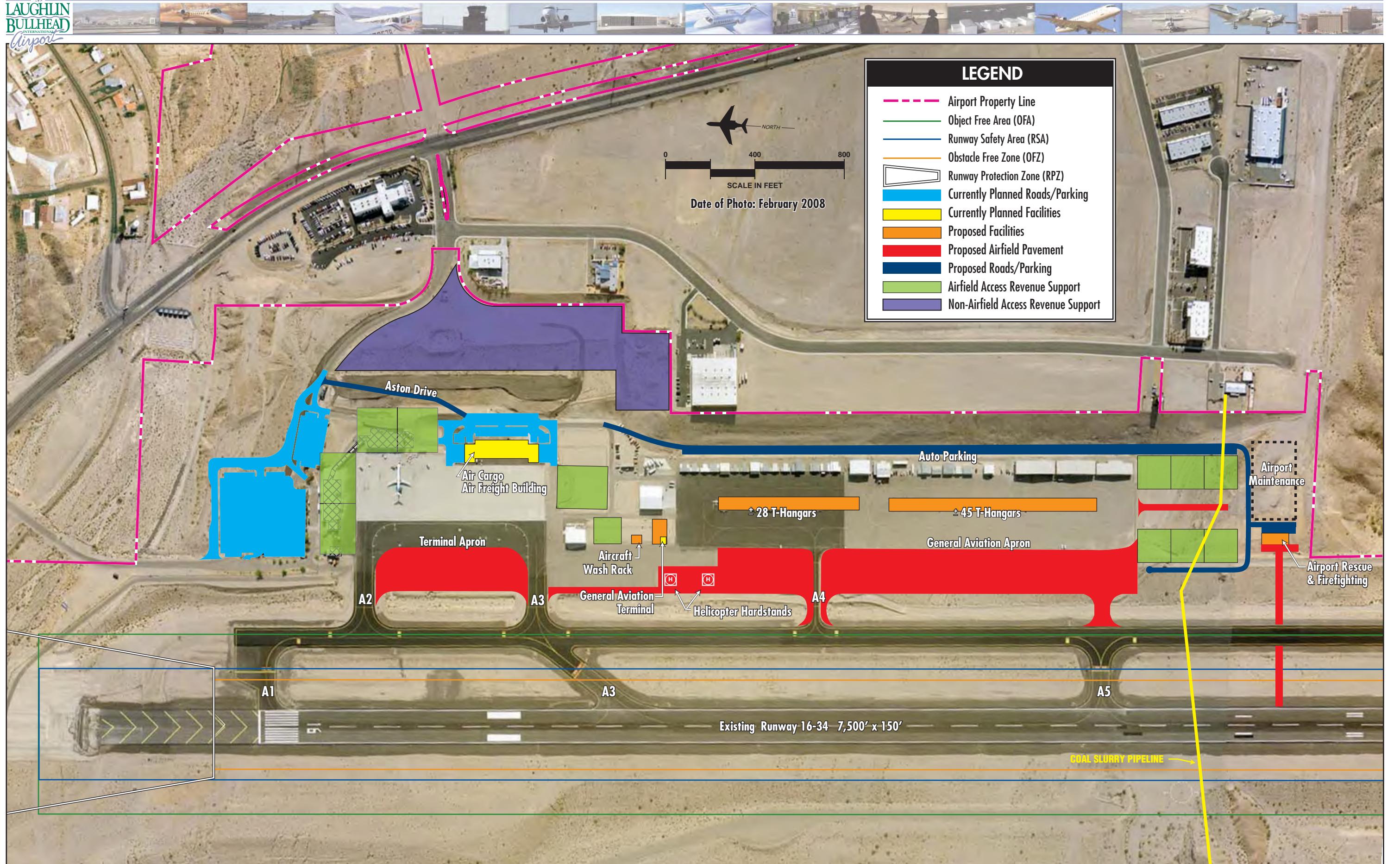
#### GENERAL AVIATION & SUPPORT AREA PLANNING CONSIDERATIONS

- Provide areas for additional enclosed aircraft storage hangars
- Provide for an aircraft wash rack
- Provide two helicopter hardstands
- Larger general aviation terminal building
- Segregated vehicle access to existing general aviation hangars
- Approximately 175 parking spaces for general aviation users
- A new airport rescue and firefighting (ARFF) building
- A larger airport maintenance building
- Relocated/upgraded electrical vault



rental and flight training, aircraft charters, aircraft maintenance, line service, and aircraft fueling. These types of operators are commonly referred to as Fixed-Base Operators (FBOs). High levels of activity characterize businesses such as these, with a need for apron space for the storage and circulation of aircraft. These facilities are best placed along ample apron frontage with good visibility from the runway system for transient aircraft. The facilities commonly associated with businesses such as these include large conventional type hangars that hold several aircraft. Utility services are needed for these types of facilities, as well as automobile parking areas.

Planning for commercial general aviation activities is important for this Master Plan. The mix of aircraft using Laughlin/Bullhead International Airport has changed recently to include some business class aircraft which have larger wingspans than the mix of aircraft using the airport in the past. These larger





aircraft which have wingspans approaching 100 feet require greater separation distance between facilities, larger apron areas for parking and circulation, and larger hangar facilities.

### **Corporate Hangar Areas**

This includes areas for large hangar development. Typically, these types of hangars are used by corporations with company-owned aircraft. Since large business jets utilize these areas, the minimum parcel size must be at least one acre, and up to two-acre parcels are commonly requested. Corporate hangar areas require all utilities and segregated roadway access.

### **Small Aircraft Storage Hangars**

The facility requirements analysis indicated a need for the development of small general aviation aircraft storage hangars. This primarily involves additional T-hangars but may also include some clearspan hangars for accommodating several aircraft simultaneously. Since storage hangars often have lower levels of activity, these types of facilities should be located away from the primary apron areas which should be reserved for commercial general aviation activity and can be located in more remote locations of the airport. Since most of the aircraft owners want to access their aircraft directly and park their vehicle in their hangars when they are gone, these facilities do not have a requirement for large parking areas. Limited utility services are needed for these areas. Typically, this involves water, sanitary sewer, and electricity.

### **Transient Helicopters**

A helicopter parking area should be considered. There is currently no designated helipad, and

helicopters must use apron areas typically designed for use by fixed-wing aircraft. Fixed-wing aircraft and rotary aircraft should be segregated to the extent practical.

### **Public Access and Automobile Parking**

Public vehicle access and parking at the airport is a primary concern in the planning process. The lack of available automobile parking is a concern for the existing general aviation area. Access to the hangars is only available by crossing the apron area through the perimeter security fencing. Segregating vehicle access and increasing automobile parking areas will be a goal of the planning process.

### **Airport Rescue And Firefighting**

The airport rescue and firefighting (ARFF) vehicle is stored in a building west of the main airline terminal building. This building also serves as the airport maintenance building. Consideration is given in this Master Plan to relocating the ARFF building. MCAA capital planning includes the addition of a second ARFF vehicle which will require additional storage area not available in the existing building. Federal regulations require minimum response times for ARFF vehicles. Therefore, the ARFF building should be located with direct access to the runway with a minimum of turns.

### **Airport Maintenance**

Airport maintenance includes building space for storage maintenance equipment and supplies as well as an outside equipment yard. For this Master Plan, relocation of the airport lighting vault is also considered. The existing lighting vault is located between the main terminal building and airport maintenance/ARFF building. The transformers need



to be upgraded and additional space provided in the electrical vault.

## Aircraft Wash Rack

An aircraft wash rack is considered in this Master Plan. The aircraft wash rack allows for the collections of cleaning fluids and debris during the cleaning process.

### Alternative A

Alternative A is shown on **Exhibit 4J**. In this alternative, small aircraft T-hangars are constructed on the apron west of the existing row of storage hangars. Essentially, these hangars are constructed over existing tiedowns. This has the advantage of maintaining existing taxilane corridors which extend in a north/south manner.

This alternative depicts the maximum expansion potential of all apron areas to the west should this area be needed to accommodate long term needs and replace tiedown areas lost to T-hangar development. FAA design standards specify the apron can extend within 500 feet of the Runway 16-34 centerline at Laughlin/Bullhead International Airport. A significant amount of fill material must be moved to expand the general aviation apron area to the west. A taxilane connecting to Taxiway A at Taxiway A4 is shown in this alternative.

The general aviation terminal building is expanded in its currently planned location to meet long range needs. An aircraft wash rack is constructed north of the terminal building. Helicopter parking is located along the west edge of the parking apron near the planned general aviation terminal building to conveniently serve transient helicopters.

In this alternative, once airline and air cargo/air freight operations are relocated south, the existing

passenger terminal buildings are removed and redeveloped for airfield-access revenue support parcels. This could include aircraft storage hangars for corporate aircraft storage or for commercial general aviation (FBO) activities.

Aviation access parcels are also proposed for the south end of the general aviation apron. These six parcels would be served by a single taxiway extending south from the apron. Segregated roadway access and automobile parking for the general aviation area extends along the eastern side of the existing general aviation hangars. This roadway extends to the ARFF building and airport maintenance area where the electrical vault is relocated. Placing the electrical vault in this location moves it closer to the airport traffic control tower (ATCT) and could facilitate providing the ATCT with airfield lighting system controls. This ARFF facility is located with direct access to the runway via a service road. A large amount of fill will need to be relocated to construct the taxiway and provide space for these parcels and the ARFF and airport maintenance.

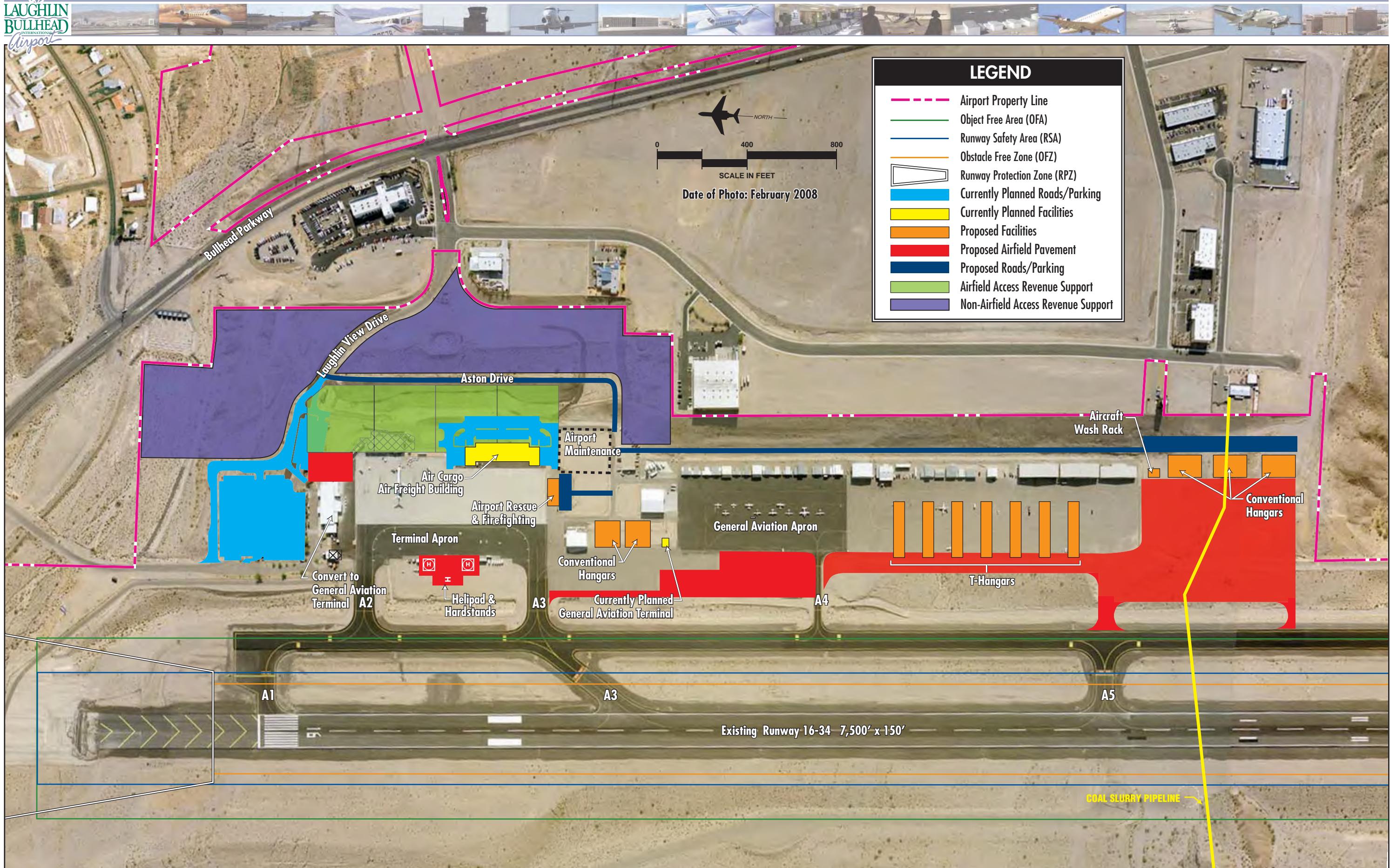
### Alternative B

Alternative B is shown on **Exhibit 4K**. This alternative places small aircraft T-hangars along the existing general aviation apron in an east/west configuration. The apron area is expanded to the west to allow for circulation taxilanes for the T-hangars. While allowing for a sufficient number of T-hangars to meet long term needs, the configuration of hangars in this manner disrupts the existing circulation patterns on this apron. Taxilanes on the apron extend in a north/south manner.

In this alternative, the general aviation apron is expanded to the south to provide areas for large conventional hangars. These hangars could be utilized for commercial general aviation (FBO) activities and/or corporate aircraft storage.

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## Alternatives





Conventional hangars are also located north of the planned general aviation terminal building.

The aircraft wash rack is located south of the existing apron area. This location allows for construction of the wash rack prior to the full expansion of the apron to the south.

The existing main commercial airline terminal building is converted to a general aviation terminal in this alternative once commercial airline activities are relocated south. This allows the continued use of the existing public parking facilities for general aviation terminal activities. The departure facility and air cargo/air freight building are removed and replaced with aviation access revenue support facilities. These areas could be utilized for commercial general aviation (FBO) activities and/or corporate aircraft storage. Aston Drive is relocated east to allow for large airfield access parcels.

Airport maintenance and ARFF facilities are constructed west of Aston Drive along the south side of the terminal apron. While the ARFF facility would have direct access to the runway via Taxiway A3, the ARFF facility is oriented to the north and would require a series of turns to access the runway. Furthermore, the area north of the ARFF facility could be obstructed by aircraft accessing the facilities on the east side of the apron.

In this alternative, a formal helipad is provided adjacent to the helicopter parking hardstands. The helipad would allow for the takeoff and landing of aircraft. Helicopter hardstands must be accessed via hover taxi operations only. While this location is near the ultimate terminal building location, in the short term prior to the relocation of commercial airline activities to the south, this helipad would be located a distance from the ultimate general aviation terminal building.

Similar to Alternative A, segregated roadway access and automobile parking for the general aviation area extends along the eastern side of the existing general aviation hangars.

## **Alternative C**

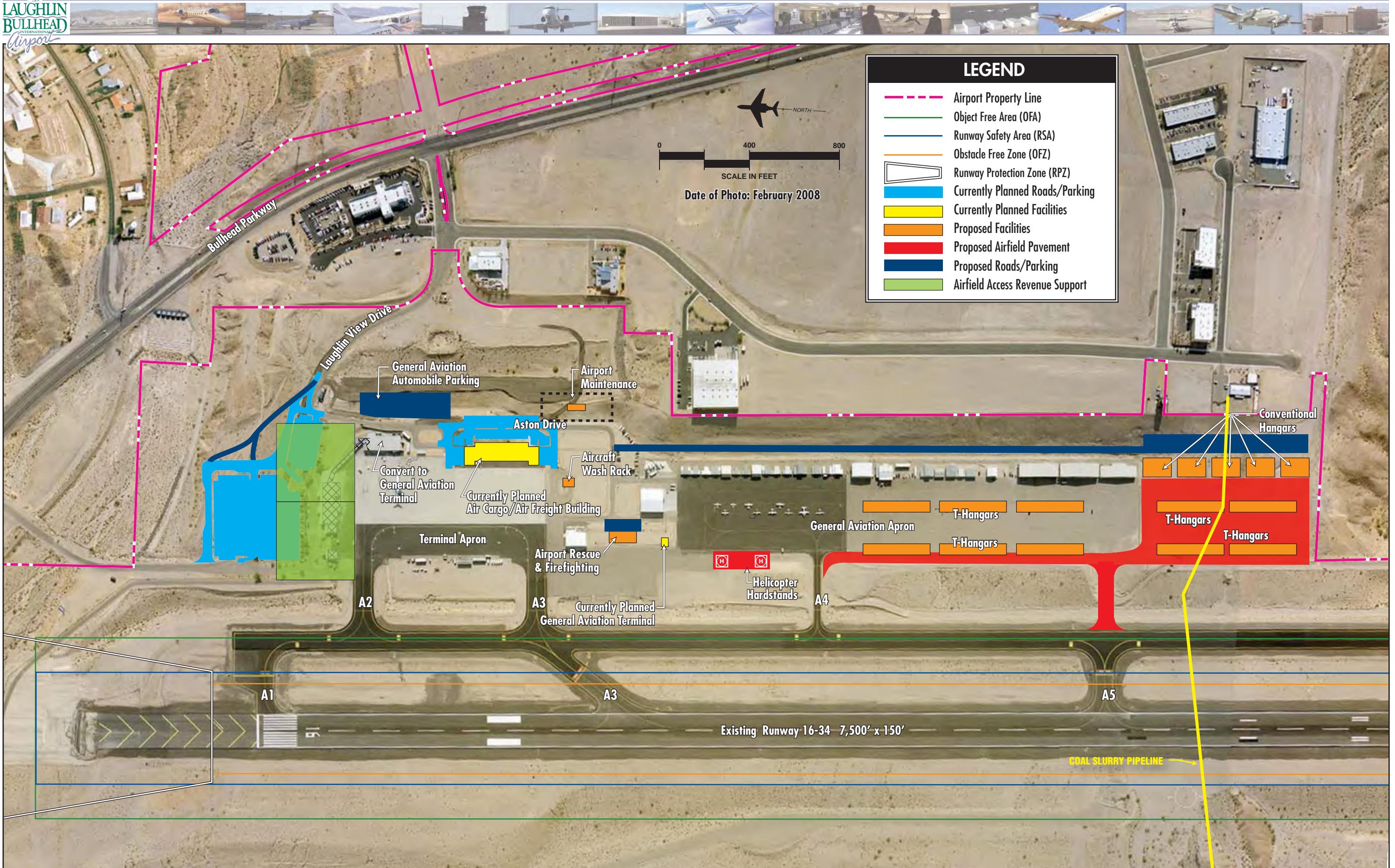
Alternative C is depicted on **Exhibit 4L**. For this alternative, the apron is extended to the south to support both conventional hangar development and T-hangar development. This area is served by segregated roadway access extending along the eastern edge of the apron area. T-hangars are also placed on the general aviation apron. In contrast with Alternative A, two rows of hangars are shown replacing existing tiedown locations.

The ARFF facility is located along the apron area between the currently planned general aviation terminal and an existing conventional hangar. This location allows the ARFF station to face the runway for more direct access. Airport maintenance and the electrical vault are located east of Aston Drive.

The aircraft wash rack is located on the south end of the terminal apron. While this parcel is readily available for development and close to existing utility infrastructure, this mixes general aviation uses with commercial airline and air cargo/air freight activities in the short term prior to relocating these activities to the south.

Once commercial airline and air cargo/air freight activities are relocated to the south, the existing departure facility is converted to the general aviation terminal area. This building is not currently served by a dedicated parking area. Thus, this alternative proposes to construct a public parking lot east of Aston Drive for that purpose. The main terminal building is removed to allow for airfield access revenue support parcels.

Helicopter parking is shown along the western edge of the general aviation area. While conveniently located for access to the currently planned general aviation terminal, this location is distant from the location identified for the ultimate general aviation terminal building in this alternative.





## SUMMARY

The process utilized in assessing airside and landside development alternatives involved a detailed analysis of short and long term requirements, as well as future growth potential. Current airport design standards were considered at each stage of development.

These alternatives present an ultimate configuration of the airport that would need to be able to be developed over a long period of time. The next phase of the Master Plan will define a reasonable phasing program to implement a preferred Master Plan development concept over time.

Upon review of this chapter by the MCAA, the public, and the PAC, a final Master Plan concept can be formed. The resultant plan will represent an airside

facility that fulfills safety and design standards, and a landside complex that can be developed as demand dictates.

The preferred Master Plan development concept for the airport must represent a means by which the airport can grow in a balanced manner, both on the airside as well as the landside, to accommodate forecast demand. In addition, it must provide for flexibility in the plan to meet activity growth beyond the 20-year planning period.

The remaining chapters will be dedicated to refining these basic alternatives into a final development concept with recommendations to ensure proper implementation and timing for a demand-based program.