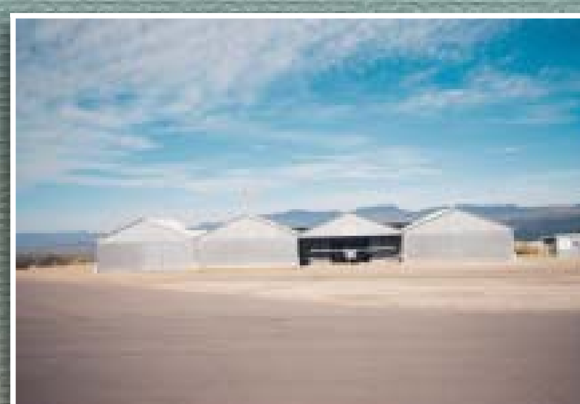
San Manuel AIRPORT



AIRPORT MASTER PLAN

SAN MANUEL AIRPORT
Pinal County, Arizona

AIRPORT MASTER PLAN

FINAL TECHNICAL REPORT

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in association with:

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Approved by the
Pinal County Board of Supervisors
November 12, 2003

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INTRODUCTION AND SUMMARY

Introduction and Summary

The San Manuel Airport Master Plan is a cooperative effort between Pinal County, the Arizona Department of Transportation, Aeronautics Division (ADOT), and the Federal Aviation Administration (FAA). This Airport Master Plan is a comprehensive analysis of airport needs and alternatives with the purpose of providing direction for the future development of this facility.

This Master Plan replaces the previous Master Plan completed in 1991. Typically, airport sponsors periodically update their master plans to ensure that their airport can continue to provide the necessary facilities required to meet aviation demand. The commitment to this Master Plan on the part of Pinal County is evidence that the County recognizes the challenges inherent in accommodating future aviation needs, as well as the importance, of San Manuel Airport to the county, the local community, and the surrounding region. The cost of maintaining a viable airport is an investment which yields significant benefits to a community. By maintaining a sound and flexible Master Plan, San Manuel Airport can increase its value as an economic asset, and continue to be a source of pride to the residents of the community.

MASTER PLAN OBJECTIVES

The primary objective of this Airport Master Plan is to determine short, intermediate, and long term development needs for the Airport to insure that it will continue to be a safe, efficient, economical, and environmentally acceptable air transportation facility. The accomplishment of this objective requires the evaluation of the existing

airport facility and needs to determine what actions should be taken to maintain an adequate, safe, and reliable airport facility to meet the needs of Pinal County and the surrounding community. The completed Master Plan will provide an outline of the necessary development and give county, state, and federal officials advance notice of future needs to aid in planning, scheduling, and budgeting. In addition, the finalized document includes a set of airport layout plans which depicts the proposed development for the Airport.

The Master Plan provides a continuous planning process through a phased outline of the proposed improvements required to meet the ultimate aviation needs of the community. This continuous planning process benefits responsible officials by giving advanced notice of future airport funding needs so that the appropriate steps can be taken to assure that adequate funds are budgeted or planned.

In order to accomplish the objectives set forth in this study, the Airport Master Plan provides the following information:

- **Inventory of Existing Conditions -** Collects, assembles, and organizes relevant information and data regarding the airport, the San Manuel and Tri-Community area, and the south-central region of Arizona.
- **Forecasts -** Projections of aviation demand, by quantity and type.
- **Facility Requirements** - Determines available capacities of various facilities at the airport and identify the facilities required to meet projected demand over the 20-year planning horizon.
- **Airport Alternatives** - Develops and evaluate various alternatives for airport development as determined by current and future facility requirements.
- **Airport Layout Plan** - Refines the recommended master plan development concept into the airport's final plan for implementation.
- **Financial Plan** - Prepares the airport development schedule and cost estimates for the recommended master plan development concept. This plan will ensure that logical staging of improvements are given proper consideration in the development of an overall financial plan and capital improvement program.
- **Environmental Evaluation** - Prepares a preliminary environmental overview to identify potential environmental concerns that will need to be addressed prior to implementing aspects of the plan.

In addition to Pinal County, ADOT, the FAA, and the consultant team, a Planning Advisory Committee (PAC) was established to review the various aspects of the plan as it was developed. This committee reviewed draft phase reports on the project and provided comments and input throughout the study to help insure that a realistic, viable plan is developed. A public information workshop is also conducted to allow the public to learn about the study and provide input. The final master plan technical report incorporates changes as a result of applicable comments gained from this review process.

SUMMARY OF THE RECOMMENDED MASTER PLAN CONCEPT

The Master Plan for San Manuel Airport provides for the orderly use of existing airport facilities to enhance the safety of aircraft operations, maintain existing airfield facilities and support future aviation demand (should new levels of demand be experienced). The Master Plan includes provisions to ensure the long-term viability and self-sufficiency of the airport by maximizing available areas at the airport for aviation-related opportunities. **Exhibit 5A** depicts elements of the Master Plan for San Manuel Airport.

Specifics of the recommended development plan and capital improvement program (together the Recommended Master Plan Concept) are provided in Chapters Five and Six of this Master Plan. In conjunction with the PAC and Pinal County, the following recommendations have been developed for San Manuel Airport:

AIRFIELD

- Acquire fee simple title to the existing airport site.
- Acquire approximately 21 acres of land to protect the Runway 11 approach from incompatible development and meet FAA design standards.
- Extend Runway 11-29 and the parallel taxiway to 4,800 feet.
- Remove hangars, apron, and other buildings at the Runway 29 end that are located in FAA mandated safety and obstruction free areas.
- Pave the parallel taxiway (Taxiway A) the full length of Runway 11-29.
- Add holding aprons at each runway end.
- Install medium intensity runway lighting (MIRL) and medium intensity taxiway (MITL) pavement edge lighting.
- Install a rotating beacon to aid in the identification of the airport location at a night and during poor visibility conditions.
- Install a precision approach path indicator (PAPI) at each runway end to assist pilots in deter-

mining the correct descent path to each runway end.

- Install runway end identifier lighting (REILs) at each runway end to assist pilots in locating the runway ends at night and during poor visibility conditions.

- In cooperation with the FAA, establish instrument approach procedures to Runway 11 and Runway 29 to assist pilots in locating and landing at the airport during inclement weather conditions.

- Mark Runway 11-29 with non-precision runway markings.

- Install an Automated Weather Observation System (AWOS) south of Runway 11-29 to collect and disseminate weather information pertinent to San Manuel Airport.

LANDSIDE

- Acquire the land south of the airport's existing lease boundary (45 acres) to the railroad. This area will be retained for long term general aviation development needs. The AWOS and relocated segmented circle and lighted wind cone will be located in this area as well.

- Realign airport entrance road to connect with State Highway 76 directly south of the airport. Pave the airport access road to the main apron area.

- Extend electrical, water, and telecommunication utilities to the north side of the airport.

- Expand the existing apron to the north to provide sufficient clearance between the taxilane and future buildings.

- Construct an additional taxiway connection to Taxiway A.

- Construct four, 10-unit T-hangars west of the existing main apron area. One of these 10-unit T-hangars is assumed to replace the existing hangar facilities at the Runway 29 end that are planned to be removed to meet FAA safety and obstruction clearance standards.

- Reserve area on the north side of the main apron for the development of large clearspan hangars that would be used to provide commercial general aviation services such as (but not limited to) aircraft maintenance and repair, aircraft sales, and aircraft charter services.

- Reserve an area on the north side of the main apron for the development of a public terminal building.

- Construct a public parking area north of the main apron to serve the T-hangars, clear span commercial hangars, and public terminal building.

- Reserve an area on the north side of the main apron for the development of an above ground fuel storage location for both 100LL and Jet-A fuel. This location is ideally suited to serve as a self service fuel island.

- Reserve an area on the north side of the apron for the development of an aircraft wash rack. The aircraft wash rack will provide for cleaning of aircraft and proper collection of aircraft cleaning fluids and debris.

- Reserve an area east of the main apron area for the construction of individual clear span hangars. These hangars would be developed on a lower terrain elevation to reduce fill requirements. The hangars would face north with the access taxiway located north of the hangars. Vehicle access would be south of the hangars.

- Construct a helipad east of the main apron. The helipad is designed to segregated fixed-wing and helicopter traffic operations for safety.

CAPITAL NEEDS

The Master Plan has identified approximately $6.8 million in capital needs over the planning period (**Exhibit 6A**). Nearly 87 percent of the total costs are eligible for grants-in-aid administered by the FAA and ADOT. The source for FAA grant funding assistance is the Federal Aviation Trust Fund and State Aviation Fund. The federal Aviation Trust Fund is a depository for aviation taxes such as those from airline tickets, aviation fuel, aircraft registrations, and other aviation-related fees. The State Aviation Fund is a depository for flight property taxes and other fees. The FAA distributes funds from the Aviation Trust Fund through the Airport Improvement Program (AIP). Under the AIP, eligible projects can receive up to 91.06 percent funding from the FAA. ADOT distributes funds from through the State Transportation Board.

Since San Manual Airport is not currently included in the federal *National Plan of Integrated Airports* (NPIAS), the airport does not receive any federal dollars for capital improvements at the airport. However, it is anticipated that San Manuel Airport will eventually be included in the NPIAS as the Airport meets all eligibility criterion. The NPIAS is updated every five years, with the next update scheduled for 2005. The primary advantages of being federally eligible include: a larger funding source and annual entitlements. If the AIP authorization is enacted into law as expected in mid 2003, over $3.0 billion in annual funding will be available for the Federal AIP program through 2008. The Federal AIP program also provides for an annual entitlement in the amount of $150,000 for general aviation airports such as San Manuel Airport that can be applied for AIP eligible projects.

San Manuel Airport is also eligible to receive discretionary funding from the AIP. The FAA prioritizes discretionary needs, regionally and nationally prior to making discretionary funding decisions. Unlike entitlement funding, discretionary funding is not guaranteed. Once eligible, Pinal County will need to pursue discretionary funding as entitlement funding is not expected to cover the identified capital needs (see Exhibit 6A).

In support of the state airport system, the State of Arizona also participates in airport development projects. Presently, the State funds 95 percent of eligible airport improvement projects at San Manuel Airport. Once San Manuel Airport is included in the NPIAS and receives FAA funding, the State will fund half of the airport's 8.92 percent matching share (4.47 percent) for all AIP eligible projects. The State of Arizona also participates in terminal development projects but at varying levels and not to exceed to 90 percent if the airport is included in the NPIAS or 95 percent if not included in the NPIAS.

Pinal County will need to utilize its own resources to provide the remaining project costs. The airport is not generating an operating income at this time. Therefore, most funding will need to come from the County's general funds. The Master Plan anticipates the need to increase the airport's operating income to assist in funding the operation and development of the airport. The Master Plan has designated areas for new hangar development as a means of developing an income stream for the airport through hangar rents or land lease payments. The expansion of general aviation services and fuel sales could provide additional revenue streams through the collection of a percentage of gross receipts and fuel flowage fees.

Chapter One
INVENTORY

Chapter One

Inventory

The initial step in preparation of the Airport Master Plan for San Manuel Airport (E77) is the collection and analysis of pertinent information, including an inventory of existing conditions at San Manuel Airport. Other essential data have been gathered that place the community of San Manuel and the airport, not only geographically, but also within the context of local and regional needs and demands. The inventory will provide a framework for all subsequent evaluations and proposed actions. This compilation of material includes the following:

- Airport setting, including locale, history, jurisdiction, climate, other airports, and previous studies.

- Physical inventories and descriptions of facilities and services now provided by the airport.

- An overview of existing regional plans and studies to determine their potential influence on the airport master plan.

- Background information pertaining to the community of San Manuel, the south-central Arizona region, and Pinal and Pima Counties. Analysis of these areas also includes descriptions of recent development which has taken place in the airport environs and plans for future development which may impact the airport.

- Population and socioeconomic information which provide an indication of the market and possible future development potential.

This information has been obtained through on-site investigations of the airport and interviews with airport management, airport tenants, and representatives of various government agencies. Information was also made available through studies concerning the airport, including: the *San Manuel Airport Master Plan* (1991), airport statistical data provided by Pinal County, and the May 2000 *Arizona State Aviation Needs Study* (SANS). Community informational reports and documents were utilized, as well as various internet web pages.

AIRPORT SETTING

The following discussion describes the physical location and historical background of San Manuel Airport. It also places it within the contexts of the national and state airspace systems.

LOCATION

As shown on **Exhibit 1A**, San Manuel Airport is located at the southeastern corner of Pinal County in south-central Arizona, two miles west of the unincorporated community of San Manuel. The airport is approximately 50 miles north of Tucson. The area is north of the Santa Catalina Mountain Range and just west of the San Pedro River and Galiuro Mountains in the eastern reaches of the Sonoran Desert. The natural scenic attractions of the area are the Santa Catalina Mountains, with Catalina State Park and Mount Lemmon Ski Valley; the new Oracle State Park (Oracle Center for Environmental Education) on the northeastern foothills of the mountain range, between Tucson and San Manuel; and several popular hiking trails, including the Oracle Ridge Trail and Arizona Trail. Major rail, freight, and bus terminals are located in Tucson.

San Manuel Airport is accessed by traveling east from Highway 77 on Highway 76, also called Redington Road. Prior to June 2003, when a new access road was constructed to Redington Road directly south of the airport, the airport was accessed via a 1.3 mile road on Broken Hills Properties (BHP Billiton) mining company of Australia property. The new road is less than one-mile long.

The airport sits at an elevation of 3,274 feet above mean sea level (MSL) on approximately 154 acres of land. The southern boundary of the airport is marked with a large storm water drainage channel. Further south is the BHP Billiton private rail line that runs to the copper mine and returns each day to the refinery and Redington Road. To the north and east is BHP Billiton-owned land. Arizona State Trust Land is located to the west.

The land surrounding the immediate airport boundaries is generally undeveloped. Surrounding land uses include an archery range and the copper smelter and refinery approximately two miles to the east.

To the north, the terrain declines towards the San Pedro River. To the west, the terrain drops off significantly as the Cottonwood Wash has worn a

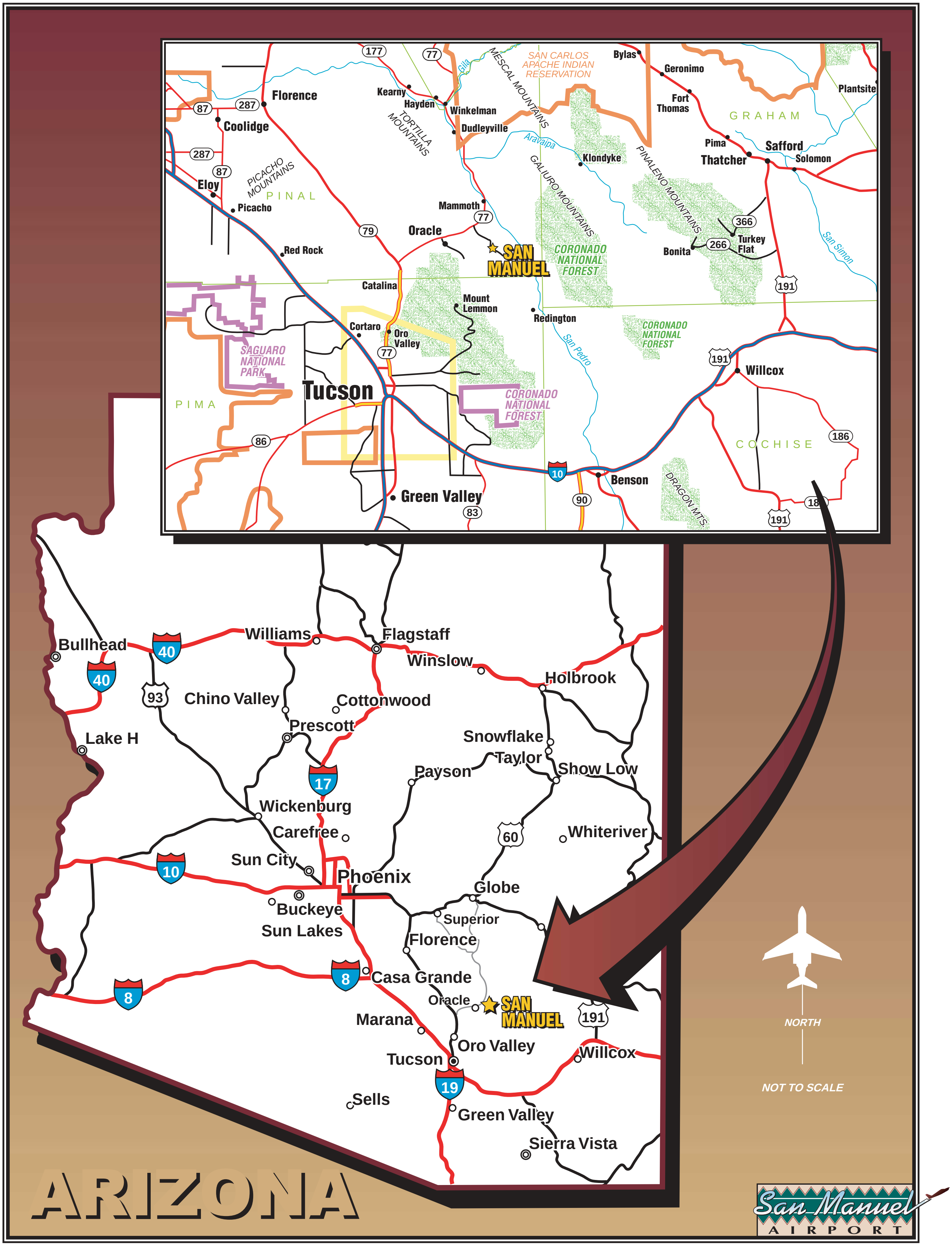

Exhibit 1A
VICINITY MAP

course from the north-facing hillsides down to the San Pedro River.

The airport property, which lies entirely within the unincorporated limits of Pinal County, is privately-owned by the BHP Billiton mining company and is leased to Pinal County for one dollar per year for 35 years, from 1995 to 2030. The county has appointed an airport manager, who oversees the operation of the airport. The airport has not established minimum standards.

The Pinal County Comprehensive Plan has designated the land surrounding the airport as either a public resource (Arizona State Trust owned land) or mining (BHP Billiton-owned land). The land surrounding the developed community of San Manuel is designated as either rural community, transitional, and rural. These land designations provide for the further commercial and residential development of the San Manuel community. Pinal County has not designated an Airport Disclosure Map for San Manuel Airport.

HISTORICAL AIRPORT DEVELOPMENT

In 1944, Magma Copper Company purchased existing mining claims in the area and began the period of exploration and manufacturing that resulted in the formation of the mine, mill, and smelter. Because of the isolated location, workers had to be brought in from outside the area. This led to the establishment of the town of San Manuel. Starting in 1953, company houses were constructed for the workers. The town was named for the old mine claim, San Manuel, after the patron saint of one of the early prospectors. Today the town is 95 percent privately-owned.

In 1953, Pinal County constructed San Manuel Airport as a 4,200-foot unpaved gravel airstrip for public use. The airstrip was used predominantly by mine contractors and visitors. In 1960, Pinal County made the first of four runway surface improvements, applying a two-inch asphalt overlay. In 1983, a slurry seal was completed, followed by a sand seal and crack repair in 1985. The most recent improvement resurfaced the entire runway while widening it to 75 feet, closing the airport from April to November 2000.

In 1967, a formal agreement was achieved between Pinal County and Magma Copper Company for lease of approximately 54 acres of land for a period of 20 years. In 1983, this lease was extended to the year 2010. In 1995, the Pinal County Board of Supervisors renegotiated the lease in favor of the existing 35-year lease agreement with Magma Copper Company to include airport development rights and a revision to the dissolution clause. The change in the clause means that rather than either party having rights to dissolution of the contract with a 30-day notice, the lessee (Pinal County) is solely able to dissolve the agreement (except upon expiration). Without this revision to the contract, the state could not expend improvement funds to improve a secondary-status airport that could conceivably revert to a private airfield at anytime. Currently, the owners of the existing hangars pay a ground lease to the county.

PREVIOUS MASTER PLAN

The *San Manuel Airport Master Plan Update* (July 1991) proposed several improvements at the airport as follows:

- Acquire state land for Runway 11 runway protection zone (RPZ);
- Reconstruct and widen Runway 11-29;
- Drainage study and improvements;
- Pave airport entrance road;
- Grade and pave access road to new terminal;
- Construct terminal apron and taxiway access;
- Extend utilities;
- Install perimeter fencing;
- Construct fuel storage area and install vaulted storage tank;
- Install PAPI lights;
- Install electrical conduit for PAPIs;
- Grade perimeter road;
- Construct partial parallel taxiway;
- Construct a general aviation terminal building;
- Install an extra (Jet A) fuel tank at fuel island;
- Construct and pave general aviation parking;
- Remove old hangars and terminal building;
- Construct taxilanes; and
- Construct a 10-unit shade hangar.

In partial fulfillment of the master plan recommendations, some of the improvements have been made, including:

- Runway reconstruction;
- Partial taxiway construction;
- Apron construction;
- Security fencing;
- Conduit for eventual electrical (lighting and navigational aid) improvements; and
- Drainage channelization.

CLIMATE

Weather is a critical factor in airport planning and operations. Temperatures determine the length of runway needed for departure. Wind speed and direction determine runway alignment and use. Precipitation affects runway conditions. Cloud cover percentages and frequency of other climatic conditions affect visibility and the need for, or use of, instrument approaches and airfield lighting. The location of San Manuel in arid south-central Arizona dictates much of the existing weather conditions.

According to the Western Regional Climate Center, the average daily minimum temperature ranges from 34 degrees Fahrenheit in January to 69 degrees Fahrenheit in July. The average daily maximum temperature ranges from 60 degrees Fahrenheit in January to 97 degrees Fahrenheit in July. The San Manuel area averages 14 inches of precipitation annually, with 3.2 inches of snow. The regional area averages sunshine 85 percent of the time, or approximately 310 days of the year. Wind patterns for the area indicate that wind flow is typically from the west/southwest. Weather data specific to San Manuel Airport is not gathered due to the lack of a weather collection device. This supports the installation of an Automated Weather Observation System (AWOS) at the airport.

AREA AIRPORTS

There are a number of nearby public and private airports providing various degrees of service within the operating vicinity of San Manuel Airport, as indicated on **Exhibit 1B**. Information is provided in **Table 1A** for those public airfields within a 40-nautical mile (nm) radius of San Manuel Airport. Although private, information is included for La Cholla Airport as the area that this airport serves may overlap with that of San Manuel. The following information is found in the table: associated city, nautical air miles from San Manuel Airport, length of longest runway, availability of an instrument approach, and the number of based aircraft.

NATIONAL PLAN OF INTEGRATED AIRPORT SYSTEMS (NPIAS)

San Manuel Airport is not designated within the FAA's *National Plan of Integrated Airport Systems* (NPIAS). Typically, to be eligible for inclusion within the NPIAS, a general aviation airport must have at least 10 based aircraft and be located 20 miles from the nearest NPIAS airport. San Manuel has not historically met this minimum criterion; therefore, it has not been included in the NPIAS. Having now met these requirements, the County has applied for inclusion in the NPIAS. As of early summer 2003 a formal decision had not been made. The next NPIAS is scheduled to be published in 2005.

Inclusion within the NPIAS allows the airport to be eligible for Airport Improvement Program (AIP) funding. According to the NPIAS, of the 3,364 airports across the country in the NPIAS, 2,558 are classified as general aviation. General aviation accounts for the bulk of civil aircraft operations. It includes all facets of aviation except for commercial and military operations.

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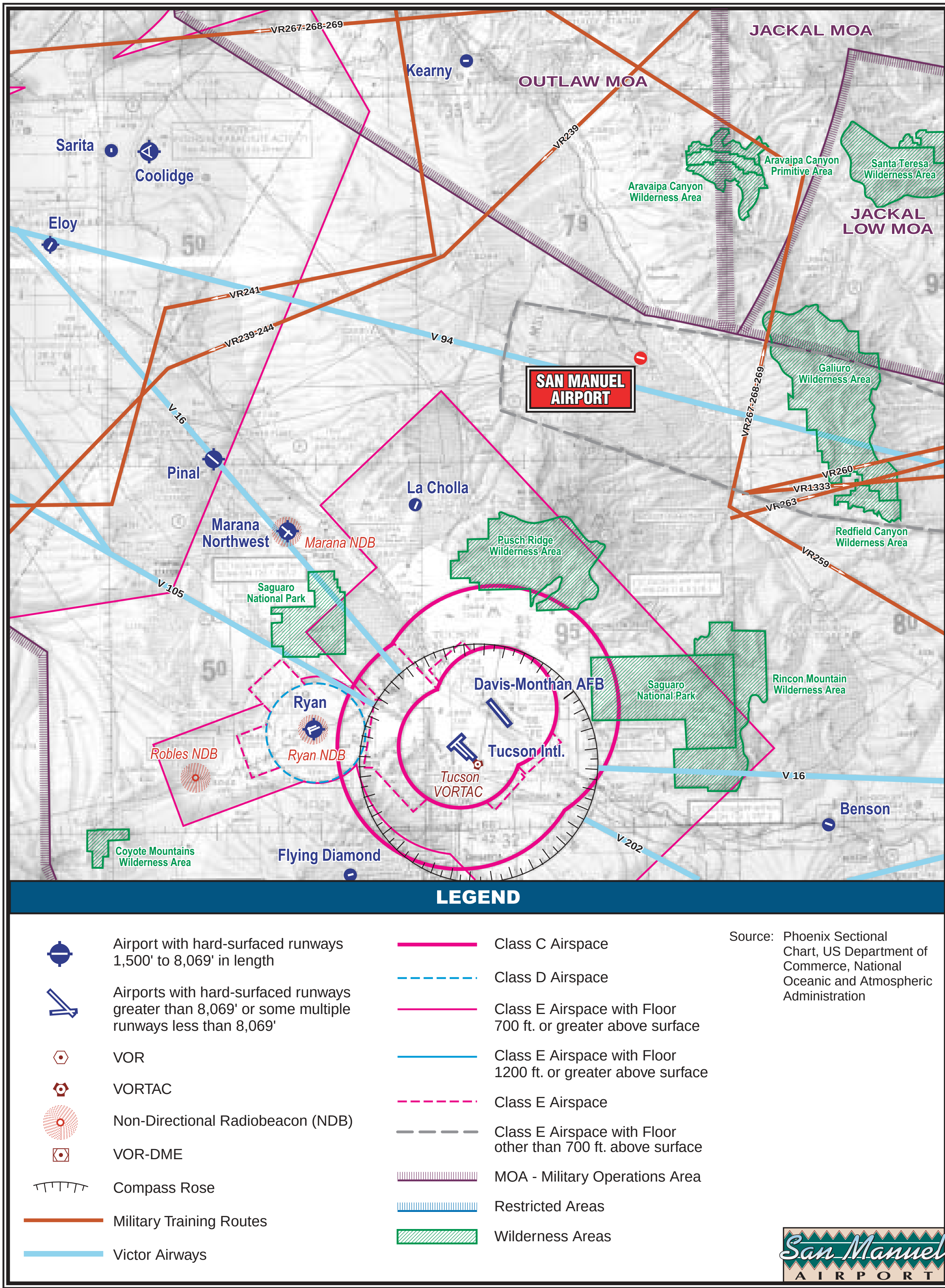

Exhibit 1B
AREA AIRSPACE & REGIONAL AIRPORTS

TABLE 1A
Area Airports

Airport/City	Distance nm (from E77)	Longest Runway	Instrument Approach	Based Aircraft
San Manuel Airport/ San Manuel	**0**	**4,200'**	**NO**	**17***
Tucson International Airport/Tucson	35	10,996'	YES	416
Pinal Airpark Airport/Marana	35	6,850'	YES	3
Ryan Field Airport/Tucson	40	5,500'	NO	253
La Cholla (private)/Tucson	22	4,500	NO	93
Marana Northwest Regional Airport/Marana	32	6,901'	NO	218
Kearny Airport/Kearny	28	3,400	NO	10
Benson Municipal Airport/Benson	40	4,000'	NO	–
Cascabel Air Park/Tucson	25	2,750'	NO	3

Source: Airport Master Records (latest available information).
* Airport management count.

ARIZONA STATE AVIATION SYSTEM PLAN (ASASP)

The *Arizona State Aviation System Plan* (ASASP) is developed by the Arizona Department of Transportation (ADOT), Aeronautics Division to address statewide airport facilities needs. The purpose of the SASP is to ensure that the state has an adequate and efficient system of airports to serve its aviation needs well into the 21st century. The SASP defines the specific role of each airport in the state's aviation system and establishes funding needs. Through the state's *Continuous Aviation System Planning Process (CASPP)*, the SASP is updated every five years. The most recent update to the SASP is the draft *2000 Arizona State Aviation Needs Study (SANS)*. The purpose of the SANS is to provide policy guidelines that promote and maintain a safe aviation system in the state, assess the state's airports' capital improvement needs, and identify resources and strategies to implement the plan. San Manuel Airport is one of 112 airports within the state's aviation system plan. The 2000 SANS included all public and private airports and heliports in Arizona which are open to the public, including American Indian and recreational airports.

AIRPORT FACILITIES

This section describes the existing facilities at San Manuel Airport. Facilities are presented as follows:

- Airside Facilities
- Landside Facilities

Airside facilities needed for the safe and efficient movement of aircraft include runways, taxiways, airfield lighting, and navigational aids. In most cases, airside facilities dictate the types and levels of aviation activity capable of operating at an airport. Landside facilities include terminal buildings, aircraft parking aprons, hangars, aviation-related businesses, and automobile access and parking.

AIRSIDE FACILITIES

An aerial view of the airside facilities at the airport is shown on **Exhibit 1C**. **Table 1B** summarizes key airside facility data for the airport, especially regarding runway and navigational information. A discussion on other key airside facilities is provided in the following paragraphs.

TABLE 1B
Airside Facilities Data
San Manuel Airport

	Runway 11-29
Runway Length (feet)	4,214
Runway Width (feet)	75
Runway Surface Material	Asphalt
Surface Treatment	None
Runway Load Bearing Strength (lbs.)	
Single Wheel Loading (SWL)	12,000
Runway Markings	Basic
Runway Lighting	None
Taxiway Lighting	None
Approach Lighting	None
Weather Aids	Windcone Segmented Circle
Navigational Aids	None

Sources: Airport Facility Directory, Southwest U.S.

Runways

The airport is served by Runway 11-29, oriented west to east. The runway, which is 4,214 feet long and 75 feet wide, is constructed of asphaltic-concrete. The strength of the runway is rated at 12,000 pounds for single wheel type landing gear (SWL).

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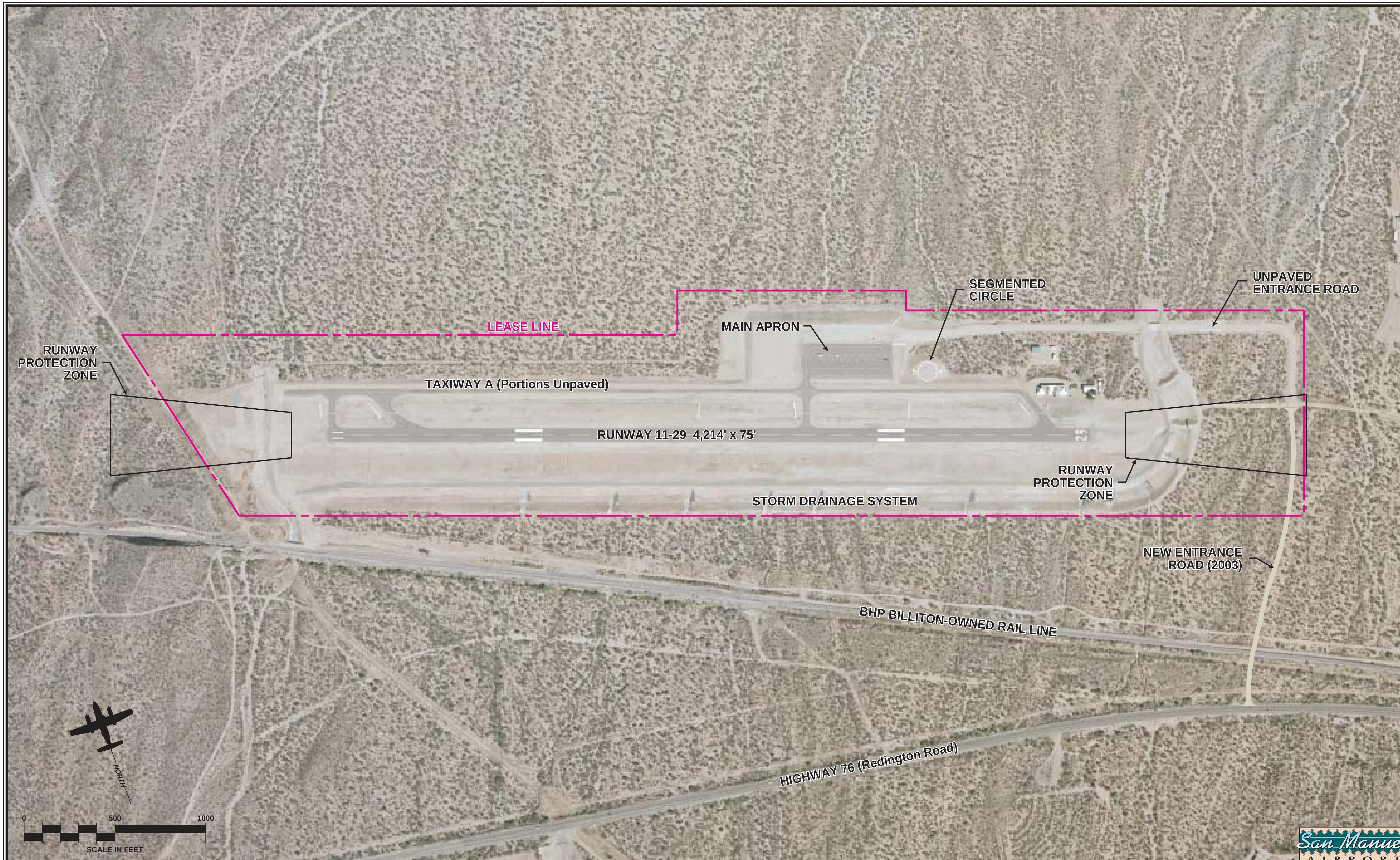

Exhibit 1C
EXISTING AIRFIELD FACILITIES

Taxiways

The airport is served by a parallel taxiway, portions of which are unpaved. The midfield taxiway and connection to the main apron, Runway 29 connecting taxiway, both connecting taxiways at the Runway 11 end and the portion of the parallel taxiway between them area paved. The remaining portions of the parallel taxiway is graded but not paved. The parallel taxiway has been set 240 feet from the runway centerline. All taxiways are 35 feet wide.

Pavement Markings

Pavement markings are used on runway and taxiway surfaces to identify a specific runway, runway threshold, centerline, hold line, or an edge line. Runways are marked with white markings in accordance with the type of approach available (e.g., visual, nonprecision, or precision) to each runway end.

The Runway 11-29 pavement markings at San Manuel are basic runway markings; that is, they identify the airfield to the extent of the needs for a visual approach only. These identify the runway designations, runway centerline, and touchdown point (two rectangular-shaped white stripes on each side of the runway centerline located 1,000 feet from the threshold).

Yellow taxiway and apron taxilane centerline markings are provided to assist way-finding and aircraft maneuvering on the ground. Aircraft hold lines and tiedowns are also marked with yellow paint.

Airfield Lighting

Airport lighting systems extend the capability of airport use into periods of darkness and/or poor visibility. Although not equipped with lighting systems, the electrical infrastructure has been installed at San Manuel Airport for this purpose. This infrastructure is intended to accommodate typical lighting systems, categorized by function and described in the following paragraphs.

Identification Lighting: The location of the airport at night is universally indicated by a rotating beacon. A rotating beacon displays flashes of alternating white and green light to identify a public airport. San Manuel Airport has no rotating beacon.

A lighted windcone and segmented circle are located on the north side of the runway, east of the main apron. This identification system allows visual confirmation of surface winds and runway traffic patterns, which is standard, or left traffic, for Runway 11 and nonstandard, or right traffic, for Runway 29.

Pavement Edge Lighting: Pavement edge lighting utilizes light fixtures placed near the pavement edge to define the lateral limits of the runway or taxiway. San Manuel Airport currently has no pavement edge lighting.

Runway End Identification Lighting: Runway end identifier lights (REILs) provide rapid and positive identification of the approach end of a runway. REILs are typically used on runways without more sophisticated approach lighting systems. The REILs systems consist of two synchronized flashing lights located laterally on each side of the runway facing the approach aircraft. San Manuel Airport has no REILs.

Approach Lighting: Approach lighting is installed for the purpose of giving landing aircraft descent guidance to the end of the runway. Approach lighting can aid in both visual and instrument landings. Visual approach slope indicator lights (VASIs) and precision approach path indicator lights (PAPIs) provide this visual vertical guidance. San Manuel Airport has no approach lighting.

LANDSIDE FACILITIES

Landside facilities are those providing support to the operation of aircraft and are essential to the aircraft and pilot/ passenger handling functions. They typically consist of terminal buildings, ground services, aircraft parking apron, hangars, fuel service, and automobile parking. Landside facilities are outlined in the following section and are depicted on **Exhibit 1D**.

Terminal Facilities

The general aviation terminal facility is located on the north side of the airport, directly behind the fuel shed and to the right of the main hangars. The space is very basic, containing approximately 200 square feet of pilots' lounge and flight planning space. A restroom is attached to the building, but separately accessed. Although no marked stalls exist, vehicle parking spaces for five to six cars are available adjacent to the fuel pump.

Aircraft Apron Areas

There are two separate apron areas serving aircraft at San Manuel Airport. The east apron area, located north of the Runway 29 end, is 20,000 square feet in area and does not provide any tiedowns.

The main apron/tie-down area is located on the north of Runway 29 at approximately midfield. The apron was constructed in 2000. The main apron provides 26 tie-down positions and encompasses approximately 11,100 square yards.

Aircraft Hangar Facilities

Existing hangar facilities at San Manuel Airport are located on the north the runway, near the Runway 29 end. Existing hangar facilities include a T-hangar/shade hangar complex aligned parallel to the runway. This facility consists of a set of five enclosed individual T-hangars facing south that share a common rear wall with three shade hangars facing north. This facility encompasses approximately 7,300 square feet. To the north of these hangars, on an unpaved apron area, is a single 1,300 square-foot hangar. This area is also used for the storage of ultralight/experimental aircraft trailers.

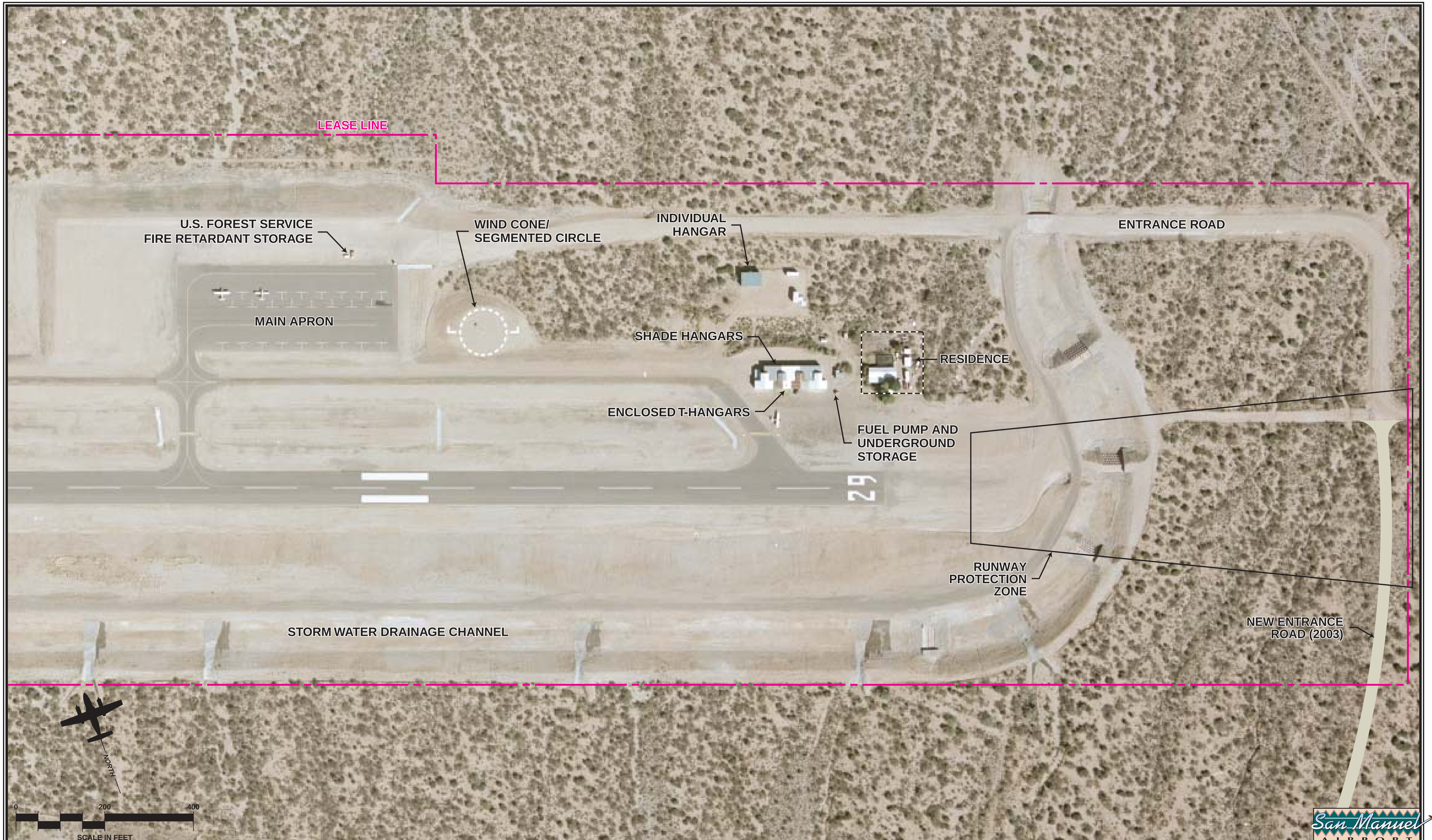

Exhibit 1D
EXISTING LANDSIDE FACILITIES

Fuel Facilities

San Manuel Airport has one above-ground fuel storage tank that is privately owned. The tank stores 2,000 gallons of 100 low-lead (LL) fuel. The self-serve pump is locked inside a utility shed adjacent to the main hangar area and the pilots' lounge.

Utilities

A critical element of land/airport facility development capability is the availability and quality of utility services. San Manuel Airport is served minimally by three utilities: water, electricity, and a septic system. A two-inch water line serves the airport from the main city line. The water is pumped uphill from the San Pedro River via two transmission lines to the 24-inch main line coming from the treatment plant located at the BHP Billiton mill. Electric service is provided by the Arizona Public Service Company (APS). The electric power is transmitted from the Oracle Substation to the San Manuel Substation. An underground distribution line runs from just south of the entrance road to a mobile home trailer. A single line feeds power from the trailer to the hangars. The trailer and pilots' lounge are hooked into an existing septic sewer system. Telephone service is provided only to the on-airport residence. Water service does not provide sufficient flow for fire protection.

Aircraft Rescue and Firefighting (ARFF)

There is no designated airport rescue and firefighting (ARFF) facility at San Manuel Airport. The local fire response system will respond to any emergencies at the airport. Equipment is located in San Manuel, approximately three miles east.

Fencing

The airport perimeter is marked with a barbed-wire fencing.

AREA AIRSPACE, NAVIGATIONAL AIDS, AND AIR TRAFFIC CONTROL

The FAA Act of 1958 established the FAA as the responsible agency for the control and use of navigable airspace within the United States. The FAA has established the National Airspace System (NAS) to protect persons and property on the ground and to establish a safe and efficient airspace environment for civil, commercial, and military aviation. The NAS is defined as the common network of U.S. airspace, including air navigation facilities; airports and landing areas; aeronautical charts; associated rules, regulations and procedures; technical information; personnel and material. System components shared jointly with the military are also included.

AIRSPACE STRUCTURE

To ensure a safe and efficient airspace environment for all aspects of aviation, the FAA has established an airspace structure that regulates and establishes procedures for aircraft using the National Airspace System. The U.S. airspace structure provides for categories of airspace and identifies them as Classes A, B, C, D, E, and G.

Class A airspace is high-level controlled airspace and includes all airspace from 18,000 feet MSL to Flight Level 600 (approximately 60,000 feet MSL). Class B airspace is controlled airspace surrounding high activity commercial service airports such as Phoenix Sky Harbor International Airport. Class C airspace is controlled airspace surrounding lower activity commercial service and some military airports that are tower-controlled. Tucson International Airport is contained within Class C airspace. Class D airspace is controlled airspace surrounding low activity commercial service and general aviation airports with an airport traffic control tower (ATCT).

All aircraft operating within Classes A, B, C, and D airspace must be in constant contact with the air traffic control facility responsible for the particular airspace. Class E airspace is controlled airspace that encompasses all instrument approach procedures and low altitude federal airways. Only aircraft conducting instrument flights are required to be in contact with air traffic control when operating in Class E airspace. Class G airspace is uncontrolled airspace. Airspace in the vicinity of San Manuel Airport is depicted on **Exhibit 1B**, **Area Airspace**. The airport is located below a segment of transition airspace (Class E) and within Class G airspace.

Located north of the airport are areas of special-use airspace designated as military operations areas (MOAs). MOAs define airspace where a high level of military activity is conducted and are intended to segregate civil and military aircraft. While civilian aircraft operations are not restricted in the MOA, civilian aircraft are cautioned to be alert for military aircraft when the MOA is active and at the specified altitude. These MOAs include the Outlaw, Jackal, and Jackal Low MOAs.

The Gladden 1 MOA is located to the northwest of Wickenburg Municipal Airport. The Gladden 1 MOA is under the control of the Albuquerque Air Route Traffic Control Center (ARTCC) and military operations are authorized from 7,000 feet MSL, or 5,000 feet AGL, whichever is higher, with no upper limit. The Gladden 1 MOA is in effect Mondays through Fridays from 6:00 a.m. to 7:00 p.m.

While not considered part of the U.S. airspace structure, the boundaries of National Park Service Areas, U.S. Fish and Wildlife Service areas, and U.S. Forest Wilderness and Primitive areas are noted on aeronautical charts. While aircraft operations are not restricted over these areas, aircraft are requested to maintain a minimum altitude of 2,000 feet above the surface. **Exhibit 1B** depicts the boundaries of these areas near the airport.

Several military visual training routes are located in the vicinity fo the airport and shown on Exhibit 1B. These routes are used by military aircraft, which commonly operate at speeds in excess of 250 knots and at altitudes above 10,000 feet MSL. While civilian aircraft are not restricted in the vicinity of these routes, civilian aircraft are cautioned to remain alert for high speed military jet aircraft.

Aircraft enroute or departing San Manuel Airport may use very high frequency omnidirectional range (VOR) navigational facilities. The VOR or VORTAC facilities, depicted on **Exhibit 1B**, provide a system of Federal Airways, also referred to as Victor Airways. Victor Airways have been established to allow assured navigational capability along corridors of airspace eight miles wide and extending upward from 1,200 feet AGL to 18,000 feet MSL between VOR facilities. For further discussion of Victor Airways, refer to the following enroute navigational aids.

TERMINAL AREA AND ENROUTE NAVIGATIONAL AIDS

Navigational aids are electronic devices that transmit radio frequencies which are received by pilots of properly equipped aircraft. These transmissions are translated into point-to-point guidance and position information. The types of navigational aids available for aircraft flying between airports include: the very high frequency omnidirectional range (VOR) facility which can also be equipped with distance measuring equipment (DME); nondirectional radio beacon (NDB); and the global positioning system (GPS).

The VOR, in general, provides azimuth readings to pilots of properly equipped aircraft by transmitting a radio signal at every degree to provide 360 individual navigational courses. Frequently, DME is combined with a VOR facility to provide distance as well as directional information to the pilot. In addition, military tactical air navigation aids (TACANs) and civil VORs are commonly combined to form a VORTAC. A VORTAC provides distance and direction information to civil and military pilots. VORs can be positively identified by a series of Morse Code transmissions that spell the three-letter identifier.

The several regional VOR facilities and their locations with respect to San Manuel Airport are listed below.

SAN SIMON (SSO) VORTAC is located 74 nautical air-miles east-southeast of San Manuel Airport. The signal may be intercepted on a radio frequency of 115.4 Megahertz, just three nautical air-miles south of San Manuel Airport.

TUCSON (TUC) VORTAC is located onfield at Tucson International Airport, 35 nautical air-miles southwest of San Manuel Airport. The signal is intercepted on a frequency of 114.0 Megahertz. There is no guaranteed Victor Airway from the VORTAC north and northeast due to the interference of the Santa Catalina Mountains.

STANFIELD (TFD) VORTAC is located 65 nautical air-miles west-northwest of San Manuel Airport. The signal is intercepted on a frequency of 114.8 Megahertz.

As mentioned, San Manuel Airport is also situated just north of the V 94 Victor Airway. V 94 passes within several miles of the airport and allows guaranteed navigation from San Simon VORTAC to Stanfield VORTAC.

The NDB transmits nondirectional radio signals whereby the pilots of properly equipped aircraft can determine the bearing to or from the NDB facility and then "home" or track to or from the station. Although none are directly associated with San Manuel Airport, there are several Tucson vicinity airports served by NDBs.

NDB Name	Identifier	Heading/Distance (nm) to E77
Marana	AVQ	053/31.7
Ryan	RYN	029/39.6

GPS is an additional navigational aid for pilots enroute to the airport, as well as an instrument approach aid. GPS was initially developed by the United States Department of Defense for military navigation around the world. Increasingly over the last few years, GPS has been utilized to a greater extent in civilian aircraft. GPS uses satellites placed in orbit around the globe to transmit electronic signals which are used by properly equipped aircraft to determine altitude, speed, and navigational information. GPS allows pilots to directly navigate to any airport in the country, eliminating the need for a specific navigational facility.

The FAA is proceeding with a program to transition to GPS as the primary enroute navigational aids with GPS. Existing navigational aids will be retained for redundancy and safety. Currently, San Manuel Airport is not served by a GPS or other instrument approach.

Instrument Approach Procedures

When the visibility and cloud ceilings deteriorate to a point where visual flight can no longer be conducted, aircraft must follow published instrument approach procedures to locate and land at the airport. The different minimum requirements for visibility and cloud ceilings are varied, dependent on the approach speed of the aircraft. There is currently no designated instrument approach procedure for the airport.

Instrument Departure Procedures

Aircraft departing an airport using instrument flight rules are required to contact and receive instruction from the designated Departure Control facility. An aircraft would then fly assigned headings and altitudes. Ultimately, the aircraft is "handed off" to the Air Route Traffic Control Center (ARTCC) with authority over that flight sector. There are no designated instrument approach procedure for the airport.

AIR ROUTE TRAFFIC CONTROL CENTER (ARTCC)

The FAA has established 21 ARTCCs in the continental United States to control aircraft operating under IFR within controlled airspace on the enroute phase of flight. An ARTCC assigns specific routes and altitudes along federal airways to maintain separation and orderly air traffic flow. Centers use radio communication and long range radar with automatic tracking capability to provide enroute air traffic services. Typically, the ARTCC splits its airspace into sectors and assigns a controller, or team of controllers, to each sector. As an aircraft travels through the ARTCC, one "hands off" control to another. Each sector guides the aircraft using discrete radio frequencies. The Albuquerque ARTCC is responsible for the enroute control of all aircraft operating under IFR arriving and departing the local airspace.

LOCAL AIR TRAFFIC CONTROL

Although San Manuel Airport is not served by an Airport Traffic Control Tower (ATCT), pilots can broadcast their intention and position on the common traffic advisory frequency (CTAF) channel 122.9 Megahertz (MHz), also called UNICOM.

SOCIOECONOMIC CHARACTERISTICS

A variety of historical and forecast socioeconomic data related to San Manuel and Pinal and Pima Counties was collected for use in various elements of this master plan. This information is essential in determining aviation service level requirements, as well as forecasting the number of based aircraft and aircraft activity at the airport. Aviation forecasts are normally related to the population base, economic strength of the region, and the ability of the region to sustain a strong economic base over an extended period of time.

This section reviews population and economic information for areas that will relate to aircraft ownership and registration (existing and potential market) for San Manuel Airport. More than half of the ownerships of the existing based aircraft come from south of San Manuel, especially north Tucson. Therefore, it will be important to identify trends, not only in Pinal County and San Manuel, but also in the growth area south along Highway 77 in northern Pima County, especially the cities of Catalina (on the county line) and Oro Valley (on the fringe of north Tucson).

This section will investigate the most recent trends for the counties and, by reviewing local census growth trends, attempt to draw conclusions that will be pertinent to a potential market area for San Manuel Airport.

POPULATION

Airports are support facilities to the communities and regions that they serve. Therefore, the population and economic structure of the attending communities are critical factors to consider when planning airport facilities. In this analysis, consideration will be given to the historical and forecast population for both Pinal County and Pima County. Pima County is included as much of the area population growth (and thereby potential San Manuel-based aircraft) is expected to continue to occur north of Tucson along the Highway 77 corridor within both counties.

Table 1C summarizes historical population data for the unincorporated San Manuel census designated place (CDP), Oro Valley, Mammoth, Catalina, Pinal County, and Pima County. As shown in the table, with the exception of Mammoth, the population in each of these areas has been growing at a steady pace since 1990. Oro Valley has grown the fastest, averaging an annual growth rate of 14.6 percent.

EMPLOYMENT

Analysis of a community's employment base can provide valuable insight to the overall well-being of the community. In most cases, the community make-up and health are significantly impacted by the availability of jobs, variety of employment opportunities, and types of wages provided by local employers.

TABLE 1C
POPULATION STATISTICS

	1990	2000	2001	2002	Avg. Annual Growth Rate
San Manuel CDP	4,009	4,375	4,574	4,683	1.3%
Catalina CDP	4,864	7,025	---	---	3.7% [1]
Oracle CDP	3,043	3,563	3703	3,814	1.6%
Mammoth	1,845	1,762	1,780	1,790	-0.3%
Oro Valley	6,670	29,700	32,520	34,050	14.6%
Pinal County	116,397	179,727	186,795	192,395	4.3%
Pima County	666,957	843,746	870,610	890,545	2.4%

Sources: Arizona Department of Commerce, Arizona Department of Economic Security
CDP - Census Designation Place
[1] Avg. Annual Growth Rate 1990 to 2000

Employment statistics for Pinal County and Pima County can be found in **Table 1D** and **Table 1E** below. According to information presented in CEDDS, 2001, by Woods and Poole Economics, Inc., Pinal County increased in total employment over the five-year reporting period by an average 1.57 percent annually. The rate of employment increased at a lower rate than the population over the same time period.

The greatest sectors of growth have been: retail trade; finance, insurance, and real estate; and services industries, all achieving greater than three percent annual growth. Combined, these three employment sectors make up almost half of all jobs in Pinal County. Employment statistics for Pima County indicate that the growth in total employment averaged 2.12 percent for the five-year period from 1995 to 2000. The growth in employment exceeded that for population for the same time period.

TABLE 1D
Employment by Sector
Pinal County

Pinal County	1995	1996	1997	1998	1999	2000	Percent Annual Increase
Total Employment	51,348	53,529	54,176	53,271	54,843	56,375	1.57%
Farm Employment	2,346	2,493	2,534	2,708	2,735	2,760	2.75%
Agricultural Services, Other	1,044	1,158	1,021	1,089	1,105	1,112	1.06%
Mining	4,810	5,509	5,470	4,724	4,792	4,861	0.18%
Construction	2,129	2,476	2,529	1,719	1,758	1,793	-2.82%
Manufacturing	4,131	3,413	3,194	3,080	3,066	3,053	-4.92%
Transport, Communications & Public Utilities	1,161	1,210	1,190	1,224	1,255	1,279	1.63%
Wholesale Trade	1,261	1,251	1,191	1,003	1,042	1,075	-2.62%
Retail Trade	7,706	7,942	8,137	8,578	8,890	9,220	3.03%
Finance, Insurance & Real Estate	1,844	2,021	2,186	2,323	2,433	2,520	5.34%
Services	10,834	12,213	13,287	13,241	13,813	14,408	4.87%
Federal Civilian Government	837	775	778	778	793	808	-0.59%
Federal Military Government	381	366	365	361	361	361	-0.89%
State and Local Government	12,864	12,702	12,294	12,443	12,791	13,125	0.34%

Source: Woods & Poole, Inc. *(*CEDDS, 2001)

A review of the various employment sectors shows that the Pima County area has a widely diversified economy. The growth sectors of employment that rose at annual rates of three percent or greater were: agricultural services; finance, insurance, and real estate; and services industries. Additionally, the statistics indicate that other sectors also rose steadily for the time period. The only negative growth sectors were in mining and government employment.

PER CAPITA PERSONAL INCOME

Table 1F, Per Capita Personal Income (PCPI), compares the per capita personal income (adjusted to 1996 dollars) for Pinal County, Pima

County, the State of Arizona, and the United States between 1995 and 2000.

As illustrated by the table, the two counties have mirrored, but slightly trailed the PCPI for the United States. The PCPI for Pinal County increased at the lowest rate of all, keeping the average per capita income below $20,000. The two Arizona counties were outperformed by the state overall, with a 2.4 percent average annual increase in income over the five-year period. This rate exceeded the United States average annual increase by several tenths-of-a-percent.

TABLE 1E
Employment by Sector
Pima County

Pima County	1995	1996	1997	1998	1999	2000	Percent Annual Increase
Total Employment	385,021	393,769	401,843	415,600	426,585	436,692	2.12%
Farm Employment	1,056	1,043	993	1,052	1,054	1,056	0.00%
Agricultural Services, Other	4,292	4,511	4,648	4,899	5,077	5,243	3.39%
Mining	2,792	2,825	2,875	2,698	2,705	2,713	-0.48%
Construction	24,360	24,427	24,717	25,526	25,399	25,235	0.59%
Manufacturing	29,863	30,178	30,533	31,162	31,401	31,640	0.97%
Transport, Communications & Public Utilities	15,260	15,433	16,056	16,128	16,734	17,236	2.05%
Wholesale Trade	11,362	11,683	11,976	12,125	12,635	13,092	2.39%
Retail Trade	68,637	68,827	70,316	71,375	72,337	73,278	1.10%
Finance, Insurance & Real Estate	26,827	28,927	29,240	31,410	31,904	32,299	3.14%
Services	129,439	134,380	138,455	146,715	153,902	160,541	3.65%
Federal Civilian Government	8,751	8,298	8,413	8,619	8,631	8,651	-0.19%
Federal Military Government	8,142	8,112	8,098	7,728	7,726	7,725	-0.87%
State and Local Government	54,240	55,125	55,523	56,163	57,080	57,983	1.12%

Source: Woods & Poole, Inc. (CEDDS, 2001)

TABLE 1F
Adjusted Per Capita Personal Income (PCPI)
County, State, and U.S.

Area	1995	1996	1997	1998	1999	2000	Average Annual Increase
Pinal County	$15,206	$15,361	$15,406	$15,462	$15,998	$16,117	0.97%
Pima County	$20,340	$20,845	$21,159	$22,055	$22,484	$22,864	1.97%
State of Arizona	$21,077	$21,611	$22,404	$23,493	$23,909	$24,298	2.40%
U.S.	$24,068	$24,651	$25,430	$26,402	$26,894	$27,323	2.14%

Source: Woods and Poole, Inc., CEDDS, 2001 - (Adjusted to 1996 Dollars)

SUMMARY

The information discussed on the previous pages provides a framework for the remaining elements of the Airport Master Planning process. Information on current airport facilities, their utilization, and conditions will serve as a basis, with additional analysis and data collection, for the development of forecasts of aviation activity and facility requirement determinations.

DOCUMENT SOURCES

A variety of different documents were referenced in the inventory process. The following listing reflects a partial compilation of these sources. An on-site inventory and interviews with city administrators were also used to review the conditions of facilities for the master planning effort.

Airport Facility Directory, Southwest U.S., U.S. Department of Commerce, National Oceanic and Atmospheric Administration.

The Complete Economic and Demographic Data Source (CEDDS) Woods and Poole Economics, Inc. 2001.

San Manuel Airport Master Plan Update, 1991; Pinal County.

National Plan of Integrated Airport Systems (NPIAS), U.S. Department of Transportation, Federal Aviation Administration, 2001-2005.

Phoenix Sectional Aeronautical Chart, U.S. Department of Commerce, National Oceanic and Atmospheric Administration.

Arizona State Airport System Plan (ASASP), Arizona Department of Transportation, Aeronautics Division.

The following Web pages were also visited for information during the preparation of the inventory:

FAA 5010 Data, Area Airports
- http://www.airnav.com/
- http://www.nasao.org/
- http://www.gcr1.com/
- http://www.faa.com/

Pima Association of Governments
- http://www.pagenet.org

Pima County
- http://www.co.pima.az.us

Pinal County
- http://www.co.pinal.az.us

Tri-Community Chamber of Commerce
- http://smortricommunity.com

United States Census
- http://www.census.gov

San Manuel Chamber of Commerce, Economic Development, and Visitor Center

Chapter Two

AVIATION DEMAND FORECASTS

Chapter Two

Aviation Demand Forecasts

Facility planning begins with a definition of the demand that may occur over a specified period. For projection of demands at San Manuel Airport (E77), forecasts of aviation activity indicators are utilized. These forecasts provide the foundation from which aviation demand is translated into specific facility improvements needed by San Manuel Airport and the region it serves over the next 20 years.

Because of the cyclical nature of the economy, it is virtually impossible to predict with certainty year-to-year fluctuations in activity when looking as far as 20 years into the future. However, a trend can be established which delineates long term growth potential.

While a single line on a graph is often used to express the anticipated growth, it is important to remember that actual growth may fluctuate above and below this line. Forecasts serve as guidelines. Planning must remain flexible to respond to unforeseen facility needs. These facility needs may differ in response to a variety of external influences, including the changing types of aircraft and the nature of available facilities.

The following forecast analysis examines recent national and regional aviation trends and historical and current socioeconomic and demographic information to develop an updated set of aviation demand projections for San Manuel Airport. Analysis of these factors will ensure a comprehensive outlook for future aviation demand.

A note about September 11, 2001:

We are unable to present statistical information in this section with regard to the affect of 9/11 on aviation forecasts, since the Federal Aviation Administration (FAA) compiles this information, and it is unavailable at this time. While they may attempt to present an overview of the events in their annual publication in March 2002, it will not be entirely inclusive of year 2001 data since most of the statistical information will not be available until later in the year.

NATIONAL TRENDS

Each year, the FAA publishes its national aviation forecasts. Included in this publication are forecasts for air carriers, air taxi/commuters, general aviation, and military activities. The FAA forecasts are prepared to meet budget and planning needs of the constituent units of the FAA and to provide information that can be used by state and local authorities, the aviation industry, and by the general public. The *Terminal Area Forecasts* (TAF), referenced in this report, uses the economic performance of the United States as a baseline indicator of future aviation industry growth.

GENERAL AVIATION

General aviation is defined as the portion of civil aviation which encompasses all facets of aviation except commercial and military operations. By most statistical measures, general aviation recorded its fifth consecutive year of growth (1994-2000). Following more than a decade of decline, the general aviation industry was invigorated by the passage of the General Aviation Revitalization Act in 1994 (federal legislation which limits the liability on general aviation aircraft to 18 years from the date of manufacture). This legislation sparked both an interest to renew the manufacturing of general aviation aircraft and a renewed optimism for the industry. The high cost of product liability insurance was a major factor in the decisions by many American aircraft manufacturers to slow or discontinue production of general aviation aircraft.

According to the General Aviation Manufacturers Association (GAMA), aircraft shipments and billings also grew for the sixth consecutive year in 2000, following 14 years of annual declines. In the first three quarters of 2000, general aviation aircraft manufacturers shipped over 2,000 units, a 16.3 percent increase over the same period in 1999. Shipments of piston aircraft and jets were up 13.8 and 15.1 percent, respectively. Turboprop shipments were up 36.3 percent during the first three quarters of 2000.

Both the number of active pilots and student pilot starts were estimated to be up in 2000 from the previous year. The total pilot population is an estimated 648,539 for 2000, up 2.1 percent over 1999. The estimated number of active student pilots for 2000 is 104,150, also up 2.1 percent from

1999. Student pilots are the future of general aviation and are a key factor impacting the general aviation industry.

Since most pilot training activities are conducted using general aviation aircraft, the increases in new pilot starts, along with increases in advanced training, are primary reasons for the resurgence in general aviation over the past years. These increases, combined with the increases in piston-powered aircraft shipments and aircraft production, are tangible evidence of the renewed vitality of the industry.

General aviation activity at towered airports declined slightly in 2000, after three consecutive years of growth. In 2000, general aviation operations totaled 39.9 million, a 0.5 percent decline following a 13.4 percent rise over 1996-1999. Most of the decline occurred in itinerant operations, down 0.8 percent. Between 1996 and 1999, local operations were up 17.4 percent, while remaining flat during 2000 at 17.0 million.

In 2000, the top 10 general aviation airports, as ranked by operations, accounted for 9.1 percent of general aviation activity at the combined 459 FAA/contract towers and 5.3 percent of total aircraft activity at towered airports. Two of the top 10 airports showing the fastest growth in general aviation operations are large hub commercial service airports (Minneapolis/St. Paul and Covington/ Cincinnati). This signifies the expansion of the general aviation fleet to include larger, more sophisticated turboprop and turbojet aircraft which require air traffic control services and airport facilities similar to commercial air carriers.

General aviation instrument operations have increased during six of the past seven years, with activity gains totaling 19.2 percent over the period. The number of general aviation aircraft handled at enroute traffic control centers also decreased slightly in 2000, but after eight consecutive years of increase, over which time general aviation activity increased 20.3 percent. These increases are consistent with the expanding fleet of sophisticated turboprop and turbojet aircraft in the general aviation fleet and the greater use of these aircraft for business/ corporate uses.

The most notable trend in general aviation is the continued strong use of general aviation aircraft for business and corporate uses. For 1999 (the most current year of data), business and corporate use of general aviation aircraft represented 22.7 percent of general aviation activity. Corporate hours were up 12.5 percent, while business hours increased 2.1 percent. This increase is consistent with the number of business jets delivered over recent years and is also supported by the increase in number of turbojet hours in corporate and business use - up 17.3 percent in 1999.

An equally striking industry trend is the continued growth in fractional ownership programs. Fractional ownership programs allow businesses and individuals to purchase an interest in an aircraft and pay for only the time they use the aircraft. This has allowed many businesses and individuals, who might not otherwise, to own and use general aviation aircraft for business and corporate uses. Between 1993 and 2000, these companies had expanded their fleet and shareholders so that by the end of 2000, there were nearly 2,100 entities involved in fractional ownership of over 500 aircraft.

While the fractional jet ownership industry is rapidly expanding, new attention has been given to the regulatory oversight of the industry. Presently, fractional jet providers operate under Federal Aviation Regulation (F.A.R.) Part 91 which governs general aviation aircraft. Industry pressure is for fractional ownership providers to operate under F.A.R. Part 135 which governs commercial operations for air carriers, air taxi, and air charter companies. Part 135 operators believe the fractional ownership providers benefit from the less restrictive F.A.R. Part 91 standards. The FAA commissioned a formal rulemaking committee to analyze regulatory requirements for the industry. Their report, released in Spring 2000, recommended that fractional ownership providers operate under a new subpart of F.A.R. 91. The FAA is now reviewing this recommendation. A formal rulemaking proposal could be made within a year.

Exhibit 2A, **U.S. Active General Aviation Forecasts**, depicts the FAA forecast for active general aviation aircraft in the United States. The FAA forecast predicts general aviation aircraft to increase at an average annual rate of 0.9 percent over the 13-year planning period for general aviation aircraft. General aviation aircraft are projected to increase from 219,464 in 1999 to 245,965 in 2012.

GENERAL AVIATION SERVICE AREA

The initial step in determining the general aviation demand for an airport is to define its generalized service area for the various segments of aviation the airport can accommodate. The airport service area is determined primarily by evaluating the location of competing airports, their capabilities and services, and their relative attraction and convenience. With this information, a determination can be made as to how much aviation demand would likely be accommodated by a specific airport. It should be recognized that aviation demand does not necessarily conform to political or geographical boundaries.

The airport service area is an area where there is a potential market for airport services. Access to general aviation airports, commercial air service, and transportation networks enter into the equation that determines the size of a service area, as well as the quality of aviation facilities, distance, and other subjective criteria. As previously mentioned, San Manuel Airport is designated as a secondary airport by the SASP. The designation indicates that the airport provides basic general aviation services. The ability to provide services, or lack of it, therefore, is a factor in defining the service area for San Manuel Airport.

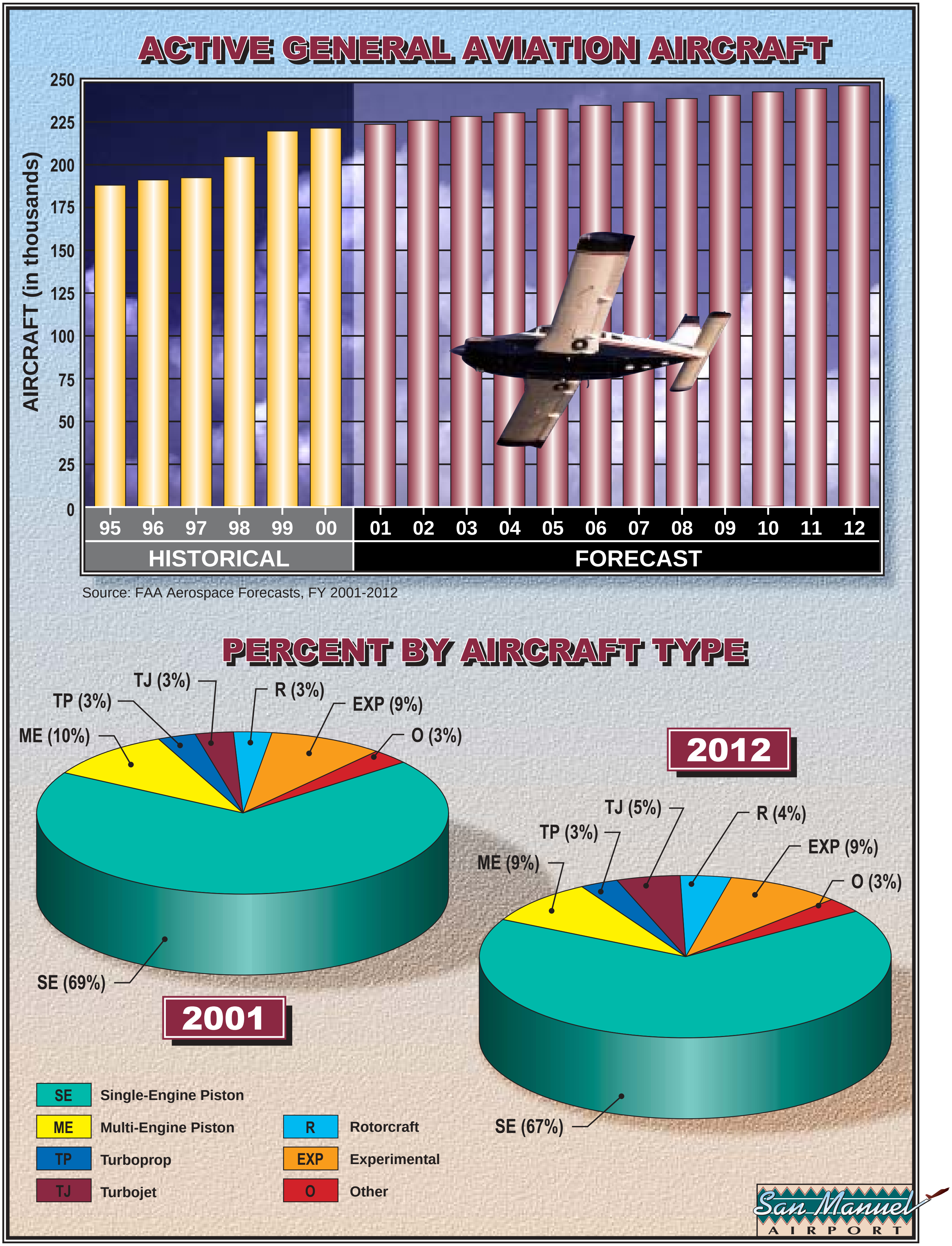

Exhibit 2A
U.S. ACTIVE GENERAL AVIATION
AIRCRAFT FORECASTS

The previous master plan defined the service area for San Manuel Airport as being a 15-mile radius with the airport as hub. This is most likely the case for those past years. General aviation airports, such as Marana Northwest Regional Airport (35 air-miles or one hour, 55 minutes driving time from San Manuel Airport) and Ryan Field (40 air-miles or two hours, seven minutes driving time from San Manuel Airport), have large fleets of based aircraft, with commensurate services: fuel, aircraft rental and instruction, and major airframe and powerplant repair service. Even the private field, La Cholla, 22 miles (38 minutes driving time) west of San Manuel, bases some 90 aircraft and supplies general services. Understandably, these airports have been more successful in attracting local general aviation due to their proximity to Tucson.

As development pressure in the north Tucson area, including Oro Valley and Catalina, has brought a larger market in terms of pilots and aircraft owners, so has this same development created impediments to access of area airport facilities. Both Marana Airport and Ryan Field have long waiting lists for hangar facilities, which can be as long as a three-year wait according to local sources. Tie-down facilities are available but at a price that equates to the demand ($26-$28 per month).

Likewise, distance (in terms of driving-time) can be a major factor in airport facility selection. At various times of the day, cross-town drive-time from north Tucson and areas farther north, such as Oro Valley and Catalina, to Marana Regional Airport or Ryan Field can greatly exceed the driving time to San Manuel Airport. Additionally, the driving experience of leaving the traffic congestion of Tucson for the open desert and mountain vistas along Highway 77 will add to the attraction of San Manuel Airport as a based aircraft facility. However, even with this appeal, there will still be the requirement by many aircraft owners for specific airside and landside facilities that are yet to be built at San Manuel Airport, including: hangars; instrument approach and nighttime operations capability; fuel; optimum runway length; and mechanic services. Currently, a waiting list for hangar facilities exists that contains 10 aircraft owners. Previously, the list contained 15 owners, with several opting to base at other airports when faced with a long wait for storage access. The extent to which the limitations of existing transportation routes to alternate airports will offset the lack of facilities at San Manuel Airport is difficult to gauge. This, and the time it takes to construct needed facilities, will to a large extent determine the service area for San Manuel Airport. It is projected that as facilities become available, the airport will capture an ever-increasing share of the service area, in essence "relieving" the Tucson area reliever airports. The increasing market will, in turn, fuel demand for San Manuel Airport facilities.

The service area for the near term is considered to be all of the tri-community area, encompassing Mammoth, San Manuel, and Oracle and an expanded area of coverage that extends across the southern edge of Pinal County and into northern Pima

County, including Catalina, Oro Valley, and north Tucson. Again, the extent of the need for facilities (and the extent to which San Manuel Airport can provide these) will determine the amount of capture of the service area, but it can be expected that San Manuel Airport will serve an ever-increasing share of the market.

LOCAL SOCIOECONOMIC FEATURES

The local socioeconomic conditions provide an important baseline consideration for preparing aviation demand forecasts. While in many cases local socioeconomic variables such as population, employment, and personal income cannot be relied upon to indicate the growth of aviation demand, these factors can provide an important indicator for understanding the dynamics of the general aviation service area and the specific trends in economic growth.

For this study, socioeconomic variables for Pinal and Pima Counties have been considered. County and state information was gathered from the Arizona Department of Economic Security and Woods and Poole Economics, Inc.: *The Complete Economic and Demographic Data Source.*

POPULATION

Table 2A summarizes various socioeconomic forecasts, including population estimates for Pinal and Pima Counties, as well as the state of Arizona and the United States. As shown in the table, each is expected to experience population growth over the next several decades. The Pinal County population is forecast to grow at the fastest pace, at an average annual growth rate of 2.3 percent, increasing from an estimated 179,727 in 2000 to 281,710 in 2020. By comparison, Pima County (including the Tucson area) is forecast to grow at an average annual growth rate of 1.7 percent from 843,746 in 2000 to 1,178,720 in 2020. The state is expected to grow at an average annual 2.1 percent over the forecast period. As Arizona is one of the fastest growing states in the United States, the forecast for the United States population is anticipated to grow at a slower pace than that of Arizona, at an average annual growth rate of 1.0 percent.

EMPLOYMENT

Employment forecast data for Pinal and Pima Counties, along with Arizona and the United States, are also presented in **Table 2A**. The table shows gains in employment for each over the forecast period. Forecast employment for Pinal County is projected to increase at annual average of 2.2 percent for the forecast period from 2000 to 2020. The remaining employment statistics are consistent with population growth trends, with Pima County forecast employment percentages slightly ahead of population growth, but lower than the State growth rate of 2.2 percent.

An examination of the employment sectors charted for Pinal and Pima Counties indicate that the leading growth sectors (service and retail trade) are expected to contribute over 20,000 jobs to the overall economy of Pinal County by 2020 and over 100,000 jobs to Pima County for the same time period.

TABLE 2A
Population/Socioeconomic Forecasts
Pinal and Pima Counties, Arizona, United States

	2000	2005	2010	2020	Percent Annual Increase
Pinal County					
Population	179,727	208,070	232,120	281,710	2.3%
Employment	51,290	58,470	65,510	80,000	2.2%
PCPI	$13,503	$14,374	$15,354	$17,641	1.3%
Pima County					
Population	843,746	927,910	1,009,330	1,178,720	1.7%
Employment	444,120	489,070	536,090	634,250	1.8%
PCPI	$22,066	$23,480	$24,973	$28,314	1.3%
Arizona					
Population	5,130,632	5,817,550	6,456,350	7,774,830	2.1%
Employment	2,822,380	3,190,840	3,573,660	4,359,260	2.2%
PCPI	$23,260	$24,806	$26,535	$30,334	1.3%
United States					
Population	282,224,350	296,923,860	311,573,090	343,039,600	1.0%
Employment	167,465,310	178,141,490	189,453,080	213,959,130	1.2%
PCPI	$27,432	$28,961	$30,637	$34,312	1.1%

Source for historical Arizona, Pinal County. and Pima County population: Arizona Department of Economic Security
Source for remaining historical and forecast data: Woods and Poole, Inc.: CEDDS,2003

PER CAPITA PERSONAL INCOME (PCPI)

Table 2A also compares per capita personal income (adjusted to 1996 dollars) for Pinal and Pima Counties, the state of Arizona, and the United States. A comparison of the forecast in PCPI for the four geographic areas indicates a different story than the forecast of population and employment. The PCPI for each segment is expected to grow roughly the same. PCPI for Pinal County, Pima County, and the State of Arizona is projected to grow at 1.3 percent annually. The US PCPI is projected to grow at 1.1 percent annually.

FORECASTING APPROACH

The development of aviation forecasts proceeds through both analytical and judgmental processes. A series of mathematical relationships are tested to establish statistical logic and rationale for projected growth. However, the judgement of the forecast analyst, based upon professional experience, knowledge of the aviation industry, and an assessment of the local situation, is important in the final determination of the preferred forecast.

The most reliable approach to estimating aviation demand is through the utilization of more than one analytical technique. Methodologies frequently considered include trend line projections, correlation/regression analysis, and market share analysis.

It is important to note that one should not assume a high level of confidence in forecasts that extend beyond five years. Facility and financial planning usually require at least a 10-year preview, since it often takes more than five years to complete a major facility development program. However, it is important to use forecasts which do not overestimate revenue-generating capabilities or understate demand for facilities needed to meet public (user) needs.

A wide range of factors are known to influence the aviation industry and can have significant impacts on the extent and nature of air service provided in both the local and national markets. Technological advances in aviation have historically altered, and will continue to change, the growth rates in aviation demand over time. The most obvious example is the impact of jet aircraft on the aviation industry, which resulted in a growth rate that far exceeded expectations. Such changes are difficult, if not impossible, to predict and there is simply no mathematical way to estimate their impacts. Using a broad spectrum of local, regional, and national socioeconomic and aviation information, and analyzing the most current aviation trends, forecasts are presented in the following sections.

The following forecast analysis examines general aviation demand expected at San Manuel Airport over the next 20 years.

AVIATION ACTIVITY FORECASTS

To determine the types and sizes of facilities that should be planned to accommodate general aviation activity, certain elements of this activity must be forecast. These indicators of general aviation demand include:

- Based Aircraft
- Based Aircraft Fleet Mix
- Local and Itinerant Operations
- Aviation Peaking Activity

BASED AIRCRAFT FORECASTS

The number of based aircraft is the most elementary indicator of general aviation demand. By first developing a forecast of based aircraft, the growth of other aviation demand indicators can be projected. The rationale for forecasting general aviation activity is presented below.

Historical Based Aircraft

A cursory review of historically-based aircraft at San Manuel Airport reveals a small population of single engine aircraft that has risen slowly, but steadily, over the last five years. In 2000, members of the San Pedro Valley Pilots Association, with intentions of constructing T-hangars, began a list of aircraft owners desiring to base an aircraft at San Manuel Airport once facilities were in place. Although construction has not ensued, the list contains the names of persons wanting to base at least 13 aircraft that are still willing to wait for these facilities. Of these, 10 are firmly committed to basing at San Manuel Airport. The number of based aircraft also includes the four seasonal aircraft that base at San Manuel Airport each winter. Due to the impact of the addition of 10 based aircraft (those on the waiting list), all projections will include a one-time 10 aircraft spike in based aircraft during the short term planning period, thus assuming that the storage facilities will be constructed in the short term.

Forecasting Rationale For Based Aircraft

A summary of historical and forecast based aircraft is illustrated on **Exhibit 2B**, **Based Aircraft Forecast**. The projections depicted on the exhibit illustrate potential based aircraft at San Manuel Airport over the long term planning period.

The first method for forecasting based aircraft for San Manuel Airport uses a trend line projection. The trend line is developed utilizing regression analysis, which attempts to average the high and low points. The acceptability of time series or regression analysis is based upon the correlation coefficient (Pearson's "r") which measures the association between changes in the dependent and independent variables. If the r-squared (r^2) value (coefficient of determination) is greater than 0.95, it indicates good predictive reliability. A value below 0.95 may be used with the understanding that the predictive reliability is lower.

Considering based aircraft at San Manuel Airport between 1995 and 2001, Pinal County population regression analysis produces an r^2 value of 0.98. The projection has indicated an increase in aircraft for all projected years, consistent with population increase, and yields 31 aircraft for the short term, 41 aircraft for the intermediate term, and 46 aircraft for the long term.

Another regression analysis was performed using Per Capita Personal Income (PCPI) values for Pinal County. The relationship between PCPI and based aircraft over the same recording period (1995 to 2001) yields an r^2 output of 0.92, corroborating the statistical significance of the use of both population and PCPI for regression analyses. These results are graphed along with further analyses results on **Exhibit 2B**.

As depicted in **Table 2B**, **Per Capita Population Forecasts**, a market analysis approach was also used. In this type of analysis, comparisons are made involving based aircraft numbers

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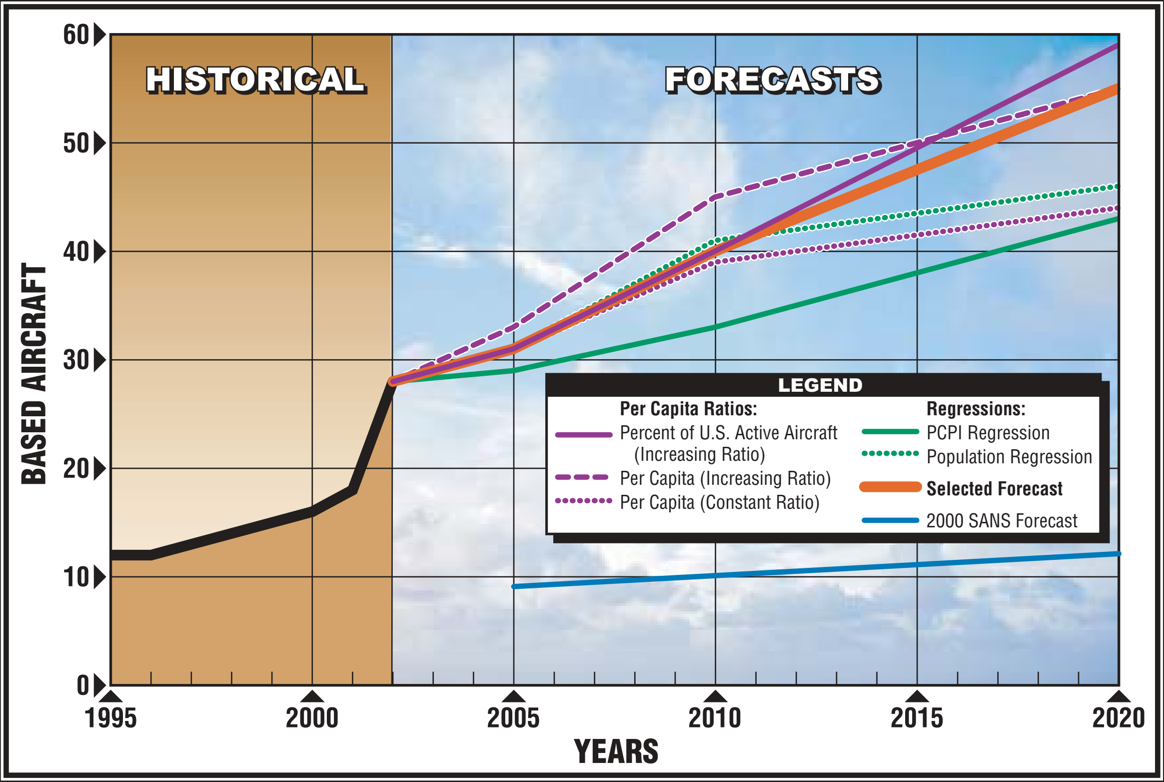
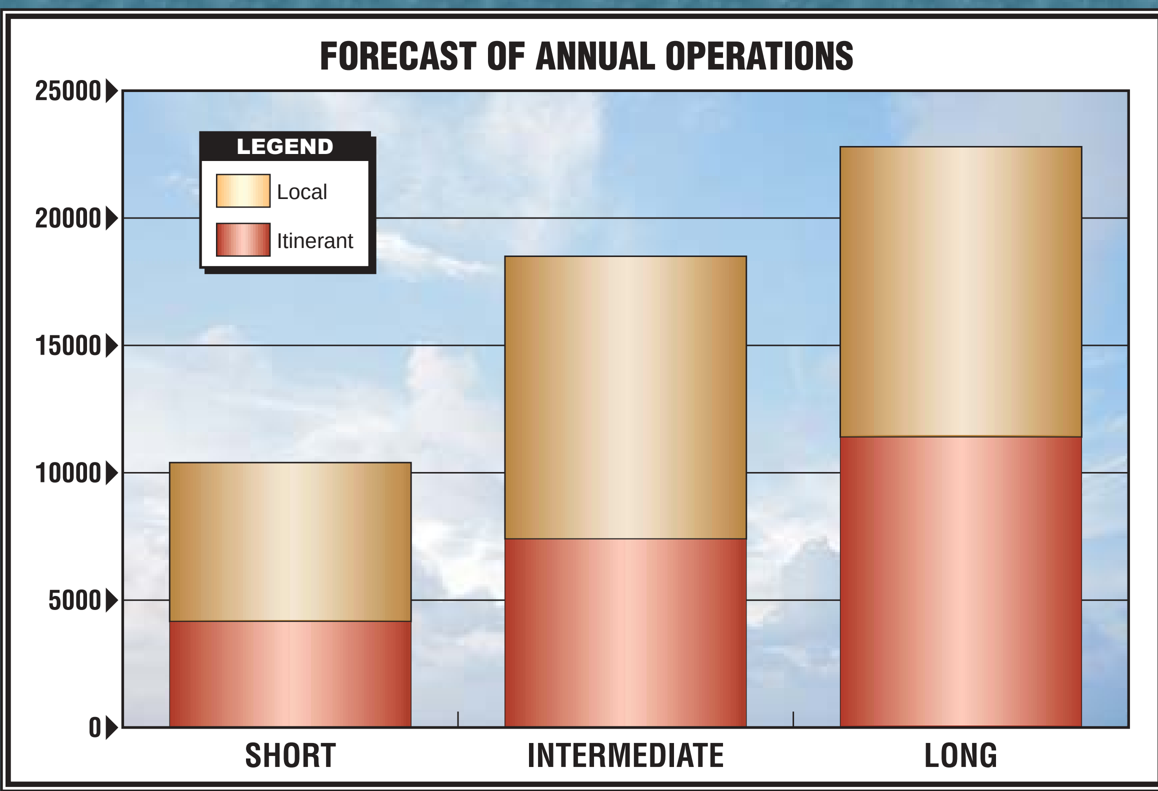




San Manuel AIRPORT

Exhibit 2B
FORECASTS

for the San Manuel Airport and the population statistics for Pinal County. The projections used for forecasting the based aircraft for the years 2005, 2010, and 2020 are indicated using both a constant share projection (or rate of growth of population that stays the same as the historical pattern) and an increasing share projection (where the same forecast population increases its share of the aircraft market). An increasing market share approach would be consistent with the projection that San Manuel Airport will draw more aircraft from the existing service area or from a wider service area.

TABLE 2B
Per Capita of Pinal County Population Forecasts
San Manuel Airport Forecasts

Year	San Manuel Airport Based Aircraft	Pinal County Population	Aircraft per 1,000 Population
1995	12	139,000	0.086
1996	12	144,150	0.083
1997	13	150,375	0.086
1998	14	157,675	0.089
1999	15	165,400	0.091
2000	16	179,727	0.089
2001	18	186,795	0.096
2002	28*	192,395	0.146
Constant Share Projection			
2005	30	208,070	0.146
2010	34	232,120	0.146
2020	41	281,710	0.146
Increasing Share Projection			
2005	33	208,070	0.159
2010	45	232,120	0.194
2020	55	281,710	0.195

Source (historical and forecast population): Woods and Poole, Inc.: CEDDS, 2001;
Historical Based Aircraft: Local Records
* Gain anticipated with new hangar construction.

Based on a current market share of 18 aircraft plus the one-time infusion of the 10 aircraft waiting to be based immediately per the 2002 population of 192,395 population, or 0.146 aircraft per 1,000, the constant share projections predict 30 based aircraft for 2005, 34 aircraft for 2010, and the projection of 41 for the year 2020. The increasing share analysis proposes a factor of 0.159 aircraft per 1,000 population is to be used to forecast based aircraft for 2005, 0.194 aircraft per 1,000 for 2010, and increasing to 0.195 per 1,000 to be used for 2020. This yields a forecast of 33 based aircraft for the year 2005, 45 aircraft for 2010, and the projection of 55 for the year 2020.

Table 2C uses a forecast based upon San Manuel Airport's historical market share of the entire U.S. active aircraft fleet. The forecasts are projected at both constant and increasing growth rates. The forecast at a constant share was not included on **Exhibit 2B**, as the relatively flat line was rejected as too low. The projection at an increasing rate is included on the exhibit and depicts straight-line growth.

TABLE 2C
Based Aircraft as Percent of U.S. Active Aircraft
San Manuel Airport Forecasts

Year	San Manuel Based Aircraft	U.S. Active Aircraft	Percent of U.S. Active Aircraft
1995	12	188,100	0.0064%
1996	12	191,100	0.0063%
1997	13	192400	0.0068%
1998	14	204700	0.0068%
1999	15	219,500	0.0068%
2000	16	221,200	0.0072%
2001	18	223,500	0.0081%
2002	28	225,800	0.0124%
Constant Share Projection			
2005	29	232,500	0.0124%
2010	30	242,300	0.0124%
2020	33	264,300	0.0124%
Increasing Share Projection			
2005	31	232,500	0.0134%
2010	40	242,300	0.0165%
2020	59	264,300	0.0225%

Source (historical and forecast U.S. Active Aircraft): FAA Aerospace Forecasts, 2001-2012

These projections are somewhat optimistic beyond the short term, but they allow for consideration of increasing capture of general aviation as awaited hangar and navigational aids become available. Additionally, it appears that, as several forecasts are tied to population, the forecast based aircraft similarly taper off by the long term. Even as growth in Arizona, in general, and Tucson, in particular, may slow by the long term planning period, the FAA forecasts remain steady for general aviation. Therefore, a forecast has been selected that is a median forecast within the envelope presented by the high and low forecasts for San Manuel Airport, yet in straight-line growth. For comparative purposes, the 2000 SANS projected based aircraft growing from 9 in 2005 to 12 in 2020.

In order to formulate a plan which will allow the sponsor, Pinal County, to develop facilities based upon demand, the following planning horizon activity milestones have been established for based aircraft:

- Short Term - 31
- Intermediate Term - 40
- Long Term - 55

BASED AIRCRAFT FLEET MIX PROJECTION

Knowing the aircraft fleet mix expected to utilize the airport is necessary to properly plan facilities that will best serve the level and type of activities occurring at the airport. The existing based aircraft fleet mix is comprised of single engine piston-powered aircraft.

As discussed previously, the national trend is toward a larger percentage of sophisticated turboprop, jet aircraft, and helicopters in the national fleet. Growth within each based aircraft category at the airport has been determined by comparison with national projections (which reflect current aircraft production) and consideration of local economic conditions. The based aircraft fleet mix projection for San Manuel Airport is summarized in **Table 2D**.

Currently, single engine aircraft compose the largest segment of aircraft at San Manuel Airport. Future based aircraft mix will continue to be dominated by single engine aircraft but with an increasing percentage of turbine aircraft. The improvement of the airport, combined with a positive economic outlook, will promote increases in operations by higher-powered general aviation aircraft. For this reason, all aircraft types, including both turboprop and turbojet aircraft, have been forecast to increase. Although increasing consistently in numbers over the forecast period, single engine based aircraft percentages are forecast to represent less of the total mix in the future.

ANNUAL OPERATIONS

There are two types of operations at an airport: local and itinerant. A local operation is a takeoff or landing performed by an aircraft that operates within sight of the airport or which executes simulated approaches or touch-and-go operations at the airport. Itinerant operations are those performed by aircraft with a specific origin or destination away from the airport. Generally, local operations are characterized by training operations.

Typically, itinerant operations increase with business and commercial use since business aircraft are used primarily to carry people from one location to another.

TABLE 2D
Fleet Mix Forecast
San Manuel Airport Forecasts

Type	2001	%	Short Term	%	Intermediate Term	%	Long Range	%
Single Engine	14	77.78%	26	81.00%	30	75.00%	40	72.00%
Multi-Engine	0	0.00%	2	7.50%	4	10.00%	8	14.00%
Turboprop	0	0.00%	1	4.50%	2	6.00%	6	10.00%
Jet	0	0.00%	0	0.00%	1	2.00%	1	2.00%
Helicopter	0	0.00%	0	0.00%	1	2.00%	1	2.00%
Other	4	22.22%	2	7.00%	2	5.00%	0	0.00%
Totals	18	100.00%	31	100.00%	40	100.00%	55	100.00%

Due to the absence of an airport traffic control tower (ATCT), actual operational counts are not available for San Manuel Airport. Instead, general estimates of aircraft operations are made based on periodic observations. The FAA 5010-1, *Airport Master Record Form*, has been consulted. However, the FAA 5010-1 form for 2000 is the only form available. The numbers for that year appear extremely low when consulting with local airport users. The San Pedro Valley Pilots Association has estimated the historical operations for this report.

Other frequent airport users include agricultural aircraft and local, state, and federal air taxi operators, both private and public in the past. BHP Billiton annually hired an agricultural flying service to spray the mine tailings pits to prevent leaching of the contaminants. These agricultural (ag) operations occurred for a one-month period, during which time several turbine engine Air Tractor 802 ag-planes take turns performing two air operations (takeoff and landing) every 10 to 15 minutes, 12 to 24 hours a day. These aircraft performed approximately 1,500 to 2,500 operations over the course of a month. These operations have been discontinued as the tails have been capped with topsoil.

San Manuel Airport is also the destination for a number of itinerant aircraft from various state and federal agencies, among them the U.S. Forest Service, U.S. Customs Service, and U.S. Army Aviation.

The U.S. Forest Service (USFS) maintains an aerial tanker support base at San Manuel Airport during the summer fire season. The USFS uses single engine aircraft such as the Air Tractor Thrush for "fire bombing" purposes. The USFS uses the airfield in response to range and mountain fires in the area, operating two to four times per hour per fire event which typically may last from one to six hours per day. The fire events occur two to four times per season on average.

The U.S. Customs Service (USCS) works in conjunction with the Drug Enforcement Agency (DEA), which performs airport surveillance and drug interdiction support. When using San Manuel Airport for training exercises, the joint forces simulate an interdiction, using a King Air and Citation II to make visual air contact with a Cessna 182 and follow it to the ground (San Manuel Airport). These exercises occur on a monthly basis.

The U.S. Army uses the airfield for training flights that include multiple takeoffs and landings per training episode. The Army flies the Bell helicopter Hueys and Cobras and Sikorsky Blackhawks, based at Marana Northwest Regional Airport, to practice approach and hovering activities at San Manuel Airport. These activities occur on a weekly to bi-weekly basis.

Air taxi operations include numerous flights involving local, state, federal, and private agencies concerned in one way or other with environmental issues. The location of San Manuel between the Galiuro Mountains and the Santa Catalina Mountains, with the natural trails and open space that exist there, draws many groups that study, or are otherwise attracted to, native desert ecosystems. Another natural attraction is the San Pedro River, a major river system that is monitored closely as many issues affect it, including water use by cities such as San Manuel. These groups have been observed flying both single and multi-engine aircraft into San Manuel Airport as it is the closest public airport available to these attractions.

Projections of annual operations have been developed with these reported operations in mind and by use of the recent report published by the Statistics and Forecast Branch of the FAA on the *Model for Estimating General Aviation Operations at Non-towered Airports Using Towered and Non-towered Airport Data*, July, 2001. The forecasts of operations for San Manuel Airport were computed with equation 15, recommended for use to estimate general aviation activity for non-towered airports. The equation is as follows:

$OPS = 775 + 241\ BA - 0.14\ BA^2 + 31{,}478\ \%\ in\ 100\ mi + 5{,}577\ (var1) + 0.001\ Pop\ 100 - 3{,}736\ (var2) + 12{,}121\ Pop\ 25/100.$

Where:

BA = Based Aircraft
BA^2 = Based Aircraft squared
% in 100 mi = % Based aircraft within a 100 mile radius
Pop 100 = Population within 100 miles
Var1 = Variable multiplier (either 0 or 1) determined by flight school operations
Var2 = Variable multiplier (either 0 or 1) determined by geographic location
Pop 25/100 = Population within 25 miles divided by population within 100 miles as a percent

The equation yielded a forecast of operations for the short, intermediate, and long terms, as shown in **Table 2E.**

An estimated percent of local versus itinerant operations is used to distinguish the type of operations at San Manuel Airport. Airports with higher training operations (local operations) will have a higher operation per based aircraft ratio, whereas airports with a higher percentage of transient aircraft operations will have a lower ratio. San Manuel Airport currently has been determined to have a higher percentage of local operations, by approximately 3:2. This has been assumed from the fact that, although there are not a high number of training operations, the pilots association members fly actively. The percent of local versus itinerant operations has been judged to be approximately one-third higher also, in part, due to the ag operations performed and the designation of these as local operations. This percentage is forecast to change as growth at the airport attracts a higher number of itinerant aircraft. The operations split is projected to be 40 percent itinerant and 60 percent local operations through the intermediate term, gradually shifting to a 50-50 split in the long term projection.

The SASP concurs in its projections of increased aircraft utilization and the number of general aviation hours flown statewide. This projected trend supports future growth in annual operations at San Manuel Airport. For comparative purposes, the 2000 SANS projected annual operations growing from 1,096 in 2005 to 1,495 in 2020.

TABLE 2E
General Aviation Operations Forecast
San Manuel Airport

Year	Itinerant	Local	Total	Based Aircraft	Operations per Based Aircraft
1995	1,200	3,800	5,000	12	417
1996	1,200	3,800	5,000	12	417
1997	1,200	3,800	5,000	13	385
1998	1,200	3,800	5,000	14	357
1999	1,200	3,800	5,000	15	333
2000	500	1,300	1,800	16	113*
2001	3,500	5,300	8,800	18	489
GENERAL AVIATION OPERATIONS FORECAST					
Short Term	4,160	6,240	10,400	31	336
Intermediate Term	7,400	11,100	18,500	40	463
Long Term	11,400	11,400	22,800	55	415

* Based on partial year of operations due to runway closure.
The historical based aircraft and aircraft operations have been estimated by the San Pedro Valley Pilots Association.

AIR TAXI

Air taxi consists of aircraft involved in on-demand passenger or small parcel transport. Typical services that qualify as air taxi operations are charter, air ambulance, and small package services.

Although not strictly "public" air taxi operations, private business aircraft operations serve to provide the same function as air taxi aircraft. For the purpose of estimating air taxi operations and the annual instrument approaches upon which these are based, private business aircraft have been included in these calculations.

These operations are representative of future Part 135 air taxi operations. A conservative estimate of air taxi defined operations would be approximately 50 percent of total itinerant operations for the airfield. The calculations are summarized in **Table 2G**.

MILITARY ACTIVITY

Projecting future military use of an airport is complicated by the fact that local missions may change with little notice. However, existing operations and aircraft mix may be confirmed for their impact on facility planning. As explored previously, there are several military agencies that use the airport. These numbers have been estimated and included in the forecast summary.

PEAKING CHARACTERISTICS

Many airport facility needs are related to the levels of activity during peak periods. The periods used in developing facility requirements for this study are as follows:

- **Peak Month** - The calendar month when peak aircraft operations occur.
- **Design Day** - The average day in the peak month. This indicator is easily derived by dividing the peak month operations by the number of days in the month.
- **Busy Day** - The busy day of a typical week in the peak month.
- **Design Hour** - The peak hour within the design day.

Without an airport traffic control tower, adequate operational information is not available to directly determine peak general aviation operational activity at the airport. Typically, the peak month for activity at general aviation airports approximates 10 to 15 percent of the airport's annual operations. For planning purposes, peak month operations have been estimated as 13 percent of annual operations. Based on peaking characteristics from similar airports, the typical busy day was determined by multiplying the design day by 20 percent of weekly operations during the peak month, or 1.4. Design hour operations were determined using 20 percent of the design day operations.

The general aviation peaking characteristics are summarized in **Table 2F, Peak Operations Forecast**.

TABLE 2F
Peak Operations Forecasts
San Manuel Airport

	2001	Short Term	Intermediate Term	Long Term
Annual Operations	8,800	10,400	18,500	22,800
Peak Month	1,144	1,352	2,405	2,964
Busy Day	53	63	112	138
Design Day	38	45	80	99
Design Hour	8	9	16	20

ANNUAL INSTRUMENT APPROACHES

An instrument approach as defined by the FAA is "an approach to an airport with the intent to land by an aircraft in accordance with an Instrument Flight Rule (IFR) flight plan, when visibility is less than three miles and/or when the ceiling is at or below the minimum initial approach altitude." Annual instrument approaches (AIAs) are included in forecasting for purposes of defining certain navigational aid requirements. There are currently no approach facilities at San Manuel Airport. However, with proposed future facilities installation, estimates for annual instrument approaches (AIAs) have been made for the intermediate and long term planning periods.

With good weather conditions locally, it has been assumed that a total of 10 percent of the annual Part 135 approaches would be performed AIAs. The AIAs have been summarized in **Table 2G, Forecast Summary**.

SUMMARY

This chapter has outlined the various aviation demand levels anticipated for approximately the next 20 years at San Manuel Airport. Long term growth at the airport will be influenced by many factors, including: the local economy; the need for a viable aviation facility in the immediate area; and trends in general aviation at the local and national levels.

The next step in the master planning process will be to assess the capacity of existing facilities, their ability to meet forecast demand, and to identify changes to the airfield and/or landside facilities which will create a more functional aviation facility. The aviation demand forecasts for San Manuel Airport through the long term planning horizon are summarized in **Table 2G**.

TABLE 2G
Forecast Summary
San Manuel Airport

	2001	Short Term	Intermediate Term	Long Term
OPERATIONS				
Itinerant				
Air Taxi	1750	2080	3700	5700
General Aviation	1250	1,580	3,200	5,200
Military	500	500	500	500
Total Itinerant	3,500	4,160	7,400	11,400
Local				
General Aviation	5300	6,240	11,100	11,400
Military	0	0	0	0
Total Local	5,300	6,240	11,100	11,400
TOTAL OPERATIONS	8800	10,400	18,500	22,800
AIA'S	NA	NA	370	560
BASED AIRCRAFT	18	31	40	55

Chapter Three
FACILITY REQUIREMENTS

Chapter Three

Facility Requirements

To properly plan for the future of San Manuel Airport, it is necessary to translate forecast aviation demand into the specific types and quantities of facilities that will serve this identified demand. This chapter uses the results of the forecasts conducted in Chapter Two, as well as established planning criteria to determine the airfield (i.e., runways, taxiways, navigational aids, marking and lighting), and landside (i.e., hangars, general aviation terminal building, aircraft parking apron, fueling, automobile parking and access) facility requirements.

Chapter Three will identify, in general terms, the adequacy of the existing airport facilities, outline what new facilities may be needed, and when these may be needed to accommodate forecast demands. Having established the facility requirements, alternatives for providing these facilities will be evaluated in Chapter Four to determine the most cost-effective and efficient means for implementation.

AIRFIELD REQUIREMENTS

Airfield requirements include those facilities related to the arrival and departure of aircraft. These facilities are comprised of the following items:

- Runways
- Taxiways
- Airfield Marking and Lighting
- Navigational Aids

The selection of appropriate Federal Aviation Administration (FAA) design standards for development of airfield facilities is based primarily upon the characteristics of aircraft which are expected to use the airport. The definitive characteristics are approach speed and wingspan of the critical design

aircraft. The critical design aircraft is defined as the most demanding category of aircraft which conducts 500 or more operations per year.

CRITICAL AIRCRAFT

The FAA has established criteria for use in the sizing and design of airfield facilities. These standards include criteria which relate to aircraft size and performance. According to FAA *Advisory Circular (AC) 150/5300-13, Change 6, Airport Design*, an aircraft's approach category is based upon 1.3 times its stall speed in landing configuration at that aircraft's maximum certificated weight. The five approach categories used in airport planning are as follows:

Category A: Speeds of less than 91 knots.

Category B: Speeds of 91 knots or more, but less than 121 knots.

Category C: Speeds of 121 knots or more, but less than 141 knots.

Category D: Speeds of 141 knots or more, but less than 166 knots.

Category E: Speeds of 166 knots or greater.

The second basic design criteria relates to aircraft size. The airplane design group (ADG) is based upon wingspan. The six groups are as follows:

Group I: Up to but not including 49 feet.

Group II: 49 feet up to but not including 79 feet.

Group III: 79 feet up to but not including 118 feet.

Group IV: 118 feet up to but not including 171 feet.

Group V: 171 feet up to but not including 214 feet.

Group VI: 214 feet or greater.

Together, approach category and ADG correspond to a coding system whereby airport design criteria are related to the operational and physical characteristics of the aircraft intended to operate at the airport. The airport reference code (ARC) has two components. The first component, depicted by a letter, is the aircraft approach category. The second component, depicted by a Roman numeral, is the airplane design group. Generally, aircraft approach speed applies to runways and runway-related facilities, while airplane wingspan primarily relates to separation criteria involving taxiways and taxilanes.

Exhibit 3A provides a listing of typical aircraft and their associated ARC. **Table 3A** indicates a listing by their ARC of typical aircraft of the type that might be expected to be used at an airport similar to San Manuel Airport. Information is also given on approach speed and wingspan - the characteristics that determine ARC.

01MP17-3A-5/9/03

A-I

Beech Baron 55
Beech Bonanza
Cessna 150
Cessna 172
Piper Archer
Piper Seneca

C-I, D-I

Lear 25, 35, **55**
Israeli Westwind
HS 125

B-I
less than 12,500 lbs.

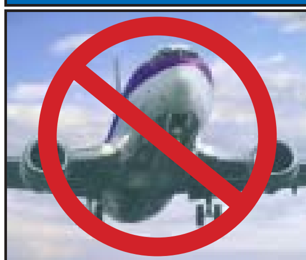
Beech Baron 58
Beech King Air 100
Cessna 402
Cessna 421
Piper Navajo
Piper Cheyenne
Swearingen Metroliner
Cessna Citation I

C-II, D-II

Gulfstream II, **III**, IV
Canadair 600
Canadair Regional Jet
Lockheed JetStar
Super King Air 350

B-II
less than 12,500 lbs.

Super King Air 200
Cessna 441
DHC Twin Otter

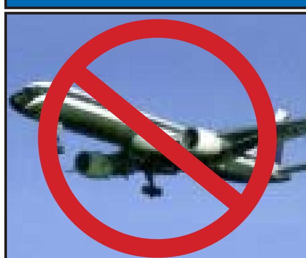


C-III, D-III

Boeing Business Jet
B 727-200
B 737-300 Series
MD-80, DC-9
Fokker 70, 100
A319, A320
Gulfstream V
Global Express

B-I, II
over 12,500 lbs.

Super King Air 300
Beech 1900
Jetstream 31
Falcon 10, 20, 50
Falcon 200, 900
Citation II, III, IV, V
Saab 340
Embraer 120

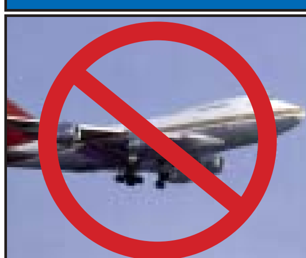


C-IV, D-IV

B-757
B-767
DC-8-70
DC-10
MD-11
L1011

A-III, B-III

DHC Dash 7
DHC Dash 8
DC-3
Convair 580
Fairchild F-27
ATR 72
ATP



D-V

B-747 Series
B-777

Note: Aircraft pictured is identified in bold type.

San Manuel AIRPORT

Exhibit 3A
AIRPORT REFERENCE CODES

TABLE 3A
Representative General Aviation Aircraft by ARC

Airport Reference Code	Typical Aircraft	Approach Speed	Wingspan (feet)	Maximum Takeoff Weight (lbs)
	Single Engine Piston			
A-I	Cessna 150	55	32.7	1,600
A-I	Cessna 172	64	35.8	2,300
A-I	Beechcraft Bonanza	75	37.8	3,850
	Turboprop			
A-II	Cessna Caravan	70	52.1	8,000
	Multi Engine Piston			
B-1	Beechcraft Baron	96	37.8	5,500
B-1	Piper Navajo	100	40.7	6,200
B-1	Cessna 421	96	41.7	7,450
	Turboprop			
B-1	Mitsubishi MU-2	119	39.2	10,800
B-1	Piper Cheyenne	119	47.7	12,050
B-1	Beechcraft King Air B-100	111	45.8	11,800
	Business Jets			
B-1	Cessna Citation I	108	47.1	11,850
B-1	Falcon 10	104	42.9	18,740
	Turboprop			
B-II	Beechcraft Super King Air	103	54.5	12,500
B-II	Cessna 441	100	49.3	9,925
	Business Jets			
B-II	Cessna Citation II	108	51.7	13,330
B-II	Cessna Citation III	114	53.5	22,000
B-II	Cessna Citation Bravo	114	52.2	15,000
B-II	Cessna Citation Ultra	109	52.2	16,500
B-II	Falcon 20	107	53.5	28,660
B-II	Falcon 900	100	63.4	45,500
	Business Jets			
C-1	Lear 55	128	43.7	21,500
C-1	Rockwell 980	137	44.5	23,300
C-1	Lear 25	137	35.6	15,000
	Turboprop			
C-II	Rockwell 980	121	52.1	10,325
	Business Jets			
C-II	Canadair Challenger	125	61.8	41,250
C-II	Gulfstream III	136	77.8	68,700
	Business Jets			
D-I	Lear 35	143	39.5	18,300
D-II	Gulfstream II	141	68.8	65,300
D-II	Gulfstream IV	145	78.8	71,780

The FAA advises designing all elements to meet the requirements of the airport's most demanding, or critical, aircraft. As discussed above, this is the aircraft, or family of aircraft, that performs greater than 500 itinerant operations per year. Once the ARC of the critical aircraft is determined, application of the appropriate design criteria can begin.

According to FAA statistics, active general aviation turbine aircraft are expected to increase on an average annual basis of 2.2 percent over the next decade. Once utilized only by larger corporations, corporate aircraft (especially jets) have been increasingly utilized by a wider variety of companies.

Also, as companies shift away from downtown locations to suburban areas and smaller communities, utilization of corporate aircraft has become a cost-effective manner in which to transport executives and other personnel. The cost benefit can be attributed to the newer, fuel efficient jet aircraft which can close the expense gap between the seat on the corporate jet versus the seat on the commercial carrier.

The community of San Manuel and, by association, the airport have been historically tied to the copper industry. As extraction became more involved and expensive, the mine decreased production and, subsequently, changed hands. Extraction techniques have made mining more feasible in older mines and San Manuel has one of the most complete and modernized facilities in the U.S. However, the copper industry is at a point of bottoming-out in value in the world market. While the future of the mining industry in San Manuel is in flux, the community of San Manuel has become more independent from the economy of the mine. Therefore, even though BHP Billiton-related air traffic will likely continue to contribute to corporate aircraft activity at San Manuel Airport, future economic growth and development of San Manuel and the expanded tri-community area may be the long term impetus for corporate/ business aircraft use.

Aircraft conducting more than 500 annual operations at San Manuel Airport currently fall within ARC B-I. This includes aircraft ranging from small single and multi-engine piston aircraft to the more sophisticated turboprop and occasional jet aircraft. The future mix of aircraft operations at San Manuel Airport can be expected to be performed by a wider range of small, single and multi-engine aircraft from Categories A and B and Groups I and II, with increased corporate aircraft utilization, as Tucson area airports and airspace become more crowded and as the tri-community area continues to grow. Furthermore, FAA data on general aviation business jet aircraft suggest that the Cessna and Lear series jet aircraft comprise the largest portion of active business jet aircraft. Within the planning time-frame of this report, the less demanding of these series of aircraft should be considered for accommodation. The series of Cessna Citation aircraft fall within ARC B-I and B-II. For planning purposes, the most critical aircraft having 500 or more annual operations at San Manuel Airport is a combination of several aircraft which fall into Category B and

ADG II, represented by the Beech King Air, the Cessna Citation (Category B aircraft) and the Cessna Caravan, Air Tractor, Beech King Air, and the Cessna Citation II and III (ADG II aircraft). Therefore, the long term critical aircraft category and group for San Manuel Airport is ARC B-II.

The airfield facility requirements outlined in this chapter correspond to the design standards described in the FAA *Advisory Circular 150/ 5300-13, Airport Design*. The following airfield facilities are outlined to describe the scope of facilities that would be necessary to accommodate the airport's role throughout the planning period.

RUNWAYS

The adequacy of the existing runway system at San Manuel Airport has been analyzed from a number of perspectives, including runway orientation, airfield capacity, runway length, and pavement strength. Using this information, requirements for runway improvements have been determined for the airport.

Airfield Capacity

A demand/capacity analysis measures the capacity of the airfield facilities (i.e. runways and taxiways) in order to identify and plan for additional development needs. The capacity of the airport's one runway system is approximately 210,000 annual operations.

FAA Order 5090.3B, *Field Formulation of the National Plan of Integrated Airport Systems* (NPIAS) indicates that improvements should be considered when operations reach 60 percent of the airfield's annual service volume (ASV). Even if the projected long range planning horizon level of operations comes to fruition prior to projections, the airfield's ASV will not exceed the 60 percent level by the long range planning horizon. Therefore, no additional airfield improvements aimed at increasing airfield capacity will be required for the planning period.

Runway Orientation

The current airfield configuration includes the single Runway 11-29, which is oriented in a west-northwest/ east-southeast manner. Ideally, the primary runway at an airport should be oriented as close as practical in the direction of the predominant winds to maximize the runway's usage. This minimizes the percent of time that a crosswind could make the preferred runway inoperable.

FAA *Advisory Circular (AC) 150/ 5300-13, Airport Design* recommends that a crosswind runway should be made available when the primary runway orientation provides less than 95 percent wind coverage for any aircraft forecast to use the airport on a regular basis. The 95 percent wind coverage is computed on the basis of the crosswind component not exceeding 10.5 knots (12 mph) for ARC (ARC) A-I and B-I; 13 knots (15 mph) for ARC A-II and B-II; and 16 knots (18 mph) for ARC C-I through D-II.

Wind information was gathered from Tucson International Airport weather station, the nearest weather reporting facility. The 1991 *San Manuel Airport Master Plan* has also been consulted to verify this information. The wind rose in **Exhibit 3B** indicates that the single Runway 11-29 is adequate to meet 94.96 percent coverage for 12 mph crosswinds and 97.12 percent at 15 mph. The analysis indicates that Runway 11-29 provides adequate crosswind coverage for ARC A-I, B-I, and B-II aircraft and is in agreement with the previous master plan.

The lack of available wind data suggests the need for an automated weather observation system (AWOS) at San Manuel Airport. The AWOS could be used to verify this analysis for future facility planning.

Runway Length

The determination of runway length requirements for the airport are based on five primary factors:

- Critical aircraft type expected to use the airport;
- Stage length of the longest nonstop trip destinations;
- Mean maximum daily temperature of the hottest month;
- Runway gradient; and
- Airport elevation.

As stated, an analysis of the existing and future fleet mix indicates that small business jets will be the most demanding aircraft at San Manuel Airport. The typical existing business aircraft range from the Cessna Caravan (A-II) and Beech King Air (B-II) to the Cessna Citation I and II (B-I and B-II). Typical business jets were identified in **Table 3A**.

Aircraft operating characteristics are affected by three of the five primary factors above. They are the mean maximum daily temperature of the hottest month, the airport's elevation, and the gradient of the runway. Where local weather information was unavailable, weather information from Tucson, the nearest weather reporting station, has been used. The mean maximum daily temperature of the hottest month of the year (June) for San Manuel is 95.8 degrees Fahrenheit (F) (from the *San Manuel Miner* weekly newspaper). The airport elevation at San Manuel is 3,274 feet MSL. The effective gradient for Runway 11-29 is 0.83 percent.

The runway length requirements for San Manuel Airport have been determined by incorporating the variables stated previously into the FAA airport design computer program, *Airport Design, Version 4.2D* based upon *Advisory Circular (AC) 150/ 5300-13, Airport Design*. **Table 3B** outlines the runway length requirements for various classifications of aircraft as calculated by this program.

Upon analysis of the current and forecasted aircraft fleet mix projected through the long range planning period, it has been determined that San Manuel Airport should be designed to

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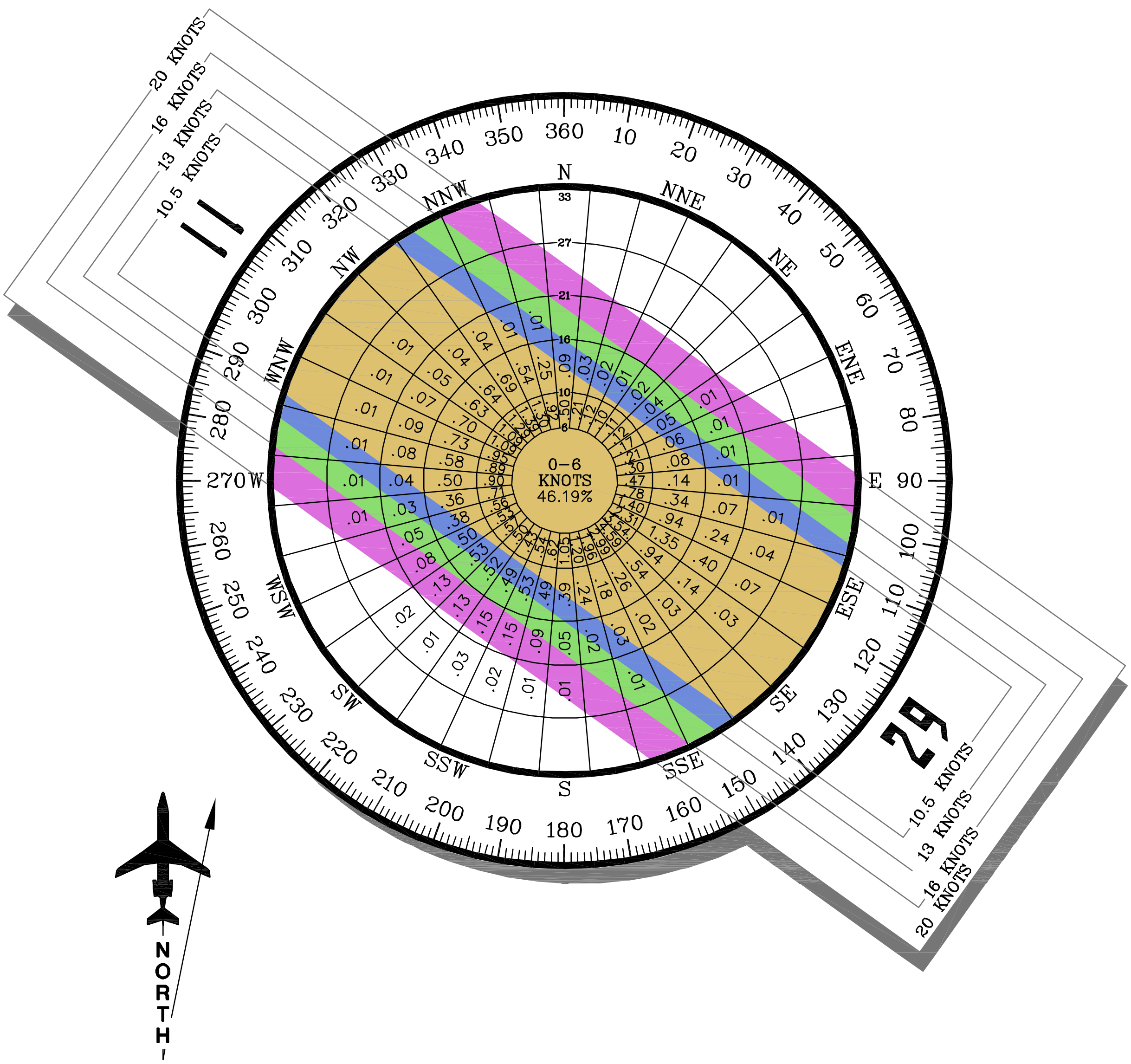
ALL WEATHER WIND COVERAGE

Runways	10.5 Knots	13 Knots	16 Knots	20 Knots
Runway 11-29	*94.96%*	*97.12%*	*99.01%*	*99.75%*

SOURCE:
NOAA National Climatic Center
Asheville, North Carolina
Tucson International Airport
Tucson, Arizona

OBSERVATIONS:
83,644 All Weather Observations
1988-1997



Magnetic Variance
11° 26' East (January 2002)
Annual Rate of Change
3.16' West (January 2002)

San Manuel AIRPORT

Exhibit 3B
WINDROSE

accommodate B-II category aircraft. The B-II designation enables the primary runway, under given variables of temperature, elevation, gradient and 500-mile trip length, to accommodate 95 percent of "small aircraft with 10 or less passenger seats". As calculated for San Manuel Airport, the recommended ARC B-II runway length is 4,800 feet. The current length of Runway 15-33 is 4,214 feet, falling short of this design group standard.

TABLE 3B
Runway Length Requirements
San Manuel Airport

AIRPORT AND RUNWAY DATA	
Airport elevation	3,274 feet
Mean daily maximum temperature of the hottest month	95.80 F
Maximum difference in runway centerline elevation	20 feet
Length of haul for airplanes of more than 60,000 pounds	500 miles
Dry runways	
RUNWAY LENGTHS RECOMMENDED FOR AIRPORT DESIGN	
Small airplanes with less than 10 passenger seats	
75 percent of these small airplanes	3,800 feet
95 percent of these small airplanes	**4,800feet**
Small airplanes with 10 or more passengers seats	5,200 feet
Large airplanes of 60,000 pounds or less	
75 percent of business jets at 60 percent useful load	6,100 feet
100 percent of these large airplanes at 60 percent useful load	8,100 feet

REFERENCE: FAA's airport design computer software utilizing Chapter Two of *AC 150/5325-4A, Runway Length Requirements for Airport Design*.

Runway Safety Areas

Consideration of runway length requirements is but one factor among other design criteria established by the FAA. FAA design criteria regarding runway object free area (OFA), runway safety area (RSA), and height clearances must also be examined.

The runway OFA is defined in FAA *Advisory Circular 150/5300-13* and is concurrent with Change 7 (the latest update to the circular), as an area centered on the runway extending out in accordance with the critical aircraft design category utilizing the runway. The OFA must provide clearance of all ground-based objects protruding above the RSA edge elevation, unless the object is fixed by function serving air or ground navigation. **Table 3C** presents airfield planning design standards for Runway 11-29. The following chapter will examine compliance with these standards.

TABLE 3C **Airfield Planning Design Standards (ARC B-II)** **San Manuel Airport**				
	Future **Runway 11-29**			
DESIGN STANDARDS				
Runways				
Length (ft.)	4,800			
Width (ft.)	75			
Pavement Strength (lbs.)				
Single Wheel (SWL)	12,000			
Dual Wheel (DWL)	30,000			
Shoulder Width (ft.)	10			
Runway Safety Area				
Width (feet)	150			
Length Beyond Runway End (ft.)	300			
Object Free Area				
Width (ft.)	500			
Length Beyond Runway End (ft.)	300			
Obstacle Free Zone				
Width (ft.)	400			
Length Beyond Runway End (ft.)	200			
Taxiways				
Width (ft.)	35			
OFA Width (ft.)	131			
Distance to Fixed or Movable Object (ft.)	58			
Runway Centerline to:				
Parallel Taxiway Centerline (ft.)	240			
Aircraft Parking Area (ft.)	250			
Building Restriction Line (ft.)				
20 ft. Height Clearance	390			
33 ft. Height Clearance	481			
Runway Protection Zones	**11**		**29**	
	Approach visibility minimums			
	Not lower than 1 mile	Not lower than 3/4 mile	Not lower than 1 mile	Not lower than 3/4 mile
Inner Width (ft.)	500	1,000	500	1,000
Outer Width (ft.)	700	1,510	700	1,510
Length (ft.)	1,000	1,700	1,000	1,700
Approach Slope	34:1	34:1	34:1	34:1

For ARC B-II OFA design standards at San Manuel Airport, FAA criteria call for a cleared area 500 feet wide (centered on the runway) extending 300 feet beyond the runway.

The RSA is also centered on the runway extending out a specific distance depending on the approach speed of the critical aircraft using the runway. The FAA requires the RSA to be cleared and graded, drained by grading or storm sewers, capable of supporting aircraft, capable of accommodating fire and rescue vehicles, and free of obstacles not fixed by navigational purpose.

In order to meet design criteria for ARC B-II aircraft at San Manuel Airport, the cleared and graded RSA will need to be 150 feet wide (centered on the runway) and extend 300 feet beyond each runway end.

Runway 11-29 currently does not provide adequate area for the required ARC B-II OFA and RSA standards, as objects that fall within this envelope are the hangars, mobile home, and trees next to the home. In Chapter Four, Alternatives the applied standards will be depicted graphically and mitigation measures analyzed.

Runway Width

Runway 15-33 is currently 75 feet wide. FAA design criteria calls for a runway width of 75 feet to serve aircraft in approach category B-II.

Runway Strength

As previously mentioned, the pavement for Runway 11-29 is strength-rated at 12,000 pounds single wheel gear loading (SWL).

Facility planning must consider the possibility of a greater number of higher performance business jets basing or utilizing the airport in the future. In acknowledging that San Manuel Airport will likely upgrade from a B-I to a B-II facility, Runway 11-29 meets current runway strength needs for most aircraft with exception to the Air Tractor whose gross take-off weight is 16,000 pounds. The runway should be improved to achieve 30,000 SWL by the intermediate to long term. It is the responsibility of airport management to ensure that pavement capacities are not exceeded by itinerant aircraft which may fall outside of this design standard.

TAXIWAYS

Taxiways are constructed primarily to facilitate aircraft movements to and from the runway system. Some taxiways are necessary simply to provide access between the aprons and runways, whereas other taxiways become necessary to facilitate safe and efficient separation of air traffic on the airfield.

As detailed in Chapter One, Runway 11-29 is served by a partial-parallel taxiway system and four entrance/exit taxiways. Serving to route traffic in a predominantly parallel fashion, Taxiway A varies from being a full parallel taxiway by approximately 400 feet on the east end due to existing hangars and mobile home which are would lie along the taxiway centerline and taxiway object free areas. Portions of this taxiway are unpaved. Long term facility planning should include extending this runway the full length of the runway and paving the full length of the taxiway.

The B-II distance separation standard between taxiway and runway centerlines is 240 feet. As referenced in Chapter One, Exhibit 1B, the width of partial-parallel Taxiway A is 35 feet where improved, meeting FAA criteria, 15 feet in width where unimproved. In order to accommodate all aircraft currently based and expected to base at San Manuel Airport in the future, all taxiways serving Runway 11-29 should be a minimum of 35 feet wide.

NAVIGATIONAL AIDS, LIGHTING, AND MARKING

Airport and runway navigational aids are based on FAA recommendations as depicted in DOT/FAA Handbook 7031.2B*, Airway Planning Standard Number One* and FAA *Advisory Circular 150/ 5300-2D, Airport Design Standards*, *Site Requirements for Terminal Navigation Facilities*.

Navigational aids provide two primary services to airport operations: precision guidance to a specific runway and/or non-precision guidance to a runway or the airport itself. The basic difference between a precision and non-precision navigational aid is that the former provides electronic descent alignment (course) and position guidance, while the non-precision navigational aid provides only alignment and position location information. The necessity of such equipment is usually determined by design standards predicated on safety considerations and operational needs. The type, purpose and volume of aviation activity expected at the airport are factors in determination of the airport's eligibility for navigational aids.

To determine state navigational aids needs, in 1998 ADOT produced the *Navigational Aids and Aviation Services Special Study*. San Manuel Airport was included in the group of state airports recommended for global positioning systems (GPS) facility installation during Stage III, an eight to ten year timeframe.

The study has further categorized airports with and without approved instrument approach procedures. Ofthe 69 airports without approved instrument approach procedures, San Manuel Airport falls within Group 2. Group 2 airports are defined as those airports which have potential to achieve a GPS approach "provided [that] the costs to improve the airport to applicable standards is at least equal to the anticipated 20-year stream of operational benefits."

Global Positioning System

The advancement of technology has been one of the most important factors in the growth of the aviation industry in the twentieth century. Much of the civil aviation and aerospace technology has been derived and enhanced from the initial development of technological improvements for military purposes. The use of orbiting satellites to confirm an aircraft's location is the latest military development to be made available to the civil aviation community.

Global positioning systems (GPS) use two or more satellites to derive an aircraft's location by a triangulation method. The accuracy of these systems has been remarkable, with initial degrees of error of only a few meters. As the technology improves, it is anticipated that GPS may be able to provide accurate enough position information to allow Category II and III precision instrument approaches, independent of any existing ground-based navigational facilities. In addition to the navigational benefits, it has been estimated that GPS equipment will be much less costly than existing precision instrument landing systems.

The FAA is proceeding with efforts to establish procedures that include vertical guidance and have minimums of approximately 350 feet (height above touchdown) and one mile visibility. Procedures using GPS for traditional precision minimums (200 feet/one mile) may be delayed until after the year 2010 when a second GPS frequency becomes available.

The ADOT *Navigational Aids and Aviation Services Special Study* has recommended in its final GPS analysis that San Manuel Airport receive a GPS approach to Runway 29 with a descent altitude of 305 feet above airport touchdown (HAT) and with a one-mile visibility minimum. This descent altitude is based on a controlling obstruction, noted as terrain at 3,322 feet MSL located 13,000 feet southeast. It is noted also in this report that further obstructions (smokestacks) within one and one half miles east of the airport may also present difficulties in use of Runway 29 for instrument approaches. This proposed procedure is also subject to a standards compliance survey. Associated costs should not exceed $50,500 to be economically feasible.

Airport Visual Approach Aids

Visual glide slope indicators are a system of lights located at the side of the runway which provide visual descent guidance information during an approach to the runway. As mentioned, Runway 11-29 is ready for the installation of PAPIs. The four-box systems are preferred for use, especially by business jet aircraft, due to their high efficiency during instrument weather conditions.

Weather Measurement Equipment

An AWOS (Automated Weather Observing System) is a computerized system that automatically measures one or more weather parameters, analyzes the data, prepares a weather observation that consists of the parameter(s) measured, and broadcasts the observation to the pilot using an integral very high frequency (VHF) radio or an existing navigational aid. The AWOS is a modular system utilizing a central processor which may receive input from several sensors. Basically, there are five standard groups of sensors, however, an AWOS may be certified with any combination of sensors. Dependent upon system design, additional sensors may be certified to any AWOS configuration. At present, there are no weather measurement facilities available at San Manuel Airport. For a more detailed description of the standards of AWOS systems and the types of weather sensors available, please reference *FAA Advisory Circular (AC) 150-5220-16C, Automated Weather Observing Systems For Non-federal Applications*, dated December 13, 1999. Additionally, installation criteria is available in *FAA Order 6560.20B, Siting Criteria For Automated Weather Observing Systems (AWOS),* dated July 20, 1998.

The *Navigational Aids and Aviation Services Special Study*. study also recommends, coincidental to establishment of the GPS approach, the installation of an AWOS-A weather reporting system. There may be further potential for an upgrade to an AWOS-3 based on the following criteria cited in the study:

- The revised forecast of annual aircraft operations per this Master Plan report;

- The recommended statewide distribution of AWOS-3 systems and the gap that an AWOS-3 system at San Manuel Airport could bridge between the Avra Valley Airport and Safford Regional Airport; and

- The unique position of San Manuel Airport north of the Catalina Mountains and along the San Pedro Valley, where frontal activity patterns differ from the closest AWOS-3 systems (45 nautical miles away) due to terrain and elevation changes.

Airfield Lighting And Marking

Runway identification lighting provides the pilot with a rapid and positive identification of the runway end. The most basic system involves runway end identifier lights (REILs). Both REILs and medium intensity runway edge lighting (MIRL) are recommended for use with nonprecision approaches.

Previous planning efforts forecast the need for instrument approach capability. Approach lighting is recommended for use with an instrument approach. The following approach lighting systems are acceptable for nonprecision GPS approaches by FAA *AC 150/1500-13, Change 7* in Table A16-1C: ODALS, MALS, SSALS, or SALS.

A consideration for the instrument approach to Runway 29 (approach from the east, landing to the west) is the height of the set of smokestacks at the mill, 550 feet, or 3,760 MSL, and located one and one-half miles off the runway end. After review, it appears that the smokestacks would be obstacles as they will penetrate the approach slope at either a 20:1 or a 34:1 approach. Therefore, a nonprecision approach to Runway 11 should be considered.

As approaches are improved from visual to nonprecision, so should the basic airport markings be upgraded to nonprecision markings.

All taxiways at San Manuel Airport should be lighted by medium intensity taxiway lighting (MITL).

The airport has a lighted wind cone and a segmented circle which provides pilots with information about wind conditions and traffic pattern circulation. Preparation should be made for night use of the airport. To this purpose, an airport beacon should be installed that assists in identifying the airport from the air at night.

LANDSIDE REQUIREMENTS

Landside facilities are those necessary for handling of aircraft, passengers, and cargo while on the ground. These facilities provide the essential interface between air and ground transportation modes. These areas will be subdivided into two parts: general aviation facilities and support facilities. The capacities of the various components of each area were examined in relation to projected demand to identify future landside facility needs.

GENERAL AVIATION FACILITIES

The purpose of this section is to determine space requirements during the planning period for the following types of facilities normally associated with general aviation terminal areas:

- Hangars
- Aircraft Parking Apron
- General Aviation Terminal
- Vehicle Access
- Vehicle Parking
- Fuel

Hangars

The space required for hangar facilities is dependent upon the number and type of aircraft expected to be based at the airport. Other variables may also influence hangar use. The intensity of weather conditions and the increased demand for storage facilities, in general, are likely to encourage most owners of based aircraft to prefer hangar space to outside tie-downs.

The following tables depicting forecast need are calculated based upon an analysis of existing general aviation facilities and the current and future demands at San Manuel Airport. An initial overview of existing aircraft storage verifies the preference for individual hangars. This is consistent with an overall trend in aviation toward ownership of higher performance aircraft and, many times, of multiple aircraft ownership. Because of this preference, it is necessary to determine what percentages of these aircraft would utilize conventional and executive hangars in addition to individual T-hangars.

T-hangars are relatively inexpensive to construct and provide the aircraft owner more privacy and greater ease in obtaining access to the aircraft. The principal uses of conventional hangars at general aviation airports are for large and/or multiple aircraft storage, storage during maintenance, and for housing fixed base operator activities. Executive hangars provide a storage area typically larger than T-hangars allowing for storage of larger aircraft or multiple small aircraft.

The analysis of hangar storage at San Manuel Airport concludes that all based aircraft are stored in hangars. There is approximately 15,000 square feet of total hangar storage area.

A planning standard of 1,200 square feet per based aircraft stored in T-hangars has been used to determine future T-hangar requirements. A standard of 1,200 square feet has also been applied to each position that would be available within a conventional hangar. Executive hangar requirements were calculated based on a 2,500 square-foot standard per aircraft position. Additional hangar storage square footage has been calculated for maintenance areas based on 15 percent of total storage space needs. These figures were then applied to aircraft to be hangared as determined by based aircraft forecasts. These figures are presented in **Table 3D.**

TABLE 3D
Aircraft Storage Hangar Requirements
San Manuel Airport

	Existing	Future Requirements			
	2001	**2002**	**Short Term**	**Intermediate**	**Long Term**
Aircraft to be Hangared	18	28	31	40	55
T-hangar Positions	3	20	20	22	27
Executive/Individual Hangar Positions	8	3	6	10	18
Conventional Hangar	0	6	6	7	9
Hangar Area Requirements					
T-hangar Area (s.f.)	5,600	23,500	23,500	26,900	32,800
Executive/Individual Hangar Positions	9,800	3,400	10,100	21,800	40,700
Conventional Hangar	0	6,700	7,500	9,700	13,400
Total Maintenance Area (s.f.)	0	10,000	6,200	8,800	13,000
Total Required Hangar Area (s.f.)	15,400	43,600	47,300	67,200	99,900

From the analysis in **Table 3D**, it is apparent that the number of existing hangars do not meet current storage demands. Therefore, short through long term facility planning may be determined to include all three hangar types. It should be noted that the trend toward use of executive hangars in lieu of conventional style hangars may allow for a shift of allotted square footages accordingly. Short term needs should consider replacement of existing hangars, so they may be removed by the intermediate term planning period.

Aircraft Parking Apron

A parking apron should be provided, at a minimum, for based aircraft not stored in hangars and maintenance operations, as well as transient aircraft. At the present time, there are 27 single/multi-engine piston tie-downs for a total of 11,100 square yards of apron space.

To understand apron area needs, busy day figures were used to first determine the number of itinerant and local aircraft, based on a 60:40 split in operations by total busy day aircraft. A multiplier (.25) was used to determine the actual number of itinerant aircraft on the ground. Total apron area requirements were determined by applying a planning criterion of 600 square yards for itinerant single and multi-engine piston aircraft (90 percent of busy day itinerant requiring tie-down), 1,200 square yards for itinerant and/or local jet aircraft (10 percent of busy day itinerant requiring tie-down), and 360 square yards for local piston aircraft (10 percent of busy day local requiring tie-down, including maintenance and permanent tie-downs).The results of this analysis are presented in **Table 3E, Aircraft Parking Apron Requirements.**

TABLE 3E
Aircraft Parking Apron Requirements
San Manuel Airport

	Currently Available	Short Term	Intermediate Term	Long Term
Single, Multi-engine Transient Aircraft Positions		6	10	16
Apron Area (s.y.)		3,400	6,200	9,600
Jet Transient Positions		1	1	2
Apron Area (s.y.)		1,200	1,200	2,400
Locally-Based Aircraft Positions		5	6	8
Apron Area (s.y.)		1,800	2,200	2,900
Total Positions	26	12	17	26
Total Apron Area (s.y.)	11,100	6,400	9,600	14,900

Based on the available 11,100 square yards of apron space, additional aircraft apron area will be needed only for itinerant jet or other large aircraft, such as the Air Tractor (59.2-foot wingspan) until the long term planning period.

Previous reports by local pilots indicate moderate itinerant (Army) helicopter activity. Parking needs for several itinerant helicopters should also be evaluated.

General Aviation Terminal Facilities

General aviation terminal facilities have a variety of functions and, therefore, space needs. Building space is required for passenger waiting, the pilots' lounge and flight planning area, concessions, management, storage, and various other needs. At San Manuel Airport, the pilots' lounge/terminal functions out of a small office facility. The office is approximately 200 square feet in area. There is no FBO or fuel concession.

The selected methodology used to estimate general aviation terminal facility needs was based upon recommendations from FAA *Advisory Circular 150/5300-13* and uses the design hour number of passengers to estimate expected facility need. **Table 3F, General Aviation Terminal Area Facilities** indicates that a planning average of four itinerant passengers per design hour in the short term, increasing to 10 passengers by the long term, was multiplied by 90 square feet to determine an approximate amount of square feet of terminal building space that will be needed.

TABLE 3F
General Aviation Terminal Area Facilities
San Manuel Airport

	Short Term	Intermediate Term	Long Term
General Aviation Design Hour Itinerant Passengers	4	6	10
General Aviation Building Space (s.f.)	360	540	900

VEHICLE ACCESS

In 2003, a new entrance road the airport is to be developed from Redington Road. This road will be less than one mile long, compared to the circuitous 1.3 mile long previous entrance through BHP Billiton property. Signage on Redington Road should be improved to indicate the new airport entrance.

VEHICLE PARKING

Vehicle parking demands have been determined for San Manuel Airport. Space determinations were based on an evaluation of existing airport use as well as industry standards. Automobile parking spaces required to meet general aviation demand were calculated by adding the hangar and terminal areas for short term, intermediate term, and long term. The standard of 400 square feet per vehicle space needed was applied. Parking requirements are summarized in **Table 3G**.

FUEL STORAGE

Fuel storage at San Manuel Airport includes one above-ground fuel storage tank that stores 2,000 gallons of 100 low-lead fuel. Consideration should be given to relocation of the fueling facility and having sufficient fuel to meet future demands by both piston and turbine aircraft.

UTILITIES

The airport is served by only limited electrical, water, and telephone service to the on-airport residence. This service is not sufficient for expansion of facilities, to provide fire protection, or for improving airfield lighting. Facility planning should include upgrading all primary utilities at the airport including electrical, water, sanitary sewer, and communication.

FENCING

The airport lease boundary is presently equipped with barded wire fencing. Facility planning should include chain link fencing around the airport perimeter for greater access restriction and to prevent inadvertent wildlife access to the airport. Consideration should also be given to fencing-off the aircraft operations area. This will prevent the inadvertent access to the aircraft operations by people or vehicles and provide greater security for based and transient aircraft.

TABLE 3G
Vehicle Parking Requirements
San Manuel Airport

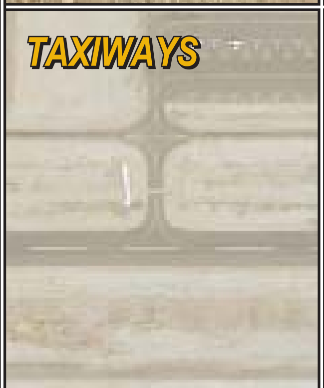
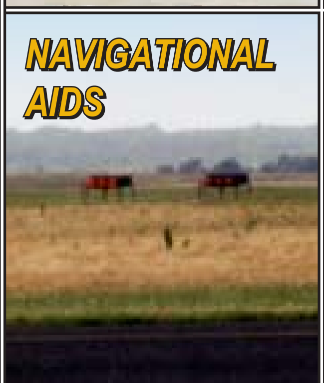
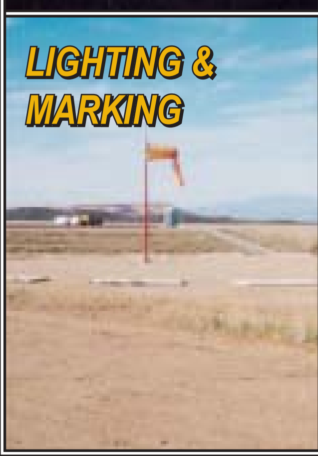
	Future Requirements		
	Short Term	**Intermediate Term**	**Long Term**
Design Hour Passengers	9	16	20
Terminal Vehicle Spaces Needed	12	21	26
Parking Area (s.f.)	4,800	8,400	10,400
General Aviation Spaces Needed	15	20	28
Parking Area (s.f.)	6,000	8,000	11,200
Total Parking Spaces	27	41	54
Total Parking Area (s.f.)	10,800	16,400	21,600

SUMMARY

The intent of this chapter has been to outline the facilities required to meet potential aviation demands projected for San Manuel Airport for the planning horizon. A summary of airfield and landside general aviation facility requirements is presented on **Exhibits 3C** and **3D**.

The following step will be to use this analysis of facility requirements to formulate a direction for development which best meets these projected needs. The remainder of the master plan will be devoted to outlining this direction, its schedule, and its costs.

00MP04-3C-5/9/03

	EXISTING	SHORT TERM	LONG TERM
	**Runway 11-29** 4,214' x 75' 12,000 SWL	**Runway 11-29** 4,214' x 75' 12,000 SWL	**Runway 11-29** 4,800' x 75' Same 30,000 SWL Remove Buildings from OFA
	**Runway 11-29** Partial Parallel Taxiway Four Exits Portions Unpaved	**Runway 11-29** Pave and Widen Parallel	**Runway 11-29** Full Parallel Taxiway Five Exits
	**Runway 11-29** None	**Runway 11-29** AWOS-3	**Runway 11-29** Same One-mile Visibility Minimum Instrument Approach Procedure
	Segmented Circle Windcone Basic Runway Markings **Runway 11-29**	Same **Runway 11-29** Rotating Beacon Lighted Windcone REILs 11 and 29 MIRL MITL PAPI-4 11 and 29	Same **Runway 11-29** Same Nonprecision Markings

San Manuel AIRPORT

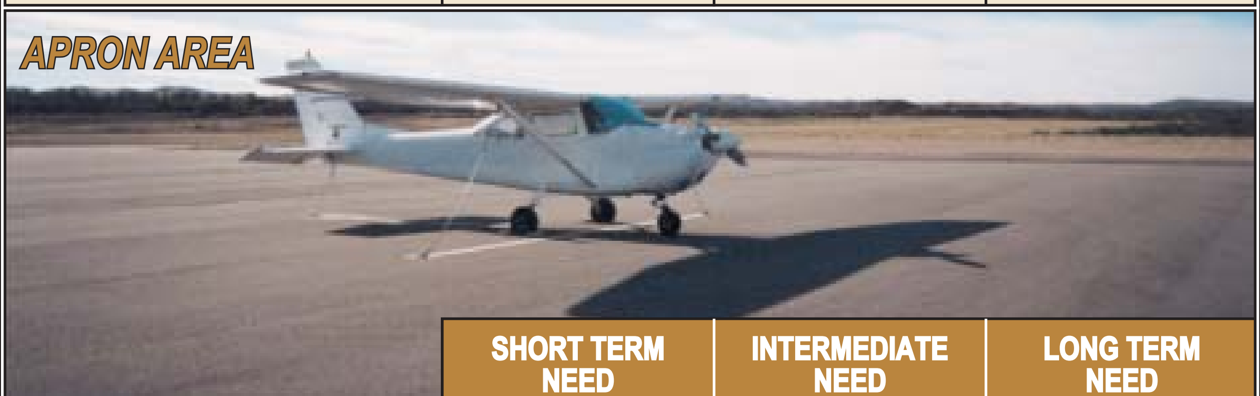
Exhibit 3C
AIRFIELD FACILITY REQUIREMENTS

01MP17-3D-1/25/01

AIRCRAFT STORAGE HANGARS

	SHORT TERM NEED	INTERMEDIATE NEED	LONG TERM NEED
T-hangar Positions	20	22	27
Executive Hangar Positions	6	10	18
Conventional Hangar Positions	6	7	9
T-hangar Area (s.f.)	23,500	26,900	32,800
Executive Hangar Area (s.f.)	10,100	21,800	40,700
Conventional Hangar Area (s.f.)	7,500	9,700	13,400
Maintenance Area (s.f.)	6,200	8,800	13,000
Total Hangar Area (s.f.)	47,300	67,200	99,900

APRON AREA



	SHORT TERM NEED	INTERMEDIATE NEED	LONG TERM NEED
Small Itinerant Positions	6	10	16
Large Itinerant Positions	1	1	2
Locally-Based Aircraft Positions	5	6	8
Total Positions	12	17	26
Total Apron Area (s.y.)	6,400	9,600	14,900

TERMINAL SERVICES & VEHICLE PARKING	SHORT TERM NEED	INTERMEDIATE NEED	LONG TERM NEED
Terminal Building Space (s.f.)	300	600	900
Total Parking Spaces	27	41	54
Total Parking Area (s.f.)	10,900	16,300	21,400

San Manuel AIRPORT

Exhibit 3D
LANDSIDE FACILITY REQUIREMENTS

Chapter Four

AIRPORT DEVELOPMENT ALTERNATIVES

Chapter Four

Airport Development Alternatives

Prior to defining the development program for San Manuel 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 that are needed to accommodate projected demand and meet the program requirements as defined in Chapter Three, Facility Requirements.

In this chapter, a series of airport development scenarios are considered for the airport. In each of these scenarios, different physical facility layouts are presented for the purposes of evaluation. The ultimate goal is to develop the underlying rationale that supports the final master plan recommendations. Through this process, an evaluation of the highest and best uses of airport property is made while considering local goals, physical constraints, and appropriate federal airport design standards, where appropriate.

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. The master planning process attempts to develop a viable concept for meeting the needs caused by projected demands through the planning period.

The number of potential alternatives that can be considered can be endless. Therefore, some judgment must be applied to identify the alternatives that have the greatest potential for implementation. The alternatives

presented in this chapter have been identified as such.

The alternatives presented in the 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) and Pinal County, the alternatives (or combination thereof) will be refined and modified as necessary to develop the recommended development program. Therefore, the alternatives presented in this chapter can be considered a beginning point in the development of the recommended master plan concept and input will be necessary to define the resultant plan.

While the focus of the analysis summarized in this chapter is identifying future development options for San Manuel Airport, it is also important to consider the impacts of alternatives to developing San Manuel Airport to meet future demands. These include: 1) no future development at the airport (no action alternative); and 2) transferring aviation demand to another airport.

The "no action" alternative essentially considers keeping the airport in its present condition and not providing for any type of improvement to the existing facilities to accommodate future demand. The primary results of this alternative would be the inability of the airport to satisfy the projected aviation demands of the airport service area and derive additional revenues through the development of viable parcels of land.

The airport's aviation forecasts projected future growth in based aircraft and aircraft using San Manuel Airport. The analysis of facility requirements indicated a potential need for a lengthened runway, lengthened and widened parallel taxiway, an instrument approach procedure, airfield lighting, expanded fuel storage, and expanded hangar facilities. Without these improvements to the airport facilities, regular and potential users of the airport will be constrained from taking maximum advantage of the airport's air transportation capabilities. Pinal County would also not be able to accrue new revenues from the development of new facilities which can support the operational costs of the airport.

Not improving San Manuel Airport to meet existing and future needs is also inconsistent with the *Arizona State Aviation System Plan* (SANS). San Manuel is classified as a secondary airport in the SANS. This classification denotes the importance of San Manuel Airport to the state airport system. The effectiveness of the state airport system can only be enhanced if San Manuel Airport fully meets the needs of its users and state development standards.

The unavoidable consequences of the "no action" alternative would involve the airport's inability to attract new users, especially those businesses and industries seeking locations with adequate and convenient aviation facilities. Without regular maintenance and additional improvements, potential users and business for the local area could be lost. To propose no further development at the airport would be inconsistent with local community goals to expand the economic development in Pinal County. Corporate aviation plays a major role in the transportation of business leaders. Thus, an airport's facilities are often the first impression many corporate officials will have of the community. If the airport does not have the capability to meet hangar, apron, or airfield needs of potential users, the airport's capabilities to accommodate businesses that rely on air transportation will be diminished. As detailed in Chapter Two, Aviation Demand Forecasts, corporate aviation is becoming an increasingly larger portion of total general aviation activity regionally, nationally, and at San Manuel Airport.

Transferring aviation services to another airport essentially considers limiting development at San Manuel Airport and relying on other airports to serve aviation demand for the local area. A review of regional airports indicates that there is only one public use airport within 30 nautical miles of San Manuel Airport: Kearny Airport. Kearny Airport provides a paved runway. With a runway length of only 3,400 feet, Kearny Airport cannot serve the mix of aircraft that can use the 4,214 feet of runway length available at San Manuel Airport. Considering the current capability of these airports, neither of these airports is presently configured to serve the existing mix of aircraft serving San Manuel Airport without significant investments.

Other public use general aviation airports are more than 30 nautical miles from San Manuel Airport. Marana Northwest Regional Airport is the closest and is 32 nautical miles west. Tucson International Airport and Ryan Airfield serve the Tucson metropolitan area and are located 35 nautical miles and 40 nautical miles southwest, respectively. Pinal Airpark Airport is located 35 nautical miles west. While each of these airports has comparable or superior airfield facilities and could theoretically accommodate the demand from San Manuel Airport, each of these airports has a role to fill in the regional and national aviation system. Accommodating demand from San Manuel Airport could potentially reduce the long term ability of these airports to meet their future demand levels.

Additionally, each of these airports is a considerable distance from the primary communities that San Manuel Airport serves (Oracle, Mammoth, San Manuel). These airports would not be in a good position to serve these communities due to the extended drive times from these airports to the communities served by San Manuel Airport.

As new industries in the community begin to emerge and existing businesses expand, there will be a need for a highly functional airport. This is demonstrated by the existing corporate users of San Manuel Airport. General aviation plays an important role in the way companies conduct their businesses. San Manuel Airport is expected to contribute to economic development of the area by serving the general aviation needs of southeastern Pinal County, northeastern Pima County, southwestern Graham County, and northwestern Cochise County.

As detailed in Chapter Two, San Manuel Airport is used by a number of governmental agencies as well. Considering the existing private, corporate, and governmental users that rely on San Manuel Airport, the airport cannot be easily replaced by another airport and must be improved for the betterment of its existing and future users.

AIRPORT DEVELOPMENT OBJECTIVES

It is the overall objective of this effort to produce a balanced airside and landside complex to serve forecast aviation demands. However, before defining and evaluating specific alternatives, airport development objectives should be considered. As owner and operator, Pinal County provides the overall guidance for the operation and development of San Manuel Airport. It is of primary concern that the airport is marketed, developed, and operated for the betterment of the community and its users. With this in mind, the following development objectives have been defined for this planning effort:

- Develop a safe, attractive, and efficient aviation facility in accordance with applicable federal, state, and local regulations.
- Identify facilities to efficiently serve general aviation users.
- Identify the necessary improvements that will provide sufficient airside and landside capacity to accommodate the long term planning horizon level of demand of the area.
- Maintain and operate the airport in compliance with applicable environmental regulations, standards, and guidelines.

The remainder of this chapter will describe various development alternatives for the airside and landside facilities. Within each of these components, specific facilities are required or desired. Although each component is treated separately, planning must integrate the individual requirements so that they complement one another.

Exhibit 4A summarizes the primary planning issues for this analysis. These issues are the results of analyses conducted previously in Chapter Two, Aviation Demand Forecasts, and Chapter Three, Aviation Facility Requirements. These issues have been incorporated into a series of development alternatives. The following describes in detail the specific requirements considered in the development of the alternatives.

AIRFIELD ALTERNATIVES

Airfield facilities are, by nature, the focal point of the airport complex.

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AIRFIELD CONSIDERATIONS

- Conform to ARC B-II Design Requirements
  - Remove buildings within Object Free Area (OFA), Obstacle Free Zone (OFZ), and F.A.R. Part 77 primary surface
- Provide an ultimate runway length of 4,800'
- Provide for a full-length parallel taxiway
- Provide for holding aprons at each runway end
- Provide for GPS approach to Runway 29
- Provide location for the development of an automated weather observation system (AWOS)

LANDSIDE CONSIDERATIONS

- Provide areas for new storage hangar development
- Provide an area for commercial general aviation development
- Provide for the relocation of hangars which are within the OFA, OFZ, and primary surface
- Provide an area for the development of a public terminal building
- Provide location for an aircraft wash rack
- Provide for expanded fuel storage, consider self-service fueling
- Provide for a helipad

San Manuel AIRPORT

Exhibit 4A
ALTERNATIVE
DEVELOPMENT CONSIDERATIONS

Because of their primary role and the fact that they physically dominate airport land use, airfield facility needs are often the most critical factor in the determination of viable airport development alternatives. In particular, the runway system requires the greatest commitment of land area and often imparts the greatest influence of the identification and development of other airport facilities. Furthermore, aircraft operations dictate the FAA and state design criteria that must be considered when looking at airfield improvements. These criteria, depending upon the areas around the airport, can often have a significant impact on the viability of various alternatives designed to meet airfield needs.

While not an obligated federal airport, the Arizona Department of Transportation (ADOT), Aeronautics Division requires that San Manuel Airport be built to Federal Aviation Administration (FAA) design standards. As mentioned previously in Chapter Three, the FAA bases the design of airfield facilities, in part, on the physical and operational characteristics of aircraft using the airport. The FAA utilizes the Airport Reference Code (ARC) system to relate airport design requirements to the physical (wingspan) and operational (approach speed) characteristics of the largest and fastest aircraft conducting 500 or more operations annually at the airport. While this can at times be represented by one specific make and model of aircraft, most often the airport's ARC is represented by several different aircraft which collectively conduct more than 500 annual operations at the airport.

The FAA uses the 500 annual operations threshold when evaluating the need to develop and/or upgrade airport facilities to ensure that an airport is cost-effectively constructed to meet the needs of those aircraft that are using, or have the potential to use, the airport on a regular basis. Typically, aircraft operate at an airport that are outside the ARC designated for the airport. This is due to these aircraft not meeting the 500 annual operations threshold.

At San Manuel Airport, based aircraft fall within ARC A-I and B-I. However, the mix of transient aircraft is more diverse and includes aircraft in ARC B-II. Aircraft in ARC B-II are the most demanding aircraft to operate at the airport (due to their longer wing spans); however, these aircraft currently conduct less than 500 annual operations at the airport. Therefore, at this time, the most demanding approach category for the airport is Approach Category B. The wingspans of the most demanding aircraft fall within Airplane Design Group (ADG) I.

The previous master plan called for the airport to be designed and constructed to ARC B-II design standards. This has been confirmed in this master plan. This master plan anticipates that aircraft with ARC B-II will conduct more than 500 annual operations at the airport within the planning period of this master plan. Therefore, the long term design requirement for San Manuel Airport is ARC B-II.

Table 4A compares existing (ARC B-I) and future (ARC B-II) design requirements. As shown in the table, applying ARC B-II design requirements increases both the pavement and safety area requirements. For example, the minimum pavement width increases from 60 feet to 75 feet and the distance that runway safety area (RSA) and object free area (OFA) extend beyond the runway end increases from 240 feet to 300 feet. The airside alternative analysis to follow examines the options available to meeting ARC B-II design requirements.

TABLE 4A
Runway Design Standards

Airport Reference Code Approach Visibility Minimums	B-I[1] One Mile	B-II One Mile
Runway		
Width	60	75
Runway Safety Area (RSA)		
Width (centered on runway centerline)	120	150
Length Beyond Runway End	240	300
Object Free Area (OFA)		
Width	250	500
Length Beyond Runway End	240	300
Obstacle Free Zone (OFZ)		
Width (centered on runway centerline)	250	400
Length Beyond Runway End	200	200
Runway Centerline to:		
Parallel Taxiway Centerline	225	240
Runway Protection Zones (RPZ)		
Inner Width	250	500
Outer Width	450	700
Length	1,000	1,000
FAR Part 77 Primary Surface		
Width (centered on runway centerline)	250	500
Length Beyond Runway End	200	200

[1] Small aircraft exclusively
Source: FAA Airport Design Software Version 4.2D, FAR Part 77

Of concern with meeting ARC B-II design requirements is the number of objects within the ARC B-II OFA. The FAA defines the OFA as "a two dimensional ground area surrounding runways, taxiways, and taxilanes which is clear of objects except for objects whose location is fixed by function (i.e. airfield lighting)." The limits of the OFA are shown by a pink solid line on **Exhibit 4B**. As shown on the exhibit, there are approximately four permanent facilities within the ARC B-II OFA. This includes a fuel pump, seven-unit T-hangar facility, public restroom facilities, and residence. To fully comply with ARC B-II OFA standards, these facilities should be removed and/or relocated. The relocation of the seven-unit T-hangar facility is considered in the landside alternatives, although the feasibility of doing so is not readily known. If the facilities cannot be efficiently relocated,

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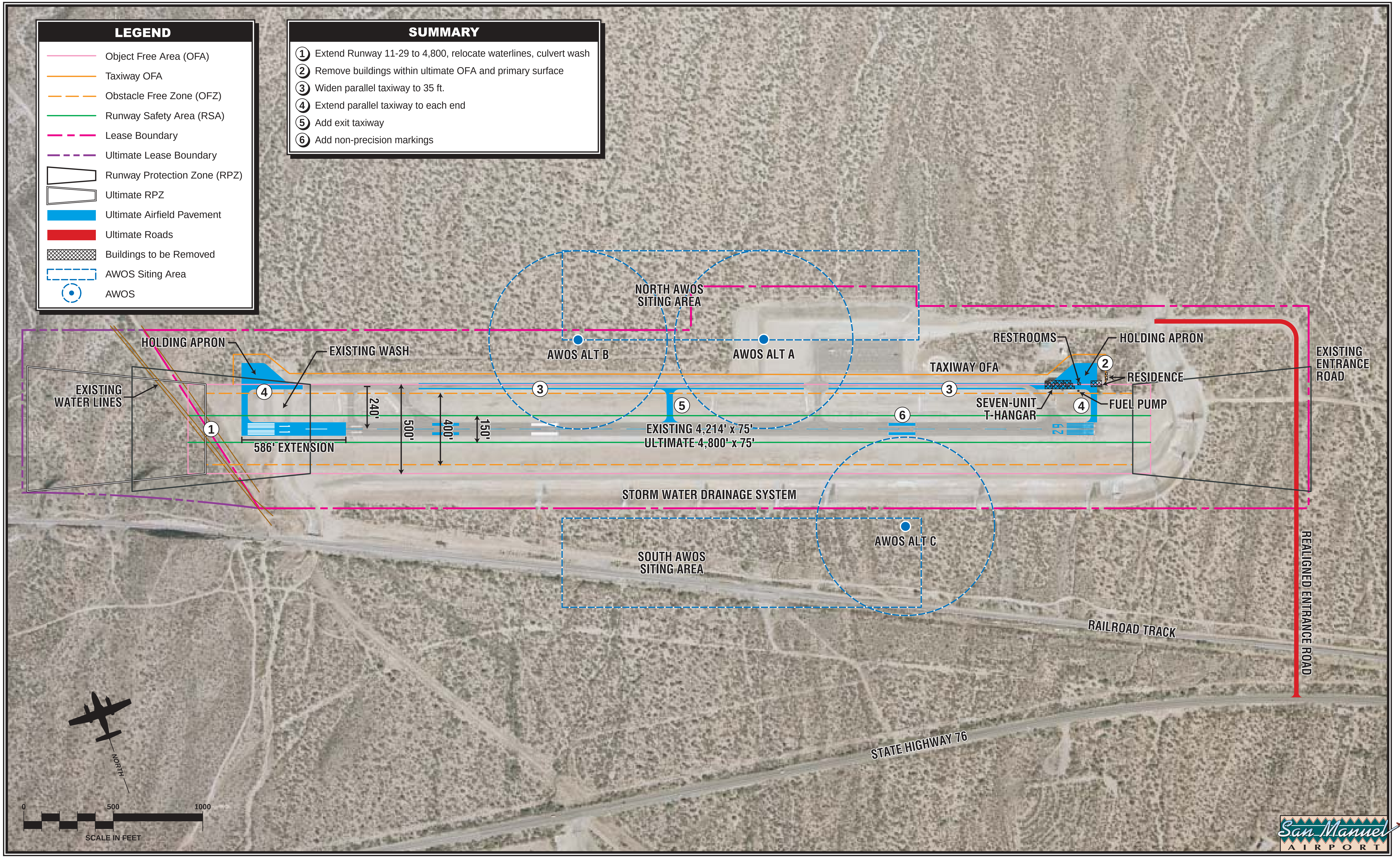

Exhibit 4B
AIRFIELD ALTERNATIVES

planning would need to consider replacement facilities.

The requirements of the obstacle free zone (OFZ) must also be considered. The OFZ is a defined volume of airspace 400 feet wide, centered on the runway centerline, extending 200 feet beyond each runway end. FAA standards preclude any permanent development or taxiways within the OFZ. Objects which may only temporarily be located within the OFZ are also prohibited (e.g. a moving vehicle or parked aircraft). The OFZ is intended to protect an area for the operation of landing or departing aircraft and is shown by the orange dashed line on **Exhibit 4B**. The taxiway hold lines at the airport are placed to ensure aircraft hold outside the limits of the OFZ. The hold lines are presently marked 125 feet from the runway centerline. In the future, the hold lines would need to be situated 200 feet from the runway centerline to meet OFZ standards.

Presently, the area south of the seven-unit T-hangar facility is used for aircraft parking, aircraft refueling, and getting aircraft into and out of the T-hangars. Since the northern limits of the ultimate OFZ are only approximately 24 feet from the seven-unit T-hangar facility and 10 feet from the fuel pump, aircraft using these facilities would be within the limits of the ultimate OFZ. Therefore, the airport does not fully comply with OFZ standards. To ensure that the OFZ remains clear, the seven-unit T-hangar facility and fuel pump should be removed and/or relocated.

Obstacle clearance is further governed by Federal Aviation Regulation (FAR) Part 77, *Objects Affecting Navigable Airspace.* FAR Part 77 establishes the primary surface and transitional surface. The primary surface for San Manuel Airport would extend 250 feet either side of the runway centerline. Similar to the OFA and OFZ, the primary surface is to be clear of any objects other than objects that are fixed by function (e.g., runway edge lighting, approach lighting systems). The transitional surface extends upward and outward at a ratio of 7:1. The transitional surface begins at the edge of the primary surface. The same objects penetrating the ARC B-II OFA also penetrate the ultimate primary surface and transitional surface, and should ultimately be removed and/or relocated.

Compliance with OFZ standards is a requirement for the establishment of an instrument approach procedure. An instrument approach procedure is an important component of the overall safety and reliability of San Manuel Airport. Presently, San Manuel Airport does not have an established approach procedure. Without an approach procedure, the airport is effectively closed to arrivals during weather conditions when visual flight can no longer be conducted. With the need for the airport to support local economic growth, it is important that the airport is accessible during all weather conditions and that the amount of time the airport is inaccessible due to weather conditions is reduced. An instrument approach procedure is a tool that increases the accessibility of the airport by providing procedures for pilots to locate the airport during poor weather conditions. The State Transportation Board Policy for the Aeronautics Division provides for the State Planning Standards for Airports in Arizona. These policies and standards call for the establishment of an instrument approach procedure at airports serving aircraft within ADG II, as planned for San Manuel Airport. The *Navigational Aids and Aviation Services Special Study* also called for the establishment of an instrument approach procedure at San Manuel Airport. Besides complying with OFZ standards, to qualify for a nonprecision instrument approach procedure, the Runway 11-29 markings would need to be upgraded from the existing basic/visual markings to nonprecision markings.

The parallel taxiway should ultimately be extended to each runway end and equipped with holding aprons. Appendix 16 of FAA Advisory Circular (AC) 150/5300-13 recommends a full-length parallel taxiway for airports served with a nonprecision instrument approach procedure. Furthermore, the State Planning Standards for Airports in Arizona recommends a parallel taxiway for ADG II airports. The parallel taxiway is mandatory when annual operations levels exceed 20,000. The airport is projected to exceed this level in the Long Term Planning Horizon.

Holding aprons provide an area at the runway end for aircraft to prepare for departure and/or bypass other aircraft which are ready for departure. When a holding apron cannot be developed, a bypass taxiway should be planned. This is a taxiway that lies parallel to the runway end taxiway and allows aircraft ready for departure to bypass aircraft that may be holding at the runway end. The location of holding aprons at San Manuel Airport are shown on **Exhibit 4B**.

Also shown on **Exhibit 4B**, the parallel taxiway extends almost the entire length of Runway 11-29. The parallel taxiway ends approximately 400 feet short of the Runway 29 end to avoid the existing hangar facilities, fuel pump, restrooms, and residence described previously. The taxiway extending to the Runway 29 end has been configured to ensure that aircraft remain clear of these existing facilities. Extending the parallel taxiway to the existing Runway 29 end also requires the relocation of the seven-unit T-hangar, fuel pump, restroom facilities, and residence.

Exhibit 4B depicts the development of a midfield exit taxiway. This taxiway would be 2,400 feet from each runway end and allow a greater number of landing aircraft the ability to exit the runway quicker by not having to taxi to the runway end to exit. **Exhibit 4B** also depicts the widening of the parallel taxiway to 35 feet to conform with ARC B-II width standards.

The runway length analysis in Chapter Three indicated a need for a longer runway for the projected mix of aircraft using San Manuel Airport. Presently, Runway 11-29 is 4,214 feet long. The analysis in Chapter Three indicates that a runway length of 4,800 feet is needed to serve the mix of aircraft expected to use the airport through the planning period.

Three alternatives can be considered to provide additional runway length: 1) place the entire extension on the east (Runway 29) end; 2) place the entire extension on the west (Runway 11) end; or 3) divide the extension between each runway end. The distance the runway can be extended at either end is dependent upon the ability to meet safety area requirements at that end of the runway. In other words, the distance the runway can be extended is dependant upon the extent that a full RSA and OFA can be provided at the far end of the extension.

An extension to the Runway 29 end is limited by the location of a stormwater drainage system. As shown on **Exhibit 4B**, the existing OFA already extends to the limits of the stormwater drainage system. Therefore, the Runway 29 end cannot be extended any further without extending the OFA further into the stormwater drainage system. It is unlikely, then, that the Runway 29 end can be further extended to the east. This leaves the only viable extension option as extending the runway entirely to the west.

Exhibit 4B depicts a 586-foot extension of Runway 11-29 to the west for an ultimate length of 4,800 feet. An extension to the west was considered during the development of Runway 11-29 as the parallel taxiway presently extends beyond the Runway 11 end. Extending Runway 11-29 to the west would impact an existing wash and water lines. The wash would need to be placed in a culvert to direct the stormwater below the runway. The existing water lines would need to be relocated outside the limits of the OFA and RSA. This would also ensure that the water lines could be serviced without affecting airport operations.

Extending Runway 11-29 586 feet to the west would cause the Runway 11 RPZ to extend beyond the existing lease boundary. **Exhibit 4B** depicts the additional lease area that would need to be obtained to fully encompass the Runway 11 RPZ.

The facility requirements analysis determined that an automated weather observation system (AWOS) is needed at San Manuel Airport to provide important weather details to pilots, especially transient and charter aircraft operators (charter companies cannot operate to the airport without current weather data). An AWOS includes various sensors for recording cloud height, visibility, wind, temperature, dew point, and precipitation. The *Navigational Aids and Aviation Services Special Study* also called for installing an AWOS at San Manuel Airport.

FAA Order 6560.20A, *Siting Criteria For Automated Weather Observing Systems* (AWOS) provides AWOS siting requirements. While each AWOS sensor has specific siting requirements, all AWOS sensors should be located together and outside the runway and taxiway object free areas. Generally, AWOS sensors are best placed between 1,000 feet and 3,000 feet from the primary runway threshold and between 500 feet and 1,000 feet from the runway centerline. If the elevation of the sensor site is above or below the runway elevation, the lateral distance from the runway centerline is adjusted by seven feet for every foot of elevation difference. The adjustment is negative (i.e., the minimum distance is less than 500 feet) if the sensor site elevation is less than the runway elevation. The adjustment is positive (i.e., the minimum distance is greater than 500 feet) if the sensor site elevation is greater than runway elevation.

Since Runway 29 is being designated for an instrument approach procedure, the AWOS is best placed near the Runway 29 end. The AWOS could be located on either the north or south sides of the runway. **Exhibit 4B** depicts the boundaries of an AWOS siting area on each side of Runway 11-29. As shown on the exhibit, following the general siting criteria above, the south siting area is completely outside the existing airport lease boundary. A portion of the north siting area extends over the existing lease area.

Generally, an area within a 500-foot radius of the AWOS is protected from development that could interfere with the sensing equipment. This protection area is shown on the exhibit and used to determine the potential location for the AWOS.

Exhibit 4B depicts three alternative siting locations. Alternative A locates a potential AWOS system on existing leased property west of the primary apron area. This location falls midway in the siting area. Since this location has been graded to a similar elevation of the runway, only small lateral adjustments to the sensors would be needed. The primary disadvantage of this site is that it is located within one of the primary developable parcels on the airport. The landside alternatives to follow examine developing this area to meet future hangar and/or apron demands. Placing the AWOS in this area could limit landside development.

Alternative B places a potential AWOS just inside the northern airport boundary. This area is generally below the runway elevation; therefore, a lateral adjustment towards the runway may be necessary. While the sensory equipment may be located on leased property, the protection area would extend outside the existing leased boundary. To fully protect the AWOS protection area, additional lease area may be needed.

Alternative C locates the AWOS in the south siting area, south of the stormwater drainage system. This area is completely outside the existing lease boundary and additional property would need to be leased to install this equipment and provide access to it.

LANDSIDE ALTERNATIVES

The primary landside facilities to be accommodated at the airport include airport-related businesses, public terminal facilities, aircraft storage hangars, and aircraft parking aprons. The interrelationship of these functions is important to defining a long range landside layout for the airport. To a certain extent, landside uses need to be grouped with similar uses or uses that are compatible. Other functions should be separated, or at least have well defined boundaries, for reasons of safety, security, and efficient operation. Finally, each landside use must be planned in conjunction with the airfield, as well as ground access that is suitable to the function. Runway frontage should be reserved for those uses with a high level of airfield interface, or need for exposure. Other uses with lower levels of aircraft movements, or little need for runway exposure, can be planned in more isolated locations. The following briefly describes landside facility requirements.

Fixed Base Operator (FBO): 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 rental and flight training, aircraft charters, aircraft maintenance, line service, and aircraft fueling. Businesses such as these are characterized by high levels of activity with a need for apron space for the storage and circulation of aircraft. In addition, the facilities commonly associated with businesses such as these include large, conventional type hangars which hold several aircraft plus attached office and business space. Utility services are needed for these types of facilities as well as automobile parking areas. The alternatives consider the potential for two to three 10,000 square-foot hangars for future FBO activities. Presently, there are no such facilities available at San Manuel Airport.

Terminal Building: General aviation terminal facilities have several functions including: providing space for passenger waiting, a pilot's lounge, flight planning, concessions, airport management, storage, and various other needs. Utility services are needed for this type of facility as well as automobile parking areas. Terminal buildings are best placed along the apron for ease of access to aircraft. There is no terminal building at San Manuel Airport, although a small building near the fuel pump provides restroom facilities. The State Planning Standards for Airports in Arizona states that, at a minimum, the following terminal services should be provided at an airport: telephone, access to weather data, a waiting area, restroom facilities, portable fire extinguishers, and posted local procedures/emergency procedures. While terminal services can be provided in a separate dedicated building, they can also be incorporated into larger FBO hangars. The alternatives consider a separate dedicated building for this purpose at San Manuel Airport.

Aircraft Storage Hangars: This includes a wide variety of hangar facilities, such as: T-hangars, shade T-hangars, and small conventional hangar designs. The facility needs analysis indicated a need for enclosed T-hangars and executive/individual hangars at the airport. T-hangars are characterized by a series of smaller hangars within a larger contiguous building. Executive/individual hangars are smaller conventional hangars that accommodate one or more small aircraft. Unlike FBO hangars, these hangars are typically smaller, encompassing only approximately 3,600 square feet or less. Since these facilities are utilized only for aircraft storage, they typically have lower levels of activity than hangar facilities associated with FBO operations. Therefore, these facilities can be constructed along taxiways. These facilities do not require a location along runway frontage. Utility services are needed for these types of facilities as well as automobile parking areas.

Fuel Storage and Dispensing: The facility requirements analysis indicated a need for expanded fuel storage at San Manuel Airport. Presently, a single 2,000-gallon above-ground storage tank is used for 100LL fuel storage. Typically, fuel storage totals 10,000 gallons to 12,000 gallons to ensure a full tanker load of fuel (approximately 8,000 gallons) can be delivered. This ensures the most competitive fuel prices. In the future, Jet-A fuel storage may be needed as well.

Besides considering expanded fuel storage, fuel dispensing options must be considered. Presently, fuel is dispensed through a fixed pump located near the Runway 29 end. This is the most cost-effective option of dispensing fuel since mobile fuel trucks are not required to bring the fuel to an aircraft. Fixed dispensing islands also allow for a self-service option, which can allow for after-hours fueling and reduce labor costs. Under this option, pilots could refuel their own aircraft using a credit card. The primary disadvantage of a fixed fuel island is the area that the island occupies and the need to locate the fuel storage tanks in close proximity to the fuel island. Additional aircraft handling is also required to position the aircraft at the fuel island for refueling. With mobile fuel trucks, the fuel storage tanks can be remotely located.

Helipad: A helipad is being considered to provide a marked and segregated landing and takeoff area for helicopters.

Wash Rack: An aircraft wash rack provides a suitable area for the cleaning of an aircraft's exterior. The wash rack provides for the proper disposal of aircraft cleaning fluids. There is no such facility currently available at the airport.

Vehicle Access: For safety and security, vehicle access areas and aircraft movement areas should be segregated. This is particularly important for areas requiring public access, such as FBO facilities. FBO facilities require access from a variety of users (i.e., delivery vehicles, charter passengers, etc.), some which are not familiar with operating at an airport environment. Therefore, these facilities cannot be accessed using a taxiway or crossing an apron area. FAA AC 150/5210-20, *Ground Vehicle Operations on Airports*, states: "The control of vehicular activity on the airside of an airport is of the highest importance." The AC further states: "An airport operator should limit vehicle operations on the movement areas of the airport to only those vehicles necessary to support the operational activity of the airport." For the alternatives analysis, vehicular access to storage hangars will be considered that does not require the aircraft owner to cross an apron or taxiway area.

Consideration for a new main entrance road should be considered. Presently, access to the airport is via a 1.3 mile unpaved (yet graded) road from Highway 76. This roadway is located on BHP Billiton-owned land. While current planning includes paving this road, an alternate connection to Highway 76 should be considered. **Exhibit 4B** depicts a connection with Highway 76 directly south of the airport. As shown on the exhibit, the existing airport road could be extended south to Highway 76. This roadway would extend approxi-mately 1,600 feet south of the existing entrance road intersection at the airport lease boundary. Of concern is the need to cross the BHP Billiton-owned railroad track. This track is in limited use (approximately one train per day). Safety barriers may need to be considered.

Finally, consideration must be given to providing for the relocation of the seven-unit T-hangar facility that is within the limits of the ARC B-II OFA. The other facilities within the OFA are considered to be removed and not replaced on airport property as they are not an aviation-related use (residence) or of little value due to their size, age, and condition.

To a certain extent, landside uses should be grouped with similar uses or uses that are compatible. Other functions should be separated, or at least have well defined boundaries, for reasons of safety, security, and efficient operation. Finally, each landside use must be planned in conjunction with the airfield, as well as ground access that is suitable to the function.

The landside alternatives are limited to the area north of Runway 5-23. This area is within the existing lease boundaries of the airport and has been initially developed to accommodate landside development needs. The area south of Runway 11-29 is outside the existing lease boundary. Airfield access to this area is complicated by the location of the stormwater drainage system. Airfield access would require bridging or constructing a culvert to allow for continued stormwater drainage. Impacts on stormwater flows would need to be considered prior to developing the area south of the runway. Furthermore, the area south of Runway 11-29 is not expected to be needed to accommodate projected landside growth in the planning period of this master plan. As the landside alternatives to follow will show, ample area exists north of Runway 11-29 to accommodate projected long term growth for San Manuel Airport.

The existing terrain features should be considered in the long term landside layout. The terrain north of Runway 11-29 is a lower elevation from the runway, generally declining towards the airport lease boundary. The area surrounding the main apron area has been filled and graded; however, additional fill to the east may be needed to accommodate future development in this area.

LANDSIDE ALTERNATIVE A

Landside Alternative A is shown on **Exhibit 4C**. The intent of this alternative is to segregate aircraft storage, commercial general aviation services, and transient uses at the airport, to the extent practicable. In this alternative, a public terminal building is constructed on the existing

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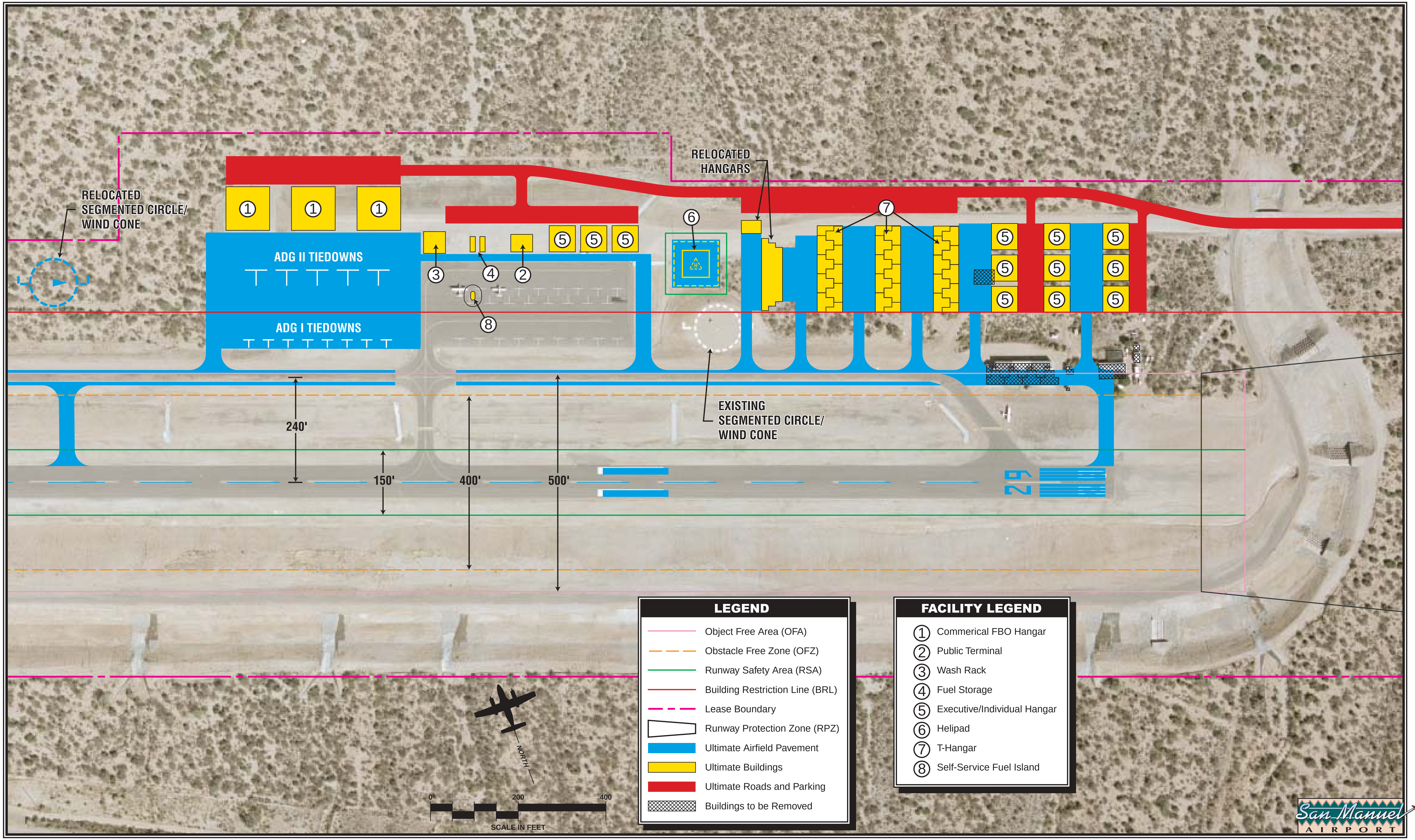

Exhibit 4C
LANDSIDE ALTERNATIVE A

apron area. Two 10,000-gallon to 12,000-gallon fuel storage tanks are located west of the terminal. A fixed fuel island is located on the apron near the terminal building for ease of access by the fuel provider. This fuel island could be configured for self-service fueling. The fuel island is connected to the fuel storage tanks through underground piping. An aircraft wash rack is located at the west end of the existing apron area. The east end of the apron is reserved for small conventional hangar development. These hangars could either serve commercial FBO services or for aircraft storage. A new exit taxiway is shown on the east end of the apron.

The existing apron is also expanded approximately 20 feet north. This ensures that any future development on the north side of the apron is located at a sufficient lateral distance from the existing marked taxilane. Vehicle access and parking is available from an extended airport entrance road that is moved along the northern lease boundary.

Large commercial FBO facilities are reserved for the area west of the existing paved apron area. This apron area is configured for both small aircraft tiedowns (ADG I tiedowns) and large aircraft tiedowns (ADG II tiedowns). The large FBO hangars are developed on the north side of the apron with adjacent automobile parking.

To accommodate a proposed helipad and T-hangar development, the existing segmented circle and lighted wind cone are relocated to the west. The helipad is developed east of the existing apron area, 500 feet from the runway centerline consistent with standards set forth in FAA AC 150/5390-2B, *Heliport Design*. The helipad is designed according to the standards in the AC to accommodate helicopters with rotor diameters to 50 feet.

The first row of T-hangars is reserved for the relocated seven-unit T-hangar facility and existing individual hangar located north of the runway. To the east of the relocated T-hangars are three rows of eight-unit nested T-hangars. Automobile parking for the hangars is reserved along the airport entrance road. At the east end of the runway, area is reserved for the development of nine executive hangars. Each hangar is served by dedicated automobile parking areas.

This alternative does not allow for the development of a holding apron at the Runway 29 end as previously shown on **Exhibit 4A**. The holding apron would interfere with taxiway development for the executive hangars.

Advantages: This alternative exceeds projected long term landside facility needs. This alternative provides for a wide variety of hangar types and uses. This alternative provides for the relocation of existing facilities that are located within the ARC B-II OFA. This alternative allows for self-service fueling.

Disadvantages: This alternative requires significant new taxiway development for T-hangar and executive hangar development. Large amounts of fill may be necessary to develop the T-hangar and executive hangars.

Taxiway development is required prior to the relocation of the existing seven-unit T-hangar. A holding apron is not provided at the Runway 29 end.

LANDSIDE ALTERNATIVE B

Landside Alternative B is shown on **Exhibit 4D**. This alternative attempts to maximize the existing graded area around the main apron for near-term development needs. These needs could include the relocation of the seven-unit T-hangar, development of a public terminal building, wash rack, T-hangars, and an FBO hangar. As shown on the exhibit, the existing seven-unit T-hangar facility would be relocated to the northern side of the apron. This is consistent with the previous master plan that had planned for T-hangar development along the northern side of the apron. A public terminal building and FBO hangar are developed to the east. The wash rack is developed on the west side of the existing apron.

Fuel storage is located off the apron area to the east. This location is near the entrance road for ease of fuel delivery. Locating the fuel storage off the apron area allows for more hangar development along the apron frontage. However, this option relies on mobile fuel delivery vehicles to get fuel to the aircraft.

Long term FBO hangar development is reserved for an area east of the existing apron. This includes an expanded apron area to serve both large and small aircraft tiedowns. This would eventually require the relocation of the existing segmented circle and wind cone to the west. A helipad is developed to the east. To ensure sufficient area is available on the north side of the existing apron for large FBO hangar development, the access road is developed to the north of the existing airport lease boundary. Additional lease area would be needed to develop the road as shown.

A helipad is developed to the east of the expanded apron area. This requires the relocation of an existing hangar that is moved to the northern edge of the main apron. This location provides maximum segregation from the apron area for helicopter activities.

T-hangar and executive hangar development is reserved for the area west of the existing apron area. This layout accommodates 24 T-hangars and 36,000 square feet of executive hangar area.

Advantages: This alternative exceeds projected long term landside facility needs. This alternative provides for a wide variety of hangar types and uses. This alternative provides for the relocation of existing facilities that are located within the ARC B-II OFA. This alternative maximizes development around the existing apron area and graded area west of this apron area prior to new apron and taxiway development.

Disadvantages: This alternative does not allow for self-service fueling. Additional lease area is needed for the proposed roadway alignment.

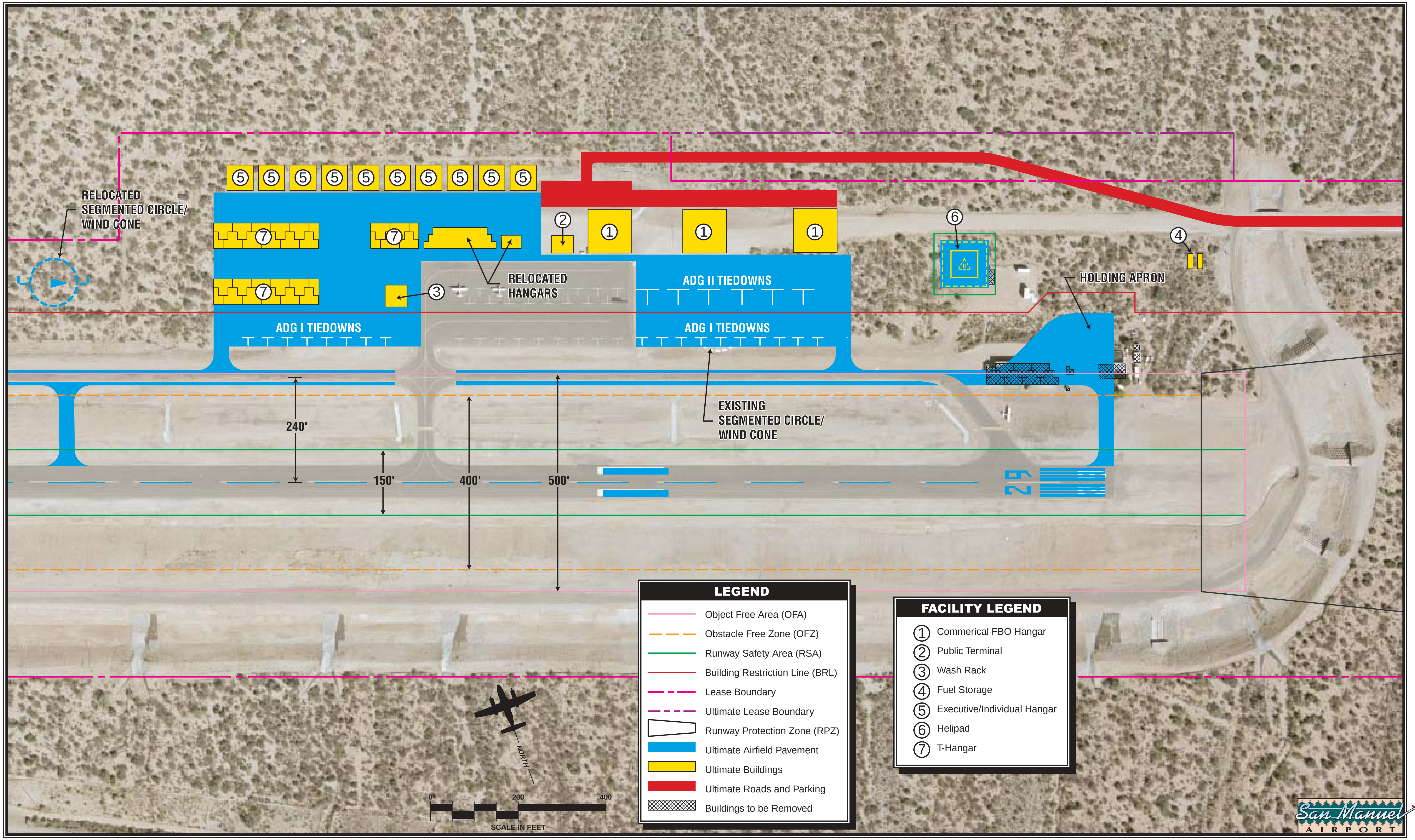

Exhibit 4D
LANDSIDE ALTERNATIVE B

LANDSIDE ALTERNATIVE C

Landside Alternative C is shown on **Exhibit 4E**. Similar to Landside Alternative B, this alternative attempts to maximize development around the existing apron area and utilize the existing graded area for near term development. In this alternative, the seven-unit T-hangar facility is relocated to the west edge of the existing apron area and situated in a north-south alignment. An additional 10-unit nested T-hangar facility could be developed to the west without additional grading or fill. The north portion of the apron is reserved for FBO development, the public terminal, and fuel storage. In this alternative, a fixed fuel island would be located adjacent to the fuel storage tanks, which could be configured for self-service fueling. As needed for demand, the existing apron is expanded to the east to accommodate both small and large aircraft tiedowns. Prior to apron development, the aircraft wash rack could be developed in the graded area currently occupied by the segmented circle and wind cone. The segmented circle and wind cone are relocated to the east.

Executive hangar development is reserved for an area east of the main apron. This configuration may limit the amount of grading and fill necessary to develop taxiway access to the runway, as the taxiway leading to the hangars would be developed to follow the existing grade down to the level where the hangars would be built. The nine executive hangars would be served by automobile parking and access.

Advantages: This alternative exceeds projected long term landside facility needs. This alternative provides for a wide variety of hangar types and uses. This alternative provides for the relocation of existing facilities that are located within the ARC B-II OFA. This alternative allows for self-service fueling.

Disadvantages: A holding apron is not provided at the Runway 29 end.

SUMMARY

The process utilized in assessing the 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.

Upon review of this report by Pinal County and the Planning Advisory Committee, 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 proposed development plan 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 (as all good development plans should) for flexibility in the plan to meet activity growth beyond the 20-year planning period.

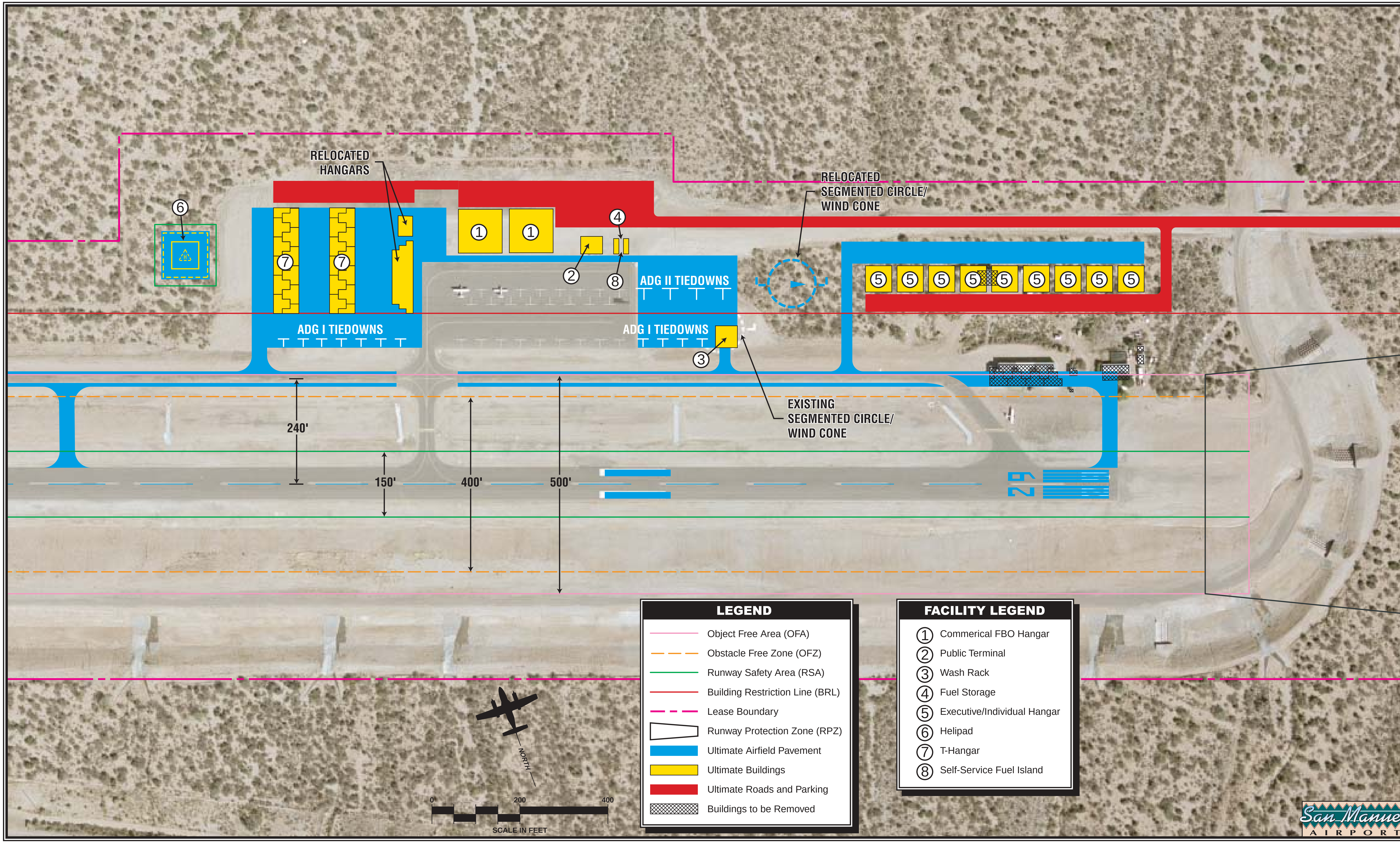

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Exhibit 4E
LANDSIDE ALTERNATIVE C

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

Chapter Five
AIRPORT PLANS

Chapter Five

Airport Plans

The planning process for the San Manuel Airport Master Plan has included several analytic efforts in the previous chapters intended to project potential aviation demand, establish airside and landside facility needs, and evaluate options for the improving the airport to meet those airside and landside facility needs. The planning process, thus far, has included the presentation of two draft phase reports (representing the first four chapters of the master plan) to the planning advisory committee (PAC) and Pinal County. A plan for the use of San Manuel Airport has evolved considering their input. The purpose of this chapter is to describe in narrative and graphic form, the plan for the future use of San Manuel Airport.

AIRFIELD PLAN

The airfield plan for San Manuel Airport focuses on meeting Federal Aviation Administration (FAA) design and safety standards, extending Runway 11-29 to the west, establishing instrument approach procedures to each runway end, installing airfield lighting aids, installing an automated weather observation system (AWOS), paving the parallel taxiway, and constructing holding aprons at each runway end. **Exhibit 5A** graphically depicts the proposed airfield improvements. The following text summarizes the elements of the airfield plan.

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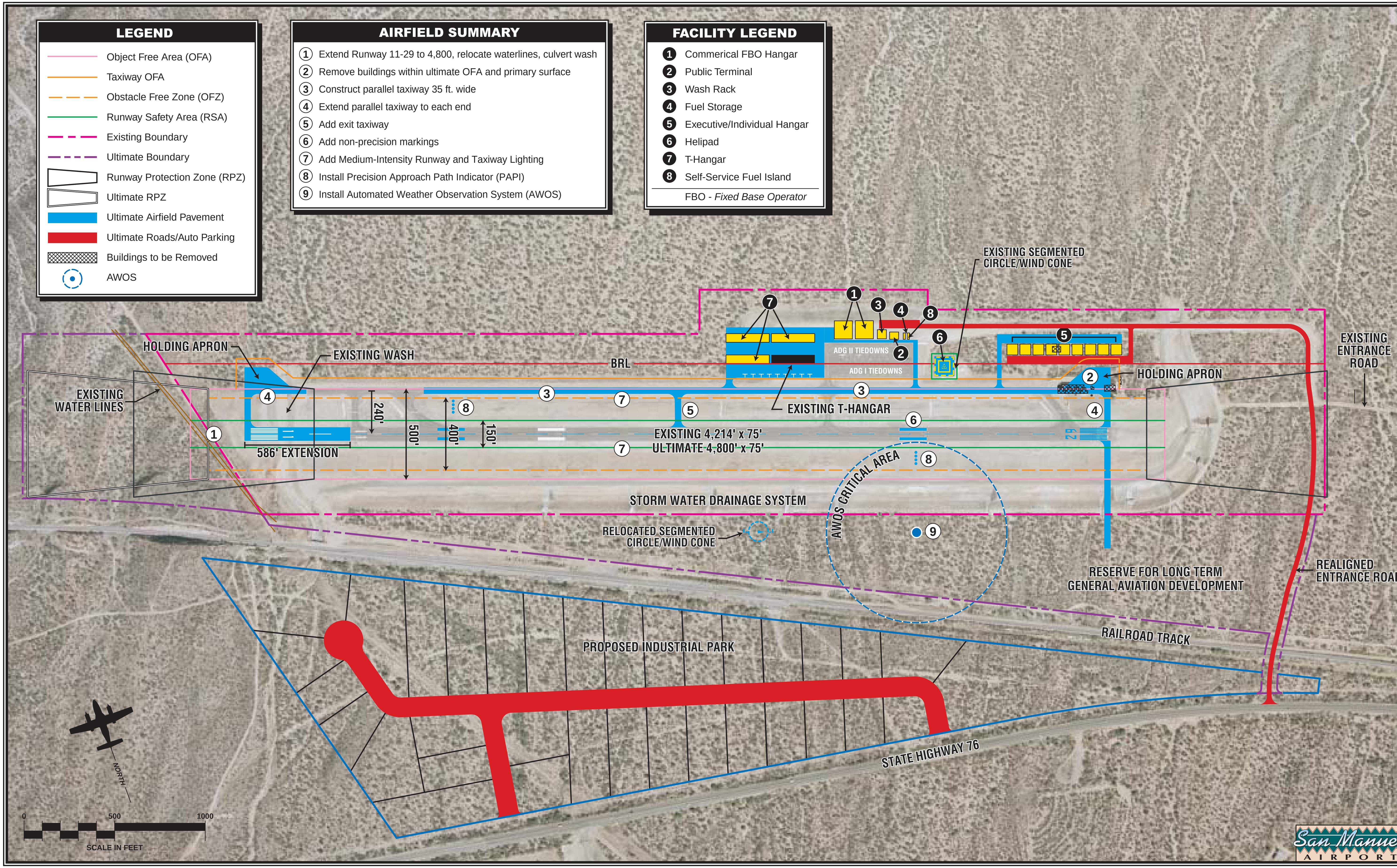

Exhibit 5A
RECOMMENDED MASTER PLAN CONCEPT

AIRFIELD DESIGN STANDARDS

Federal Aviation Administration (FAA) design and safety standards have been applied to the ultimate design and layout of airfield facilities for San Manuel Airport. This is done even though San Manuel Airport is not presently required to meet FAA design standards since it is not included in the federal *National Plan of Integrated Airports* (NPIAS) and as such not a federally-obligated airport. The Arizona Department of Transportation - Aeronautics Divisions (ADOT) has required the use of FAA design standards as a condition of ADOT funding of runway improvements in the past. Pinal County has made application to the FAA for inclusion in the NPIAS. Designing and developing San Manuel Airport to FAA design standards now will ensure compliance with these standards when San Manuel Airport is finally included in the NPIAS.

The FAA has established safety design criteria to define the physical dimensions of runways and taxiways and the imaginary surfaces surrounding them that protect the safe operation of aircraft at the airport. FAA design standards also define the separation criteria for the placement of landside facilities. As discussed previously in Chapter Three, FAA design criteria is a function of the critical design aircraft's (the most demanding aircraft or "family" of aircraft which will conduct 500 or more operations [take-offs and landings] per year at the airport) wingspan and approach speed, and in some cases, the runway approach visibility minimums. The Federal Aviation Administration (FAA) has established the Airport Reference Code (ARC) to relate these factors to airfield design standards.

San Manuel Airport is currently used by a wide range of general aviation aircraft and helicopters. General aviation aircraft include single and multi-engine aircraft within ARCs A-I and B-I, and turboprop and turbojet aircraft within ARCs B-I and B-II.

Based on operational estimates at the airport and information of the based aircraft fleet mix, the critical design aircraft for San Manuel Airport fall within ARC B-I since aircraft within ARC B-II are not expected to currently conduct 500 annual operations at the airport. Therefore, following FAA guidance, aircraft within ARC B-I are considered the current critical design aircraft. This Master Plan has assumed that aircraft operations within ARC B-II will increase in the future following national trends for increased business aircraft use and the expected increase in utilization of San Manuel Airport as improvements to the airside and landside facilities are made over time. Therefore, aircraft within ARC B-II are projected to comprise the critical design aircraft in the future. Thus, long term facility planning for San Manuel Airport should include considering ARC B-II design requirements in the placement of all airport facilities.

Table 5A summarizes ARC B-II airfield safety and facility dimensions for San Manuel Airport. These standards were considered in the planned improvements of the existing airport site to be discussed in greater detail later within this chapter.

TABLE 5A Planned Airfield Safety and Facility Dimensions (in feet)	
Airport Reference Code (ARC)	B-II
Approach Visibility Minimums	One-Mile
Runway	
Width	75
Length	4,800
Runway Safety Area (RSA)	
Width	150
Length Beyond Runway End	300
Object Free Area (OFA)	
Width	500
Length Beyond Runway End	300
Obstacle Free Zone (OFZ)	
Width	400
Length Beyond Runway End	200
Runway Centerline To:	
Hold Line	200
Parallel Taxiway Centerline	240
Edge of Aircraft Parking	250
Runway Protection Zone (RPZ)	
Inner Width	500
Outer Width	700
Length	1,000
Approach Obstacle Clearance	34:1
Taxiways	
Width	35
Safety Area Width	79
Object Free Area Width	131
Taxiway Centerline To:	
Parallel Taxiway/Taxilane	105
Taxilanes	
Taxilane Centerline To:	
Parallel Taxilane Centerline	97
Fixed or Moveable Object	57.5
Taxilane Object Free Area	115
Source: FAA Advisory Circular 150/5300-13, *Airport Design,* Change 7, FAR Part 77, *Objects Affecting Navigable Airspace*, FAA Advisory Circular 150/5340-1F, *Marking Of Paved Areas On Airports*	

AIRFIELD DEVELOPMENT

The airfield plan for San Manuel Airport is shown on **Exhibit 5A**. The airfield plan provides for the extension of Runway 11-29 and Taxiway A 586 feet west for an ultimate length of 4,800 feet. Prior to extending the runway west, a wash must be placed in a culvert and an existing water line and power line relocated. The acquisition of approximately 21.5 acres of Arizona

State Trust land is required to secure the Runway 11 runway protection zone (RPZ) and the necessary property to accommodate the runway safety area (RSA), object free area (OFA), and obstacle free zone (OFZ) behind the Runway 11 end.

A review of ARC B-II OFA standards and Federal Aviation Regulation (FAR) Part 77 primary surface standards for one-mile visibility minimum approaches indicates that these standards are not fully met at the airport. The OFA and primary surface north of the Runway 29 end are obstructed by an existing apron area and four buildings, including an existing hangar facility, fuel pump, restroom facilities, and a residence. The ARC B-II OFZ is obstructed by the apron area.

The airfield plan includes the removal of these obstructing facilities. The residence would not be replaced on the airport. The T-hangars would be replaced with a T-hangar complex adjacent to the main apron. The fuel pump would be replaced with a new facility on the north side of the main apron. The restrooms would be replaced with a new transient general aviation terminal building on the north side of the main apron.

Following the removal of the buildings, Taxiway A, the parallel taxiway, is planned to be extended to the Runway 29 end. This will allow Taxiway A to extend the full length of the runway. The recommended master plan concept includes paving all portions of Taxiway A and adding an additional exit taxiway at approximately midfield. Holding aprons are planned for each runway end to provide and area for pilots to prepare for departure off the active taxiway surface.

The recommended master plan concept includes the extension of all primary utility lines to the north side of the airport. Residential capacity electrical, water, and telephone service is available to the on-airport residence. The recommended master plan concept includes provisions to extend the necessary utilities to support the landside development proposed in this Master Plan. Utilities will be extended to the main apron area as hangar construction is currently taking place in this area and this area is filled and graded for future landside development. This maximizes the investments already made in the main apron area, grading and filling in the terminal area, and the graded access road.

Following the extension of new electrical surface to the airport, all typical airfield lighting aids would be installed. This includes a rotating beacon, medium intensity runway edge lighting (MIRL), medium intensity taxiway edge lighting (MITL), and precision approach path indicators (PAPIs) and runway end identifier lights (REILs) at each runway end. The PAPI will assist pilots in determining the correct descent path to each runway end. The REIL will assist pilots in locating the runway end at night and during low visibility situations.

The recommended master plan concept provides for the development of an instrument approach procedure to each runway end. The instrument approach procedure is primarily designed to assist pilots in locating and landing at the airport during inclement weather conditions. For many transient pilots, instrument approach procedures assist in locating the airport during visual conditions. An instrument approach procedure is also necessary for many business aircraft users. Many company standards and insurance requirements give preference to airports with an instrument approach procedure for landing.

The ADOT *Navigational Aids and Aviation Services Special Study* recommended a GPS approach to Runway 29. This study determined that a GPS approach with a descent altitude of 305 feet above airport touchdown (HAT) and with a one-mile visibility minimum could be achieved at this runway end. An evaluation of the Runway 11 approach was not completed in the study; however, an instrument approach procedure is recommended for this plan.

Nonprecision runway markings are also planned. These are required should a new global positioning system (GPS) instrument approach procedure be established to either runway end as planned.

An automated weather observation system (AWOS) is planned to be installed south of Runway 11-29. The AWOS would provide automated weather observations and reporting.

LANDSIDE PLAN

The landside plan for San Manuel Airport has been devised to safely, securely, and efficiently accommodate potential aviation demand. The landside plans provides for the development of new commercial general aviation facilities, aircraft storage facilities, an aircraft wash rack, public terminal building, fuel farm, helipad, and segregated vehicle access routes. Landside improvements are shown in detail on **Exhibit 5A**.

The landside plan maximizes development in the area north of Runway 11-29, along the recently paved main apron area. T-hangar development is currently underway in this area. Additionally, this apron has capacity to accommodate many years of demand. The ongoing development will require the extension of main utility lines to this area. Once this is accomplished, it will be necessary to maximize development in this area to justify the cost of utility extensions.

Once the main apron area is maximized, development should be directed south of Runway 11-29. The landside plan provides for the acquisition of approximately 45 acres of land south of the existing airport lease boundary to the BHP Billiton mine railroad for future development. Airfield access could be available by developing a taxiway across the storm water drainage channel as shown on **Exhibit 5A**. This land area is also planned to accommodate the AWOS and relocated segmented circle and wind cone, which must be relocated for the development of a helipad.

With the exception of the public terminal building, T-hangars, and aircraft wash rack, most structural improvements are anticipated to be developed privately, as has been done historically in the past at San Manuel Airport. The capital improvement program identifies the infrastructure improvements needed at the airport to support development and the federal and state funding assistance available to Pinal County to make those improvements.

The implementation of the *Aviation and Transportation Security Act* of 2001 will need to be closely monitored throughout the implementation of this Master Plan. This law established the Transportation Security Administration (TSA) to administer transportation security nationally. While the focus of the TSA in 2002 and 2003 was commercial airline checked baggage and carry-on baggage screening, a component of the TSA security plan will be general aviation airports.

As of the May 2003, there was no formal rulemaking for general aviation airport security. However, industry groups had made a series of recommendations to the TSA for general aviation threat assessment and security standards for general aviation airports. This Master Plan has anticipated that greater security scrutiny will be placed on general aviation airports in the future, especially those general aviation airports serving aircraft greater than 12,500 pounds. The TSA has already implemented security provisions for air charter operations with aircraft over 12,500 pounds. For San Manuel Airport, the Master Plan security enhancements focus on limiting vehicle and pedestrian access to the apron areas and aircraft operational areas.

The segregation of vehicle and aircraft operational areas is further supported by new FAA guidance established in June 2002. FAA AC 150/5210-20, *Ground Vehicle Operations on Airports*, states: "The control of vehicular activity on the airside of an airport is of the highest importance". The AC further states: "An airport operator should limit vehicle operations on the movement areas of the airport to only those vehicles necessary to support the operational activity of the airport." The recommended landside plan for San Manuel Airport has been developed to reduce the need for vehicles to cross an apron or taxiway area. Special attention has been given to ensure public access routes to the public terminal building and commercial general aviation facilities. Commercial general aviation facilities or fixed base operator (FBO) facilities are focal points for users who are not familiar with aircraft operations (i.e. delivery vehicles, charter passengers, etc..).

To provide a more secure environment at the airport, the existing barbed-wire fencing extending around the airport boundary is planned to be replaced with six-foot tall chain link fencing. Vehicle parking areas and roadways would be located outside the perimeter fencing.

The internal fencing plan is shown on the Terminal Area Drawing included in Appendix C.

The landside plan provides for the development of two large clear-span hangars along the north side of the main apron. These hangars are reserved for commercial general aviation operators such as aircraft maintenance and repair, flight training, or aircraft charter. These facilities are ideally located on the primary apron area for ease of access and easy identification for transient users. The main airport roadway would extend to the a nearby automobile parking area to serve these hangars.

An aircraft wash rack and public terminal building are designated for a area along the north side of the main apron area. The aircraft wash rack would provide an area for aircraft cleaning and the proper collection of the aircraft cleaning solvents and contaminants removed from the aircraft hull during cleaning. A public terminal building will provide areas for airport administration, commercial general aviation services, and for transient facilities such as restrooms and flight planning.

An above ground fuel farm with storage capacity for both Jet-A and 100LL fuels is also provided along the north side of the main apron area. Locating the fuel storage in this area also allows for the potential for self-service fueling. This allows for lower costs to pilots and after hours fueling capability.

The landside plan includes expanding the apron 20 feet north to allow for proper centerline clearance between the northern apron taxilane and hangar and terminal building development on the north side of the apron. A new taxilane connection along the eastern portion of the main apron is planned for increased circulation to the apron.

The development of four 10-unit T-hangars is planned west of the terminal building and main apron. These facilities will be aligned parallel with the runway. A 10-unit T-hangar facility was to be installed in June 2003. The three additional units will allow for the replacement of existing hangar facilities which must be removed from the OFA and primary surface , as well as provide for long term projected needs. The existing terminal area is graded sufficiently to provide for the development of two 10-unit hangars without additional fill. Prior to developing the two western-most T-hangars, additional fill and grading is needed. As much as 28,000 cubic yards of fill will be needed for the development of these two T-hangars. Aircraft tiedown positions are planned south of the T-hangars.

Individual clear span hangar development is planned east of the main apron area. This area is planned for nine 3,600 square-foot hangars would be served by dedicated automobile parking and access. The hangars would face north. This design allows these hangars to be developed on lower terrain and reduce fill requirements.

A helipad is planned for the area currently occupied by the segmented circle and lighted wind cone, which would be relocated south of Runway 11-29. This helipad would be available for use and would be properly marked and lighted. The helipad would segregate helicopter and fixed wing aircraft operations. This helipad would also be used by U.S. Forest Service helicopters on fire suppression missions. The U.S. Forest Service currently retains fire retardant at the airport for this purpose.

NOISE EXPOSURE ANALYSIS

Aircraft sound emissions are often the most noticeable environmental effect an airport will produce on the surrounding community. If the sound is sufficiently loud or frequent in occurrence it may interfere with various activities or otherwise be considered objectionable.

To determine the noise related impacts that the proposed development could have on the environment surrounding San Manuel Airport, noise exposure patterns were analyzed for both existing airport activity conditions and projected long term activity conditions.

The basic methodology employed to define aircraft noise levels involves the use of a mathematical model for aircraft noise predication. The Yearly Day-Night Average Sound Level (DNL) is used in this study to assess aircraft noise. DNL is the metric currently accepted by the FAA, Environmental Protection Agency (EPA), and Department of Housing and Urban Development (HUD) as an appropriate measure of cumulative noise exposure. These three federal agencies have each identified the 65 DNL noise contour as the threshold of incompatibility, meaning that noise levels below 65 DNL are considered compatible with underlying land uses. Most federally funded airport noise studies use DNL as the primary metric for evaluating noise.

DNL is defined as the average A-weighted sound level as measured in decibels (dB), during a 24-hour period. A 10 dB penalty applies to noise events occurring at night (10:00 p.m. to 7:00 a.m.). DNL is a summation metric which allows objective analysis and can describe noise exposure comprehensively over a large area. The 65 DNL contour has been established as the threshold of incompatibility, meaning that noise levels below 65 DNL are considered compatible with underlying land uses.

Since noise decreases at a constant rate in all directions from a source, points of equal DNL noise levels are routinely indicated by means of a contour line. The various contour lines are then superimposed on a map of the airport and its environs. It is important to recognize that a line drawn on a map does not imply that a particular noise condition exists on one side of the line and not on the other. DNL calculations do not precisely define noise impacts. Nevertheless, DNL contours can be used to: (1) highlight existing or potential incompatibilities between and airport and any surrounding development; (2) assess relative exposure levels; (3) assist in the preparation of airport environs land use plans; and (4) provide guidance in the development of land use control devices, such as zoning ordinances, subdivision regulations and building codes.

The noise contours for San Manuel Airport have been developed from the Integrated Noise Model (INM), Version 6.1. The INM was developed by the Transportation Systems Center of the U.S. Department of Transportation at Cambridge, Massachusetts, and has been specified by the FAA as one of the two models acceptable for federally funded noise analysis.

The INM is a computer model which accounts for each aircraft along flight tracks during an average 24-hour period. These flight tracks are coupled with separate tables contained in the data base of the INM which relate to noise, distances, and engine thrust for each make and model of aircraft type selected.

Computer input files for the noise analysis assumed implementation of the proposed airfield plan. The input files contain operational data, runway utilization, aircraft flight tracks, and fleet mix as projected in the plan. The operational data and aircraft fleet mix are summarized in **Table 5B**.

TABLE 5B
Aircraft Operational Summary

Type of Operation	Percentage of Annual Operations
Single-Engine Piston	91%
Multi-Engine Piston	5%
Turboprop	2%
Business Jet	1%
Helicopter	1%

The aircraft noise contours generated using the aforementioned data for San Manuel Airport are depicted on **Exhibit 5B, Existing Noise Exposure** and **Exhibit 5C, Long Term Noise Exposure**. As shown on both exhibits, the 65 DNL noise contour is expected to remain entirely within the existing airport property line when considering both existing and forecast activity at the airport and do not impact any incompatible development.

ENVIRONMENTAL EVALUATION

The protection and preservation of the local environment are essential concerns in the master planning process. Now that a program for the use and development of San Manuel Airport has been finalized, it is necessary to review environmental issues to ensure that the program can be implemented in compliance with applicable environmental regulations, standards, and guidelines.

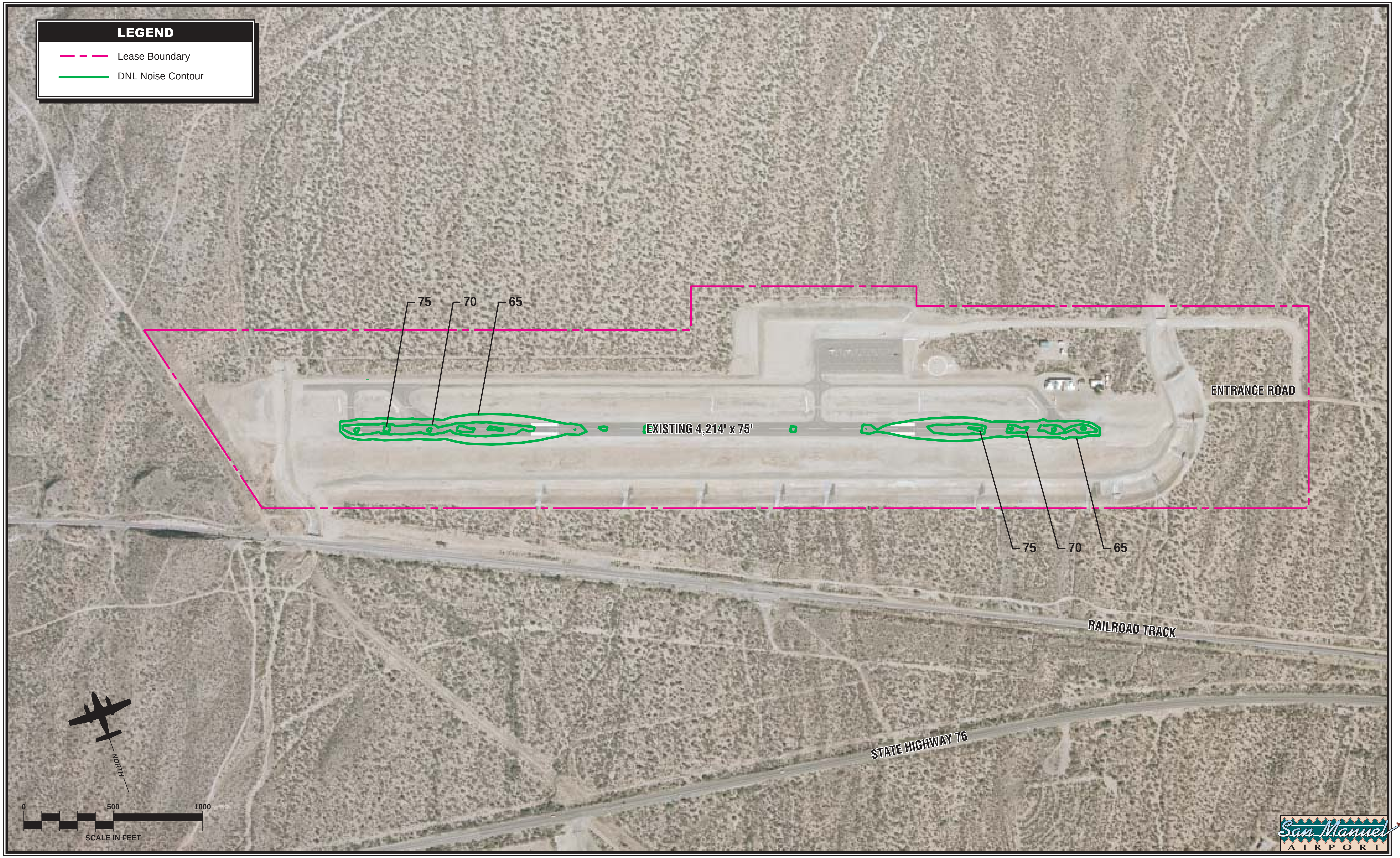

Exhibit 5B
EXISTING (2003) AIRCRAFT NOISE EXPOSURE

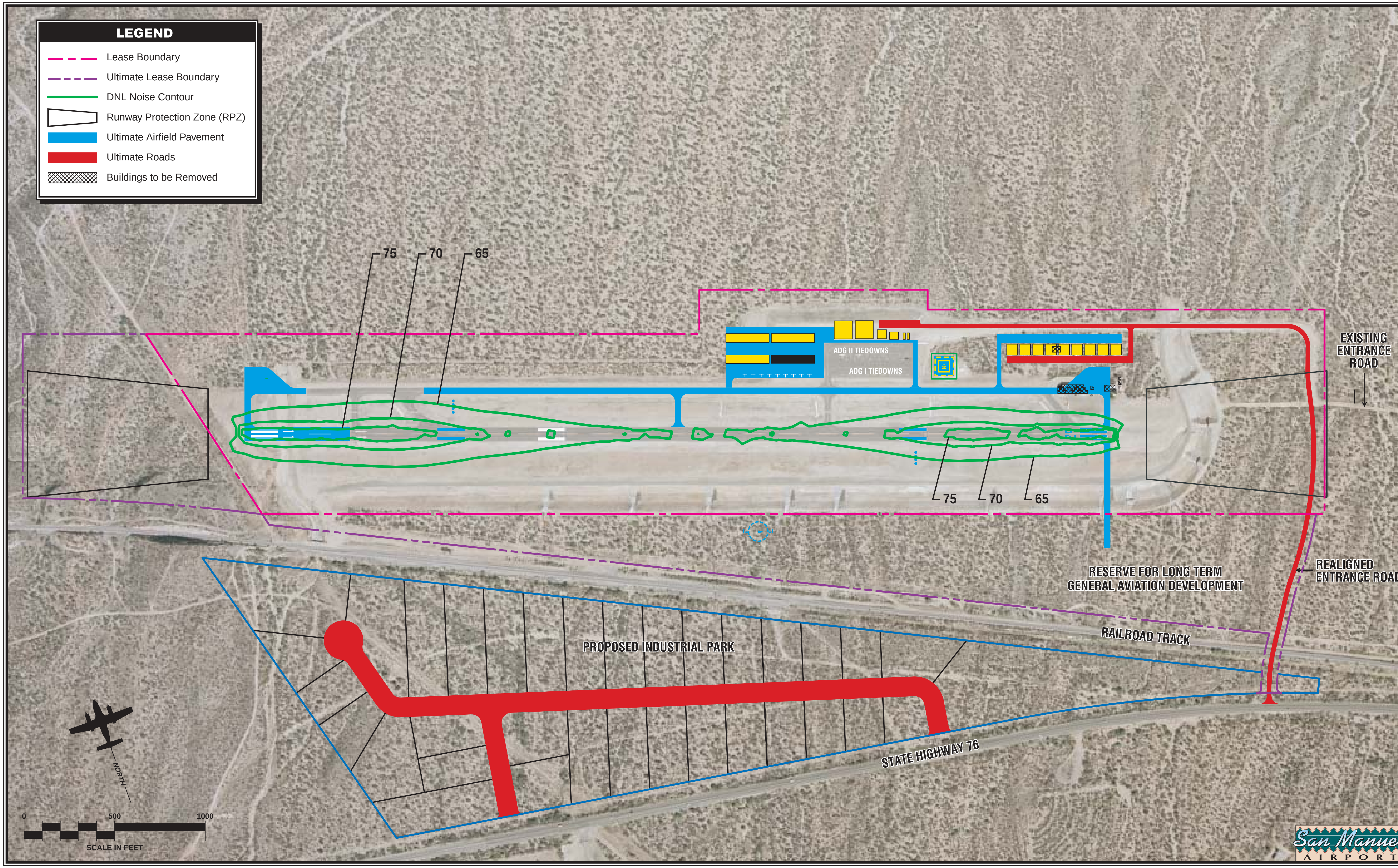

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Exhibit 5C
2020 AIRCRAFT NOISE EXPOSURE

Once the airport begins receiving federal funding, improvements planned for San Manuel Airport, as depicted on the Airport Layout Plan (ALP), will require compliance with the *National Environmental Policy ACT (NEPA) of 1969,* as amended. Many of the improvements will be categorically excluded and will not require further NEPA documentation; however, some improvements may require further NEPA analysis and documentation. As detailed in *FAA Order 5050.4A, Airport Environmental Handbook,* compliance with NEPA is generally satisfied with the preparation of an Environmental Assessment (EA). In cases where a categorical exclusion is issued, environmental issues such as wetlands, threatened or endangered species, and cultural resources are further evaluated during the federal, state, and/or local permitting processes.

This section is intended to supply a preliminary review of environmental issues that would need to be analyzed in more detail within the NEPA or the permitting process. Consequently, this analysis ***does not*** address mitigation or the resolution of environmental issues. The following pages consider the environmental resources as outlined in *FAA Order 5050.4A*.

This environmental evaluation has been prepared using *FAA Order 1050.1D, Policies and Procedures for Considering Environmental Impacts, and FAA Order 5050.4A, Airport Environmental Handbook* as guidelines. Several factors are considered in a formal environmental document, such as an EA or an EIS, which are not included in an environmental evaluation. These factors include details regarding the project location, historical perspective, existing conditions at the airport, and the purpose and need for the project. This information is available within the Master Plan document. A formal environmental document also includes the resolution of issues/impacts identified as significant during the environmental process. Each of the specific impacts categories outlined in FAA Order 5050.4A are addressed in **Table 5C**.

TABLE 5C **Review of Environmental Resources** **Proposed Facility Improvements**	
Environmental Resource	**Resources Potentially Affected**
Noise. The Yearly Day-Night Average Sound Level (DNL) is used in this study to assess aircraft noise. DNL is the metric currently accepted by the Federal Aviation Administration (FAA), Environmental Protection Agency (EPA), and Department of Housing and Urban Development (HUD) as an appropriate measure of cumulative noise exposure. These three federal agencies have each identified the 65 DNL noise contour as the threshold of incompatibility.	• As depicted previously on **Exhibit 5B** and **Exhibit 5C**, the 65 DNL noise contour remains entirely on airport property. No noise sensitive institutions or development are impacted by noise in excess of 65 DNL.
Compatible Land Use. FAR Part 150 recommends guidelines for planning land use compatibility within various levels of aircraft noise exposure. In addition, *Advisory Circular 150/ 5200-33* identifies land uses that are incompatible with safe airport operations because of their propensity for attracting birds or other wildlife, which in turn results in an increased risk of aircraft strikes and damage. Finally, FA. Part 77 regulates the height of structures within the vicinity of the airport.	• As outlined within the Capitol Improvement Program, the residence located on the east end of the proposed parallel taxiway will be purchased. The purchase will ensure compliance with the compatible land use guidelines. • The proposed airport improvements will not result in noise impacts on noise sensitive development, as no noise-sensitive development is contained within the 65 DNL contour. • The proposed improvements will not provide wildlife attractants. While there are existing obstructions to the FAR Part 77 surfaces, the proposed development program does not produce any new obstructions.

TABLE 5C (Continued)
Review of Environmental Resources
Proposed Facility Improvements

Environmental Resource	Resources Potentially Affected
Social Impacts. These impacts are often associated with the relocation of residents or businesses or other community disruptions.	• The proposed projects will involve the need to acquire one residence which is currently located on airport property. • Compliance with the *Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970* (URARPAPA) will be required for the purchase of the property. FAA Order 5050.4A provides that where the relocation or purchase of a residence, business, or farmland is involved, the provisions of URARPAPA must be met. The Act requires that landowners, whose property is to be acquired, be compensated fair market value for their property. • The proposed development and associated residence acquisition, with mitigation, are not anticipated to divide or disrupt an established community, interfere with orderly planned development, or create a short-term, appreciable change in employment.
Induced Socioeconomic Impacts. These impacts address those secondary impacts to surrounding communities resulting from the proposed development, including shifts in patterns of population growth, public service demands, and changes in business and economic activity to the extent influenced by the airport development.	• Significant shifts in patterns of population movement or growth, or public service demands are not anticipated as a result of the proposed development. It could be expected, however, that the proposed development would potentially induce positive socioeconomic impacts for the community over a period of years. The airport, with expanded facilities and services, would be expected to attract additional users. It is also expected to encourage tourism, industry, and trade and to enhance the future growth and expansion of the community's economic base. Future socioeconomic impacts resulting from the proposed development would be primarily positive in nature.

TABLE 5C (Continued) **Review of Environmental Resources** **Proposed Facility Improvements**	
Environmental Resource	**Resources Potentially Affected**
Air Quality. The US Environmental Protection Agency (EPA) has adopted air quality standards that specify the maximum permissible short-term and long-term concentrations of various air contaminants. The National Ambient Air Quality Standards (NAAQS) consist of primary and secondary standards for six criteria pollutants which include: Ozone (O3), Carbon Monoxide (CO), Sulfur Dioxide (SO2), Nitrogen Oxide (NO), Particulate matter (PM10), and Lead (Pb). Various levels of review apply within both NEPA and permitting requirements. For example, an air quality analysis is typically required during the preparation of a NEPA document if enplanement levels exceed 3.2 million enplanements or general aviation operations exceed 180,000.	• San Manuel Airport is located in Pinal County which is in a non-attainment area for SO_2 (largely due to the mining of copper nearby). Therefore, further air quality analysis is required to determine project impacts on air quality. • Air quality impacts are anticipated to be less than significant as it is expected that emissions will increase at a de minim us amount as a result of the proposed improvements.
Water Quality. Water quality concerns associated with airport expansion most often relate to domestic sewage disposal, increased surface runoff and soil erosion, and the storage and handling of fuel, petroleum, solvents, etc.	• The airport will need to obtain and comply with an National Pollution Discharge Elimination System (NPDES) operations permit. • With regard to construction activities, the airport and all applicable contractors will need to comply with the requirements and procedures of the construction related NPDES General Permit, including the preparation of a *Notice of Intent* and a *Stormwater Pollution Prevention Plan*, prior to the initiation of product construction activities.
Section 4(f) Lands. These include publicly owned land from a public park, recreation area, or wildlife and waterfowl refuge of national, state, or local significance, or any land from a historic site of national, state, or local significance.	• No impacts anticipated. The proposed development will not require the use of Section 4(f) lands.

TABLE 5C (Continued)
Review of Environmental Resources
Proposed Facility Improvements

Environmental Resource	Resources Potentially Affected
Historical and Cultural Resources	• No impacts anticipated as the National Register of Historic Places does not list any sites in the area of the airport. Further coordination with the State Historic Preservation Office (SHPO) is required for a final determination of impacts.
Threatened or Endangered Species and Biological Resources	• A literature review of threatened and endangered species in Pinal County indicated that the majority of protected species are found in riparian habitats which are not found on airport property. To protected species, the Arizona Hedgehog Cactus and the Lessor Long Nosed Bat, inhabits desert scrub areas which can be found surrounding the airport. • Further coordination with the United States Fish and Wildlife Service, and a potential biological evaluation, is required for a final determination.
Waters of the U.S. Including Wetlands	• As a result of the extension of the Runway 11 end, a wetland delineation will need to be conducted to determine the impact to the wash located at the western end of Runway 11-29.
Floodplains	• No impacts anticipated. Proposed airport improvements are not contained within a designated 100-year floodplain.
Coastal Zone Management Program and Coastal Barriers	• No impacts. The airport is not near any coastal zones.
Wild and Scenic Rivers	• No impacts. The airport is not near any designated wild and scenic rivers.
Farmland	• No impacts. The proposed development will not affect prime or unique farmland.

TABLE 5C (Continued) Review of Environmental Resources Proposed Facility Improvements	
Environmental Resource	**Resources Potentially Affected**
Energy Supply and Natural Resources	• The proposed alternative will result in a less-than significant impact to energy supply and natural resources. Impacts are a result of increased operations and upgraded facilities.
Light Emissions	• The proposed alternative will result in a less-than significant impact to energy supply and natural resources. Impacts are a result of increased operations and upgraded facilities.
Solid Waste	• As a result of increased operations at the airport, solid waste will slightly increase. These impacts are expected to be less-than significant.

STATE OF ARIZONA REVISED STATUTES

In 1999, the State of Arizona enacted legislation which gives local communities the ability to establish public airport disclosure maps. These maps are intended to assist property owners in identifying whether their home would be located in an area that is subject to aircraft noise and overflight. The public disclosure map is recorded with the County recorder and maintained for viewing upon demand at the state real estate department. The statue is summarized below.

Arizona Revised Statute 28-8486
Public Airport Disclosure

A. The state real estate department shall have and make available to the public on request a map showing the exterior boundaries of each territory in the vicinity of a public airport. The map shall clearly set forth the boundaries on a street map. The real estate department shall work closely with each public airport and affected local government as necessary to create a map that is visually useful in determining whether property is located in or outside of a territory in the vicinity of a public airport.

B. Each public airport shall record the map prepared pursuant to Subsection A in the office of the county recorder in each county that contains property in a territory in the vicinity of the public airport. The recorded map shall be sufficient to notify owners and potential purchasers of property that the property is located in or outside of a territory in the vicinity of a public airport.

For the purposes of this section:

A. Public airport" means an airport that is owned by a political subdivision of this state or that is otherwise open to the public.

B. "Territory in the vicinity of a public airport" means property that is within the traffic pattern airspace as defined by the federal aviation administration and includes property that experiences a day-night average sound level as follows: In counties with a population of more than five hundred thousand persons, of sixty decibels or higher at airports where such an average sound level has been identified in either the Airport Master Plan for the twenty year planning period or in a noise study prepared in accordance with Airport Noise Compatibility Planning. 14 code of Federal Regulations Part 150. In counties with a population of more than five hundred thousand persons or less, sixty-five decibels or higher at airports where such an average sound level has been identified in the Airport Master Plan for the twenty year planning period.

Facility planning should include establishing an public disclosure map for San Manuel Airport. Since the 65 DNL noise contour remains on airport property, it is critical that the disclosure map include the areas encompassing the aircraft traffic patters as stipulated by the statute. To be compatible with FAR Part 77 height and hazard zoning, it is recommended that the public disclosure map for San Manuel Airport consist of the FAR Part 77 horizontal surface as depicted on **Exhibit 5D**. As shown on the exhibit, this surface extends for 10,200 feet off each runway end. At this distance, the public disclosure map would encompass all aircraft traffic patterns to each runway end.

SUMMARY

The Master Plan for San Manuel Airport has been developed in cooperation with the planning advisory committee, interested citizens, and Pinal County. It is designed to assist the County in making decisions relative to the future use of San Manuel Airport as it is maintained to meet the air transportation needs for the County.

Flexibility will be a key to the plan since activity may not occur exactly as forecast. The Master Plan provides Pinal County with options to pursue in marketing the assets of the airport for community development. Following the general recommendations of the plan, the airport can maintain it's viability and continue to provide air transportation services to the region.

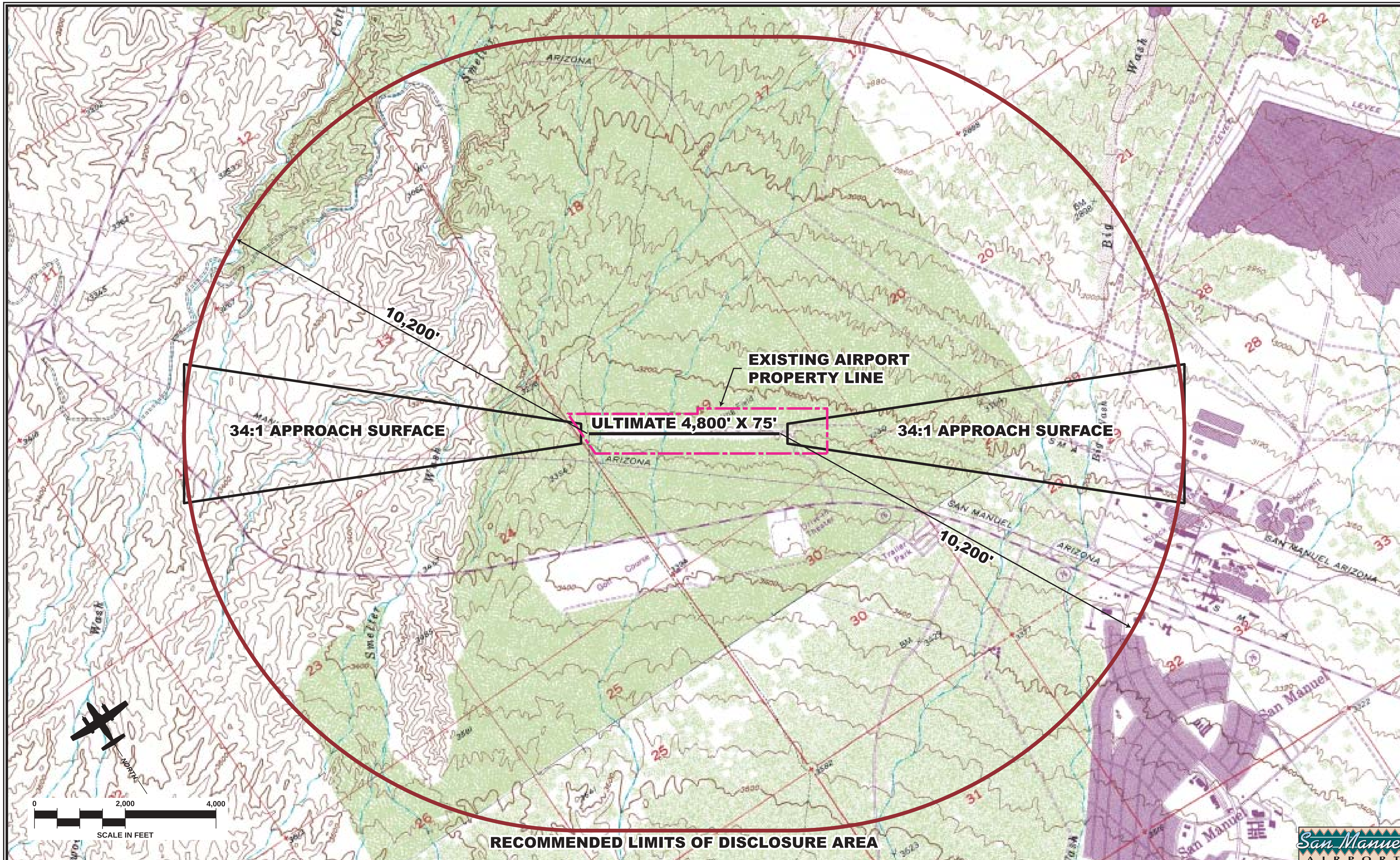
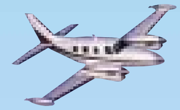


Exhibit 5D
RECOMMENDED AIRPORT DISCLOSURE MAP

Chapter Six

CAPITAL IMPROVEMENT PROGRAM

Capital Improvement Program



The analyses conducted in the previous chapters evaluated airport development needs based upon safety, security, potential aviation activity, and operational efficiency. However, one of the more important elements of the Master Planning process is the application of basic economic, financial, and management rationale to each development item so that the feasibility of implementation can be assured. The purpose of this chapter is to identify capital needs at San Manuel Airport and identify when these should be implemented according to need, function, and demand.

The presentation of the financial plan and its feasibility has been organized into two sections. First, the airport's capital needs are presented in narrative and graphic form. Secondly, funding sources on the federal and local levels are identified and discussed.

DEMAND-BASED PLAN

The Master Plan for San Manuel Airport has been developed according to a demand-based schedule. Demand-based planning refers to the intention to develop planning guidelines for the airport based upon airport activity levels, instead of guidelines based on points in time. By doing so, the levels of activity derived from the demand forecasts can be related to the actual capital investments needed to safely and efficiently accommodate the level of demand being experienced at the airport. More specifically, the intention of this Master Plan is that the facility improvements needed to serve new levels of demand should only be implemented when the levels of demand

experienced at the airport justify their implementation.

For example, the aviation demand forecasts projected that based aircraft could be expected to grow through the year 2020. This forecast was supported by the local community's growing economy, population, households, and historical trends showing growing based aircraft levels.

The forecasts noted, however, that future based aircraft levels will be dependent upon a number of economic factors. These factors could slow or accelerate based aircraft levels differently than projected in the aviation demand forecasts. Since changes in these factors cannot be realistically predicted for the entire forecast period, it is difficult to predict, with the level of accuracy needed to justify a capital investment, exactly when an improvement will be needed to satisfy demand level.

For these reasons, the San Manuel Airport Master Plan has been developed as a demand-based plan. The Master Plan projects various activity levels for short, intermediate, and long term planning horizons. When activity levels begin to reach or exceed the level of one of the planning horizons, the Master Plan suggests planning begin to consider the next planning horizon level of demand. This provides a level of flexibility in the Master Plan as the development program can be accelerated or slowed to meet demand. This can extend the time between Master Plan updates.

A demand-based Master Plan does not specifically require implementation of any of the demand-based improvements. Instead, it is envisioned that implementation of any Master Plan improvement would be examined against demand levels prior to implementation. In many ways, this Master Plan is similar to a community's general plan. The Master Plan establishes a plan for the use of the airport facilities consistent with potential aviation needs and the capital needs required to support that use. However, individual projects in the plan are not implemented until the need is demonstrated and the project is approved by Pinal County.

CAPITAL NEEDS AND COST SUMMARIES

Once the specific needs for the airport have been established, the next step is to determine a realistic schedule and costs for implementing each project. The capital needs presented in this chapter outline the costs and timing for implementation. The program outlined on the following pages has been evaluated from a variety of perspectives and represents the culmination of a comparative analysis of basic budget factors, demand, and priority assignments.

The recommended improvements are grouped into three planning horizons: short, intermediate, and long term. Each year, Pinal County will need to re-examine the priorities for funding in the short-term period, adding or removing projects on the capital programming lists. **Table 6A** summarizes the key activity milestones for each planning horizon.

TABLE 6A
Planning Horizon Activity Levels
San Manuel Airport

	2001	Short Term	Intermediate Term	Long Term
Based Aircraft	18	31	40	55
Annual Operations	8,800	10,400	18,500	22,800

While some projects will be demand-based, others will be dictated by design standards, safety, or rehabilitation needs. In putting together a listing of projects, an attempt has been made to include anticipated rehabilitation needs through the planning period and capital replacement needs. However, it is difficult to project with certainty the scope of such projects when looking 10 or more years into the future.

Exhibit 6A summarizes capital needs for San Manuel Airport through the planning period of this Master Plan. An estimate has been included with each project of federal and state funding eligibility, although this none of these amounts are guaranteed. Federal funding will not be available until the airport is included in the *National Plan of Integrated Airports* (NPIAS). As will be discussed in greater detail later in this chapter, the primary advantage of being included in the NPIAS is the availability of more discretionary dollars than currently available by the Arizona Department of Transportation - Aeronautics Division (ADOT) grants. The ADOT program only has several million dollars available each year, whereas, the federal program has had more than $3.0 billion dollars available annually to airports nationwide over the past four years. Additionally, most general aviation airports qualify for an annual entitlement of $150,000 to be used for federally eligible projects.

Individual project cost estimates account for engineering and other contingencies that may be experienced during implementation of the project and are in current (2003) dollars. Due to the conceptual nature of a Master Plan, implementation of capital improvement projects should occur only after further refinement of their design and costs through engineering and/or architectural analyses. Capital costs in this chapter should be viewed only as estimates subject to further refinement during design. Nevertheless, these estimates are considered sufficient for performing the feasibility analyses in this chapter.

SHORT TERM CAPITAL NEEDS

The short term planning horizon is the only planning horizon correlated to time. This is because development within this initial period is concentrated on the most immediate needs of the airfield and landside areas. Therefore, the program is presented year-by-year to assist in capital planning not only locally, but at the state and federal levels. Short term capital needs presented on **Exhibit 6A** are estimated at $2.8 million.

A focus of the short term planning horizon is developing the utility infrastructure at the airport. This includes installing electrical, water, and communication services in 2004. All utilities would be extended to the north of the runway to support existing facilities in this area and ongoing hangar development.

Once the utilities have been installed, the installation of all airfield lighting aids is anticipated. This includes a rotating beacon, medium intensity runway edge lighting (MIRL), medium intensity taxiway edge lighting (MITL), and precision approach path indicators (PAPIs) and runway end identifier lights (REILs) to each runway end. The PAPIs will assist pilots in determining the correct descent path to each runway end. The REILs will assist pilots in locating the runway threshold at night and during poor visibility conditions.

The parallel taxiway is planned to paved and widened in the short term planning horizon. This includes the construction of an additional exit taxiway at approximately midfield.

The short term planning horizon also includes the installation of the automated weather observation system (AWOS). The AWOS will provide automated weather observation and reporting at the airport.

A security measure is the installation of chain link fencing around the existing and ultimate property lines and around the main apron area to secure the aircraft operational areas. This is intended to deter unauthorized pedestrian and vehicle access to the aircraft operational areas.

Landside development included in the short term planning horizon includes developing paved taxilanes to the T-hangars installed in June 2003 and paving the airport entrance road. Currently, this road is unpaved from the new entrance with Redington Road. The surface is only chip sealed.

Finally, the short term planning horizon includes the acquisition of the existing 156 acre airport site from BHP Billiton, acquisition of 45 acres of land south of the airport from BHP Billiton for long term facility development, and acquisition of approximately 21.5 acres of land from the Arizona State Land Trust to provide for the future runway extension.

INTERMEDIATE TERM AND LONG TERM CAPITAL NEEDS

Development within the intermediate term planning horizon is completely focused on improving landside facilities for both transient and locally-based aircraft. This includes developing a public terminal building, aircraft wash

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	Total Cost	Federally Eligible	ADOT Eligible	Local Share
Short Term Planning Horizon (First Six Years)				
2004				
Install Electrical, Water, and Communication Utility Services	$ 350,000	$ 318,710	$ 15,645	$ 15,645
Construct T-Hangar Access Taxilanes	60,000	54,636	2,682	2,682
Subtotal 2004	**$ 410,000**	**$ 373,346**	**$ 18,327**	**$ 18,327**
2005				
Construct Parallel Taxiway/Exit Taxiway	**457,000**	**$ 416,144**	**$ 20,428**	**$ 20,428**
2006				
Install MIRL & MITL	$ 250,000	$ 227,650	$ 11,175	$ 11,175
Install PAPIs and REILs to Each Runway End	173,000	157,534	7,733	7,733
Install Rotating Beacon	50,000	45,530	2,235	2,235
Subtotal 2006	**$ 473,000**	**$ 430,714**	**$ 21,143**	**$ 21,143**
2007				
Install Automated Weather Observation System (AWOS)	**$ 200,000**	**$ 182,120**	**$ 8,940**	**$ 8,940**
2008				
Pave Access Road	$ 225,000	$ 204,885	$ 10,058	$ 10,058
Install Security Fencing - & Automated Security Gate	295,000	268,627	13,187	13,187
Subtotal 2009	**$ 520,000**	**$ 473,512**	**$ 23,244**	**$ 23,244**
2009				
Acquire 21.5 Acres of State Trust Land and Airport Site from BHP	$ 800,000	$ 728,480	$ 35,760	$ 35,760
Subtotal 2009	**$ 800,000**	**$ 728,480**	**$ 35,760**	**$ 35,760**
Subtotal Short Term Planning Horizon	**$ 2,860,000**	**$ 2,604,316**	**$ 127,842**	**$ 127,842**
Intermediate Term Planning Horizon (7-10 years)				
Install Sanitary Sewer System	$ 75,000	$ 68,295	$ 3,353	$ 3,353
Construct Public Terminal Building	200,000	-	180,000	20,000
Construct Terminal Area Automobile Parking	72,000	65,563	3,218	3,218
Construct Access Taxilanes	140,000	127,484	6,258	6,258
Construct 10-Unit T-Hangar	200,000	-	-	200,000
Construct Aircraft Wash Rack	50,000	45,530	2,235	2,235
Construct Executive Hangar Taxilane	153,000	139,322	6,839	6,839
Construct Executive Hangar Parking and Access	93,000	84,686	4,157	4,157
Annual Pavement Maintenance/Preservation	250,000	227,650	11,175	11,175
Subtotal Intermediate Term Planning Horizon	**$ 1,233,000**	**$ 758,530**	**$ 217,235**	**$ 257,235**
Long Term Planning Horizon (11-20 years)				
Construct Drainage for Runway Extension - 650' x 64" Drain	$ 313,000	$ 285,018	$ 13,991	$ 13,991
Relocation Water Lines for Runway Extension	100,000	91,060	4,470	4,470
Relocate Electrical Power Line for Runway Extension	200,000	182,120	8,940	8,940
Extend Runway 11-29 and Taxiway A to 4,800'/Construct Holding Apron Install Nonprecision Runway Markings	461,000	419,787	20,607	20,607
Remove Buildings	70,000	63,742	3,129	3,129
Extend Taxiway A to Runway 29/Construct Holding Apron	164,000	149,338	7,331	7,331
T-Hangar Earthwork	175,000	159,355	7,823	7,823
Construct T-Hangar Access Taxilanes	146,000	132,948	6,526	6,526
Construct Two 10-Unit T-Hangars	400,000	-	-	400,000
Construct Tiedowns	97,000	88,328	4,336	4,336
Relocate Segmented Circle/Lighted Wind Cone	25,000	22,765	1,118	1,118
Construct Helipad	60,000	54,636	2,682	2,682
Annual Pavement Maintenance/Preservation	500,000	455,300	22,350	22,350
Subtotal Long Term Planning Horizon	**$ 2,711,000**	**$ 2,104,397**	**$ 103,302**	**$ 503,302**
Total All Development	**$ 6,804,000**	**$ 5,467,242**	**$ 448,379**	**$ 888,379**

San Manuel AIRPORT

Exhibit 6A
AIRPORT DEVELOPMENT SCHEDULE

rack, sanitary sewer system, a 10-unit T-hangar, T-hangar access taxilanes, the easterly main apron taxilane, and the executive hangar area north of Runway 11-29.

Development within the long term planning horizon focuses on extending Runway 11-29 to the west and constructing additional T-hangars. The Runway 11-29 extension is reserved for the long term planning horizon in order to focus capital funding on improving general aviation services at the airport. It is not expected that the aircraft that will need the full 4,800 feet of runway length will be conducting a significant number of operations at the airport until the landside facilities and general aviation services are in place to accommodate these aircraft. The long term planning horizon includes provisions to culvert the existing wash to the east and relocate a water line and powerline prior to extending the runway and Taxiway A to the east. Nonprecision runway markings will be installed as well.

The long term planning horizon also includes provisions for the removal of the hangar facilities and residence located in the OFA and primary surface. The hangar facilities will be replaced with new T-hangars located north of Runway 11-29, west of the main apron. Provisions for expanding fill within the terminal area and removal of the buildings are included in the long term planning horizon.

Other projects in the long term planning horizon include relocating the segmented circle and lighted windcone to allow for the development of the helipad. Once the buildings within the OFA and primary surface are removed, Taxiway A is programmed to be extended to the Runway 29 end and a holding apron constructed.

A total of $50,000 annually is included in the intermediate term planning horizon for pavement preservation activities. Pavement preservation activities typically include applying a slurry seal to rejuvenate and protect the pavement surface, crack sealing, and/or small pavement repairs.

Exhibit 6B graphically depicts development staging.

CAPITAL IMPROVEMENTS FUNDING

Financing capital improvements at the airport will not rely exclusively upon the financial resources of Pinal County. Capital improvements funding is available through various grants-in-aid programs at both the federal and state level. The following discussion outlines the key sources for capital improvement funding.

FEDERAL GRANTS

Through federal legislation over the years, various grants-in-aid programs have been established to develop and maintain a system of public airports throughout the United States. The purpose of this system and its federally-based funding is to maintain national defense and promote interstate

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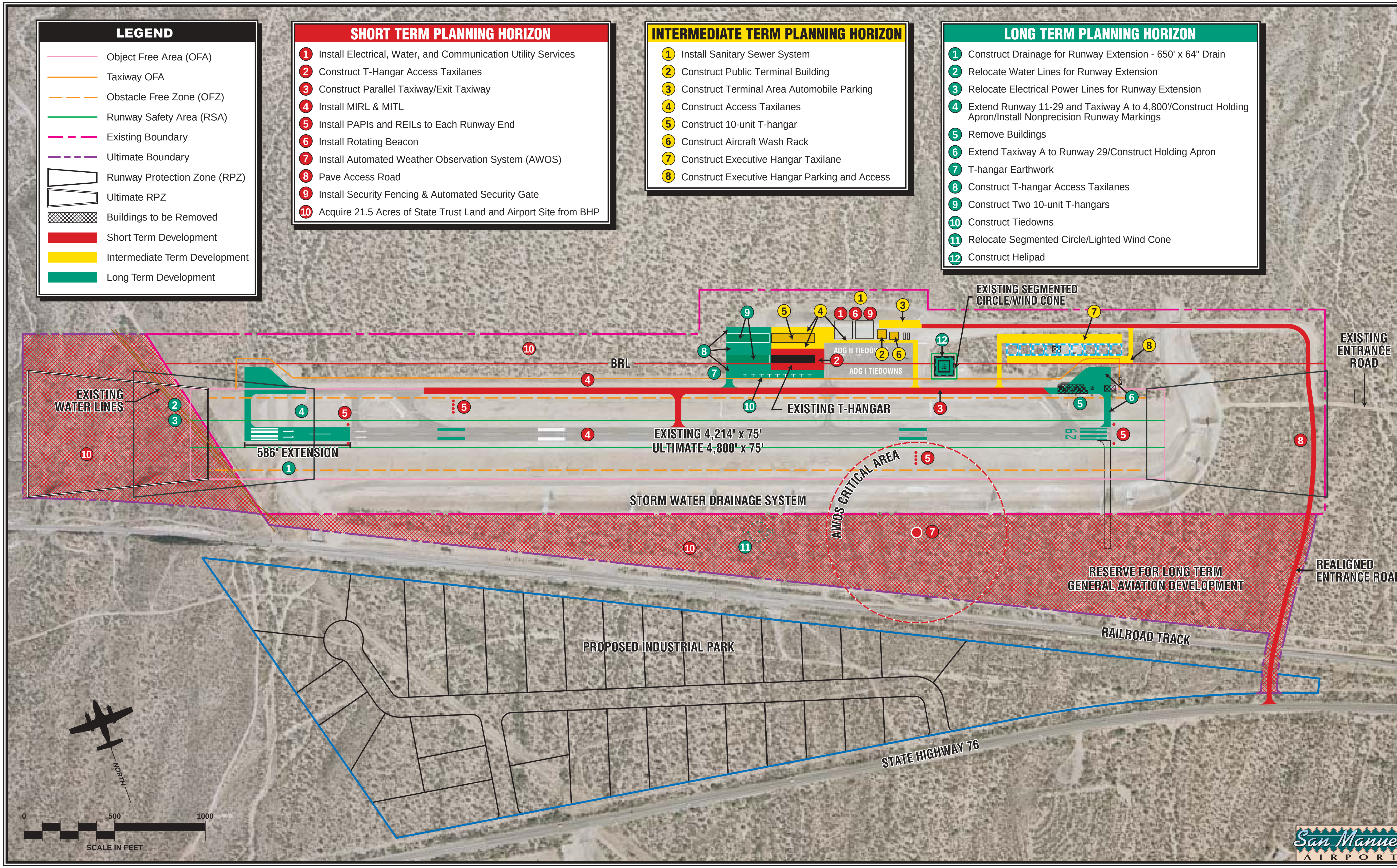


Exhibit 6B
DEVELOPMENT STAGING

commerce. The most recent legislation was enacted in early 2000 and is entitled the *Wendell H. Ford Aviation Investment and Reform Act for the 21st Century* or AIR-21.

The four-year bill covers FAA fiscal years 2000, 2001, 2002, and 2003. This was breakthrough legislation because it authorized funding levels significantly higher than ever before. Airport Improvement Program (AIP) funding was authorized at $2.475 billion in 2000, $3.2 billion in 2001, $3.3 billion in 2002, and $3.4 billion in 2003. An AIP bill after 2003 is still uncertain. The U.S. Congress will need to consider re-authorization of the program in calender year 2003.

The source for AIR-21 funds is the Aviation Trust Fund. The Aviation Trust Fund was established in 1970 to provide funding for aviation capital investment programs (aviation development, facilities and equipment, and research and development). The Trust Fund also finances the operation of the FAA. It is funded by user fees, taxes on airline tickets, aviation fuel, and various aircraft parts.

Funds are distributed each year by the FAA from appropriations by Congress. A portion of the annual distribution is to primary commercial service airports based upon enplanement levels. If Congress appropriates the full amounts authorized by AIR-21, eligible general aviation airports receive up to $150,000 of funding each year. The remaining AIP funds are distributed by the FAA based upon the priority of the project for which they have requested federal assistance through discretionary apportionments. A National Priority Ranking System is used to evaluate and rank each airport project. Those projects with the highest priority are given preference in funding.

Should San Manuel Airport eventually be included in the NPIAS, each airport project for San Manuel Airport would be required to follow this procedure and compete with other airport projects in the State for AIP State Apportionment dollars and across the country for other Federal AIP funds. An important point to consider is that, unlike entitlement dollars for commercial service airports, most funding for San Manuel Airport would not be guaranteed.

General aviation airport development that meets FAA's eligibility requirements can receive 91.06 percent federal funding from AIR-21. Property acquisition, airfield improvements, aprons, perimeter service roads, and access road improvements are examples of eligible items. General aviation terminal buildings, cargo buildings, and fueling facilities are not generally eligible.

As evident from the airport development schedule and cost summaries, Pinal County could benefit significantly from federal discretionary funding. Federal funding extends the amount of state dollars available for airport funding and guarantees a limited amount of entitlement dollars each year (assuming the current program is continued through the planning period). The County should continue to pursue inclusion in the

NPIAS in order to be eligible for federal funding.

FAA FACILITIES AND EQUIPMENT PROGRAM

The Airway Facilities Division of the FAA administers the national Facilities and Equipment (F&E) Program. This annual program provides funding for the installation and maintenance of various navigational aids and equipment for the national airspace system and airports. Under the F&E program, funding is provided for FAA airport traffic control towers, enroute navigational aids, and on-airport navigational aids such as approach lighting systems. Assuming inclusion in the NPIAS, as activity levels and other development warrant, the airport may be considered by the FAA Airways Facilities Division for the installation and maintenance of navigational aids through the F&E program. This could include the installation of the REILs and PAPIs and communication facilities enroute air traffic control.

STATE AID TO AIRPORTS

In support of the state airport system, the State of Arizona also participates in airport improvement projects. The source for State airport improvement funds is the Arizona Aviation Fund. Taxes levied by the State on aviation fuel, flight property, aircraft registration tax, and registration fees, (as well as interest on these funds) are deposited in the Arizona Aviation Fund. The transportation Board establishes the policies for distribution of these State funds.

Under the State of Arizona grant program, an airport can receive funding for one-half (4.47 percent) of the local share of projects receiving federal AIP funding. The State also provides 90 percent funding for projects which are typically not eligible for federal AIP funding or have not received federal funding. Historically, improvements at San Manuel Airport have been funded at 95 percent of the project cost since San Manuel Airport is not included in the NPIAS. This essentially has allowed Pinal County to bear the same local share cost for improvements as if they were receiving federal AIP grand funds.

State Airport Loan Program

The Arizona Department of Transportation-Aeronautics Division (ADOT) Airport Loan Program was established to enhance the utilization of State funds and provide a flexible funding mechanism to assist airports in funding improvement projects. Eligible projects include runway, taxiway, and apron improvements; land acquisition, planning studies, and the preparation of plans and specifications for airport construction projects, as well as revenue generating improvements such as hangars and fuel storage facilities. Projects which are not currently eligible for the State Airport Loan Program are considered if the project would enhance the airport's ability to be financially self-sufficient.

There are three ways in which the loan funds can be used: Grant Advance, Matching Funds, or Revenue Generating Projects. The Grant Advance loan funds are provided when the airport can demonstrate the ability to accelerate the development and construction of a multi-phase project. The project(s) must be compatible with the Airport Master Plan and be included in the ADOT 5-year Airport Development Program. The Matching Funds are provided to meet the local matching fund requirement for securing federal airport improvement grants or other federal or state grants. The Revenue Generating funds are provided for airport-related construction projects that are not eligible for funding under another program.

LOCAL FUNDING

The balance of project costs, after consideration has been given to grants, must be funded through local resources. Assuming federal funding, this essentially equates to 4.47 percent of the project costs if all eligible FAA and state funds are available. If only ADOT grants were available, the local share would be five percent of the project, or 0.053 percent higher

There are several alternatives for local finance options for future development at the airport, including airport revenues, direct funding from the County, issuing bonds, and leasehold financing. These strategies could be used to fund the local matching share, or complete the project if grant funding cannot be arranged.

The capital improvement program has assumed that some landside facility development would be completed privately, while other developments (namely T-hangars, the aircraft wash rack, and public terminal building) would be completed by Pinal County. Pinal County would complete the necessary infrastructure improvements as this development is grant eligible.

There are several municipal bonding options available to Pinal County including: general obligation bonds, limited obligation bonds, and revenue bonds. General obligation bonds are a common form of municipal bond which is issued by voter approval and is secured by the full faith and credit of the County. County tax revenues are pledged to retire the debt. As instruments of credit, and because the community secures the bonds, general obligation bonds reduce the available debt level of the community. Due to the community pledge to secure and pay general obligation bonds, they are the most secure type of municipal bond and are generally issued at lower interest rates and carry lower costs of issuance. The primary disadvantage of general obligation bonds is that they require voter approval and are subject to statutory debt limits. This requires that they be used for projects that have broad support among the voters, and that they be reserved for projects that have highest public priorities.

In contrast to general obligation bonds, limited obligation bonds (sometimes referred to as a Self-Liquidating Bonds) are secured by revenues from a local source. While neither general fund revenues nor the taxing power of the local community is pledged to pay the debt service, these sources may be required to retire the debt if pledged revenues are insufficient to make interest and principal payments on the bonds. These bonds still carry the full faith and credit pledge of the local community and, therefore, are considered, for the purpose of financial analysis, as part of the debt burden of the local community. The overall debt burden of the local community is a factor in determining interest rates on municipal bonds.

There are several types of revenue bonds, but in general they are a form of municipal bond which is payable solely from the revenue derived from the operation of a facility that was constructed or acquired with the proceeds of the bonds. For example, a Lease Revenue Bond is secured with the income from a lease assigned to the repayment of the bonds. Revenue bonds have become a common form of financing airport improvements. Revenue bonds present the opportunity to provide those improvements without direct burden to the taxpayer. Revenue bonds normally carry a higher interest rate because they lack the guarantees of general and limited obligation bonds.

Leasehold financing refers to a developer or tenant financing improvements under a long term ground lease. The obvious advantage of such an arrangement is that it relieves the community of all responsibility for raising the capital funds for improvements. However, the private development of facilities on a ground lease, particularly on property owned by a municipal agency, produces a unique set of problems. In particular, it is more difficult to obtain private financing as only the improvements and the right to continue the lease can be claimed in the event of a default. Ground leases normally provide for the reversion of improvements to the lessor at the end of the lease term, which reduces their potential value to a lender taking possession. Also, companies that want to own their property as a matter of financial policy may not locate where land is only available for lease. Pinal County has used long term lease arrangements successfully to finance capital improvements at the airport in the past. Most hangar facilities were developed with private funds under a long term ground lease with the County.

PLAN IMPLEMENTATION

The successful implementation of the San Manuel Airport Master Plan will require sound judgment on the part of Pinal County with regard to the implementation of projects to meeting future activity demands, while maintaining the existing infrastructure and improving this infrastructure to support new development. While the projects included in the capital improvement program have been broken into short, intermediate, and long term planning periods, the County will need to consider the scheduling of projects in a flexible manner and add new projects from time-to-time to satisfy safety or design standards, or newly created demands.

In summary, the planning process requires that Pinal County continually monitor the need for new or rehabilitated facilities, since applications (for eligible projects) must be submitted to FAA and State each year. Pinal County should continually monitor, with the FAA and State, the projects which are required for safety and security.

Appendix A
Glossary And Abbreviations

Appendix A

GLOSSARY OF TERMS

ACCELERATE-STOP DISTANCE AVAILABLE (ASDA): see declared distances.

AIR CARRIER: an operator which: (1) performs at least five round trips per week between two or more points and publishes flight schedules which specify the times, days of the week, and places between which such flights are performed; or (2) transport mail by air pursuant to a current contract with the U.S. Postal Service. Certified in accordance with Federal Aviation Regulation (FAR) Parts 121 and 127.

AIRPORT REFERENCE CODE (ARC): a coding system used to relate airport design criteria to the operational (Aircraft Approach Category) to the physical characteristics (Airplane Design Group) of the airplanes intended to operate at the airport.

AIRPORT REFERENCE POINT (ARP): The latitude and longitude of the approximate center of the airport.

AIRPORT ELEVATION: The highest point on an airport's usable runway expressed in feet above mean sea level (MSL).

AIRPORT LAYOUT DRAWING (ALD): The drawing of the airport showing the layout of existing and proposed airport facilities.

AIRCRAFT APPROACH CATEGORY: a grouping of aircraft based on 1.3 times the stall speed in their landing configuration at their maximum certificated landing weight. The categories are as follows:

- *Category A:* Speed less than 91 knots.
- *Category B:* Speed 91 knots or more, but less than 121 knots.
- *Category C:* Speed 121 knots or more, but less than 141 knots.
- *Category D:* Speed 141 knots or more, but less than 166 knots.
- *Category E:* Speed greater than 166 knots.

AIRPLANE DESIGN GROUP (ADG): a grouping of aircraft based upon wingspan. The groups are as follows:

- *Group I:* Up to but not including 49 feet.
- *Group II:* 49 feet up to but not including 79 feet.
- *Group III:* 79 feet up to but not including 118 feet.
- *Group IV:* 118 feet up to but not including 171 feet.
- *Group V:* 171 feet up to but not including 214 feet.
- *Group VI:* 214 feet or greater.

AIR TAXI: An air carrier certificated in accordance with FAR Part 135 and authorized to provide, on demand, public transportation of persons and property by aircraft. Generally operates small aircraft "for hire" for specific trips.

AIRPORT TRAFFIC CONTROL TOWER (ATCT): a central operations facility in the terminal air traffic control system, consisting of a tower, including an associated instrument flight rule (IFR) room if radar equipped, using air/ground communications and/or radar, visual signaling, and other devices to provide safe and expeditious movement of terminal air traffic.

AIR ROUTE TRAFFIC CONTROL CENTER (ARTCC): a facility established to provide air traffic control service to aircraft operating on an IFR flight plan within controlled airspace and principally during the enroute phase of flight.

ALERT AREA: see special-use airspace.

ANNUAL INSTRUMENT APPROACH (AIA): an approach to an airport with the intent to land by an aircraft in accordance with an IFR flight plan when visibility is less than three miles and/or when the ceiling is at or below the minimum initial approach altitude.

APPROACH LIGHTING SYSTEM (ALS): an airport lighting facility which provides visual guidance to landing aircraft by radiating light beams by which the pilot aligns the aircraft with the extended centerline of the runway on his final approach and landing.

APPROACH MINIMUMS: the altitude below which an aircraft may not descend while on an IFR approach unless the pilot has the runway in sight.

AUTOMATIC DIRECTION FINDER (ADF): an aircraft radio navigation system which senses and indicates the direction to a non-directional radio beacon (NDB) ground transmitter.

AUTOMATED WEATHER OBSERVATION STATION (AWOS): equipment used to automatically record weather conditions (i.e. cloud height, visibility, wind speed and direction, temperature, dewpoint, etc...)

AUTOMATED TERMINAL INFORMATION SERVICE (ATIS): the continuous broadcast of recorded non-control information at towered airports. Information typically includes wind speed, direction, and runway in use.

AZIMUTH: Horizontal direction expressed as the angular distance between true north and the direction of a fixed point (as the observer's heading).

BASE LEG: A flight path at right angles to the landing runway off its approach end. The base leg normally extends from the downwind leg to the intersection of the extended runway centerline. See "traffic pattern."

BEARING: the horizontal direction to or from any point, usually measured clockwise from true north or magnetic north.

BLAST FENCE: a barrier used to divert or dissipate jet blast or propeller wash.

BUILDING RESTRICTION LINE (BRL): A line which identifies suitable building area locations on the airport.

CIRCLING APPROACH: a maneuver initiated by the pilot to align the aircraft with the runway for landing when flying a predetermined circling instrument approach under IFR.

CLASS A AIRSPACE: see Controlled Airspace.

CLASS B AIRSPACE: see Controlled Airspace.

CLASS C AIRSPACE: see Controlled Airspace.

CLASS D AIRSPACE: see Controlled Airspace.

CLASS E AIRSPACE: see Controlled Airspace.

CLASS G AIRSPACE: see Controlled Airspace.

CLEAR ZONE: see Runway Protection Zone.

CROSSWIND: wind flow that is not parallel to the runway of the flight path of an aircraft.

COMPASS LOCATOR (LOM): a low power, low/medium frequency radiobeacon installed in conjunction with the instrument landing system at one or two of the marker sites.

CONTROLLED AIRSPACE: airspace of defined dimensions within which air traffic control services are provided to instrument flight rules (IFR) and visual flight rules (VFR) flights in accordance with the airspace classification. Controlled airspace in the United States is designated as follows:

- *CLASS A:* generally, the airspace from 18,000 feet mean sea level (MSL) up to but not including flight level FL600. All persons must operate their aircraft under IFR.

- *CLASS B:* generally, the airspace from the surface to 10,000 feet MSL surrounding the nation's busiest airports. The configuration of Class B airspace is unique to each airport, but typically consists of two or more layers of air space and is designed to contain all published instrument approach procedures to the airport. An air traffic control clearance is required for all aircraft to operate in the area.

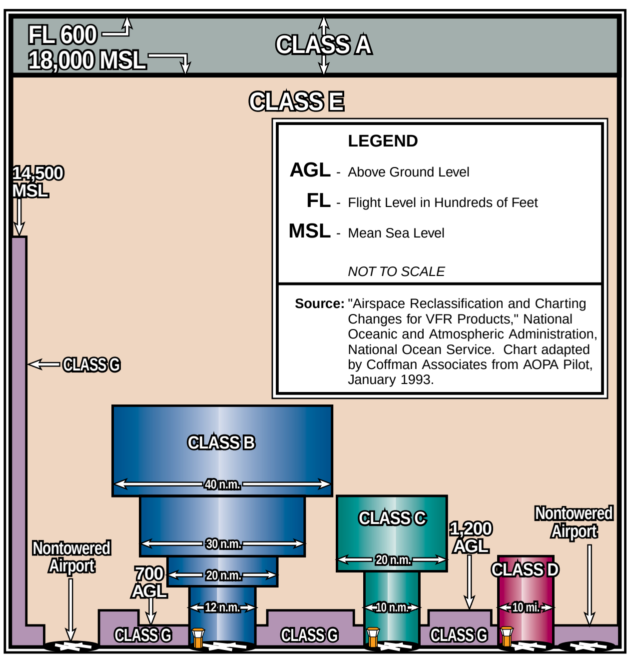
- *CLASS C:* generally, the airspace from the surface to 4,000 feet above the air port elevation (charted as MSL) surrounding those airports that have an operational control tower and radar approach control and are served by a qualifying number of IFR operations or passenger enplanements. Although individually tailored for each airport, Class C airspace typically consists of a surface area with a five nautical mile (nm) radius and an outer area with a 10 nautical mile radius that extends from 1,200 feet to 4,000 feet above the airport elevation. Two-way radio communication is required for all aircraft.

- *CLASS D:* generally, that airspace from the surface to 2,500 feet above the air port elevation (charted as MSL) surrounding those airport that have an operational control tower. Class D air space is individually tailored and configured to encompass published instrument approach procedures.
  Unless otherwise authorized, all

persons must establish two-way radio communication.

- *CLASS E:* generally, controlled airspace that is not classified as Class A, B, C, or D. Class E airspace extends upward from either the surface or a designated altitude to the overlying or adjacent controlled airspace. When designated as a surface area, the airspace will be configured to contain all instrument procedures. Class E airspace encompasses all Victor Airways. Only aircraft following instrument flight rules are required to establish two-way radio communication with air traffic control.

- *CLASS G:* generally, that airspace not classified as Class A, B, C, D, or E. Class G airspace is uncontrolled for all aircraft. Class G airspace extends from the surface to the overlying Class E airspace.



CONTROLLED FIRING AREA: see special-use airspace.

CROSSWIND LEG: A flight path at right angles to the landing runway off its upwind end. See "traffic pattern."

DECLARED DISTANCES: The distances declared available for the airplane's takeoff runway, takeoff distance, accelerate-stop distance, and landing distance requirements. The distances are:

- *TAKEOFF RUNWAY AVAILABLE (TORA):* The runway length declared available and suitable for the ground run of an airplane taking off;

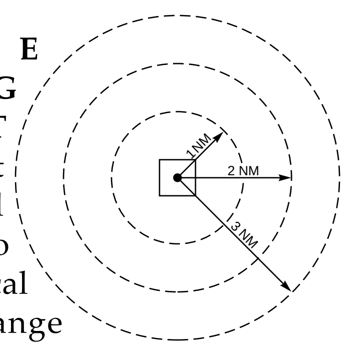
- *TAKEOFF DISTANCE AVAILABLE (TODA):* The TORA plus the length of any remaining runway and/or clear way beyond the far end of the TORA;

- *ACCELERATE-STOP DISTANCE AVAILABLE (ASDA):* The runway plus stopway length declared available for the acceleration and deceleration of an aircraft aborting a takeoff; and

- *LANDING DISTANCE AVAILABLE (LDA):* The runway length declared available and suitable for landing.

DISPLACED THRESHOLD: a threshold that is located at a point on the runway other than the designated beginning of the runway.

DISTANCE MEASURING EQUIPMENT (DME): Equipment (airborne and ground) used to measure, in nautical miles, the slant range



distance of an aircraft from the DME navigational aid.

DNL: The 24-hour average sound level, in A-weighted decibels, obtained after the addition of ten decibels to sound levels for the periods between 10 p.m. and 7 a.m. as averaged over a span of one year. It is the FAA standard metric for determining the cumulative exposure of individuals to noise.

DOWNWIND LEG: A flight path parallel to the landing runway in the direction opposite to landing. The downwind leg normally extends between the crosswind leg and the base leg. Also see "traffic pattern."

EASEMENT: The legal right of one party to use a portion of the total rights in real estate owned by another party. This may include the right of passage over, on, or below the property; certain air rights above the property, including view rights; and the rights to any specified form of development or activity, as well as any other legal rights in the property that may be specified in the easement document.

ENPLANED PASSENGERS: the total number of revenue passengers boarding aircraft, including originating, stop-over, and transfer passengers, in scheduled and non-scheduled services.

FINAL APPROACH: A flight path in the direction of landing along the extended runway centerline. The final approach normally extends from the base leg to the runway. See "traffic pattern."

FIXED BASE OPERATOR (FBO): A provider of services to users of an airport. Such services include, but are not limited to, hangaring, fueling, flight training, repair, and maintenance.

FRANGIBLE NAVAID: a navigational aid which retains its structural integrity and stiffness up to a designated maximum load, but on impact from a greater load, breaks, distorts, or yields in such a manner as to present the minimum hazard to aircraft.

GENERAL AVIATION: that portion of civil aviation which encompasses all facets of aviation except air carriers holding a certificate of convenience and necessity, and large aircraft commercial operators.

GLIDESLOPE (GS): Provides vertical guidance for aircraft during approach and landing. The glideslope consists of the following:

1. Electronic components emitting signals which provide vertical guidance by reference to airborne instruments during instrument approaches such as ILS; or

2. Visual ground aids, such as VASI, which provide vertical guidance for VFR approach or for the visual portion of an instrument approach and landing.

GLOBAL POSITIONING SYSTEM: See "GPS."

GPS - GLOBAL POSITIONING SYSTEM: A system of 24 satellites used as reference points to enable navigators equipped with GPS receivers to determine their latitude, longitude, and altitude.

HELIPAD: a designated area for the takeoff, landing, and parking of helicopters.

HIGH-SPEED EXIT TAXIWAY: a long radius taxiway designed to expedite aircraft turning off the runway after landing (at speeds to 60 knots), thus reducing runway occupancy time.

INSTRUMENT APPROACH: A series of predetermined maneuvers for the orderly transfer of an aircraft under instrument flight conditions from the beginning of the initial approach to a landing, or to a point from which a landing may be made visually.

INSTRUMENT FLIGHT RULES (IFR): Rules governing the procedures for conducting instrument flight. Also a term used by pilots and controllers to indicate type of flight plan.

INSTRUMENT LANDING SYSTEM (ILS): A precision instrument approach system which normally consists of the following electronic components and visual aids:

1. Localizer.
2. Glide Slope.
3. Outer Marker.
4. Middle Marker.
5. Approach Lights.

LANDING DISTANCE AVAILABLE (LDA): see declared distances.

LOCAL TRAFFIC: aircraft operating in the traffic pattern or within sight of the tower, or aircraft known to be departing or arriving from the local practice areas, or aircraft executing practice instrument approach procedures. Typically, this includes touch-and-go training operations.

LOCALIZER: The component of an ILS which provides course guidance to the runway.

LOCALIZER TYPE DIRECTIONAL AID (LDA): a facility of comparable utility and accuracy to a localizer, but is not part of a complete ILS and is not aligned with the runway.

LORAN: long range navigation, an electronic navigational aid which determines aircraft position and speed by measuring the difference in the time of reception of synchronized pulse signals from two fixed transmitters. Loran is used for enroute navigation.

MICROWAVE LANDING SYSTEM (MLS): an instrument approach and landing system that provides precision guidance in azimuth, elevation, and distance measurement.

MILITARY OPERATIONS AREA (MOA): see special-use airspace.

MISSED APPROACH COURSE (MAC): The flight route to be followed if, after an instrument approach, a landing is not effected, and occurring normally:

1. When the aircraft has descended to the decision height and has not established visual contact; or

2. When directed by air traffic control to pull up or to go around again.

MOVEMENT AREA: the runways, taxiways, and other areas of an airport which are utilized for taxiing/hover taxiing, air taxiing, takeoff, and landing of aircraft, exclusive of loading ramps and parking areas. At those airports with a tower, air traffic control clearance is required for entry onto the movement area.

NAVAID: a term used to describe any electrical or visual air navigational aids, lights, signs, and associated supporting equipment (i.e. PAPI, VASI, ILS, etc..)

NOISE CONTOUR: A continuous line on a map of the airport vicinity connecting all points of the same noise exposure level.

NONDIRECTIONAL BEACON (NDB): A beacon transmitting nondirectional signals whereby the pilot of an aircraft equipped with direction finding equipment can determine his or her bearing to and from the radio beacon and home on, or track to, the station. When the radio beacon is installed in conjunction with the Instrument Landing System marker, it is normally called a Compass Locator.

NONPRECISION APPROACH PROCEDURE: a standard instrument approach procedure in which no electronic glide slope is provided, such as VOR, TACAN, NDB, or LOC.

OBJECT FREE AREA (OFA): an area on the ground centered on a runway, taxiway, or taxilane centerline provided to enhance the safety of aircraft operations by having the area free of objects, except for objects that need to be located in the OFA for air navigation or aircraft ground maneuvering purposes.

OBSTACLE FREE ZONE (OFZ): the airspace below 150 feet above the established airport elevation and along the runway and extended runway centerline that is required to be kept clear of all objects, except for frangible visual NAVAIDs that need to be located in the OFZ because of their function, in order to provide clearance for aircraft landing or taking off from the runway, and for missed approaches.

OPERATION: a take-off or a landing.

OUTER MARKER (OM): an ILS navigation facility in the terminal area navigation system located four to seven miles from the runway edge on the extended centerline indicating to the pilot, that he/she is passing over the facility and can begin final approach.

PRECISION APPROACH: a standard instrument approach procedure which provides runway alignment and glide slope (descent) information. It is categorized as follows:

- *CATEGORY I (CAT I):* a precision approach which provides for approaches with a decision height of not less than 200 feet and visibility not less than 1/2 mile or Runway Visual Range (RVR) 2400 (RVR 1800) with operative touchdown zone and runway centerline lights.

- *CATEGORY II (CAT II):* a precision approach which provides for approaches with a decision height of not less than 100 feet and visibility not less than 1200 feet RVR.

- *CATEGORY III (CAT III):* a precision approach which provides for approaches with minima less than Category II.

PRECISION APPROACH PATH INDICATOR (PAPI): A lighting system providing visual approach slope guidance to aircraft during a landing approach. It is similar to a VASI but provides a sharper transition between the colored indicator lights.

PRECISION OBJECT FREE AREA (POFA): an area centered on the extended runway centerline, beginning at the runway threshold and extending behind the runway threshold that is 200 feet long by 800 feet wide. The POFA is a clearing standard which requires the POFA to be kept clear of above ground objects protruding above the runway safety area edge elevation (except for frangible NAVAIDS). The POFA applies to all new authorized instrument approach procedures with less than 3/4 mile visibility.

PROHIBITED AREA: see special-use airspace.

REMOTE COMMUNICATIONS OUTLET (RCO): an unstaffed transmitter receiver/facility remotely controlled by air traffic personnel. RCOs serve flight service stations (FSSs). RCOs were established to provide ground-to-ground communications between air traffic control specialists and pilots at satellite airports for delivering enroute clearances, issuing departure authorizations, and acknowledging instrument flight rules cancellations or departure/landing times.

REMOTE TRANSMITTER/RECEIVER (RTR): see remote communications outlet. RTRs serve ARTCCs.

RELIEVER AIRPORT: an airport to serve general aviation aircraft which might otherwise use a congested air-carrier served airport.

RESTRICTED AREA: see special-use airspace.

RNAV: area navigation - airborne equipment which permits flights over determined tracks within prescribed accuracy tolerances without the need to overfly ground-based navigation facilities. Used enroute and for approaches to an airport.

RUNWAY: a defined rectangular area on an airport prepared for aircraft landing and takeoff. Runways are normally numbered in relation to their magnetic direction, rounded off to the nearest 10 degrees. For example, a runway with a magnetic heading of 180 would be designated Runway 18. The runway heading on the opposite end of the runway is 180 degrees from that runway end. For example, the opposite runway heading for Runway 18 would be Runway 36 (magnetic heading of 360). Aircraft can takeoff or land from either end of a runway, depending upon wind direction.

RUNWAY BLAST PAD: a surface adjacent to the ends of runways provided to reduce the erosive effect of jet blast and propeller wash.

RUNWAY END IDENTIFIER LIGHTS (REIL): Two synchronized flashing lights, one on each side of the runway threshold, which provide rapid and positive identification of the approach end of a particular runway.

RUNWAY GRADIENT: the average slope, measured in percent, between the two ends of a runway.

RUNWAY PROTECTION ZONE (RPZ): An area off the runway end to enhance the protection of people and property on the ground. The RPZ is trapezoidal in shape. Its dimensions are determined by the aircraft approach speed and runway approach type and minima.

RUNWAY SAFETY AREA (RSA): a defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway.

RUNWAY VISUAL RANGE (RVR): an instrumentally derived value, in feet, representing the horizontal distance a pilot can see down the runway from the runway end.

RUNWAY VISIBILITY ZONE (RVZ): an area on the airport to be kept clear of permanent objects so that there is an unobstructed line-of-site from any point five feet above the runway centerline to any point five feet above an intersecting runway centerline.

SEGMENTED CIRCLE: a system of visual indicators designed to provide traffic pattern information at airports without operating control towers.

SHOULDER: an area adjacent to the edge of paved runways, taxiways or aprons providing a transition between the pavement and the adjacent surface; support for aircraft running off the pavement; enhanced drainage; and blast protection. The shoulder does not necessarily need to be paved.

SLANT-RANGE DISTANCE: The straight line distance between an aircraft and a point on the ground.

SPECIAL-USE AIRSPACE: airspace of defined dimensions identified by a surface area wherein activities must be confined because of their nature and/or wherein limitations may be imposed upon aircraft operations that are not a part of those activities. Special-use airspace classifications include:

- *ALERT AREA:* airspace which may contain a high volume of pilot training activities or an unusual type of aerial activity, neither of which is hazardous to aircraft.

- *CONTROLLED FIRING AREA:* airspace wherein activities are conducted under conditions so controlled as to eliminate hazards to nonparticipating aircraft and to ensure the safety of persons or property on the ground.

- *MILITARY OPERATIONS AREA (MOA):* designated airspace with defined vertical and lateral dimensions established outside Class A airspace to separate/segregate certain military activities from instrument flight rule (IFR) traffic and to identify for visual flight rule (VFR) traffic where these activities are conducted.

- *PROHIBITED AREA:* designated airspace within which the flight of aircraft is prohibited.

- *RESTRICTED AREA:* airspace designated under Federal Aviation Regulation (FAR) 73, within which the flight of aircraft, while not wholly prohibited, is subject to restriction. Most restricted areas are designated joint use. When not in use by the using agency, IFR/VFR operations can be authorized by the controlling air traffic control facility.

- *WARNING AREA:* airspace which may contain hazards to nonparticipating aircraft.

STANDARD INSTRUMENT DEPARTURE (SID): a preplanned coded air traffic control IFR departure routing, preprinted for pilot use in graphic and textual form only.

STANDARD TERMINAL ARRIVAL (STAR): a preplanned coded air traffic control IFR arrival routing, preprinted for pilot use in graphic and textual or textual form only.

STOP-AND-GO: a procedure wherein an aircraft will land, make a complete stop on the runway, and then commence a takeoff from that point. A stop-and-go is recorded as two operations: one operation for the landing and one operation for the takeoff.

STRAIGHT-IN LANDING/APPROACH: a landing made on a runway aligned within 30 degrees of the final approach course following completion of an instrument approach.

TACTICAL AIR NAVIGATION (TACAN): An ultra-high frequency electronic air navigation system which provides suitably-equipped aircraft a continuous indication of bearing and distance to the TACAN station.

TAKEOFF RUNWAY AVAILABLE (TORA): see declared distances.

TAKEOFF DISTANCE AVAILABLE (TODA): see declared distances.

TAXILANE: the portion of the aircraft parking area used for access between taxiways and aircraft parking positions.

TAXIWAY: a defined path established for the taxiing of aircraft from one part of an airport to another.

TAXIWAY SAFETY AREA (TSA): a defined surface alongside the taxiway prepared or suitable for reducing the risk of damage to an airplane unintentionally departing the taxiway.

TETRAHEDRON: a device used as a landing direction indicator. The small end of the tetrahedron points in the direction of landing.

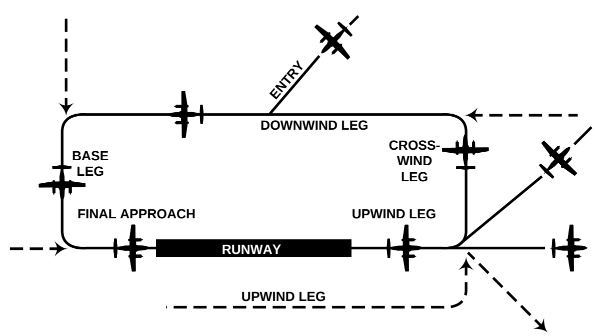
THRESHOLD: the beginning of that portion of the runway available for landing. In some instances the landing threshold may be displaced.

TOUCH-AND-GO: an operation by an aircraft that lands and departs on a runway without stopping or exiting the runway. A touch-and-go is recorded as two operations: one operation for the landing and one operation for the takeoff.

TOUCHDOWN ZONE LIGHTING (TDZ): Two rows of transverse light bars located symmetrically about the runway centerline normally at 100-foot intervals. The basic system extends 3,000 feet along the runway.

TRAFFIC PATTERN: The traffic flow that is prescribed for aircraft landing at or taking off from an airport. The components of a typical traffic pattern are the upwind leg, crosswind leg, downwind leg, base leg, and final approach.

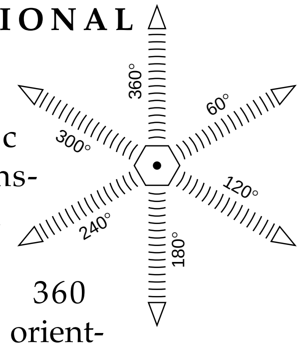
UNICOM: A nongovernment communication facility which may provide airport information at certain airports. Locations and frequencies of UNICOM's are shown on aeronautical charts and publications.



UPWIND LEG: A flight path parallel to the landing runway in the direction of landing. See "traffic pattern."

VECTOR: A heading issued to an aircraft to provide navigational guidance by radar.

VERY HIGH FREQUENCY/ OMNIDIRECTIONAL RANGE STATION (VOR): A ground-based electronic navigation aid transmitting very high frequency navigation signals, 360 degrees in azimuth, oriented from magnetic north. Used as the basis for navigation in the national airspace system. The VOR periodically identifies itself by Morse Code and may have an additional voice identification feature.



VERY HIGH FREQUENCY OMNIDIRECTIONAL RANGE STATION/TACTICAL AIR NAVIGATION (VORTAC): A navigation aid providing VOR azimuth, TACAN azimuth, and TACAN distance-measuring equipment (DME) at one site.

VICTOR AIRWAY: A control area or portion thereof established in the form of a corridor, the centerline of which is defined by radio navigational aids.

VISUAL APPROACH: An approach wherein an aircraft on an IFR flight plan, operating in VFR conditions under the control of an air traffic control facility and having an air traffic control authorization, may proceed to the airport of destination in VFR conditions.

VISUAL APPROACH SLOPE INDICATOR (VASI): An airport lighting facility providing vertical visual approach slope guidance to aircraft during approach to landing by radiating a directional pattern of high intensity red and white focused light beams which indicate to the pilot that he is on path if he sees red/white, above path if white/white, and below path if red/red. Some airports serving large aircraft have three-bar VASI's which provide two visual guide paths to the same runway.

VISUAL FLIGHT RULES (VFR): Rules that govern the procedures for conducting flight under visual conditions. The term VFR is also used in the United States to indicate weather conditions that are equal to or greater than minimum VFR requirements. In addition, it is used by pilots and controllers to indicate type of flight plan.

VOR: See "Very High Frequency Omnidirectional Range Station."

VORTAC: See "Very High Frequency Omnidirectional Range Station/Tactical Air Navigation."

WARNING AREA: see special-use airspace.

ABBREVIATIONS

AC: advisory circular

ADF: automatic direction finder

ADG: airplane design group

AFSS: automated flight service station

AGL: above ground level

AIA: annual instrument approach

AIP: Airport Improvement Program

AIR-21: Wendell H. Ford Aviation Investment and Reform Act for the 21st Century

ALS: approach lighting system

ALSF-1: standard 2,400-foot high intensity approach lighting system with sequenced flashers (CAT I configuration)

ALSF-2: standard 2,400-foot high intensity approach light ing system with sequenced flashers (CAT II configuration)

APV: instrument approach procedure with vertical guidance

ARC: airport reference code

ARFF: aircraft rescue and fire-fighting

ARP: airport reference point

ARTCC: air route traffic control center

ASDA: accelerate-stop distance available

ASR: airport surveillance radar

ASOS: automated surface observation station

ATCT: airport traffic control tower

ATIS: automated terminal information service

AVGAS: aviation gasoline - typically 100 low lead (100LL)

AWOS: automated weather observation station

BRL: building restriction line

CFR: Code of Federal Regulations

CIP: capital improvement program

DME: distance measuring equipment

DNL: day-night noise level

DWL: runway weight bearing capacity for air craft with dual-wheel type landing gear

DTWL: runway weight bearing capacity for aircraft with dual-tandem type landing gear

FAA: Federal Aviation Administration

FAR: Federal Aviation Regulation

FBO: fixed base operator

FY: fiscal year

GPS: global positioning system

GS: glide slope

HIRL: high intensity runway edge lighting

IFR: instrument flight rules (FAR Part 91)

ILS: instrument landing system

IM: inner marker

LDA: localizer type directional aid

LDA: landing distance available

LIRL: low intensity runway edge lighting

LMM: compass locator at middle marker

LOC: ILS localizer

LOM: compass locator at ILS outer marker

LORAN: long range navigation

MALS: medium intensity approach lighting system

MALSR: medium intensity approach lighting system with sequenced flashers

MALSR: medium intensity approach lighting system with runway alignment indicator lights

MIRL: medium intensity runway edge lighting

MITL: medium intensity taxiway edge lighting

MLS: microwave landing system

MM: middle marker

MOA: military operations area

MSL: mean sea level

NAVAID: navigational aid

NDB: nondirectional radio beacon

NM: nautical mile (6,076 .1 feet)

NPIAS: National Plan of Integrated Airport Systems

NPRM: notice of proposed rule-making

ODALS: omnidirectional approach lighting system

OFA: object free area

OFZ: obstacle free zone

OM: outer marker

PAC: planning advisory committee

PAPI: precision approach path indicator

PFC: porous friction course

PFC: passenger facility charge

PCL: pilot-controlled lighting

PIW: public information workshop

PLASI: pulsating visual approach slope indicator

POFA: precision object free area

PVASI: pulsating/steady visual approach slope indicator

RCO: remote communications outlet

REIL: runway end identifier lighting

RNAV: area navigation

RPZ: runway protection zone

RTR: remote transmitter/receiver

RVR: runway visibility range

RVZ: runway visibility zone

SALS: short approach lighting system

SASP: state aviation system plan

SEL: sound exposure level

SID: standard instrument departure

SM: statute mile (5,280 feet)

SRE: snow removal equipment

SSALF: simplified short approach lighting system with sequenced flashers

SSALR: simplified short approach lighting system with runway alignment indicator lights

STAR: standard terminal arrival route

SWL: runway weight bearing capacity for aircraft with single-wheel type landing gear

STWL: runway weight bearing capacity for aircraft with single-wheel tandem type landing gear

TACAN: tactical air navigational aid

TAF: Federal Aviation Administration (FAA) Terminal Area Forecast

TODA: takeoff distance available

TORA: takeoff runway available

TRACON: terminal radar approach control

VASI: visual approach slope indicator

VFR: visual flight rules (FAR Part 91)

VHF: very high frequency

VOR: very high frequency omnidirectional range

VORTAC: VOR and TACAN collocated

APPENDIX B
BASED AIRCRAFT/LAND LEASE LIST

Appendix B
BASED AIRCRAFT/LAND LEASE LIST

REGISTRATION NAME	N#	AIRCRAFT TYPE
Patricia Brower Privately owned hangar upper pad.	N33417	Piper Archer
Craig Spillman Ramp tiedown	N2862U	Cessna 172
Morris Courtright Ramp tiedown	N2448C	Piper Tomahawk
Ron Lee Privately owned hangar, upper pad.	N4680L	Titan Tornado
W. Traweek Privately owned hangar, upper pad.	NC2227K	Luscombe 8A
W. Traweek Privately owned hangar,upper pad.	N93569	Ercoupe
C. Traweek Privately owned hangar, upper pad.	NC 71177	Luscombe 8E
Robert Berg Privately owned hangar, lower pad.	A11RHB	Titan tornado
Winston Seiler Ramp Tiedown	N930JS	Cessna 150
Robert Berg Privately owned hangar,lower pad.	A10RHB	Quicksilver
Bruce Drath Privately owned hangar, lower pad.	A74BBD	Titan Tornado
Unknown Enclosed hangar/trailer, lower pad	unknown;	Kolb Firefly
Jim Hefner Privately owned hangar, upper pad	UL not registered	Kolb Firefly
Tim McMakanus Temporarily in rebuild	unknown	Champion Citrabria
Max Wood Privately owned hangar, upper pad.	N3MW	Bede BD-4
Ivan Bennet Privately owned hangar, upper pad.	N900WH	Titan Tornado
George Crowe Ramp Tiedown.	N71595	Cessna 182M
Don Cahill Privately owned hangar, upper pad.	not registered	Rans Coyote UL Trainer

APPENDIX C
AIRPORT LAYOUT PLAN DRAWINGS

Appendix C
AIRPORT LAYOUT PLAN DRAWINGS

Per Federal Aviation Administration (FAA) and Arizona Department of Transportation, Division of Aeronautics (ADOT) requirements, an official Airport Layout Plan (ALP) has been developed for San Manuel Airport. The ALP graphically presents the existing and ultimate airport layout. The ALP is used, in part by the FAA and state, to determine funding eligibility for future development projects.

The ALP was prepared on a computer-aided drafting system for future ease of use. The computerized plan set provides detailed information of existing and future facility layout on multiple layers that permits the user to focus in on any section of the airport at a desirable scale. The plan can be used as base information for design, and can be easily updated in the future to reflect new development and more detail concerning existing conditions as made available through design surveys.

A number of related drawings, which depict the ultimate airspace and landside development, are included with the ALP. The following provides a brief discussion of the additional drawings included with the ALP:

Terminal Area Drawing - The terminal area drawing provides greater detail concerning landside improvements north of Runway 11-29 and at a larger scale than on the ALP.

Airport Airspace Drawing - The Airport Airspace Drawing is a graphic depiction of Federal Aviation Regulations (F.A.R.) Part 77, *Objects Affecting Navigable Airspace*, regulatory criterion. The Airport Airspace Drawing is intended to aid local authorities in determining if proposed development could present a hazard to the airport and obstruct the approach path to a runway end. This plan should be coordinated with local land use planners.

Runway 11-29 Approach Zone Profiles and Runway Profiles Drawing - This drawing provides both plan and profile views of the F.A.R. Part 77 approach surface for each runway end. A composite profile of the extended ground line is depicted. Obstructions and clearances over roads and railroads are shown as appropriate.

Inner Portion of the Runway 11-29 Approach Surface Drawing - The Inner Portion of the Approach Surface Drawing is a scaled drawings of the runway protection zone (RPZ), runway safety area (RSA), obstacle free zone (OFZ), and object free area (OFA) for each runway end. A plan and profile view of each RPZ is provided to facilitate identification of obstructions that lie within these safety areas. Detailed obstruction and facility data is provided to identify planned improvements and the disposition of obstructions (as appropriate).

On-Airport Land Use Drawing - The On-Airport Land Use Drawing is a graphic depiction of the land use recommendations. When development is proposed, it should be directed to the appropriate land use area depicted on this plan.

Airport Property Map - The Property Map provides information on the acquisition and identification of all land tracts under the control of the airport. Both existing and future property holdings are identified on the Property Map.

AIRPORT LAYOUT PLANS

FOR

San Manuel
AIRPORT

SAN MANUEL, ARIZONA

Prepared for

PINAL COUNTY,
ARIZONA

INDEX OF DRAWINGS

1. AIRPORT LAYOUT DRAWING
2. AIRPORT AIRSPACE DRAWING
3. RUNWAY 11-29 APPROACH SURFACE & RUNWAY PROFILE DRAWING
4. INNER PORTION OF THE RUNWAY 11 APPROACH SURFACE DRAWING
5. INNER PORTION OF THE RUNWAY 29 APPROACH SURFACE DRAWING
6. TERMINAL AREA DRAWING
7. ON-AIRPORT LAND USE DRAWING
8. AIRPORT PROPERTY MAP

Coffman Associates D:\CAD\San Manuel\2003\ALP Set\Draft Final\E77COV.dwg 01/09/2004

Coffman Associates
Airport Consultants

MODIFICATIONS FROM FAA AIRPORT DESIGN STANDARDS

DEVIATION DESCRIPTION	EFFECTED DESIGN STANDARD	STANDARD	PROPOSED DISPOSITION
Buildings in Ultimate Object Free Area	Object Free Area	250'	Buildings to be Removed

AIRPORT DATA

San Manuel Airport (E77)

CITY: San Manuel, Arizona		COUNTY: Pinal	
RANGE: 17E TOWNSHIP: 9S		OWNER: Pinal County, Arizona	
		EXISTING	ULTIMATE
AIRPORT CLASSIFICATION		General Aviation	General Aviation
DESIGN AIRCRAFT		Beech, King Air	Cessna Citation
AIRPORT REFERENCE CODE		B-I	B-II
AIRCRAFT DESIGN GROUP		I(1)	II
AIRPORT ELEVATION		3,274.0 MSL	3,274.0 MSL
MEAN MAXIMUM TEMPERATURE OF HOTTEST MONTH		95.8° F	95.8° F
AIRPORT REFERENCE POINT (ARP) COORDINATES (NAD 83)	Latitude	32° 38' 11.253" N	32° 38' 09.565" N
	Longitude	110° 38' 50.351" W	110° 38' 47.566" W
AIRPORT ELECTRONIC AIDS		None	GPS
VISUAL AIDS		WINDCONE SEGMENTED CIRCLE	WINDCONE SEGMENTED CIRCLE REILS PAPI-2
GPS Approach		None	Yes

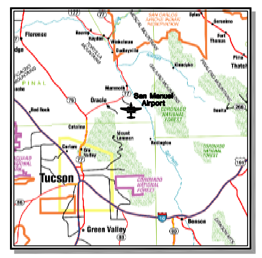
(1) Small Aircraft Exclusively

RUNWAY END COORDINATES (NAD 83)

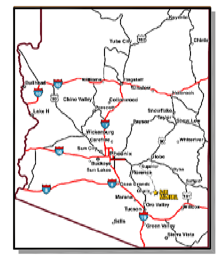
RUNWAY		EXISTING	ULTIMATE
Runway 11	Latitude	32°38'23.374" N	32°38'26.131" N
	Longitude	110°39'10.722" W	110°39'15.576" W
Runway 29	Latitude	32°38'00.210" N	SAME
	Longitude	110°38'29.955" W	SAME

Source: Gilbertson Associates, July 23, 2001.

LOCATION MAP

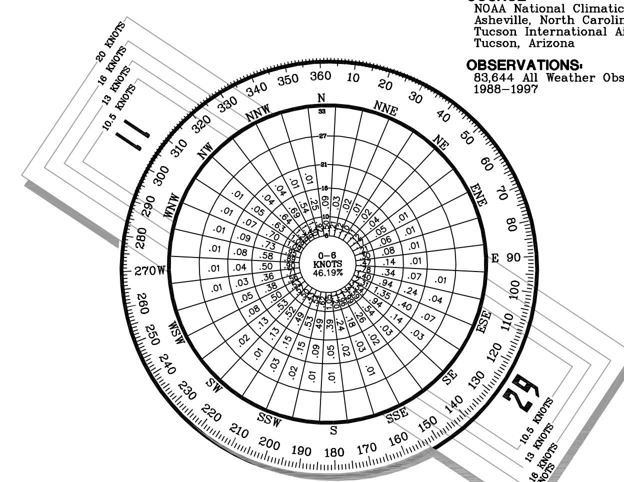


VICINITY MAP



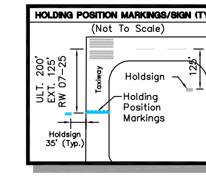
ALL WEATHER WIND COVERAGE

Runways	10.5 Knots 12 MPH	13 Knots 15MPH	16 Knots 18MPH	20 Knots 23MPH
Runway 11-29	94.96%	97.12%	99.01%	99.75%



SOURCE:
NOAA National Climatic Center
Asheville, North Carolina
Tucson International Airport
Tucson, Arizona

OBSERVATIONS:
83,644 All Weather Observations
1988-1997

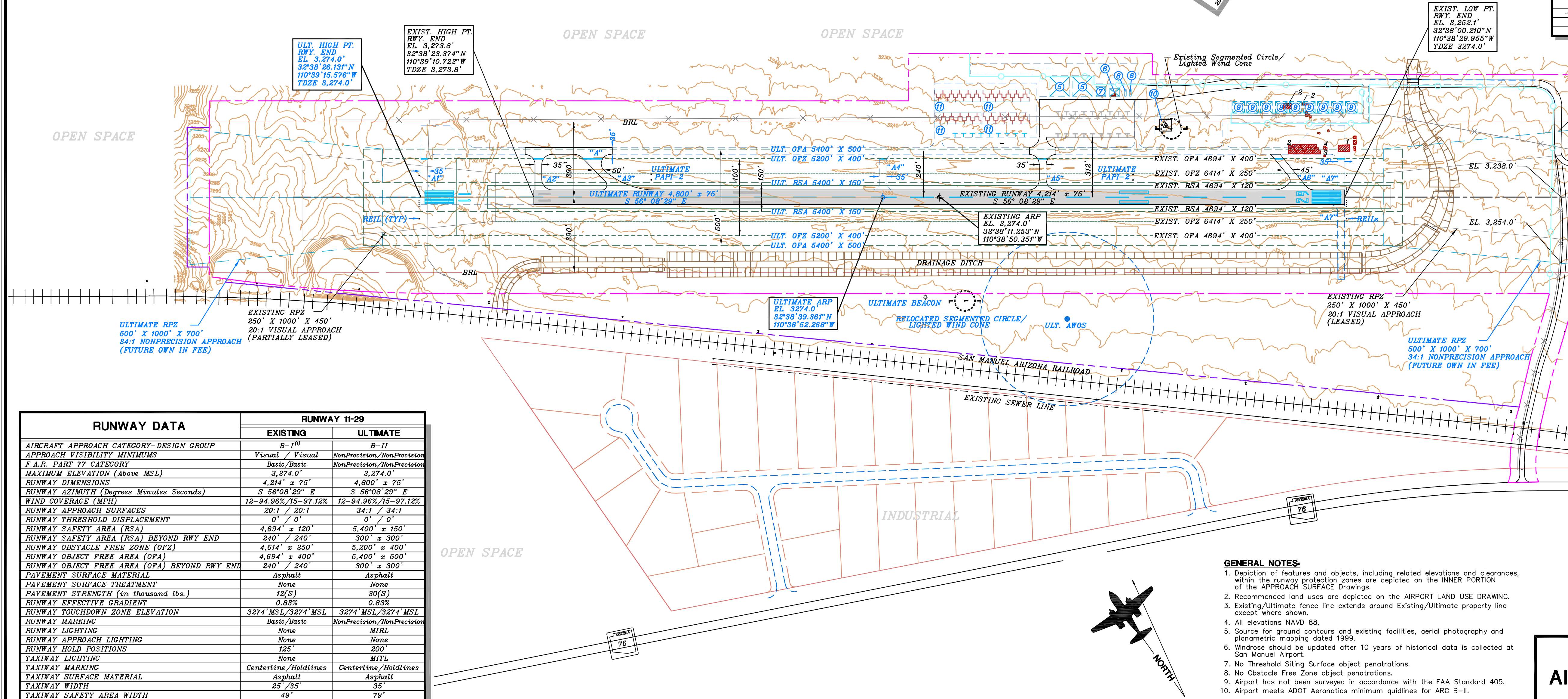


BUILDINGS/FACILITIES

EXISTING	ULTIMATE	DESCRIPTION
1	--	RESIDENCE (TO BE REMOVED)
2	--	HANGARS (TO BE REMOVED)
3	--	FUEL STORAGE (TO BE REMOVED)
4	--	RESTROOM (TO BE REMOVED)
--	5	COMMERICAL/FBO HANGARS
--	6	TERMINAL BUILDING
--	7	WASH RACK
--	8	FUEL STORAGE/ SELF SERVE FUEL ISLAND
--	9	EXECUTIVE/INDIVIDUAL HANGARS
--	10	HELIPAD
--	11	T-HANGARS (10 UNITS EACH)
--	--	--
--	--	--
--	--	--
--		
--		

LEGEND

EXISTING	ULTIMATE	DESCRIPTION
		ABANDONED/REMOVED PAVEMENT
		AIRPORT PROPERTY LINE
		AIRPORT REFERENCE POINT (ARP)
		AIRPORT ROTATING BEACON
		AVIGATION EASEMENT (if applicable)
		BUILDING REMOVAL
		BUILDING CONSTRUCTION
	BRL	BUILDING RESTRICTION LINE (BRL)
		DRAINAGE
		FACILITY CONSTRUCTION
		FENCING
PAPI-2	PAPI-2	NAVIGATIONAL AID INSTALLATION
		RUNWAY END IDENTIFICATION LIGHTS (REIL)
		RUNWAY THRESHOLD LIGHTS
		SEGMENTED CIRCLE/WIND INDICATOR
1080		TOPOGRAPHY
		WIND INDICATOR (Lighted)
		SECTION CORNER
A1	A1	TAXIWAY DESIGNATION



PINAL COUNTY

Approved By: On The Date Of:

Mr. Jim Petty, Airport Manager

ADOT AERONAUTICS APPROVAL

Approved conditionally

Subject to comments in our letter

Arizona Department of Transportation, Aeronautics Division

Kim Stevens, Acting Director

The contents of this plan do not necessarily reflect the official views or policies of the FAA or ADOT Aeronautics. Acceptance of these documents by ADOT Aeronautics does not in any way constitute a commitment on the part of the State of Arizona to participate in any development depicted herein nor does it indicate that the proposed development is environmentally acceptable in accordance with appropriate public or State laws.

RUNWAY DATA

RUNWAY DATA	RUNWAY 11-29 EXISTING	RUNWAY 11-29 ULTIMATE
AIRCRAFT APPROACH CATEGORY-DESIGN GROUP	B-I(1)	B-II
APPROACH VISIBILITY MINIMUMS	Visual / Visual	NonPrecision/NonPrecision
F.A.R. PART 77 CATEGORY	Basic/Basic	NonPrecision/NonPrecision
MAXIMUM ELEVATION (Above MSL)	3,274.0'	3,274.0'
RUNWAY DIMENSIONS	4,214' x 75'	4,800' x 75'
RUNWAY AZIMUTH (Degrees Minutes Seconds)	S 56°08'29" E	S 56°08'29" E
WIND COVERAGE (MPH)	12-94.96%/15-97.12%	12-94.96%/15-97.12%
RUNWAY APPROACH SURFACES	20:1 / 20:1	34:1 / 34:1
RUNWAY THRESHOLD DISPLACEMENT	0' / 0'	0' / 0'
RUNWAY SAFETY AREA (RSA)	4,694' x 120'	5,400' x 150'
RUNWAY SAFETY AREA (RSA) BEYOND RWY END	240' / 240'	300' x 300'
RUNWAY OBSTACLE FREE ZONE (OFZ)	4,614' x 250'	5,200' x 400'
RUNWAY OBJECT FREE AREA (OFA)	4,694' x 400'	5,400' x 500'
RUNWAY OBJECT FREE AREA (OFA) BEYOND RWY END	240' / 240'	300' x 300'
PAVEMENT SURFACE MATERIAL	Asphalt	Asphalt
PAVEMENT SURFACE TREATMENT	None	None
PAVEMENT STRENGTH (in thousand lbs.)	12(S)	30(S)
RUNWAY EFFECTIVE GRADIENT	0.83%	0.83%
RUNWAY TOUCHDOWN ZONE ELEVATION	3274'MSL/3274'MSL	3274'MSL/3274'MSL
RUNWAY MARKING	Basic/Basic	NonPrecision/NonPrecision
RUNWAY LIGHTING	None	MIRL
RUNWAY APPROACH LIGHTING	None	None
RUNWAY HOLD POSITIONS	125'	200'
TAXIWAY LIGHTING	None	MITL
TAXIWAY MARKING	Centerline/Holdlines	Centerline/Holdlines
TAXIWAY SURFACE MATERIAL	Asphalt	Asphalt
TAXIWAY WIDTH	25'/35'	35'
TAXIWAY SAFETY AREA WIDTH	49'	79'
TAXIWAY OBJECT FREE AREA WIDTH	89'	131'
RUNWAY ELECTRONIC NAVIGATIONAL AIDS	None	GPS
RUNWAY VISUAL NAVIGATIONAL AIDS	WINDCONE SEGMENTED CIRCLE	WINDCONE SEGMENTED CIRCLE REILS PAPI-2

(1) Small Aircraft Exclusively

GENERAL NOTES:

1. Depiction of features and objects, including related elevations and clearances, within the runway protection zones are depicted on the INNER PORTION of the APPROACH SURFACE Drawings.
2. Recommended land uses are depicted on the AIRPORT LAND USE DRAWING.
3. Existing/Ultimate fence line extends around Existing/Ultimate property line except where shown.
4. All elevations NAVD 88.
5. Source for ground contours and existing facilities, aerial photography and planametric mapping dated 1999.
6. Windrose should be updated after 10 years of historical data is collected at San Manuel Airport.
7. No Threshold Siting Surface object penatrations.
8. No Obstacle Free Zone object penatrations.
9. Airport has not been surveyed in accordance with the FAA Standard 405.
10. Airport meets ADOT Aeronatics minimum quidlines for ARC B-II.

No.	REVISIONS	DATE	BY	APP'D.
1	Master Plan Update	10/05/92	S.C.	
2	Revised for Master Plan Update	1/09/04	M.J.R.	C.H.

San Manuel Airport

AIRPORT LAYOUT DRAWING

Pinal County, Arizona

PLANNED BY: Christopher H. Hugunin
DETAILED BY: Troy A. Erwin/Maggie Rogers
APPROVED BY: Stephen C. Wagner

January 9, 2004 SHEET 1 OF 8

Coffman Associates Airport Consultants

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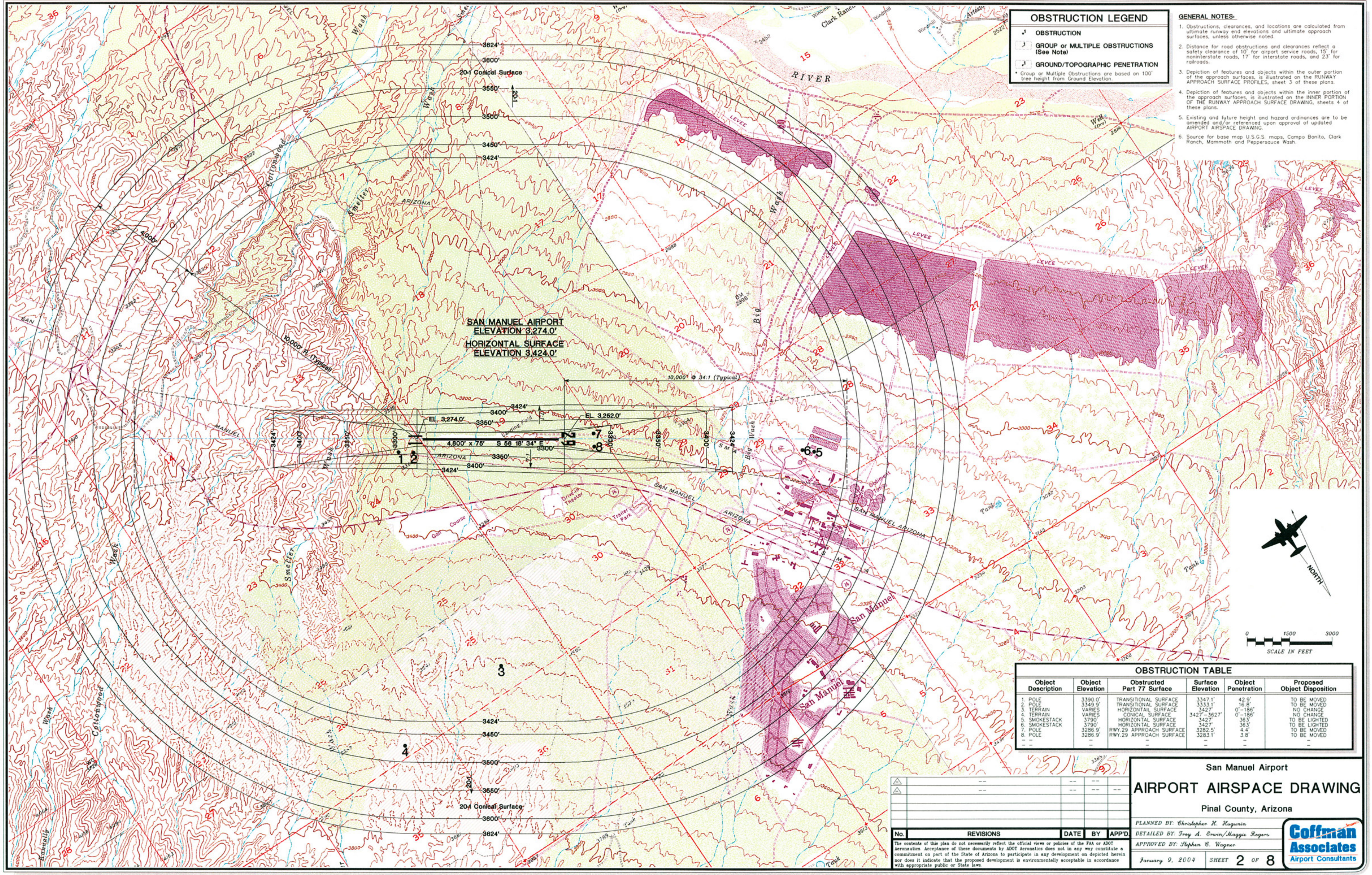

OBSTRUCTION LEGEND

- OBSTRUCTION
- GROUP or MULTIPLE OBSTRUCTIONS (See Note)
- GROUND/TOPOGRAPHIC PENETRATION

* Group or Multiple Obstructions are based on 100' tree height from Ground Elevation.

GENERAL NOTES:

1. Obstructions, clearances, and locations are calculated from ultimate runway end elevations and ultimate approach surfaces, unless otherwise noted.
2. Distance for road obstructions and clearances reflect a safety clearance of 10' for airport service roads, 15' for noninterstate roads, 17' for interstate roads, and 23' for railroads.
3. Depiction of features and objects within the outer portion of the approach surfaces, is illustrated on the RUNWAY APPROACH SURFACE PROFILES, sheet 3 of these plans.
4. Depiction of features and objects within the inner portion of the approach surfaces, is illustrated on the INNER PORTION OF THE RUNWAY APPROACH SURFACE DRAWING, sheets 4 of these plans.
5. Existing and future height and hazard ordinances are to be amended and/or referenced upon approval of updated AIRPORT AIRSPACE DRAWING.
6. Source for base map U.S.G.S. maps, Campo Bonito, Clark Ranch, Mammoth and Peppersauce Wash.

OBSTRUCTION TABLE

Object Description	Object Elevation	Obstructed Part 77 Surface	Surface Elevation	Object Penetration	Proposed Object Disposition
1. POLE	3390.0'	TRANSITIONAL SURFACE	3347.1'	42.9'	TO BE MOVED
2. POLE	3349.9'	TRANSITIONAL SURFACE	3333.1'	16.8'	TO BE MOVED
3. TERRAIN	VARIES	HORIZONTAIL SURFACE	3427'	0'–186'	NO CHANGE
4. TERRAIN	VARIES	CONICAL SURFACE	3427'–3627'	0'–186'	NO CHANGE
5. SMOKESTACK	3790'	HORIZONTAL SURFACE	3427'	363'	TO BE LIGHTED
6. SMOKESTACK	3790'	HORIZONTAL SURFACE	3427'	363'	TO BE LIGHTED
7. POLE	3286.9'	RWY.29 APPROACH SURFACE	3282.5'	4.4'	TO BE MOVED
8. POLE	3286.9'	RWY.29 APPROACH SURFACE	3283.1'	3.8'	TO BE MOVED
– –	–	–	–	–	–
– –	–	–	–	–	–

No.	REVISIONS	DATE	BY	APP'D.
△	--	--	--	
△	--	--	--	--

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San Manuel Airport

AIRPORT AIRSPACE DRAWING

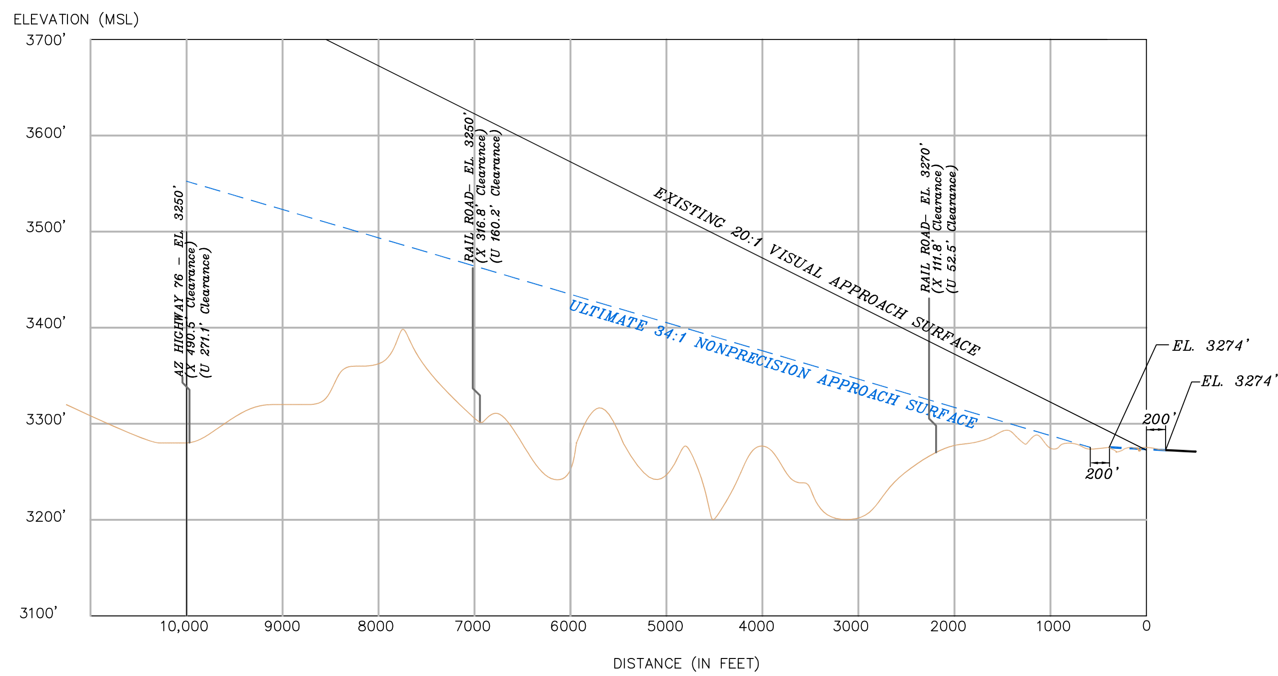
Pinal County, Arizona

PLANNED BY: Christopher H. Hugunin
DETAILED BY: Troy A. Erwin/Maggie Rogers
APPROVED BY: Stephen C. Wagner

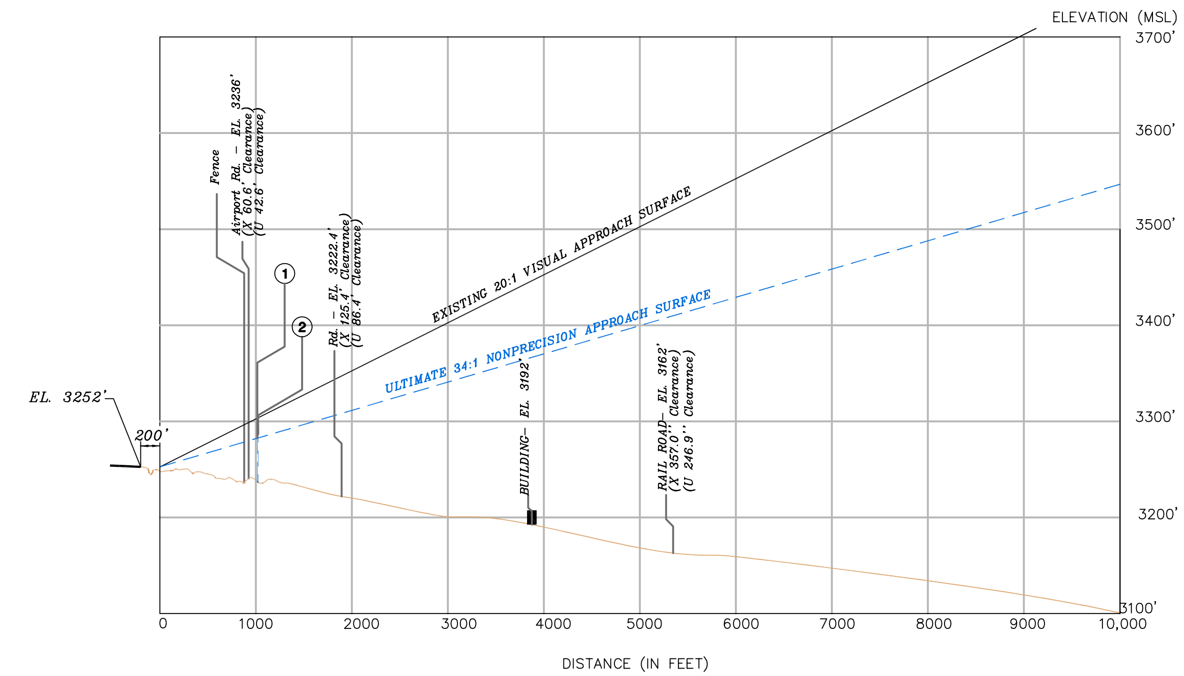
January 9, 2004 SHEET 2 OF 8

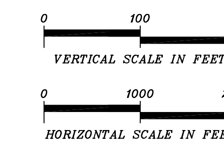
Coffman Associates Airport Consultants

RUNWAY 11

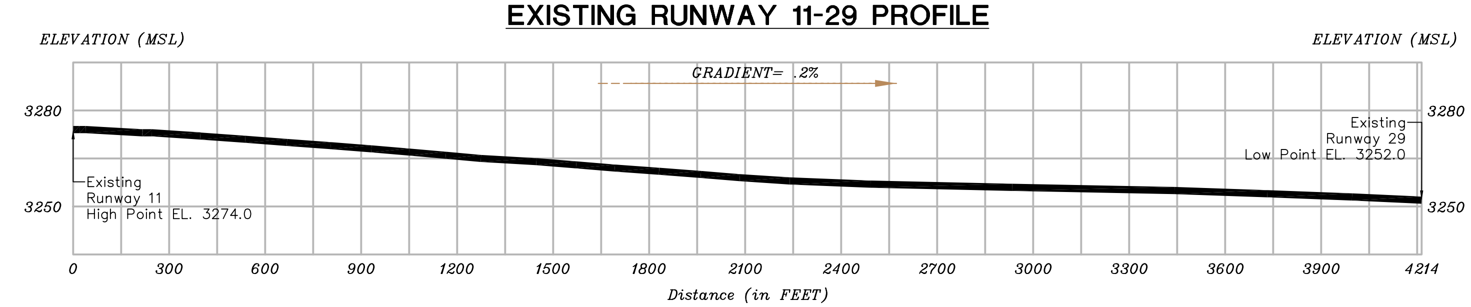


RUNWAY 29

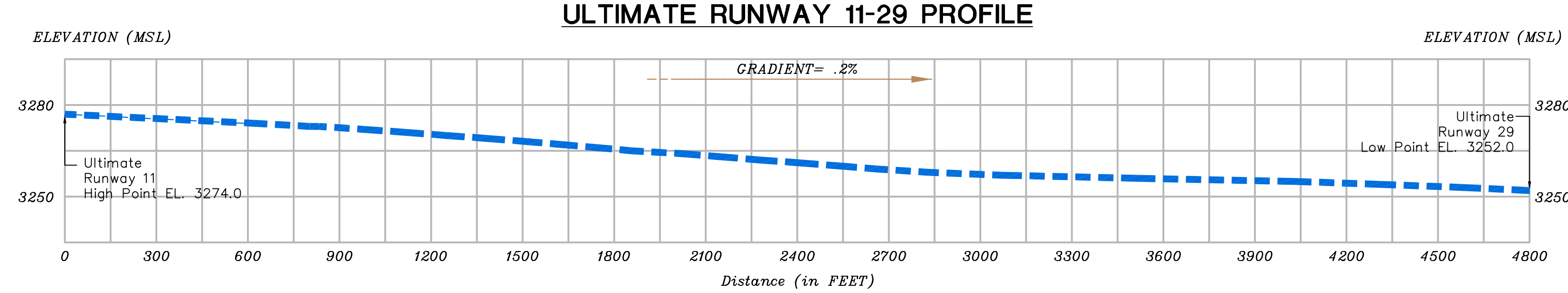


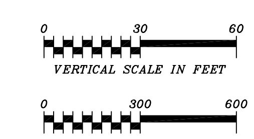


EXISTING RUNWAY 11-29 PROFILE



ULTIMATE RUNWAY 11-29 PROFILE





GENERAL NOTES:

1. Obstructions, clearances, and locations are calculated from ultimate runway end elevations and ultimate approach surfaces, unless otherwise noted.
2. Distance for road obstructions and clearances reflect a safety clearance of 10' for airport service roads, 15' for noninterstate roads, 17' for interstate roads, and 23' for railroads.
3. Depiction of features and objects within the inner portion of the approach surfaces, is illustrated on the INNER PORTION OF RUNWAY APPROACH SURFACE DRAWING, sheet 4 of these plans.

RUNWAY 11 OBSTRUCTION TABLE

Object Description	Object Elevation	Obstructed Part 77 Surface	Surface Elevation	Object Penetration	Proposed Object Disposition
1. NONE	--	--	--	--	--

RUNWAY 29 OBSTRUCTION TABLE

Object Description	Object Elevation	Obstructed Part 77 Surface	Surface Elevation	Object Penetration	Proposed Object Disposition
1. POLE	3,286.9'	RWY 29 APPROACH SURFACE	3,282.5'	4.4'	TO BE REMOVED
2. POWER POLE	3,286.9'	RWY 29 APPROACH SURFACE	3,283.1'	3.8'	TO BE REMOVED

No.	REVISIONS	DATE	BY	APP'D.
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San Manuel Airport

APPROACH ZONE PROFILES AND RUNWAY PROFILES DRAWING

Pinal County, Arizona

PLANNED BY: Christopher H. Hugunin
DETAILED BY: Troy A. Erwin/Maggie Rogers
APPROVED BY: Stephen C. Wagner

January 9, 2004 SHEET 3 OF 8

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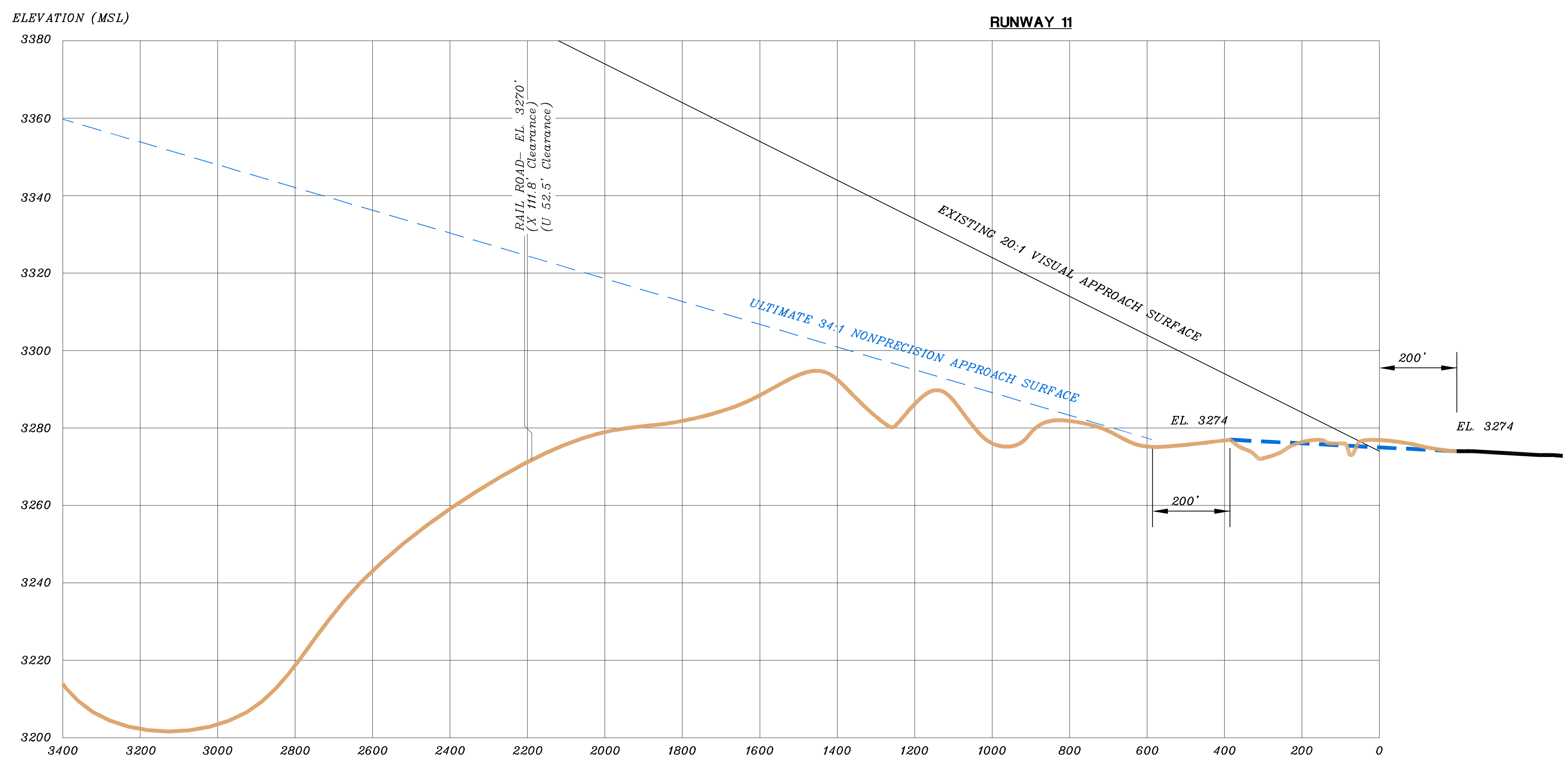
RUNWAY 11



GENERAL NOTES:

1. Obstructions, clearances, and locations are calculated from ultimate runway end elevations and ultimate approach surfaces, unless otherwise noted.
2. Distance for road obstructions and clearances reflect a safety clearance of 10' for airport service roads, 15' for noninterstate roads, 17' for interstate roads, and 23' for railroads.

RUNWAY 11 OBSTRUCTION TABLE

Object Description	Object Elevation	Obstructed Part 77 Surface	Surface Elevation	Object Penetration	Proposed Object Disposition
1. NONE	--	--	--	--	-- --

0 20 40
VERTICAL SCALE IN FEET

0 200 400
HORIZONTAL SCALE IN FEET

No.	REVISIONS	DATE	BY	APP'D.
△	--	--	--	
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San Manuel Airport

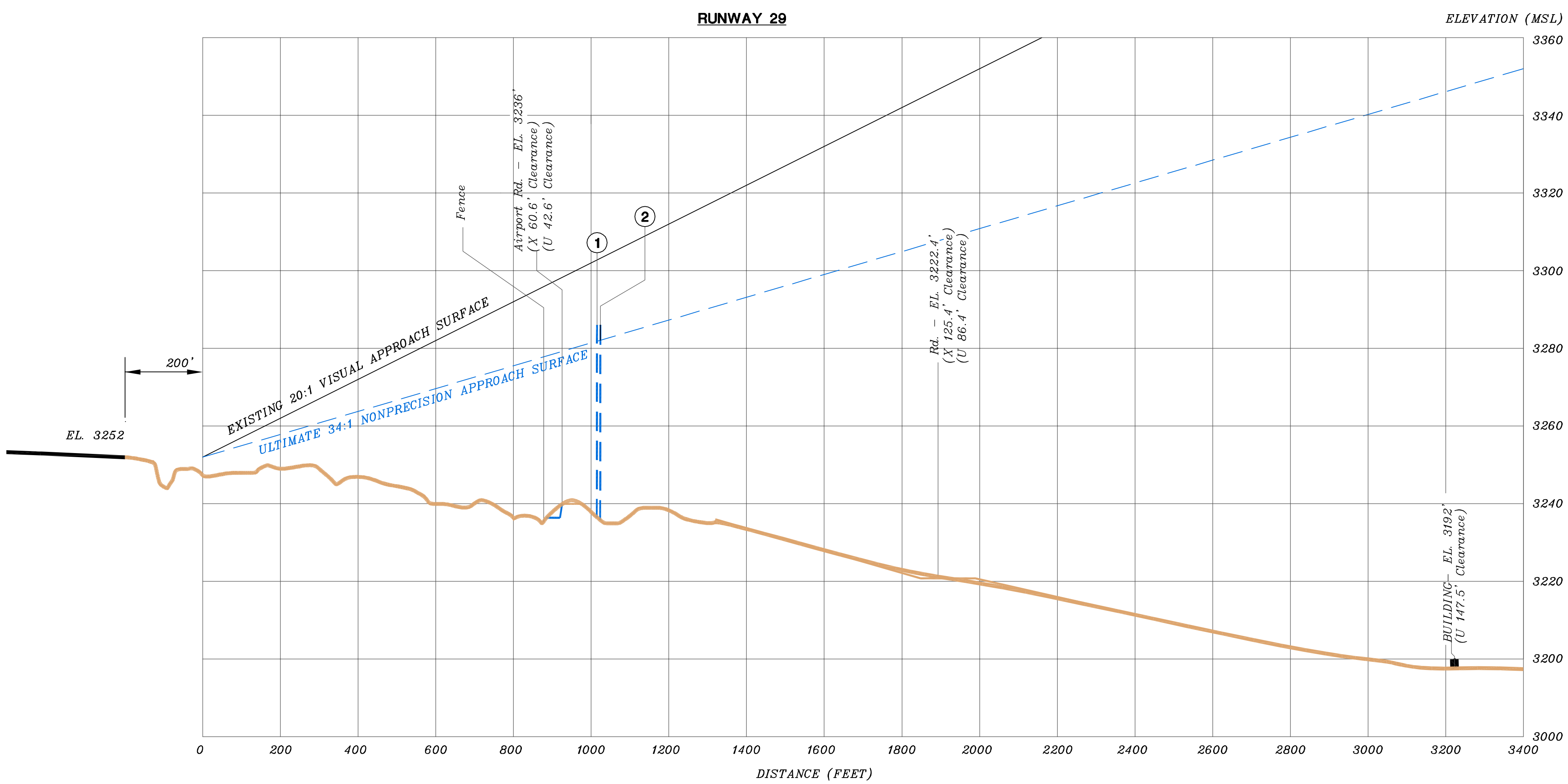
INNER PORTION OF EXISTING RUNWAY 11 APPROACH SURFACE DRAWING

Pinal County, Arizona

PLANNED BY: Christopher H. Hugunin
DETAILED BY: Troy A. Erwin/Maggie Rogers
APPROVED BY: Stephen C, Wagner

January 9, 2004 SHEET 4 OF 8

Coffman Associates Airport Consultants



RUNWAY 29 OBSTRUCTION TABLE

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0 20 40
VERTICAL SCALE IN FEET

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HORIZONTAL SCALE IN FEET

No.	REVISIONS	DATE	BY	APP'D.
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San Manuel Airport

INNER PORTION OF EXISTING RUNWAY 29 APPROACH SURFACE DRAWING

Pinal County, Arizona

PLANNED BY: Christopher H. Hugunin
DETAILED BY: Troy A. Erwin/Maggie Rogers
APPROVED BY: Stephen C. Wagner

January 9, 2004 SHEET 5 OF 8

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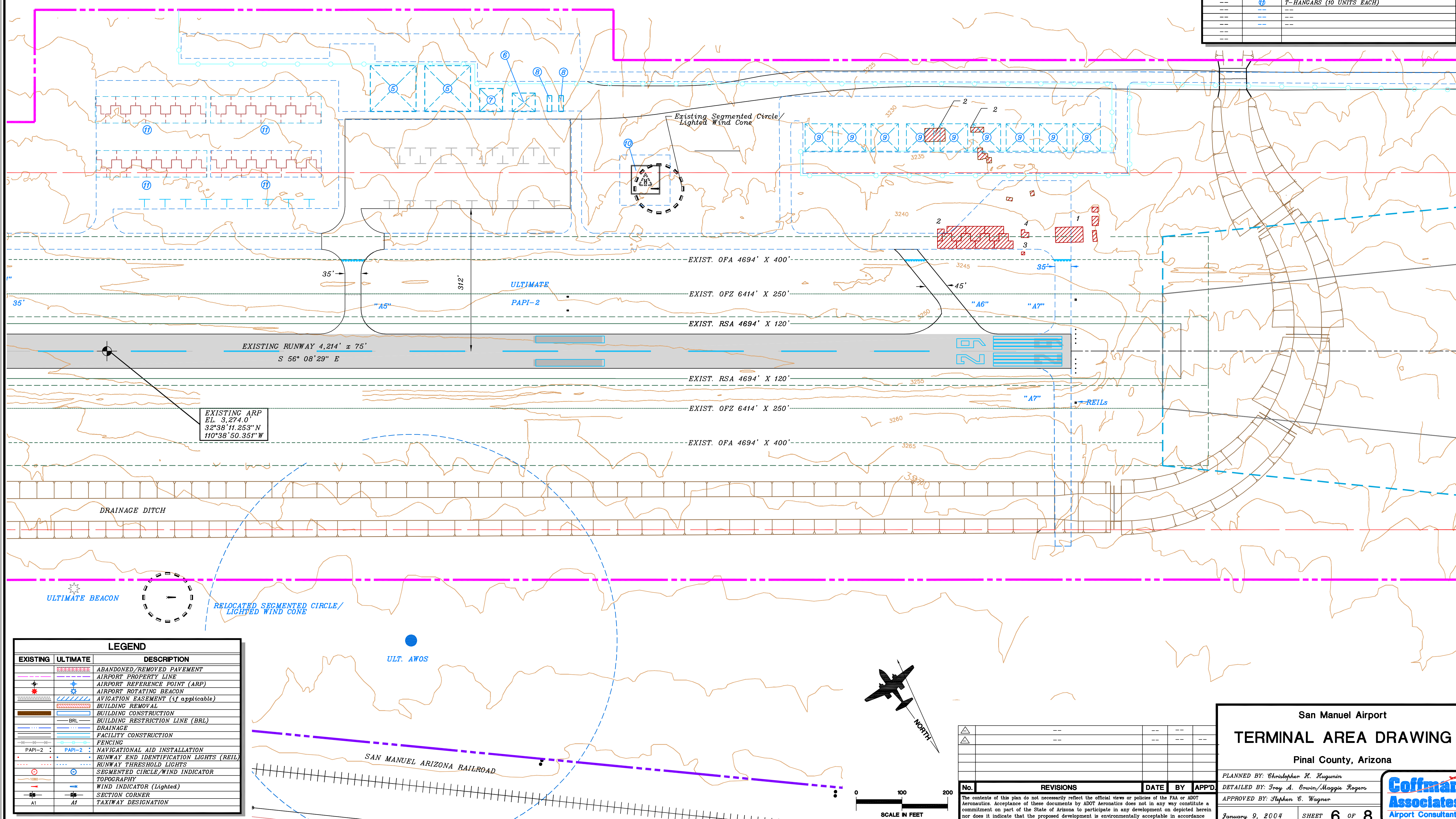

BUILDINGS/FACILITIES

EXISTING	ULTIMATE	DESCRIPTION
1	--	RESIDENCE (TO BE REMOVED)
2	--	HANGARS (TO BE REMOVED)
3	--	FUEL STORAGE (TO BE REMOVED)
4	--	RESTROOM (TO BE REMOVED)
--	5	COMMERICAL/FBO HANGARS
--	6	TERMINAL BUILDING
--	7	WASH RACK
--	8	FUEL STORAGE/ SELF SERVE FUEL ISLAND
--	9	EXECUTIVE/INDIVIDUAL HANGARS
--	10	HELIPAD
--	11	T-HANGARS (10 UNITS EACH)
--	--	--
--	--	--
--	--	--
--		
--		

LEGEND

EXISTING	ULTIMATE	DESCRIPTION
		ABANDONED/REMOVED PAVEMENT
		AIRPORT PROPERTY LINE
		AIRPORT REFERENCE POINT (ARP)
		AIRPORT ROTATING BEACON
		AVIGATION EASEMENT (if applicable)
		BUILDING REMOVAL
		BUILDING CONSTRUCTION
	BRL	BUILDING RESTRICTION LINE (BRL)
		DRAINAGE
		FACILITY CONSTRUCTION
		FENCING
PAPI-2	PAPI-2	NAVIGATIONAL AID INSTALLATION
		RUNWAY END IDENTIFICATION LIGHTS (REIL)
		RUNWAY THRESHOLD LIGHTS
		SEGMENTED CIRCLE/WIND INDICATOR
1080		TOPOGRAPHY
		WIND INDICATOR (Lighted)
		SECTION CORNER
A1	A1	TAXIWAY DESIGNATION

Coffman Associates D: CAD\San Manuel\2003\ALPset\Final Draft\E77TAD.dwg 101/09/2004

No.	REVISIONS	DATE	BY	APP'D.
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San Manuel Airport

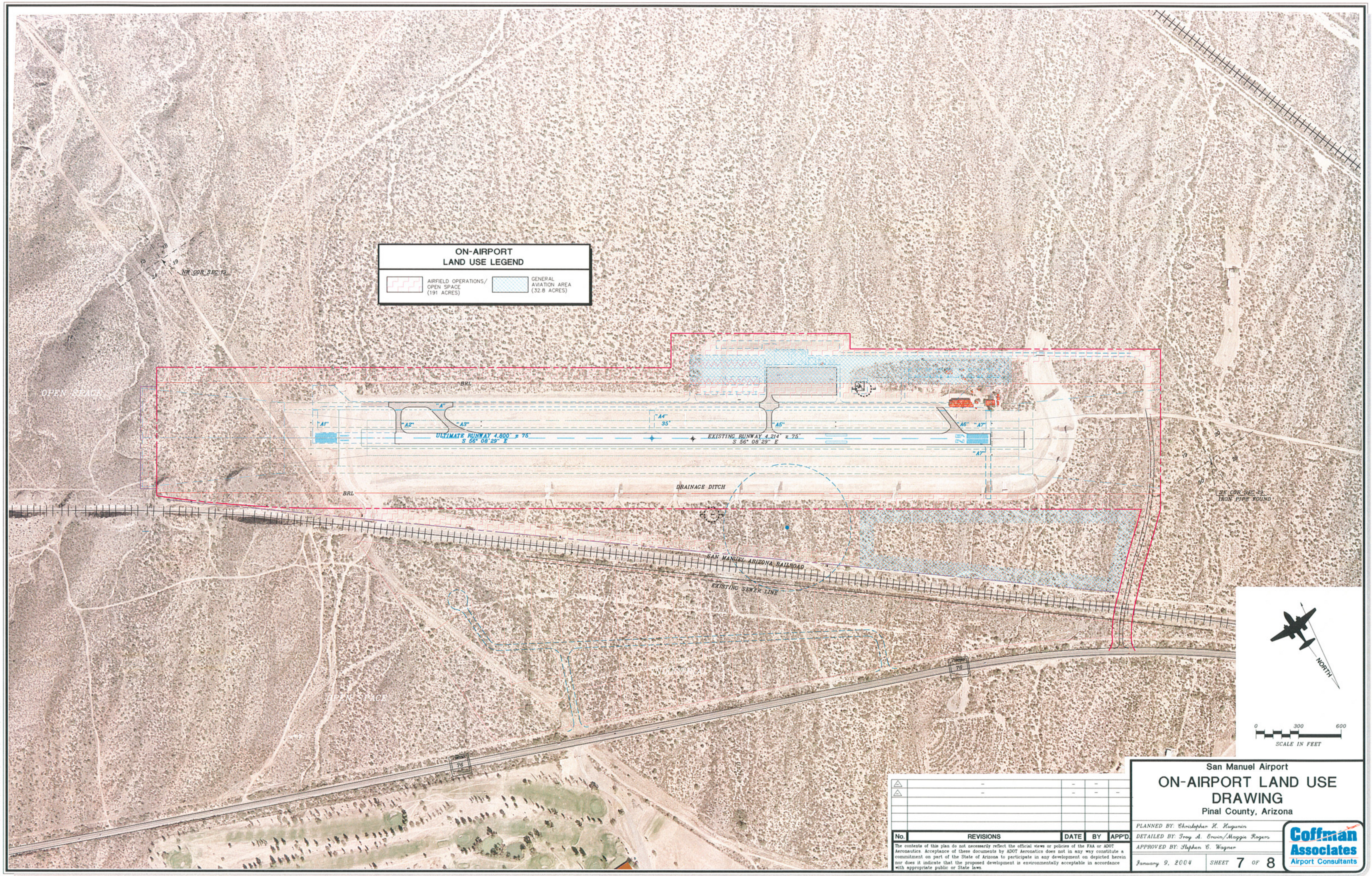
TERMINAL AREA DRAWING

Pinal County, Arizona

PLANNED BY: Christopher H. Hugunin
DETAILED BY: Troy A. Erwin/Maggie Rogers
APPROVED BY: Stephen C. Wagner

January 9, 2004 SHEET 6 OF 8

Coffman Associates Airport Consultants



San Manuel Airport

ON-AIRPORT LAND USE DRAWING

Pinal County, Arizona

No.	REVISIONS	DATE	BY	APP'D.
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PLANNED BY: Christopher H. Huguenin
DETAILED BY: Troy A. Erwin/Maggie Rogers
APPROVED BY: Stephen C. Wagner

January 9, 2004 — SHEET 7 OF 8

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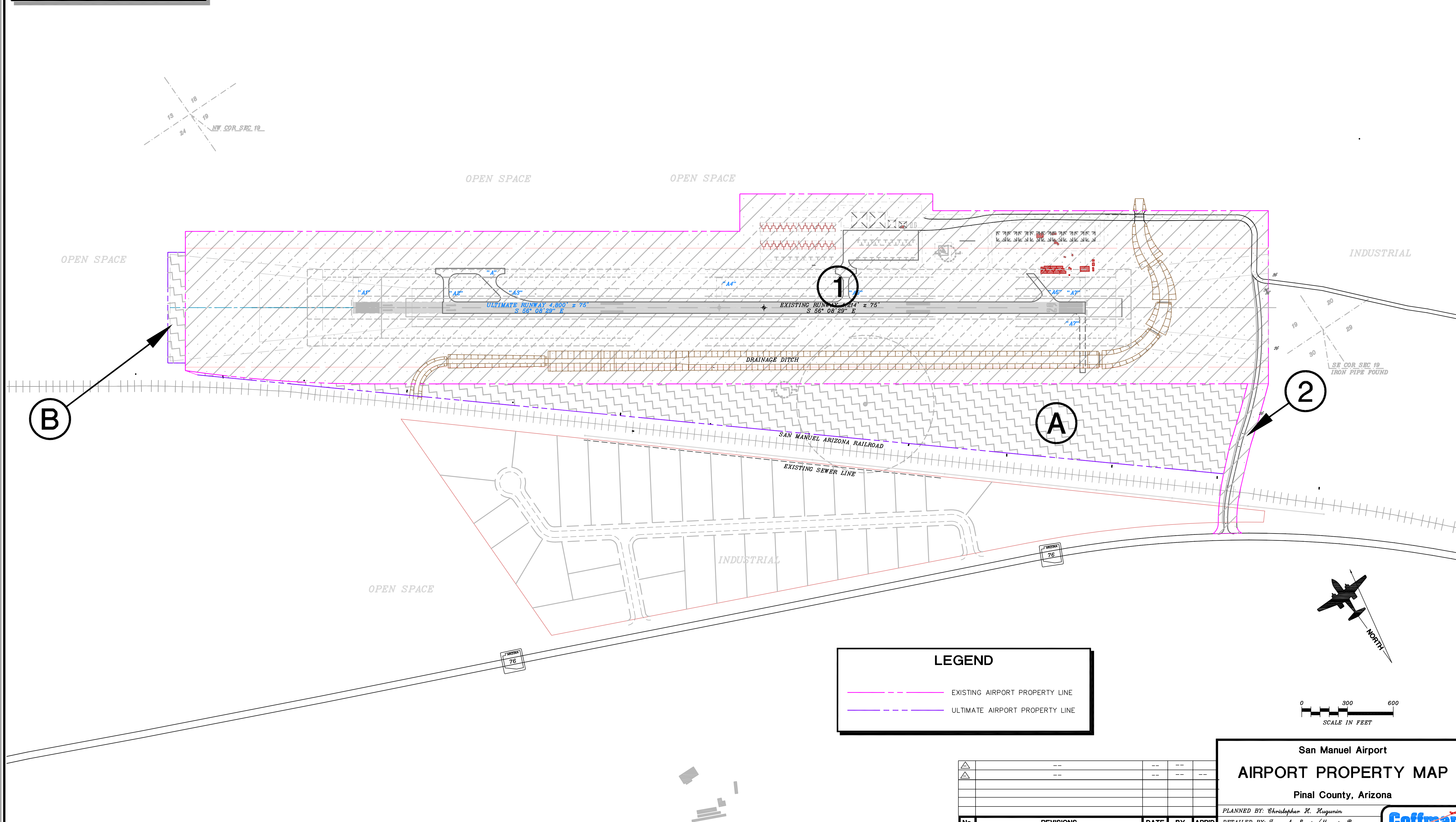
PROPERTY INFORMATION		
PARCEL NO.	DESCRIPTION	ACERAGE
1	LEASE AGREEMENT BOUNDRY DOC.#1995-033569	156±
2	LEASE AGREEMENT	3.5±
A	FUTURE ACQUISITION	41.5±
B	FUTURE ACQUISITION	2±



LEGEND

EXISTING AIRPORT PROPERTY LINE

ULTIMATE AIRPORT PROPERTY LINE

No.	REVISIONS	DATE	BY	APP'D.
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San Manuel Airport

AIRPORT PROPERTY MAP

Pinal County, Arizona

PLANNED BY: Christopher H. Hugunin
DETAILED BY: Troy A. Erwin/Maggie Rogers
APPROVED BY: Stephen C. Wagner

January 9, 2004 | SHEET 8 OF 8

Coffman Associates Airport Consultants

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In Association With

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