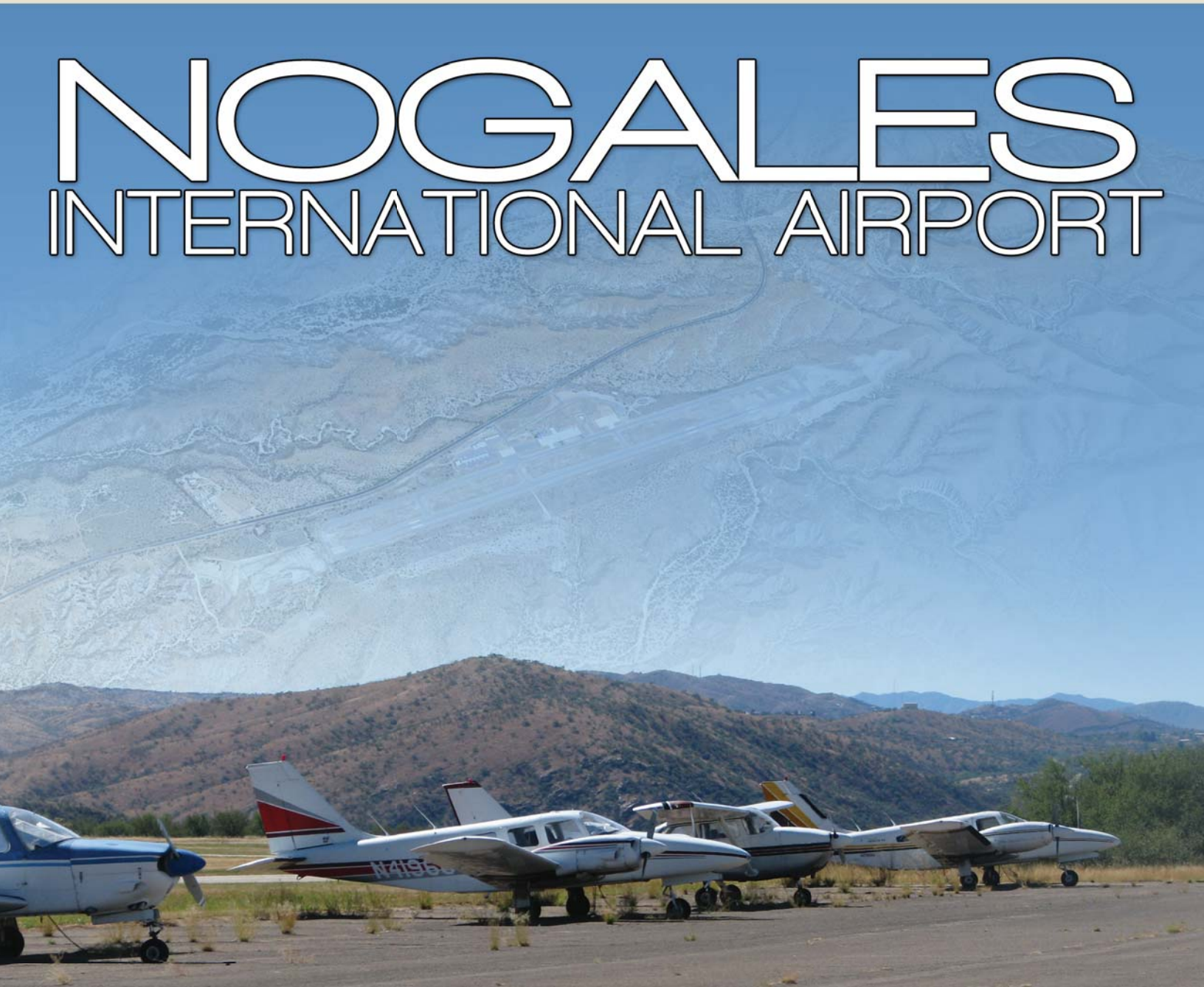
NOGALES INTERNATIONAL AIRPORT



February 2015

Airport Master Plan

Board of Supervisors
Santa Cruz County

I, Melinda Meek, the duly appointed Clerk of the Board of Supervisors of Santa Cruz County, State of Arizona, do hereby certify that the following is a true and exact replica of a portion of the official minutes of the Board of Supervisors Regular Meeting held on May 7th, 2014:

APPROVE THE NOGALES INTERNATIONAL AIRPORT MASTER PLAN: Chairman Ruiz made a motion to approve the Master Plan as presented; second by Supervisor Molera; motion carried unanimously.

Dated this 8th day of May, 2014.

Melinda Meek
Clerk of the Board
Santa Cruz County, AZ

Santa Cruz County Complex
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AIRPORT MASTER PLAN

for

NOGALES INTERNATIONAL AIRPORT
Santa Cruz County, Arizona

Prepared for

SANTA CRUZ COUNTY

by

Coffman Associates, Inc.

February 2015

"The contents of this plan do not necessarily reflect the official views or policy of the FAA or ADOT Aeronautics. Acceptance of this document by the FAA and ADOT Aeronautics does not in any way constitute a commitment on the part of the United States or 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 laws."

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INTRODUCTION

INTRODUCTION AND SUMMARY

The Federal Aviation Administration (FAA) recommends that airports update their long term planning documents every seven to 10 years, or as necessary to address local changes at the airport. The last Master Plan Update for Nogales International Airport (Airport) was completed in 2002. Santa Cruz County (County) has received a grant from the FAA to update the airport Master Plan. The FAA grant covers 91.06 percent of the project cost with the State of Arizona Department of Transportation (ADOT) and the County each providing a 4.47 percent match. The study is designed to provide guidance for future development and provide updated justification for projects for which the Airport may request funding participation through federal and state airport improvement programs.

The Airport Master Plan Update will be prepared in accordance with FAA requirements, including Advisory Circular (AC) 150/5300-13A, *Airport Design* (as amended), and AC 150/5070-6B, *Airport Master Plans* (2007). The scope of services, budget, and schedule was approved by the County, following review by the FAA.

Nogales International Airport is a general aviation facility, as defined by the FAA, which is intended to serve the aviation needs of the community. The Airport is included in the FAA's *National Plan of Integrated Airport Systems* (NPIAS). As such, the Airport is eligible for federal development grants. Santa Cruz County owns and operates the Airport, which is located approximately seven miles northeast of the central business district of Nogales, Arizona. The Airport provides support to approximately 24 locally based aircraft. Services and facilities available include: hangar storage, tie-downs, fixed base operator (FBO) services, flight instruction, aircraft maintenance, and fueling. The airport encompasses approximately 340 acres of land.

MASTER PLAN OBJECTIVES

The overall objective of the Airport Master Plan Update is to provide the Airport Sponsor (Santa Cruz County) with guidance for future development of the Airport, meeting the needs of existing and future users, while also being compatible with the environment. The most recent planning effort related to the Airport is the 2002 Airport Master Plan. This Airport Master Plan Update will evaluate previously identified projects and identify and provide justification for new priorities. This plan is closely coordinated with other existing and on-going planning studies in the area, and with aviation plans developed by the FAA and the state. Specific objectives of the study included:

- To examine the projected aviation demand and identify the facilities necessary to accommodate the demand.
- To determine projected needs of airport users for the next 20 years by which to support airport development alternatives.
- To recommend improvements that will enhance the airport's safety and capacity, to the maximum extent possible.
- To establish a schedule of development priorities and a program for the improvements proposed in the Master Plan Update.
- To prioritize the airport capital improvement program.
- To prepare a new Airport Layout Plan in accordance with FAA and ADOT guidelines.
- To develop active and productive public involvement throughout the planning process.

MASTER PLAN ELEMENTS AND PROCESS

To achieve the objectives described above, the Airport Master Plan Update has been prepared in a systematic fashion pursuant to the scope of services that was coordinated with the airport sponsor, the FAA, and ADOT. The study has 10 elements:

1.0 **Study Initiation** - Development of the scope of services, budget, and schedule. A kickoff meeting was held with a planning advisory committee (PAC) at the study's initiation to obtain a more comprehensive understanding of local issues.

2.0 **Inventory** - Inventory of facility and operational data, wind data, environmental inventory, population and economic data, and new aerial photography and mapping.

3.0 **Forecasts** - Forecasts for based aircraft, operations, peaking characteristics, and the critical design aircraft of the airport over a 20-year period. The aviation forecasts received FAA approval on September 23, 2013.

4.0 **Facility Requirements** - After establishing the critical design aircraft and physical planning criteria, airport needs were developed for airside and landside facilities.

5.0 **Airport Development Alternatives** - Potential airside and land-

side alternatives were developed for meeting long-term needs. Each of the alternatives was subjected to engineering and environmental analysis.

6.0 **Recommended Master Plan Concept** - Following input from the PAC, FAA, ADOT, County staff, and public comments on the development alternatives, a single recommended program for development and use of airport facilities was established.

7.0 **Financial Management and Development Program** - A 20-year capital improvement program that is phased over time to various demand milestones has been developed. Cost estimates for each project have been developed in current (2013) dollars.

8.0 **Airport Layout Plans** - Airport layout plans (the technical drawings) have been developed to depict existing and proposed facilities. The drawing set meets the requirements of the FAA's *Standard Procedure for FAA Review and Approval of Airport Layout Plans (ALPs)*, October 1, 2013. On-airport land use plans have been developed to ensure the highest and best use of airport property.

9.0 **Environmental Overview** - Information regarding environmental sensitivities near the Airport have been gathered to analyze potential environmental concerns that must be addressed prior to program implementation. Projects which may require further *National Environmental Policy Act* (NEPA) analysis have been identified as well. In addition, noise exposure contours were developed for existing and future conditions to determine the extent of critical noise exposure in the airport vicinity.

10.0 **Final Documentation and Public Workshop** - This final Master Plan report has been compiled to include appropriate revisions suggested by the PAC and the public throughout the process.

STUDY COORDINATION

The study process includes local participation through the formation of a PAC. The PAC consists of federal, state, and local agencies, airport tenants, and other Airport stakeholders. The Airport sponsor determined the final makeup of the committee. The PAC convened four times throughout the study process to discuss draft phase report submittals. A kickoff meeting was held on January 16, 2013, during the initial inventory process. Remaining meetings were held on April 17, 2013; July 18, 2013; and October 29, 2013.

Two "open house" public information workshops were held to present findings and to solicit public comment. These workshops were held on July 18, 2013 and October 29, 2013. The draft reports and other project related materials were made available to the public on a project website throughout the planning process. **Exhibit IA** presents the key study elements, meeting intervals, project schedule, and documentation.

SUMMARY AND RECOMMENDATIONS

The proper planning of a facility of any type must consider the demand that may occur in the future. For Nogales International Airport, this involved updating forecasts to identify potential future aviation demand. Because of the cyclical nature of the economy, it is virtually impossible to predict with certainty year-to-year fluctuations in activity when looking five, ten, and twenty years into the future.

Recognizing this reality, the Master Plan is keyed toward potential demand "horizon" levels rather than future dates in time. These "planning horizons" were established as levels of activity that will call for consideration of the implementation of the next step in the Airport Master Plan program. By developing the Airport to meet the aviation demand levels instead of specific points in time, the Airport will serve as a safe and efficient aviation facility which will meet the operational demands of its users while being developed in a cost-efficient manner. This program allows Santa Cruz County to change specific development in response to unanticipated needs or demand.

The forecast approach recognizes the current economic climate and anticipates modest growth through the planning period of the Master Plan. The forecast planning horizons are summarized in **Table A**.

TABLE A
Planning Horizon Summary
Nogales International Airport

	2012	Short Term	Intermediate Term	Long Term
ANNUAL OPERATIONS				
Total Itinerant	7,467	8,560	10,160	13,660
Total Local	1,867	2,400	3,300	5,400
Total Operations	**9,334**	**10,960**	**13,460**	**19,060**
BASED AIRCRAFT				
Single Engine Piston	17	17	18	20
Multi-Engine Piston	7	6	5	4
Turboprop	0	1	2	3
Jet	0	1	1	2
Rotorcraft	0	1	2	3
Total Based Aircraft	**24**	**26**	**28**	**32**

The Airport Layout Plan (ALP) set has also been updated to act as a blueprint for everyday use by management, planners, programmers, and designers. These plans were prepared on computer to help ensure their continued use as an everyday working tool for Airport management.

The last master plan update was completed in April 2002. The key components of the last master plan included the following projects:

- Widen the runway to 100 feet
- Provide proper grading off Runway 3 to meet FAA design standards
- Upgrade taxiway reflectors to medium intensity taxiway lights (MITL)
- Concentrate general aviation (GA) development on the west side
- Concentrate cargo facilities on the northwest side with expanded cargo facilities on the east side with U.S. Customs facilities

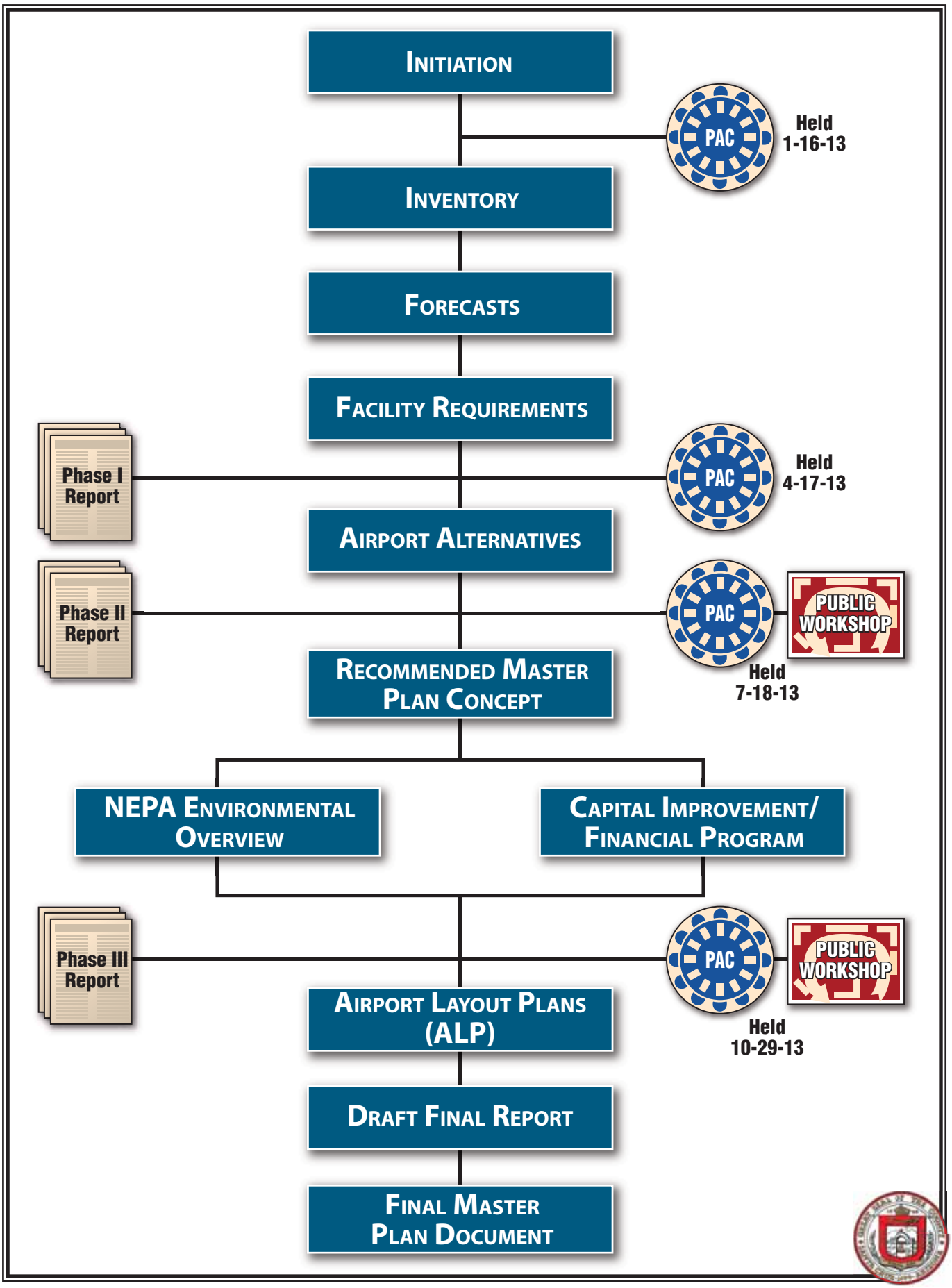

Exhibit IA
MASTER PLAN PROCESS FLOW

- Relocate the Runway 21 displaced threshold from 1,912 feet to 900 feet

Since the completion of the previous master plan, the County has completed each of these projects with the exception of the construction of cargo facilities on the east side of the runway.

MASTER PLAN CONCEPT

The Master Plan concept includes improvements to the airfield and landside area to satisfy FAA design and safety standards and to meet current and forecast needs. Improvements are also designed to ensure a viable aviation facility for the region and state well into the future. The following summarizes recommendations in the Master Plan Concept. **Exhibit IB** depicts the Recommended Master Plan Concept.

Airfield Improvements – Key airfield improvements include: a 300-foot extension of Runway 3-21 to satisfy FAA recommended runway length to fully accommodate 75 percent of business jets at 60 percent useful load; removal/relocation of obstructions to the runway object free area (ROFA) and runway safety area (RSA), which include trees and other vegetation south of the runway, the perimeter security fence, and a drainage ditch southwest of the runway; and taxiway modifications to mitigate runway incursion potential. In addition, approximately 22 acres of property is proposed for acquisition to protect the runway protection zones (RPZs) off each end of the runway and to allow for the construction of a perimeter service road and to implement a soil erosion mitigation plan on the northeast side of the airport near the Cañada de la Paloma.

Landside Facilities – The Master Plan's landside facility recommendations have been devised to efficiently accommodate potential aviation demand and provide revenue enhancement possibilities. Landside facility development will only occur as demand dictates; in this manner, the facilities will only be constructed if required by verifiable demand.

The focus of landside facilities is to accommodate projected demand on the west side of the runway to avoid costs associated with development on the east side of the runway. Activity areas are segregated to the extent possible with high activity (FBO/transient) focused near the existing terminal building; medium activity (air cargo) focused to the north of the transient ramp; and low activity (small general aviation) focused to the south of the terminal. Recommendations provide for the expansion of the terminal facility and its adjacent parking lot and apron, new hangar development in each activity area, an air cargo development parcel, new helicopter parking spaces, an aircraft wash rack, and new fuel storage tanks.

DEVELOPMENT FUNDING

The full implementation of the Airport Master Plan is likely to take two decades or more at a cost of $12.7 million in 2013 dollars. The breakdown of funding over the three planning horizons is presented in **Table B**. More than 95 percent of the total is eligible for grant funding from the FAA and ADOT. The source for FAA funding is the Aviation Trust Fund, which is funded through user fees and taxes on airline tickets, aviation fuel, and aircraft parts. ADOT provides a separate state funding mechanism which receives annual funding appropriation from collection of statewide aviation related taxes.

TABLE B
Development Funding Summary
Nogales International Airport

PLANNING HORIZON	Total Costs	AIP Share	ADOT Share	County Share
Short Term Program	$5,586,200	$4,332,635	$949,123	$304,443
Intermediate Term Program	$1,684,000	$1,533,450	$75,275	$75,275
Long Term Program	$5,429,000	$4,943,647	$242,676	$242,677
Total Program Costs	**$12,699,200**	**$10,809,733**	**$1,267,074**	**$622,394**

With the Airport Master Plan Update completed, the most important challenge is implementation. The cost of developing and maintaining aviation facilities is an investment which yields impressive benefits for the County. This plan and associated development program provides the tools Santa Cruz County will require to meet the challenges of the future. By providing a safe and efficient facility, Nogales International Airport will continue to be a valuable asset to the County and the surrounding region.

12MP10-5A-10121/13

Airfield Recommendations

LEGEND

- Airport Property Line
- Ultimate Property Line
- Runway Safety Area (RSA)
- Object Free Area (OFA)
- Obstacle Free Zone (OFZ)
- Pavement to be Removed
- Ultimate Airfield Pavement
- Runway Protection Zone (RPZ)
  - 1 mile or Greater
- Land Acquisition
- Ultimate Airport Parking / Roads
- Hangar Development
- Aviation Compatible Industrial Park
- Terminal Facilities
- Cargo
- Vegetation to be Removed
- Relocated Perimeter Security Fence
- Perimeter Service Road

0 1000 2000
SCALE IN FEET

State Route 82
Approach RPZ
6.31 Acres
Departure RPZ
B-50'
300' Extension
1,199'
Displaced Threshold
C-50'
REILS
1.88 Acres
D-50'
Runway 3-21 Ultimate 7,500' x 100'
E-50'
Taxiway A
F-50'
G-50'
5.1 Acres
Relocate Drainage Ditch
REILS
Relocated Perimeter Security Fence
8.86 Acres
NORTH

Landside Recommendations

0 500 1000
SCALE IN FEET

Install New Fuel Storage Tanks
Airport Access Road
2.5 acres
18,000 sq. ft.
Aircraft Wash Rack
Helicopter Parking
1.4 acres
20,000 sq. ft
3,600 sq. ft each
22,500 sq. ft

Exhibit IB
RECOMMENDED DEVELOPMENT CONCEPT

Chapter One

INVENTORY

Chapter One
INVENTORY

To produce a realistic and adequate plan for future growth at Nogales International Airport (OLS or Airport), it is essential to understand the framework within which the Airport functions. An initial task within this Master Plan consists of gathering data to provide a clear definition of the Airport's physical and operational features, including facilities, users, and activity levels. The information that follows formed the baseline for developing this report.

The initial action necessary in preparing a master plan is the collection of all pertinent data that relates to the area served by the airport, as well as the airport itself. This inventory was conducted using the following sources of information:

- *Nogales International Airport Master Plan Update*, April 2002; *Nogales International Airport Master Plan* 1990-2010, July 1992; and other planning documents prepared since 2002
- On-site visits
- Aerial and ground photography
- Interviews with Airport management, tenants, and users
- Federal, state, and local publications
- Project record drawings

This chapter briefly describes the physical facilities at the Airport. Aviation-specific information on the airspace, aviation activity, and role of the Airport are described. The chapter also details the environment in which the Airport operates, including surrounding land uses and the socioeconomic characteristics of the region.

AIRPORT SETTING

LOCALE

The City of Nogales is located approximately 70 miles south of Tucson, on the international border with Mexico, within Santa Cruz County, Arizona. Nogales serves as the County seat. As shown on **Exhibit 1A**, Nogales International Airport is located approximately seven miles northeast of downtown Nogales along State Route 82. The County is home to a significant portion of the Coronado National Forest, the incorporated community of Patagonia, and other non-incorporated communities including Rio Rico, Tumacacori-Carmen, Tubac, Amado, Sonoita, and Elgin.

The Airport, classified in the *National Plan of Integrated Airport Systems* (NPIAS) as a general aviation airport, encompasses approximately 340 acres. **Exhibit 1B** depicts the Airport property in its immediate surroundings.

LAND USE

The Airport and the surrounding land are within the jurisdiction of Santa Cruz County. Land uses in the vicinity of the Airport consist primarily of vacant/open and undeveloped land uses. Intermittent low-density residential uses are located primarily along Highway 82 southwest of the Airport.

The Santa Cruz County Comprehensive Plan, which was adopted in June 2004, identifies an objective to encourage appropriately scaled mixed uses that contribute to the overall functioning and success of the Nogales International Airport. The Plan recognizes the Airport as a potential economic growth area and calls for industrial and commercial land uses surrounding the Airport that would complement long-term expansion of the Airport, including restricting noise-sensitive developments.

Santa Cruz County has established an Airport District Overlay Zone (ADOZ) to encourage compatible land uses in the vicinity of airports and the promotion of public health and safety of the general public and the welfare and safety of airport users. According to Article 24 of the County's *Zoning and Development Code*, 2011, The ADOZ is an overlay extending 5,280 feet by 5,280 feet from the runway ends and the runway centerline. The ADOZ restricts structure and building heights and certain land uses including: high hazard occupancies, institutional and educational occupancies (excluding aviation schools), and medium and high density residential development. In addition, the ADOZ regulates the construction of structures within noise zones to assure suitable noise attenuation characteristics.

According to the *City of Nogales General Plan* (adopted in December 2010), the Airport is located within an identified growth area for the City of Nogales and is designated as an Urban Reserve Area. The General Plan identifies a goal to support and promote the Nogales International Airport by attracting compatible land uses that support the expansion and long-term viability of the Airport. Furthermore, the General Plan includes a measure that would prohibit new residential development within the Airport's "Accident Potential Zones and the 65 DNL noise contour or higher."

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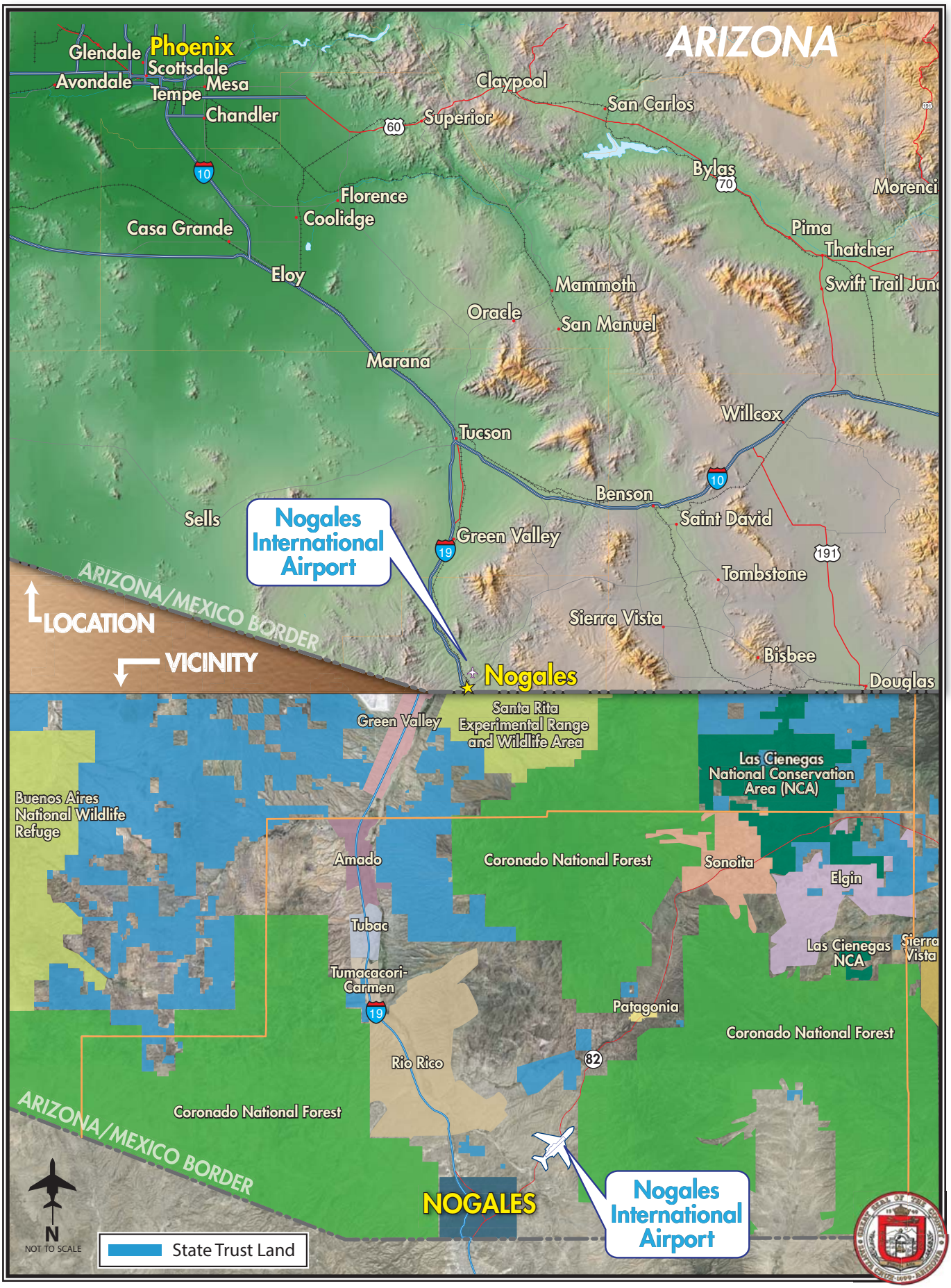
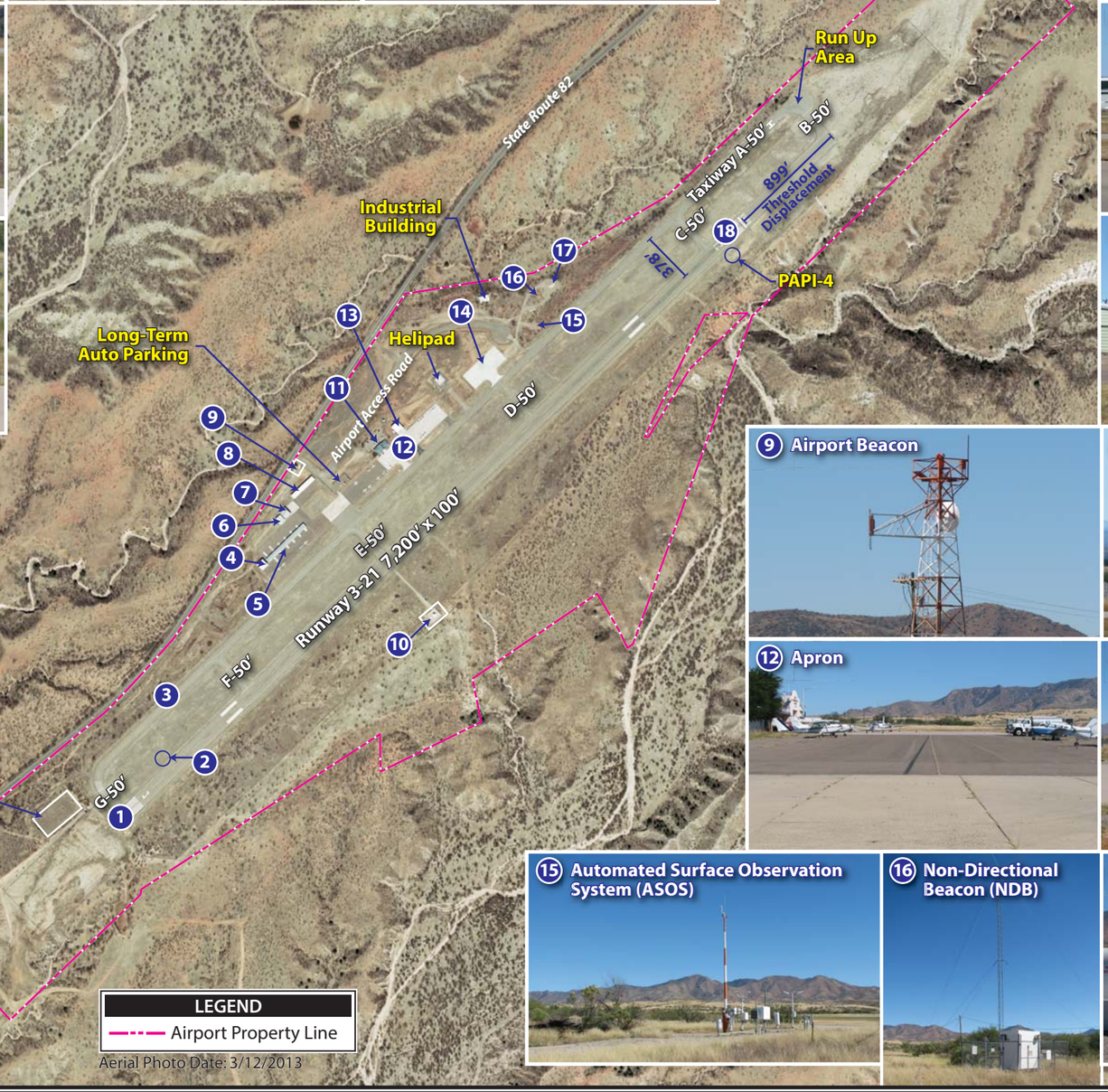


Exhibit 1A
LOCATION/VICINITY MAP

Airfield Signage

1 Runway 3

2 Precision Approach Path Indicator(PAPI-4)



3 Taxiway A

4 Conventional Hangar

5 12-Unit T-Hangar

6 Conventional Hangar

7 Conventional Hangar

8 Box Hangar

9 Airport Beacon

10 Very High Frequency Omni Directional Range/Distance Measuring Equipment (VOR/DME)

11 Terminal Building

12 Apron

13 Conventional Hangar

14 Air Cargo Apron

15 Automated Surface Observation System (ASOS)

16 Non-Directional Beacon (NDB)

17 Fuel Farm

18 Runway 21

Exhibit 1B
EXISTING FACILITIES

CLIMATE

The southern Arizona region can be generally described as having a desert climate with mild winters and hot summers. January experiences the lowest average temperature of 27.3 degrees, and June is the hottest month with an average maximum temperature of 95.4 degrees. Nogales averages 16.98 inches of rainfall each year with much of that coming during the summer monsoon season, which typically occurs during the late summer (July through September). **Table 1A** summarizes climatic data for the Airport.

TABLE 1A
Monthly Climate Summary
Nogales, Arizona

	Monthly Temperature Averages		Precipitation
Month	**Maximum (F)**	**Minimum (F)**	**Mean (inches)**
January	64.3	27.3	1.11
February	66.7	29.6	0.83
March	70.9	33.8	0.84
April	78.3	38.7	0.36
May	86.3	45.1	0.22
June	95.4	54.6	0.45
July	94.0	64.0	4.34
August	91.9	62.8	3.94
September	90.3	55.7	1.59
October	82.5	44.0	1.27
November	71.8	33.2	0.64
December	64.5	27.6	1.39
Annual	79.7	43.0	16.98

Source: Western Regional Climate Center; Nogales 6N Station, Period of Record: 10/01/1952 to 9/30/2012.

AIRPORT HISTORY

In order to maintain a detailed account of the history of the Nogales International Airport, the Airport History and Development History sections from the 2002 Master Plan Update has been carried over and updated to include recent Airport developments.

The Airport's establishment began in January 1928 when the Santa Cruz County Chamber of Commerce bought property north of Nogales for an airfield. The Airport opened with a grass airstrip in March 1928, with the official dedication taking place in September 1929. The original land was deeded to Santa Cruz County on October 3, 1928. During these early years, the first scheduled air service began operating out of Nogales International Airport. The service was provided by Pickwick Airlines and consisted of flights into Mexico. After Pickwick's unsuccessful attempt to establish scheduled air service at Nogales International Airport, other airlines followed with the same failed results. Some of these airlines included Frontier Airlines, Copper State Airlines, and international airlines such as Aero-

naves de Mexico and Latin American Air Transportation Line. During World War II, Nogales International Airport was host to a Navy V5 training program and the Civil Air Patrol. The two remaining parcels of land were deeded to Santa Cruz County on December 1942.

DEVELOPMENT HISTORY

Nogales International Airport has evolved from a grass airstrip into a modern facility with a 7,200-foot asphalt runway with parallel taxiway. The Airport began as a graded area with native earth and a grass surface. It was not until March 1944 that the Airport had its first paved runway. In addition to paving the north-south grass strip, a new primary northeast-southeast runway with parallel taxiway was constructed. Later the same year (August 1944), a new aircraft apron with lighting was added. The next year, new Air National Guard lighting with contact lights was installed on the northeast-southeast runway. Between 1956 and 1975, additions to the Airport included taxiway strips, hardstands for tie-downs, an aircraft fueling facility, a very-high frequency omni-directional range/distance measuring equipment (VOR/DME), access road, and power service.

The undertaking of airport improvements has been a part of the Airport's history in the continuous effort of maintaining the Airport. Improvements to pavement areas have included resurfacing, which involved armor coating and sealcoating at various times, remarking, and strengthening. The primary runway was strengthened and paved with asphaltic concrete in 1989. Usage and, consequently, upkeep, of the original north-south runway, which had become the crosswind runway, ceased around 1988. Eventually, the crosswind runway deteriorated to the point of nonexistence. Between 1993 and 1994, the current terminal building was constructed. Other improvements have included the development of a drainage system and lighting improvements.

Airport developments that have occurred since the completion of the previous Master Plan Update in 2002 include the improvement of the runway safety area (RSA) to meet ARC C-II FAA design standards, installation of perimeter fencing, the installation of airfield guidance signage and runway lighting, the construction of a new aircraft parking apron, the installation of taxiway lighting, the widening of the parallel taxiway, utility vault upgrades and the acquisition of new emergency generators.

Table 1B provides a description of major Airport developments since its opening in 1928 through 2011.

FAA AIRPORT IMPROVEMENT PROGRAM (AIP) PROJECTS

To assist in funding capital improvements, the Federal Aviation Administration (FAA) has provided funding assistance to the Airport through the Airport Improvement Program (AIP). The AIP is funded through the Aviation Trust Fund, which 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 a portion of the operation of the FAA and is funded by user fees, taxes on airline tickets, aviation fuel, and various aircraft parts.

The bottom portion of **Table 1B** summarizes FAA AIP grants for Fiscal Year (FY) 2002 through FY 2011. The FAA has granted almost $6 million for improvements at the Airport over the past ten years.

TABLE 1B
Development History
Nogales International Airport

Date	Development Description
Pre-2002 Developments	
March 1928	Airport opened as a rectangular (1,980' x 4,180') graded area facility with native earth and grass surface.
March 31, 1944	Paving (asphalt) of the N-S 500' x 2,500' grass airstrip. Federal funds ($106,356.70).
March 31, 1944	Construction of a new NE-SW 150' x 6,000' asphalt runway and parallel taxiway. Development included an airport drainage system. Federal funds ($221,694.50).
August 25, 1944	New 100' x 200' lighted aircraft apron. Federal funds ($10,357.50).
June 23, 1945	Runways and taxiways marking. New Air National Guard lighting with contact lights on NE-SW runway. Federal funds ($992.10).
February 12, 1945	Seed and drainage repair. Federal funds ($80,610.70).
April 1, 1956	Armor coat runway. Federal funds ($24,000). Total cost was $5,000.
June 1, 1956	Taxiway strips. Federal funds ($6,000). Total cost was $10,000.
July 1, 1956	Hardstands for tie-downs. Federal funds ($3,000). Total cost was $5,000.
September 10, 1965	Resurface and marking of existing 6,000' x 90' Runway 3-21 (Project No. 9-02-021-C501). Federal funds ($327,427).
May 1, 1967	New aircraft fueling facility. Service provided by Standard Oil of Ohio.
September 20, 1971	Sealcoat runway, taxiway, and ramp. Marking and striping of runway. Remodel public restrooms. State funds ($15,000).
October 1975	Acquire and install VOR/DME, and construct access road and install power service (Project No. 7-04-0024-01). Federal funds ($88,357).
1984	Surface Runway 3-21. Federal and state funds ($222,031).
1984	Taxiway and lighting improvements. Federal and state funds ($508,047).
1989	Strengthening, paving (asphaltic concrete), and striping of main runway. Federal and state funds ($409,402).
1991	Construct portion of airport access road. Federal and state funds ($40,635).
1993-1994	New airport terminal building. State funds ($458,000).
1996	1,200-foot Runway 3-21 extension (100-foot wide), land acquisition, and fencing. Federal and state funds ($1,842,313).
1997-2000	Placement of industrial park infrastructure, which included water distribution and transmission line, wastewater collection, transmission, and treatment facility, and completion of road. EDA and state funds ($1,605,000).
1999	Commercial apron and new heliport facility. Federal and state funds ($452,549).
1998-1999	Construction of one FBO hangar and six box hangars. State funds ($307,566).
2001	Improve Runway Safety Area Phase I. AIP Grant #8 ($273,180).
2002-2011 Developments	
2002	Install perimeter fencing, install airfield guidance signs, install runway lighting, improve runway safety area. AIP Grant #9 ($850,830).
2003	Rehabilitate Runway 3-21. AIP Grant #10 ($1,450,000).
2004	Construct apron. AIP Grant #11 ($637,420).
2005	Rehabilitate taxiway. AIP Grant #12 ($973,750).
2006	Install taxiway lighting (signs and generator), widen taxiway (Phase II). AIP Grant #13 ($1,502,500).
2009	Acquire emergency generator, install guidance signs, rehabilitate access road (approximately 2,000 square yards, Phase III). AIP Grant #14 ($202,533).
2011	Acquire equipment: sweeper and mower, and remote controlled access gate for the fuel farm. AIP Grant #15 ($150,000).

Source: *Nogales International Airport Master Plan Update*, April 2002; FAA Airport Improvement Program (AIP) Grant Histories, http://www.faa.gov/airports/aip/grant_histories/.
Note: All federal and state funded projects included a locally funded match.

AIRPORT ADMINISTRATION

The Airport is owned by Santa Cruz County (County) and managed by the County Department of Community Development. The terminal building and hangar facilities are leased to the Airport's fixed base operator (FBO), Tiffin Aviation, which manages day-to-day operations at the Airport. Maintenance activities such as sweeping airfield pavements and mowing are performed either by County staff as time permits or by Tiffin Aviation on a reimbursement basis. Presently, the FBO has six full-time and two part-time employees at the Airport.

AVIATION ACTIVITY

Records of airport operational activity are essential for determining required facilities (types and sizes), as well as eligibility for federal funding. Tiffin Aviation, the Airport's FBO, maintains records of key operational statistics, including aircraft operations and based aircraft. Analysis of historical activity levels aid in projecting future trends which will enhance the Airport's ability to plan for facility demands in a timely manner. The following sections outline basic operational activities at the Airport. More detailed breakdowns and analyses of aviation activity will be provided and discussed in the next chapter on airport forecasts.

AIRCRAFT OPERATIONS

Aircraft operational statistics at the Airport are recorded by Tiffin Aviation, while the Airport is actively operated between 7:00 am and 7:00 pm daily. Operations are categorized as either itinerant or local. Itinerant operations are those made by aircraft which arrive from or depart to destinations outside the local operating area. Local operations are associated primarily with touch-and-go or pilot training activities. Historically, itinerant and local operations accounted for approximately 58 percent and 42 percent of total operations, respectively. In recent years, the split has widened to approximately 80 percent itinerant and 20 percent local as estimated by Tiffin Aviation.

Table 1C presents a summary of the Tiffin Aviation count since 1993.

TABLE 1C
Historical Operations
Nogales International Airport

Year	Itinerant	Local	Total Operations
1993	2,372	1,718	4,090
1994	3,505	2,538	6,043
1995	7,660	5,547	13,207
1996	10,651	7,713	18,364
1997	12,767	9,245	22,012
1998	13,836	10,020	23,856
1999	16,097	11,657	27,754
2000	15,084	10,923	26,007
2001	13,210	9,566	22,776
2002	10,753	7,787	18,540
2003	7,993	5,787	13,780
2004	9,310	6,742	16,052
2005	7,813	5,657	13,470
2006	6,298	4,560	10,858
2007	9,782	7,084	16,866
2008	13,853	9,235	23,088
2009	14,812	7,976	22,788
2010	9,958	4,268	14,226
2011	6,605	2,202	8,807
2012	7,467	1,867	9,334

Source: Tiffin Aviation

BASED AIRCRAFT

Identifying the current number of based aircraft is important to master plan analysis as this number helps determine existing demand for a number of different facilities, including aircraft storage hangar space, parking aprons, pilot and passen-

ger services, and various other aircraft support facilities. Historical based aircraft counts were limited to years in which the Airport's master plan was updated (1990, 2002 [1999 base year], and 2012). Total based aircraft for these years are presented in **Table 1D**. Tiffin Aviation records indicate the existing (2012) count of based aircraft is 24. The Airport's based aircraft total of 24 in 2012 represents 48 percent of all registered aircraft (50) in Santa Cruz County. The existing based aircraft count consists of 17 single-engine piston aircraft and seven multi-engine piston aircraft. There are no turboprop or jet aircraft currently based at the Airport.

TABLE 1D
Historical Based Aircraft
Nogales International Airport

Year	Based Aircraft
1990	30
1999	36
2012	24

Sources: Tiffin Aviation

CARGO ACTIVITY

Air cargo is an encompassing term used to describe the combined activities of air mail and air freight operations. The air cargo industry includes a diverse range of businesses providing a variety of different services supporting the movement of air freight. This includes air cargo transported by dedicated cargo airlines, passenger airlines, freight forwarders and custom brokers, and air freight truckers.

Nogales International Airport is a unique airport for cargo activity due to its location near the Mexican border. As a result, many cargo operations conducted at the Airport are associated with the Maquiladora program. The Maquiladora program, which began in 1965, allows U.S. companies to move manufacturing to Mexico to benefit from lower labor costs. Goods can then be shipped to the U.S. and Canada under the North American Free Trade Agreement (NAFTA)'s preferential tariff rates.

Numerous companies operate in the regional area under the Maquiladora program and have materials and finished goods flown into and out of Nogales International Airport. Origins and destinations for the chartered air cargo flights vary across the U.S. The aircraft utilized depends upon the size and type of cargo but the Airport is regularly utilized by small business jet and turboprop aircraft such as the Embraer 120, Beechcraft 1900, and Falcon 20, up to narrow-body jets including DC-9s, Boeing 737-600, and Boeing 727-200. Cargo operations at Nogales International Airport are typically conducted by charter operators including Ameriflight, Ameristar Air Cargo, Kalitta Air, Royal Air Freight, Sierra West Airlines, and USA Jet Airlines, among others.

AIRFIELD FACILITIES

Airport facilities can be functionally classified into two broad categories: airfield and landside. The airfield category includes those facilities directly associated with aircraft operations. The landside category includes those facilities necessary to provide a safe transition from surface to air transportation and support aircraft parking, servicing, storage, maintenance, and operational safety. This section describes the airfield facilities, including runways, taxiways, lighting, marking, navigational aids, and weather reporting. Airfield facilities are depicted on **Exhibit 1B**. **Table 1E** summarizes key airfield facility data.

TABLE 1E
Airfield Facility Data
Nogales International Airport

	Runway 3-21	
Length (feet)	7,200	
Width (feet)	100	
Surface Material	Asphalt	
Load Bearing Strength		
SWL	24,000	
DWL	60,000	
DTW	115,000	
Instrument Approach Procedures	VOR/DME or GPS-B (circling) VOR or GPS-A (circling) NDB or GPS-C (circling)	
Approach Aids	**3** PAPI-4 (3.0 degree)	**21** PAPI-4 (4.0 degree)
Fixed Wing Aircraft Traffic Pattern	Left	Left
Displaced Threshold (feet)	None	899
End Elevation (feet MSL)	3,838.9	3,955.1
Runway Gradient	1.6%	
Pavement Markings	Non-precision	
Pavement Lighting	MIRL	
Weather Reporting	ASOS	

Abbreviations:
ASOS: Automated Surface Observation System
DME: Distance Measuring Equipment
DTW: Dual-Tandem Wheel Loading
DWL: Dual-Wheel Loading
GPS: Global Positioning System
MIRL: Medium Intensity Runway Lighting
MSL: Mean Sea Level
NDB: Non-Directional Beacon
PAPI: Precision Approach Path Indicators
SWL: Single-Wheel Loading
VOR: Very-High Frequency Omni-Directional Range

Source: FAA Form 5010 Airport Master Record

RUNWAYS

Nogales International Airport has a single asphalt Runway 3-21 that measures 7,200 feet long and 100 feet wide. The Runway 21 threshold is displaced 899 feet due to the rising terrain beyond the runway end. Runway gradient describes the average slope of a runway. Gradient is determined by dividing the runway's high and low points by its length. Runway 3-21 slopes down toward Runway 3 resulting in a 1.6 percent gradient.

Runway load bearing strength for Runway 3-21 is shown in **Table 1E**. Single wheel loading (SWL) refers to design aircraft landing gear with a single wheel on each main landing gear strut. Dual wheel loading (DWL) refers to design aircraft landing gear with two wheels on each main landing gear strut. Dual tandem wheel loading (DTW) refers to aircraft landing gear struts with a tandem set of dual wheels (four wheels) on each main landing gear strut.

TAXIWAYS

Taxiways on the airfield are identified by a single letter (as shown on **Exhibit 1B**).

Taxiway A, with a width of 50 feet, serves as the full-length parallel taxiway to Runway 3-21. The Taxiway A centerline is located 378 feet from the runway centerline. Taxiways B through G serve as connecting/exit taxiways to the runway. These taxiways have widths of 50 feet. The taxiway system is constructed of asphalt.

AIRFIELD PAVEMENT CONDITION

As a part of the Arizona Department of Transportation (ADOT) Airport Pavement Preservation Program (APPP), Nogales International Airport's airfield pavements are inspected on a 3-year cycle. Pavements are assessed using the pavement condition index (PCI) methodology for visually assessing pavement conditions. PCI provides a numerical indication of overall pavement condition. Types and amounts of deterioration are used to calculate the PCI value of the section. The PCI ranges from 0 to 100, with 100 representing a pavement in excellent condition.

Nogales International Airport's pavements were most recently inspected on March 25 and 26, 2010. The resulting PCI values for each pavement section on the Airport are depicted on **Exhibit 1C**. Runway 3-21 and Taxiway A were found to have very high PCI ratings of 95 and 99, respectively. The most recent rehabilitation of the runway pavement occurred in 2003 and the most recent rehabilitation of taxiway pavements was in 2005.

The main apron area adjacent to the terminal building was split into three sections for inspection purposes. These areas received PCI ratings of 67, 30, and 99. The two lower rated sections were found to have more extensive cracking and deterioration in addition to oil/fuel spill damage in areas. The cargo apron was found to have a PCI rating of 70 due to low-severity cracking and shattered slabs. The apron/taxilanes adjacent to the T-hangar and conventional hangar facilities was found to have PCI ratings of 67 and 57 due to significant amounts of unsealed cracking and areas of raveling and weathering.

The helipad pavement was separated into two sections: the main landing portion received a PCI rating of 98 and the taxilane and outer portion of the landing area received a rating of 63. The lower rated portion was found to have unsealed and high-severity cracking.

AIRFIELD LIGHTING

Airfield lighting systems extend an airport's usefulness into periods of darkness and/or poor visibility. A variety of lighting systems are installed at the Airport for this purpose. They are categorized by function as follows:

Airport Identification Lighting: The location of the airport at night or during low-visibility weather is universally identified by a rotating beacon. A rotating beacon projects two beams of light, one white and one green, 180 degrees apart. The airport beacon is located at the west Airport Access Road.

Runway Pavement and Edge Lighting: Pavement edge lighting utilizes light fixtures placed near the edge of the pavement to define the lateral limits of the pavement. This lighting is essential for safe operations during night and/or times of low visibility in order to maintain safe and efficient access to and from the runway and aircraft parking areas. Runway

3-21 is equipped with a medium intensity runway lighting (MIRL) system.

Taxiway Lighting: Taxiway A and associated connector taxiways are equipped with blue medium intensity taxiway lights (MITL).

Obstruction Lighting: Objects which obstruct the Federal Aviation Regulation (FAR) Part 77 imaginary surfaces are marked with red lights. Obstructions marked at the Airport include the weather reporting station (ASOS) and the VOR/DME equipment.

Visual Approach Lighting: Visual approach aids have been installed at the Airport to assist pilots in determining the correct descent path to the runway end during an approach to the Airport. Precision approach path indicators (PAPI-4s) are available on both ends of Runway 3-21. The PAPIs provide approach path guidance with a series of light units. The four-unit PAPIs give the pilot an indication of whether their approach is above, below, or on-path, through the pattern of red and white lights visible from the light units. The Runway 3 PAPI system is set at a standard three-degree approach glide path. The Runway 21 PAPI is set to a four-degree approach glide path due to the rising terrain in the approach path north of the Airport.

AIRFIELD SIGNAGE

Airfield identification signs assist pilots in identifying runways, taxiway routes, and critical areas. Runway 3-21 is identified with lighted signs located at each taxiway intersection. Taxiways are identified using lighted location, directional, and informational signs. Lighted signs are installed at all taxiway and runway intersections. Lighted signage is also available to provide guidance to the FBO and cargo apron.

AIRPORT MARKINGS

Pavement markings aid in the movement of aircraft along airport surfaces and identify closed or hazardous areas on the airport. The Airport provides and maintains parking systems in accordance with Part 139.311(a) and Advisory Circular 150/5340-1, *Standards for Airport Marking*.

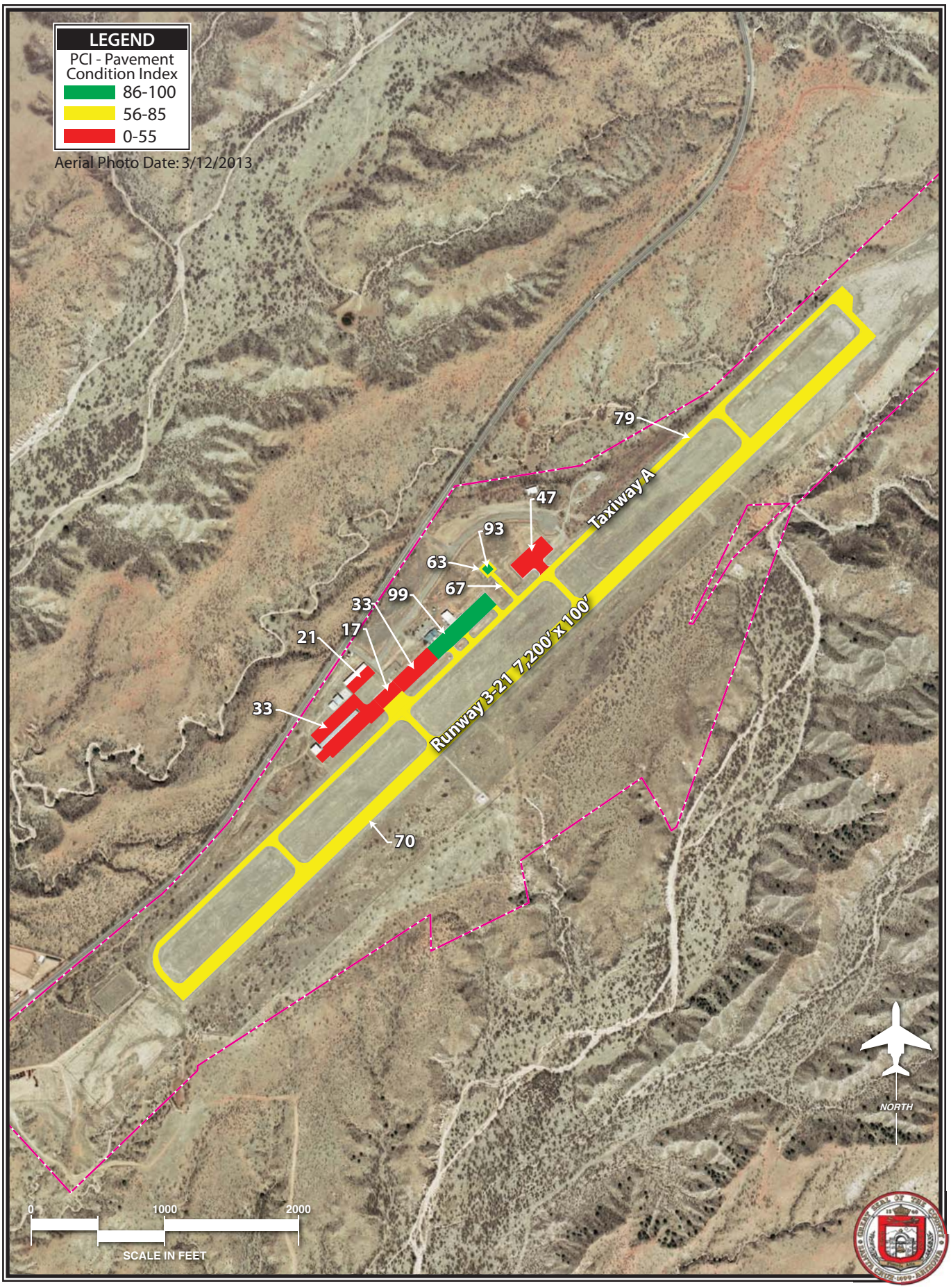
Runway 3-21 has non-precision instrument runway markings that identify the runway centerline, threshold, designation, touchdown point, and aircraft holding positions.

All taxiways at the Airport are marked with yellow centerline and hold position markings. Centerline markings assist pilots in maintaining proper clearance from pavement edges and objects near the taxiway edges.

Aircraft hold positions are also marked at each runway/taxiway intersection. Yellow holding position markings for Runway 3-21 are located 250 feet from the runway centerline.

NAVIGATIONAL AIDS

Navigational aids are electronic devices that transmit radio frequencies, which pilots of properly equipped aircraft translate into point-to-point guidance and position information. The types of electronic navigational aids available for aircraft flying to or from Nogales International Airport include the VOR, global position-



Source: Nogales International Airport Pavement Re-Inspection Report, September 23, 2013

Exhibit 1C
PAVEMENT CONDITIONS

ing system (GPS), and the nondirectional beacon (NDB).

The VOR provides azimuth readings to pilots of properly equipped aircraft by transmitting a radio signal at every degree to provide 360 individual navigational courses. Frequently, distance measuring equipment (DME) is combined with a VOR facility to provide distance as well as direction information to the pilot. The Nogales VOR/DME serves the regional area, including Nogales International Airport.

GPS was initially developed by the United States Department of Defense for military navigation around the world. However, GPS is now used extensively for a wide variety of civilian uses, including civil aircraft navigation.

GPS uses satellites placed in orbit around the globe to transmit electronic signals, which pilots of properly equipped aircraft use to determine altitude, speed, and navigational information. This provides more freedom in flight planning and allows for more direct routing to the final destination. GPS provides for enroute navigation and non-precision circling instrument approaches. According to the Airport's FAA Form 5010, Airport Master Record, straight-in approaches are not recommended due to rising terrain surrounding the Airport.

The NDB transmits nondirectional radio signals, whereby the pilot of a properly equipped aircraft can determine the bearing to or from the NDB facility and then "home" or track to or from the station. Nogales International Airport is equipped with NDB equipment on the airfield.

WEATHER REPORTING

Nogales International Airport is served by an automated surface observing system (ASOS). The ASOS provides automated aviation weather observations 24 hours per day. The system updates weather observations every minute, continuously reporting significant weather changes as they occur. The ASOS system reports cloud ceiling, visibility, temperature, dew point, wind direction, wind speed, altimeter setting (barometric pressure), and density altitude (airfield elevation corrected for temperature). The ASOS equipment is located on the north side of the airfield northeast of the cargo apron.

LANDSIDE FACILITIES

TERMINAL

Constructed in 1994, the approximately 4,186 square foot terminal building facilitates a range of services including FBO activities, a restaurant, administration offices, and Federal Inspection Services (FIS). The terminal also has a lobby, pilot lounge, and restrooms. The terminal is located west of midfield and is accessible from State Route 82 via Airport Access Road.

The terminal building is owned by Santa Cruz County and leased to Tiffin Aviation, the Airport's FBO. Tiffin Aviation provides a wide range of FBO services including: aircraft fuel services (Avgas & Jet A), hotel and car arrangements, aircraft maintenance, FAR Part 135 charter services, flight training, and aircraft rental.

Nogales International Airport is a port-of-entry and, therefore, FIS are required for inspection of passengers, aircraft, crew-members, baggage, and cargo. An office in the terminal building is provided to the U.S. Department of Homeland Security for Customs and Border Protection agents to conduct FIS activities.

ACCESS AND PARKING

The Airport is accessible by traveling approximately seven miles northeast of downtown Nogales on the two-lane State Route 82. The primary access for the terminal and parking is provided via the paved two-lane Airport Access Road, which has an unmarked intersection with State Route 82.

The parking lot immediately adjacent to the terminal has two handicap parking spaces with the remainder of the lot unmarked but capable of accommodating approximately 28 vehicles. A long-term parking lot located southwest of the terminal building is capable of accommodating an additional 25 vehicles.

HANGAR AND APRON FACILITIES

The Airport has six separate hangar facilities ranging in size and purpose (FBO, T-hangar, conventional, and box hangar). Each of the hangar facilities is owned by Santa Cruz County and leased to tenants on a month-to-month basis. Each hangar facility is identified on **Exhibit 1B**. The FBO's conventional hangar (#13 on Exhibit 1B), located immediately to the north of the terminal building, has a footprint of 4,536 square feet and is used for aircraft maintenance services and storage of flight school aircraft. Three conventional hangars (#s 4, 7, and 6 on Exhibit 1B) located southwest of the terminal provide 3,178 square feet, 3,080 square feet, and 2,526 square feet of aircraft storage, respectively. A 13,300 square foot T-hangar facility (#5 on Exhibit 1B) provides 12 individual aircraft storage units and a 7,600 square foot box hangar facility (#8 on Exhibit 1B) provides five individual aircraft storage units.

In all, there is approximately 34,220 square feet of aircraft storage/ maintenance space on the Airport.

The Airport has designated apron areas to accommodate the variety of uses served. The main apron area, located immediately adjacent to the terminal building, serves three purposes. The northernmost portion, with an area of approximately 75,000 square feet (8,333 square yards), is used primarily by corporate and business turbine/jet aircraft parking. This portion of the apron is also typically where FIS occurs. The middle portion of the main apron, which has an area of approximately 43,200 square feet (4,800 square yards), is used for transient single-engine and multi-engine aircraft parking. This portion of the apron has 14 marked tie-down positions and is also utilized for the parking of three fuel trucks. The southern portion of the main apron, at the intersection of Taxiway E and the apron, is utilized for heavier jet aircraft parking. This portion has an area of approximately 20,000 square feet (2,222 square yards).

Apron space south of the main apron consists of two segments on the northwest and southeast sides of the T-hangar building. These two segments provide 12 marked tie-down positions for locally based aircraft on approximately 18,750 square feet (2,083 square yards) of pavement.

A 41,600 square foot (4,622 square yard) lighted cargo apron is located directly northwest of Taxiway D. This apron is

accessible by vehicle via a roadway that extends through a secured gate from the Airport Access Road. Cargo operators utilize this apron to load and offload cargo to/from delivery trucks. The air cargo charter operators utilize aircraft ranging from small business jet and turboprop aircraft, such as the Embraer 120, Beechcraft 1900, and Falcon 20, up to narrow-body jets including the DC-9, Boeing 737, and Boeing 727.

The Airport also has a single lighted helipad located between the cargo apron and the main apron with an area of approximately 2,750 square feet (300 square yards). The helipad consists of a square touchdown and lift-off (TLOF) inner area and a final approach and takeoff area (FATO) surrounding the TLOF.

Combined, the Airport has approximately 201,300 square feet (22,360 square yards) of aircraft parking apron and 26 total marked tie-down positions.

SUPPORT FACILITIES

Several support facilities serve as critical links in providing the necessary efficiency to aircraft ground operations, such as aircraft rescue and firefighting (ARFF), airport maintenance, and fuel storage.

Aircraft Rescue and Firefighting Facilities (ARFF)

Only Part 139 certificated airports are required to provide aircraft rescue and firefighting (ARFF) services. Since Nogales International Airport is not a Part 139 certificated airport, it does not have onsite ARFF services. The Nogales Suburban Fire District provides fire protection services to the Airport. The nearest station to the Airport is Station A, located approximately 2.7 miles southwest along State Route 82.

Maintenance Facilities

The Airport does not have a dedicated maintenance facility but does have mowing and pavement sweeper equipment onsite. This equipment is stored outdoors next to the terminal building. Regular airfield maintenance activities are performed either by County staff as time permits or by Tiffin Aviation on a reimbursement basis.

Fuel Storage

The County maintains a fuel farm consisting of two 12,500 gallon fuel tanks (one each for Jet A and 100LL Avgas) located at the north end of the Airport. Both fuel tanks are in poor condition and the County is currently pursuing replacements. The fuel tanks are accessible to fuel delivery trucks via a secured gate access point at the end of the Airport Access Road. The FBO operates three fuel trucks. Two Jet A trucks (2,200 and 3,300 gallons) and one 100LL Avgas truck (700 gallons). These trucks are generally parked on the transient portion of the main apron when not in use.

Historic fuel flowage on the Airport for the years 2007 through August 2013 is presented in **Table 1F**. These records indicate that over this time period, Jet A fuel flowage has accounted for 77.7 percent of all flowage at the Airport. Since flowage records for only the first eight months of 2013 were available, a comparison to the same period of 2012 was made to identify any trends. The resulting analysis indicates that Jet A fuel flowage by August 2013 was up from the same period in 2012 by more than 50 percent. The same comparison for Avgas shows a smaller increase in flowage (up 4.1 percent in 2013 from 2012). Fuel flowage at the Airport is down from historical highs ex-

perienced in 2010 for Jet A (327,027 gallons) and 2008 for Avgas (79,692 gallons). The flowage drop-off is at least partially attributed to sagging economic conditions that have lingered since the recession.

TABLE 1F
Historic Fuel Flowage (gallons)
Nogales International Airport

Year	Avgas	Jet A
2007	61,182	231,232
2008	79,692	141,349
2009	66,836	140,234
2010	49,052	327,027
2011	35,649	172,001
2012	32,784	99,318
2013*	22,399	99,391

*Records through August 2013
Source: Tiffin Aviation

UTILITIES

The availability and capacity of the utilities serving the Airport are factors in determining the development potential of Airport property, as well as the land immediately adjacent to the facility. The Airport receives water services from the City of Nogales. Sanitary sewer services on the Airport are handled by a septic system. UniSource Energy Services provides overhead and underground electrical power to the various Airport facilities. The Airport also has two emergency generators. The airfield lighting vault is located adjacent to the rotating beacon tower. Telecommunications, including telephone and internet services, are provided by Santa Cruz County. Natural gas utility services are not available at the Airport.

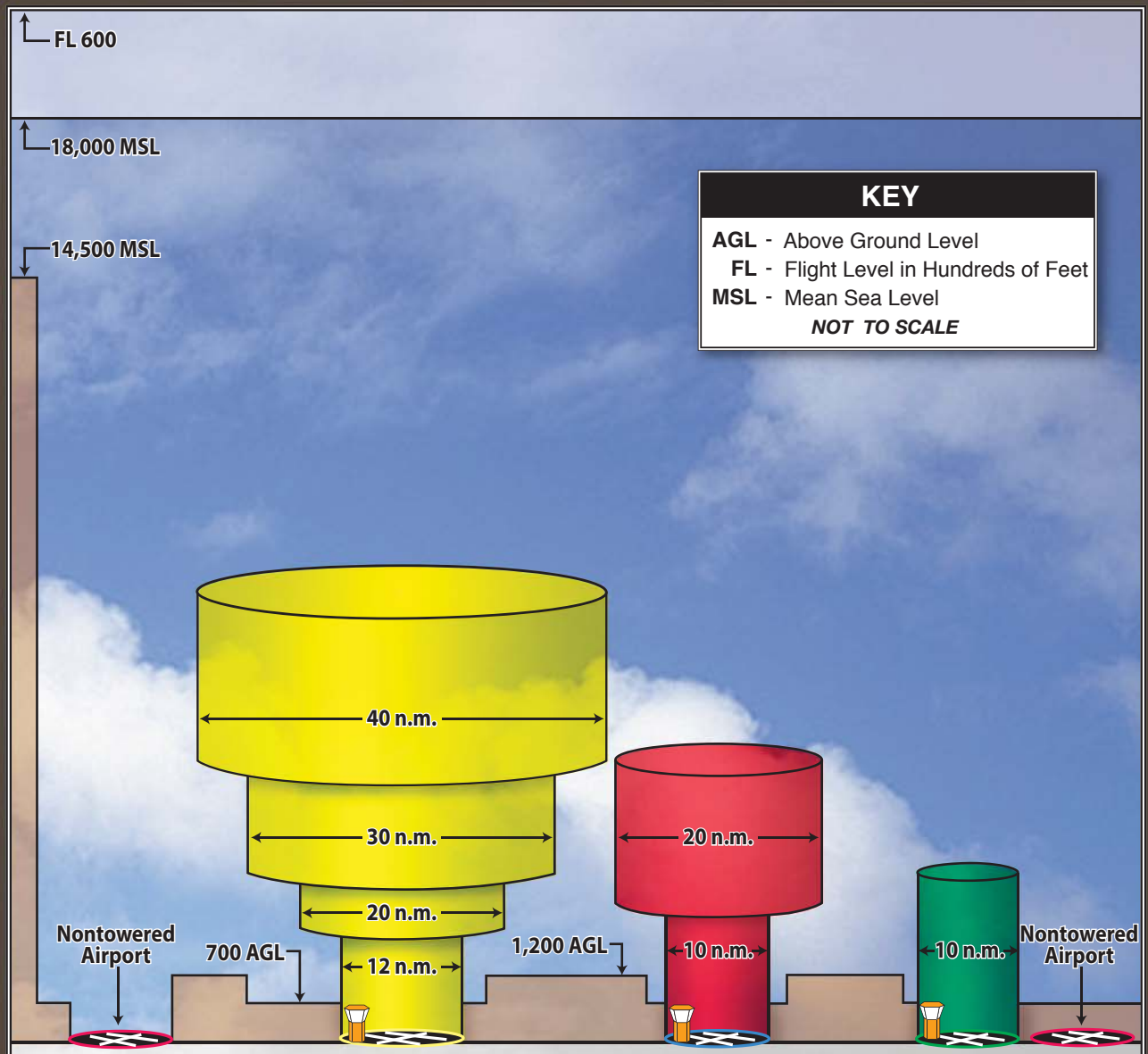
AREA AIRSPACE AND AIR TRAFFIC CONTROL

The *Federal Aviation Administration (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 covers the common network of U.S. airspace, including air navigation facilities; airports and landing areas; aeronautical charts; associated rules, regulations, and procedures; technical information; and personnel and material. The system also includes components shared jointly with the military.

AIRSPACE STRUCTURE

Airspace within the United States is broadly classified as either "controlled" or "uncontrolled." The difference between controlled and uncontrolled airspace relates primarily to requirements for pilot qualifications, ground-to-air communications, navigation and air traffic services, and weather conditions. Six classes of airspace have been designated in the United States, as shown on **Exhibit 1D**. Airspace designated as Class A, B, C, D, or E is considered controlled airspace. Aircraft operating within controlled airspace are subject to varying requirements for positive air traffic control. Airspace in the vicinity of Nogales International Airport is depicted on **Exhibit 1E**.

Class A Airspace: Class A airspace includes all airspace from 18,000 feet mean sea level (MSL) to flight level (FL) 600 (approximately 60,000 feet MSL) over the contiguous 48 states and Alaska. This airspace is designated in Federal Aviation Regulation (F.A.R.) Part 71.33, for positive control of aircraft. All aircraft must be on an instrument flight rules (IFR) clearance to operate within Class A airspace.

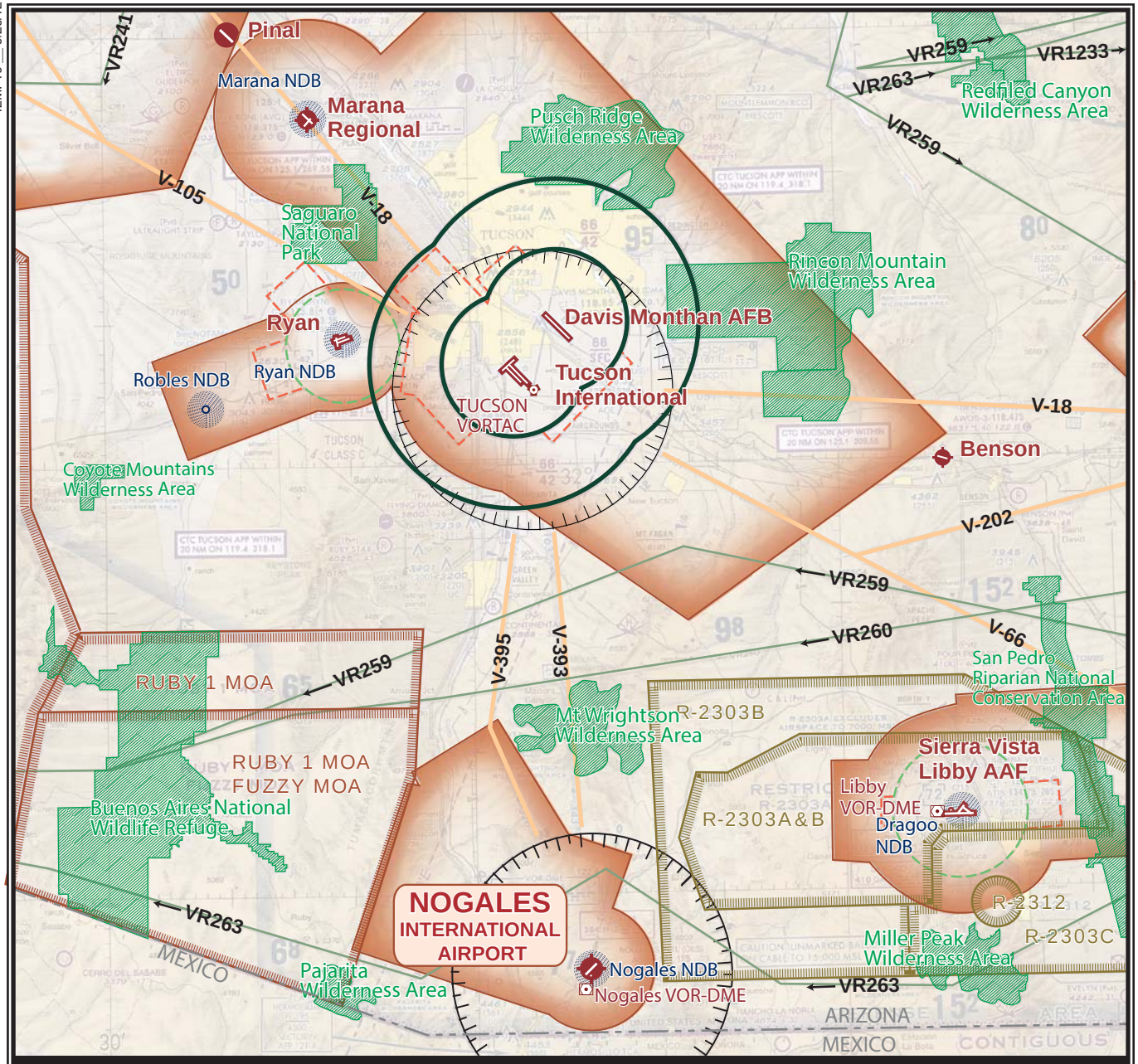


CLASSIFICATION	DEFINITION
CLASS A	Generally airspace above 18,000 feet MSL up to and including FL 600.
CLASS B	Generally multi-layered airspace from the surface up to 10,000 feet MSL surrounding the nation's busiest airports.
CLASS C	Generally airspace from the surface to 4,000 feet AGL surrounding towered airports with service by radar approach control.
CLASS D	Generally airspace from the surface to 2,500 feet AGL surrounding towered airports.
CLASS E	Generally controlled airspace that is not Class A, Class B, Class C, or Class D.
CLASS G	Generally uncontrolled airspace that is not Class A, Class B, Class C, Class D, or Class E.

Source: "Airspace Reclassification and Charting Changes for VFR Products," National Oceanic and Atmospheric Administration, National Ocean Service. Chart adapted by Coffman Associates from AOPA Pilot, January 1993.

Exhibit 1D
AIRSPACE CLASSIFICATION

12MP10__9/20/12



LEGEND

- Airport with other than hard-surfaced runways
- Airport with hard-surfaced runways 1,500' to 8,069' in length
- Airports with hard-surfaced runways greater than 8,069' or some multiple runways less than 8,069'
- Non-Directional Radiobeacon
- VOR-DME
- VORTAC
- Compass Rose
- Wilderness Areas
- Victor Airways
- Class C Airspace (Mode C)
- Class D Airspace
- Class E Airspace
- Class E Airspace with floor 700' above surface
- Military Operations Area
- Prohibited, Restricted and Warning Area
- Military Training Route

NORTH

NOT TO SCALE

Source: Phoenix South Sectional Chart, US Department of Commerce, National Oceanic and Atmospheric Administration, 11/2012

Exhibit 1E
VICINITY AIRSPACE

Class B Airspace: Class B airspace has been designated around some of the country's major airports, such as Phoenix Sky Harbor International Airport, to separate all aircraft within a specified radius of the primary airport. Each Class B airspace is specifically tailored for its primary airport. All aircraft operating within Class B airspace must have an ATC clearance. Certain minimum aircraft equipment and pilot certification requirements must also be met. This airspace is the most restrictive controlled airspace routinely encountered by pilots operating under visual flight rules (VFR) in an uncontrolled environment. The nearest Class B airspace is centered on Phoenix Sky Harbor International Airport (PHX).

Class C Airspace: The FAA has established Class C airspace at approximately 120 airports around the country that have significant levels of instrument flight rules (IFR) traffic. Class C airspace is designed to regulate the flow of uncontrolled traffic above, around, and below the arrival and departure airspace required for high-performance, passenger-carrying aircraft at major airports. In order to fly inside Class C airspace, an aircraft must have a two-way radio, an encoding transponder, and have established communication with the ATC facility. Aircraft may fly below the floor of the Class C airspace or above the Class C airspace ceiling without establishing communication with ATC. The nearest Class C airspace to Nogales International Airport surrounds the Tucson International Airport and Davis Monthan Air Force Base, approximately 32 nautical miles to the north.

Class D Airspace: Class D airspace is controlled airspace surrounding airports with an ATCT. The Class D airspace typically constitutes a cylinder with a horizontal radius of four or five nautical miles (NM) from the airport, extending from the surface up to a designated vertical limit, typically set at approximately 2,500 feet above the airport elevation. If an airport has an instrument approach or departure, the Class D airspace sometimes extends along the approach or departure path. Sierra Vista Municipal Airport-Libby Army Airfield operates in Class D airspace.

Class E Airspace: Class E airspace consists of controlled airspace designed to contain IFR operations near an airport and while aircraft are transitioning between the airport and enroute environments. Unless otherwise specified, Class E airspace terminates at the base of the overlying airspace. Only aircraft operating under IFR are required to be in contact with air traffic control when operating in Class E airspace. While aircraft conducting visual flights in Class E airspace are not required to be in radio communications with air traffic control facilities, visual flight can only be conducted if minimum visibility and cloud ceilings exist.

Nogales International Airport is located within Class E airspace as depicted on **Exhibit 1E**. The Airport's Class E airspace surrounds the Airport and extends out to the north and west, where it ends at its intersection with a military operations area (MOA). This Class E airspace begins at 700 feet AGL with Class G airspace below down to the surface.

Class G Airspace: Airspace not designated as Class A, B, C, D, or E is considered uncontrolled, or Class G, airspace. Air traffic control does not have the authority or responsibility to exercise control over air traffic within this airspace. Class G airspace lies between the surface and the overlaying Class E airspace (700 to 1,200 feet above ground level).

While aircraft may technically operate within this Class G airspace without any contact with ATC, it is unlikely that many aircraft will operate this low to the ground. Furthermore, federal regulations specify minimum altitudes for flight. F.A.R. Part 91.119*, Minimum Safe Altitudes*, generally states that except when necessary for takeoff or landing, pilots must not operate an aircraft over any congested area of a city, town, or settlement, or over any open-air assembly of persons, at an altitude of 1,000 feet above the highest obstacle within a horizontal radius of 2,000 feet of the aircraft.

Over less congested areas, pilots must maintain an altitude of 500 feet above the surface, except over open water or sparsely populated areas. In those cases, the aircraft may not be operated closer than 500 feet to any person, vessel, vehicle, or structure. Helicopters may be operated at less than the minimums prescribed above if the operation is conducted without hazard to persons or property on the surface. In addition, each person operating a helicopter shall comply with any routes or altitudes specifically prescribed for helicopters by the FAA.

Special Use Airspace

Special use airspace is defined as airspace where activities must be confined because of their nature or where limitations are imposed on aircraft not taking part in those activities. These areas are depicted on **Exhibit 1E**.

Wildlife/Wilderness Areas: As depicted on **Exhibit 1E**, there are several wildlife and wilderness areas in the vicinity of Nogales International Airport including: Parjarita Wilderness Area, Mt. Wrightson Wilderness Area, Miller Peak Wilderness Area, Buenos Aires National Wildlife Refuge, the San Pedro Riparian National Conservation Area, and the Las Cienegas National Conservation Area. Various other wilderness areas are located further north in the Tucson area. Aircraft are requested to maintain a minimum altitude of 2,000 feet above the surface of designated National Park areas, which includes wilderness areas and designated breeding grounds. FAA Advisory Circular 91-36C defines the "surface" as the highest terrain within 2,000 feet laterally of the route of flight or the uppermost rim of a canyon or valley.

Victor Airways: For aircraft arriving or departing the regional area using VOR facilities, a system of Federal Airways, referred to as Victor Airways, has been established. Victor Airways are corridors of airspace eight miles wide that extend upward from 1,200 feet AGL to 18,000 feet MSL and extend between VOR navigational facilities. Victor Airways are shown with gold lines on **Exhibit 1E**.

For aircraft enroute or departing Nogales International Airport, there are several Victor Airways available. The Nogales VOR-DME located on-site is a converging point for Victor Airways in the Nogales area.

Military Operations Areas: Military Operating Areas (MOAs) in the vicinity of Nogales International Airport include the Ruby 1 MOA and Fuzzy MOA, both located west of the Airport.

Military Training Routes: Military training routes near Nogales International Airport are identified with the letters VR and a three-digit number. The arrows on the route indicate the direction of travel. Military aircraft travel on these routes below 10,000 feet MSL and at speeds in excess of 250 knots. **Exhibit 1E** depicts the military training routes in the vicinity of Nogales International Airport.

Restricted Areas: Restricted areas are depicted on **Exhibit 1E** with brown hatched lines. The restricted areas in the vicinity of Nogales International Airport include: R-2303B, R-2303A, R-2312, and R-2303C. Each of these warning areas is located east of the Airport and is associated with activities at Libby Army Airfield.

AIRSPACE CONTROL

The FAA has established 21 Air Route Traffic Control Centers (ARTCC) throughout the continental United States to control aircraft operating under IFR within controlled airspace and while enroute. An ARTCC assigns specific routes and altitudes along federal airways to maintain separation and orderly traffic flow. The Albuquerque ARTCC controls IFR airspace enroute to and from the Nogales International Airport area.

Instrument Approach Procedures

Instrument approach procedures are a series of predetermined maneuvers established by the FAA using electronic navigational aids that assist pilots in locating and landing at an airport, especially during instrument flight conditions. There are currently three published non-precision circling-only instrument approaches into Nogales International Airport. Non-precision approaches provide course guidance to the pilot without vertical guidance. Straight-in instrument approach procedures are not recommended due to rising terrain surrounding the Airport.

The capability of an instrument is defined by the visibility and cloud ceiling minimums associated with the approach. Visibility minimums define the horizontal distance the pilot must be able to see in order to complete the approach. Cloud ceilings define the lowest level a cloud layer (defined in feet above the ground) can be situated for the pilot to complete the approach. If the observed visibility or ceilings are below the minimums prescribed for the approach, the pilot cannot complete the instrument approach. **Table 1G** summarizes instrument approach minima for the Airport.

TABLE 1G
Instrument Approach Data
Nogales International Airport

	WEATHER MINIMUMS BY AIRCRAFT TYPE							
	Category A		Category B		Category C		Category D	
	CH	VIS	CH	VIS	CH	VIS	CH	VIS
VOR/DME or GPS-B								
Circling	1,268	1.25	1,268	1.5	1,268	3.0	1,268	3.0
VOR or GPS-A								
Circling	1,568	1.25	1,568	1.5	1,568	3.0	1,568	3.0
NDB or GPS-C								
Circling	2,648	1.25	2,648	1.5	2,648	3.0	2,648	3.0

Aircraft categories are based on the approach speed of aircraft, which is determined by 1.3 times the stall speed in landing configuration. The approach categories are as follows:

Category A	0-90 knots (Cessna 172)
Category B	91-120 knots (Beechcraft KingAir)
Category C	121-140 knots (Canadair Challenger)
Category D	141-165 knots (Gulfstream IV)
Category E	Speed greater than 166 knots (F-16)

Abbreviations:

CH:	Cloud Height (in feet above ground level)	DME:	Distance Measuring Equipment
GPS:	Global Positioning System	NDB:	Non Directional Beacon
VIS:	Visibility (in statute miles)	VOR:	Very High Frequency Omni-directional Range

Source: U.S. Terminal Procedures

Local Operating Procedures

The traffic pattern at the Airport is maintained to provide the safest and most efficient use of the airspace. A standard left-hand traffic pattern is published for Runway 3-21. For either runway end, the approach to landing is made using a series of left turns. Runway 21 is designated for use during calm wind conditions (wind speeds of less than five knots). Touch-and-go operations are allowed only on Runway 21.

Nogales International Airport does not have aircraft restrictions, curfews, or a mandatory noise abatement program, as these programs would violate the federal *Airport Noise and Capacity Act* (ANCA) of 1990. Federal law requires the Airport to remain open 24 hours a day, 7 days a week, and to accept all civilian and military aircraft that can be safely accommodated.

AREA AIRPORTS

A review of other public-use airports with at least one paved runway within a 50-nautical mile radius of Nogales International Airport was conducted to identify and distinguish the types of air service provided in the region. It is important to consider the capabilities and limitations of these airports when planning for future changes or improvements at Nogales International Airport. **Exhibit 1F** provides information on public-use airports within the vicinity of the Nogales International Airport. Information pertaining to each airport was obtained from FAA Form 5010-1, Airport Master Record.

SOCIOECONOMIC PROFILE

The following sections will analyze socioeconomic indicators including population, employment, and income for the City of Nogales, Santa Cruz County, the State of Arizona, and the United States. Socioeconomic data was obtained from the U.S. Census Bureau, the U.S. Department of Labor, the Bureau of Labor Statistics, the Arizona Department of Administration Office of Employment and Population Statistics, and Woods and Pool Economics, *The Complete Economic and Demographic Data Source*, 2012.

POPULATION

Historical population information is summarized in **Exhibit 1G**. As indicated, the City of Nogales has grown at a slower pace than that of the County and State since 1970 and actually decreased slightly in total population between 2000 and 2010.

EMPLOYMENT

A breakdown of employment by sector for Santa Cruz County is presented on **Exhibit 1G**. Over the past ten years, total non-farm employment has grown an average rate of 0.9 percent annually. However, since 2007, the only employment sector in the County to experience growth was federal, state, and local government. The goods producing sector has seen the largest drop losing 675 jobs since 2002.

Unemployment rates are also a good indicator of the state economic conditions. Historical unemployment rate comparisons since 1990 are depicted on **Exhibit**

Sierra Vista Municipal Airport - Libby Army Airfield (FHU)

Airport Sponsor:
City of Sierra Vista/U.S. Army Intelligence Center
Distance from OLS:
28 nm Northeast
Airport Classification:
General Aviation
Primary Runway: 8-26
Length: 12,001′
Width: 150′

Surface Type/Condition: Concrete/Excellent
Strength Rating: 70,000 lbs SWL / 200,000 lbs DWL / 400,000 lbs DTWL / 700,000 lbs DDTWL
Marking: Precision
Runway Lighting: HIRL
Visual Approach Aids: PAPI-4 (8 and 26)
2012 Based Aircraft: 58
2012 Estimated Annual Operations: 133,410
Services Provided: Aircraft Fuel (JetA, AvGas); Tiedowns; Passenger Terminal and Lounge; Pilot Lounge
Published Instrument Approach Procedures: 7

Tucson International Airport (TUS)

Airport Sponsor:
Tucson Airport Authority
Distance from OLS:
42 nm North
Airport Classification:
Primary Commercial Service
Primary Runway: 11L-29R
Length: 10,996′
Width: 150′

Surface Type/Condition: Asphalt-Grooved/Good
Strength Rating: 160,000 lbs SWL / 200,000 lbs DWL / 350,000 lbs DTWL / 585,000 lbs DDTWL
Marking: Precision (11L); Nonprecision (29R)
Runway Lighting: HIRL
Visual Approach Aids: PAPI-4 (11L and 29R); MALSR (11L)
2012 Based Aircraft: 303
2012 Annual Operations: 145,111
Services Provided: Aircraft Fuel (JetA, AvGas); Aircraft Maintenance; Aircraft Rental; Charter; Aircraft Sales; Tiedowns; Pilot Supplies; Full Service FBOs
Published Instrument Approach Procedures: 12

Benson Municipal Airport (E95)

Airport Sponsor:
City of Benson
Distance from OLS:
43 nm Northeast
Airport Classification:
General Aviation
Primary Runway: 10-28
Length: 4,002′
Width: 75′

Surface Type/Condition: Asphalt/Good
Strength Rating: 12,500 lbs SWL
Marking: Basic
Runway Lighting: MIRL
Visual Approach Aids: PAPI-2 (10 and 28)
2012 Based Aircraft: 31
2012 Estimated Annual Operations: 7,700
Services Provided: Aircraft Fuel (JetA, AvGas); Aircraft Parking; Flight Training; Aircraft Rental; Aerial Tours; Pilot Supplies
Published Instrument Approach Procedures: 0

Tombstone Municipal Airport (P29)

Airport Sponsor:
City of Tombstone
Distance from OLS:
45 nm Northeast
Airport Classification:
NA
Primary Runway: 6-24
Length: 4,430′
Width: 60′

Surface Type/Condition: Asphalt/Good
Strength Rating: NA
Marking: Basic
Runway Lighting: None
Visual Approach Aids: None
2012 Based Aircraft: 4
2012 Estimated Annual Operations: 340
Services Provided: Aircraft Tiedowns
Published Instrument Approach Procedures: 0

Ryan Field Airport (RYN)

Airport Sponsor:
Tucson Airport Authority
Distance from OLS:
47 nm Northwest
Airport Classification:
Reliever
Primary Runway: 6R-24L
Length: 5,500′
Width: 75′

Surface Type/Condition: Asphalt/Good
Strength Rating: 12,500 lbs SWL / 30,000 lbs DWL
Marking: Precision (6R); Basic (24L)
Runway Lighting: MIRL
Visual Approach Aids: VASI-4 (24L)
2012 Based Aircraft: 188
2012 Annual Operations: 122,306
Services Provided: Aircraft Fuel (JetA, AvGas); Tiedowns; Aircraft Repairs/Maintenance; Charter Services; Flight Training; Aircraft Rental
Published Instrument Approach Procedures: 0

Bisbee Municipal Airport (P04)

Airport Sponsor:
City of Bisbee
Distance from OLS:
50 nm East
Airport Classification:
General Aviation
Primary Runway: 17-35
Length: 5,929′
Width: 60′

Surface Type/Condition: Asphalt/Good
Strength Rating: 12,000 lbs SWL
Marking: Basic
Runway Lighting: MIRL
Visual Approach Aids: PAPI-2 (17 and 35)
2012 Based Aircraft: 12
2012 Estimated Annual Operations: 4,900
Services Provided: Aircraft Fuel (JetA, AvGas); Tiedowns; Flight Training; Passenger Terminal
Published Instrument Approach Procedures: 0

KEY

DME - Distance Measuring Equipment
DWL - Dual Wheel Loading
DTWL - Dual-Tandem Wheel Loading
GPS - Global Positioning System
HIRL - High Intensity Runway Lighting
ILS - Instrument Landing System
LOC - Localizer
MALSR - Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights
MIRL - Medium Intensity Runway Lights
NA - Not Applicable/Not Available
NM - Nautical Miles
PAPI - Precision Approach Path Indicator
REIL - Runway End Identification Lights
RNAV - Area Navigation
SWL - Single Wheel Loading
VASI - Visual Approach Slope Indicator
VOR - Very High Frequency Omni-directional Range

NORTH (All Pictures)

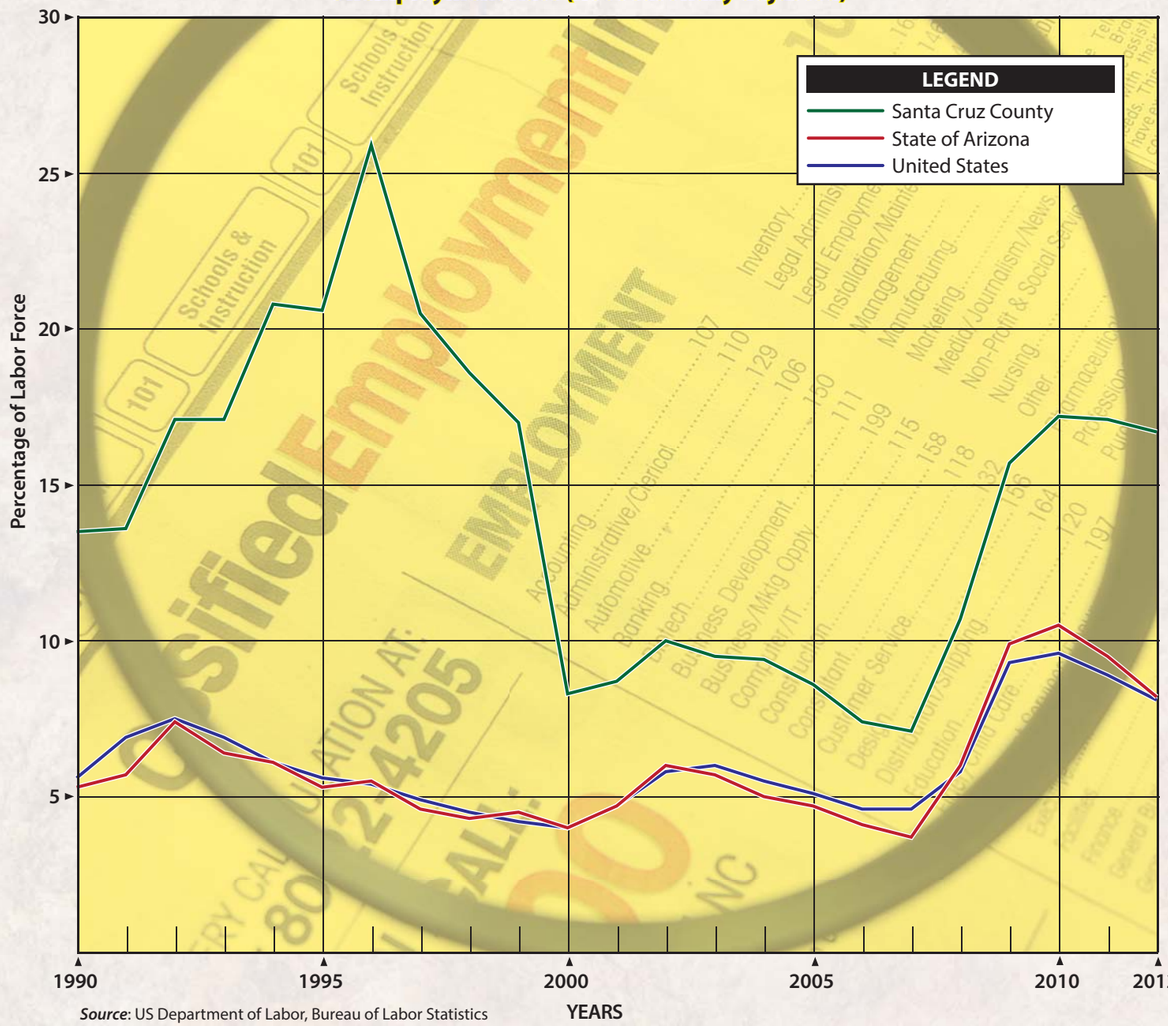
Exhibit 1F
REGIONAL PUBLIC-USE AIRPORTS

Population

Year	City of Nogales	Santa Cruz County	State of Arizona
1970	8,945	13,966	1,770,900
1980	15,683	20,459	2,718,425
1990	19,489	29,676	3,665,228
2000	20,878	38,381	5,130,632
2010	20,837	47,420	6,392,017
Avg. Annual Growth Rate	**2.1%**	**3.1%**	**3.3%**

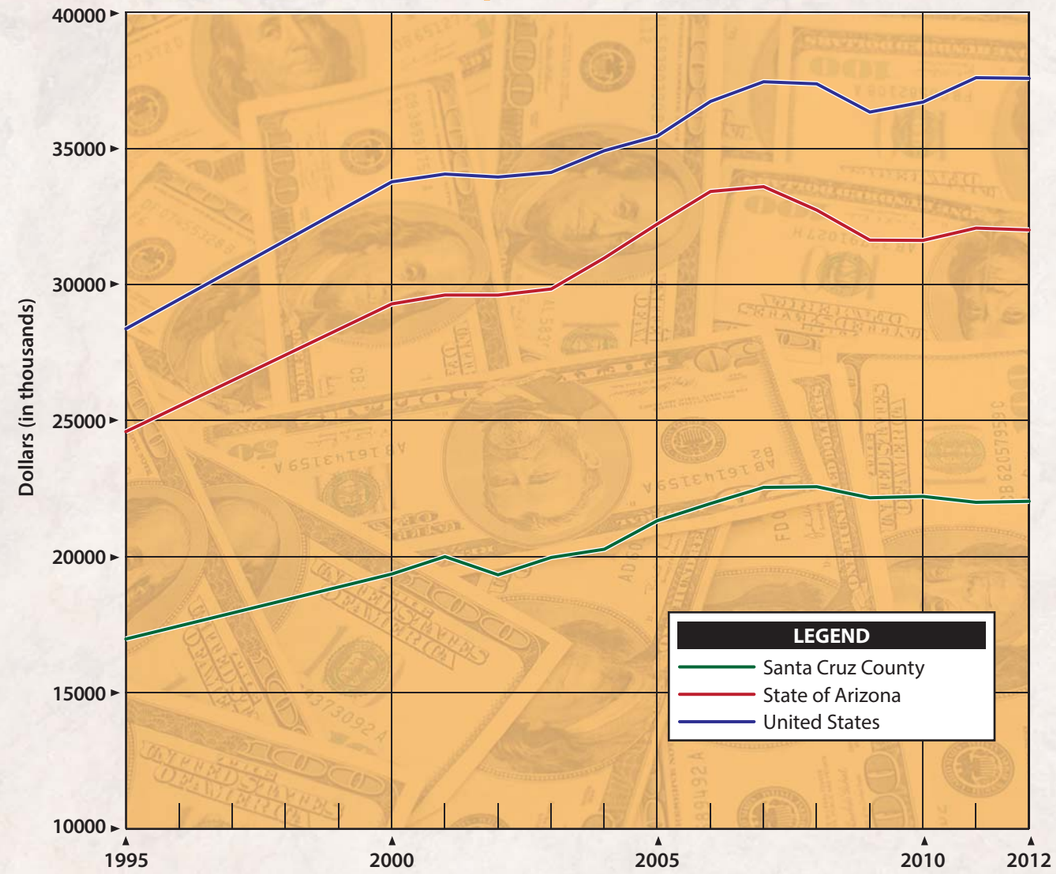
Source: U.S. Census Bureau

Unemployment Rate (not seasonally adjusted)



Source: US Department of Labor, Bureau of Labor Statistics

Per Capita Personal Income



Source: Woods & Pool Economics,
The Complete Economic and Demographic Data Source, 2012

Employment by Industry Sector (Santa Cruz County)

Sector	2002	2007	2012
Total Nonfarm	12,000	14,200	13,125
Total Private	8,775	10,575	9,050
Goods Producing	1,325	950	650
Service-Providing	10,650	13,275	12,475
Private Service Providing	7,450	9,625	8,400
Trade, Transportation, and Utilities	4,525	5,750	5,725
Other Private Service-Providing	2,900	3,875	2,675
Government	3,225	3,625	4,075
Federal Government	1,125	1,375	1,825
State and Local Government	2,100	2,250	2,250

Source: Arizona Department of Administration; Office of Employment and Population Statistics, 2012

1G. Santa Cruz County has experienced much higher unemployment rates when compared to the State of Arizona and the United States since 1990. The 22-year low unemployment rate for the County was reached in 2007 (7.1 percent), but rose significantly during the recession years and, as of 2012, is still in the mid-teens (16.7 percent).

INCOME

Per Capita Personal Income (PCPI in 2005 dollars) data illustrated on **Exhibit 1G** includes Santa Cruz County, the State of Arizona, and the United States. Since 1970, the County's PCPI has grown at a slower (1.0 percent) average annual pace than that of the State (1.6 percent) and nationally (1.9 percent). However, in the past 10 years of data (2002-2012), the County's PCPI has grown at a rate of 1.3 percent surpassing state (0.8 percent) and national (1.0 percent) growth rates.

ENVIRONMENTAL INVENTORY

Research was done for each of the environmental impact categories described within the FAA's Order 1050.1E, *Environmental Impacts: Policies and Procedures*. The following resources cannot be inventoried but are analyzed in the Environmental Overview section of this Master Plan:

- Resources that were not inventoried
    - Construction Impacts
    - Energy Supply and Natural Resources
    - Noise
    - Social Impacts

Available information regarding the existing conditions at Nogales International Airport has been derived from internet resources, agency maps, and existing literature. The intent of this task is to inventory potential environmental sensitivities that might affect future improvements at the airport.

The following sections provide a discussion of the remaining resource categories.

AIR QUALITY

The United States (U.S.) Environmental Protection Agency (EPA) has established National Ambient Air Quality Standards (NAAQS) based on health risks for six pollutants: carbon monoxide (CO); nitrogen dioxide (NO_2); sulfur dioxide (SO_2); lead (Pb); ozone (O_3); and two sizes of particulate matter (PM): PM measuring 10 micrometers or less in diameter (PM_{10}) and PM measuring 2.5 micrometers in diameter ($PM_{2.5}$).

An area with ambient air concentrations exceeding the NAAQS for a criteria pollutant is said to be a nonattainment area for the pollutant's NAAQS, while an area where ambient concentrations are below the NAAQS is considered an attainment area. The EPA requires areas designated as nonattainment to demonstrate how they will attain the NAAQS by an established deadline. To accomplish this, states prepare State Implementation Plans (SIPs). SIPs are typically a comprehensive set of reduction strategies and emissions budgets designed to bring the area into attainment.

Various levels of review apply within both the *National Environmental Policy Act*

(NEPA) and permitting requirements for airport development projects. Potentially significant air quality impacts associated with an FAA project or action would be demonstrated by the project or action exceeding one or more of the NAAQS for any of the time periods analyzed.

The Airport is located in Santa Cruz County. According to the EPA's *Green Book – Nonattainment Status for Each County by Year for Arizona*, the City of Nogales is a non-attainment area for PM_{10} and $PM_{2.5}$. [1] The Airport lies outside of the City of Nogales in a portion of the County that is in attainment for all NAAQS standards.

COASTAL RESOURCES

The Airport is located approximately 130 miles from the nearest coastal body of water, which is the Gulf of California. It is located more than 350 miles from the Pacific Ocean, the nearest U.S. protected coastal area. Thus, the Airport is not located within a Coastal Zone.

FARMLAND

According to the U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS), the Airport consists primarily of the following soils: comoro soils, white house-caralampi complex, and white house-hathaway association soils.[2] The white house soils are not considered prime or unique farmland. Comoro soils are prime farmland if irrigated. These soils are found in the extreme southeastern border of the Airport. The airside and landside facilities are located in the white house soils are not considered prime farmland. Therefore, the *Farmland Protection Policy Act* is not applicable to development in these areas.

FISH, WILDLIFE, AND PLANTS

The U.S. Fish and Wildlife Service (FWS) is charged with overseeing the requirements of the *Endangered Species Act*, specifically Section 7, which sets forth requirements for consultation to determine if a proposed action "may affect" a federally endangered or threatened species. If an agency determines that an action "may affect" a federally protected species, then Section 7(a)(2) requires the agency to consult with the FWS to ensure that any action the agency authorizes, funds, or carries out is not likely to jeopardize the continued existence of any federally-listed endangered or threatened species, or result in the destruction or adverse modification of critical habitat.

According to the Arizona Ecological Service's database of the FWS, dated February 5, 2013, there are eleven species that are listed as endangered (E) and three species listed as threatened (T) known to occur within Santa Cruz County.[3] These species are identified in **Table 1H**. Of the species identified in **Table 1H**, only the pima pineapple cactus has the potential to occur at the Airport.

[1] http://www.epa.gov/oar/oaqps/greenbk/anay_az.html, dated December 14, 2012, accessed February 2013.
[2] http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx, accessed February 2013.
[3] http://www.fws.gov/southwest/es/arizona/Documents/CountyLists/SantaCruz.pdf, dated February 5, 2013, accessed March 2013.

TABLE 1H
Endangered, Threatened and Candidate Species
Santa Cruz County, Arizona

Common Name	Status	Habitat	Potential for Occurrence at Airport
Canelo Hills ladies' tresses	Endangered	Finely grained, highly organic, saturated soils of cienegas.	Unlikely to Occur
Chiricahua leopard frog	Threatened	Streams, rivers, backwaters, ponds, and stock tanks that are mostly free from introduced fish, crayfish, and bullfrogs.	Unlikely to Occur
Desert pupfish	Endangered	Shallow springs, small streams, and marshes. Tolerates saline and warm water.	Unlikely to Occur
Gila chub	Endangered	Pools, springs, cienegas, and streams.	Unlikely to Occur
Gila topminnow	Endangered	Small streams, springs, and cienegas vegetated shallows.	Unlikely to Occur
Huachuca water umbel	Endangered	Cienegas, perennial low gradient streams, wetlands	Unlikely to Occur
Jaguar	Endangered	Found in Sonoran desertscrub up through subalpine conifer forest	Unlikely to Occur
Lesser long-nosed bat	Endangered	Desert scrub habitat with agave and columnar cacti present as food plants. Day roosts in caves and abandoned tunnels.	Unlikely to Occur
Mexican spotted owl	Threatened	Nests in canyons and dense forests with multi-layered foliage structure.	Unlikely to Occur
Ocelot	Endangered	Desert scrub in Arizona. Humid tropical and subtropical forests, and savannahs in areas south of the U.S. Universal component is presence of dense cover.	Unlikely to Occur
Pima pineapple cactus	Endangered	Sonoran desert scrub or semi-desert grassland communities.	Potential to Occur
Sonora chub	Threatened	Perennial and intermittent, small to moderate sized streams with boulders and cliffs.	Unlikely to Occur
Sonoran tiger salamander	Endangered	Stock tanks and impounded cienegas; rodent burrows, rotted logs, and other moist cover sites	Unlikely to Occur
Southwestern willow flycatcher	Endangered	Cottonwood/willow and tamarisk vegetation communities along rivers and streams.	Unlikely to Occur

Source: U.S. Fish & Wildlife Service, Arizona Ecological Services; Santa Cruz County Threatened and Endangered Species List, February 5, 2013.

The Arizona Department of Game and Fish's (ADGF) Online Environmental Review Tool was used to ascertain if there have been known occurrences of special status species or critical habitats within three miles of the Airport. According to this database, there have been occurrences within three miles of the Airport of the pima pineapple cactus (E). Additional wildlife of special concern (WSC) in Arizona known to occur within three miles of the Airport include: the grey hawk, black-bellied whistling-duck, Sonoran desert tortoise, and the winter population of the bald eagle.

Other federal laws potentially applicable to the Airport include the *Migratory Bird Treaty Act,* which prohibits activities that would harm migratory birds, their eggs or

nests, and the *Fish and Wildlife Coordination Act,* which requires consultation with state wildlife agencies concerning wildlife resources if impacts to water resources might occur. Executive Order (EO) 13312, *Invasive Species,* aims to prevent the introduction of invasive species as a result of a proposed action.

FLOODPLAINS

Executive Order 11988, *Floodplain Management*, directs federal agencies to take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by the floodplains.

According to the Federal Emergency Management Agency (FEMA) National Flood Insurance Rate Map, (FIRM #040090-04023C-0490C) southeast portions of the Airport property are located within the 100-year floodplain. The floodplain is associated with a tributary of the Santa Cruz River, named Cañada de la Paloma, which extends through Airport property in this location.

HAZARDOUS MATERIALS AND WASTES

Federal, state, and local laws, including the *Resource Conservation Recovery Act* (RCRA) and the *Comprehensive Environmental Response, Compensation, Liability Act* (CERCLA), as amended (also known as the Superfund), regulate hazardous materials use, storage, transport, and disposal. These laws may extend to past and future landowners of properties containing these materials. Disturbing areas that contain hazardous materials or contaminates may cause significant impacts to soil, surface water, groundwater, air quality, and the organisms using these resources.

According to the EPA's EJ View Enviromapper web site, there are no businesses currently reporting to the EPA for their handling of hazardous materials or wastes on or near the Airport.[4] There are no mapped Superfund or Brownfield sites in proximity to the Airport.

Fuel storage facilities are located at the Airport and are required to comply with all applicable regulations.

HISTORICAL, ARCHITECTURAL, ARCHAEOLOGICAL, AND CULTURAL RESOURCES

Determination of a project's environmental impact to historic and cultural resources is made under guidance in the *National Historic Preservation Act* (NHPA) *of 1966*, as amended, the *Archaeological and Historic Preservation Act* (AHPA) *of 1974*, the *Archaeological Resources Protection Act* (ARPA), and the *Native American Graves Protection and Repatriation Act* (NAGPRA) *of 1990*, among others. Impacts may occur when the proposed project causes an adverse effect on a property which has been identified (or is unearthed during construction) as having historical, architectural, archaeological, or cultural significance.

A *Cultural Resources Survey at Nogales International Airport* dated March 26, 2008 was conducted during the preparation of an environmental assessment to acquire land adjacent to Airport property. The findings of this survey included two sites adjacent to Airport property related to historic ranching operations. Both

[4] http://epamap14.epa.gov/ejmap/ejmap.aspx?wherestr=nogales%2C%20az, accessed February 2013.

sites were recommended as eligible for inclusion in the National Register of Historic Places (NRHP). This indicates potential for additional eligible sites in the area including on Airport property.

According to the NRHP, there are no federally registered properties at the Airport. The nearest listed property is the Santa Cruz Bridge #1, located approximately 2½ miles to the southwest.

U.S. DEPARTMENT OF TRANSPORTATION (DOT) ACT: SECTION 4(f)

Section 4(f) of the DOT Act, which was recodified and renumbered as Section 303(c) of 49 United States Code (USC), provides that the Secretary of Transportation will not approve any program or project that requires the use of any publicly owned land from a historic site, public park, recreation area, or waterfowl and wildlife refuge of national, state, regional, or local importance unless there is no feasible and prudent alternative to the use of such land, and the project includes all possible planning to minimize harm resulting from the use.

The term "use" includes not only the physical taking of such lands, but "constructive use" of such lands. "Constructive use" of lands occurs when "a project's proximity impacts are so severe that the protected activities, features, or attributes that qualify a resource for protection under Section 4(f) are substantially impaired" (23 Code of Federal Regulations [CFR] Part 771.135).

In the case of the Airport, the nearest Section 4(f) property is the Coronado National Forest located approximately ¾-miles to the east of the Airport boundary. The Coronado National Forest is public land available for recreational uses such as hiking and camping. The City of Nogales has several public parks located within its municipal boundaries southwest of the Airport.

The nearest NRHP-listed historic site, as discussed previously, is the Santa Cruz Bridge #1, located approximately 2½ miles to the southwest.

WATER QUALITY

Under the *Clean Water Act* (CWA), the State of Arizona has been given authority by the EPA to establish water quality standards, control discharges, and regulate other issues concerning water quality. The use of best management practices (BMPs) during construction is a requirement of construction-related permits such as Arizona Pollutant Discharge Elimination System (AZPDES) Construction General Permit (AZG2003-001) and is incorporated into an airport's storm water pollution prevention plan (SWPPP).

The Cañada de la Paloma, which flows along the southeastern boundary of the Airport, conveys storm water off Airport property into the Santa Cruz River southwest of the Airport. The Airport is located within the Upper Santa Cruz Watershed (Hydrologic Unit Code [HUC] No. 15050301). A 17-mile stretch of the Santa Cruz River is listed as impaired due to the presence of Escherichia Coli (E. Coli) from the Mexico border in the south to the Nogales wastewater treatment plant located approximately nine miles north of downtown Nogales.

WETLANDS/WATERS OF THE U.S.

Certain drainages (both natural and human-made) come under the purview of the U.S. Army Corps of Engineers (ACOE) under Section 404 of the CWA; wetlands are also protected. In addition, EO Order 11990, *Protection of Wetlands*, also provides definitions and protection of wetlands. Wetlands typically exhibit three characteristics: hydrology, hydrophytes (plants able to tolerate various degrees of flooding or frequent saturation), and poorly drained or "hydric" soils.

As mentioned previously, the Cañada de la Paloma is present on the Airport. However, according to the Environmental Assessment for Land Acquisition at the Airport conducted in July 2008, coordination with the U.S. Army Corps of Engineers indicated that there are no waters of the United States within the project area, which includes portions of the Cañada de la Paloma. According to the NRCS soils survey, the soils present on Airport property are not considered hydric.

A review of the U.S. Fish and Wildlife Service's National Wetlands Inventory, a portion of the Cañada de la Paloma on the extreme southern portion of Airport property is considered a riverine habitat contained in natural channels, which intermittently contains flowing water.

WILD AND SCENIC RIVERS

Wild and scenic rivers refer to designations within the U.S. Department of the Interior, National Park Service's *Nationwide Rivers Inventory*. Public Law 90-542 states that such rivers are free flowing and possess "outstanding remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural or other similar values."

The State of Arizona has two designated Wild and Scenic Rivers: Fossil Creek and the Verde River. These resources are located approximately 195 miles north of the Airport and are located in a separate drainage basin.

ENVIRONMENTAL REFERENCES

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Chapter Two

AVIATION DEMAND FORECASTS

Chapter Two

AVIATION DEMAND FORECASTS

An important factor when planning the future needs of an airport involves a definition of aviation demand that may reasonably be expected to occur in both the near term (five years) and long term (20 years). For a general aviation airport such as Nogales International Airport (OLS or Airport), forecasts of based aircraft and operations (takeoffs and landings) serve as the basis for facility planning.

The Federal Aviation Administration (FAA) has oversight responsibility to review and approve aviation forecasts developed in conjunction with airport planning studies. The FAA reviews such forecasts with the objective of comparing them to the FAA *Terminal Area Forecasts* (TAF) and the *National Plan of Integrated Airport Systems* (NPIAS). In addition, aviation activity forecasts are an important input to the benefit-cost analyses associated with some airport development projects. FAA Order 5090.3C, *Field Formulation of the National Plan of Integrated Airport Systems*, dated December 4, 2004, states that forecasts should be:

- Realistic
- Based on the latest available data
- Reflective of current conditions at the airport
- Supported by information in the study
- Able to provide adequate justification for airport planning and development

The forecast process for an airport master plan consists of a series of basic steps that vary in complexity depending upon the issues to be addressed and the level of effort required. The steps include a review of previous forecasts, determination of data needs, identification of data sources, collection of data, selection of forecast methods, preparation of the forecasts, and evaluation and documentation of the results. FAA Advisory Circular (AC) 150/5070-6B, Airport Master Plans, out-

lines seven standard steps involved in the forecast process, including:

1) **Identify Aviation Activity Measures**: The level and type of aviation activities likely to impact facility needs. For general aviation, this typically includes based aircraft and operations.

2) **Review Previous Airport Forecasts**: May include the FAA *Terminal Area Forecast*, state or regional system plans, and previous master plans.

3) **Gather Data**: Determine what data are required to prepare the forecasts, identify data sources, and collect historical and forecast data.

4) **Select Forecast Methods**: There are several appropriate methodologies and techniques available, including regression analysis, trend analysis, market share or ratio analysis, exponential smoothing, econometric modeling, comparison with other airports, survey techniques, cohort analysis, choice and distribution models, range projections, and professional judgment.

5) **Apply Forecast Methods and Evaluate Results**: Prepare the actual forecasts and evaluate for reasonableness.

6) **Summarize and Document Results**: Provide supporting text and tables as necessary.

7) **Compare Forecast Results with FAA's TAF**: Follow guidance in FAA Order 5090.3C, *Field Formulation of the National Plan of Integrated Airport Systems*. In part, the Order indicates that forecasts should not vary significantly (more than 10 percent) from the TAF. When there is a greater than 10 percent variance, supporting documentation should be supplied to the FAA.

The aviation demand forecasts are then submitted to the FAA for their approval. Master plan forecasts for operations and based aircraft for general aviation airports are considered to be consistent with the TAF if they meet certain criteria:

Where the 5- or 10-year forecasts exceed 100,000 total annual operations or 100 based aircraft:

a) Forecasts differ by less than 10 percent in the 5-year forecast and 15 percent in the 10-year period, or
b) Forecasts do not affect the timing or scale of an airport project, or
c) Forecasts do not affect the role of the airport as defined in the current version of FAA Order 5090.3C.

Aviation activity can be affected by many influences on the local, regional, and national levels, making it virtually impossible to predict year-to-year fluctuations of activity over 20 years with any certainty. Therefore, it is important to remember that forecasts are to serve only as guidelines, and planning must remain flexible enough to respond to a range of unforeseen developments.

The following forecast analysis for Nogales International Airport was produced following these basic guidelines. Existing forecasts are examined and compared against current and historic activity. The historical aviation activity is then examined along with other factors and trends that can affect demand. The intent is to provide an updated set of aviation-

demand projections for Nogales International Airport that will permit County officials to make planning adjustments as necessary to maintain a viable, efficient, and cost-effective facility.

FORECASTING APPROACH

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

Beyond five years, the predictive reliability of the forecasts can diminish. Therefore, it is prudent for the Airport to update the forecasts, reassess the assumptions originally made, and revise the forecasts based on the current Airport and industry conditions. Facility and financial planning usually require at least a 10-year preview, since it often takes several 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 activity occurring 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. A recent example is the substantial growth in the production and delivery of business jet aircraft, which resulted in a growth rate that far exceeded expectations. Such changes are difficult to predict, but over time, reasonable growth trends can be identified. Using a broad spectrum of demographic, economic, and industry data, forecasts for Nogales International Airport have been developed.

For each aviation demand indicator, such as based aircraft and operations, several forecasts are developed. These forecasts are presented to define a reasonable planning envelope. The selected forecast for a particular demand indicator may be one of the forecasts or it may be an average of all of the forecasts. Several standard statistical methods have been employed to generate various projections of aviation demand.

Trend series projections are probably the simplest and most familiar of the forecasting techniques. By fitting growth curves to historical demand data and then extending them into the future, a basic trend line projection is produced. A basic assumption of this technique is that outside factors will continue to affect aviation demand in much the same manner as in the past. As broad as this assumption may be, the trend line projection does serve as a reliable benchmark for comparing other projections.

Correlation analysis provides a measure of a direct relationship between two separate sets of historic data. Should there be a reasonable correlation between the data, further evaluation using regression analysis may be employed.

Regression analysis measures the statistical relationship between dependent and independent variables, yielding a "correlation coefficient." The correlation coefficient (Pearson's "r") measures the associ-

ation between changes in a dependent variable and independent variable(s). If the r-squared (r^2) value (coefficient determination) is greater than 0.90, it indicates good predictive reliability. A value below 0.90 may be used with the understanding that the predictive reliability is lower.

Historical growth analysis is a simple forecasting method in which the historical average annual growth rate is identified, and then extended out to forecast years. This analysis method assumes factors that impacted growth in the past will continue into the future.

Market share analysis involves a historical review of airport activity as a percentage, or share, of a larger regional, state, or national aviation market. A historical market share trend is determined providing an expected market share for the future. These shares are then multiplied by the forecasts of the larger geographical area to produce a market share projection. This method has the same limitations as trend line projections, but can provide a useful check on the validity of other forecasting techniques.

Utilizing these statistical methods, available existing forecasts, and analyst expertise, forecasts of aviation demand for Nogales International Airport have been developed. The remainder of this chapter presents the aviation demand forecasts and includes activity in two broad categories: based aircraft and annual operations.

NATIONAL AVIATION TRENDS AND FORECASTS

The forecasts developed for the airport must consider national, regional, and local aviation trends. The following section describes the trends in aviation. This information is utilized both in statistical analysis and to aid the forecast preparer in making any manual adjustments to the forecasts as necessary. The national aviation forecast information is primarily sourced from the *FAA Aerospace Forecast: Fiscal Years 2013-2033*.

NATIONAL TRENDS

The aviation industry in the United States has experienced an event-filled decade. Since the turn of the century, the industry has faced impacts of the events of September 11, 2001, scares from pandemics such as SARS, the bankruptcy of five network air carriers, all-time high fuel prices, and a serious economic downturn with global ramifications. The Bureau of Economic Research has determined that the worst economic recession in the post-World War II era began in December 2007 and lasted until mid-2009. Eight of the world's top 10 economies were in recession by January 2009.

As the recession began, unemployment in the United States was at 5.0 percent. While it grew through 2008, unemployment intensified in 2009 until peaking at 10.1 percent in October, although the recession officially ended in June of that year. As of the end of 2011, unemployment stood at 8.7 percent and by the end of 2012, the unemployment rate was still high at 7.7 percent.

This recession did not face the high inflationary environment of the recession in the early 1980s or the high-energy costs of the mid-1970s recession. While recessions during the post-war era have averaged 10 months in duration, this one lasted 19 months. Continued levels of high debt, a weak housing market, and tight

credit are expected to keep the recovery modest by most standards. The resolution of those factors will determine the future path of the recovery.

The nation's gross domestic product (GDP) is the primary measure of overall economic growth. GDP growth rate in fiscal year 2012 was 2.2 percent, reassuring concerns about the possibility of a double-dip recession. GDP growth did, however, soften in the 4th quarter of 2012 as uncertainty over the "fiscal cliff" reduced demand. The FAA forecasts were based upon a 2.5 percent annual average growth in GDP from federal fiscal year 2012 through 2033.

Economic growth on the global scale is expected to be higher, with emerging markets in Asia/Pacific and Latin America leading the way. The global GDP was projected to grow at an average of 3.2 percent over the 20-year forecast period.

GENERAL AVIATION TRENDS

Following more than a decade of decline, the general aviation industry was revitalized with the passage of the *General Aviation Revitalization Act* in 1994, which limits the liability on general aviation aircraft to 18 years from the date of manufacture. This legislation sparked an interest to renew the manufacture of general aviation aircraft due to the reduction in product liability, as well as renewed optimism for the industry. The high cost of product liability insurance had been a major factor in the decision by many American aircraft manufacturers to slow or discontinue the production of general aviation aircraft.

General aviation activity trends tend to closely match national economic trends. From 2008 through 2012, total operations by general aviation aircraft have declined annually. The FAA forecasts a return to growth in 2013 with an average annual growth rate of 0.5 percent through 2033.

The FAA forecasts the fleet and hours flown for single-engine piston aircraft, multi-engine piston aircraft, turboprops, business jets, piston and turbine helicopters, light sport, experimental, and others (gliders and balloons). The FAA forecasts "active aircraft," not total aircraft. An active aircraft is one that is flown at least one hour during the year. **Exhibit 2A** presents the historical and forecast U.S. active general aviation aircraft.

After growing rapidly for most of the decade, the demand for business jet aircraft has slowed over the past few years as the industry has been hard hit by the economic recession. However, recent shipment activity indicates a cautiously optimistic outlook. The FAA forecast calls for robust growth in the long-term, driven by higher corporate profits and continued concerns about safety, security, and flight delays. Overall, business aviation is projected to outpace personal/recreational use.

The active general aviation fleet is projected to increase at an average annual rate of 0.5 percent through 2033, growing from a 2012 estimate of 220,670 to 246,375 in 2033. The turbine fleet, including helicopters, is forecast to grow annually at 2.8 percent, with the jet portion increasing at 3.5 percent annually.

Piston-powered aircraft are projected to decrease from the 2010 total of 159,007 through 2028, with declines in both single- and multi-engine fixed wing aircraft, but growth in piston helicopters. Beyond 2028, active piston-powered aircraft are

forecast to increase to 148,660 in 2033, still below the current number in the fleet. Fixed-wing single and multi-engine piston aircraft are forecast to decline annually at 0.2 percent and 0.6 percent, respectively.

The FAA began tracking the light sport aircraft segment of the general aviation fleet in 2005. At the end of 2011, a total of 6,645 aircraft were estimated in this category. By 2033, a total of 10,245 light sport aircraft are forecast to be in the fleet.

SOCIOECONOMIC PROJECTIONS

The socioeconomic conditions provide an important baseline for preparing aviation demand forecasts. Local socioeconomic variables such as population, employment, and income are indicators for understanding the dynamics of the community and can relate to local trends in aviation activity. Analysis of the demographics of the airport service area will give a more comprehensive understanding of the socioeconomic situations affecting the region which supports Nogales International Airport. The following is a summary of historical demographic trends as well as forecasts of those socioeconomic characteristics.

Table 2A summarizes historical and forecast population, employment, and income estimates for Santa Cruz County and the State of Arizona. Over the next 20 years, County population, employment, and income are anticipated to grow at nearly the same rates as the State.

TABLE 2A
Demographic Trends and Forecast

	HISTORIC				FORECAST			
	2000	2010	2012	AAGR 2000-2012	2017	2022	2032	AAGR 2012-2032
Santa Cruz County								
Population	39,325	47,539	48,724	1.8%	52,857	57,484	65,706	1.5%
Employment	15,693	18,216	17,466	0.9%	19,181	21,050	25,211	1.9%
Income (PCPI)	$19,363	$22,214	$22,034	1.1%	$23,211	$25,211	$30,433	1.6%
Arizona								
Population	5,160,586	6,413,737	6,659,333	2.1%	7,288,976	7,922,880	9,202,851	1.6%
Employment	2,795,766	3,227,559	3,294,203	1.4%	3,617,335	3,966,220	4,752,155	1.8%
Income (PCPI)	$29,287	$31,619	$32,003	0.7%	$33,686	$36,396	$43,492	1.5%

AAGR: Average annual growth rate
PCPI - Per Capita Personal Income ($2005)
Source: Woods & Poole Economics - Complete Economic Demographic Data Source (CEDDS-2012);

GENERAL AVIATION 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. Indicators of general aviation demand include:

- Based Aircraft
- Based Aircraft Fleet Mix
- General Aviation Operations
- Peaking Period Operations

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U.S. Active General Aviation Aircraft

	2013	2018	2023	2028	2033
FIXED WING					
Piston					
Single Engine	135,005	131,095	128,200	127,115	129,040
Multi-Engine	15,530	15,165	14,605	14,085	13,650
Turbine					
Turboprop	9,830	10,650	11,595	12,665	13,740
Turbojet	12,230	14,420	16,895	20,285	24,620
ROTORCRAFT					
Piston	3,865	4,400	4,885	5,415	5,970
Turbine	7,130	8,415	9,705	11,110	12,585
EXPERIMENTAL					
	24,750	26,250	27,745	29,370	30,980
SPORT AIRCRAFT					
	7,075	7,890	8,680	9,460	10,245
OTHER					
	5,670	5,635	5,605	5,575	5,545
TOTAL	**221,085**	**223,920**	**227,915**	**235,080**	**246,375**

Source: FAA Aerospace Forecasts, Fiscal Years 2013-2033.

Notes: An active aircraft is one that has a current registration and was flown at least one hour during the calendar year.

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

The remainder of this chapter will examine historical trends with regard to these areas of general aviation and project future demand for these segments of general aviation activity at the Airport. These forecasts, once approved by the FAA, will become the basis for planning future facilities, both airside and landside, at the Airport.

REGISTERED AIRCRAFT FORECAST

The number of based aircraft is the most basic indicator of general aviation demand at an airport. By first developing a forecast of based aircraft, other demand segments can be projected utilizing the forecast trend in based aircraft. One method of forecasting based aircraft is to first examine local aircraft ownership by reviewing aircraft registrations in the region. To help identify the service area of the Airport, the distribution of based aircraft is depicted on **Exhibit 2B**. Based upon the distribution, the County approximates the service area for the Airport. **Table 2B** presents historical data regarding aircraft registered in Santa Cruz County.

The trend in registered aircraft in Santa Cruz County since 1993 shows very little change over time. A growing population, employment base, and income proportions in the County over this same time period has failed to result in increased numbers of registered aircraft. Even during periods of economic downturn and growth, registered aircraft in the County have not significantly fluctuated.

Since the historical trend for registered aircraft has not shown any sustained growth, several market share forecasts of registered aircraft were developed. Forecasting methods, such as regression analysis and historical growth trend line analysis, would not return reliable statistical results and were not considered further.

TABLE 2B
Registered Aircraft

Year	Santa Cruz County
1993	51
1994	51
1995	47
1996	45
1997	46
1998	51
1999	49
2000	48
2001	45
2002	46
2003	52
2004	52
2005	46
2006	47
2007	48
2008	48
2009	46
2010	50
2011	54
2012	54
AAGR 1993-2012	**0.3%**

Source: FAA Aircraft Registry Database; FAA Census of U.S. Civil Aircraft

The first forecast considers the relationship between historical registered aircraft and the population. By maintaining the same ratio of aircraft per 1,000 people (1.1), a long term forecast emerges.

Two additional forecasts have been developed utilizing a market share ratio of the active U.S. general aviation fleet as forecast by the FAA. In 2012, Santa Cruz County registered aircraft represented 0.024 percent of the total general aviation fleet of 220,670. This is in line with the average percentage over the past 19 years (0.023 percent). An increasing market share forecast was also considered in which the previous 19-year high ratio of

0.029 percent was reclaimed within the next 20 years.

Since the precise nature of the future economy cannot be known, an average of the three market share forecasts has been chosen as the selected forecast of registered aircraft for Santa Cruz County. This results in registered aircraft increasing from 54 currently to 67 in 20 years. **Exhibit 2C** shows the forecast growth in registered aircraft for Santa Cruz County. These registered aircraft forecasts will be one element considered in the based aircraft forecasts to follow.

BASED AIRCRAFT FORECASTS

Prior to generating statistical forecasts of based aircraft for the Airport, it is important to establish the current number of based aircraft. Until recently, the FAA has not required airports to maintain annual based aircraft figures. The Airport's fixed base operator (FBO), Tiffin Aviation, maintains a listing of based aircraft. Currently, there are a total of 24 aircraft based at the Airport.

The first forecast generated for based aircraft utilizes the previously determined forecast of registered aircraft for Santa Cruz County. This is a distributive forecast that recognizes that aircraft registered in Santa Cruz County utilize other public-use general aviation airports outside of the County. By taking the forecast number of registered aircraft and distributing a relative percentage as based aircraft, a forecast emerges.

Nogales International Airport accounted for 44.4 percent of the registered aircraft in Santa Cruz County. By maintaining this market share of registered aircraft as a constant, a forecast of based aircraft is presented. For Nogales International Airport, this forecast results in 25 based aircraft by 2017, 26 based aircraft by 2022, and 30 based aircraft by the long term.

Existing Forecasts

There are several existing forecasts of based aircraft for Nogales International Airport, as shown in **Table 2C**. The FAA TAF is a generalized annual forecast of airport activity produced by the FAA. It can be used for long term planning when other statistical measures support its forecasts. The TAF estimates that in 2012, there were 23 based aircraft at the Airport. The TAF shows no growth in based aircraft staying static at 23 through 2032. Since it is likely that over the course of the 20-year planning period the Airport will experience some growth in based aircraft, the TAF forecast will be used for comparison purposes but will not be considered a viable forecast for this Master Plan.

A second existing forecast is from the previous master plan finalized in 2002. The base year for the previous master plan forecast was 1999, when a total of 36 based aircraft were identified. The 2002 Master Plan forecasts reflected an average annual growth rate of 1.3 percent.

A third existing forecast is from the 2008 *Arizona State Airports System Plan* (SASP). The SASP has a base year of 2007, and it identified 35 based aircraft at that time. Three forecasts were prepared in the SASP: a high, medium, and low. It was concluded in the SASP that the medium forecast is the most reasonable for long range planning; therefore, that is what will be used for comparison purposes in this Master Plan. The SASP medium forecast for the Airport reflected an annual growth rate of 2.0 percent.

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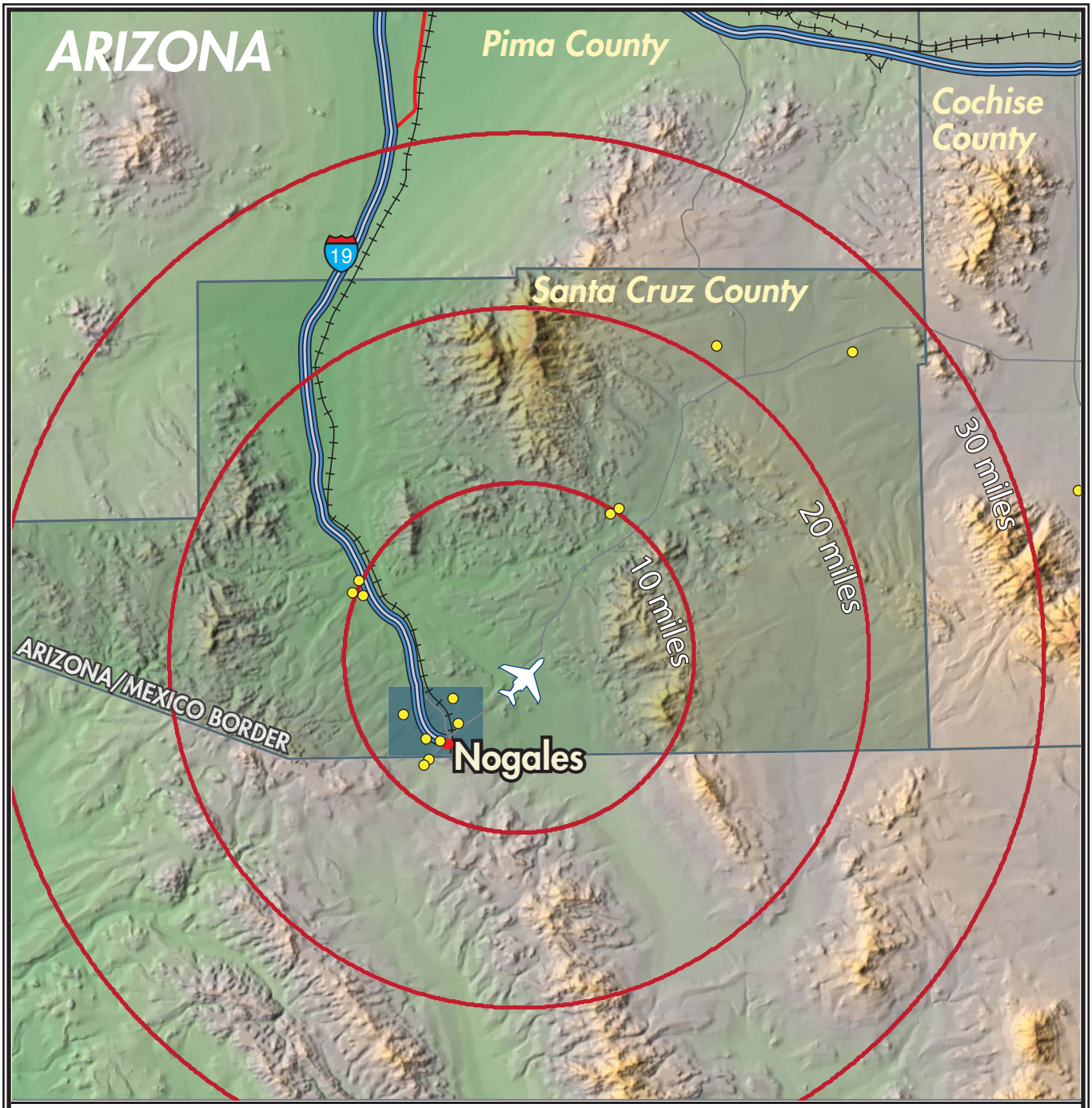


LEGEND

- Based Aircraft *(Markers can represent one or multiple aircraft)*
- County Boundary
- City Boundary

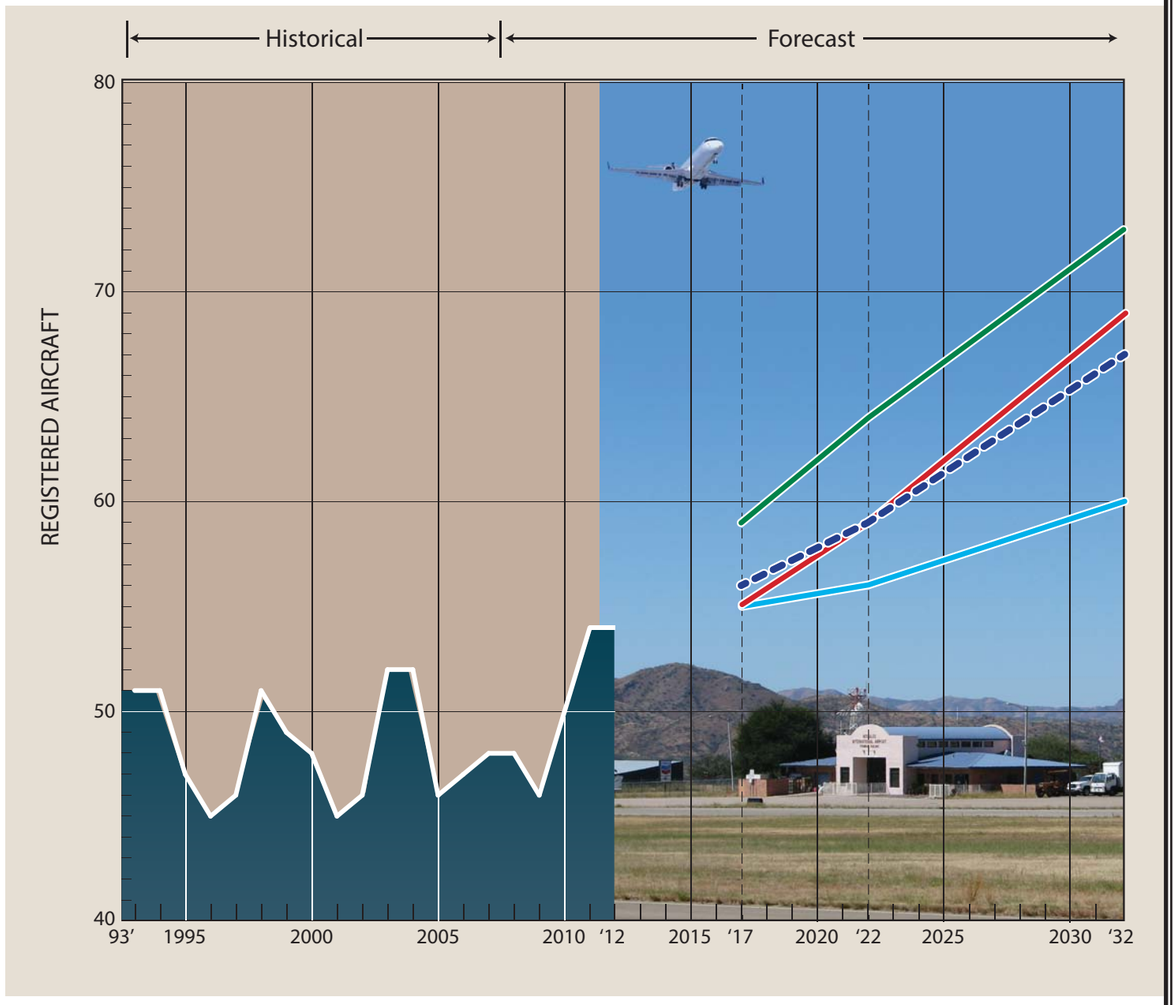
N
NOT TO SCALE

Note: Six based aircraft are registered to out-of-state owners and therefore are not represented on this exhibit.

Exhibit 2B
BASED AIRCRAFT DISTRIBUTION

Year	Santa Cruz County Registration[1]	U.S. Active Aircraft[2]	Percent of U.S. Active Aircraft	Santa Cruz County Population[3]	Aircraft Per 1,000 Population
1993	51	177,120	0.029%	31,525	1.618
1994	51	172,935	0.029%	32,400	1.574
1995	47	182,605	0.026%	33,875	1.387
1996	45	187,312	0.024%	35,050	1.284
1997	46	189,328	0.024%	36,350	1.265
1998	51	205,700	0.025%	37,800	1.349
1999	49	219,500	0.022%	39,100	1.253
2000	48	217,533	0.022%	39,325	1.221
2001	45	211,446	0.021%	39,325	1.144
2002	46	211,244	0.022%	39,840	1.155
2003	52	209,606	0.025%	40,800	1.275
2004	52	219,319	0.024%	42,410	1.226
2005	46	224,257	0.021%	44,055	1.044
2006	47	221,942	0.021%	45,245	1.039
2007	48	231,606	0.021%	46,907	1.023
2008	48	228,664	0.021%	47,471	1.011
2009	46	223,876	0.021%	47,900	0.960
2010	50	223,370	0.022%	47,539	1.052
2011	54	220,770	0.024%	48,088	1.123
2012	54	220,670	0.024%	48,724	1.108
Constant Share of U.S. Fleet (AAGR = 0.5%)					
2017	55	223,315	0.024%	52,857	1.034
2022	56	226,970	0.024%	57,484	0.966
2032	60	243,670	0.024%	65,706	0.907
Increasing Share of U.S. Fleet (AAGR = 1.4%)					
2017	55	223,315	0.024%	52,857	1.034
2022	59	226,970	0.026%	57,484	1.027
2032	69	243,670	0.029%	65,706	1.057
Constant Aircraft Per 1,000 Population (AAGR = 1.5%)					
2017	59	223,315	0.025%	52,857	1.108
2022	64	226,970	0.027%	57,484	1.108
2032	73	243,670	0.029%	65,706	1.108
Selected Forecast - Average (AAGR = 1.1%)					
2017	56	223,315	0.025%	52,857	1.059
2022	59	226,970	0.026%	57,484	1.026
2032	67	243,670	0.027%	65,706	1.020

[1]FAA Aircraft Registration Database
[2]FAA Aerospace Forecasts Fiscal Years 2013-2033
[3]Office of Employment & Population Statistics, Arizona Department of Administration
AAGR - Average Annual Growth Rate
Source: *Coffman Associates analysis.*



LEGEND
- Constant Aircraft per 1,000 Population
- Constant Share of U.S. Fleet
- Increasing Share of U.S. Fleet
- Selected Forecast

Exhibit 2C
REGISTERED AIRCRAFT FORECASTS

TABLE 2C
Existing Based Aircraft Forecasts
Nogales International Airport

		Projections Adjusted to Plan Years of this Master Plan				
	Base Year of Study	2012	2017	2022	2032	AAGR 2012-2032
Existing Projection Source						
2013 FAA *Terminal Area Forecast*	23 (2013)	23	23	23	23	0.0%
2002 Master Plan	36 (1999)	52	60	69	89	1.3%
2008 *Arizona State Airports System Plan – Medium*	35 (2007)	39	43	48	58	2.0%

AAGR: Average annual growth rate
Source: Coffman Associates analysis

These three existing forecasts have been interpolated and extrapolated to the plan years of this Master Plan, as shown in the table. The previous forecasts can serve as a comparison to the selected based aircraft forecast to emerge from this Master Plan and they can also serve as the basis for several new forecasts.

New Based Aircraft Forecasts

Several new forecasts of based aircraft have been developed and are presented in **Table 2D**. The first three forecasts simply utilize the average annual growth rate from the existing based aircraft forecasts and apply that to the actual current based aircraft figure of 24. This results in growth rates that are the same as the previous forecasts, but the new based aircraft figures are relative to the plan years of this Master Plan.

The 2002 Master Plan's growth rate of 1.3 percent results in modest based aircraft growth to 31 by 2032. The 2008 SASP medium growth rate of 2.0 percent results in 36 based aircraft by 2032.

TABLE 2D
Existing Based Aircraft Forecasts
Nogales International Airport

	2012 (Base Year)	2017	2022	2032	AAGR 2012-2032
Comparison Projections					
2002 Master Plan Growth Rate	24	26	27	31	1.3%
2008 *Arizona State Airport System Plan – Medium Growth Rate*	24	27	29	36	2.0%
Additional Projections					
Constant Share of County Registered Aircraft	24	25	26	30	1.1%
2012 FAA Active Aircraft Forecast Growth Rate	24	25	25	27	0.5%
Santa Cruz County Population Growth Rate	24	26	28	32	1.4%
Santa Cruz County Employment Growth Rate	24	26	29	35	1.9%
Santa Cruz County Income Growth Rate	24	26	28	33	1.6%

AAGR: Average annual growth rate
Source: Coffman Associates analysis

Several additional new forecasts have been developed that are based on applying the forecast growth rate of one variable to the current based aircraft figure. The first variable considered is the FAA forecast of an annual growth rate of 0.5 percent for active aircraft. When applying this growth rate to the current based aircraft figure of 24, we see a long term based aircraft figure of 27. Other forecasts have been similarly developed which consider the forecast growth rate for population, employment, and income in Santa Cruz County.

SELECTED BASED AIRCRAFT FORECAST

Since the forecasts resulted in a relatively focused long term range of 27 to 36 based aircraft, an average of each was utilized for the selected forecast. This forecast results in an average annual growth rate of 1.4 percent aligning with the County population growth forecast. The following is the based aircraft forecast for Nogales International Airport to be utilized for this Airport Master Plan:

Short Term – 26
Intermediate Term – 28
Long Term – 32

Exhibit 2D presents the based aircraft forecasts and the selected forecasts.

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 of activity and the type of activities occurring at the Airport. The existing based aircraft fleet mix is comprised of 17 single-engine aircraft and seven multi-engine piston-powered aircraft.

Several factors must be considered when projecting a future fleet mix. As discussed previously, on the national level, the growth areas for the general aviation fleet are in turbine-powered aircraft (business jets and helicopters), while piston-powered aircraft are forecast to remain relatively flat.

On a more local level, the trends in registered aircraft in Santa Cruz County dating back to 1993 have been identified and are presented in **Table 2E**. As can be seen, the total number of registered aircraft has remained relatively steady, with 51 in 1993 and 54 in 2012.

Each category of aircraft has fluctuated only slightly over the years, with single-engine piston-powered aircraft remaining flat with 36 aircraft in 1993 and 2012. Multi-engine piston aircraft declined from 11 in 1993 to nine in 2012. Turboprop aircraft reached a high of nine in 2003, but have now reduced down to one in 2012, and there has been no registered jet aircraft in the County since 2003. Helicopters have grown as a percentage from two in 1993 to four in 2012.

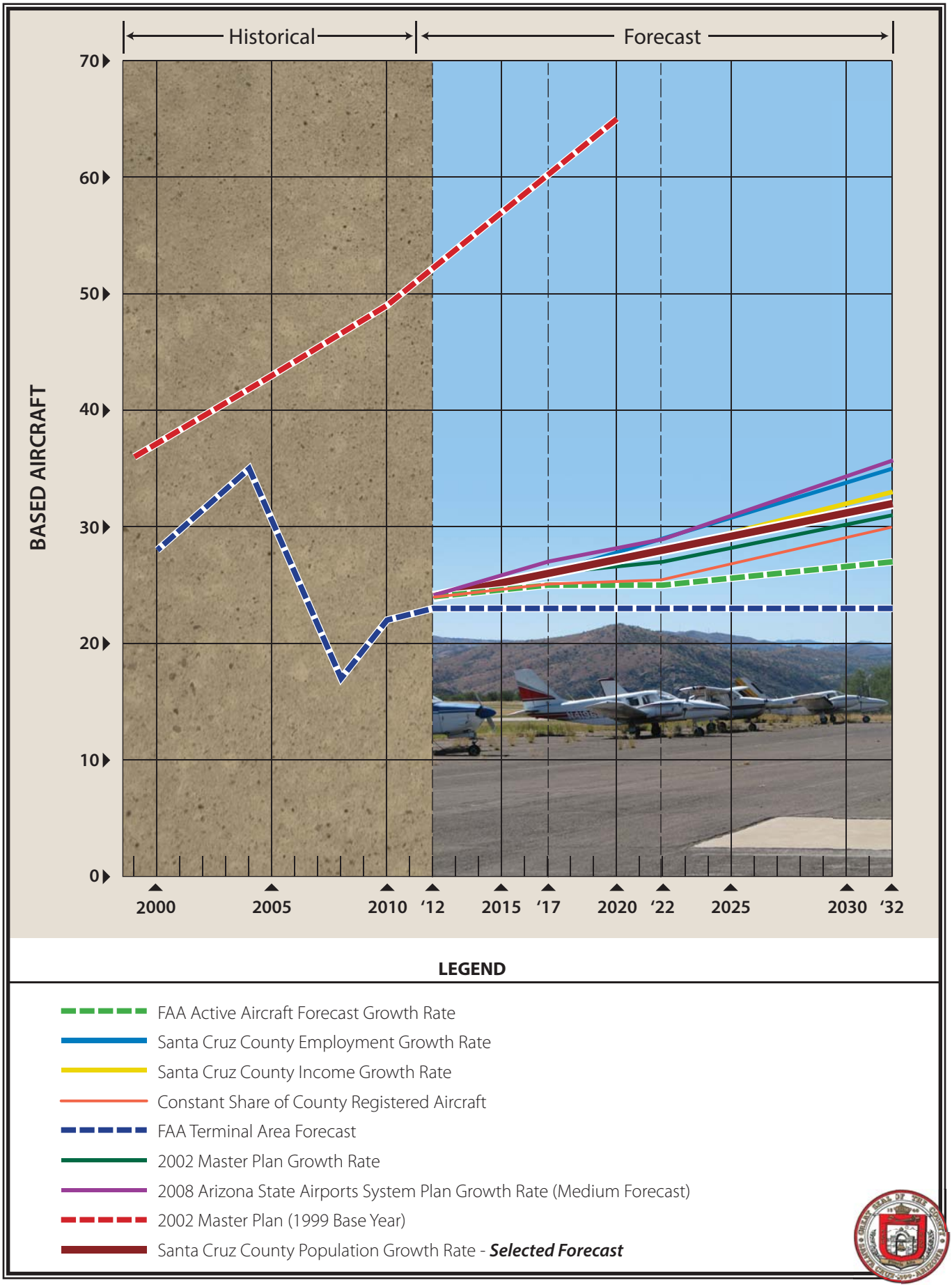


Exhibit 2D
BASED AIRCRAFT FORECASTS

TABLE 2E
Santa Cruz County Registered Aircraft Fleet Mix Projections

Year	SEP	%	MEP	%	TP	%	J	%	R	%	O	%	Total
1993	36	70.6%	11	21.6%	1	2.0%	1	2.0%	2	3.9%	0	0.0%	51
1994	36	70.6%	11	21.6%	1	2.0%	1	2.0%	2	3.9%	0	0.0%	51
1995	34	72.3%	9	19.1%	1	2.1%	1	2.1%	2	4.3%	0	0.0%	47
1996	32	71.1%	10	22.2%	0	0.0%	1	2.2%	2	4.4%	0	0.0%	45
1997	32	69.6%	12	26.1%	0	0.0%	0	0.0%	2	4.3%	0	0.0%	46
1998	34	66.7%	14	27.5%	1	2.0%	0	0.0%	2	3.9%	0	0.0%	51
1999	32	65.3%	15	30.6%	1	2.0%	0	0.0%	1	2.0%	0	0.0%	49
2000	31	64.6%	15	31.3%	1	2.1%	1	2.1%	0	0.0%	0	0.0%	48
2001	29	64.4%	8	17.8%	6	13.3%	1	2.2%	1	2.2%	0	0.0%	45
2002	31	67.4%	7	15.2%	6	13.0%	1	2.2%	1	2.2%	0	0.0%	46
2003	31	59.6%	8	15.4%	9	17.3%	1	1.9%	2	3.8%	1	1.9%	52
2004	32	61.5%	9	17.3%	8	15.4%	0	0.0%	2	3.8%	1	1.9%	52
2005	30	65.2%	8	17.4%	6	13.0%	0	0.0%	2	4.3%	0	0.0%	46
2006	33	70.2%	10	21.3%	0	0.0%	0	0.0%	2	4.3%	2	4.3%	47
2007	31	64.6%	11	22.9%	0	0.0%	0	0.0%	3	6.3%	3	6.3%	48
2008	34	70.8%	11	22.9%	0	0.0%	0	0.05	3	6.3%	0	0.0%	48
2009	35	76.1%	7	15.2%	0	0.0%	0	0.0%	3	6.5%	1	2.2%	46
2010	34	68.0%	9	18.0%	0	0.0%	0	0.0%	4	8.0%	3	6.0%	50
2011	36	66.7%	9	16.7%	2	3.7%	0	0.0%	4	7.4%	3	5.6%	54
2012	36	66.7%	9	16.7%	1	1.9%	0	0.0%	4	7.4%	4	7.4%	54
Avg.		67.6%		20.8%		4.5%		0.8%		4.5%		1.8%	
FLEET MIX PROJECTIONS													
2017	37	67.3%	7	12.7%	1	1.8%	1	1.8%	5	9.1%	4	7.3%	55
2022	38	64.4%	6	10.2%	3	5.1%	2	3.4%	6	10.2%	4	6.8%	59
2032	40	59.7%	6	9.0%	5	7.5%	4	6.0%	8	11.9%	4	6.0%	67

SEP-Single-engine Piston; MEP-Multi-Engine Piston; TP-Turboprop; J-Jet; R-Rotor (Helicopter); O-Other
Source: Coffman Associates analysis of FAA Aircraft Registry Database

Table 2F presents the forecast fleet mix of based aircraft for Nogales International Airport. Growth trends for the Airport will closely mirror patterns of national trends. Single-engine piston aircraft are forecast to continue to account for the vast majority of based aircraft, while modestly decreasing as a percentage of the total based aircraft. Other categories of aircraft are forecast to grow modestly. Turboprops and helicopters are forecast to grow to three, and business jets are forecast to grow to two by 2032.

TABLE 2F
Based Aircraft Fleet Mix
Nogales International Airport

Aircraft Type	2012	Percent	2017	Percent	2022	Percent	2032	Percent
Single-engine Piston	17	70.8%	17	65.4%	18	64.3%	20	62.5%
Multi-Engine Piston	7	29.2%	6	23.1%	5	17.9%	4	12.5%
Turboprop	0	0.0%	1	3.8%	2	7.1%	3	9.4%
Jet	0	0.0%	1	3.8%	1	3.6%	2	6.3%
Helicopters	0	0.0%	1	3.8%	2	7.1%	3	9.4%
Other/Experimental	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total	**24**	**100.00%**	**26**	**100.00%**	**28**	**100.00%**	**32**	**100.00%**

Source: Coffman Associates analysis

ANNUAL OPERATIONS

Since the Airport is not equipped with an airport traffic control tower (ATCT), precise operational (takeoff and landing) counts are not available; however, Tiffin Aviation has kept operational records since 1993. Typically, operations are reported in four general categories: air carrier, air taxi, general aviation, and military. Nogales International Airport does not presently experience scheduled air carrier operations. The Airport regularly experiences air taxi operations by aircraft hauling cargo associated with the Maquiladora program. General aviation operations include a wide range of activity from personal to business and corporate uses. Most operations at the Airport would be considered general aviation. Military operations include operations conducted by various branches of the U.S. military. Presently, military operations at the Airport consist of helicopter activities associated with the National Guard.

Aircraft operations are further classified as 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. Generally, local operations are characterized by training operations. Itinerant operations are those performed by aircraft with a specific origin or destination away from the airport. Typically, itinerant operations increase with business and commercial use since business aircraft are used primarily to transport passengers from one location to another.

Historically, itinerant and local operations accounted for approximately 58 percent and 42 percent respectively of total operations. In recent years, the split has widened to approximately 80 percent itinerant and 20 percent local as estimated by Tiffin Aviation.

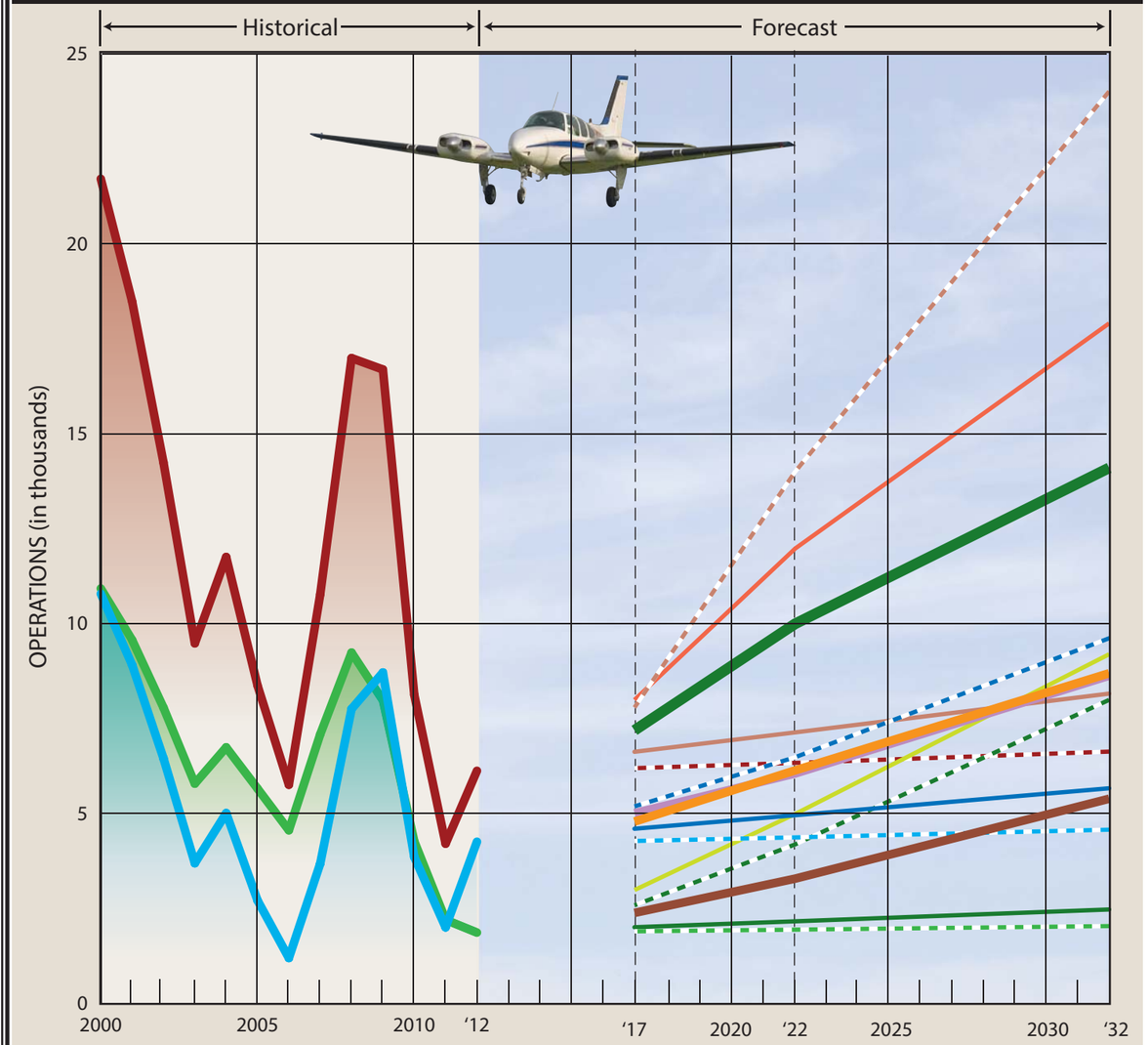
Exhibit 2E, shows the historical itinerant and local operations at Nogales International Airport since 1993. In 2012, the Airport experienced 9,334 operations. The 2012 operations count shows growth over the previous (2011) year total, but it is still down from historical levels, likely due to the national recession and the slow recovery. During the analyzed period, the Airport's highest operational year occurred in 1999 with 27,754 operations.

It is clear, from an operations perspective, that the Airport has been significantly impacted by economic conditions over the past several years. This is true of general aviation airports across the country. While all segments of aviation were affected, local training operations were particularly hit hard. At Nogales International Airport, local operations have fallen from 9,235 in 2008 to 1,867 in 2012. Itinerant operations also declined significantly over the same time period.

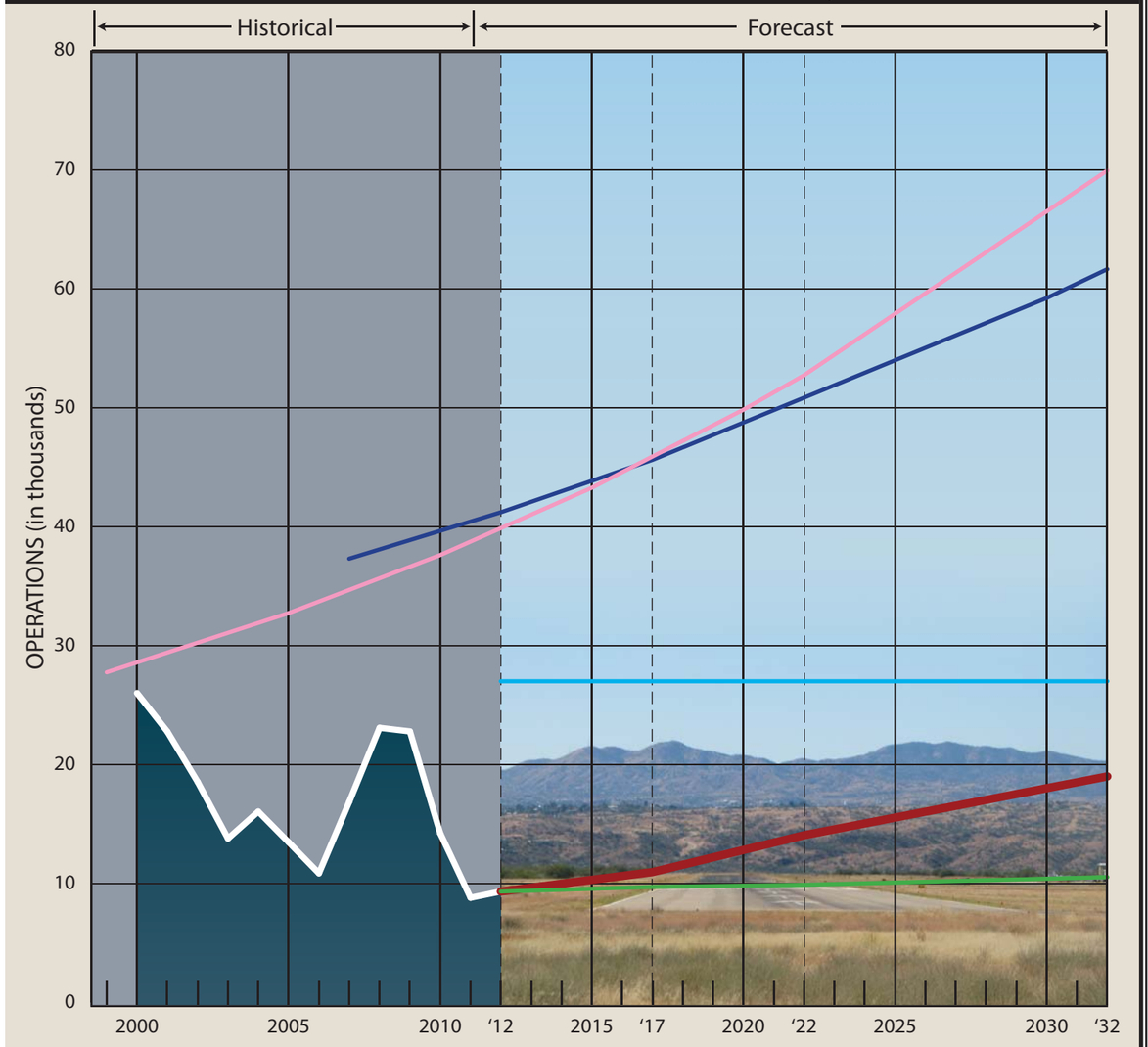
EXISTING TOTAL OPERATIONS FORECASTS

There are several existing forecasts of total operations for Nogales International Airport which are presented in **Table 2G**. These have been interpolated and extrapolated to the plan years of this Master Plan. When interpolating the operations forecast from the 2002 Master Plan, a 2012 figure of 39,770 operations results. This is considerably higher than the actual 2012 figure of 9,334. In the last 20 years, the Airport has never achieved this level of operations. The 2002 Master Plan forecasts are more than ten years old and do not consider the turbulent aviation environment of the last ten years; therefore, this forecast is not considered reasonable.

GENERAL AVIATION FORECASTS



TOTAL OPERATIONS FORECAST (includes air taxi and military operations)



Local
- Historical
- Constant Market Share of 2012 Percent
- Constant Operations per Based Aircraft
- Increasing Operations per Based Aircraft
- Recapture 10-Year High of Operations
- Selected Forecast

Itinerant
- Historical
- Constant Market Share of 2012 Percent
- Constant Operations per Based Aircraft
- Increasing Operations per Based Aircraft
- Recapture 10-Year High of Operations
- Selected Forecast

Total
- Historical
- Constant Market Share of 2012 Percent
- Constant Operations per Based Aircraft
- Increasing Operations per Based Aircraft
- Recapture 10-Year High of Operations
- Selected Forecast

LEGEND
- 2002 Master Plan (1999 Base Year)
- 2008 Arizona State Airports System Plan (Medium Forecast - 2007 Base Year)
- 2013 FAA Terminal Area Forecast
- 2013 FAA Terminal Area Forecast State Growth Rate
- Selected Forecast

Exhibit 2E
OPERATIONS FORECAST

TABLE 2G
Existing Total Operations Forecasts
Nogales International Airport

Year	2002 Master Plan[1]	2008 SASP[2]	2013 TAF[3]	2013 FAA TAF State Growth Rate[4]
2012	39,770	41,200	27,000	9,334
2017	45,772	45,600	27,000	9,545
2022	52,716	50,415	27,000	9,835
2032	69,922	61,626	27,000	10,505
AAGR 2012-2032	2.9%	2.0%	0.0%	0.6%

[1]2002 Airport Master Plan - Interpolated and Extrapolated to Plan Years
[2]2008 *Arizona State Airports System Plan* – (Medium Forecast) Interpolated and Extrapolated to Plan Years
[3]TAF - FAA *Terminal Area Forecast* for 2013
[4]Actual 2012 Operations with FAA State GA Forecast Growth Rate of 0.6% from 2013-2033

Source: Coffman Associates analysis

The 2008 SASP, similar to the based aircraft forecast, prepared a high, medium, and low operational forecast for the Airport. It was suggested again that the medium forecast be used for long-range planning. The SASP medium forecast estimated 41,200 operations for 2012 and, when extrapolated, a 2032 figure of 61,626. The SASP forecast, like the 2002 Master Plan, is considerably higher than current operational levels as it was prepared prior to the economic recession. As a result, the 2008 SASP forecast is also considered unreasonable.

The 2013 TAF from the FAA presents a flat-lined forecast of 27,000 total operations through 2032. The TAF does not consider a potential growth scenario for the Airport. As stated, in the recent past prior to the economic recession, the Airport has experienced sustained operations above current levels.

The FAA indicates that the overall growth rate for the state from the TAF can also be applied to individual airports to produce a forecast. The TAF growth rate for Arizona is 0.6 percent. Applying this growth rate from the base 2012 operations level results in a long term forecast of 10,505 annual operations. The statewide TAF growth rate does not take into account local considerations, such as the recent past operations levels.

The older forecasts (2002 Master Plan and 2008 SASP) were prepared prior to the recent economic recession and result in operation levels above a reasonable range for growth. The more recent FAA TAF forecasts have a base year well above existing conditions, but do provide a reasonable range of total operations that the Airport may experience. The next step is to generate new operations forecasts which address each segment of activity (general aviation, air taxi, and military) from the local level.

GENERAL AVIATION OPERATIONS FORECAST

General aviation operations constitute the largest share of operations at Nogales International Airport. In 2012, itinerant general aviation operations represented 69.5 percent of total general aviation operations. On average, general aviation

itinerant operations have represented 44 percent of total general aviation since 2000.

Distinguishing between local and itinerant operations is an important consideration for future facility planning. An airport with a large percentage of local operations may be in need of more aircraft storage units or fuel facilities. A high level of itinerant operations may be an indicator of a need for more transient apron, overnight storage, or improved navigational aids. **Exhibit 2E** presents a summary of the operations forecasts which follow.

Itinerant General Aviation Operations Forecast

Itinerant operations have generally fluctuated from a high of 10,784 in 2000 and a low of 1,198 in 2006. The market share of itinerant operations at Nogales International Airport, as a percentage of general aviation itinerant operations at all towered airports, has generally declined since 2000. This is in large part due to the fact that itinerant operations nationally have decreased. In 2000, Nogales International Airport's market share of national itinerant general aviation operations was 0.047 percent, and by 2012 that percentage had decreased to 0.029 percent. **Table 2H** presents several new forecasts of itinerant general aviation operations.

A total of four forecasts of general aviation itinerant operations are presented in the table. The first forecast considers the market share of total U.S. itinerant general aviation operations that Nogales International Airport has experienced. The next two consider the ratio of itinerant general aviation operations to based aircraft at the Airport. It should be noted that the historic based aircraft figures are a composite estimate beginning in 2000 with 36, as identified in the 2002 Master Plan (1999 base year), and ending in 2012 with the actual number of 24 based aircraft. The last forecast of itinerant general aviation operations considers the potential for the Airport to recapture the high level of itinerant operations experienced within the last ten years.

The 2012 constant market share forecast considers the Airport maintaining a constant share of total U.S. itinerant operations. The result is a long term total of 4,587 itinerant operations, which appears low considering the Airport experienced over 8,700 itinerant operations just four years ago.

The next forecast considers a 2012 constant market share of itinerant general aviation operations per based aircraft of 177. This results in a long term total of 5,676 itinerant general aviation operations for the Airport. At 177 itinerant operations per based aircraft, this is well below levels achieved in the recent past. Therefore, an increasing forecast of itinerant operations per based aircraft is also considered. In this case, the long term forecast considers 300 itinerant general aviation operations per based aircraft, which was achieved during peak itinerant operational years (2000 and 2001). This results in a long term forecast of 9,600 itinerant general aviation operations.

The last forecast considers a long term figure of 8,700 itinerant general aviation operations, which represents a recapture of the high level achieved within the last 10 years.

TABLE 2H
General Aviation Itinerant Operations Forecast
Nogales International Airport

Year	OLS GA Itinerant Ops[1]	US GA Itinerant Ops	Market Share Itinerant Ops	OLS Based Aircraft[2]	Itinerant Ops Per Based Aircraft
2000	10,784	22,844,100	0.047%	36	300
2001	8,910	21,433,300	0.042%	28	318
2002	6,453	21,450,500	0.030%	28	230
2003	3,693	20,231,300	0.018%	28	132
2004	5,010	20,007,200	0.025%	35	143
2005	2,713	19,303,200	0.014%	35	78
2006	1,198	18,707,100	0.006%	35	34
2007	3,682	18,575,200	0.020%	35	105
2008	7,753	17,492,700	0.044%	17	456
2009	8,712	15,571,100	0.056%	17	512
2010	3,858	14,863,900	0.026%	22	175
2011	2,005	14,527,900	0.014%	22	91
2012	4,257	14,521,700	0.029%	24	177
Constant Market Share of 2012 (AAGR = 0.37%)					
2017	4,290	14,634,400	0.029%	26	165
2022	4,385	14,956,200	0.029%	28	157
2032	4,587	15,646,800	0.029%	32	143
Constant Operations Per Based Aircraft (AAGR = 1.45%)					
2017	4,612	14,634,400	0.032%	26	177
2022	4,967	14,956,200	0.033%	28	177
2032	5,676	15,646,800	0.036%	32	177
Increasing Operations Per Based Aircraft (AAGR = 4.15%)					
2017	5,200	14,634,400	0.036%	26	200
2022	6,385	14,956,200	0.043%	28	228
2032	9,600	15,646,800	0.061%	32	300
Recapture 10-Year High of Operations (AAGR = 3.64%)					
2017	5,090	14,634,400	0.035%	26	196
2022	6,086	14,956,200	0.041%	28	217
2032	8,700	15,646,800	0.056%	32	272
Selected Forecast (AAGR = 3.64%)					
2017	4,800	14,634,400	0.033%	26	185
2022	6,100	14,956,200	0.041%	28	218
2032	8,700	15,646,800	0.056%	32	272

[1] Historical data from Tiffin Aviation
[2] Based aircraft figure is a composite with year 2000 from the 2002 Master Plan, years 2001-2011 from the TAF, and 2012 begin actual
AAGR = Average annual growth rate from 2012 to 2032
Source: Coffman Associates analysis

These four forecasts of itinerant general aviation operations create the planning envelope. The selected forecast is similar to the recapture forecast as it was considered reasonable for the Airport to achieve operational levels over the course of the planning period that were reached only a few years ago. By 2017, itinerant general aviation operations are estimated at 4,800 annually. By the long term, it is estimated that the Airport could reach operational levels experienced in previous peak years, resulting in 8,700 itinerant general aviation operations. The overall average annual growth rate of this forecast is 3.64 percent.

Local General Aviation Operations

Local general aviation operations have declined significantly since 2008, as shown on **Table 2J**. From 2000 to 2008, the Airport averaged over 7,500 annual local general aviation operations. By 2012, the Airport registered only 1,867 local operations. A wide variety of factors could affect future local general aviation operational levels, but the state of the economy will likely have a significant impact.

TABLE 2J
General Aviation Local Operations Forecast
Nogales International Airport

Year	OLS GA Local Ops[1]	US GA Local Ops	Market Share Local Ops	OLS Based Aircraft[2]	Local Ops Per Based Aircraft
2000	10,923	17,034,400	0.064%	36	303
2001	9,566	16,193,700	0.059%	28	342
2002	7,787	16,172,800	0.048%	28	278
2003	5,787	15,292,700	0.038%	28	207
2004	6,742	14,960,400	0.045%	35	193
2005	5,657	14,843,600	0.038%	35	162
2006	4,560	14,365,400	0.032%	35	130
2007	7,084	14,556,800	0.049%	35	202
2008	9,235	14,081,200	0.066%	17	543
2009	7,976	12,448,000	0.064%	17	469
2010	4,268	11,716,300	0.036%	22	194
2011	2,202	11,437,000	0.019%	22	100
2012	1,867	11,608,300	0.016%	24	78
Constant Market Share of 2012 Percent (AAGR = 0.48%)					
2017	1,915	11,906,400	0.016%	26	74
2022	1,959	12,178,200	0.016%	28	70
2032	2,053	12,763,100	0.016%	32	64
Constant Operations Per Based Aircraft (AAGR = 1.45%)					
2017	2,023	11,906,400	0.017%	26	78
2022	2,178	12,178,200	0.018%	28	78
2032	2,489	12,763,100	0.020%	32	78
Increasing Operations Per Based Aircraft (AAGR = 7.55)					
2017	2,600	11,906,400	0.022%	26	100
2022	4,200	12,178,200	0.034%	28	150
2032	8,000	12,763,100	0.063%	32	250
Recapture 10-year High of Operations (AAGR = 8.30%)					
2017	3,000	11,906,400	0.025%	26	115
2022	5,000	12,178,200	0.041%	28	179
2032	9,200	12,763,100	0.072%	32	288
Selected Forecast (AAGR = 5.45%)					
2017	2,400	11,906,400	0.020%	26	92
2022	3,300	12,178,200	0.027%	28	118
2032	5,400	12,763,100	0.042%	32	169

[1] Historical data from Tiffin Aviation
[2] Based aircraft figure is a composite with year 2000 from the 2002 Master Plan, years 2001-2011 from the TAF, and 2012 begin actual
AAGR = Average annual growth rate from 2012 to 2032
Source: Coffman Associates analysis

Four forecasts of local general aviation operations have been developed. One considers the relationship to national local general aviation operations as counted at towered general aviation airports. Two consider the relationship to operations per based aircraft, and the last one considers the possibility of the Airport recapturing the 2008 level of approximately 9,200 annual local general aviation operations.

The selected forecast is an approximate average of the several forecasts presented. In the short term, local general aviation operations are forecast to increase from 1,867 in 2012 to 2,400 in 2017. In 2022, local general aviation operations are forecast to increase to 3,300 annually. By the long term, local general aviation operations are estimated at 5,400 annual operations. This forecast results in an average annual growth rate of 5.45 percent.

AIR TAXI AND MILITARY OPERATIONS FORECAST

Nogales International Airport experienced approximately 1,750 annual air taxi operations in 2012. Air taxi operations, consisting primarily of chartered air cargo operations, have been fairly consistent historically, with the FAA's TAF reporting 2,300 every year from 2001 to 2010 and dropping to 1,750 in 2011 and 2012.

It is anticipated that once economic conditions stabilize and improve, an increasing number of air cargo/air taxi operations will be experienced at Nogales International Airport in support of the Maquiladora program. The selected forecast calls the Airport to recapture its historic air taxi operational level of approximately 2,300 by 2017, then grow more modestly over the remainder of the planning period, reaching 3,500 total air taxi operations by 2032. The overall average annual growth rate for air taxi operations is 3.53 percent.

Military operations have also been fairly consistent historically. Military operations at the Airport primarily consist of helicopter operations conducted by the National Guard, with occasional operations by fixed wing aircraft including the Lockheed C-130 Hercules, the Bell Boeing V-22 Osprey, and the Gulfstream V business jet. Tiffin Aviation estimates there were approximately 1,460 itinerant military operations in 2012 (approximately four operations daily). Historically, the Airport has not been used for local military operations. Because of the unpredictable nature of military activity and readiness, the existing military operational level is planned for future operations. **Table 2K** presents a summary of air taxi and military operations forecasts.

TABLE 2K
Air Taxi and Military Operations Forecasts
Nogales International Airport

Year	Air Taxi Operations (Itinerant)	Military (Local)	Military (Itinerant)	Total Military
2001	2,300	0	2,000	2,000
2002	2,300	0	2,000	2,000
2003	2,300	0	2,000	2,000
2004	2,300	0	2,000	2,000
2005	2,300	0	2,800	2,800
2006	2,300	0	2,800	2,800
2007	2,300	0	2,800	2,800
2008	2,300	0	3,800	3,800
2009	2,300	0	3,800	3,800
2010	2,300	0	3,800	3,800
2011	1,750	0	2,850	2,850
2012	1,750	0	1,460	1,460
Selected Forecast				
2017	2,300	0	1,460	1,460
2022	2,600	0	1,460	1,460
2032	3,500	0	1,460	1,460

TOTAL OPERATIONS FORECAST

Table 2L summarizes the selected operations forecast for Nogales International Airport. In the short term, operations are forecast to increase from 9,334 in 2012 to 10,960 in 2017. By the long term planning period, total operations are forecast to reach 19,060 annual operations.

TABLE 2L
Total Operations Forecast
Nogales International Airport

	Itinerant Operations				Local Operations			
Year	Air Taxi/ Air Cargo	GA	Military	Total Itinerant	GA	Military	Total Local	Total Operations
2012	1,750	4,257	1,460	7,467	1,867	0	1,867	9,334
2017	2,300	4,800	1,460	8,560	2,400	0	2,400	10,960
2022	2,600	6,100	1,460	10,760	3,300	0	3,300	13,460
2032	3,500	8,700	1,460	13,660	5,400	0	5,400	19,060
AAGR:	3.53%	3.64%	0.0%	3.07%	5.45%	0.0%	5.45%	3.63%

AAGR: Average annual growth rate
Source: Coffman Associates analysis

COMPARISON TO THE TAF

The FAA will review the forecasts of this Master Plan and compare them to the TAF. Where the 5- or 10-year forecasts exceed 100,000 total annual operations or 100 based aircraft, the FAA prefers that the forecasts differ by less than 10 percent in the 5-year period and 15 percent in the 10-year period. Where the forecasts do differ, supporting documentation should be provided.

Table 2M presents a direct comparison of the 2013 TAF to the forecasts in this Master Plan. In the 5-year timeframe, the new forecast is 59.4 percent lower than the TAF, which is flat lined at 27,000 throughout the planning period. The 10-year forecast is 50.1 percent lower than the TAF, and the 15-year forecast is 40.7 percent lower than the TAF. The primary reason for this is that the actual number of operations experienced at the Airport in 2012 is 65 percent lower than what the TAF estimated for 2012 operations. In addition, the TAF presents a zero growth scenario. The selected forecast reflects an annual growth rate of 3.63 percent. The long term forecast of 19,060 annual operations is slightly below the high operations total achieved as recently as 2009.

TABLE 2M
Forecast Comparison to the Terminal Area Forecast
Nogales International Airport

Year	OLS Operations	2013 FAA TAF	Percent Difference
TOTAL OPERATIONS			
2012	9,334	27,000	-65.4%
2017	10,960	27,000	-59.4%
2022	13,460	27,000	-50.1%
2027	15,983	27,000	-40.8%
2032	19,060	27,000	-29.4%
AAGR 2012-2032	3.63%	0.0%	
BASED AIRCRAFT			
2012	24	23	4.3%
2017	26	23	13.0%
2022	28	23	21.7%
2027	30	23	30.1%
2032	32	23	39.1%
AAGR 2012-2032	1.45%	0.0%	

Source: Coffman Associates analysis

The based aircraft total exceeds the TAF totals. This is because the TAF has a 2012 base year of 23 based aircraft with zero growth through 2032. By the 15-year horizon, the Master Plan forecast is 30.1 percent higher than the TAF. By the long term, the master plan forecast of 32 based aircraft exceeds the TAF by 39.1 percent.

ANNUAL INSTRUMENT APPROACHES (AIAs)

An instrument approach, as defined by the FAA, is "an approach to an airport with the intent to land 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." To qualify as an instrument approach, aircraft must land at the airport after following one of the published instrument approach procedures. Forecasts of annual instrument approaches (AIAs) provide guidance in determining an airport's requirements for navigational aid facilities. Practice or training approaches do not count as annual AIAs.

While AIAs can be partially attributed to weather, they may be expected to increase as transient operations and operations by more sophisticated aircraft increase through the planning period. For

this reason, AIA projections consider a constant percentage of 2.0 of annual itinerant operations. The projections are presented in **Table 2N**.

TABLE 2N
Annual Instrument Approaches (AIAs)
Nogales International Airport

Year	AIAs	Itinerant Operations	Ratio
2012	149	7,467	2.00%
2017	171	8,560	2.00%
2022	203	10,160	2.00%
2032	273	13,660	2.00%

Source: Coffman Associates analysis

PEAKING CHARACTERISTICS

Many aspects of facility planning relate to levels of peaking activity – times when the airport is busiest. For example, the appropriate size of a terminal building can be estimated by determining the number of people that could reasonably be expected to use the facility at a given time. The following planning definitions apply to the peak periods:

- **Peak Month** -- The calendar month when peak aircraft operations occur.
- **Design Day** -- The average day in the peak month.
- **Busy Day** -- The busy day of a typical week in the peak month.
- **Design Hour** -- The peak hour within the design day.

It is important to note that only the peak month is an absolute peak within a given year. All other peak periods will be exceeded at various times during the year. The peak period forecasts represent reasonable planning standards that can be applied without overbuilding or being too restrictive.

According to records kept by Tiffin Aviation, the peak month in 2012 was February, with approximately 10.1 percent of annual operations (940 operations). Over the past ten years, the peak month has represented, on average, 10.9 percent of annual operations. The design day is equal to the number of operations in February 2012, divided by the number of days in the month (28) for a design day of 34. Historically, January or March has been the peak month of the year; therefore, design day forecasts will be calculated by dividing peak month by 31.

The busiest day of each week typically accounts for approximately 18 percent of weekly operations. Thus, to determine the typical busy day, the design day is multiplied by 1.25, which represents approximately 18 percent of the days in a week. Design hour operations were determined at 15 percent of the design day operations. Utilizing these factors, the peaking characteristics for the future can be estimated, as shown in **Table 2P**.

TABLE 2P
Total Peak Operations Forecast
Nogales International Airport

	2012	2017	2022	2032
Annual Operations	9,334	10,960	13,460	19,060
Peak Month	940	1,195	1,467	2,078
Busy Day	42	48	59	84
Design Day	34	39	47	67
Design Hour	5	6	7	10

Source: Coffman Associates analysis

DESIGN AIRCRAFT

The selection of appropriate FAA design standards for the development and location of airport facilities is based primarily upon the characteristics of the aircraft which are currently using or are expected to use the airport. The critical design aircraft is used to define the design parameters for the airport. In most cases, the design aircraft is a composite aircraft representing a collection of aircraft classified by three parameters: Aircraft Approach Category (AAC), Airplane Design Group (ADG), and Taxiway Design Group (TDG). In the case of an airport with multiple runways, a design aircraft is selected for each runway. The first consideration is the safe operation of aircraft likely to use the airport. Any operation of an aircraft that exceeds design criteria of the airport may result in either an unsafe operation or a lesser safety margin; however, it is not the usual practice to base the airport design on an aircraft that uses the airport infrequently.

The design aircraft is defined as the most demanding category of aircraft, or family of aircraft, which conducts at least 500 operations per year at the airport. Planning for future aircraft use is of particular importance since the design standards are used to plan separation distances between facilities. These future standards must be considered now to ensure that short term development does not preclude the long range potential needs of the airport.

Exhibit 2F summarizes representative design aircraft categories. The Airport does not currently, nor is it expected to, regularly serve larger commercial transport aircraft such as Boeing 747, 757, or 767. Large transport aircraft are used by commercial carriers which do not currently use, nor are they expected to use, the Airport through the planning period. However, charter operators hauling cargo do utilize larger aircraft such as the Boeing 737 and the McDonnell Douglas DC-9 and some medium-sized business jets, such as the Bombardier Challenger 300 and the Falcon 20. In addition to various helicopter operations, military operators occasionally operate the Lockheed C-130 Hercules, the Bell Boeing V-22 Osprey, and the Gulfstream V jet aircraft.

In order to determine airfield design requirements, a design aircraft, or group of aircraft with similar characteristics, is determined for each runway. This begins with a review of aircraft currently using the Airport and those expected to use the airport through the 20-year planning period.

Runway Design Code (RDC)

The AAC, ADG, and approach visibility minimums are combined to form the RDC of a particular runway. The RDC provides the information needed to determine certain design standards that apply. The first component, depicted by a letter, is the AAC and relates to aircraft approach speed (operational characteristics). The second component, depicted by a Roman numeral, is the ADG and relates to either the aircraft wingspan or tail height (physical characteristics), whichever is most restrictive. The third component relates to the visibility minimums expressed by runway visual range (RVR) values in feet of 1,200, 1,600, 2,400, and 4,000. The third component should read “NPI-1” for runways with a non-precision instrument approach with visibility minimums between one and three miles and “VIS” for runways designed for visual approach use only. Generally, runway standards are

related to aircraft approach speed, aircraft wingspan, and designated or planned approach visibility minimums. **Table 2Q** presents the RDC parameters.

TABLE 2Q
Runway Design Code Parameters

Aircraft Approach Category (AAC)		
Category	**Approach Speed**	
A	less than 91 knots	
B	91 knots or more but less than 121 knots	
C	121 knots or more but less than 141 knots	
D	141 knots or more but less than 166 knots	
E	166 knots or more	
Airplane Design Group (ADG)		
Group #	**Tail Height (ft)**	**Wingspan (ft)**
I	<20	<49
II	20-<30	49-<79
III	30-<45	70-<118
IV	45-<60	118-<171
V	60-<66	171-<214
VI	66-<80	214-<262
Visibility Minimums		
RVR (ft)	**Flight Visibility Category (statute miles)**	
VIS	3-mile or greater visibility minimums	
NPI - 1	Lower than 3 miles but not lower than 1-mile	
4,000	Lower than 1-mile but not lower than ¾-mile (APV ≥ ¾ but < 1-mile)	
2,400	Lower than ¾-mile but not lower than ½-mile (CAT-I PA)	
1,600	Lower than ½-mile but not lower than ¼-mile (CAT-II PA)	
1,200	Lower than ¼-mile (CAT-III PA)	

RVR: Runway Visual Range
APV: Approach Procedure with Vertical Guidance
PA: Precision Approach
Source: FAA AC 150/5300-13A, Airport Design

Taxiway Design Group (TDG)

The TDG relates to the undercarriage dimensions of the design aircraft. Taxiway/taxilane width and fillet standards, and in some instances, runway to taxiway and taxiway/taxilane separation requirements, are determined by TDG. It is appropriate for taxiways to be planned and built to different TDG standards based on expected use.

The TDG standards are based on the Main Gear Width (MGW) and the Cockpit to Main Gear (CMG) distance. The taxiway design elements determined by the application of the TDG include the taxiway width, taxiway edge safety margin, taxiway shoulder width, taxiway fillet dimensions, and, in some cases, the separation distance between parallel taxiways/taxilanes. Other taxiway elements such as the taxiway safety area (TSA), taxiway/taxilane object free area (TOFA), taxiway/taxilane separation to parallel taxiway/taxilanes or fixed or movable objects, and taxiway/taxilane wingtip clearances are determined solely based on the wingspan (ADG) of the design aircraft utilizing those surfaces.

A-I

- Beech Baron 55
- **Beech Bonanza**
- Cessna 150
- Cessna 172
- Cessna Citation Mustang
- Eclipse 500/550
- Piper Archer
- Piper Seneca

B-I

- Beech Baron 58
- Beech King Air 100
- Cessna 402
- **Cessna 421**
- Piper Navajo
- Piper Cheyenne
- Swearingen Metroliner
- Cessna Citation I (525)

B-II

- Super King Air 200
- Cessna 441
- DHC Twin Otter
- Super King Air 350
- Beech 1900
- Citation Excel (560), Sovereign (680)
- Falcon 50, 900, 2000
- **Citation Bravo (550)**
- Embraer 120

A-III, B-III

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

C-I, D-I

- Beech 400
- **Lear 31, 35,** 45, 60
- Israeli Westwind

C-II, D-II

- **Cessna Citation X (750)**
- Gulfstream 100, 200,300
- Challenger 300/600
- ERJ-135, 140, 145
- CRJ-200/700
- Embraer Regional Jet
- Lockheed JetStar
- Hawker 800

C-III, D-III *less than 100,000 lbs.*

- ERJ-170
- CRJ 705, 900
- Falcon 7X
- **Gulfstream 500**, 550, 650
- Global Express, Global 5000
- Q-400

C-III, D-III *over 100,000 lbs.*

- ERJ-90
- Boeing Business Jet
- B-727
- **B-737**-300, **700,** 800
- MD-80, DC-9
- A319, A320

C-IV, D-IV

- **B-757**
- B-767
- C-130 Hercules
- DC-8-70
- MD-11

D-V

- **B-747-400**
- B-777
- B-787
- A-330, A-340

Note: Aircraft pictured is identified in bold type.

Exhibit 2F
AIRCRAFT REFERENCE CODES

CURRENT DESIGN AIRCRAFT

The critical design aircraft is defined as the most demanding category of aircraft which conduct 500 or more itinerant operations at the airport each year. In some cases, more than one specific make and model of aircraft comprises the airport's critical design aircraft. One category of aircraft may be the most critical in terms of approach speed, while another is most critical in terms of wingspan and/or tail height, which affects runway/taxiway width and separation design standards. The critical design aircraft for a general aviation airport may be a specific aircraft model or it can be a combination of several aircraft within the same design code, that when combined, exceed the 500 operations threshold.

A critical design aircraft will be determined for Runway 3-21. The largest design aircraft in terms of approach speed and airplane design group will determine the appropriate design standards for the runway and its associated taxiways.

General aviation aircraft using the Airport include a variety of single and multi-engine piston-powered aircraft, turboprops, business jets, narrow-body air charter aircraft and helicopters. While the Airport is used by helicopters, they are not included in this determination as they are not assigned an approach speed or an airplane design group.

The previous approved Airport Layout Plan (ALP), which depicts the existing and future critical design aircraft, identifies the Beechcraft Super King Air 350 (airport reference code [ARC] C-II) as the design aircraft. This determination made in the previous Master Plan was based upon the Super King Air 350's use by the military. Since the preparation of the previous Master Plan, military aircraft use at the Airport has changed to primarily helicopters with occasional operations by business jets such as the Gulfstream V and larger aircraft, including the Lockheed C-130 Hercules and the Bell Boeing V-22 Osprey. None of these military aircraft operate frequently enough to exceed the 500 operations threshold.

Based Aircraft

The determination of the design aircraft (or family of aircraft) will first examine the types of based aircraft followed by an analysis of itinerant activity. Based aircraft are single and multi-engine piston-powered aircraft which fall within approach category A and ADG I. Many of these smaller aircraft are often used for local training operations, which are not included in the critical aircraft determination.

Itinerant Aircraft

The AirportIQ.com Data Center maintains operation records for aircraft that file flight plans for most airports in the United States. Due to factors such as incomplete flight plans, AirportIQ data cannot account for all aircraft activity at an airport. For example, in 2012, AirportIQ's records report a total of only 299 total GA operations at Nogales International Airport. However, this information can be useful in identifying the different types of itinerant aircraft that utilize the Airport.

Since business jets and turboprop aircraft are larger and faster, they will typically have a greater impact on airport design standards than smaller aircraft. The following analysis will focus on itinerant activity by jets and turboprops at Nogales

International Airport. The AirportIQ database is the primary source for business jet and air taxi/air cargo activity at the Airport. In 2012, records show a wide variety of business jets and turboprops utilized the Airport, including the Boeing 737-200, DC-9, Super King Air 200, Embraer 120, and the Beechcraft 1900.

Table 2R presents the Airport's current and forecasted fleet mix by ARC based on information from Airport IQ's database and records kept by Tiffin Aviation. With over 1,300 annual operations in 2012, ARC category B-II is the most demanding category to exceed the FAA's 500 annual operations threshold to be considered the Airport's design group.

TABLE 2R
Operational Fleet Mix by ARC
Nogales International Airport

ARC	Representative Aircraft	2012	Short Term	Intermediate Term	Long Term
A-I	• Cessna 172 • Cirrus SR-20	4,740	5,530	6,590	9,040
A-II	• Gulfstream Commander • Dehavilland Twin Otter	1,166	1,270	1,540	2,020
B-I	• Piaggio P-180 Avanti • King Air 90	200	245	324	520
B-II	•Super King Air 200 •Beech 1900 •Embraer 120 •Citation Excel	1,368	1,630	2,040	2,760
C-I	•Learjet 24/25/35	114	145	224	400
C-II	•Challenger 300 •Citation X	38	90	200	550
C-III	•Boeing 737 •DC-9 •Gulfstream V/G500/G550	77	102	125	220
C-IV	•Lockheed C-130 Hercules	24	28	32	50
D-I	•Learjet 60	0	10	22	64
D-II	•Gulfstream IV/G400/G450	6	18	34	126
D-III	•Gulfstream G650	0	0	25	50

Source: 2012 operational fleet mix interpolated from calendar year 2012 data as reported by the AirportIQ.com. Short, Intermediate, and Long term data from Coffman Associates analysis.
Note: Helicopter operations are not included in this data.

Runway 3-21 Design Aircraft

Nogales International Airport experiences frequent business jet/air taxi operations and should be designed and planned to continue to accommodate these types of aircraft. In 2012, the most frequent and most demanding air taxi aircraft operating at the Airport was the Beechcraft 1900 turboprop, an ARC B-II aircraft, with approximately 900 operations. **Therefore, this Master Plan will consider an existing RDC of B-II as applied to Runway 3-21.**

FUTURE DESIGN AIRCRAFT

The aviation demand forecasts indicate the potential for continued growth in business jet and air taxi activity at the Airport. This includes two (2) based jets and (3) three based turboprops by the long term planning horizon. The type and

size of business jets/turboprops using the Airport regularly can impact the design standards to be applied to the airport system. Therefore, it is important to have an understanding of what type of aircraft may use the Airport in the future. **Table 2R** presents a forecast estimate of the operational fleet mix anticipated to use the Airport in the future. Factors such as population and employment growth in the airport service area, the proximity and level of service of other regional airports, and development at the Airport can influence future activity.

The trend toward manufacturing of a larger percentage of medium and large business jets, those in approach categories C and D, may lead to greater utilization of these aircraft at Nogales International Airport by the intermediate and long term horizons. Additionally, with customer deliveries of the Gulfstream G650, which began in 2012, and continued operational growth of the Gulfstream business jet aircraft nationally, the Airport might experience increased usage by these aircraft within Approach Category D. However, it is not anticipated that this category of aircraft will exceed the 500 annual operations threshold by the long term planning horizon.

The majority of operations throughout the planning period of this Master Plan are expected to be by aircraft within approach categories A and B and within design groups I and II. Over time, operations by business jets in ARC C-II are anticipated to exceed the FAA's critical design aircraft threshold. **Therefore, the future critical design aircraft for Runway 3-21 is projected to be RDC C-II.**

SUMMARY

This chapter has outlined the various activity levels that might reasonably be anticipated over the next 20 years at Nogales International Airport. **Exhibit 2G** presents a summary of the aviation demand forecasts. The baseline year for forecast data is 2012. The forecasting effort extends 20 years to the year 2032.

General aviation activity often trends with national and local economies. The country was in a recessionary period from December 2007 through the third quarter of 2009 and has been slow to recover. Activity at both commercial service airports and general aviation airports has been down. Nogales International Airport has not been immune to these national trends, experiencing a decline in operations most significantly in local general aviation operations.

Forecasts of aviation activity, including based aircraft and operations, is key to determining future facility requirements. There are currently 24 aircraft based at the Airport, and this is forecast to grow to 32 aircraft by 2032. The Airport experienced 9,334 operations in 2012. This is forecast to grow to approximately 19,060 operations annually by 2032.

The fleet mix operations, or type and frequency of aircraft use, is important in determining facility requirements and environmental impacts. While single-engine piston-powered aircraft are expected to represent the majority of based aircraft, the long term forecast considers the possibility of three turboprop aircraft and two business jet aircraft by 2032.

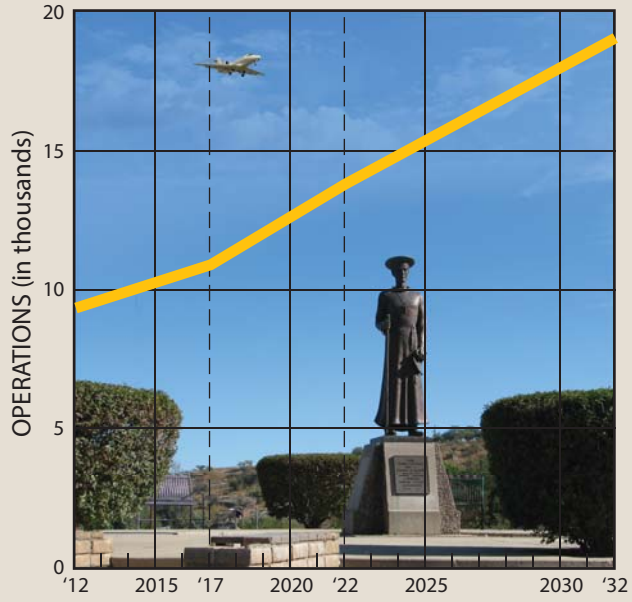
The next step in the Master Plan process is to use the forecasts to determine development needs for the Airport through 2032. Chapter Three – Facility Requirements will address airside elements, such as safety areas, runways, taxiways, lighting, and navigational aids, as well as landside requirements, including hangars, aircraft aprons, and support services. As a general observation, Nogales International Airport is well-positioned for growth into the future. The remaining portions of the Master Plan will lay out how that growth can be accommodated in an orderly, efficient, and cost-effective manner.

FAA Review and Approval

The aviation demand forecast materials presented in this chapter were submitted to the FAA for review and approval on August 28, 2013. In a letter dated September 23, 2013, the FAA approved the forecast for airport planning purposes, including Airport Layout Plan (ALP) development. A copy of the FAA approval letter is included at the end of this chapter.

	ACTUAL	FORECAST		
	2012	2017	2022	2032
ANNUAL OPERATIONS FORECAST				
General Aviation				
Itinerant	4,257	4,800	6,100	8,700
Local	1,867	2,400	3,300	5,400
Military				
Itinerant	1,460	1,460	1,460	1,460
Local	0	0	0	0
Air Taxi (Itinerant)	1,750	2,300	2,600	3,500
Total Itinerant	7,467	8,560	10,160	13,660
Total Local	1,867	2,400	3,300	5,400
Total Operations	**9,334**	**10,960**	**13,460**	**19,060**
BASED AIRCRAFT FORECAST				
Single Engine Piston	17	17	18	20
Multi-Engine Piston	7	6	5	4
Turboprop	0	1	2	3
Business Jet	0	1	1	2
Helicopter	0	1	2	3
Total Based Aircraft	**24**	**26**	**28**	**32**

ANNUAL OPERATIONS FORECAST



BASED AIRCRAFT FORECAST

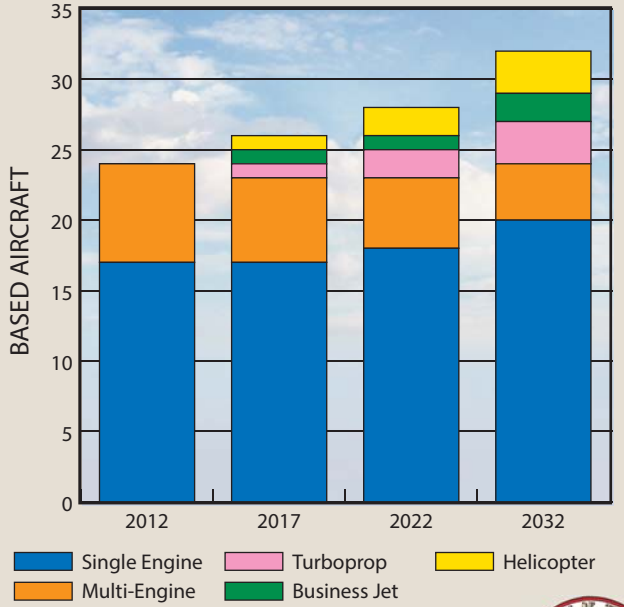


Exhibit 2G
FORECAST SUMMARY

U.S. Department
of Transportation
Federal Aviation Administration

Federal Aviation Administration
Phoenix Airports Field Office

2800 N 44th Street
Suite 510
Phoenix, AZ 85008

September 23, 2013

Ms. Mary Dahl
Community Development Director
Santa Cruz County
275 Rio Rico Dirve
Rio Rico, AZ 85648

Dear Ms. Dahl:

Nogales International Airport (OLS), Nogales, Arizona
Aviation Activity Forecast Approval

The Federal Aviation Administration (FAA) has reviewed the aviation forecast for the airport master plan for Nogales International Airport dated August 28, 2013. The FAA approves these forecasts for airport planning purposes, including Airport Layout Plan development.

In summary, while the difference between the FAA TAF and Nogales' forecast update regarding total operations isn't within the 10 percent and 15 percent allowance for 5 and 10 year planning horizons, the airport forecast update appropriately explains these differences due to the slow recovery from the national economic recession. Therefore, approval of this forecast doesn't need to be sent to FAA Headquarters for review because the 5 and 10 year forecasts do not exceed benchmarks established in the FAA's Guidance on Review & Approval of Local Aviation Forecasts published in 2008.

The forecast was formulated using current data and appropriate methodologies, therefore the FAA locally approves this forecast for planning purposes at Nogales International Airport. It is important to note that the approval of this forecast doesn't guarantee future funding for large scale capital improvements as future projects will need to be justified by current activity levels reached at the time the projects are proposed for implementation.

If you have any questions about this forecast approval, please call me at 602-379-3022

Sincerely,

Jared M. Raymond
Airport Planner

cc: Scott Driver, ADOT, Airport Grant Manager

Chapter Three

AIRPORT FACILITY REQUIREMENTS

Chapter Three
AIRPORT FACILITY REQUIREMENTS

To properly plan for the future of Nogales International Airport, it is necessary to translate forecast aviation demand into the specific types and quantities of facilities that can adequately serve the identified demand. This chapter uses the results of the forecasts presented in Chapter Two, as well as established planning criteria, to determine the airside (i.e., runways, taxiways, navigational aids, marking and lighting) and landside (i.e., hangars, aircraft parking apron, and automobile parking) facility requirements.

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

PLANNING HORIZONS

An updated set of aviation demand forecasts for Nogales International Airport has been established. These activity forecasts include annual operations, based aircraft, fleet mix, peaking characteristics, and the critical design aircraft. With this information, specific components of the airfield and landside system can be evaluated to determine their capacity to accommodate future demand.

Cost-effective, efficient, and orderly development of an airport should rely more upon actual demand at an airport than on a time-based forecast figure. In order to develop a master plan that is demand-based rather than time-based, a series of planning horizon milestones have been

established that take into consideration the reasonable range of aviation demand projections. The planning horizons are the Short Term (approximately years 1-5), the Intermediate Term (years 6-10), and the Long Term (years 11-20).

It is important to consider that the actual activity at the Airport may be higher or lower than what the annualized forecast portrays. By planning according to activity milestones, the resultant plan can accommodate unexpected shifts or changes in the area's aviation demand. It is important for the plan to accommodate these changes so that airport officials can respond to unexpected changes in a timely fashion.

The most important reason for utilizing milestones is it allows airport management the flexibility to make decisions and develop facilities according to need generated by actual demand levels. The demand-based schedule provides flexibility in development, as development schedules can be slowed or expedited according to demand at any given time over the planning period. The resultant plan provides Airport officials with a financially responsible and needs-based program.

DESIGN STANDARDS

The FAA publishes Advisory Circular (AC) 150/5300-13A, *Airport Design*, to guide airport planning. The AC provides guidance on various design elements of an airport intended to maintain or improve safety at airports. The design standards include airport elements such as runways, taxiways, safety areas, and separation distances. According to the AC, *"airport planning should consider both the present and potential aviation needs and demand associated with the airport."* Consideration should be given to planning runway and taxiway locations that will meet future separation requirements even if the width, strength, and length must increase later. Such decisions should be supported by the aviation demand forecasts and coordinated with the FAA and shown on the Airport Layout Plan (ALP).

FAA Advisory Circular (AC) 150/5300-13A, *Airport Design*, was published on September 28, 2012. It is intended to replace AC 150/5300-13, *Airport Design*, which was dated September 29, 1989. The latter was subject to 18 published changes over 23 years.

The new AC defines the Airport Reference Code (ARC) as, *"An airport designation that signifies the airport's highest Runway Design Code (RDC), minus the third (visibility) component of the RDC. The ARC is used for planning and design only and does not limit the aircraft that may be able to operate safely on the airport."*

The RDC is defined as, *"A code signifying the design standards to which the runway is to be built."* The Aircraft Approach Category (AAC), the Airplane Design Group (ADG), and the approach visibility minimums combine to form the RDC of a particular runway. These provide the information needed to determine certain design standards that apply.

It was determined in the Forecast chapter of this Master Plan that the existing critical design aircraft falls within RDC B-II and the ultimate critical design aircraft falls within RDC C-II. Therefore, design standards for these groups will be applied to existing and ultimate facility design.

AIRFIELD CAPACITY

A demand/capacity analysis measures the capacity of the airfield facilities (i.e., run-

ways and taxiways) in order to identify a plan for additional development needs. The capacity of the airfield is affected by several factors, including airfield layout, meteorological conditions, aircraft mix, runway use, aircraft arrivals, aircraft touch-and-go activity, and exit taxiway locations. An airport's airfield capacity is expressed in terms of its annual service volume (ASV). ASV is a reasonable estimate of the maximum level of aircraft operations that can be accommodated in a year.

Pursuant to FAA guidelines detailed in the FAA Advisory Circular (AC 150/5060-5, *Airport Capacity and Delay*, the ASV of a single runway configuration is approximately 230,000 operations at general aviation airports similar to Nogales International Airport. The forecasts for the Airport indicate that activity throughout the planning period will remain well below 230,000 annual operations. Current (2012) operations reached only 4.1 percent of the Airport's ASV and are forecast to reach only 8.3 percent of ASV by the long term horizon. The capacity of the existing airfield system will not be reached and the airfield is expected to accommodate the forecasted operational demands. Therefore, no additional runways or taxiways are needed for capacity reasons.

AIRFIELD REQUIREMENTS

As indicated earlier, airport facilities include both airfield and landside components. Airfield facilities include those facilities that are related to the arrival, departure, and ground movement of aircraft. These components include:

- Runway Configuration
- Safety Area Design Standards
- Runways
- Taxiways
- Navigational Approach Aids
- Lighting, Marking, and Signage

RUNWAY CONFIGURATION

The Airport is currently served by a single-runway system. Runway 3-21 is 7,200 feet long and is orientated in a northeast to southwest manner.

For the operational safety and efficiency of an airport, it is desirable for the primary runway to be oriented as close as possible to the direction of the prevailing wind. This reduces the impact of wind components perpendicular (crosswind) to the direction of travel of an aircraft that is landing or taking off.

FAA Advisory Circular 150/5300-13A, *Airport Design,* recommends that a crosswind runway be made available when the primary runway orientation provides for less than 95 percent wind coverage for specific crosswind components. The 95 percent wind coverage is computed on the basis of the crosswind component not exceeding 10.5 knots (12 mph) for RDC A-I and B-I, 13 knots (15 mph) for RDC A-II and B-II, and 16 knots (18 mph) for RDC A-III, B-III, C-I through C-III, and D-I through D-III.

Weather data specific to the Airport was obtained from the National Oceanic Atmospheric Administration (NOAA) National Climatic Data Center. This data was collected from the on-field automated surface observation system (ASOS) over a continuous 10-year period from 2003 to 2012. A total of 86,545 observations of wind direction and other data points were made.

Runway 3-21 provides 95.55 percent wind coverage for 10.5 knot crosswinds,

97.77 percent coverage at 13 knots, 99.42 percent at 16 knots, and 99.87 percent at 20 knots. **Exhibit 3A** presents the all-weather wind rose for the Airport.

This wind rose data tells us that Runway 3-21 satisfies 95 percent wind coverage recommendation at the Airport and that no new runways are necessary for cross-wind purposes.

RUNWAY DESIGN STANDARDS

The FAA has established several imaginary surfaces to protect aircraft operational areas and keep them free from obstructions that could affect their safe operation. These include the runway safety area (RSA), runway object free area (ROFA), runway obstacle free zone (ROFZ), and runway protection zone (RPZ).

The entire RSA, ROFA, and ROFZ must be under the direct ownership of the airport sponsor to ensure these areas remain free of obstacles and can be readily accessed by maintenance and emergency personnel. The RPZ should also be under airport ownership. An alternative to outright ownership of the RPZ is the purchase of avigation easements (acquiring control of designated airspace within the RPZ) or having sufficient land use control measures in places which ensure the RPZ remains free of incompatible development. The existing RDC B-II and ultimate RDC C-II airport safety areas are presented on **Exhibit 3B**.

Dimensional standards for the various safety areas associated with the runways are a function of the type of aircraft expected to use the runways as well as the instrument approach capability. **Table 3A** presents the FAA design standards as they apply to the runway at Nogales International Airport.

Runway Safety Area (RSA)

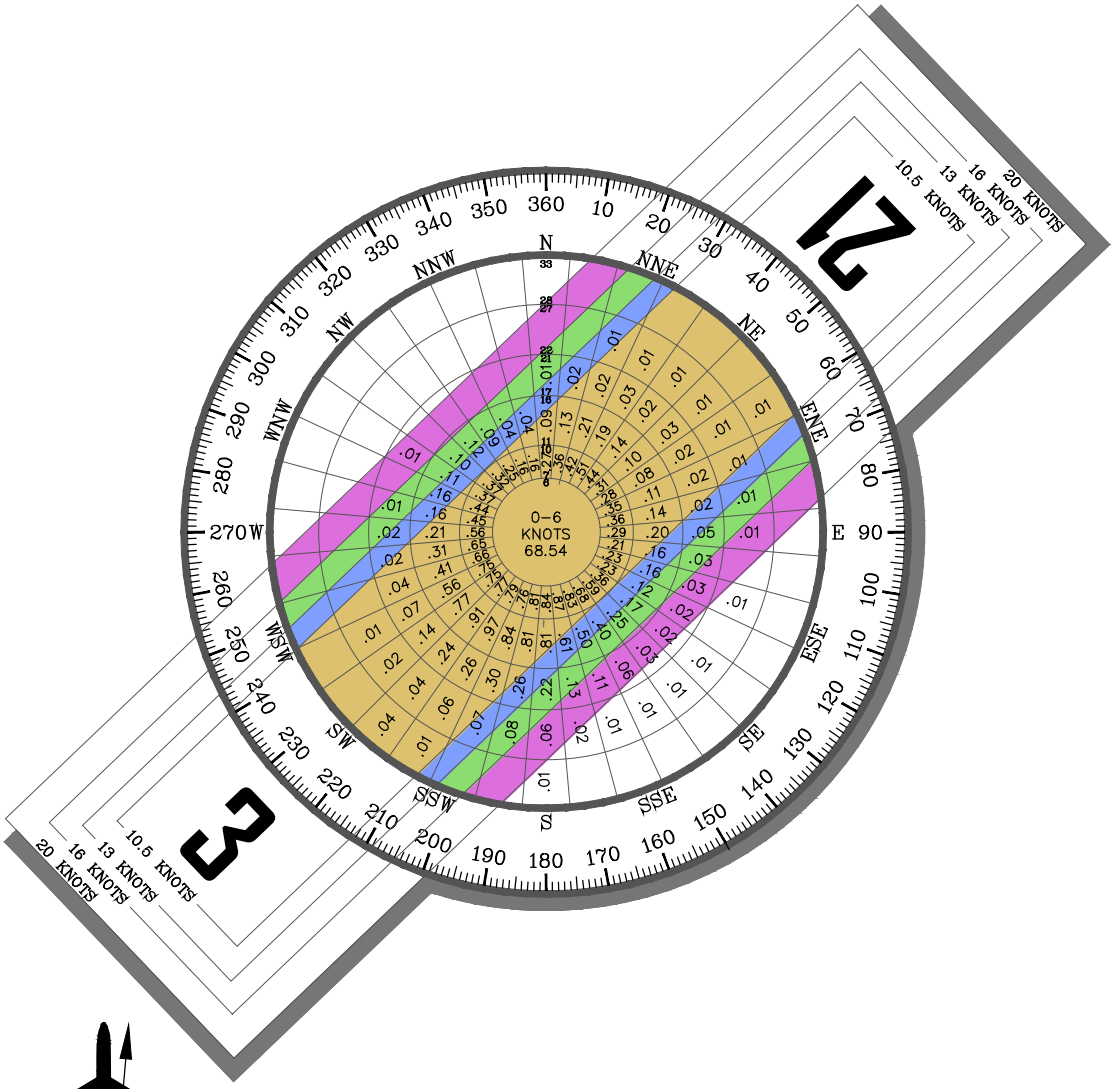
The RSA is defined in FAA AC 150/5300-13A, *Airport Design,* as a "surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of undershoot, overshoot, or excursion from the runway." The RSA is centered on the runway and dimensioned in accordance to the approach speed of the critical design aircraft using the runway. The FAA requires the RSA to be cleared and graded, drained by grading or storm sewers, capable of accommodating the design aircraft and fire and rescue vehicles, and free of obstacles not fixed by navigational purpose such as runway edge lights or approach lights.

The FAA has placed a higher significance on maintaining adequate RSA at all airports. Under Order 5200.8, effective October 1, 1999, the FAA established the *Runway Safety Area Program.* The Order states, "The objective of the Runway Safety Area Program is that all RSAs at federally-obligated airports…shall conform to the standards contained in Advisory Circular 150/5300-13, *Airport Design*, to the extent practicable." Each Regional Airports Division of the FAA is obligated to collect and maintain data on the RSA for each runway at the airport and perform airport inspections.

Existing airfield conditions at Nogales International Airport meet RDC B-II RSA design standards. However, upgrading to RDC C-II design standards would require the removal of deficiencies, including several trees on the east side of the runway and grading improvements west of the Runway 3 end where a drainage ditch lo-

ALL WEATHER WIND COVERAGE

Runways	10.5 Knots	13 Knots	16 Knots	20 Knots
Runway 3–21	*95.55%*	*97.77%*	*99.42%*	*99.87%*



NORTH

Magnetic Declination
10° 06' East (March 2013)
Annual Rate of Change
00° 06' West (March 2013)

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

OBSERVATIONS:
86,545 All Weather Observations
2003–2012

Exhibit 3A
WIND ROSE

RDC B-II

RDC C-II

0 1200 2400

SCALE IN FEET

Departure RPZ

Approach RPZ

Runway 3-21 7,200' x 100'

Taxiway A

Drainage Ditch

8.86 Acres

NORTH

LEGEND

- Airport Property Line
- Runway Safety Area (RSA)
- Object Free Area (OFA)
- Obstacle Free Zone (OFZ)
- Perimeter Fence
- Runway Protection Zone (RPZ)
- Uncontrolled Safety Areas
- Vegetation Obstruction of OFA/RSA/OFZ

Exhibit 3B
AIRPORT SAFETY AREAS

cated approximately 215 feet northwest of the extended runway centerline would not meet RSA grading standards, which require grades to be between 1.5 to 3.0 percent. These RSA deficiencies are identified on **Exhibit 3B**.

TABLE 3A
Runway Design Standards
Nogales International Airport

	Runway 3-21	
Runway Design Code	**Existing B-II**	**Ultimate C-II**
Visibility Minimums	**Not Lower than 1 Mile**	**Not Lower than 1 Mile**
RUNWAY DESIGN		
Runway Width	75	100
Runway Shoulder Width	10	10
RUNWAY PROTECTION		
Runway Safety Area (RSA)		
Width	150	500
Length Beyond Departure End	300	1,000
Length Prior to Threshold	300	600
Runway Object Free Area (ROFA)		
Width	500	800
Length Beyond Departure End	300	1,000
Length Prior to Threshold	300	600
Runway Obstacle Free Zone (ROFZ)		
Width	400	400
Length Beyond End	200	200
Precision Obstacle Free Zone (POFZ)		
Width	NA	NA
Length	NA	NA
Approach Runway Protection Zone (RPZ)		
Length	1,000	1,700
Inner Width	500	500
Outer Width	700	1,010
Departure Runway Protection Zone (RPZ)		
Length	1,000	1,700
Inner Width	500	500
Outer Width	700	1,010
RUNWAY SEPARATION		
Runway Centerline to:		
Holding Position	200	250
Parallel Taxiway	240	300
Aircraft Parking Area	250	400

Note: All dimensions in feet
NA – Not Applicable
Source: FAA AC 150/5300-13A, Airport Design

Runway Object Free Area (ROFA)

The ROFA is "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 ROFA does not have to be graded and level like the RSA; instead, the primary requirement for the ROFA is that no object in the ROFA penetrates the lateral elevation of the RSA. The ROFA is centered on the runway, extending out in accordance

to the critical design aircraft utilizing the runway.

Existing airfield conditions at Nogales International Airport do not meet ROFA design standards. Vegetation east of the runway is located within the ROFA and the perimeter fence line extends into the ROFA in certain areas. Vegetation found to be located within the ROFA should be removed and the fence line should be relocated as necessary. Due to negatively sloping terrain on the east side of the airport where the Cañada de la Paloma has caused soil erosion, the fence line may not be able to be relocated outside of the ROFA. In such a case, the County should consider requesting a modification to design standard from the FAA to allow the fence line to be located within the ROFA. These areas are identified on **Exhibit 3B**.

Runway Obstacle Free Zone (ROFZ)

The ROFZ is an imaginary volume of airspace which precludes object penetrations, including taxiing and parked aircraft. The only allowance for ROFZ obstructions is navigational aids mounted on frangible bases which are fixed in their location by function, such as airfield signs. The ROFZ is established to ensure the safety of aircraft operations. If the ROFZ is obstructed, the airport's approaches could be removed or approach minimums could be increased.

Similar to the RSA and ROFA, the ROFZ is obstructed by vegetation east of the runway. Vegetation obstructing the ROFZ should be removed.

Runway Protection Zones (RPZ)

The RPZ is a trapezoidal area centered on the runway, typically beginning 200 feet beyond the runway end. The RPZ has been established by the FAA to provide an area clear of obstructions and incompatible land uses, in order to enhance the protection of people and property on the ground. The RPZ is comprised of the central portion of the RPZ and the controlled activity area. The central portion of the RPZ extends from the beginning to the end of the RPZ, is centered on the runway, and is the width of the ROFA. The controlled activity area is any remaining portions of the RPZ. The dimensions of the RPZ vary according to the visibility minimums serving the runway and the type of aircraft (design aircraft) operating on the runway.

While the RPZ is intended to be clear of incompatible objects or land uses, some uses are permitted with conditions, while other land uses are prohibited. According to AC 159/5300-13A, the following land uses are permissible within the RPZ:

- Farming that meets the minimum buffer requirements,
- Irrigation channels as long as they do not attract birds,
- Airport service roads, as long as they are not public roads and are directly controlled by the airport operator.
- Underground facilities, as long as they meet other design criteria, such as RSA requirements, as applicable,
- Unstaffed navigational aids (NAVAIDs) and facilities, such as required for airport facilities that are fixed-by-function in regard to the RPZ.

Any other land uses considered within RPZ land owned by the Airport sponsor must be evaluated and approved by the FAA Office of Airports. The FAA has published the *Interim Guidance on Land Uses within a Runway Protection Zone*

(9.27.2012), which identifies several potential land uses that must be evaluated and approved prior to implementation. The specific land uses requiring FAA evaluation and approval include:

- Buildings and structures. Examples include, but are not limited to: residences, schools, churches, hospitals or other medical care facilities, commercial/industrial buildings, etc.
- Recreational land use. Examples include, but are not limited to: golf courses, sports fields, amusement parks, other places of public assembly, etc.
- Transportation facilities. Examples include, but are not limited to:
  -- Rail facilities - light or heavy, passenger or freight
  -- Public roads/highways
  -- Vehicular parking facilities
- Fuel storage facilities (above and below ground)
- Hazardous material storage (above and below ground)
- Wastewater treatment facilities
- Above ground utility infrastructure (i.e., electrical substations), including any type of solar panel installations.

The *Interim Guidance on Land within a Runway Protection Zone* states, "RPZ land use compatibility also is often complicated by ownership considerations. Airport owner control over the RPZ land is emphasized to achieve the desired protection of people and property on the ground. Although the FAA recognizes that in certain situations the airport sponsor may not fully control land within the RPZ, the FAA expects airport sponsors to take all possible measures to protect against and remove or mitigate incompatible land uses."

Currently, the RPZ review standards are applicable to any new or modified RPZ. The following actions or events could alter the size of an RPZ, potentially introducing an incompatibility:

- An airfield project (e.g., runway extension, runway shift)
- A change in the critical design aircraft that increases the RPZ dimensions
- A new or revised instrument approach procedure that increases the size of the RPZ
- A local development proposal in the RPZ (either new or reconfigured)

Since the Interim guidance only addresses new or modified RPZs, existing incompatibilities are essentially grandfathered under certain circumstances. While it is still necessary for the airport sponsor to take all reasonable actions to meet the RPZ design standard, FAA funding priority for certain actions, such as relocating existing roads in the RPZ, will be determined on a case-by-case basis.

Currently, the RDC B-II RPZs are located entirely within existing airport property and do not have any incompatible land uses.

Upgrading to RDC C-II design standards will result in larger RPZ dimensions. As shown on **Exhibit 3B**, implementing RDC C-II RPZs would result in approximately 8.86 acres of the Runway 3 RPZ extending beyond Airport property. This incompatibility is on private property, and the Airport does not currently own easement rights. In addition, there is a gravel service road extending along the airport's southwest property line, which would be located within the ultimate RPZ. This gravel road is not a public access road, but according to the 2002 Airport Layout Plan (ALP), the property that this road is located on was conveyed to the adjoining land owner. It is recommended that the County reexamine the land conveyance and upon upgrade to RDC C-II design

standards, close or relocate the gravel road so that it does not extend through the RPZ.

Runway/Taxiway Separation

The design standards for the separation between runways and parallel taxiways are a function of the critical design aircraft and the instrument approach visibility minimum. The separation standard for RDC C-II with not lower than one-mile visibility minimums is 300 feet from the runway centerline to the parallel taxiway centerline. This standard applies to those taxiway segments that are parallel to Runway 3-21. Taxiway A is 378 feet from the runway. Therefore, Taxiway A meets separation design standards.

RUNWAYS

The adequacy of the existing runway at Nogales International Airport has been analyzed from a number of perspectives, including runway orientation and adherence to safety area standards. From this information, requirements for runway improvements were determined for the Airport. Runway elements, such as length, width, and strength, are now analyzed.

Runway Length

The determination of runway length requirements for the airport is based on four primary factors:

- Mean maximum temperature of the hottest month
- Airport elevation
- Runway gradient
- Performance characteristics and operating weight of aircraft

The mean maximum daily temperature of the hottest month for Nogales International Airport is 95.4 degrees Fahrenheit (F), which occurs in June. The Airport elevation is 3,955 feet above mean sea level (MSL). The runway elevation difference is 116 feet, resulting in a gradient of 1.6 percent. The ultimate RDC for Runway 3-21 is C-II.

Advisory Circular 150/5325-4B, *Runway Length Requirements for Airport Design*, provides guidance for determining runway length needs. Airplanes operate on a wide variety of available runway lengths. Many factors will govern the suitability of those runway lengths for aircraft such as elevation, temperature, wind, aircraft weight, wing flap settings, runway condition (wet or dry), runway gradient, vicinity airspace obstructions, and any special operating procedures. Airport operators can pursue policies that can maximize the suitability of the runway length. Policies, such as area zoning and height and hazard restricting, can protect an airport's runway length. Airport ownership (fee simple or easement) of land leading to the runway ends can reduce the possibility of natural growth or man-made obstructions. Planning of runways should include an evaluation of aircraft types expected to use the airport, or a particular runway now and in the future. Future plans should be realistic and supported by the FAA approved forecasts and should be based on the critical design aircraft (or family of aircraft).

The first step in evaluating runway length is to determine general runway length requirements for the majority of aircraft operating at the Airport. The majority of operations at Nogales International Airport are conducted using smaller single- and multi-engine piston-powered aircraft weighing less than 12,500 pounds. Following guidance from AC 150/5325-4B, to accommodate 95 percent of small aircraft with less than 10 passenger seats, a

runway length of 5,300 feet is recommended. To accommodate 100 percent of these small aircraft, a runway length of 5,600 feet is recommended. Small aircraft with 10 or more passenger seats also require a runway length of 5,600 feet.

Runway length requirements for business jets weighing less than 60,000 pounds have also been calculated. These calculations take into consideration the runway gradient and landing length requirements for contaminated runways (wet). Business jets tend to need greater runway length when landing on a wet surface because of their increased approach speeds. AC 150/5325-4B stipulates that runway length determination for business jets consider a grouping of airplanes with similar operating characteristics. The AC provides two separate "family groupings of airplanes" each based upon their representative percentage of aircraft in the national fleet. The first grouping is those business jets that make up 75 percent of the national fleet, and the second group is those making up 100 percent of the national fleet. **Table 3B** presents a partial list of common aircraft in each aircraft grouping. A third group considers business jets weighing more than 60,000 pounds. Runway length determination for these aircraft must be based on the performance characteristics of the individual aircraft.

TABLE 3B
Business Jet Categories for Runway Length Determination

75 percent of the national fleet	MTOW	75-100 percent of the national fleet	MTOW	Greater than 60,000 pounds	MTOW
Lear 35	20,350	Lear 55	21,500	Gulfstream II	65,500
Lear 45	20,500	Lear 60	23,500	Gulfstream IV	73,200
Cessna 550	14,100	Hawker 800XP	28,000	Gulfstream V	90,500
Cessna 560XL	20,000	Hawker 1000	31,000	Global Express	98,000
Cessna 650 (VII)	22,000	Cessna 650 (III/IV)	22,000		
IAI Westwind	23,500	Cessna 750 (X)	36,100		
Beechjet 400	15,800	Challenger 604	47,600		
Falcon 50	18,500	IAI Astra	23,500		

MTOW: Maximum Take Off Weight
Source: FAA AC 150/5325-4B, Runway Length Requirements for Airport Design

Table 3C presents the results of the runway length analysis for business jets developed following the guidance provided in AC 150/5325-4B. To accommodate 75 percent of the business jet fleet at 60 percent useful load, a runway length of 7,500 feet is recommended. This length is derived from a raw length of 6,300 feet that is adjusted, as recommended, for runway gradient and consideration of landing length needs on a contaminated runway (wet and slippery). To accommodate 100 percent of the business jet fleet at 60 percent useful load, a runway length of 9,800 feet is recommended.

TABLE 3C
Runway Length Requirements
Nogales International Airport

Airport Elevation	3,955 feet above mean sea level
Average High Monthly Temp.	95.4 degrees (June)
Runway Gradient	116'

Fleet Mix Category	Raw Runway Length from FAA AC	Runway Length With Gradient Adjustment (+1,160')	Wet Surface Landing Length for Jets (+15%)*	Final Runway Length
75% of fleet at 60% useful load	6,300'	7,460'	5,500'	7,500'
100% of fleet at 60% useful load	8,600'	9,760'	5,500'	9,800'
75% of fleet at 90% useful load	9,900'	11,060'	7,000'	11,100'
100% of fleet at 90% useful load	10,000'	11,160'	7,000'	11,200'

*Max 5,500' for 60% useful load and max 7,000' for 90% useful load in wet conditions
Source: FAA AC 150/5325-4B, Runway Length Requirements for Airport Design.

Utilization of the 90 percent category for runway length determination is generally not considered by the FAA unless there is a demonstrated need at the airport. This could be documented activity by a cargo carrier or by a business jet operator that flies out frequently with heavy loads. To accommodate 75 percent of the business jet fleet at 90 percent useful load, a runway length of 11,100 feet is recommended. To accommodate 100 percent of business jets at 90 percent useful load, a runway length of 11,200 feet is recommended.

Another method to determine runway length requirements at Nogales International Airport is to examine aircraft flight planning manuals under conditions specific to the Airport. Several aircraft that are known to operate at the Airport were analyzed for takeoff length required under maximum loading conditions when the temperature is 95 degrees. **Table 3D** shows the runway length results.

Several of the example aircraft would require a runway length greater than the 7,200 feet currently available on Runway 3-21.

Runway 3-21 Length

Runway 3-21's current length is 7,200 feet. The runway should be capable of accommodating at least 75 percent of the business jet fleet at 60 percent useful load. This would indicate a minimum runway length of 7,500 feet. To accommodate the next category of business jets, 100 percent at 60 percent useful load, a runway length of 9,800 feet is recommended.

The forecast of business jet operations does not indicate that the Airport will exceed the 500 operations threshold by business jets utilizing at least 90 percent useful load; therefore, the runway length required to fully accommodate these aircraft will not be considered in the alternatives chapter.

The alternatives chapter will assess the maximum runway length that the Airport site can accommodate, up to 9,800 feet, to accommodate 100 percent of the business jet fleet at 60 percent useful load. Justification would come when a specific aircraft, or a combination of aircraft, is in the 100 percent category, accounting for 500 annual operations.

TABLE 3D
Select Business Jet Takeoff Length Requirements
Nogales International Airport

Assumptions:
Mean Maximum Temp of Hottest Month: 95 degrees
Runway Gradient: 116-foot runway elevation difference
Airport Elevation: 3,955 feet

Aircraft	75% or 100% Category of National Fleet	ARC	MTOW (pounds)	Takeoff Length (feet)
Falcon 20	75% Category	B-II	24,000	7,700
Beechjet 400	75% Category	B-I	16,100	7,100
Cessna 550	75% Category	B-II	14,100	8,250
Lear 45	75% Category	D-I	21,500	7,300
Cessna 525	75% Category	B-I	9,900	5,400
Cessna 560XL	75% Category	B-II	19,500	5,700
Cessna 750	100% Category	C-II	31,000	5,900
Cessna 680	100% Category	B-II	30,300	5,300
Hawker 800XP	100% Category	C-II	23,000	5,400
Gulfstream IV/G450	> 60,000 pounds	D-II	73,900	8,400
Gulfstream V/G550	> 60,000 pounds	C-III	91,000	9,700
Douglas DC-9*	> 60,000 pounds	C-III	119,000	10,200
Boeing 737-600*	> 60,000 pounds	C-III	144,500	12,100

* Flight Planning Manuals account for temperatures up to 86 degrees Fahrenheit.
ARC: Aircraft Reference Code
MTOW: Maximum Certified Takeoff Weight
Source: Aircraft Flight Planning Manuals

Runway Width

The width of the runway is a function of the airplane design group (ADG). Runway 3-21 is 100 feet wide, which meets the RDC C-II design standard. Therefore, the existing runway width should be maintained throughout the planning period.

Runway Strength

An important feature of airfield pavement is its ability to withstand repeated use by aircraft. Based upon runway pavement improvements made in 2003, the pavement strength for Runway 3-21 is 24,000 pounds single wheel loading (SWL), 60,000 pounds dual wheel loading (DWL), and 115,000 pounds dual tandem wheel loading (DTWL). Despite the improvement in pavement strength, the FAA's Airport Facility Directory continues to reflect pre-improvement pavement strength ratings.

Strength ratings refer to the configuration of the aircraft landing gear. For example, SWL indicates an aircraft with a single wheel on each landing gear. The strength ratings of a runway do not preclude operations by aircraft that weigh more; however, frequent activity by heavier aircraft can shorten the useful life of that pavement. The strength rating for Runway 3-21 is adequate and should be maintained through the planning period.

Runway Reference Code

FAA AC 150/5399-13A, *Airport Design*, introduces the Runway Reference Code (RRC). The RRC is defined as, *"A code signifying the current operational capabilities of a runway and associated parallel taxiway."* Like the RDC, the RRC is made up of

the same three components: AAC, ADG, and runway visibility minimums. The RDC, however, is based upon planned development with no operational component, while the RRC describes the current operational capabilities of a runway where no special operating procedures are necessary.

The RRC for a runway is established based upon the minimum runway to taxiway centerline separation.

At Nogales International Airport, Runway 3-21 is served by a full-length parallel Taxiway A, which has a separation distance of 378 feet. This separation distance exceeds the RRC C-II NPI-1 design standard of 300 but is less than the RRC C/D-III standard of 400 feet. Therefore, the RRC for Runway 3-21 is identified as RRC C-II-NPI-1.

TAXIWAYS

The design standards associated with taxiways are determined by the taxiway design group (TDG) or the airplane design group (ADG) of the critical design aircraft. As determined previously, the applicable ADG for Runway 3-21 now and into the future is ADG-II. **Table 3E** presents the various taxiway design standards related to ADG II.

The table also shows those taxiway design standards related to TDG. The TDG standards are based on the Main Gear Width (MGW) and the Cockpit to Main Gear (CMG) distance of the critical design aircraft expected to use those taxiways. Different taxiways/taxilane pavements can and should be designed to the most appropriate TDG design standards.

TABLE 3E
Taxiway Dimensions and Standards
Nogales International Airport

STANDARDS BASED ON WINGSPAN	ADG II	
Taxiway Protection		
Taxiway Safety Area (TSA) width	79'	
Taxiway Object Free Area (TOFA) width	131'	
Taxilane Object Free Area width	115'	
Taxiway Separation		
Taxiway Centerline to:		
Fixed or Movable Object	65.5'	
Parallel Taxiway/Taxilane	105'	
Taxilane Centerline to:		
Fixed or Movable Object	57.5'	
Parallel Taxilane	97'	
Taxiway Centerline to:		
Runway 3-21 Centerline	300'	
Wingtip Clearance		
Taxiway Wingtip Clearance	26'	
Taxilane Wingtip Clearance	18'	
STANDARDS BASED ON TDG	**TDG 2**	**TDG 3**
Taxiway Width Standard	35'	50'
Taxiway Edge Safety Margin	7.5'	10'
Taxiway Shoulder Width	10'	20'

ADG: Airplane Design Group
TDG: Taxiway Design Group
Source: FAA AC 150/5300-13A, Airport Design

For aircraft utilizing Runway 3-21 currently, the critical TDG is 2. This means that the taxiways associated with this runway should be at least 35 feet wide. However, the taxiway system is currently constructed to satisfy TDG 3 standards, which accommodates aircraft including the Cessna Citation Sovereign, Cessna Citation X, and the Bombardier Challenger aircraft, which operate at the airport frequently. Therefore, the taxiways associated with Runway 3-21 should be maintained at their current width.

Table 3F presents the existing taxiway dimensions and separation distances at the Airport.

TABLE 3F
Existing Taxiway Condition
Nogales International Airport

Existing Taxiway Widths	
Taxiway A	50'
Taxiway B	50'
Taxiway C	50'
Taxiway D	50'
Taxiway E	50'
Taxiway F	50'
Taxiway G	50’
Existing Taxiway Separations	
Taxiway A to Runway 3-21	378'

Taxiway Design Considerations

FAA AC 150/5300-13A, *Airport Design*, provides guidance on recommended taxiway and taxilane layouts to enhance safety by avoiding runway incursions. A runway incursion is defined as, “any occurrence at an airport involving the incorrect presence of an aircraft, vehicle, or person on the protected area of a surface designated for the landing and takeoff of aircraft.”

The taxiway system at Nogales International Airport generally provides for the efficient movement of aircraft; however, recently published AC 150/5300-13A, *Airport Design*, provides new recommendations for taxiway design. One particular recommendation that is applicable to Nogales International Airport is limiting direct access to runways to reduce the potential for runway incursions. *Airport Design* recommends to planners, “do not design taxiways to lead directly from an apron to a runway. Such configurations can lead to confusion when a pilot typically expects to encounter a parallel taxiway.”

Presently, the taxiway system provides for direct access to the runway from the terminal/transient parking apron via Taxiway E, and from the air cargo apron via Taxiway D. The FAA recommends taxiway design should increase pilot situational awareness by forcing pilots to consciously make turns by staggering taxiway layout. *Airport Design* states that, “existing taxiway geometry should be improved whenever feasible. To the extent practicable, the removal of existing pavement may be necessary to correct confusing layouts.

The alternatives chapter of this Master Plan will consider various designs to improve taxiway layout.

Taxilane Design Considerations

Taxilanes are distinguished from taxiways in that they do not provide access to or from the runway system directly. Taxilanes typically provide access to hangar areas. As a result, taxilanes can be designed to varying design standards depending on the type of aircraft utilizing the taxilane. For example, a taxilane leading to a T-hangar area only needs to be designed to accommodate those aircraft typically accessing a T-hangar.

The alternatives chapter will consider various designs for improving the safe

movement of aircraft via taxilanes as hangar and apron facilities expand over time.

INSTRUMENT NAVIGATIONAL AIDS

The Airport has three published non-precision (circling only) instrument approach procedures. These approaches provide for visibility minimums as low as 1¼-mile and cloud ceilings down to 1,268 feet. These are excellent instrument approaches providing all-weather capability for the Airport and they should be maintained in the future.

Recent advancements in the accuracy of GPS instrument approaches has led to the possibility of new or improved approach visibility minimums across the country at little or no expense to the airport. Currently, localizer performance with vertical guidance (LPV) approaches with visibility minimums as low as ¾-mile are being implemented at airports without any additional ground-based navigational aids such as approach lighting systems (ALS); however, these navigations aids are recommended.

At Nogales International Airport, previous analysis has concluded that straight-in instrument approaches are not recommended due to rising terrain surrounding the Airport. The alternatives chapter of this Master Plan will give consideration to the potential for improved instrument approaches to both ends of Runway 3-21 in order to confirm/deny the previous recommendation. Specifically, the impacts of GPS non-precision instrument approaches with 1-mile visibility minimums will be considered for these runway ends.

VISUAL NAVIGATION AIDS

The airport beacon is located adjacent to the intersection of State Route 82 and the Airport Access Road. The beacon should be maintained.

Both ends of Runway 3-21 are equipped with 4-light precision approach path indicator (PAPIs). These should be maintained for their useful life.

Runway end identification lights (REIL) are strobe lights set to either side of the runway. These lights provide rapid identification of the runway threshold. REILs should be installed at runway ends not currently providing an approach lighting system (ALS) but supporting instrument operations. Neither runway end is equipped with REILs. Consideration will be given to the installation of REILs on each end of Runway 3-21.

The FAA does not require an ALS for approaches with 1-mile visibility minimums but does require an ALS for instrument approaches lower that 1-mile visibility minimums. As previously discussed, neither runway end currently supports straight-in instrument approaches.

If instrument approaches with less than 1-mile visibility minimums are planned to either runway end, an ALS should be planned. Acceptable systems would include MALSR, SSALR, or ALSF.

WEATHER AIDS

Nogales International Airport is equipped with an Automated Surface Observing System (ASOS). This is an important system that automatically records weather conditions such as wind speed, wind gust, wind direction, temperature, dew point, altimeter setting, visibility, fog/haze condition, precipitation, and cloud height. This information is then transmitted at regular intervals (usually once per hour). Aircraft in the vicinity can receive this information if they have their radio tuned to the correct frequency (121.125 MHz).

In addition, pilots and individuals can call a published telephone number and receive the information via an automated voice recording. This system should be maintained through the planning period.

A summary of the airside needs at Nogales International Airport is presented on **Exhibit 3C**.

LANDSIDE REQUIREMENTS

Landside facilities are those necessary for the handling of aircraft and passengers while on the ground. These facilities provide the essential interface between the air and ground transportation modes. The capacity of the various components of each element was examined in relation to projected demand to identify future landside facility needs. This includes components for general aviation needs such as:

- Aircraft Hangars
- Aircraft Parking Aprons
- Terminal Building Services
- Auto Parking and Access
- Airport Support Facilities

HANGARS

Utilization of hangar space varies as a function of local climate, security, and owner preferences. The trend in general aviation, whether single or multi-engine aircraft, is toward more sophisticated aircraft (and, consequently, more expensive aircraft); therefore, many aircraft owners prefer enclosed hangar space to outside tie-downs.

The demand for aircraft storage hangars is dependent upon the number and type of aircraft expected to be based at the airport in the future. However, hangar development should be based upon actual demand trends and financial investment conditions.

While a majority of aircraft owners prefer enclosed aircraft storage, a number of based aircraft owners may still tie-down outside (due to the lack of hangar availability, hangar rental rates, and/or operational needs). Therefore, enclosed hangar facilities do not necessarily need to be planned for each based aircraft. At Nogales International Airport, nearly all aircraft are stored in a covered facility; however, a few still prefer outside tie-downs. Therefore, it will not be assumed that all future based aircraft will be housed in a hangar.

There are three general types of aircraft storage hangars: T-hangars, box hangars, and conventional hangars. T-hangars are similar in size and will typically house a single-engine piston-powered aircraft. Some multi-engine aircraft owners may elect to utilize these facilities as well. There are typically many T-hangar units "nested" within a single structure. There are 12 T-hangar units at the Airport encompassing an estimated 13,300 square feet of floor space.

Box hangars are open-space facilities with no interfering supporting structure. Box hangars can vary in size and can either be attached to others or be standalone hangars. Typically, box hangars will house larger multi-engine, turboprop, or jet aircraft. At Nogales International Airport, there are five box hangars with a total of approximately 7,596 square feet of floor space.

Conventional hangars are the familiar large hangars with open floor plans that can store several aircraft. At Nogales International Airport, there are four conventional hangars, including Tiffin Aviation's hangar, which is cross-utilized for aircraft maintenance and aircraft storage. It is estimated that these hangars have the capability of housing seven aircraft. Conventional hangars are estimated to en-

compass 13,320 square feet of floor space.

Table 3G presents aircraft storage needs based on the demand forecasts. Assumptions have been made on owner preferences for a hangar type based on trends at general aviation airports. Presently, 100 percent of hangar facilities are occupied; therefore, facility requirements consider space requirements for eight additional aircraft anticipated to require storage space through the planning period. All turboprops, business jets, and helicopters are assumed to be stored in conventional hangars. T-hangars and box hangars are assumed to house single-engine piston aircraft.

TABLE 3G
Hangar Needs
Nogales International Airport

	Currently Available	Short Term	Intermediate Term	Long Term	Total Need Less Current Supply
Based Aircraft	24	26	28	32	
Aircraft to be Hangared	21	23	25	29	8
T-Hangar Positions	12	12	12	12	0
Box Hangar Positions	5	5	5	5	0
Conventional Hangar Positions	7	9	11	15	8
Hangar Area Requirements					
T-Hangar Area (s.f.)	13,300	13,300	13,300	13,300	0
Box Hangar Area (s.f.)	7,600	7,600	7,600	7,600	0
Conventional Hangar Area (s.f.)	13,320	19,800	23,800	30,300	16,980
Total Storage Area (s.f.)	**34,220**	**40,700**	**44,700**	**51,200**	**16,980**
Maintenance Area (s.f.)	4,536	5,000	5,000	6,000	1,464

Source: Coffman Associates analysis.

A portion of conventional hangars often are utilized for maintenance activities. A planning standard of 175 square feet per based aircraft is considered for these purposes and is considered in addition to the aircraft storage needs. Nested T-hangar facilities typically have small storage units on the end as well.

It is estimated that there are 34,220 square feet of hangar storage space available currently. This includes 13,300 square feet for T-hangars, 7,600 square feet for box hangars, and 13,320 square feet for conventional hangars. Throughout the planning period, it is anticipated the most significant change in aircraft storage needs will occur for more sophisticated aircraft (turbine and helicopters). By the long term planning horizon, it is anticipated that five turbine aircraft and three helicopters could base at the Airport. A planning standard of 2,500 square feet per turbine aircraft and 1,500 square feet per helicopter was utilized to generate additional conventional hangar space needs for each planning period. By the long term planning period, a total of 16,980 square feet of conventional hangar space is forecast as needed.

It is anticipated that the number of based single- and multi-engine piston aircraft will not change significantly over the planning period and, therefore, no additional hangar space is recommended for these aircraft.

Hangar requirements are general in nature and are based on standard hangar

	AVAILABLE	SHORT TERM	LONG TERM
RUNWAY			
 	**Runway 3-21**	**Runway 3-21**	**Runway 3-21**
	RDC B-II-NPI-1	RDC C-II-NPI-1	RDC C-II-NPI-1
	RRC C-II-NPI-1	RRC C-II-NPI-1	RRC C-II-NPI-1
	7,200' x 100'	Maintain	Consider 9,800' x 100'
	24,000-S; 60,000-D; 115,000-DT	Maintain	Maintain
	ROFZ/ROFA Deficiencies Standard RSA	Correct RSA/ROFZ/ROFA Deficiencies	Maintain
	RPZs under full ownership	Establish full control of expanded RPZs	Maintain
	Non-precision marking	Maintain	Maintain
	MIRL	Maintain	Maintain
	AVAILABLE	**SHORT TERM**	**LONG TERM**
TAXIWAYS			
	TDG-3	TDG-3	TDG-3
	Centerline marking	Maintain	Maintain
	Taxiway A is 50' wide	Maintain	Maintain
	MITL	Maintain	Maintain
	Connector layout deficiencies	Correct connector deficiencies	Maintain
NAVIGATIONAL AND WEATHER AIDS			
 	ASOS	Maintain	Maintain
	Beacon	Maintain	Maintain
	Circling only non-precision instrument approaches	Maintain	Consider down to 1 mile GPS non-precision approach
VISUAL AIDS			
	PAPI-4 (3 & 21)	Maintain	Maintain
		REIL	Maintain

KEY

RDC - Runway Design Code
RRC - Runway Reference Code
RSA - Runway Safety Area
ROFA - Runway Object Free Area
ROFZ - Runway Obstacle Free Zone
RPZ - Runway Protection Zone
TDG - Taxiway Design Group
PAPI - Precision Approach Path Indicator
GPS - Global Positioning System
NPI - Non-Precision Instrument
REIL - Runway End Identification Lights
MIRL - Medium Intensity Runway Lighting
MITL - Medium Intensity Taxiway Lighting
ASOS - Automated Surface Observation System
##-S/D/DT - Runway Strength Rating in Thousands of Pounds for Single (S), Dual (D), and Dual Tandem (DT) Wheel Struts

size estimates. If a private developer desires to construct or lease a large hangar to house one plane, any extra space in that hangar may not be available for other aircraft. The actual hangar area needs will be dependent on the usage within each hangar.

AIRCRAFT PARKING APRON

The aircraft parking apron is an expanse of paved area intended for aircraft parking and circulation. Typically, a main apron is centrally located near the airside entry point, such as the terminal building or FBO facility. Ideally, the main apron is large enough to accommodate transient airport users as well as a portion of locally based aircraft. Often, smaller aprons are available adjacent to hangars and at other locations around the airport. The apron layout at Nogales International Airport follows this typical pattern.

The main terminal area apron encompasses approximately 15,355 square yards and serves multiple purposes. The northernmost portion is primarily used by corporate and business turbine aircraft parking, the middle portion is used for transient single- and multi-engine piston parking, and the southern portion is used for heavier transient jet aircraft parking. There are 14 marked transient tie-down positions on the middle portion of the apron. The Airport is equipped with a 4,622 square yard air cargo apron northwest of Taxiway D for the loading/offloading of chartered cargo aircraft. A total of 34 transient turbine parking positions were estimated for the unmarked portions of these aprons.

Apron areas south of the main terminal apron consist of two segments on the northwest and southeast side of the T-hangar facility. The total area of this apron is approximately 2,083 square yards providing 12 marked local tie-down positions.

FAA AC 150/5300-13A, *Airport Design*, suggests a methodology by which transient apron requirements can be determined from knowledge of busy-day operations. At Nogales International Airport, the number of itinerant spaces required is estimated at 13 percent of the busy-day itinerant operations (27 x 0.13 = 4). This results in a current need for four itinerant aircraft parking spaces. Of these, two should be for small aircraft and two should be for turboprops and business jets. By the long term planning period, seven spaces are estimated to be needed, with three identified for small aircraft and four for larger planes.

A planning criterion of 800 square yards per aircraft was applied to determine future transient apron area requirements for single and multi-engine aircraft. For turboprops and business jets (which can be much larger), a planning criterion of 1,600 square yards per aircraft position was used. The current need for transient apron area is 4,800 square yards. By the long term planning period, approximately 8,900 square yards is estimated.

An aircraft parking apron should provide space for the number of locally based aircraft that are not stored in hangars, transient aircraft, and for maintenance activity. For local tie-down needs, an additional three spaces are identified to meet estimated long term demand. Calculations indicated that local aircraft tie-down positions are adequate through the long term planning period. Total apron parking requirements are presented in **Table 3H**. While existing apron area is shown to ex-

ceed long term needs, the alternatives chapter will examine the potential for new apron areas in association with the construction of new facilities.

TABLE 3H
Aircraft Apron Requirements
Nogales International Airport

			FORECAST		
	Currently Available (2012)	Calculated Need (2012)	Short Term	Intermediate Term	Long Term
Local Apron Positions	12	3	3	3	3
Local Apron Area (s.y.)	2,083	1,800	1,800	1,800	1,800
Transient Apron Positions	48	4	4	5	7
Piston Transient Positions	14	2	2	2	3
Turbine Transient Positions	34	2	2	3	4
Transient Apron Area (s.y.)	19,977	4,800	4,800	6,400	8,900
Total Apron Area (s.y)	22,060	6,600	6,600	8,200	10,700

Source: Coffman Associates analysis

TERMINAL BUILDING FACILITIES

General aviation terminal facilities have several functions. Space is necessary for a pilots' lounge, flight planning, concessions, management, and storage. More advanced airports will have leasable space in the terminal building for such features as a restaurant, FBO line services, and other needs. This space is not necessarily limited to a single, separate terminal building, but can include space offered by FBOs in their hangars for these functions and services.

The methodology used in estimating general aviation terminal facility needs is based on the number of airport users expected to utilize general aviation facilities during the design hour. General aviation space requirements were then based upon providing 150 square feet per design hour itinerant passenger. Design hour itinerant passengers are determined by multiplying design hour itinerant operations by the number of passengers on the aircraft (multiplier). An increasing passenger count (from 1.8 to 2.0) is used to account for the likely increase in the number of passengers utilizing general aviation services. **Table 3J** outlines the general aviation terminal facility space requirements for Nogales International Airport.

TABLE 3J
General Aviation Terminal Area Facilities
Nogales International Airport

	Existing	Short Term	Intermediate Term	Long Term
Design Hour Operations	5	6	7	10
Design Hour Itinerant Operations	2	3	3	5
Multiplier	1.8	1.8	1.9	2.0
Total Design Hour Itinerant Passengers	4	5	6	10
Terminal Building Public Space (s.f.)[1]	3,186	800	900	1,500
Terminal Building Lease Space (s.f.)[2]	1,000	County Business Decision		
Total Terminal Building Space (s.f.)	4,186	County Business Decision		

[1]Includes FBO and other general aviation user functions.
[2]Includes restaurant and leasable office space.
Source: Coffman Associates analysis

The terminal building at Nogales International Airport encompasses approximately 4,186 square feet of floor space. Of this total, 1,000 square feet are leasable space that currently includes the restaurant and U.S. Department of Homeland Security. A total of 3,186 square feet is currently used for general aviation functions, which include the FBO line services, flight planning, and the pilots' lounge.

Terminal building calculations based on forecast passenger activity indicates that the existing terminal building should be adequate to meet long term demands. The terminal building is the entrance to the community for most air passengers utilizing the Airport. It should be assumed that these passengers include decision-makers who may be considering investment in the community. Therefore, it is recommended that the airport sponsor be cognizant of the appearance of the Airport and the terminal building in particular.

SUPPORT REQUIREMENTS

Various facilities that do not logically fall within classifications of airside or landside facilities have also been identified. These other areas provide certain functions related to the overall operation of the airport.

AUTOMOBILE PARKING

Planning for adequate automobile parking is a necessary element for any airport. Parking needs can effectively be divided between transient airport users, locally based users, and airport business needs. Transient users include those employed at the airport and visitors, while locally based users primarily include those attending to their based aircraft. A planning standard of 1.9 times the design hour passenger count provides the minimum number of vehicle spaces needed for transient users. Locally based parking spaces are calculated as one-half the number of based aircraft.

A planning standard of 315 square feet per space is utilized to determine total vehicle parking area necessary, which includes area needed for circulation and handicap clearances. Parking requirements for the Airport are summarized in **Table 3K**.

TABLE 3K
GA Vehicle Parking Requirements
Nogales International Airport

	Existing	Short Term	Intermediate Term	Long Term
Design Hour Itinerant Passengers		5	6	10
VEHICLE PARKING SPACES				
GA Itinerant Spaces		10	11	19
GA Based Spaces		13	14	16
Total Parking Spaces	53	23	25	35
VEHICLE PARKING AREA				
GA Itinerant Parking Area (s.f.)		3,350	3,400	5,600
GA Based Parking Area (s.f.)		4,100	4,400	5,050
Total Parking Area (s.f.)	15,425	7,450	7,800	10,650

Source: Coffman Associates analysis

There appears to be enough designated vehicle parking through the long term planning period. Parking should be made available in close proximity to the terminal building and airport businesses. In an effort to limit the level of vehicle traffic on the aircraft movement areas, many general aviation airports are providing separate parking in support of facilities with multiple aircraft parking positions, such as T-hangars. Vehicle parking spaces will be considered in conjunction with additional facility needs in the alternatives chapter.

AIRPORT ACCESS ROADS

Airport Access Road serves as the main access point to the Airport from State Route 82. This paved, two-lane road provides access to the terminal building and the fuel farm and hangar facilities via secured access gates. The access gates ensure that unauthorized individuals cannot access the airfield system. This road is sufficient and should be maintained.

FUEL STORAGE

The Airport maintains two above ground fuel storage tanks east of the terminal building. The tanks consist of a 12,500 gallon tank for AvGas and a 12,500 gallon tank for Jet A. Tiffin Aviation maintains three fuel delivery trucks. Two of the trucks are for Jet A and have capacities of 2,200 gallons and 3,300 gallons. One of the trucks is for AvGas fuel and has a capacity of 700 gallons.

Additional fuel storage capacity should be planned when the airport is unable to maintain an adequate supply and reserve. While each airport (or FBO) determines their own desired reserve, a 14-day reserve is common for general aviation airports. When additional capacity is needed, it should be planned in 10,000- to 12,000-gallon increments. Common fuel tanker trucks have an 8,000-gallon capacity.

Table 3L presents a forecast of fuel demand through the planning period. Jet A fuel needs were forecast based on an average of 30 gallons purchased per itinerant operation. For AvGas aviation fuel, eight gallons per local operation was assumed.

TABLE 3L
Fuel Storage Requirements
Nogales International Airport

		Planning Horizon		
	Current Capacity	Short Term	Intermediate Term	Long Term
Jet A Requirements	12,500			
Annual Usage (gal.)		256,800	322,800	409,800
Daily Usage (gal.)		704	884	1,123
14-Day Storage (gal.)		9,850	12,381	15,718
Avgas Requirements	12,500			
Annual Usage (gal.)		19,200	26,400	43,200
Daily Usage (gal.)		53	72	118
14-Day Storage (gal.)		736	1,013	1,657

Assumptions:
Jet A — 30 gallons per itinerant operation.
Avgas — 8 gallons per general aviation local operation.

Source: FBO fuel sales; Coffman Associates analysis

By the estimates developed, the current capacity of AvGas is adequate through the long term planning period. The current capacity of Jet A fuel may be inadequate to maintain a two-week supply by the intermediate and long term horizons.

In addition to the potential need for greater capacity, the existing fuel storage tanks are in poor condition and the County is in the beginning stages of replacing them. In the alternatives chapter, an appropriate site for a new above ground fuel farm will be considered.

PERIMETER FENCING

The entire Airport boundary is equipped with barbed-wire and chain link fencing. Secured gates provide vehicular access to the apron, hangar facilities, and ASOS and fuel storage facilities. The secured gates are accessible only to Airport tenants with magnetic cards. Portions of the perimeter fencing extend into the ROFA. Where possible, perimeter fencing should be relocated outside of the ROFA. Where perimeter fencing cannot be relocated due to terrain constraints, the County should request a modification to standard be approved by the FAA to allow the fence to remain in its current location.

A summary of landside and support needs is presented on **Exhibit 3D**.

SECURITY RECOMMENDATIONS

In cooperation with representatives of the general aviation community, the Transportation Security Administration (TSA) published security guidelines for general aviation airports. These guidelines are contained in the publication entitled, *Security Guidelines for General Aviation Airports*, published in May 2004. Within this publication, the TSA recognized that general aviation is not a specific threat to national security. However, the TSA does believe that general aviation may be vulnerable to misuse by terrorists as security is enhanced in the commercial portions of aviation and at other transportation links.

To assist in defining which security methods are most appropriate for a general aviation airport, the TSA defined a series of airport characteristics that potentially affect an airport's security posture. These include:

1. Airport Location – An airport's proximity to areas with over 100,000 residents or sensitive sites that can affect its security posture. Greater security emphasis should be given to airports within 30 miles of mass population centers (areas with over 100,000 residents) or sensitive areas such as military installations, nuclear and chemical plants, centers of government, national monuments, and/or international ports.

2. Based Aircraft – A smaller number of based aircraft increases the likelihood that illegal activities will be identified more quickly. Airports with based aircraft weighing more than 12,500 pounds warrant greater security measures.

3. Runways – Airports with longer paved runways are able to serve larger aircraft. Shorter runways are less attractive as they cannot accommodate the larger aircraft which have more potential for damage.

4. Operations – The number and type of operations should be considered in the security assessment.

Table 3M summarizes the recommended airport characteristics and ranking criterion. The TSA suggests that an airport rank its security posture according to this scale to determine the types of security enhancements that may be appropriate. As shown in the table, the Nogales International Airport ranking on this scale is 21. Points are assessed for the Airport being located near the international border with Mexico. Points are also assessed for a based aircraft count of 24, having a runway greater than 5,001 feet in length, having a paved runway surface, having 14 CFR Part 135 charter operations, and for having flight training and rental aircraft activities at the airport.

TABLE 3M
General Aviation Airport Security Measurement Tool
Transportation Security Administration

	Assessment Scale	
Security Characteristic	**Public Use Airport**	**Nogales International Airport**
Location		
Within 20nm of mass population areas[1]	5	0
Within 30nm of a sensitive site[2]	4	4
Falls within outer perimeter of Class B airspace	3	0
Falls within boundaries of restricted airspace	3	0
Based Aircraft		
Greater than 101 based aircraft	3	0
26-100 based aircraft	2	0
11-25 based aircraft	1	1
10 or fewer based aircraft	0	0
Based aircraft over 12,500 pounds	3	0
Runways		
Runway length greater than 5,001 feet	5	5
Runways less than 5,000 feet and greater than 2,001 feet	4	0
Runway length less than 2,000 feet	2	0
Asphalt or concrete runway	1	1
Operations		
Over 50,000 annual operations	4	0
Part 135 operations (Air taxi and fractionals)	3	3
Part 137 operations (Agricultural aircraft)	3	0
Part 125 operations (20 or more passenger seats)	3	0
Flight training	3	3
Flight training in aircraft over 12,500 pounds	4	0
Rental aircraft	4	4
Maintenance, repair, and overhaul facilities conducting long-term storage of aircraft over 12,500 pounds	4	0
Totals	**64**	**21**

[1] An area with a population over 100,000

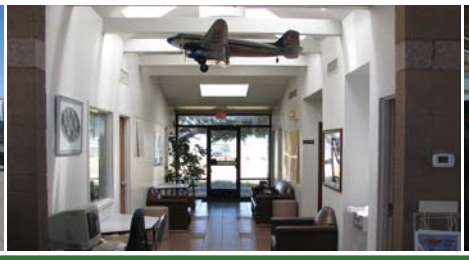
[2] Sensitive sites include military installations, nuclear and chemical plants, centers of government, national monuments, and/or international ports

Source: Security Guidelines for General Aviation Airports (TSA 2004)

	Base Year (2012)	Short Term	Intermediate Term	Long Term
Based Aircraft	**24**	**26**	**28**	**32**
Aircraft to be Hangared				
Single Engine	17	17	18	19
Multi-Engine	4	3	2	2
Turboprop	0	1	2	3
Jet	0	1	1	3
Helicopter	0	1	2	3
Total to be Hangared	**21**	**23**	**25**	**29**



Hangar Positions				
T-Hangars Positions	12	12	12	12
Box Hangar Positions	5	5	5	5
Conventional Hangar Positions	7	9	11	15
Hangar Area				
T-Hangars (s.f.)	13,300	13,300	13,300	13,300
Executive Box Hangar (s.f.)	7,600	7,600	7,600	7,600
Conventional Hangar (s.f.)	13,320	19,800	23,800	30,300
Maintenance Area (s.f.)	4,536	5,000	5,000	6,000
Aircraft Parking				
Local Apron Positions	12	3	3	3
Local Apron Area (s.y.)	2,083	1,800	1,800	1,800
Transient Apron Positions	48	4	5	7
Piston Transient Positions	14	2	2	3
Turbine Transient Positions	34	2	3	4
Transient Apron Area (s.y.)	19,977	4,800	6,400	8,900
Total Apron Area (s.y)	22,060	6,600	8,200	10,700


Auto Parking				
Total Spaces	53	23	25	35
Total Area (s.f.)	15,425	7,450	7,800	10,650
Terminal Building				
Area (s.f.)	3,186	800	900	1,500

Exhibit 3D
LANDSIDE REQUIREMENTS

As shown in **Table 3N**, a rating of 21 points places Nogales International Airport in the third tier ranking of security measures by the TSA. This rating clearly illustrates the importance of meeting security needs at Nogales International Airport as the activity at the Airport grows. The Airport is not projected to transition to the second or first tier during the planning period. Based upon the results of the security assessment, the TSA recommends nine potential security enhancements for Nogales International Airport. These enhancements are discussed in detail as follows:

TABLE 3N
Recommended Security Enhancements

	Points Determined Through Airport Security Characteristics Assessment			
Security Enhancements	**Tier 1 > 45**	**Tier 2 25-44**	**Tier 3 15-24**	**Tier 4 0-14**
Fencing	■			
Hangars	■			
Closed-Circuit Television (CCTV)	■			
Intrusion Detection System	■			
Access Controls	■	■		
Lighting System	■	■		
Personal ID/Vehicle ID System	■	■		
Challenge Procedures	■	■		
Law Enforcement Support	■	■	■	
Security Committee	■	■	■	
Transient Pilot Sign-in/Sign-Out Procedures	■	■	■	
Signs	■	■	■	
Documented Security Procedures	■	■	■	■
Positive/Passenger/Cargo/Baggage ID	■	■	■	■
Aircraft Security	■	■	■	■
Community Watch Program	■	■	■	■
Contact List	■	■	■	■

Source: Security Guidelines for General Aviation Airports

Law Enforcement Support: This involves establishing and maintaining a liaison with appropriate law enforcement including local, state, and federal agencies. These organizations can better serve the Airport when they are familiar with airport operating procedures, facilities, and normal activities. Procedures may be developed to have local law enforcement personnel regularly or randomly patrol ramps and aircraft hangar areas, with increased patrols during periods of heightened security.

Security Committee: This committee should be composed of Airport tenants and users drawn from all segments of the Airport community. The main goal of this group is to involve Airport stakeholders in developing effective and reasonable security measures and disseminating timely security information.

Transient Pilot Sign-in/Sign-Out Procedures: This involves establishing procedures to identify non-based pilots and aircraft using their facilities, and implementing sign-in/sign-out procedures for

all transient operators and associating them with their parked aircraft. Having assigned spots for transient parking areas can help to easily identify transient aircraft on an apron.

Signs: The use of signs provides a deterrent by warning of facility boundaries as well as notifying of the consequences for violation.

Documented Security Procedures: This refers to having a written security plan. This plan would include documenting the security initiatives already in place at Nogales International Airport, as well as any new enhancements. This document should consist of Airport and local law enforcement contact information and include utilization of a program to increase airport user awareness of security precautions, such as an airport watch program.

Positive/Passenger/Cargo/Baggage ID: A key point to remember regarding general aviation passengers is that the persons boarding these flights are generally better known to airport personnel and aircraft operators than the typical passenger on a commercial airliner. Recreational general aviation passengers are typically friends, family, or acquaintances of the pilot in command. Charter/sightseeing passengers typically will meet with the pilot or other flight department personnel well in advance of any flights. Suspicious activities, such as use of cash for flights or probing or inappropriate questions, are more likely to be quickly noted and authorities could be alerted. For corporate operations, typically all parties onboard the aircraft are known to the pilots. Airport operators should develop methods by which individuals visiting the airport can be escorted into and out of aircraft movement and parking areas.

Aircraft Security: The main goal of this security enhancement is to prevent the intentional misuse of general aviation aircraft for criminal purposes. Proper securing of aircraft is the most basic method of enhancing general aviation airport security. Pilots should employ multiple methods of securing their aircraft to make it as difficult as possible for an unauthorized person to gain access to it. Some basic methods of securing a general aviation aircraft include: ensuring that door locks are consistently used to prevent unauthorized access or tampering with the aircraft; using keyed ignitions where appropriate; storing the aircraft in a hangar, if available; and locking hangar doors, using an auxiliary lock to further protect aircraft from unauthorized use (i.e., propeller, throttle, and/or tie-down locks); and ensuring that aircraft ignition keys are not stored inside the aircraft.

Community Watch Program: The vigilance of airport users is one of the most prevalent methods of enhancing security at general aviation airports. Typically, the user population is familiar with those individuals who have a valid purpose for being on the airport property. Consequently, new faces are quickly noticed. A watch program should include elements similar to those listed below. These recommendations are not all-inclusive. Additional measures that are specific to each airport should be added as appropriate, including:

- Coordinate the program with all appropriate stakeholders, including Airport officials, pilots, businesses, and/or other Airport users.

- Hold periodic meetings with the Airport community.

- Develop and circulate reporting procedures to all who have a regular presence on the Airport.

- Encourage proactive participation in aircraft and facility security and heightened awareness measures. This should include encouraging airport and line staff to "query" unknowns on ramps, near aircraft, etc.

- Post signs promoting the program, warning that the Airport is watched. Include appropriate emergency phone numbers on the sign.

- Install a bulletin board for posting security information and meeting notices.

- Provide training to all involved for recognizing suspicious activity and appropriate response tactics.

Contact List: This involves the development of a comprehensive list of responsible personnel/agencies to be contacted in the event of an emergency procedure. The list should be distributed to all appropriate individuals. Additionally, in the event of a security incident, it is essential that first responders and Airport management have the capability to communicate. Where possible, coordinate radio communication and establish common frequencies and procedures to establish a radio communications network with local law enforcement.

Other security measures may be considered by the Airport as the local need demands. The additional measures include full perimeter fencing, hangar availability, closed-circuit television, intrusion detection systems, access controls, lighting systems, personal/vehicle ID systems, and challenge procedures.

SUMMARY

The intent of this chapter has been to outline the facilities required to meet potential aviation demand projected for Nogales International Airport for the next 20 years. In an effort to provide a more flexible master plan, the yearly forecasts from Chapter Two have been converted to planning horizon levels. The short term roughly corresponds to a five-year time frame, the intermediate term is approximately 10 years, and the long term is 20 years. By utilizing planning horizons, Airport management can focus on demand indicators for initiating projects and grant requests rather than on specific dates in the future.

Runway 3-21 has been planned and designed to meet FAA design standards associated with RDC C-II-NPI-1. This category includes most small- and medium-size business jets, such as the Cessna Citation X, Cessna Citation Sovereign, and Bombardier Challenger.

As a general aviation airport that experiences frequent activity by business jets, the FAA recommends a runway length of 7,500 feet to accommodate the needs of 75 percent of the business jet fleet at 60 percent useful load. At 7,200 feet in length, Runway 3-21 does not currently meet this recommendation. The alternatives chapter will explore options for extending the runway to 7,500 feet.

On the landside, planning calculations show a need for additional conventional hangars as more sophisticated aircraft (i.e., business jets and turboprops) base at the Airport. Hangar space will largely depend on individual desires and may not precisely follow the forecast. If demand indicates a desire for additional T-hangars, then these should be the first priority. The availability of additional

hangar space is a significant factor as to whether the airport will experience and can accommodate the forecast growth in based aircraft.

The next chapter, Alternatives, will examine potential improvements to the airfield system and the landside. Most of the alternatives discussion will focus on those capital improvements that would be eligible for federal grant funds. Other projects of local concern will also be presented. On the landside, several facility layouts that meet the forecast demands over the next 20 years will be presented. Ultimately, an overall airport layout that presents a vision beyond the 20-year scope of the Master Plan will be developed.

Chapter Four

ALTERNATIVES

Chapter Four
ALTERNATIVES

In the previous chapter, airside and landside facilities required to satisfy the demand through the long range planning period were identified. The next step in the planning process is to evaluate reasonable ways these facilities can be provided. There can be numerous combinations of design alternatives, but the alternatives presented here are those with the perceived greatest potential for implementation.

Any development proposed for a master plan is evolved from an analysis of projected needs for a set period of time. Though the needs were determined by utilizing industry accepted statistical methodologies, unforeseen future events could impact the timing of the needs identified. The master planning process attempts to develop a viable concept for meeting the needs caused by projected demands for the next 20 years. However, no plan of action should be developed which may be inconsistent with the future goals and objectives of Santa Cruz County, which has a vested interest in the development and operation of Nogales International Airport (Airport).

The development alternatives for the Airport can be categorized into two functional areas: the **airside** (runways, navigational aids, taxiways, etc.) and **landside** (hangars, apron, and terminal area). Within each of these areas, specific capabilities and facilities are required or desired. In addition, the utilization of Airport property to provide revenue support for the County and to benefit the economic development and well-being of the region must be considered.

Each functional area interrelates and affects the development potential of the others. Therefore, all areas are examined individually and then coordinated as a

whole to ensure the final plan is functional, efficient, and cost-effective. The total impact of all these factors on the Airport must be evaluated to determine if the investment in Nogales International Airport will meet the needs of the County, both during and beyond the 20-year planning period.

The alternatives considered are compared to determine which of the alternatives will best fulfill the local aviation needs. With this information, as well as input from various Airport stakeholders, a final Airport concept can evolve into a realistic development plan.

NON-DEVELOPMENT ALTERNATIVES

Prior to the presentation of development alternatives for Nogales International Airport, there are several non-development options that should be considered. Non-development alternatives include a "no-build" or "do-nothing" alternative, development of a new replacement airport at a new location, or closure of the existing Airport and the transfer of services to another existing airport.

Nogales International Airport is the only public-use airport in Santa Cruz County. The nearest public use airport is the Sierra Vista Municipal Airport-Libby Army Airfield (Sierra Vista), which is located 28 nautical miles east of Nogales.

Sierra Vista is classified as a general aviation airport in the *National Plan of Integrated Airport Systems* (NPIAS). Sierra Vista is also classified as a general aviation-public-use airport in the *2008 Arizona State Airports System Plan* (SASP). Sierra Vista supports approximately 133,410 annual operations, the majority of which are military operations associated with Fort Huachuca.

Fort Huachuca is headquarters to the U.S. Army Intelligence Center and School and a major unmanned aerial system (UAS) test center. In addition to UAS operations, Sierra Vista serves other military aircraft such as small fighter jets (F-16) up to large wide-body refueling aircraft (KC-135).

Nogales International Airport and Sierra Vista have benefited from various development grants over the years. Development grants come with certain grant assurances that the airport sponsor must meet to be in compliance with the award of the grant. One of the grant assurances is for the sponsor to maintain the improvement for its useful life, typically 20 years. Acceptance of development grants also obligates the airport sponsor to maintain the airport as an airport.

The following will present a discussion of the three primary non-development alternatives and the impact of pursuing each.

NO-BUILD/DO-NOTHING ALTERNATIVE

There is significant public and private investment at the Nogales International Airport. Pursuit of a non-development alternative would slowly devalue these investments, lead to infrastructure deterioration, and potentially the loss of significant levels of federal funding for Airport improvements. Ultimately, the safety of aircraft, pilots, and persons on the ground could be jeopardized. Therefore, the no-build/do-nothing alternatives are not considered further.

RELOCATE AIRPORT ALTERNATIVE

This option considers constructing a new airport to replace the existing Nogales International Airport. Typically, this option may be considered if the existing airport has been encroached upon by surrounding incompatible land uses to such a degree that safety has been compromised. This is not the situation for Nogales International Airport. Constructing a replacement airport will not be considered further.

TRANSFER SERVICE TO ANOTHER AIRPORT ALTERNATIVE

Under this scenario, Nogales International Airport would be closed and all activity would be transferred to Sierra Vista. Without consideration of the consequences, obligations, or costs of closure, Sierra Vista could theoretically absorb a transfer of activity and facilities from Nogales International Airport. However, due to the distance between the two airports (28 nautical miles), the prospect that Sierra Vista would be capable of serving local tenants and businesses is not reasonable. Furthermore, closing Nogales International Airport would eliminate the County's only public-use airport and a vital economic engine.

Due to its location on the international border with Mexico, Nogales International Airport serves the needs of businesses associated with the Maquiladora program that utilize the Airport for corporate aviation and air cargo activities. The Airport is a port-of-entry for the U.S. The U.S. Department of Homeland Security has offices at the Airport for its Customs and Border Protection agents to conduct Federal Inspection Services (FIS). It has a fixed base operator (FBO), as well as other aviation and non-aviation businesses. Eliminating these services would be detrimental to the County economy and infrastructure. The County would lose the investment they have made through the years to maintain and improve the Airport. In short, transferring service to another airport is not feasible and will not be considered further.

SUMMARY

Nogales International Airport plays a critical role in the economic development of the County and an important role in the continuity of the national aviation network. Pursuing a no-build/do-nothing alternative will directly lead to a deterioration of Airport facilities including the runway and taxiways. Ultimately, safety could be compromised.

Construction of a replacement airport is not necessary as the Airport is able to serve its defined role in the aviation system currently (that of general aviation activity). Closure of Nogales International Airport and transferring activity to another airport is not considered feasible primarily due to the detrimental impacts to the County, legal obligations, and the substantial costs associated with closure. Federal grant assurances necessitate that the Airport remain in operation until grant assurances expire.

Therefore, it is recommended that the County continue to maintain the Airport to serve aviation and economic development. No further consideration will be given to the non-development alternatives.

REVIEW OF THE PREVIOUS AIRPORT PLAN

The last master plan update was completed in April 2002. **Exhibit 4A** presents the master plan concept from 2002. The highlights of that concept include:

- Widen the runway to 100 feet
- Provide proper grading off Runway 3 to meet FAA design standards
- Upgrade taxiway reflectors to medium intensity taxiway lights (MITL)
- Concentrate general aviation (GA) development on the west side
- Concentrate cargo facilities on the northwest side with expanded cargo facilities on the east side with U.S. Customs facilities
- Relocate the Runway 21 displaced threshold from 1,912 feet to 900 feet

Since the completion of the previous Master Plan, the County has completed each of these projects with the exception of the construction of cargo facilities on the east side of the runway. The previous Master Plan has successfully provided the County with development guidance for more than a decade. In this time, there have been many changes within the aviation industry and within the regulatory environment. Of particular note is the 2012 update of the primary airport planning guidance provided by the FAA. Application of the new guidance will have a direct impact on the planning potential for the Airport.

The analysis to follow in this Alternatives chapter will revisit the recommendations presented in the previous master plan. Some elements may be carried over to this Master Plan Update and others may be removed from future consideration.

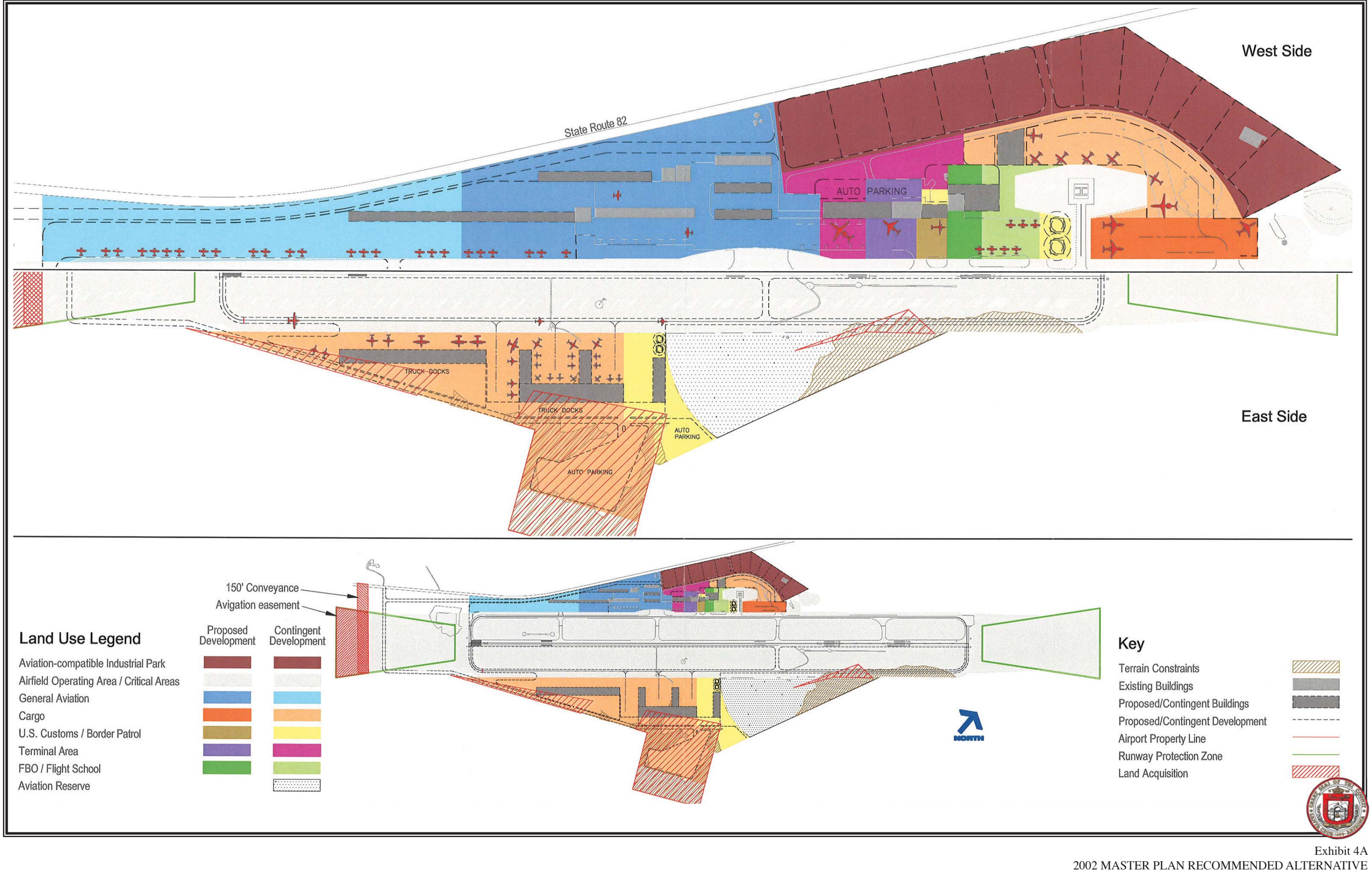
AIRSIDE PLANNING CONSIDERATIONS

Generally, airside issues relate to those airport elements that contribute to the safe and efficient transition of aircraft and passengers from air transportation to the landside facilities at the airport. This includes the established design standard for the airport, the instrument approach capability, the capacity of the airfield, the length and strength of the runways, and the layout of the taxiways. Each of these elements was introduced in the previous chapters. This chapter will examine airside issues specific to Nogales International Airport. These will then be applied to several airside development alternatives. **Exhibit 4B** presents a summary of the primary airside and landside planning issues to be considered in this alternatives analysis.

As discussed in the Facility Requirements chapter of this Master Plan, a Runway Design Code (RDC) identifies the appropriate design standards to apply to the runway and taxiway system. The RDC for Runway 3-21 is planned to be C-II-NPI-1. The applicable design standards were previously presented on Table 3A.

RUNWAY LENGTH

Runway 3-21 is 7,200 feet long and 100 feet wide. Analysis in Chapter Three - Facility Requirements indicated that a minimum recommended length would be 7,500 feet. At this length, the Airport could fully accommodate 75 percent of business jets at 60 percent useful load. To accommodate 100 percent of business jets at 60 percent useful load, a runway length of 9,800 feet is recommended.



Land Use Legend

	Proposed Development	Contingent Development
Aviation-compatible Industrial Park		
Airfield Operating Area / Critical Areas		
General Aviation		
Cargo		
U.S. Customs / Border Patrol		
Terminal Area		
FBO / Flight School		
Aviation Reserve		

Key

- Terrain Constraints
- Existing Buildings
- Proposed/Contingent Buildings
- Proposed/Contingent Development
- Airport Property Line
- Runway Protection Zone
- Land Acquisition

Exhibit 4A
2002 MASTER PLAN RECOMMENDED ALTERNATIVE

AIRFIELD CONSIDERATIONS

- Meet Runway Design Code (RDC) C-II NPI-I FAA design standards.
- Consider Runway 3-21 extension to at least 7,500 feet and up to 9,800 feet.
- Protection of runway approaches.
- Maintain Taxiway Design Group (TDG) 3 FAA design standards.
- Correction of taxiway layout deficiencies.

LANDSIDE CONSIDERATIONS

- Locations for aircraft storage hangar development and apron expansion.
- Consider terminal facilities expansion.
- Locations for expanded cargo handling facilities.
- Vehicle parking lot expansion.
- Fuel storage facilities, including consideration of a self-service fuel island.
- Consider an aircraft wash rack.
- Locations for revenue support parcels.

INSTRUMENT APPROACHES

Instrument approach procedures, as previously described in the Inventory chapter, are critical to extending the usefulness of an airport in times of poor weather. Instrument approaches are particularly important for airports serving business jet operations.

At present, Nogales International Airport has three published non-precision, circling only, instrument approaches utilizing very high frequency omnidirectional range-distance measuring equipment (VOR-DME), non-directional beacon (NDB), or global positioning system (GPS) equipment. Circling approaches provide lateral guidance to an airfield, not to a runway end. High terrain in the vicinity of the runway has restricted the Airport from implementing a straight-in (lateral guidance to a runway end) instrument approach procedure. Therefore, for the sizing of the runway protection zones (RPZs), it is assumed that instrument approach minimums will not be lower than one mile.

TAXIWAYS

The taxiway system at Nogales International Airport generally provides for the efficient movement of aircraft to and from the runway. FAA AC 150/5300-13A, *Airport Design*, instituted new design standards for taxiways, some of which impact planning for Nogales International Airport. Presently, the taxiway system meets taxiway design group (TDG) 3 standards, which requires 50-foot wide taxiways.

The following are taxiway geometry concerns at Nogales International Airport as previously identified in Chapter Three – Facility Requirements:

1. Taxiway E provides for direct access from the terminal apron to the runway.
2. The Taxiway E stub from Taxiway A to the terminal apron is a wide pavement area.
3. Taxiway D provides for direct access from the cargo apron to the runway.

Each airfield alternative will propose corrections for these taxiway geometry concerns.

AIRFIELD ALTERNATIVES

Each of the following airfield alternatives are depicted on **Exhibit 4C**.

Alternative 1: Maintain Current Runway Length

There are several options to consider with regard to the length of Runway 3-21. The first is to maintain the current length. At 7,200 feet in length, the runway is 300 feet short of the FAA recommended length. However, this has been the length of the runway since 1996. On those occasions when operators may desire additional runway length, they have the option to take on less weight by reducing fuel load or passenger and baggage weight. Maintaining the current runway length is a viable option for the County since weight restrictions are only necessary for the largest aircraft operating at the Airport on the hottest days during the summer months.

With the implementation of RDC C-II-NPI-1 design standards, a portion of the Runway 3 RPZ would extend beyond Airport property. These approximately 8.86 acres of unprotected RPZ should be protected either via fee-simple acquisition or avigation easement.

This alternative considers maintaining current taxiway widths and thus meeting TDG 3 standards. Other taxiway improvements include the removal of taxiway pavement to eliminate direct-access from aprons. Alternative 1 proposes removing pavement at Taxiway E and relocating Taxiway D, which would cause pilots to make additional turns before entering the runway.

Alternative 2: 300-Foot Runway Extension

When considering a potential extension of Runway 3-21, there are several options available. Additional length could be added to one end or the other, or the planned extension could be split between the two ends. Due to rising terrain from the southwest to the northeast and terrain obstructions already causing the displacement of the Runway 21 threshold, a runway extension to the southwest will be considered.

The first extension alternative considered for Runway 3-21 is to add 300 feet for a total length of 7,500 feet. An extension of the runway would require the acquisition of approximately 16.36 acres of property (or avigation easement) to protect the RPZ.

Taxiway improvements in this alternative consider relocating Taxiway E to eliminate direct access from the terminal apron to the runway. The Taxiway D stub from the cargo apron to Taxiway A is proposed to be relocated to the north, again to cause pilots to make additional turns before entering the runway.

Alternative 3: 2,600-Foot Runway Extension

The second extension option is to extend Runway 3-21 to the southwest by 2,600 feet for a total length of 9,800 feet. Again, an extension to the northeast is not ideal due to rising terrain that would obstruct approaches to the Runway 21 threshold. While there is land available southwest of the Airport to accommodate the pavement extension and associated runway safety area (RSA), object free area (OFA), and the RPZ, this option would require considerable land acquisition and site preparation of approximately 85.73 acres to meet FAA design standards and to protect the RPZ.

Runway 3 is currently equipped with a precision approach path indicator (PAPI-4) visual approach aid and medium intensity runway lighting (MIRL). Under both runway extension options, these systems would need to be relocated and extended along with the new runway pavement.

The benefit to planning for an extension of the runway are that the Airport could fully and safely accommodate larger business jet and charter/cargo aircraft during the hotter periods of the summer months.

Alternative 3 also considers relocating Taxiway E to the north and the Taxiway D stub to the cargo apron is proposed to be relocated to the south to eliminate direct access to the runway.

LANDSIDE PLANNING CONSIDERATIONS

Generally, landside issues relate to those airport facilities necessary, or desired, for the safe and efficient parking and storage of aircraft, movement of passengers and

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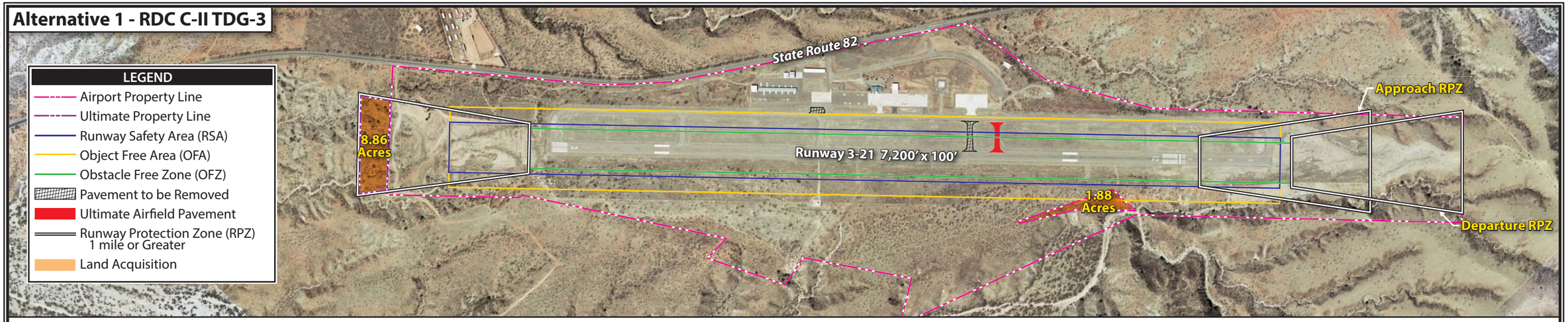
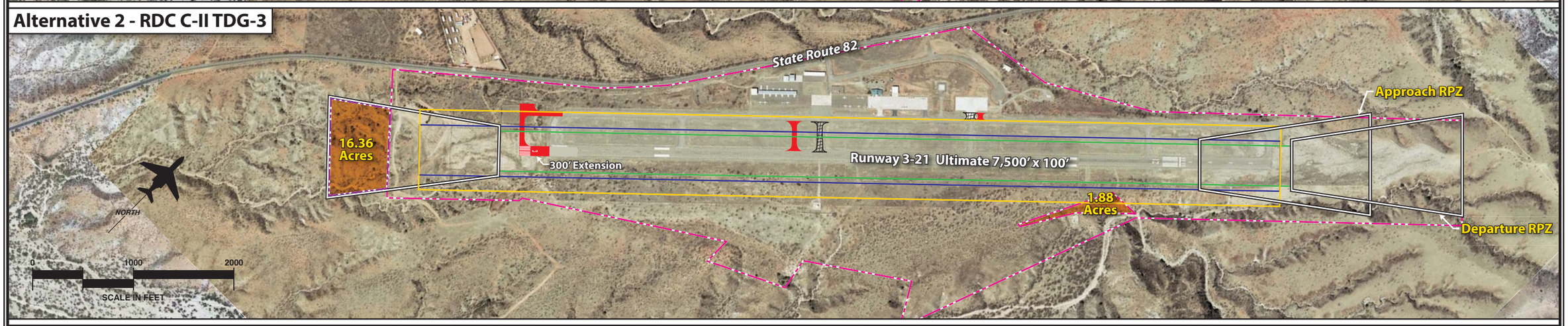
Alternative 1 - RDC C-II TDG-3



Alternative 2 - RDC C-II TDG-3



Alternative 3 - RDC C-II TDG-3

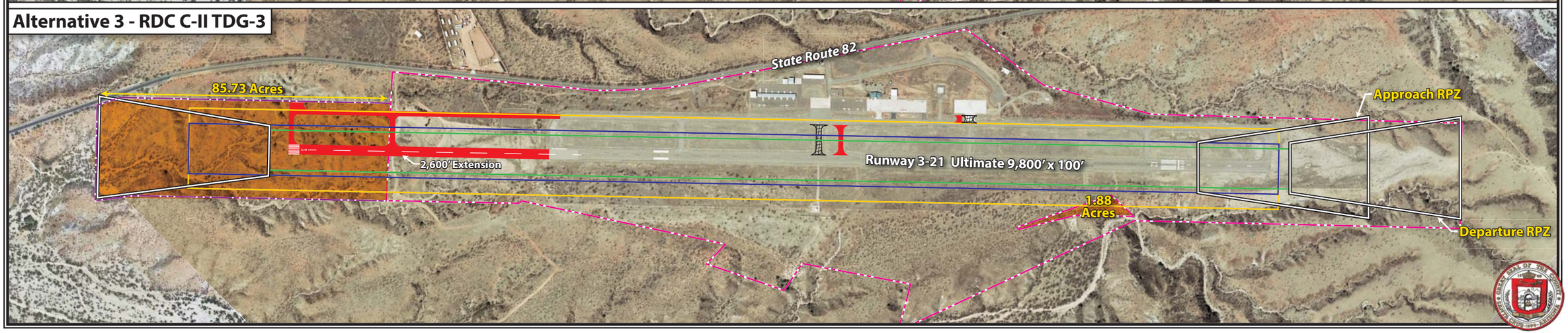


Exhibit 4C
AIRFIELD ALTERNATIVES

pilots to and from aircraft, airport land use, and overall revenue support functions. In addition, elements such as fueling capability, availability of services, and emergency response are also considered in the landside functions.

Landside planning issues, summarized on **Exhibit 4B**, will focus on facility locating strategies following a strategy of separating activity levels. To maximize Airport efficiency, it is important to locate facilities intended to serve similar functions close together. For example, it makes sense to plan hangar structures in a designated area rather than haphazardly building them as needed on the next available spot at the Airport. It is also important to plan for facilities that airport users desire and to group those facilities together, whether they are T-hangars, box hangars, or larger conventional hangars.

The orderly development of the Airport terminal area (those areas parallel to the runway and along the flight line) can be the most critical, and probably the most difficult development to control on the airport. A development approach of "taking the path of least resistance" can have a significant effect on the long term viability of an airport. Allowing development without regard to a functional plan can result in a haphazard array of buildings and small ramp areas, which will eventually preclude the most efficient use of valuable space along the flight line.

Activity in the terminal area should be divided into three categories at an airport. The high-activity area should be planned and developed as the area providing aviation services on the airport. An example of a high-activity area is the terminal aircraft parking apron, which provides outside storage and circulation of aircraft. Large conventional hangars housing FBOs, other airport businesses, or those used for bulk aircraft storage would be considered high-activity uses. A conventional hangar structure in the high-activity area should be a minimum of 6,400 square feet (80 feet by 80 feet). If space is available, it is more common to plan these hangars for up to 200 feet by 200 feet. The best location for high-activity areas is along the flight line near midfield for ease of access to all areas of the airfield.

The medium-activity category defines the next level of airport use and primarily includes corporate aircraft operators or charter/cargo operators that may desire their own box or conventional hangar storage or have a designated staging apron on the airport. A hangar in the medium-activity use area should be at least 50 feet by 50 feet, or a minimum of 2,500 square feet. The best location for medium-activity use is off the immediate flight line, but still with ready access to the runway/taxiway system. Typically, these areas will be adjacent to the high-activity areas. Parking and utilities, such as water and sewer, should also be provided in this area.

The low-activity use category defines the area for storage of smaller single and twin-engine aircraft. Low-activity users are personal or small business aircraft owners who prefer individual space in T-hangars or small box hangars. Low-activity areas should be located in less conspicuous areas or to the ends of the flight line. This use category will require electricity, but may not require water or sewer utilities.

In addition to the functional compatibility of the terminal area, the proposed development concept should provide a first-class appearance for Nogales International Airport. Consideration to aesthetics should be given high priority in all public

areas, as many times the airport can serve as the first impression a visitor may have of the community.

Generally, the existing development at the Airport has followed the strategy of separating activity levels. The terminal apron serves the terminal building and the FBO's larger conventional hangar. Ideally, terminal area facilities at general aviation airports should follow a linear configuration parallel to the primary runway. The linear configuration allows for maximizing available space, while providing ease of access to terminal facilities from the airfield. At Nogales International Airport, the hangars are situated parallel to the runway, thus facilitating maximum developable space.

The cargo staging apron is along the flight line to the northeast of the terminal area. A helipad separates the terminal apron from the cargo apron. As air charter/cargo operations increase, consideration will need to be given to expanded cargo handling facilities.

Each landside alternative will address development issues, such as the separation of activity levels and efficiency of layout. Each of the landside alternatives will plan for adequate facilities to meet the forecast needs as defined in the previous chapter of this plan.

VEHICULAR ACCESS AND PARKING

A planning consideration for any airport master plan is the segregation of vehicles and aircraft operational areas. This is both a safety and security consideration for the Airport. Aircraft safety is reduced and accident potential increased when vehicles and aircraft share the same pavement surfaces. Vehicles contribute to the accumulation of debris on aircraft operational surfaces, which increases the potential for foreign object debris (FOD) damage, especially for turbine-powered aircraft. The potential for runway incursions is increased, as vehicles may inadvertently access active runway or taxiway areas if they become disoriented once on the aircraft operational area (AOA). Airfield security may be compromised as there is loss of control over the vehicles as they enter the AOA. The greatest concern is for public vehicles, such as delivery vehicles and visitors, which may not fully understand the operational characteristics of aircraft and the markings in place to control vehicle access. The best solution is to provide dedicated vehicle access roads to each landside facility that is separated from the aircraft operational areas with security fencing.

The segregation of vehicle and aircraft operational areas is supported by FAA guidance established in June 2002 and amended in March 2008. 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."

At Nogales International Airport, access to the terminal area is relatively secure as there is perimeter fencing and parking lots are accessible from the landside. While it is preferable to completely separate vehicles from the AOA, including taxilanes, this is not always feasible, especially at general aviation airports. It is common for airport tenants to access their hangar by traversing the AOA. Therefore, a balance must be achieved that permits airport tenants to access their hangars,

while reducing the potential for the public to inadvertently access the AOA.

The landside alternatives for Nogales International Airport have been developed to consider new access roads and parking lots for potential hangar and terminal area developments.

TERMINAL BUILDING

The Airport terminal building was constructed in 1994 and is still in good condition. The terminal building houses a range of activities, including the FBO's offices and a restaurant. Terminal buildings serve not only the needs of pilots, but also as an important entrance to the community. They are the first impression of a community for visitors, who may be making economic contributions to the community.

At a minimum, the terminal building should be maintained and improved in order to meet the needs of general aviation users. The Facility Requirements analysis concluded the existing terminal facility would adequately serve the Airport through the planning period of this Master Plan; however, for future planning purposes, the alternatives will consider potential expansion areas for terminal facilities.

FUEL STORAGE FACILITIES

The existing fuel storage facilities on the Airport are in poor condition and are in need of replacement. Furthermore, the Facility Requirements analysis concluded that additional Jet A storage capacity will be needed over the course of the planning period. The landside alternatives consider new above-ground fuel storage facilities as well as the possibility of a self-service fuel island.

LANDSIDE LAYOUT ALTERNATIVES

As presented in Chapter Three – Facility Requirements, additional aircraft hangar storage area is recommended to accommodate forecast growth in based aircraft. An additional 16,980 square feet of hangar space is recommended. Based on the analysis of the future based aircraft fleet mix, most of this identified need should be in the form of conventional hangars.

It should be noted that individual preference should be the final arbiter as to what types of hangars are desired. For example, if the Airport has a 10-person wait list for a T-hangar space, then it is a good time to plan for more T-hangars. Likewise, if an individual desires to construct a box hangar, then that becomes the priority. The overall hangar space estimates can and should be adjusted by the County to reflect actual demand at the Airport.

The number of potential landside alternatives can be infinite. The following three alternatives are those that best meet design standards while maximizing the efficiency of aircraft storage and movement. The landside element of the recommended Master Plan concept, to be presented in the next chapter, may be one of these alternatives or, more likely, is a combination of elements from each of them. Input from the planning advisory committee (PAC) is integral to determining the landside vision for the Airport.

LANDSIDE ALTERNATIVE 1

Landside Alternative 1, depicted on **Exhibit 4D**, closely maintains the 2002 Master Plan Recommended Alternative. In this alternative, the high-, medium-, and low-activity areas would be expanded in their existing locations. Planning development as an extension of existing facilities will reduce costs and limit potential environmental impacts. Terminal and FBO facilities are proposed to be expanded along the existing terminal apron including the addition of two helicopter parking spots adjacent to the helipad.

Cargo facilities would be expanded northeast of the helipad. Should a significant increase of air charter/cargo activities take place, land on the east side of the runway is designated for expanded cargo handling facilities. The development of the east side of the runway would require the construction of a new access roadway around the southern end of the Airport as well as the construction of a parallel taxiway to allow for airfield access. In this scenario, cargo activities would be present on both sides of the runway, which could present complications with aircraft and support vehicles needing to cross the active runway to access both areas.

Hangar development proposed in this alternative is largely located southwest of the existing general aviation hangars. These development areas would be capable of providing up to approximately 85,400 square feet of new aircraft storage space.

Parcels west of the access road are designated as an aviation-compatible industrial park. These parcels would have limited direct taxiway access to the airfield due to the location of the airport access road, but could be developed by aviation-related business. Sizes of these parcels range from 0.8 to 1.0 acres.

LANDSIDE ALTERNATIVE 2

Landside Alternative 2 considers meeting all future landside development needs on the west side of the runway. This would be a significant cost and environmental savings as it would not require the construction of a new access road, new taxiways and utilities to the east side.

Under this alternative, depicted on **Exhibit 4E**, the terminal apron would be expanded to the north along with an expanded terminal facility and parking lot. This northerly expansion of the apron would allow for taxilane access to parcels fronting State Route 82. Adjacent the terminal building is a proposed self-service fuel island. This self-service facility would allow pilots to conduct their own fueling and would make fuel available during periods in which the FBO is closed.

Cargo facilities in this alternative would be located along the northwest side with taxilane access provided by the expansion of the cargo ramp. Additional handling facilities could be developed in the parcels west of the access road. General aviation facilities to the southwest include additional hangar development parcels, providing up to approximately 141,625 square feet of new hangar facilities as well as a proposed aircraft wash rack. A wash rack provides a suitable area for washing an aircraft and for the proper disposal of aircraft cleaning fluids.

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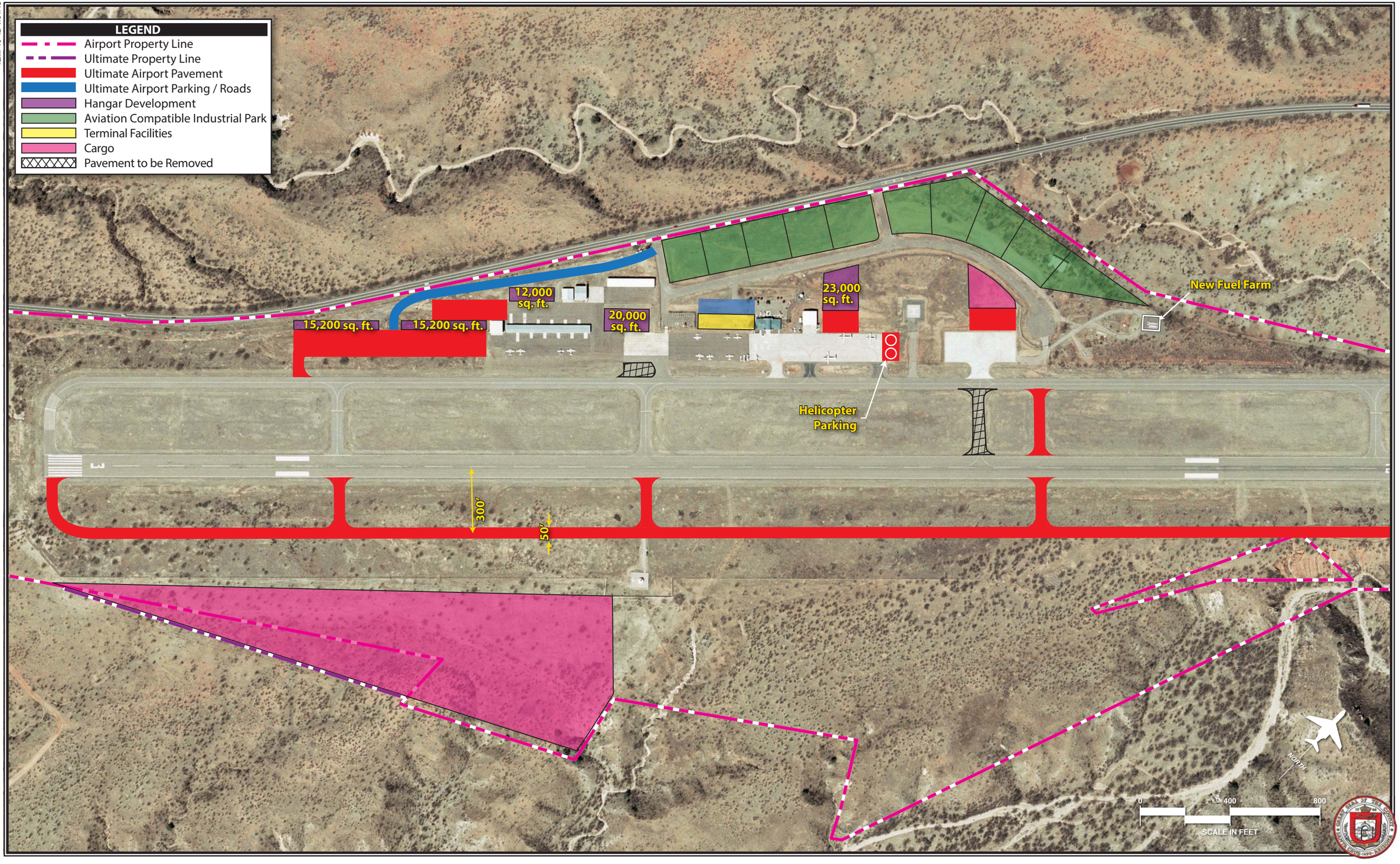

Exhibit 4D
LANDSIDE ALTERNATIVE 1

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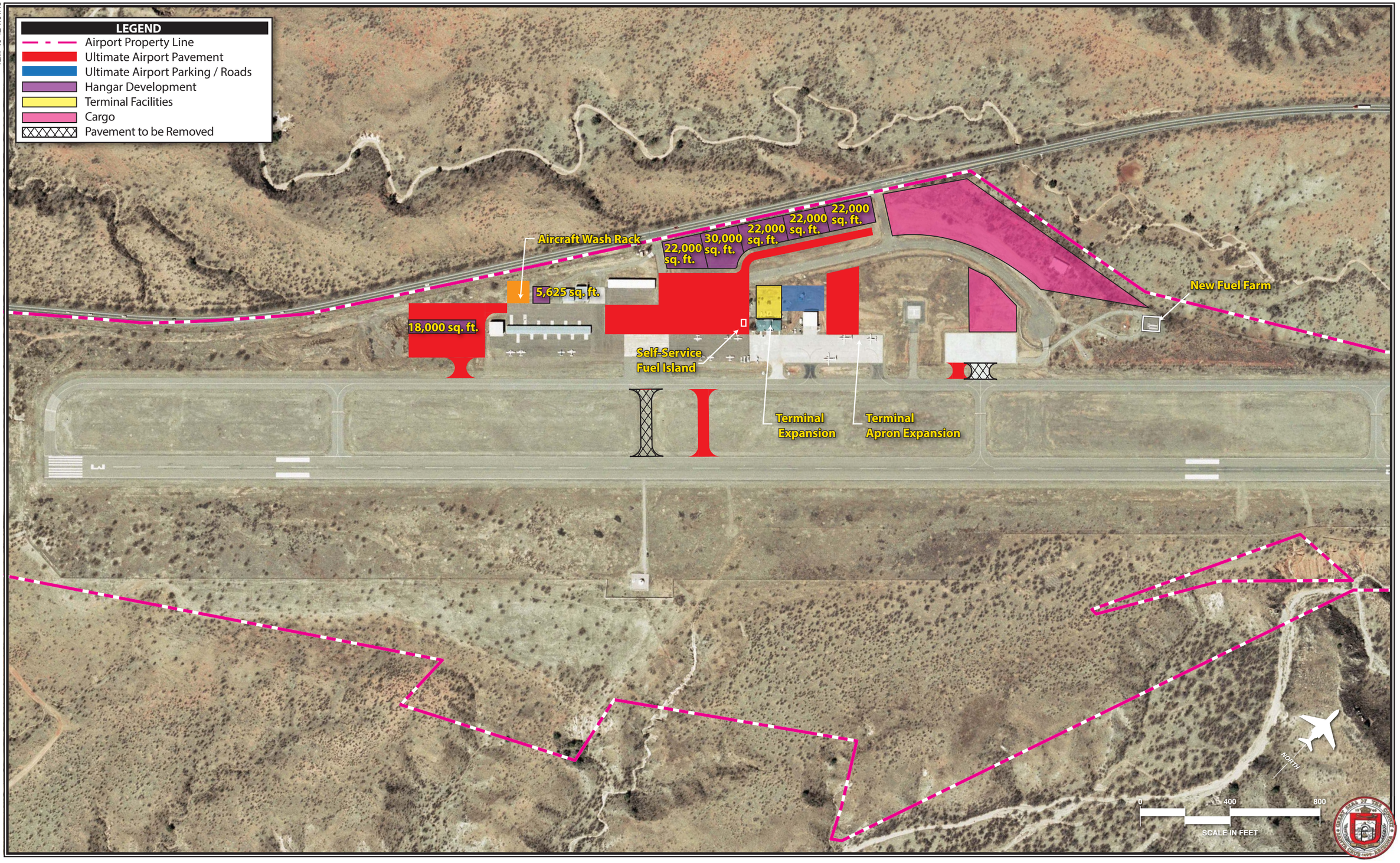

Exhibit 4E
LANDSIDE ALTERNATIVE 2

LANDSIDE ALTERNATIVE 3

The focus of Landside Alternative 3, depicted on **Exhibit 4F**, is the relocation of all cargo handling facilities to the east side of the runway. Should air charter/cargo activities increase such that the existing cargo apron is no longer accommodating, relocating cargo activities entirely to the east side of the runway would segregate the use from other general aviation activities and open up the northwest side of the Airport to more low-activity hangar development. The development of the east side would again require the construction of a new access road and taxiways as well as the extension of utilities.

Relocation of cargo activities would allow for the existing cargo ramp and the vacant land to the northeast to be developed primarily as a low-activity area for new hangar development and for additional helicopter parking. Combined, this alternative provides for 477,500 square feet of new aircraft storage hangar space.

This alternative gives consideration to relocating the fuel farm southwest of the terminal area. This proposed site would be easily accessible from the access road and would not require FBO fuel trucks to utilize Taxiway A for access.

Terminal facilities would be expanded similar to what was proposed in Landside Alternative 1, extending to the southwest parallel to the runway and taxiway. An aircraft wash rack is proposed in this alternative at the northwest corner of the existing terminal apron. While this location is easily accessible, helicopter operations to the helipad would have the potential to interfere with aircraft washing activities.

ALTERNATIVES SUMMARY

Several development alternatives related to both the airside and the landside have been presented. On the airside, the major considerations are the potential to extend Runway 3-21. A runway extension project should be considered a long term project that will be dependent upon a specific business jet or cargo aircraft operating frequently. This specific justification will be needed to move forward with an extension.

On the landside, several alternatives were presented to consider additional hangar development, terminal area expansions, air cargo handling capabilities, as well as general aviation support facilities such as an aircraft wash rack and a self-service fuel island. All options for future hangar and apron development far exceed the forecast 20-year need.

After review by the PAC, a recommended concept will be presented in the next chapter. Elements, such as compliance with FAA standards and on-airport land use, will also be addressed.

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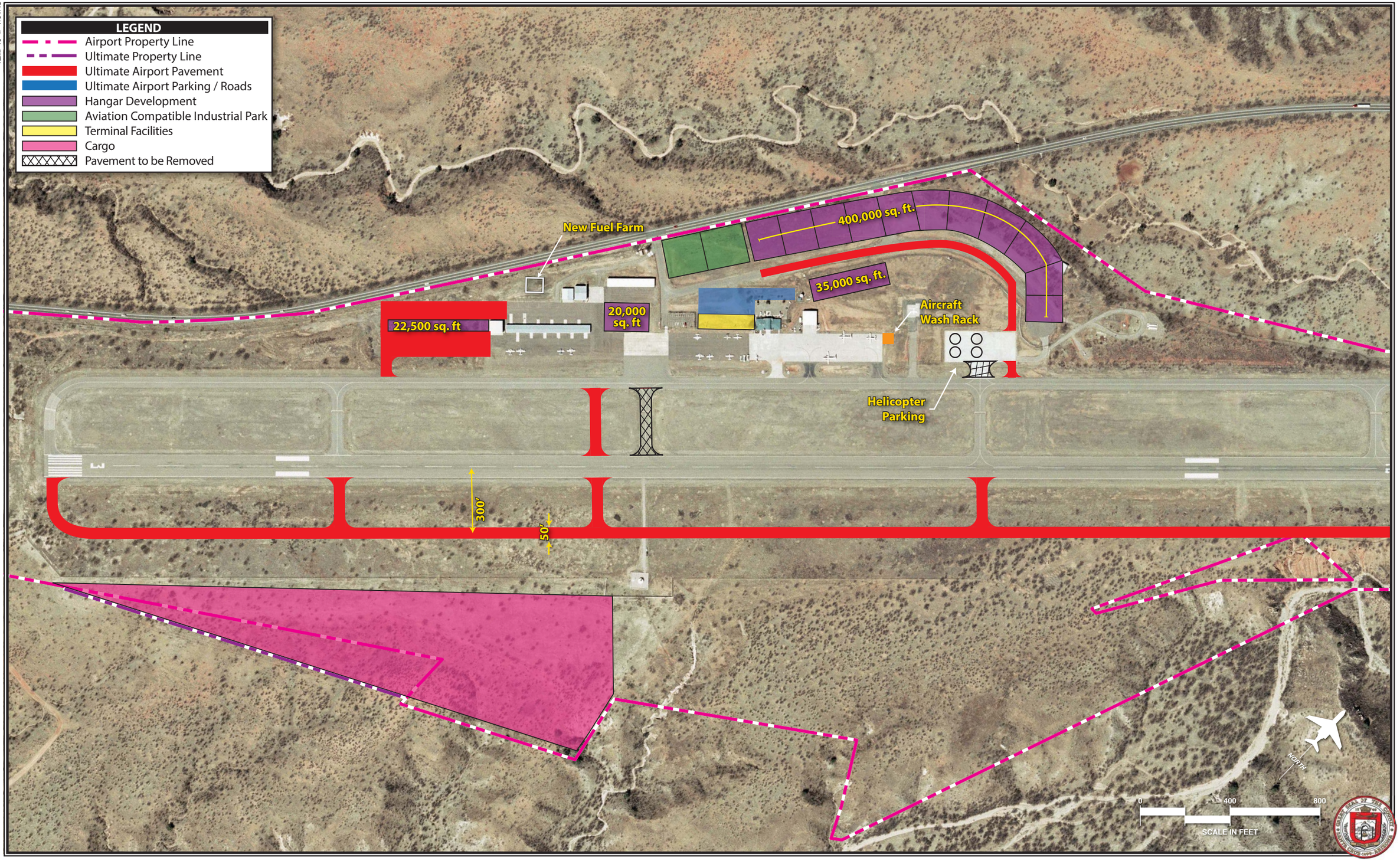

Exhibit 4F
LANDSIDE ALTERNATIVE 3

Chapter Five

RECOMMENDED MASTER PLAN CONCEPT

Chapter Five
RECOMMENDED MASTER PLAN CONCEPT

The planning process for the Nogales International Airport Master Plan has included several analytical efforts in the previous chapters intended to project potential aviation demand, establish airside and landside facility requirements, and evaluate options for improving the Airport to meet the identified facility needs. The purpose of this chapter is to describe, in narrative and graphic form, the recommended Master Plan concept for the future of Nogales International Airport.

AIRPORT DESIGN STANDARDS

Advisory Circular 150/ 5300-13A, *Airport Design*, is the key reference used to ensure compliance with FAA design standards. Design and safety standards are based primarily upon the characteristics of aircraft expected to use an airport on a regular basis. As previously discussed in Chapter Three, the design codes are based upon the approach speeds and wingspans of these "critical" aircraft. This is comprised of the most demanding aircraft or "family" of aircraft conducting at least 500 annual operations at the Airport.

Analysis in Chapter Two – Aviation Demand Forecasts indicated that the current critical design aircraft for Nogales International Airport is the Beechcraft 1900 turboprop aircraft, which is utilized by charter air cargo operators to transport materials and goods to and from businesses in the Nogales area both on the U.S. and Mexico side of the border. The Beechcraft 1900 is an airport reference code (ARC) B-II aircraft. In anticipation of growth in the business jet fleet, the ultimate critical design aircraft is projected

to fall within the ARC C-II family of aircraft. As such, the airfield should be planned to satisfy runway design code (RDC) C-II-NPI-I standards.

A runway design analysis conducted in Chapter Three – Facility Requirements concluded that existing runway lengths and widths are adequate for existing users; however, to meet FAA runway length standards for projected business jet demands, a 300-foot extension to the runway should be planned.

RECOMMENDED MASTER PLAN CONCEPT

The Master Plan concept includes improvements to the airfield and landside facilities to meet current and forecast needs over the long range planning horizon. It is also designed to ensure a viable aviation facility for the region and State well beyond the long range horizon. The recommended concept is depicted on **Exhibit 5A**. The following sections further detail these plans and recommendations.

AIRFIELD RECOMMENDATIONS

The principal airfield recommendations should always focus first upon safety and security. Of key importance is to ensure that FAA airport design standards are adequately planned for and met. Recommendations are then provided to improve the operational efficiency, circulation, and capability of the airfield. **Exhibit 5A** depicts the principal airfield recommendations. The following subsections summarize the elements of the airfield recommendations.

- **Runway 3-21 extension to 7,500 feet.**

Runway 3-21's current length of 7,200 feet does not satisfy FAA's recommended length to fully accommodate 75 percent of business jets at 60 percent useful load. To meet this recommended runway length, an extension of 300 feet is needed. Consideration was also given to extending the runway to 9,800 feet to satisfy 100 percent of business jets at 60 percent useful load; however, through discussions with the planning advisory committee (PAC) and County staff, it was determined that a demonstrated need for a 9,800-foot runway length is not foreseeable at the current time.

The alternatives analysis examined extensions to the southwest, but after consideration, it was determined that an extension to the southwest would be less desirable due to the sloping terrain off the end of Runway 3, which would require extensive grading work not only for runway pavement construction but also for the grading of the runway safety area (RSA), which extends 1,000 feet beyond the runway pavement. On the other hand, the terrain to the northeast of the runway is much more level and would require far less grading work, making it more economically feasible.

The Runway 21 end is presently displaced by 899 feet due to the rising terrain to the northeast of the runway. A runway extension would increase the threshold displacement to 1,199 feet. It is usually less desirable to extend a runway end that is displaced because the runway pavement behind the displaced threshold is only usable for takeoff operations. Functionally, the added pavement could be used only for departures and not arrivals, whereas an extension to the southwest, where no displaced threshold is needed, could be used for both arrivals and departures. However, at Nogales International Air-

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Airfield Recommendations

LEGEND

- Airport Property Line
- Ultimate Property Line
- Runway Safety Area (RSA)
- Object Free Area (OFA)
- Obstacle Free Zone (OFZ)
- Pavement to be Removed
- Ultimate Airfield Pavement
- Runway Protection Zone (RPZ)
  - 1 mile or Greater
- Land Acquisition
- Ultimate Airport Parking / Roads
- Hangar Development
- Aviation Compatible Industrial Park
- Terminal Facilities
- Cargo
- Vegetation to be Removed
- Relocated Perimeter Security Fence
- Perimeter Service Road

0 1000 2000
SCALE IN FEET

State Route 82
Approach RPZ
6.31 Acres
Departure RPZ
B-50'
300' Extension
1,199'
Displaced Threshold
C-50'
REILS
1.88 Acres
D-50'
Runway 3-21 Ultimate 7,500' x 100'
E-50'
Taxiway A
F-50'
G-50'
5.1 Acres
Relocate Drainage Ditch
REILS
Relocated Perimeter Security Fence
8.86 Acres
NORTH

Landside Recommendations

0 500 1000
SCALE IN FEET

Install New Fuel Storage Tanks
Airport Access Road
2.5 acres
18,000 sq. ft.
Aircraft Wash Rack
Helicopter Parking
1.4 acres
20,000 sq. ft
3,600 sq. ft each
22,500 sq. ft

Exhibit 5A
RECOMMENDED DEVELOPMENT CONCEPT

port, an extension to the northeast could be considered to be fully functional because jet aircraft typically depart using Runway 21 and arrive on Runway 3 to take advantage of the sloping terrain rising from the 3 end to the 21 end.

The existing medium intensity runway lighting (MIRL) system and runway pavement markings would be expanded to include the extended runway pavement. Runway end identification lighting (REIL) systems aid pilots during their approach to the runway and are planned to be installed at each end of the runway.

The proposed extension to Runway 3-21 is included in this Master Plan for planning purposes only. An extension of the runway will not be considered justified unless support is gained from users detailing 500 annual operations by the critical aircraft requiring the additional runway length. Planning for the runway extension will aid in local land use planning to ensure that appropriate land use measures are put into place to allow for this extension in the future if a specific demand can be identified. By planning for a runway extension, the County can take appropriate measures to ensure there are no hazards or obstacle penetrations to the Title 14 Code of Federal Regulations (CFR) Part 77 airspace in the future that could prevent the extension, and to allow for compatible land use to be planned in the extended runway approach/departure area. Detailed justification for constructing the runway extension will be required with the environmental assessment (EA) and benefit-cost analysis.

- **Satisfy Runway Design Code (RDC) C-II NPI-I FAA design standards.**

The FAA has established design criterion to define the physical dimensions of runways and taxiways and the surrounding imaginary surfaces that protect the safe operation of aircraft at the airport. FAA design standards also define the separation criteria for the placement of landside facilities. FAA RDC standards are a function of the critical design aircraft's wingspan, approach speed, and approach visibility minimums.

Nogales International Airport is currently used by a variety of aircraft, including small single-engine piston aircraft used for flight training and recreational flying up to medium-sized business jet aircraft such as the Falcon 20 and Bombardier Challenger 300. Air charter/air cargo operators utilize even larger aircraft up to Boeing 737-200 and McDonnell Douglas DC-9 aircraft. Military aircraft that occasionally use the airport include the Lockheed C-130 Hercules, the Bell Boeing V-22 Osprey, and the Gulfstream V jet.

It is anticipated that the most demanding aircraft to conduct 500 or more annual itinerant operations will ultimately be within the RDC C-II category. Therefore, Nogales International Airport should ultimately meet RDC C-II NPI-I design standards.

- **RSA/ROFA Obstruction Removal**

As was discussed in previous chapters, there are several obstructions to the RSA and runway object free area (ROFA). Trees and other vegetation south of the runway are located within the RSA and ROFA and should be removed as necessary. The perimeter fence line also obstructs the ROFA and should be relocated outside of the ROFA where possible. Where the fence line cannot be relocated as a result of soil erosion associated with the Cañada de la Paloma, the County should request a modification to design

standard from the FAA to allow the fence to remain in its current location. Also, a drainage ditch west of Runway 3 would be located within the ultimate RSA and would not meet grading standards. As a result, this drainage ditch should be relocated outside of the ultimate RSA.

- **Taxiway modifications to mitigate runway incursion potential.**

The FAA recently instituted new design standards for taxiways to help reduce the potential for runway incursions. One such recommendation is to design taxiways so that they do not lead directly from an apron to a runway. Nogales International Airport presently has two connecting taxiways that lead directly from an apron to the runway. A Taxiway E stub from the terminal apron leads directly to the runway and a Taxiway D stub from the cargo apron leads directly to the runway.

To correct these configurations, it is recommended that Taxiway E be relocated to the northeast so that direct access from the apron area to the runway is eliminated. The Taxiway D stub is recommended to be closed and removed and a new 50-foot wide stub constructed at the northeast end of the cargo apron. This again creates an off-set alignment from the apron. As a result of both of these projects, pilots will be required to make a turn onto the parallel taxiway prior to accessing the runway.

- **Acquire lands for the protection of Runway Protection Zones (RPZs) and for the construction of a perimeter service road.**

RPZs are established to provide an area clear of obstructions and incompatible land uses, in order to enhance the protection of people and property on the ground. The FAA expects airport sponsors to take all possible measures to acquire property within RPZs and to protect against and remove or mitigate incompatible land uses. Currently, approximately 8.86 acres of uncontrolled property is encompassed by the Runway 3 RPZ. Upon completion of an extension to the end of Runway 21, approximately 6.31 acres of uncontrolled property will be encompassed by the Runway 21 departure RPZ. This property should be acquired via fee simple acquisition if possible, otherwise avigation easements could be considered if fee simple acquisition is not possible.

The Master Plan recommends constructing a perimeter service road to allow for easier access to all areas of airport property to maintenance and emergency service vehicles and personnel. The alignment of the perimeter service road would require the acquisition of two parcels on the east side of the runway. The two parcels total approximately seven acres (5.1 acres and 1.9 acres). The smaller 1.9-acre parcel is also a location where drainage leading to the Cañada de la Paloma has created ongoing erosion problems. Continued erosion could result in RSA grading requirements not being met. Acquisition of this parcel will allow the County to take action to mitigate soil erosion. Due to the sloping terrain caused by the soil erosion and the location of the ROFA, it is not feasible to construct a perimeter service road in this area. The plan calls for the service road to extend to all other areas where it will remain outside of the ROFA.

LANDSIDE RECOMMENDATIONS

Examples of landside facilities include aircraft storage hangars, terminal build-

ings, aircraft parking aprons, hangars, and vehicle parking lots. Landside recommendations have been devised to efficiently accommodate potential aviation demand and provide revenue enhancement possibilities.

The development of landside facilities will be demand-based. In this manner, the facilities will only be constructed if required by verifiable demand. For example, T-hangars will only be constructed if an adequate number of new based aircraft owners desire enclosed aircraft storage. The landside plan is based on projected needs that can change over time and was planned with flexibility in mind to ensure the orderly development of the airport should this demand materialize.

Landside recommendations focus on the segregation of uses while maintaining the established flight line, which provides for good visibility from the airfield and coincides with existing landside facilities. The terminal apron area will be maintained as a high activity area for transient users, including business aircraft. The northeast area will be further developed as a medium activity area for air cargo operations. The focus of the southwest area will continue to be as a low activity area for small piston engine aircraft. Recommendations provide for the expansion of the terminal facility and its adjacent parking lot and terminal apron, new hangar development areas, an air cargo development parcel, new helicopter parking spaces, an aircraft wash rack, and new fuel storage tanks. Recommended landside projects are depicted on the right side of **Exhibit 5A**.

- **Terminal and apron facilities expansion.**

The 3,189 square foot terminal building is projected to be adequate to meet the long term demands of the airport. However, should unforeseen demand materialize for added terminal facilities, it is recommended that the terminal be expanded to the southwest along the terminal apron flight line. The existing automobile parking lot could also be extended to the southwest to coincide with a building expansion.

The existing terminal apron is also projected to satisfy long term demands for transient aircraft parking. However, it is recommended that the terminal apron and the cargo apron be extended to create a single apron for transient aircraft. The proposed apron has an area of 3,800 square yards and includes two helicopter parking spaces. An additional apron expansion is recommended to the north of the existing terminal apron. This addition has an area of approximately 3,300 square yards and would serve as parking for an adjacent 18,000 square foot hangar development parcel. An aircraft wash rack is recommended in the north corner of this new apron. In this location, an aircraft wash rack would be centrally located and easily accessible to all users of the airport.

- **Aircraft storage hangar development.**

The facility requirements analysis identified a need for new hangar development. Primarily, it is anticipated that new conventional hangar space will be needed to meet the needs of more sophisticated aircraft anticipated to be in the Airport's fleet mix. The plan does allow for flexibility by identifying an area for additional T-hangar development as well. In all, recommended hangar development parcels, depicted in purple on **Exhibit 5A**, could

be developed to provide up to 64,100 square feet of storage space. Depending on the needs of the developer, portions of these hangar development parcels could include automobile parking as well as ramp pavement to allow access to the airfield system.

- **Fuel storage tank replacement.**

The Airport's two aboveground fuel storage tanks are in poor condition and need to be replaced. It is recommended that the existing fuel farm location be maintained and new tanks installed. This site is easily accessible to supply trucks and is not in a prime location for aviation-related development.

- **Air cargo development parcel.**

A 2.5-acre air cargo development parcel has been planned west of the existing air cargo apron. The Master Plan has not identified a specific need or user for a large air cargo development; however, due to the Airport's current use by air cargo operators and the potential for significant growth in this activity, identification of an air cargo development parcel is considered prudent. The existing air cargo operators support manufacturing plants associated with the Maquiladora program, which allows for U.S. companies to have manufacturing factories in Mexico. As economic conditions improve, it is reasonable to assume air cargo activities in support of these factories could grow to the point that a dedicated air cargo facility is needed at the Airport.

- **Aviation compatible industrial park.**

Land to the northwest of the Airport Access Road has been reserved for development as an industrial park. These parcels can serve as revenue generating property for the County and can be attractive to specialty operators wishing to be located on the airport to conduct aviation-related activities.

RECOMMENDED MASTER PLAN SUMMARY

The Master Plan for Nogales International Airport has been developed in cooperation with the PAC, interested citizens, and Santa Cruz County. It is designed to assist the County in making decisions relative to the future use of Nogales International Airport as it is maintained and developed to meet its role as a general aviation airport.

Flexibility will be a key to the plan, since activity may not occur exactly as forecast. The Master Plan provides the 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 its viability and continue to provide air transportation services to the County.

ENVIRONMENTAL OVERVIEW

Analysis of the potential environmental impacts of proposed airport development projects, as discussed in this chapter and depicted on **Exhibit 5A**, is an important component of the Airport Master Plan process. The primary purpose of this Environmental Overview is to identify significance thresholds for the various resource categories contained in Federal Aviation Administration (FAA) Order 1050.1E, *Environmental Impacts: Policies and Procedures* and FAA Order 5050.4B, *National Environmental Policy Act* (NEPA) *Implementation Instructions for Airport*

Actions. The overview then evaluates the recommended Master Plan projects to determine whether proposed actions could individually or collectively affect the quality of the environment.

The construction of any improvements depicted on the recommended development concept plan would require compliance with NEPA to receive federal financial assistance. For projects not "categorically excluded" under FAA Order 1050.1E, compliance with NEPA is generally satisfied through the preparation of an Environmental Assessment (EA). In instances where significant environmental impacts are expected, an Environmental Impact Statement (EIS) may be required. While this portion of the Master Plan is not designed to satisfy the NEPA requirements for a Categorical Exclusion (CatEx), EA, or EIS, it is intended to supply a preliminary review of environmental issues.

This Environmental Overview is based on information contained in the Environmental Inventory of Chapter One.

POTENTIAL ENVIRONMENTAL CONCERNS

The following table (**Table 5A**) summarizes potential environmental concerns associated with build-out of the Master Plan. In some cases, these concerns are related to the future construction of specific projects that could be built under the Master Plan; in other cases, the concerns are related to the overall projected future increase in Airport operations (i.e., the aviation forecasts). Construction-related impacts are temporary and are addressed separately as their own impact category. All recommendations for future studies or mitigation are called out with underlines and italics.

TABLE 5A
Summary of Potential Environmental Concerns
Nogales International Airport

FAA Resource Category	Threshold of Significance	Potential Concern
Air Quality, including Greenhouse Gases (GHGs) and Climate	**For air quality:** Potentially significant air quality impacts associated with an FAA project or action would be demonstrated by the project or action exceeding one or more of the National Ambient Air Quality Standards (NAAQS) for any of the time periods analyzed. **For GHGs and climate:** There are no federal standards for aviation-related GHG emissions developed at this time.	**For air quality:** None. The portion of Santa Cruz County that contains the Airport currently meets federal standards. The projected increase in operations over the 20-year planning horizon of the Airport Master Plan (AMP) would result in additional emissions. According to FAA Air Quality Handbook dispersion threshold calculations, a NAAQS assessment would not be necessary for any of the future planning horizons, based on the aviation forecasts provided in Table 2L of the AMP. **For GHGs and climate:** None. An increase in GHG emissions would also occur over the 20-year planning horizon of the AMP. However, there are no federal GHG emissions standards that can be applied to this growth at this time. The FAA is involved in several studies aimed at quantifying aviation contributions to GHG emissions and climate changes.
Coastal Resources	No specific thresholds have been established; however, if a local Coastal Development Permit cannot be issued due to a lack of consistency with a local coastal program, the FAA typically will not make a federal coastal consistency determination either.	None. The Airport is not located within a Coastal Zone and is located more than 350 miles from the Pacific Ocean, the nearest United States (U.S.) protected coastal area.
Compatible Land Use/Noise	See significance threshold for noise.	None. A discussion of noise associated with the recommended airport improvements is provided in the section on noise below. The airport is primarily surrounded by undeveloped open space and the existing and future Day-Night Equivalent Level (DNL) 65 decibel (dB) noise contours for the Airport remain within existing Airport property (**Exhibits 5B**, **5C**, and **5D**). There are also no other types of incompatible land uses located near the Airport; for example, landfills or water bodies that would attract wildlife hazards. Article 24 of the Santa Cruz County *Zoning and Development Code* (2011) restricts incompatible land uses within the county's Airport District Overlay Zone.

12MP10-5B-10/21/13

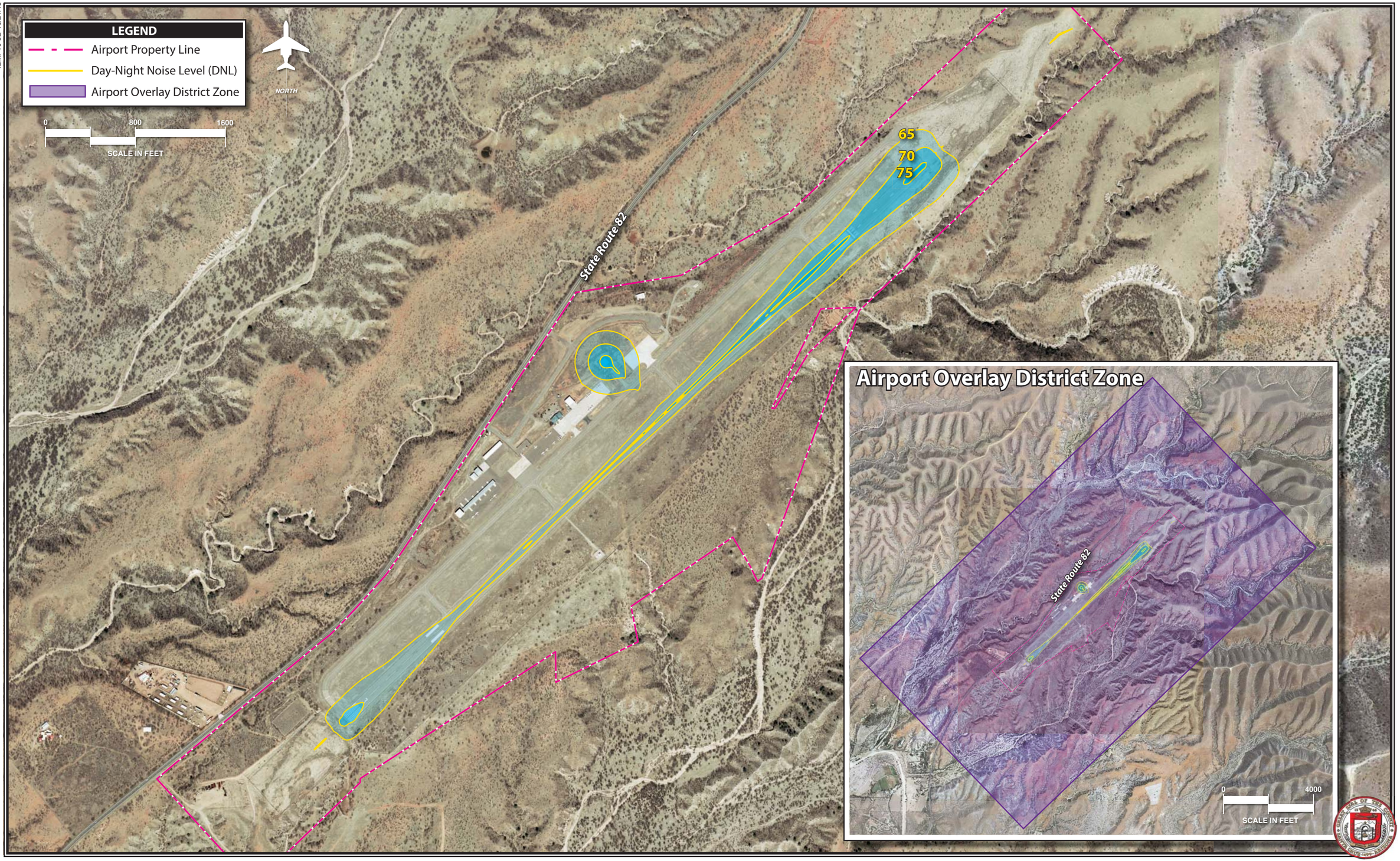

Exhibit 5B
2012 NOISE CONTOURS

12MP10-5C-10/21/13

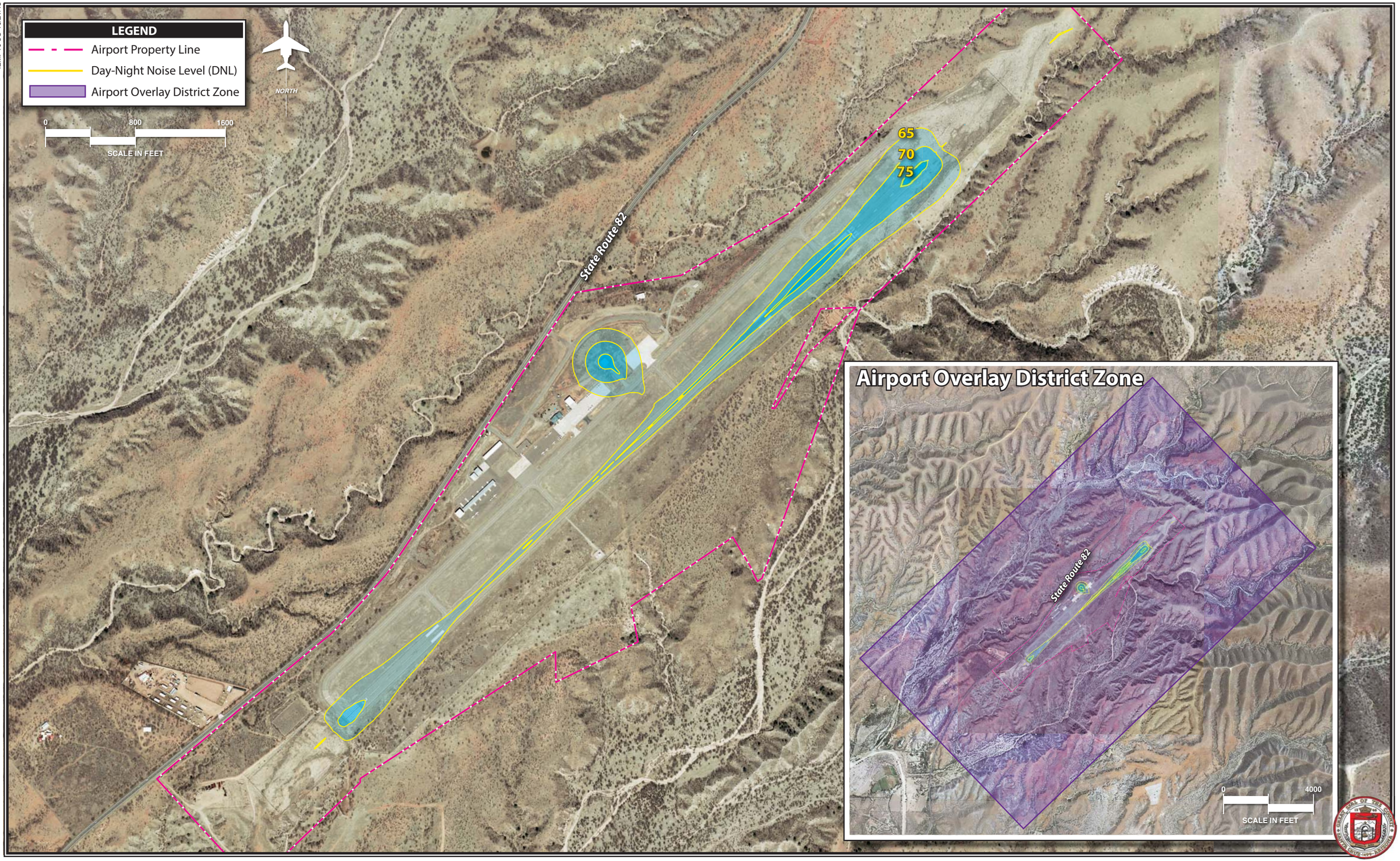

Exhibit 5C
2017 NOISE CONTOURS

12MP10-5D-10/21/13

LEGEND

- Airport Property Line
- Day-Night Noise Level (DNL)
- Airport Overlay District Zone

NORTH

0 800 1600

SCALE IN FEET

State Route 82

65

70

75

Airport Overlay District Zone

State Route 82

0 4000

SCALE IN FEET

Exhibit 5D
2032 NOISE CONTOURS

TABLE 5A(Continued)
Summary of Potential Environmental Concerns
Nogales International Airport

FAA Resource Category	Threshold of Significance	Potential Concern
Construction Impacts	Construction impacts alone are rarely significant pursuant to NEPA. See significance threshold(s) for the resource(s) that construction could affect.	None. FAA's Advisory Circular (AC) 150/5370-10F, *Standards for Specifying Construction of Airports, Item P-156, Temporary Air and Water Pollution, Soil Erosion and Siltation Control* would be implemented during construction projects at the airport. This AC and other best management practices (BMPs) that may be required by Arizona Department of Environmental Quality (ADEQ) as part of its Arizona Pollutant Discharge Elimination System (AZPDES) General Construction Permit (AZG2003-001) would be incorporated into future Airport development to minimize dust, emissions, and water quality concerns. The closest noise-sensitive receptor is a residence located approximately 1,580 feet (0.3 mile) southwest from the end of Runway 3.
Department of Transportation (DOT) *Act*: Section 4(f)	When the action's physical use would be more than minimal or its constructive use substantially impairs the Section 4(f) property. In either case, mitigation is not enough to sustain the resource's designated use.	None. The closest Section 4(f) land to the Airport is the Coronado National Forest, which is located approximately 0.75 mile to the east. This is well outside of the 65 DNL for the Airport. There are no known Section 4(f) lands that would be directly impacted by the recommended Airport projects. In addition, no off-airport Section 4(f) resources would be indirectly affected by the AMP. See also the discussion on noise.
Farmland	When the combined score on Form AD-1006 ranges between 200 and 260. Impact severity increases as the total score approaches 260.	None. There are very few soils at the Airport that are classified as farmland by U.S. Department of Agriculture, and none that would be affected by the proposed development concept program.
Fish, Wildlife, and Plants	**For federally-listed species:** When the U.S. Fish and Wildlife Service (USFWS) or the National Marine Fisheries Service determines a proposed action would likely jeopardize a species' continued existence or destroy or adversely affect a species' critical habitat.	**For federally-listed species:** Potential Impact. Most of the proposed improvements are located in areas of the Airport that are currently developed or maintained. However, there are areas proposed for acquisition that have not been disturbed. According to USFWS and Arizona Game and Fish Department (AGFD) databases, there is one federally listed species with potential to occur on the Airport property. Therefore, *any future development projects would need to avoid impacts to the Pima pineapple cactus, which has the potential to occur in Sonoran desert scrub or semi-desert grassland communities.*

TABLE 5A(Continued)
Summary of Potential Environmental Concerns
Nogales International Airport

FAA Resource Category	Threshold of Significance	Potential Concern
Fish, Wildlife, and Plants (Continued)	**For non-listed species:** Consider scientific literature on, and information from, agencies having expertise in addressing the affected species. Consider information on: project effects on population dynamics; sustainability; reproduction rates; natural and artificial mortality (aircraft strikes); and the minimum population size needed to maintain the affected population.	**For non-listed species:** Potential Impact. Non-listed species of concern known to occur within three miles of the Airport include the grey hawk, black-bellied whistling-duck, bald eagle, and the Sonoran desert tortoise. In addition, one species, the Northern Mexican garter snake is proposed for listing. This species can be found in cienegas, stock tanks, large-river riparian woodlands and forests, and streamside gallery forests. It is assumed that most of these non-listed species would not occur on the Airport due to a lack of habitat present (i.e., water sources or nesting substrates). However, *prior to the actual implementation of recommended development projects, the likelihood of any of these species to occur should be evaluated.*
Floodplains	When notable adverse impacts on natural and beneficial floodplain values would occur.	Potential Impact. The AMP Update includes the acquisition of a 1.88-acre parcel of land located partially within the on-site 100-year floodplain of Cañada de la Paloma. This parcel is being acquired to accommodate the construction of a perimeter service road and to allow for mitigation of ongoing soil erosion. *Care should be taken that any erosion mitigation and the perimeter service road be located outside of the 100-year floodplain.*
Hazardous Materials, Pollution Prevention, and Solid Waste	**For hazardous materials:** When an action involves a property on or eligible for the National Priority List (NPL). Uncontaminated properties within an NPL site's boundary do not always trigger this significance threshold. **For pollution prevention:** See significance thresholds for water quality. **For solid waste:** There are no solid waste thresholds of significance established.	**For hazardous materials:** None. There are no U.S. Environmental Protection Agency (EPA)-listed hazardous materials or waste sites known to occur at the Airport, although the main apron pavement does have oil/fuel spill damage. The installation of new fuel storage tanks would have to comply with all applicable state and federal regulations. **For pollution prevention:** Potential Impact (see Water Quality discussion below). Neither the County nor the Airport has an approved storm water pollution prevention plan (SWPPP). The Airport would be required to utilize BMPs under FAA's AC 150/5370-10F and the AZPDES General Construction permit for all construction projects, as discussed under Construction impacts. *An Airport SWPPP should be developed and submitted to ADEQ for approval under its AZPDES permitting program.* **For solid waste:** None. Existing and future solid waste is, or would be, collected and disposed of at the Rio Rico Landfill, located approximately 10 miles northwest of the Airport. This landfill is expected to have capacity through 2029 (Williams and Stantec 2009).

TABLE 5A(Continued)
Summary of Potential Environmental Concerns
Nogales International Airport

FAA Resource Category	Threshold of Significance	Potential Concern
Historic, Architectural, Archaeological, and Cultural Resources	When an action adversely affects a protected property and the responsible FAA official determines that information from the state and/or tribal Historic Preservation Officer addressing alternatives to avoid adverse effects and mitigation warrants further study.	Potential Impact. Unsurveyed areas of the Airport have the potential to contain historical, architectural, archaeological, or cultural resources, based on findings of similar resources adjacent to Airport property (Santa Cruz County and ADOT 2008). Thus, *any areas at the Airport that would be disturbed by new development should be surveyed for cultural resources prior to ground disturbance unless previously disturbed to the point that artifacts could no longer be intact. In the event that unknown resources are found during construction, all applicable state and federal law regarding such finds must be followed.*
Light Emissions and Visual Effects	**For light emissions:** When an action's light emissions create annoyance to interfere with normal activities. **For visual effects:** When consultation with federal, state, or local agencies, tribes, or the public shows these effects contrast with existing environments and the agencies state the effect is objectionable.	**For light emissions:** None. All new lighting associated with the proposed AMP would remain on the airfield and other developed portions of the airport. From off-site areas, such as Highway 82, the property would continue to look like a developed Airport with no noticeable change in its night-time appearance. **For visual effects:** None. Development in the form of an aviation compatible industrial park is planned along the highway. This development would be highly visible from off the Airport, but would serve to screen other airport buildings from Highway 82. No designated scenic resources or views in the area would be adversely impacted.
Natural Resources and Energy	When an action's construction, operation, or maintenance would cause demands that would exceed available or future (project year) natural resource or energy supplies.	None. Planned development projects at the Airport are not anticipated to result in a demand for natural resources or energy consumption beyond what is available by service providers.
Noise	**For most areas:** When an action, compared to the No Action alternative for the same timeframe, would cause noise-sensitive areas located at or above the 65 dB DNL to experience a noise increase of at least DNL 1.5 dB. An increase from DNL 63.5 dB to DNL 65 dB is a significant impact. **For national parks, national wildlife refuges and historic sites, including traditional cultural properties:** FAA must give special consideration to these areas. The 65 dB DNL threshold may not adequately address noise effects on visitors to these areas. Consult the jurisdictional agency for more information to determine a significant noise impact.	**For most areas:** None. Existing and future noise contours for the airport are shown in **Exhibits 5B**, **5C**, and **5D**. The Airport is primarily surrounded by undeveloped open space and the existing and future 65 dB DNL noise contours for the Airport remain on Airport property. **For national parks, national wildlife refuges and historic sites, including traditional cultural properties:** None. There are no sensitive national parks, refuges, historic sites, or known traditional cultural properties within proximity to the Airport's noise contours.

TABLE 5A(Continued)
Summary of Potential Environmental Concerns
Nogales International Airport

FAA Resource Category	Threshold of Significance	Potential Concern
Secondary (Induced) Impacts	Induced impacts will not normally be significant except where there are also significant impacts in other categories, especially noise, land use, or direct social impacts.	None. The proposed actions are not expected to create significant adverse noise, land use, or social impacts. See also discussion under those sections.
Socioeconomic Impacts, Environmental Justice, and Children's Environmental Health and Safety Risks	**For socioeconomic issues:** When an action would cause: • Extensive relocation, but sufficient replacement housing is unavailable; • Extensive relocation of community businesses that would cause severe economic hardship for affected communities; • Disruption of local traffic patterns that substantially reduce the Levels of Service of roads serving the airport and its surrounding communities; • A substantial loss in community tax base. **For environmental justice issues:** When an action would cause disproportionately high and adverse human health or environmental effects on minority and low-income populations, a significant impact may occur. **For children's health & safety risks:** An action causing disproportionate health and safety risks to children may indicate a significant impact.	**For socioeconomic issues:** None. Proposed development projects would occur on the Airport property itself and would not result in the relocation of housing or community businesses, disruption of local traffic patterns, or a loss in the community tax base. **For environmental justice issues:** None. There are no neighborhoods or communities located within proximity to the Airport. **For children's health & safety risks:** None. No impacts to the health and safety of children would occur as a result of the proposed actions. All proposed projects would occur on the Airport property itself.
Water Quality	When an action would not meet water quality standards. Potential difficulty in obtaining a permit or authorization may indicate a significant impact.	Potential Impact. ADEQ is authorized to issue water quality permits under the *Clean Water Act*. The AZPDES Multi-sector General Action permit (MSGP) is designed for discharges of storm water from certain industrial sites that are of a non-construction nature. The MSGP is one large permit divided into numerous separate sectors. Each sector represents a different type of activity and is dependent upon its Standard Industrial Classification (SIC) code or narrative description. Airports are classified as an S industry. Existing facilities such as Nogales International Airport were allowed 120 days from the MSGP's effective date (i.e., until May 31, 2011) to prepare a SWPPP and submit a Notice of Intent (NOI) to ADEQ to obtain coverage under one of the MSGP 2010 permits. However, neither the County nor the Airport currently has an approved SWPPP and thus may not currently meet the standards of the AZPDES program under the *Clean Water Act*.

TABLE 5A(Continued)
Summary of Potential Environmental Concerns
Nogales International Airport

FAA Resource Category	Threshold of Significance	Potential Concern
Water Quality (Continued)		*Future development projects of the AMP should be evaluated to address their interface with the Airport's storm water drainage system and should be incorporated into a countywide or Airport-specific SWPPP once it is approved. Conditions of the MSGP permit would then be applicable to all new development at the airport.* *During construction, project-specific SWPPPs could be required by ADEQ as part of its AZPDES General Construction permit (AZG2003-001) for specific projects. As discussed previously, the Airport is also required to utilize BMPs under FAA's AC 150/5370-10F.*
Wetlands, jurisdictional or non-jurisdictional	When an action would: • Adversely affect a wetland's function to protect the quality or quantity of a municipal water supply, including sole source aquifers and a potable water aquifer. • Substantially alter the hydrology needed to sustain the affected wetland's values and functions or those of a wetland to which it is connected. • Substantially reduce the affected wetland's ability to retain floodwaters or storm runoff, thereby threatening public health, safety, or welfare. The last term includes cultural, recreational, and scientific public resources or property. • Adversely affect the maintenance of natural systems supporting wildlife and fish habitat or economically important timber, food, or fiber resources of the affected or surrounding wetlands. • Promote development that causes any of the above impacts. • Be inconsistent with applicable State wetland strategies.	None. The development considered under the proposed AMP would not affect any wetlands or jurisdictional waters of the Airport. According to the USFWS National Wetlands Inventory, there are no wetlands or riparian areas on Airport property. There are wetland and riparian resources located immediately adjacent to the Airport within off-Airport portions of Cañada de la Paloma. However, very limited development (i.e., a perimeter service road) is planned for this part of the Airport. BMPs required by FAA and ADEQ should be adequate to prevent indirect impacts to these adjacent resources.
Wild and Scenic Rivers	No specific thresholds have been established.	None. The closest designated Wild and Scenic river segments are more than 195 miles from the Airport and are located in a separate drainage basin.

ENVIRONMENTAL ACTION SUMMARY

Prior to construction, some of the Master Plan-recommended projects would require further NEPA environmental consideration and analysis. As discussed previously, the three types of environmental documentation under NEPA are the CatEx, EA, or EIS. A CatEx must meet the criteria in Title 40 Code of Federal Regulations (CFR) §1508.4 and are defined as "a category of actions that do not

normally require an EA or EIS because they do not individually or cumulatively have a significant effect on the human environment, with the exception of extraordinary circumstances." It is the duty of the responsible FAA official to determine whether extraordinary circumstances exist and, if so, deem the action appropriate for an EA. **Table 5B** provides an annotated description of extraordinary circumstances as detailed in FAA Order 5050.4B.

TABLE 5B
Extraordinary Circumstances
FAA Order 5050.4B (Table 6-3)

Extraordinary Circumstance Category	Annotated Description
Air Quality	An action that would violate applicable federal, state, tribal, or local air quality standards under the *Clean Air Act of 1990*, as amended.
Coastal Zone Areas	Federal actions in, or affecting, coastal resources must meet requirements of *Coastal Zone Management Act* programs.
Community Disruption	An action dividing or disrupting an established community or planned development, or that is inconsistent with plans or goals of a community where the project would occur.
Cumulative Impacts	An action likely to cumulatively cause significant impacts.
Endangered Species	An action that may affect listed or candidate species under the *Endangered Species Act*, including designated or proposed critical habitats.
Farmlands Conversion	An action that would convert important farmland protected by the *Farmland Protection Act*.
Floodplains	An impact on natural, ecological, or scenic floodplain resources of federal, state, tribal, or local significance caused by an action in the 100-year floodplain.
Hazardous Materials	An action involving or causing contamination of areas based on Phase I or II Environmental Due Diligence Audits.
Highly Controversial Action	Effects are considered highly controversial when reasonable disagreement exists over a project's risks of causing environmental harm.
Historic or Cultural Property	An action causing an adverse effect on historic or cultural property protected by Section 106 of the *National Historic Preservation Act*.
Inconsistency with Applicable Laws	An action that is likely to be inconsistent with any applicable federal, state, local or tribal law relating to the proposed action's environmental aspects.
Noise	Noise impact on noise-sensitive areas.
Section 4(f) Resources	An action having an impact on properties protected by DOT Act, Section 4(f) such as publicly owned land in a park, recreation area, or wildlife and waterfowl refuge of national, state, or local significance or a historical site of national, state, or local significance.
Traffic Congestion	An action causing transportation congestion due to unacceptable Levels of Service.
U.S. Waters, including Jurisdictional Wetlands	An action affecting these waters or wetlands that does not qualify for a U.S. Army Corps of Engineers General Permit under Section 404 of the *Clean Water Act*.
Water Quality	An impact on water quality, a sole source aquifer, a public water supply system or State or Tribal water quality or water standards established under the *Clean Water Act* or the *Safe Drinking Water Act*.
Wild and Scenic Rivers	An action affecting a river segment that is listed in the Wild and Scenic River System, the National Rivers Inventory, or one that is eligible for the Inventory.

An EA, at a minimum, must be prepared for a proposed action when the initial review of the proposed action indicates that it is not categorically excluded, involves at least one extraordinary circumstance, or the action is not one known normally to

require an EIS and is not categorically excluded. The purpose of an EA is to document the FAA determination as to whether or not a proposed action has the potential for significant environmental impacts. If none of the potential impacts are likely to be significant, then the responsible FAA official shall prepare a Finding of No Significant Impact (FONSI), which briefly presents, in writing, the reasons why an action, not otherwise categorically excluded, will not have a significant impact on the human environment and the approving official may approve it. Issuance of a FONSI signifies that the FAA will not prepare an EIS and has completed the NEPA process for the proposed action.

If the responsible FAA official determines that the proposed action may significantly affect the quality of the human environment, an EIS shall be prepared. An EIS is a clear, concise, and appropriately detailed document that provides agency decision-makers and the public with a full and fair discussion of significant environmental impacts of the proposed action and reasonable alternatives, and implements the requirement in NEPA §102(2)(C) for a detailed written statement.

Some of the actions normally requiring an EA, according to FAA Order 1050.1E, Change 1, are recommended projects with the proposed Master Plan, including the acquisition of parcels of land greater than three acres, the construction of a perimeter service road, and the construction of a runway extension.

REFERENCES

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Chapter Six

CAPITAL IMPROVEMENT PROGRAM

Chapter Six
CAPITAL IMPROVEMENT PROGRAM

The implementation of the Nogales International Airport Master Plan will require sound judgment on the part of Airport management. Among the more important factors influencing decisions to carry out a recommendation are timing and airport activity. Both of these factors should be used as references in plan implementation.

Experience has indicated that problems can materialize from the standard time-based format of traditional planning documents. The problems typically center on inflexibility and an inability to deal with unforeseen changes that may occur.

While it is necessary for scheduling and budgeting purposes to consider timing of airport development, the actual need for facilities is established by airport activity. Proper master planning implementation suggests the use of airport activity levels, rather than time, as guidance for development.

This section of the Master Plan is intended to become one of the primary references for decision-makers responsible for implementing master plan recommendations. Consequently, the narrative and graphic presentations must provide understanding of each recommended development item. This understanding will be critical in maintaining a realistic and cost-effective program that provides maximum benefit to the community.

DEMAND-BASED PLAN

The Nogales International Airport Master Plan has been developed according to a demand-based schedule. Demand-based planning establishes planning guidelines for the Airport based upon activity levels

instead of guidelines based upon subjective factors such as 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 the 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 indicate based aircraft at Nogales International Airport can be expected to grow through the long term. The potential for increased aviation activity can be related to the expectation for a growing population within Santa Cruz County as well as projected facility development at the Airport. Future based aircraft levels, however, will be dependent upon the actual growth in the Airport service area's economy and population, as well as trends in the aviation industry. Factors affecting future based aircraft levels include, but are not limited to, aircraft storage hangar costs and the impact of oil prices on recreational aviation. Individually or collectively, these factors can slow or accelerate based aircraft levels differently. Since changes in these factors can affect the accuracy of time-based forecasts over time, it can be difficult to predict the exact time a given improvement may become justified for the out-years of the planning period.

For these reasons, the Master Plan for Nogales International Airport has been developed as a demand-based plan. The Master Plan projects based aircraft at the Airport for the short term planning horizon. As such, the development plan and corresponding CIP should consider those needs necessary to accommodate these aircraft. When based aircraft levels in the short term planning horizon are realized, the Master Plan suggests planning begin to consider the intermediate term horizon levels. While the aviation demand forecasts suggest these levels could be reached in another five years, a varying economy and other factors could speed up or slow down when this horizon is reached.

Should the intermediate term horizon levels take longer to achieve than projected in the aviation demand forecasts, any related improvements to accommodate the next horizon would be delayed. Should this level be reached sooner, the schedule to implement the improvements could be accelerated. This provides a level of flexibility in the Master Plan.

A demand-based Master Plan does not specifically require the implementation of any of the demand-based improvements. Instead, it is envisioned that implementation of any Master Plan improvement would be examined against the 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 airport facilities consistent with the potential aviation needs and capital needs required to support that specific use. However, individual projects in the plan are not implemented until the need is demonstrated and the project is approved for funding. **Table 6A** summarizes the key demand milestones for each of the three planning horizons.

TABLE 6A
Planning Horizon Summary
Nogales International Airport

	Current	Short Term	Intermediate Term	Long Term
ANNUAL OPERATIONS				
Total Itinerant	7,467	8,560	10,160	13,660
Total Local	1,867	2,400	3,300	5,400
Total Operations	**9,334**	**10,960**	**13,460**	**19,060**
BASED AIRCRAFT				
Single Engine Piston	17	17	18	20
Multi-Engine Piston	7	6	5	4
Turboprop	0	1	2	3
Jet	0	1	1	2
Rotorcraft	0	1	2	3
Total Based Aircraft	**24**	**26**	**28**	**32**

CAPITAL IMPROVEMENT SCHEDULE AND COST SUMMARIES

Once the specific needs and improvements for the airport have been established, the next step is to determine the cost of development and a realistic schedule for implementing the plan. This section will examine the overall cost of each project in the development plan and present a development schedule. 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 by planning horizon: short term, intermediate term, and long term. Each year, Santa Cruz County will need to re-examine the priorities for funding, adding or removing projects on the capital programming lists.

Exhibit 6A summarizes the CIP for Nogales International 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 amount is not guaranteed. **Exhibit 6B** graphically depicts development staging. As a Master Plan is a conceptual document, implementation of these capital projects should only be undertaken after further refinement of their design and costs through architectural and engineering analyses. Some projects, like the runway/taxiway extension and land acquisitions, will require further environmental consideration at the time of implementation as well.

The cost estimates presented in this chapter have been increased to allow for contingencies that may arise on the project. Capital costs presented here should be viewed only as estimates subject to further refinement during design. Nevertheless, these estimates are considered sufficiently accurate for planning purposes. Cost estimates for each of the development projects listed in the CIP are listed in current (2013) dollars. Adjustments will need to be applied over time as construction costs or capital equipment costs change.

A primary assumption in the CIP is that all future hangar development will be completed privately. The capital plan does provide for the Airport to construct apron, taxiway, and taxilane improvements leading to proposed hangar development which is eligible for Federal Aviation Administration (FAA) and Arizona Department of Transportation (ADOT)-Aeronautics Group grant funding. This reduces the overall development costs for the private hangar construction.

SHORT TERM IMPROVEMENTS

The developments proposed in the short term are concentrated on the most immediate needs of the airfield and landside areas. A total of 14 projects are considered to meet airfield design standards, protect approach surfaces, provide adequate fuel storage facilities, and to rehabilitate existing pavement. The short term improvement projects are depicted on **Exhibit 6B** with red shading. The short term planning period is the only planning horizon separated into single years. This is to allow the CIP to be coordinated with the five-year planning cycle of the FAA and ADOT-Aeronautics Group programs. In later planning periods, actual demand levels will dictate implementation.

The first year of the CIP considers projects that may be accomplished in the 2014 federal funding cycle (October 2013 to September 2014). Some of these projects in this timeframe are very specific in terms of actual design and construction. As proposed, most projects are initially put through a design phase and then followed up with actual construction.

The only project planned for fiscal year (FY) 2014 is the preparation of an environmental assessment (EA) for the acquisition of 15.84 acres, which includes 1.88 acres of land to allow for the implementation of erosion mitigation measures east of the runway; 8.86 acres of the Runway 3 RPZ; and 5.1 acres south of the runway. The only project programmed for 2015 includes the reconstruction of 2,225 square yards of the terminal apron. FY 2016 projects include acquisition of 15.84 acres, which is the subject of the FY 2014 EA, and the preservation of 17,800 square yards of T-hangar apron and terminal apron connectors. Projects scheduled for FY 2017 include: the implementation of erosion mitigation measures east of the runway; the removal/relocation of runway object free area (ROFA) and runway safety area (RSA) obstructions, including vegetation and the perimeter security fence; an EA for the construction of a perimeter service road; and the design and construction of replacement fuel farm storage tanks. FY 2018 projects include: installation of runway end identifier light (REIL) systems at both ends of the runway; design of a perimeter service road; and design of a terminal apron expansion of 3,300 square yards. Remaining short term projects for FY 2019 include: construction of the perimeter service road and the construction of the terminal apron expansion.

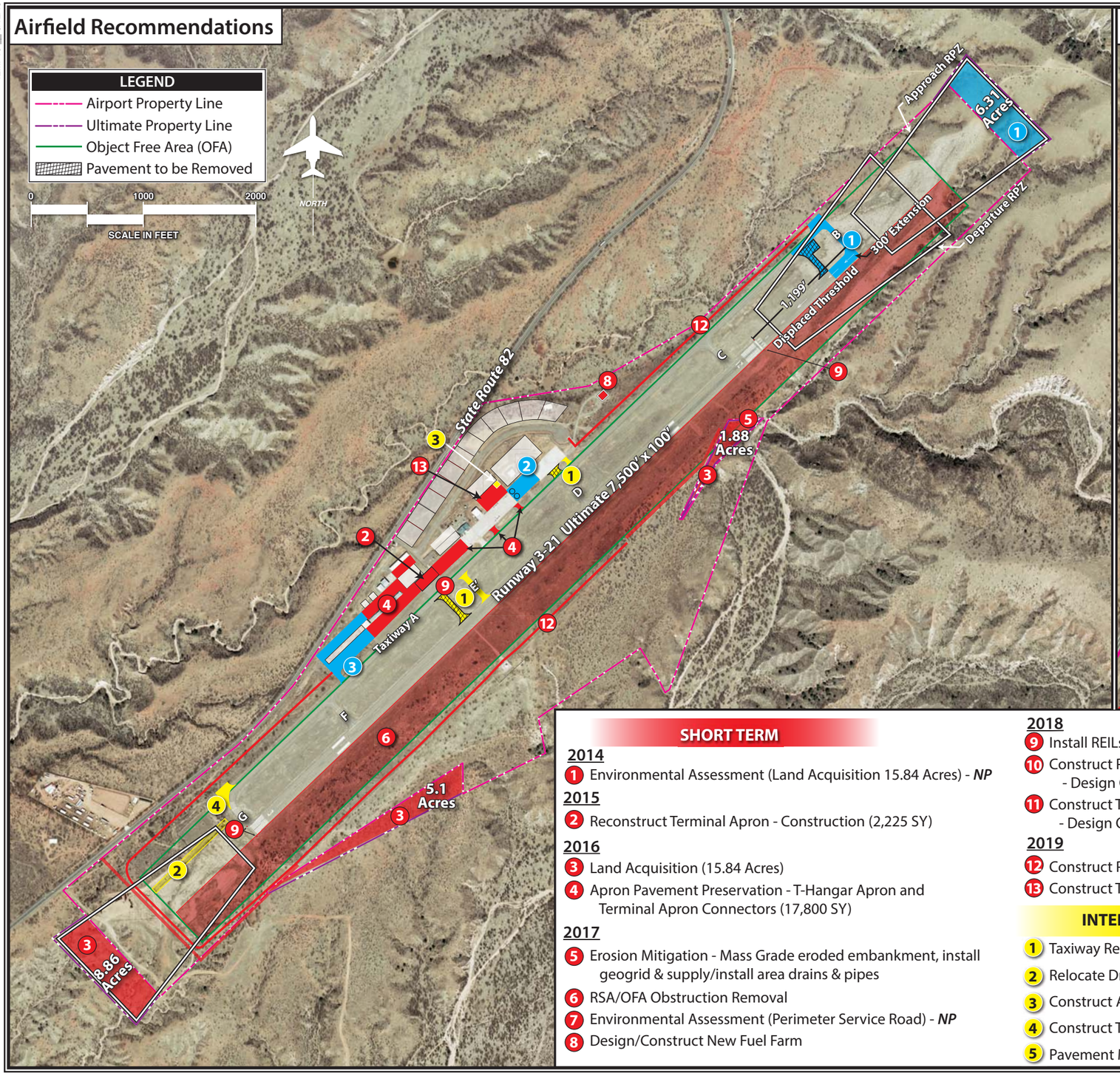
The total investment necessary for the short term CIP is approximately $5,586,200. Of this total, $4,322,635 is eligible for FAA grant funding and $949,123 is eligible for state funds, with the airport sponsor responsible for $304,443.

	PROJECT DESCRIPTION	TOTAL COST	AIP COST	STATE	LOCAL
SHORT TERM					
2014					
1	Environmental Assessment (Land Acquisition - 15.84 Acres)	$150,000	$136,590	$6,705	$6,705
2015					
2	Reconstruct Terminal Apron - Construction (2,225 SY)	$500,000	$0	$450,000	$50,000
2016					
3	Land Acquisition (15.84 Acres)	$250,000	$227,650	$11,175	$11,175
4	Apron Pavement Preservation - T-Hangar Apron and Terminal Apron Connectors (17,800 SY)	$220,000	$200,332	$9,834	$9,834
2017					
5	Erosion Mitigation - Mass grade eroded embankment, install geogrid & supply/install area drains & pipes	$1,500,000	$1,365,900	$67,050	$67,050
6	RSA/OFA Obstruction Removal	$50,000	$45,530	$2,235	$2,235
7	Environmental Assessment (Perimeter Service Road)	$150,000	$136,590	$6,705	$6,705
8	Design/Construct New Fuel Farm	$200,000	$182,120	$0	$17,880
2018					
9	Install REILs - Runway 3-21	$50,000	$45,530	$2,235	$2,235
10	Construct Perimeter Service Road - Design Only	$282,000	$0	$253,800	$28,200
11	Construct Terminal Apron Expansion - Design Only (3,300 SY)	$46,200	$0	$41,580	$4,620
2019					
12	Construct Perimeter Service Road	$1,880,000	$1,711,928	$84,036	$84,036
13	Construct Terminal Apron Expansion (3,300 SY)	$308,000	$280,465	$13,768	$13,768
Subtotal		***$5,586,200***	***$4,332,635***	***$949,123***	***$304,443***
INTERMEDIATE TERM					
1	Taxiway Reconfiguration (Taxiway E and D Stub Relocation)	$302,000	$275,001	$13,499	$13,499
2	Relocate Drainage Ditch	$100,000	$91,060	$4,470	$4,470
3	Construct Aircraft Wash Rack	$128,000	$116,557	$5,722	$5,722
4	Construct Taxiway A Holding Apron - RWY 3 End	$154,000	$140,232	$6,884	$6,884
5	Pavement Maintenance	$1,000,000	$910,600	$44,700	$44,700
Subtotal		***$1,684,000***	***$1,533,450***	***$75,275***	***$75,275***
LONG TERM					
1	Extend Runway 3-21 and Taxiway A - 300' and Construct Taxiway A Holding Apron and Land Acquisition of 6.31 Acres (Including Environmental Assessment)	$1,178,000	$1,072,687	$52,657	$52,657
2	Connect Terminal and Cargo Aprons (3,800 SY)	$358,000	$325,995	$16,003	$16,003
3	Construct T-Hangar Taxilanes (8,500 SY)	$893,000	$813,166	$39,917	$39,917
4	Pavement Maintenance	$3,000,000	$2,731,800	$134,100	$134,100
Subtotal		***$5,429,000***	***$4,943,647***	***$242,676***	***$242,677***
CIP Total		**$12,699,200**	**$10,809,733**	**$1,267,074**	**$622,394**

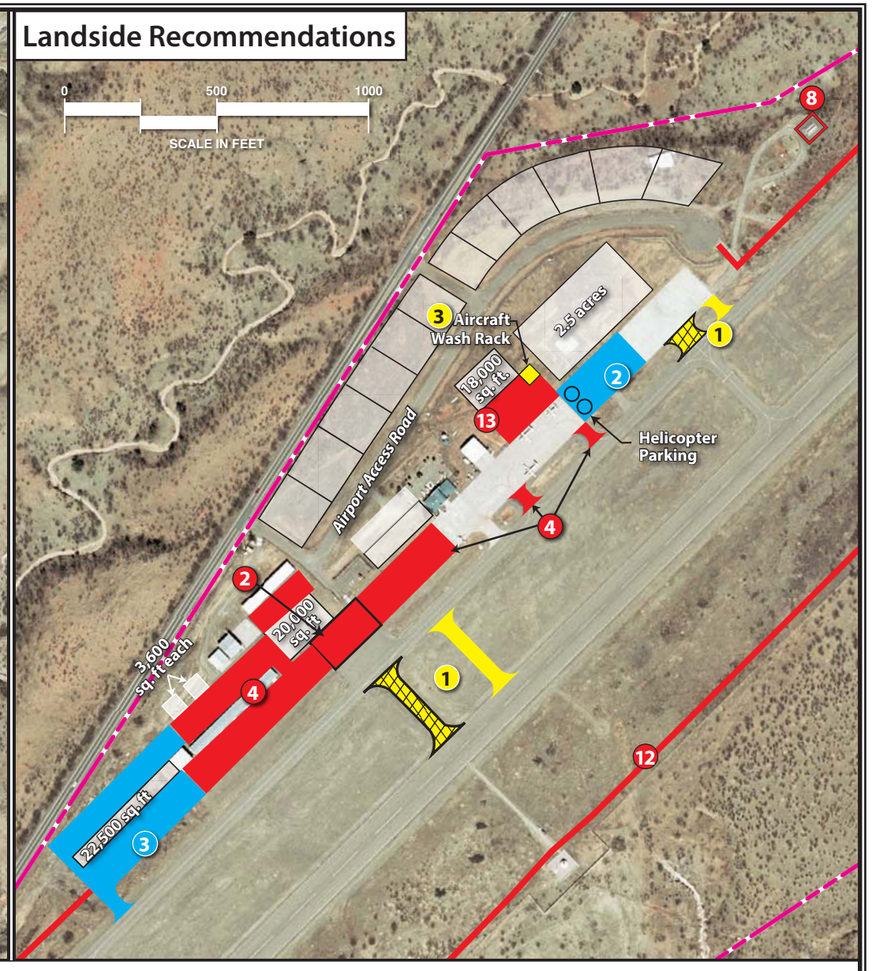
Exhibit 6A
CAPITAL IMPROVEMENT PROGRAM

12MP10-__-3/12/13

Airfield Recommendations



Landside Recommendations



SHORT TERM

2014
1. Environmental Assessment (Land Acquisition 15.84 Acres) - ***NP***

2015
2. Reconstruct Terminal Apron - Construction (2,225 SY)

2016
3. Land Acquisition (15.84 Acres)
4. Apron Pavement Preservation - T-Hangar Apron and Terminal Apron Connectors (17,800 SY)

2017
5. Erosion Mitigation - Mass Grade eroded embankment, install geogrid & supply/install area drains & pipes
6. RSA/OFA Obstruction Removal
7. Environmental Assessment (Perimeter Service Road) - ***NP***
8. Design/Construct New Fuel Farm

2018
9. Install REILs - Runway 3-21
10. Construct Perimeter Service Road - Design Only - ***NP***
11. Construct Terminal Apron Expansion - Design Only (3,300 SY) - ***NP***

2019
12. Construct Perimeter Service Road
13. Construct Terminal Apron Expansion (3,300 SY)

INTERMEDIATE TERM

1. Taxiway Reconfiguration (Taxiway E and D Stub Relocation)
2. Relocate Drainage Ditch
3. Construct Aircraft Wash Rack
4. Construct Taxiway A Holding Apron
5. Pavement Maintenance - ***NP***

LONG TERM

1. Extend Runway 3-21 and Taxiway A - 300' and Construct Taxiway A Holding Apron and Land Acquisition of 6.31 Acres (Including Environmental Assessment)
2. Connect Terminal and Cargo Aprons (3,800 SY)
3. Construct T-Hangar Taxilanes (8,500 SY)
4. Pavement Maintenance - ***NP***

NP - *Not Pictured*

NOTE: Proposed improvements not included will be privately developed or are not anticipated to occur until beyond the 20-year scope of this Master Plan.

Exhibit 6B
DEVELOPMENT STAGING

INTERMEDIATE PLANNING HORIZON

The intermediate term planning horizon focuses on the Airport's development needs during the six- to ten-year time frame. Due to the fluid nature of general aviation growth and the uncertainty of infrastructure and development needs more than five years into the future, the projects in the intermediate term were combined into a single project listing and not prioritized by year. However, the project listing is intended to depict a prioritization of projects as now anticipated to meet future demand. Intermediate projects are depicted on **Exhibit 6B** with yellow shading.

The implementation of many of the items in the intermediate term should be based upon actual demand. Those projects, such as the construction of additional apron pavement, should not be undertaken unless there is an existing demand for such facilities.

The intermediate term includes an airfield project to reconfigure taxiway access to the runway to reduce the potential for runway incursions. This includes the relocation of Taxiway E and the Taxiway D stub from the air cargo apron to Taxiway A. A project is also included to relocate the drainage ditch at the west end of Runway 3, which would ultimately obstruct runway design code (RDC) C-II RSA standards. Another project will construct a holding apron at the Runway 3 end of Taxiway A to improve taxiing efficiency and safety.

Landside projects in the intermediate term include the construction of an aircraft wash rack.

A total of $1,000,000 million is included in this planning period for on-going pavement maintenance needs such as crack sealing, rejuvenating seal coats, and slab replacements as necessary.

The total investment necessary for the intermediate term CIP is approximately $1,684,000. Of this total, $1,533,450 is eligible for FAA grant funding and $75,275 is eligible for state funds, with the airport sponsor responsible for $75,275.

LONG TERM PLANNING HORIZON

Long term improvements, as presented on **Exhibit 6B** with blue shading, include the proposed 300-foot extension to Runway 3-21 and Taxiway A along with the construction of a taxiway holding apron at the Runway 21 end of Taxiway A. This project would also include the acquisition of 6.31 acres of property that would be encompassed by the ultimate Runway 21 departure RPZ. These projects would satisfy the FAA's recommended runway length for most small and medium sized business jet aircraft. This project has been programmed for the long term horizon because there is not currently a specific user that is demanding additional runway length. This project has been included for planning purposes and specific justification will need to be detailed before the FAA will participate in funding the project. The total project cost for the runway/taxiway extension project represented on **Exhibit 6A** includes associated EA costs.

Landside projects programmed for the long term time frame include an additional 3,800 square yards of terminal apron, which will involve connecting the existing terminal apron with the cargo apron.

This space would include two dedicated helicopter parking spaces to replace the proposed elimination of the existing helipad. A project to construct 8,500 square yards of taxilane pavement included in the long term time frame and would be pursued should a developer decide to construct a new T-hangar facility at the southwest end of the landside area.

A total of $3,000,000 million is included in this planning period for on-going pavement maintenance needs such as crack sealing, rejuvenating seal coats, and slab replacements as necessary.

The total investment necessary for the long term CIP is approximately $5,429,000. Of this total, $4,943,647 is eligible for FAA grant funding and $242,676 is eligible for state funds, with the airport sponsor responsible for $242,677.

CAPITAL IMPROVEMENTS FUNDING

Financing for capital improvements comes from several sources. Contributors to the Airport's development are its users, through a system of user taxes, lease rates, fees, and charges. These sources include not only the rates and charges for Airport use imposed by Santa Cruz County, but also federal airport improvement programs. The following paragraphs outline the key sources for funding.

FEDERAL GRANTS

The United States Congress has long recognized the need to develop and maintain a system of aviation facilities across the nation for the purpose of national defense and promotion of interstate commerce. Various grant-in-aid programs to public airports have been established over the years for this purpose. The most recent legislation affecting federal funding was enacted on February 17, 2012 and is titled, the *FAA Modernization and Reform Act of 2012*.

The law authorizes the FAA's Airport Improvement Program (AIP) at $3.35 billion for fiscal years 2012 through 2015. Eligible airports, which include those in the *National Plan of Integrated Airport Systems* (NPIAS), such as Nogales International Airport, can apply for airport improvement grants. **Table 6B** presents the approximate distribution of the AIP funds. Currently, Nogales International Airport is eligible to apply for grants which may be funded through several categories.

Funding for AIP-eligible projects is undertaken through a cost-sharing arrangement, in which FAA provides approximately 91 percent of the cost and the airport sponsor invests the remaining approximately nine percent. In exchange for this level of funding, the airport sponsor is required to meet various Grant Assurances, including maintaining the improvement for its useful life, usually 20 years.

The source for AIP 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 Aviation Trust Fund also finances the operation of the FAA. It is funded by user fees, including taxes on airline tickets, aviation fuel, and various aircraft parts.

TABLE 6B
Federal AIP Funding Distribution

Funding Category	Percent of Total	Funds*
Apportionment/Entitlement		
Passenger Entitlements	29.19%	$977,865,000
Cargo Entitlements	3.00%	$100,500,000
Alaska Supplemental	0.65%	$21,775,000
State Apportionment for Nonprimary Entitlements	10.35%	$346,725,000
State Apportionment Based on Area and Population	9.65%	$323,275,000
Carryover	10.77%	$360,795,000
Small Airport Fund		
Small Hubs	1.67%	$55,945,000
Nonhubs	6.68%	$223,780,000
Nonprimary (GA and Reliever)	3.34%	$111,890,000
Discretionary		
Capacity/Safety/Security/Noise	11.36%	$380,560,000
Pure Discretionary	3.79%	$126,965,000
Set-Asides		
Noise	8.40%	$281,400,000
Military Airports Program	0.99%	$33,165,000
Reliever	0.16%	$5,360,000
Totals	100.00%	$3,350,000,000

* *FAA Modernization and Reform Act of 2012*
AIP: Airport Improvement Program
Source: FAA Order 5100.38C, Airport Improvement Program Handbook

Apportionment (Entitlement) Funds

AIP provides funding for eligible projects at airports through an apportionment (entitlement) program. Non-primary airports, such as Nogales International Airport, receive a guaranteed minimum level of federal assistance each year in the amount of $150,000. These funds are available to use in the fiscal year it becomes available and the following three fiscal years. Unused funds expire after four years unless the sponsor obligates the funds under a grant or transfers the funds to another NPIAS airport.

Small Airport Fund

If a large or medium hub commercial service airport chooses to institute a passenger facility charge (PFC), which is a fee of up to $4.50 on each airline ticket, for funding of capital improvement projects, then their apportionment is reduced. A portion of the reduced apportionment goes to the small airport fund. The small airport fund is reserved for small-hub primary commercial service airports, non-hub commercial service airports, and general aviation airports. Nogales International Airport is a general aviation airport; therefore, it is eligible for funds from this source.

Discretionary Funds

In a number of cases, airports face major projects that will require funds in excess of the airport's annual entitlements. Thus, additional funds from discretionary apportionments under AIP become desirable. The primary feature about discretionary funds is that they are distributed on a priority basis. These priorities are

established by the FAA, utilizing a priority code system. Under this system, projects are ranked by their purpose. Projects ensuring airport safety and security are ranked as the most important priorities, followed by maintaining current infrastructure development, mitigating noise and other environmental impacts, meeting standards, and increasing system capacity.

It is important to note that competition for discretionary funding is not limited to airports in the State of Arizona or those within the FAA Western Pacific Region. The funds are distributed to all airports in the country and, as such, are more difficult to obtain. High priority projects will often fare favorably, while lower priority projects many times will not receive discretionary grants.

Set-Aside Funds

Portions of AIP funds are set-asides designed to achieve specific funding minimums for noise compatibility planning and implementation, select former military airfields (Military Airport Program), and select reliever airports. It is not anticipated that Nogales International Airport will be eligible for this funding category.

FAA Facilities and Equipment (F&E) Program

The Airway Facilities Division of the FAA administers the Facilities and Equipment (F&E) Program. This program provides funding for the installation and maintenance of various navigational aids and equipment of the national airspace system. Under the F&E program, funding is provided primarily for FAA Airport Traffic Control Towers (ATCTs), enroute navigational aids, on-airport navigational aids, and approach lighting systems. The recommended projects at Nogales International Airport are not anticipated to qualify for the F&E program.

STATE FUNDING PROGRAM

In support of the state aviation 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 State Transportation Board establishes the policies for distribution of these state funds.

Under the State of Arizona's grant program, an airport can receive funding for one-half (currently approximately 4.5 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.

State Airport Loan Program

The ADOT – Aeronautic Group 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 hang-

ars 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 Five-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.

Pavement Maintenance Program

The airport system in Arizona is a multi-million dollar investment of public and private funds that must be protected and preserved. State aviation fund dollars are limited, and the State Transportation Board recognizes that need to protect and extend the maximum useful life of the airport system's pavement. The Arizona Pavement Preservation Program (APPP) has been established to assist in the preservation of the Arizona airports' system infrastructure.

Public Law 103-305 requires that airports requesting federal AIP funding for pavement rehabilitation or reconstruction have an effective pavement maintenance program system. To this end, ADOT-Aeronautics Group maintains an Airport Pavement Management System (APMS). This system requires monthly airport inspections which are conducted by airport management and supplied to ADOT.

The Arizona Airport Pavement Management System uses the Army Corps of Engineers "Micropaver" program as a basis for generating a Five-Year APPP. The APMS consists of visual inspections of all airport pavements. Evaluations are made of the types and severities observed and entered into a computer program database. Pavement Condition Index (PCI) values are determined through the visual assessment of pavement conditions in accordance with the most recent FAA Advisory Circular 150/5380-7, *Pavement Management System*, and range from 0 (failed) to 100 (excellent). Every three years, a complete database update with new visual observations is conducted. Individual airport reports from the update are shared with all participating system airports. ADOT-Aeronautics Group ensures that the APMS database is kept current, in compliance with FAA requirements.

Every year, ADOT-Aeronautics Group, utilizing the APMS, will identify airport pavement maintenance projects eligible for funding for the upcoming five years. These projects will appear in the State's Five-Year Airport Development Program. Once a project has been identified and approved for funding by the State Transportation Board, the airport sponsor may elect to accept a state grant for the project and not participate in the APPP, or the airport sponsor may sign an Inter-Government Agreement (IGA) with ADOT-Aeronautics Group to participate in the APPP.

LOCAL FUNDING

The balance of project costs, after consideration has been given to grants, must be funded through local resources. Nogales International Airport is operated by Santa Cruz County and could receive some assistance from the County. The goal for the operation of the Airport is to generate ample revenues to cover all operating and maintenance costs, as well as the local matching share of capital expenditures. As with many airports, this is not always possible and other financial methods will be needed.

According to **Exhibit 6A**, local funding will be needed in each planning horizon. This includes $304,443 in the short term, $75,275 in the intermediate term, and $242,677 in the long term.

There are several alternatives for local financing 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.

Local funding options may also include the solicitation of private developers to construct and manage hangar facilities at the Airport. The capital improvement program has assumed that hangar facility development would be undertaken in this manner. Outsourcing hangar development can benefit the airport sponsor by generating land lease revenue and relieving the sponsor of operations and maintenance costs.

FUNDING AIRPORT OPERATIONS

The Airport is operated by Santa Cruz County through the collection of various rates and charges from general aviation revenue sources. These revenues are generated specifically by airport operations. There are, however, restrictions on the use of revenues collected by the Airport. All receipts, excluding bond proceeds or related grants and interest, are irrevocably pledged to the punctual payment of operating and maintenance expenses, payment of debt service for as long as bonds remain outstanding, or to additions or improvements to Airport facilities.

Operating revenues at Nogales International Airport currently include ground leases and rentals. Revenues are anticipated to continue to grow consistent with aviation activity and an overall positive economic outlook. As more aircraft base at the Airport, additional revenues from land leases should increase proportionately.

To ensure that the airport maximizes revenue potential in the future, Santa Cruz County should also periodically review aviation services rates and charges (i.e., ground lease rates, rental rates, etc.) at other airports to ensure that rates and charges at the Airport are competitive and similar to aviation services at other airports and further generate the opportunity for the County to establish other means of revenue collection or establish future rates and charges. Additionally, all new leases at the Airport should have inflation clauses allowing for periodic rate increases in line with inflationary factors.

While it is desirable for the Airport to directly pay for itself, the indirect and intangible benefits of the Airport to the community's economy and growth must be considered in implementing future capital improvements.

Airport Rates and Charges

The FAA places several stipulations on rates and charges establishment and collection; however, two primary considerations need to be addressed. First, the rates and charges must be fair, equally applied, and resemble fair market value. Second, the rates and charges collected must be returned to and used only by and/or for the airport. In other words, the revenues generated by Airport operations cannot be diverted to the general use of Santa Cruz County. The FAA requires funds to be used at airports as these funds are many times needed to either support the day-to-day operational costs or offset capital improvement costs.

The following provides several activities that could enhance revenue production for an airport, some of which are currently being practiced at Nogales International Airport.

Aircraft Parking

Aircraft parking fees, also referred to as tiedown fees, are typically assessed to those aircraft utilizing a portion of an aircraft parking area that is owned by the airport. These fees are most generally assessed on a daily or monthly basis, depending upon the specific activity of a particular aircraft.

Aircraft parking fees can be established in several different ways. Typically, airports assess aircraft parking fees in accordance with an established schedule in which an aircraft within a designated weight and/or size pays a similar fee (i.e., small aircraft, single engine aircraft). Aircraft parking fees may also be charged according to a "cents per 1,000 pounds" basis in which larger aircraft with increased weights would obviously pay more for utilizing the aircraft parking apron. There are also instances in which aircraft parking fees are not assessed on an airport.

An airport sponsor may also include in a lease agreement with an aviation-related commercial operator at the airport to collect aircraft parking fees on portions of an aircraft parking apron in which the airport does not own or is leasing to a commercial operator, such as a fixed base operator (FBO). As a result, the airport could directly collect parking fees from an aircraft utilizing this space or allow the commercial operator to collect the parking fee, in which the agreement may allow the commercial operator to retain a portion of the parking fee as an administrative or service fee.

As previously discussed, aircraft parking fees can be assessed on a daily or monthly basis. Daily aircraft parking fees are typically assessed to transient aircraft utilizing the airport on a short-term basis, while monthly fees are charged to aircraft that utilize a particular parking area for the permanent storage of their aircraft. Monthly aircraft parking fees are often assessed at airports that contain a waiting list for aircraft hangar storage space. It is also common practice at many airports to waive a daily aircraft parking fee in the event the aircraft purchases fuel prior to departing the airport.

Aircraft Storage Hangars

There are several types of aircraft storage hangars that can accommodate aircraft on an airport. In order to establish hangar fees, an airport typically factors in such qualities as hangar size, location, and utilities. Aircraft hangar fees are most often charged on a monthly basis.

Common aircraft storage hangars are typically categorized as shade hangars, T-hangars, and conventional hangars. Shade hangars consist of tiedown spaces with a protective roof covering. T-hangars provide for separate, single-aircraft storage areas. Conventional hangars provide a larger enclosed space that can accommodate larger multi-engine piston or turbine aircraft and/or multiple aircraft storage. Conventional hangars can also be utilized by aviation-related commercial operators for their business activities on an airport.

Location can also play a role in determining hangar rates. Aircraft storage hangars with direct access to improved taxiways/taxilanes and adjacent to aviation services being offered at an airport can oftentimes be more expensive to rent. In addition, the type of utility infrastructure being offered to the hangar can also help determine storage fees. Smaller aircraft storage hangars, such as a T-hangar or small box hangar, can either be granted access through a manual sliding door or electric door. It is common for hangars that provide electric doors to have higher rental fees as the cost associated with constructing these hangars would exceed the cost associated with simpler structures.

At some airports, hangar facilities are constructed by the airport sponsor, while at other airports, hangars are built by private entities. In some cases, airports have both public and private hangar facilities available. Hangars can be expensive to construct and offer minimal return on investment in the short term. In order to amortize the cost of constructing hangars, lease rates should be developed at a minimum to recover development and finance costs.

Ground Rental

Ground rentals can be applied to aviation and non-aviation development on an airport. Also known as a land lease, a ground lease can be structured to meet the particular needs of an airport operator in terms of location, terrain features, amount of land needed, and type of facility infrastructure included.

One of the single most valuable assets available to an airport is the leasable land with access to the runway/taxiway system. For aviation-related businesses, it is critical that they be located on an airport. Airport property is available for long term lease but, in most cases, it cannot be sold. At the expiration of the lease and any extensions, the improvements on the leased land revert back to the airport sponsor. In order for this arrangement to make financial sense, most ground leases are at least 20 years in length and include extension opportunities. Those who lease land on an airport are typically interested in constructing a hangar for their own private use, for sub-lease, or for operation of an airport business. Therefore, the long term lease arrangement is important in order to obtain capital funding for the construction of a hangar or other type of facility. It should also be noted that ground leases should include the opportunity to periodically review the lease and adjust the rate according to the consumer

price index (CPI). Typical lease agreements range from 20 to 30 years with options for extensions.

Ground leases are typically established on a yearly fee schedule based upon the amount of square feet leased. The amount charged can vary greatly depending on the level of improvements to the land. For example, undeveloped land with readily accessible utilities and taxiway access can generate more revenue than unimproved property.

Some airports will have other leasable space available. For example, airports with a terminal building may have office or counter space available for aviation and non-aviation related businesses. Some example businesses could include FBOs, aircraft sales, flight instruction, aircraft insurance, and a restaurant.

As previously mentioned, under certain circumstances, an airport sponsor may utilize portions of the airport for non-aeronautical purposes such as commercial and/or industrial development if certain areas are not needed to satisfy aviation demand or are not accessible to aviation activity. Prior to an airport pursuing a ground lease with a commercial operator for non-aeronautical purposes, the sponsor must formally request from the FAA a release from certain land parcels that may not be needed for aviation-related uses.

Fuel Sales and Flowage

Fuel sales are typically managed at an airport in one of two ways: the airport sponsor acts as the fuel distributor or fueling operations are sub-contracted to an FBO. If the airport sponsor acts as the fuel distributor, then the airport would receive revenues equal to the difference between wholesale and retail prices. Of course, there are added expenses such as employing people to fuel the aircraft.

When these services are undertaken by an FBO, the airport sponsor typically receives a fuel flowage fee per gallon of fuel. By way of agreement with the airport sponsor, FBOs would be required to pay a fuel flowage fee for each gallon of fuel sold or received into inventory. In the case of self-fueling entities, a fuel flowage fee could apply for each gallon of fuel dispensed. Fuel flowage fees are typically paid on a "cents per gallon" basis. In some instances, fuel flowage fees will be established based upon the type of aviation activity. For example, commercial airline service operators may be assessed a higher fuel flowage fee than general aviation aircraft or no fuel flowage fee at all if being assessed a landing fee (to be discussed in the next section). Fuel flowage fees can also be distinguished by type of fuel (100LL or Jet A).

The owner of the fuel farm can also be the airport sponsor or an FBO operator. If the airport sponsor owns the fuel farm and the FBO operator undertakes the fueling activities, then a separate fuel storage fee can be charged or a higher fuel flowage fee may be assessed.

Landing Fees

Landing fees typically only apply to larger aircraft, such as those over 60,000 pounds, for example, and only those involved in commercial airline or air taxi operations. Landing fees are not common on general aviation airports and are generally discouraged due to collection difficulty. Moreover, landing fees are somewhat discouraging to aircraft operators,

who will many times elect to utilize a nearby airport that does not collect a landing fee.

When landing fees are assessed, they are most commonly based upon aircraft weight and a "cents per 1,000 pounds" approach. In addition, some airport sponsors may use a flat fee approach wherein aircraft within a specified weight range are charged the same fee.

Landing fees may be collected directly by the airport sponsor, or an airport may have an agreement with a commercial operator to collect landing fees. Similar to what was discussed with aircraft parking fees, under this scenario, the agreement may allow the commercial operator, such as an FBO, to retain a portion of the landing fee as an administrative or service fee.

PLAN IMPLEMENTATION

The best means to begin implementation of the recommendations in this Master Plan is to first recognize that planning is a continuous process that does not end with completion and approval of this document. Rather, the ability to continuously monitor the existing and forecast status of airport activity must be provided and maintained. The issues upon which this report is based will remain valid for a number of years. The primary goal is for the Airport to best serve the air transportation needs of the region, while continuing to be economically self-sufficient.

The actual need for facilities is most appropriately established by activity levels rather than a specified date. For example, projections have been made as to when new apron space will need to be constructed. In reality, however, the time frame in which the development is needed may be substantially different. Actual demand may be slower to develop than expected. On the other hand, high levels of demand may establish the need to accelerate the development. Although every effort has been made to conservatively estimate when facility development may be needed, aviation demand will dictate when facility improvements need to be delayed or accelerated.

The real value of a study of this nature is in keeping the issues and objectives in the minds of the managers and policymakers so that they are better able to recognize changes and their effects. In addition to adjustments in aviation demand, decisions made as to when to undertake the improvements recommended in this Master Plan will impact the period that the plan remains valid. The format used in this plan is intended to reduce the need for formal and costly updates by simply adjusting the timing. Updating can be done by Airport management, thereby improving the plan's effectiveness.

Appendix A

GLOSSARY OF TERMS

Glossary of Terms

A

ABOVE GROUND LEVEL: The elevation of a point or surface above the ground.

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

ADVISORY CIRCULAR: External publications issued by the FAA consisting of nonregulatory material providing for the recommendations relative to a policy, guidance and information relative to a specific aviation subject.

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) transports 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.

AIRCRAFT: A transportation vehicle that is used or intended for use for flight.

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.

AIRCRAFT OPERATION: The landing, takeoff, or touch-and-go procedure by an aircraft on a runway at an airport.

AIRCRAFT OPERATIONS AREA (AOA): A restricted and secure area on the airport property designed to protect all aspects related to aircraft operations.

AIRCRAFT OWNERS AND PILOTS ASSOCIATION: A private organization serving the interests and needs of general aviation pilots and aircraft owners.

AIRCRAFT RESCUE AND FIRE FIGHTING: A facility located at an airport that provides emergency vehicles, extinguishing agents, and personnel responsible for minimizing the impacts of an aircraft accident or incident.

AIRFIELD: The portion of an airport which contains the facilities necessary for the operation of aircraft.

AIRLINE HUB: An airport at which an airline concentrates a significant portion of its activity and which often has a significant amount of connecting traffic.

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.

AIRPORT AUTHORITY: A quasi-governmental public organization responsible for setting the policies governing the management and operation of an airport or system of airports under its jurisdiction.

AIRPORT BEACON: A navigational aid located at an airport which displays a rotating light beam to identify whether an airport is lighted.

AIRPORT CAPITAL IMPROVEMENT PLAN: The planning program used by the Federal Aviation Administration to identify, prioritize, and distribute funds for airport development and the needs of the National Airspace System to meet specified national goals and objectives.

AIRPORT ELEVATION: The highest point on the runway system at an airport expressed in feet above mean sea level (MSL).

AIRPORT IMPROVEMENT PROGRAM: A program authorized by the Airport and Airway

Improvement Act of 1982 that provides funding for airport planning and development.

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

AIRPORT LAYOUT PLAN (ALP): A scaled drawing of the existing and planned land and facilities necessary for the operation and development of the airport.

AIRPORT LAYOUT PLAN DRAWING SET: A set of technical drawings depicting the current and future airport conditions. The individual sheets comprising the set can vary with the complexities of the airport, but the FAA-required drawings include the Airport Layout Plan (sometimes referred to as the Airport Layout Drawing (ALD), the Airport Airspace Drawing, and the Inner Portion of the Approach Surface Drawing, On-Airport Land Use Drawing, and Property Map.

AIRPORT MASTER PLAN: The planner's concept of the long-term development of an airport.

AIRPORT MOVEMENT AREA SAFETY SYSTEM: A system that provides automated alerts and warnings of potential runway incursions or other hazardous aircraft movement events.

AIRPORT OBSTRUCTION CHART: A scaled drawing depicting the Federal Aviation Regulation (FAR) Part 77 surfaces, a representation of objects that penetrate these surfaces, runway, taxiway, and ramp areas, navigational aids, buildings, roads and other detail in the vicinity of an airport.

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 SPONSOR: The entity that is legally responsible for the management and operation of an airport, including the fulfillment of the requirements of laws and regulations related thereto.

AIRPORT SURFACE DETECTION EQUIPMENT: A radar system that provides air traffic controllers with a visual representation of the movement of aircraft and other vehicles on the ground on the airfield at an airport.

AIRPORT SURVEILLANCE RADAR: The primary radar located at an airport or in an air traffic control terminal area that receives a signal at an antenna and transmits the signal to air traffic control display equipment defining the location of aircraft in the air. The signal provides only the azimuth and range of aircraft from the location of the antenna.

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: A facility which provides en route air traffic control service to aircraft operating on an IFR flight plan within controlled airspace over a large, multi-state region.

AIRSIDE: The portion of an airport that contains the facilities necessary for the operation of aircraft.

AIRSPACE: The volume of space above the surface of the ground that is provided for the operation of aircraft.

AIR TAXI: An air carrier certificated in accordance with FAR Part 121 and 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.

AIR TRAFFIC CONTROL: A service operated by an appropriate organization for the purpose of providing for the safe, orderly, and expeditious flow of 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 en route phase of flight.

AIR TRAFFIC CONTROL SYSTEM COMMAND CENTER: A facility operated by the FAA which is responsible for the central flow control, the central altitude reservation system, the airport reservation position system, and the air traffic service contingency command for the air traffic control system.

AIR TRAFFIC HUB: A categorization of commercial service airports or group of commercial service airports in a metropolitan or urban area based upon the proportion of annual national enplanements existing at the airport or airports. The categories are large hub, medium hub, small hub, or non-hub. It forms the basis for the apportionment of entitlement funds.

AIR TRANSPORT ASSOCIATION OF AMERICA: An organization consisting of the principal U.S. airlines that represents the interests of the airline industry on major aviation issues before federal, state, and local government bodies. It promotes air transportation safety by coordinating industry and governmental safety programs and it serves as a focal point for industry efforts to standardize practices and enhance the efficiency of the air transportation system.

ALERT AREA: See special-use airspace.

ALTITUDE: The vertical distance measured in feet above mean sea level.

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.

APPROACH SURFACE: An imaginary obstruction limiting surface defined in FAR Part 77 which is longitudinally centered on an extended runway centerline and extends outward and upward from the primary surface at each end of a runway at a designated slope and distance based upon the type of available or planned approach by aircraft to a runway.

APRON: A specified portion of the airfield used for passenger, cargo or freight loading and unloading, aircraft parking, and the refueling, maintenance and servicing of aircraft.

AREA NAVIGATION: The air navigation procedure that provides the capability to establish and maintain a flight path on an arbitrary course that remains within the coverage area of navigational sources being used.

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.

AUTOMATED SURFACE OBSERVATION SYSTEM (ASOS): A reporting system that provides frequent airport ground surface weather observation data through digitized voice broadcasts and printed reports.

AUTOMATIC WEATHER OBSERVATION STATION (AWOS): Equipment used to automatically record weather conditions (i.e. cloud height, visibility, wind speed and direction, temperature, dew point, etc.)

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

AVIGATION EASEMENT: A contractual right or a property interest in land over which a right of unobstructed flight in the airspace is established.

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

B

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."

BASED AIRCRAFT: The general aviation aircraft that use a specific airport as a home base.

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.

BLAST PAD: A prepared surface adjacent to the end of a runway for the purpose of eliminating the erosion of the ground surface by the wind forces produced by airplanes at the initiation of takeoff operations.

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

C

CAPITAL IMPROVEMENT PLAN: The planning program used by the Federal Aviation Administration to identify, prioritize, and distribute Airport Improvement Program funds for airport development and the needs of the National Airspace System to meet specified national goals and objectives.

CARGO SERVICE AIRPORT: An airport served by aircraft providing air transportation of property only, including mail, with an annual aggregate landed weight of at least 100,000,000 pounds.

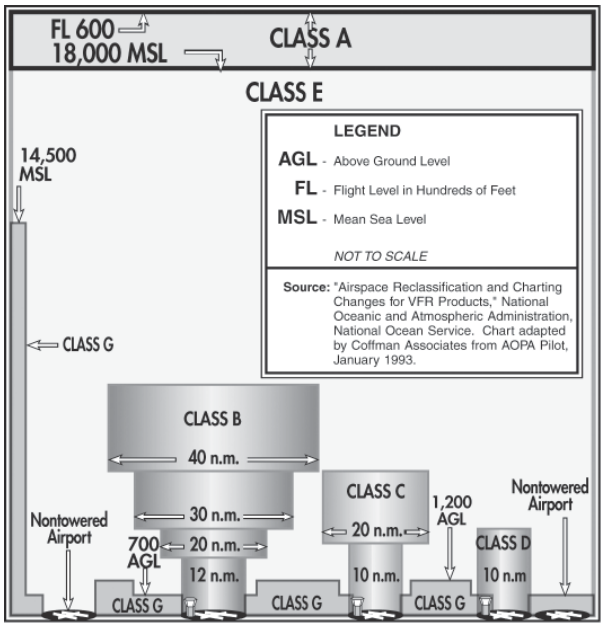
CATEGORY I: An Instrument Landing System (ILS) that provides acceptable guidance information to an aircraft from the coverage limits of the ILS to the point at which the localizer course line intersects the glide path at a decision height of 200 feet above the horizontal plane containing the runway threshold.

CATEGORY II: An ILS that provides acceptable guidance information to an aircraft from the coverage limits of the ILS to the point at which the localizer course line intersects the glide path at a decision height of 100 feet above the horizontal plane containing the runway threshold.

CATEGORY III: An ILS that provides acceptable guidance information to a pilot from the coverage limits of the ILS with no decision height specified above the horizontal plane containing the runway threshold.

CEILING: The height above the ground surface to the location of the lowest layer of clouds which is reported as either broken or overcast.

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.

COMMERCIAL SERVICE AIRPORT: A public airport providing scheduled passenger service that enplanes at least 2,500 annual passengers.

COMMON TRAFFIC ADVISORY FREQUENCY: A radio frequency identified in the appropriate aeronautical chart which is designated for the purpose of transmitting airport advisory information and procedures while operating to or from an uncontrolled airport.

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

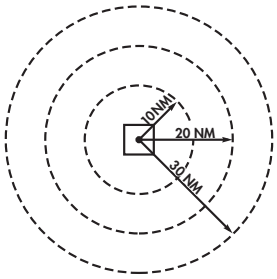
CONICAL SURFACE: An imaginary obstruction-limiting surface defined in FAR Part 77 that extends from the edge of the horizontal surface outward and upward at a slope of 20 to 1 for a horizontal distance of 4,000 feet.

CONTROLLED AIRPORT: An airport that has an operating airport traffic control tower.

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 airport 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 airports that have an operational control tower. Class D airspace is individually tailored and configured to encompass published instrument approach procedure . 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: A wind that is not parallel to a runway centerline or to the intended flight path of an aircraft.

CROSSWIND COMPONENT: The component of wind that is at a right angle to the runway centerline or the intended flight path of an aircraft.

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

D

DECIBEL: A unit of noise representing a level relative to a reference of a sound pressure 20 micro newtons per square meter.

DECISION HEIGHT/DECISION ALTITUDE: The height above the end of the runway surface at which a decision must be made by a pilot during the ILS or Precision Approach Radar approach to either continue the approach or to execute a missed approach.

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

DEPARTMENT OF TRANSPORTATION: The cabinet level federal government organization consisting of modal operating agencies, such as the Federal Aviation Administration, which was established to promote the coordination of federal transportation programs and to act as a focal point for research and development efforts in transportation.

DISCRETIONARY FUNDS: Federal grant funds that may be appropriated to an airport based upon designation by the Secretary of Transportation or Congress to meet a specified national priority such as enhancing capacity, safety, and security, or mitigating noise.

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 Aweighted 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."

E

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.

ELEVATION: The vertical distance measured in feet above mean sea level.

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

ENPLANEMENT: The boarding of a passenger, cargo, freight, or mail on an aircraft at an airport.

ENTITLEMENT: Federal funds for which a commercial service airport may be eligible based upon its annual passenger enplanements.

ENVIRONMENTAL ASSESSMENT (EA): An environmental analysis performed pursuant to the National Environmental Policy Act to determine whether an action would significantly affect the environment and thus require a more detailed environmental impact statement.

ENVIRONMENTAL AUDIT: An assessment of the current status of a party's compliance with applicable

environmental requirements of a party's environmental compliance policies, practices, and controls.

ENVIRONMENTAL IMPACT STATEMENT (EIS): A document required of federal agencies by the National Environmental Policy Act for major projects are legislative proposals affecting the environment. It is a tool for decision-making describing the positive and negative effects of a proposed action and citing alternative actions.

ESSENTIAL AIR SERVICE: A federal program which guarantees air carrier service to selected small cities by providing subsidies as needed to prevent these cities from such service.

F

FEDERAL AVIATION REGULATIONS: The general and permanent rules established by the executive departments and agencies of the Federal Government for aviation, which are published in the Federal Register. These are the aviation subset of the Code of Federal Regulations.

FEDERAL INSPECTION SERVICES: The provision of customs and immigration services including passport inspection, inspection of baggage, the collection of duties on certain imported items, and the inspections for agricultural products, illegal drugs, or other restricted items.

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."

FINAL APPROACH AND TAKEOFF AREA (FATO). A defined area over which the final phase of the helicopter approach to a hover, or a landing is completed and from which the takeoff is initiated.

FINAL APPROACH FIX: The designated point at which the final approach segment for an aircraft landing on a runway begins for a non-precision approach.

FINDING OF NO SIGNIFICANT IMPACT (FONSI): A public document prepared by a Federal agency that presents the rationale why a proposed action will not have a significant effect on the environment and for which an environmental impact statement will not be prepared.

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.

FLIGHT LEVEL: A measure of altitude used by aircraft flying above 18,000 feet. Flight levels are indicated by three digits representing the pressure altitude in hundreds of feet. An airplane flying at flight level 360 is flying at a pressure altitude of 36,000 feet. This is expressed as FL 360.

FLIGHT SERVICE STATION: An operations facility in the national flight advisory system which utilizes data interchange facilities for the collection and dissemination of Notices to Airmen, weather, and administrative data and which provides pre-flight and in-flight advisory services to pilots through air and ground based communication facilities.

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.

G

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.

GENERAL AVIATION AIRPORT: An airport that provides air service to only general aviation.

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 (GPS): A system of 48 satellites used as reference points to enable navigators equipped with GPS receivers to determine their latitude, longitude, and altitude.

GROUND ACCESS: The transportation system on and around the airport that provides access to and from the airport by ground transportation vehicles for passengers, employees, cargo, freight, and airport services.

H

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

HIGH INTENSITY RUNWAY LIGHTS: The highest classification in terms of intensity or brightness for lights designated for use in delineating the sides of a runway.

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.

HORIZONTAL SURFACE: An imaginary obstruction- limiting surface defined in FAR Part 77 that is specified as a portion of a horizontal plane surrounding a runway located 150 feet above the established airport elevation. The specific horizontal dimensions of this surface are a function of the types of approaches existing or planned for the runway.

I

INITIAL APPROACH FIX: The designated point at which the initial approach segment begins for an instrument approach to a runway.

INSTRUMENT APPROACH PROCEDURE: 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): Procedures for the conduct of flight in weather conditions below Visual Flight Rules weather minimums. The term IFR is often also used to define weather conditions and the type of flight plan under which an aircraft is operating.

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.

INSTRUMENT METEOROLOGICAL CONDITIONS: Meteorological conditions expressed in terms of specific visibility and ceiling conditions that are less than the minimums specified for visual meteorological conditions.

ITINERANT OPERATIONS: Operations by aircraft that are not based at a specified airport.

K

KNOTS: A unit of speed length used in navigation that is equivalent to the number of nautical miles traveled in one hour.

L

LANDSIDE: The portion of an airport that provides the facilities necessary for the processing of passengers, cargo, freight, and ground transportation vehicles.

LANDING DISTANCE AVAILABLE (LDA): See declared distances.

LARGE AIRPLANE: An airplane that has a maximum certified takeoff weight in excess of 12,500 pounds.

LOCAL AREA AUGMENTATION SYSTEM: A differential GPS system that provides localized measurement correction signals to the basic GPS signals to improve navigational accuracy integrity, continuity, and availability.

LOCAL OPERATIONS: Aircraft operations performed by aircraft that are based at the airport and that operate in the local traffic pattern or within sight of the airport, that are known to be departing for or arriving from flights in local practice areas within a prescribed distance from the airport, or that execute simulated instrument approaches at the airport.

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.

LONG RANGE NAVIGATION SYSTEM (LORAN): Long range navigation is 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 en route navigation.

LOW INTENSITY RUNWAY LIGHTS: The lowest classification in terms of intensity or brightness for lights designated for use in delineating the sides of a runway.

M

MEDIUM INTENSITY RUNWAY LIGHTS: The middle classification in terms of intensity or brightness for lights designated for use in delineating the sides of a runway.

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

MILITARY OPERATIONS: Aircraft operations that are performed in military aircraft.

MILITARY OPERATIONS AREA (MOA): See special-use airspace

MILITARY TRAINING ROUTE: An air route depicted on aeronautical charts for the conduct of military flight training at speeds above 250 knots.

MISSED APPROACH COURSE (MAC): The flight route to be followed if, after an instrument approach, a landing is not affected, 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.

N

NATIONAL AIRSPACE SYSTEM: The network of air traffic control facilities, air traffic control areas, and navigational facilities through the U.S.

NATIONAL PLAN OF INTEGRATED AIRPORT SYSTEMS: The national airport system plan developed by the Secretary of Transportation on a biannual basis for the development of public use airports to meet national air transportation needs.

NATIONAL TRANSPORTATION SAFETY BOARD: A federal government organization established to investigate and determine the probable cause of transportation accidents, to recommend equipment and procedures to enhance transportation safety, and to review on appeal the suspension or revocation of any certificates or licenses issued by the Secretary of Transportation.

NAUTICAL MILE: A unit of length used in navigation which is equivalent to the distance spanned by one minute of arc in latitude, that is, 1,852 meters or 6,076 feet. It is equivalent to approximately 1.15 statute mile.

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.)

NAVIGATIONAL AID: A facility used as, available for use as, or designed for use as an aid to air navigation.

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

NON-DIRECTIONAL 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.

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

NOTICE TO AIRMEN: A notice containing information concerning the establishment, condition, or change in any component of or hazard in the National Airspace System, the
timely knowledge of which is considered essential to personnel concerned with flight operations.

O

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.

ONE-ENGINE INOPERABLE SURFACE: A surface emanating from the runway end at a slope ratio of 62.5:1. Air carrier airports are required to maintain a technical drawing of this surface depicting any object penetrations by January 1, 2010.

OPERATION: The take-off, landing, or touch-and-go procedure by an aircraft on a runway at an airport.

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.

P

PILOT CONTROLLED LIGHTING: Runway lighting systems at an airport that are controlled by activating the microphone of a pilot on a specified radio frequency.

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 APPROACH RADAR: A radar facility in the terminal air traffic control system used to detect and display with a high degree of accuracy the direction, range, and elevation of an aircraft on the final approach to a runway.

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.

PRIMARY AIRPORT: A commercial service airport that enplanes at least 10,000 annual passengers.

PRIMARY SURFACE: An imaginary obstruction limiting surface defined in FAR Part 77 that is specified as a rectangular surface longitudinally centered about a runway. The specific dimensions of this surface are a function of the types of approaches existing or planned for the runway.

PROHIBITED AREA: See special-use airspace.

PVC: Poor visibility and ceiling. Used in determining Annual Service Volume. PVC conditions exist when the cloud ceiling is less than 500 feet and visibility is less than one mile.

R

RADIAL: A navigational signal generated by a Very High Frequency Omni-directional Range or VORTAC station that is measured as an azimuth from the station.

REGRESSION ANALYSIS: A statistical technique that seeks to identify and quantify the relationships between factors associated with a forecast.

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 en route 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 en route 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 ALIGNMENT INDICATOR LIGHT: A series of high intensity sequentially flashing lights installed on the extended centerline of the runway usually in conjunction with an approach lighting system.

RUNWAY DESIGN CODE: A code signifiying the design standards to which the runway is to be built.

RUNWAY END IDENTIFICATION LIGHTING (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 REFERENCE CODE: A code signifying the current operational capabilities of a runway and associated taxiway.

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 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.

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.

S

SCOPE: The document that identifies and defines the tasks, emphasis, and level of effort associated with a project or study.

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.

SMALL AIRCRAFT: An aircraft that has a maximum certified takeoff weight of up to 12,500 pounds.

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 INSTRUMENT DEPARTURE PROCEDURES: A published standard flight procedure to be utilized following takeoff to provide a transition between the airport and the terminal area or en route airspace.

STANDARD TERMINAL ARRIVAL ROUTE (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.

STOPWAY: An area beyond the end of a takeoff runway that is designed to support an aircraft during

an aborted takeoff without causing structural damage to the aircraft. It is not to be used for takeoff, landing, or taxiing by aircraft.

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.

T

TACTICAL AIR NAVIGATION (TACAN): An ultrahigh 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 DESIGN GROUP: A classification of airplanes based on outer to outer Main Gear Width (MGW) and Cockpit to Main Gear (CMG) distance.

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.

TERMINAL INSTRUMENT PROCEDURES: Published flight procedures for conducting instrument approaches to runways under instrument meteorological conditions.

TERMINAL RADAR APPROACH CONTROL: An element of the air traffic control system responsible for monitoring the en-route and terminal segment of air traffic in the airspace surrounding airports with moderate to high levels of air traffic.

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: The point at which a landing aircraft makes contact with the runway surface.

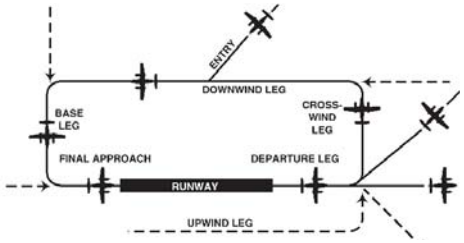
TOUCHDOWN AND LIFT-OFF AREA (TLOF): A load bearing, generally paved area, normally centered in the FATO, on which the helicopter lands or takes off.

TOUCHDOWN ZONE (TDZ): The first 3,000 feet of the runway beginning at the threshold.

TOUCHDOWN ZONE ELEVATION (TDZE): The highest elevation in the touchdown zone.

TOUCHDOWN ZONE (TDZ) LIGHTING: 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.



U

UNCONTROLLED AIRPORT: An airport without an air traffic control tower at which the control of Visual Flight Rules traffic is not exercised.

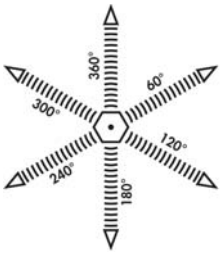
UNCONTROLLED AIRSPACE: Airspace within which aircraft are not subject to air traffic control.

UNIVERSAL COMMUNICATION (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."

V

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



VERY HIGH FREQUENCY/ OMNIDIRECTIONAL RANGE (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 OMNI-DIRECTIONAL RANGE/ 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.

VISUAL METEOROLOGICAL CONDITIONS: Meteorological conditions expressed in terms of specific visibility and ceiling conditions which are equal to or greater than the threshold values for instrument meteorological conditions.

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

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

W

WARNING AREA: See special-use airspace.

WIDE AREA AUGMENTATION SYSTEM: An enhancement of the Global Positioning System that includes integrity broadcasts, differential corrections, and additional ranging signals for the purpose of providing the accuracy, integrity, availability, and continuity required to support all phases of flight.

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 lighting system with sequenced flashers (CAT II configuration)

AOA: Aircraft Operation Area

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: automatic weather observation station

BRL: building restriction line

CFR: Code of Federal Regulation

CIP: capital improvement program

DME: distance measuring equipment

DNL: day-night noise level

DWL: runway weight bearing capacity of aircraft with dual-wheel type landing gear

DTWL: runway weight bearing capacity of 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

LOM: compass locator at outer marker

LORAN: long range navigation

MALS: medium intensity approach lighting system with 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)

NPES: National Pollutant Discharge Elimination System

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

PVC: poor visibility and ceiling

RCO: remote communications outlet

RRC: Runway Reference Code

RDC: Runway Design Code

REIL: runway end identification lighting

RNAV: area navigation

RPZ: runway protection zone

RSA: runway safety area

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 runway alignment indicator lights

STAR: standard terminal arrival route

SWL: 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

TDG: Taxiway Design Group

TLOF: Touchdown and lift-off

TDZ: touchdown zone

TDZE: touchdown zone elevation

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 omni-directional range

VORTAC: VOR and TACAN collocated

Appendix B

AIRPORT LAYOUT PLAN DRAWINGS

Appendix B
AIRPORT LAYOUT PLANS

As part of this Airport Master Plan, the Federal Aviation Administration (FAA) requires the development of several technical drawings detailing specific parts of the airport and its environs. The technical drawings are collectively referred to as the Airport Layout Plan (ALP) set. These drawings were created on a computer-aided drafting system (CAD) and serve as the official depiction of the current and planned condition of the airport. These drawings have been reviewed and approved by the FAA to ensure all applicable federal regulations are met. A copy of the FAA's approval letter is included along with the full ALP drawing set in this appendix.

The five primary functions of the ALP that define its purpose are:

1) An approved plan is necessary for the airport to receive financial assistance under the terms of the *Airport and Airway Improvement Act of 1982* (AIP), as amended, and to be able to receive specific Passenger Facility Charge funding. An airport must keep its ALP current and follow that plan, since those are grant assurance requirements of the AIP and previous airport development programs, including the 1970 Airport Development Aid Program (ADAP) and Federal Aid Airports Program (FAAP) of 1946, as amended. While ALPs are not required for airports other than those developed with assistance under the aforementioned federal programs, the same guidance can be applied to all airports.

2) An ALP creates a blueprint for airport development by depicting proposed facility improvements. The ALP provides a guideline by which the airport sponsor can ensure that development maintains airport design standards and safety requirements and is consistent with airport and community land use plans.

3) The ALP is a public document that serves as a record of aeronautical requirements, both present and future, and as a reference for community deliberations on land use proposals and budget resource planning.

4) The approved ALP enables the airport sponsor and the FAA to plan for facility improvements at the airport. It also allows the FAA to anticipate budgetary and procedural needs. The approved ALP will also allow the FAA to protect the airspace required for facility or approach procedure improvements.

5) The ALP can be a working tool for the airport sponsor, including its development and maintenance staff.

It should be noted that the FAA requires that any planned changes to the airfield (i.e., runway and taxiway system, etc.) be represented on the drawings. A landside configuration is also depicted on the drawings, but the FAA recognized that landside development is much more fluid and often dependent upon specific developer needs. Thus, an updated drawing set is not typically necessary for future landside alterations provided they do not impact planned airside facilities and land use designations.

AIRPORT LAYOUT PLAN SET

The ALP set includes several technical drawings which depict various aspects of the current and future layout of the airport. The following is a description of the ALP drawings included with this Airport Master Plan.

AIRPORT LAYOUT PLAN DRAWING

An official Airport Layout Plan drawing has been developed for Nogales International Airport, a draft of which is included in this appendix. The ALP drawing graphically presents the existing and ultimate airport layout plan. The ALP drawing will include such elements as the physical airport features, wind data tabulation, location of airfield facilities (i.e., runways, taxiways, navigational aids), and existing general aviation development. Also presented on the ALP are the runway safety areas, airport property boundary, and revenue support areas.

The computerized plan provides detailed information on existing and future facility layouts on multiple layers that permit the user to focus on any section of the airport at a desired 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.

AIRPORT LAND USE DRAWING

The objective of the Airport Land Use Drawing is to coordinate uses of the airport property in a manner compatible with the functional design of the airport facility. Airport land use planning is important for orderly development and efficient use of available space. There are two primary considerations for airport land use planning. These are to secure those areas essential to the safe and efficient operation of the airport and to determine compatible land uses for the balance of the property which would be most advantageous to the airport and community.

In the development of an airport land use plan for Nogales International Airport, the airport property was broken into several large general tracts. Each tract was analyzed for specific site characteristics, such as tract size and shape, land characteristics, and existing land uses. The availability of utilities and the accessibility to various transportation modes were also considered. Limitations and constraints to development such as height and noise restrictions, and contiguous land uses were analyzed next. Finally, the compatibility of various land uses in each tract was analyzed.

The depiction of on-airport land uses on this drawing becomes the official FAA acceptance of current and future land uses. There are six different land uses identified for Nogales International Airport: Airfield Operations, Airfield Support, Terminal Services, General Aviation, Air Cargo, and Industrial Park.

Airfield Operations

The Airfield Operations category includes the immediate runway and taxiway environment and includes the Navaid critical areas, runway and taxiway safety areas, and the runway protection zones. The Airfield Operations area is reserved for facilities critical to the safe operations of aircraft on the runways and taxiways.

Airfield Support

Airfield support includes facilities necessary to support the regular operation and maintenance of airfield facilities including the perimeter service road, weather observation systems, and fuel farm.

Terminal Services

The terminal service area includes the terminal building and associated automobile parking lot. The area to the west of the existing building is reserved for any future expansion of the terminal building and parking lot.

General Aviation

General aviation (GA) includes areas dedicated for GA business development including fixed base operator (FBO) or specialty aviation service operators (SASOs), or hangar or apron development. GA areas are located primarily to the west of the terminal area.

Air Cargo

The air cargo land use includes any development associated with the transportation of goods to/from the airport including charter cargo operators. This area is focused around the existing air cargo ramp.

Industrial Park

The industrial park category is reserved for the land to the north of the Airport Access Road. This category is airport property that can support development; however, planned development may not require access to the runway and taxiway system. This land use category may be capable of supporting aviation development; however, it is also available for airport compatible non-aviation uses. Typically, non-aviation uses will include commercial and industrial uses.

FAR PART 77 AIRSPACE DRAWING

Federal Aviation Regulation (F.A.R.) Part 77, *Objects Affecting Navigable Airspace*, was established for use by local authorities to control the height of objects near airports. The FAR Part 77 Airspace Drawing included in this Airport Master Plan is a graphic depiction of this regulatory criterion. The FAR Part 77 Airspace Drawing is a tool to aid local authorities in determining if proposed development could present a hazard to aircraft using the airport. The FAR Part 77 Airspace Drawing can be a critical tool for the airport sponsor's use in reviewing proposed development in the vicinity of the airport.

The airport sponsors should do all in their power to ensure development stays below the FAR Part 77 surfaces to protect the role of the airport. The following discussion will describe those surfaces that make up the recommended FAR Part 77 surfaces at Nogales International Airport.

The FAR Part 77 Airspace Drawing assigns three-dimensional imaginary surfaces associated with the airport. These imaginary surfaces emanate from the runway centerline and are dimensioned according to the visibility minimums associated with the approach to the runway end and size of aircraft to operate on the runway. The FAR Part 77 imaginary surfaces include the primary surface, approach surface, transitional surface, horizontal surface, and conical surface. Each surface is described as follows.

Primary Surface

The primary surface is longitudinally centered on the runway and extends 200 feet beyond each runway end. The elevation of any point on the primary surface is the same as the elevation along the nearest associated point on the runway centerline. The primary surface for Runway 3-21 is 500 feet wide as centered on the runway.

Approach Surface

An approach surface is also established for each runway end. The approach surface begins at the end of the primary surface, extends upward and outward, and is centered along an extended runway centerline. The approach surface leading to each runway is based upon the type of approach available (instrument or visual) or planned.

In an effort to protect the airport from future adjacent incompatible land uses, approach surfaces with instrument approach procedures are planned to each runway end. The approach surface for Runway 3 extends a horizontal distance of 10,000 feet at a 34:1 slope. The outer width of the approach surface is 3,500 feet.

Transitional Surface

Each runway has a transitional surface that begins at the outside edge of the primary surface at the same elevation as the runway. The surface rises at a slope of 7:1, up to a height 150 feet above the highest runway elevation. At that point, the transitional surface ends and the horizontal surface begins.

Horizontal Surface

The horizontal surface is established at 150 feet above the highest elevation of the runway surface. Having no slope, the horizontal surface connects the transitional and approach surfaces to the conical surface at a distance of 10,000 feet from the end of the primary surfaces of each runway.

Conical Surface

The conical surface begins at the outer edge of the horizontal surface. The conical surface then continues for an additional 4,000 feet horizontally at a slope of 20:1. Therefore, at 4,000 feet from the horizontal surface, the elevation of the conical surface is 350 feet above the highest airport elevation.

APPROACH SURFACE PROFILE DRAWINGS

The runway profile drawing presents the entirety of the FAR Part 77 approach surface to the runway ends. It also depicts the runway centerline profile with elevations. This drawing provides profile details that the Airspace Drawing does not.

The approach surface profile drawings include identified penetrations to the approach surface. Penetrations to the approach surface are considered obstructions. The FAA will determine if any obstructions are also hazards which require mitigation. The FAA utilizes other design criteria such as the threshold siting surface (TSS) and various surfaces defined in FAA Order 8260.3B, *Terminal Instrument Procedures* (TERPS), to determine if an obstruction is a hazard.

If an obstruction is a hazard, the FAA can take many steps to protect air navigation. The mitigation options range from removing the hazard to installing obstruction lighting to adjusting the instrument approach minimums.

AIRPORT PROPERTY MAP

The Airport Property Map provides information on property under airport control and is, therefore, subject to FAA grant assurances. The various recorded deeds that make up the airport property are listed in tabular format. The primary purpose of the drawing is to provide information for analyzing the current and future aeronautical use of land acquired with federal funds.

DEPARTURE SURFACE DRAWING

For runways supporting instrument operations, a separate drawing depicting the departure surface is required. The departure surface, when clear, allows pilots to follow standard departure procedures. The departure surface emanates from the departure end of the runway to a distance of 10,200 feet. The inner width is 1,000 feet and the outer width is 6,466 feet. The slope of the departure surface is 40:1.

Obstacles frequently penetrate the departure surface. Where object penetrations exist, the departure procedure can be adjusted by:

a) Non-standard climb rates, and/or
b) Non-standard (higher) departure minimums.

Therefore, it is important for the airport sponsor to identify and remove departure surface obstacles whenever possible in order to enhance takeoff operations at the airport. The airport sponsor should also prevent any new obstacles from developing.

ALP SET DISCLAIMER

The preparation of the ALP set has been supported, in part, through financial assistance from the FAA through the Airport Improvement Program (AIP). The contents do not necessarily reflect the official views or policy of the United States or FAA. Acceptance of the airport master plan does not in any way constitute a commitment on the part of the United States or FAA to participate in any development depicted on the ALP drawing, nor does it indicate that the proposed development is environmentally acceptable or would have justification in accordance with appropriate public laws.

U.S. Department
of Transportation
**Federal Aviation
Administration**

Western-Pacific Region
Airports Division
Phoenix Airport District Office

3800 N. Central Avenue
Suite 1025, 10th Floor
Phoenix, AZ 85012

January 13, 2015

Mary Dahl
Santa Cruz County
Community Dev. Director
275 Rio Rico Dr
Rio Rico, AZ 85648

Dear Ms. Dahl:

The Nogales International Airport Layout Plan (ALP), prepared by Coffman Associates, and bearing your signature, is approved and the master plan is accepted. A signed copy of the approved ALP is enclosed.

An aeronautical study (no.2014-AWP-1198-NRA) was conducted on the proposed development. This determination does not constitute FAA approval or disapproval of the physical development involved in the proposal. It is a determination with respect to the safe and efficient use of navigable airspace by aircraft and with respect to the safety of persons and property on the ground.

In making this determination, the FAA has considered matters such as the effects the proposal would have on existing or planned traffic patterns of neighboring airports, the effects it would have on the existing airspace structure and projected programs of the FAA, the effects it would have on the safety of persons and property on the ground, the effects that existing or proposed manmade objects (on file with the FAA), and known natural objects within the affected area would have on the airport proposal.

The FAA has only limited means to prevent the construction of structures near an airport. The airport sponsor has the primary responsibility to protect the airport environs through such means as local zoning ordinances, property acquisition, avigation easements, letters of agreement or other means.

Approval of the plan does not indicate that the United States will participate in the cost of any development proposed. Additionally, the United States will only participate in the cost of projects that meet the standards for which that airport is designed. Associated costs for any projects that exceed the appropriate airport design standard will be the responsibility of the airport sponsor.

This ALP approval is conditioned on acknowledgement that any development on airport property requiring Federal environmental approval must receive such written approval from FAA prior to commencement of the subject development. This ALP approval is also conditioned on acceptance of the plan under local land use laws. We

encourage appropriate agencies to adopt land use and height restrictive zoning based on the plan.

AIP funding requires evidence of eligibility and justification at the time a funding request is ripe for consideration. When construction of any proposed structure or development indicated on the plan is undertaken, such construction requires normal 45-day advance notification to FAA for review in accordance with applicable Federal Aviation Regulations (i.e., Parts 77, 157, 152, etc.). More notice is generally beneficial to ensure that all statutory, regulatory, technical and operational issues can be addressed in a timely manner. Additionally, any future development that will require amendments to instrument flight procedures must be coordinated by the airport district office and the airport manager to ensure those changes are made in a timely manner.

Please attach this letter to the Airport Layout Plan and retain it in the airport. We wish you great success in your plans for the development of the airport. If we can be of further assistance, please do not hesitate to call Mr. Kyler Erhard, Airport Planner, at 602-792-1073.

Sincerely,

Mike N Williams A.A.E
Manager, Phoenix Airports District Office

cc: ADOT

Enclosure: Updated Airport Layout Plan

AIRPORT LAYOUT PLANS

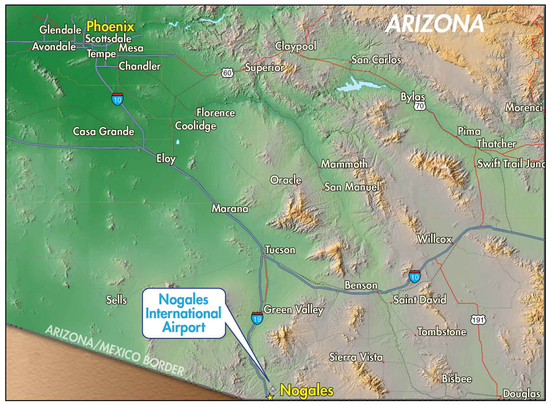
PREPARED FOR:
SANTA CRUZ COUNTY

NOGALES INTERNATIONAL AIRPORT

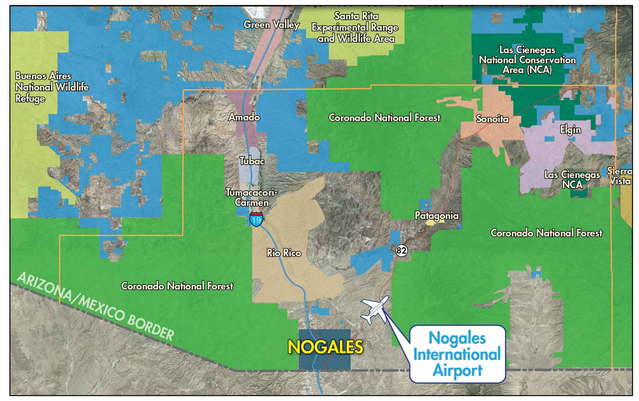
NOGALES, ARIZONA

DRAWING INDEX

LOCATION MAP



VICINITY MAP



No.	REVISIONS	DATE	BY	APPD.
	MASTER PLAN AND ALP UPDATE	02/14	COFFMAN	
	MASTER PLAN AND ALP UPDATE	03/02	STANTEC	03/02

THE PREPARATION OF THESE DOCUMENTS WAS FINANCED IN PART THROUGH A PLANNING GRANT FROM THE FEDERAL AVIATION ADMINISTRATION AS PROVIDED UNDER SECTION 505 OF THE AIRPORT AND AIRWAY IMPROVEMENT ACT OF 1982, AS AMENDED. THE CONTENTS DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICY OF THE FAA. ACCEPTANCE OF THESE DOCUMENTS BY THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT OF THE PART OF THE UNITED STATES TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED HEREIN NOR DOES IT INDICATE THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE IN ACCORDANCE WITH THE APPROPRIATE PUBLIC LAWS.

NOGALES INTERNATIONAL AIRPORT

COVER SHEET

NOGALES, ARIZONA

PLANNED BY: Eric Pfeifer
DETAILED BY: Maggie Beaver
APPROVED BY: James M. Harris Principal

MAY 7, 2014

Coffman Associates
Airport Consultants
www.coffmanassociates.com

RUNWAY DATA		RUNWAY 3-21			
		EXISTING		ULTIMATE	
		3	21	3	21
RUNWAY DESIGN CODE (RDC)		B-II-5000	B-II-5000	C-II-5000	C-II-5000
APPROACH REFERENCE CODE (APRC)		B-II-5000		B-III-5000	
DEPARTURE REFERENCE CODE (DPRC)		B-III/D-II		B-III/D-II	
APPROACH VISIBILITY MINIMUMS		1 1/4 Mile	1 1/4 Mile	1 Mile	1 Mile
RUNWAY BEARING (TRUE)		46.31°	226.31°	46.31°	226.31°
APPROACH TYPE		NON-PRECISION	NON-PRECISION	SAME	SAME
PART 77 APPROACH CATEGORY		34:1	34:1	SAME	SAME
TYPE OF AERONAUTICAL SURVEY		NVGS		NVGS	
RUNWAY DEPARTURE SURFACE		Yes	Yes	Yes	Yes
DESIGN AIRCRAFT		BEECHCRAFT 1900		CITATION X	
PERCENT WIND COVERAGE	10.5 knots	95.5 %		95.5%	
	13 knots	97.8 %		97.8%	
	16 knots	99.4 %		99.4%	
RUNWAY DIMENSION (L X W)		7,200' X 100'		7,500 X 100	
RUNWAY END ELEVATION		3,838.9'	3,955.1'	3,838.9'	3,957.5'
TOUCH DOWN ZONE ELEVATION		3,884.1'	3,940.8'	3,884.1'	3,940.8'
DISPLACED THRESHOLD ELEVATION		N/A	3,940.8'	N/A	N/A
DISPLACED THRESHOLD		0'	899'	0	1,199'
LINE OF SIGHT REQUIREMENT MET		YES		YES	
EFFECTIVE RUNWAY GRADIENT / MAXIMUM GRADIENT		1.6% / 2.0%		1.6% / 2.0%	
RUNWAY SURFACE TYPE		Asphalt		Asphalt	
RUNWAY PAVEMENT STRENGTH (in thousand lbs.)		24,500 / 60 DW / 115 DTW		24,500 / 60 DW / 115 DTW	
RUNWAY SURFACE TREATMENT		PFC		PFC	
RUNWAY LIGHTING		MIRL	MIRL	MIRL	MIRL
RUNWAY MARKING		NON-PRECISION	NON-PRECISION	NON-PRECISION	NON-PRECISION
RUNWAY NAVIGATIONAL AIDS		VOR/DME OR GPS-B (CIRCLING)	VOR/DME OR GPS-B (CIRCLING)	GPS 1 Mile	GPS 1 Mile
RUNWAY VISUAL AIDS		PAPI-4	PAPI-4	PAPI-4 REILs	PAPI-4 REILs
RUNWAY SAFETY AREA BEYOND STOP END (ACTUAL)		300'	300'	1,000'	1,000'
RUNWAY SAFETY AREA WIDTH		150'		500'	
OBJECT FREE AREA BEYOND STOP END (ACTUAL)		300'	300'	1,000'	1,000'
OBJECT FREE AREA WIDTH		500'		800'	
OBSTACLE FREE ZONE BEYOND STOP END (ACTUAL)		200'	200'	200'	200'
OBSTACLE FREE ZONE WIDTH		400'		400'	
RUNWAY PROTECTION ZONE		1000'x500' x700'	1000'x500' x700'	1700'x500' x1010'	1700'x500' x1010'
TAXIWAY DESIGN GROUP (TDG)		TDG-2		TDG-3	
TAXIWAY WIDTH		50'		50'	
TAXIWAY OBJECT FREE AREA WIDTH		131'		131'	
TAXIWAY LIGHTING		MITL		MITL	
TAXIWAY SURFACE MATERIAL		ASPHALT		ASPHALT	
TAXIWAY SAFETY AREA WIDTH		79'		79'	
TAXIWAY TO RUNWAY SEPARATION		378'		378'	
HOLDBAR TO RUNWAY CENTERLINE DISTANCE		250'		250'	
TAXIWAY TO AIRCRAFT PARKING DISTANCE		100'		100'	
TAXIWAY TO FIXED OBJECT DISTANCE		225'		225'	
THRESHOLD SITING SURFACE OBJECT PENETRATIONS		NONE		NONE	
THRESHOLD SITING SURFACE REQUIREMENTS (AC 150/5300-13A)		20:1		20:1	

SW - Single Wheel
DW - Dual Wheel
DTW - Dual Tandem Wheel

NOTES:
HORIZONTAL DATUM: NORTH AMERICAN DATUM 1983 - NAD83; VERTICAL DATUM: NORTH AMERICAN DATUM 1988 - NAVD88.
RUNWAY END ELEVATIONS, COORDINATES, DISTANCES, AND BEARINGS NOTED IN THIS ALP ARE FROM THE AVN DATASHEET.

DEVIATIONS TO STANDARDS

DEVIATION DESCRIPTION	EFFECTED DESIGN STANDARD	STANDARD	PROPOSED DISPOSITION
VEGETATION IN EXISTING OFA	OBSTRUCTION TO OFA DESIGN STANDARD	500FT WIDE AND 300FT BEYOND RUNWAY END.	REMOVE OBSTRUCTING VEGETATION FROM EXISTING AND ULTIMATE OFA
PERIMETER FENCE IN EXISTING OFA	OBSTRUCTION TO OFA DESIGN STANDARD	500FT WIDE AND 300FT BEYOND RUNWAY END.	WHERE POSSIBLE, RELOCATE FENCE OUTSIDE OF ULTIMATE OFA. REQUEST MODIFICATION TO DESIGN STANDARD WHERE FENCE CAN'T BE RELOCATED DUE TO TERRAIN CONSTRAINTS.
DRAINAGE DITCH IN ULTIMATE RSA WEST OF RUNWAY 3 THRESHOLD	OBSTRUCTION TO ULTIMATE RSA DESIGN STANDARD	500FT WIDE AND 1,000FT BEYOND DEPARTURE END.	RELOCATE DRAINAGE DITCH OUTSIDE ULTIMATE RSA
RUNWAY GRADIENT EXCEEDS ULTIMATE DESIGN STANDARD	MAXIMUM RUNWAY LONGITUDINAL GRADIENT	1.5% Max Grade Change	REQUEST MODIFICATION TO DESIGN STANDARD

AIRPORT DATA

OWNER: SANTA CRUZ COUNTY	CITY: NOGALES, ARIZONA	COUNTY: SANTA CRUZ COUNTY	
AIRPORT NPIAS SERVICE LEVEL: GA	MAGNETIC DECLINATION:10° 1' 7" E changing by 6.0' W per year 02-05-14 (NOAA)		
NOGALES INTERNATIONAL AIRPORT- (OLS)		EXISTING	ULTIMATE
AIRPORT REFERENCE CODE		B-II	C-II
AIRPORT ELEVATION		3955.1'	3957.5'
CRITICAL DESIGN AIRCRAFT WINGSPAN / UNDERCARRIAGE / APPROACH SPEED		Beechcraft 1900 58' / 17' 2" / 113 KNOTS	Cessna Citation X 63' 7" / 10' 7" / 113 KNOTS
MEAN MAXIMUM TEMPERATURE OF HOTTEST MONTH		93.6° July	SAME
AIRPORT REFERENCE POINT (NAD 83)	Latitude	31° 25' 03.8" N	31° 25' 04.8" N
	Longitude	110° 50' 52.4" W	110° 50' 51.146" W
AIRPORT INSTRUMENT NAVAIDS		VOR/DME OR GPS-B (CIRCLING)	GPS (1-Mile)
MISCELLANEOUS FACILITIES		Airport Beacon Lighted Wind Cone PAPI-4 NDB ASOS	Airport Beacon Lighted Wind Cone PAPI-4 NDB ASOS REILs

RUNWAY END COORDINATES (NAD 83)

RUNWAY	LATITUDE	LONGITUDE
EXISTING RUNWAY 3	N 31° 24' 39.1879"	W 110° 51' 22.4518"
EXISTING RUNWAY 21	N 31° 25' 28.3862"	W 110° 50' 22.3869"
ULTIMATE RUNWAY 21	N 31° 25' 30.4300"	W 110° 50' 19.8600"
DISPLACED THRESHOLD 21	N 31° 25' 22.2451"	W 110° 50' 29.8864"

EXISTING AIRPORT BUILDINGS

NO.	DESCRIPTION	ELEV. (MSL)
1	TERMINAL BUILDING	3907.2'
2	HANGAR	3911.4'
3	AIRPORT BEACON	3885.4'
4	HANGAR	3892.6'
5	HANGAR	3896.1
6	HANGAR	3888.0'
7	T-HANGAR	3888.4'
8	HANGAR	3891.9'
9	FUEL FARM	3926.8'
10	ASOS	3928.1'
11	VOR/DME	3875.7'
12	INDUSTRIAL BUILDING (TO BE REMOVED)	3922.3'
13	NDB	3914.28'

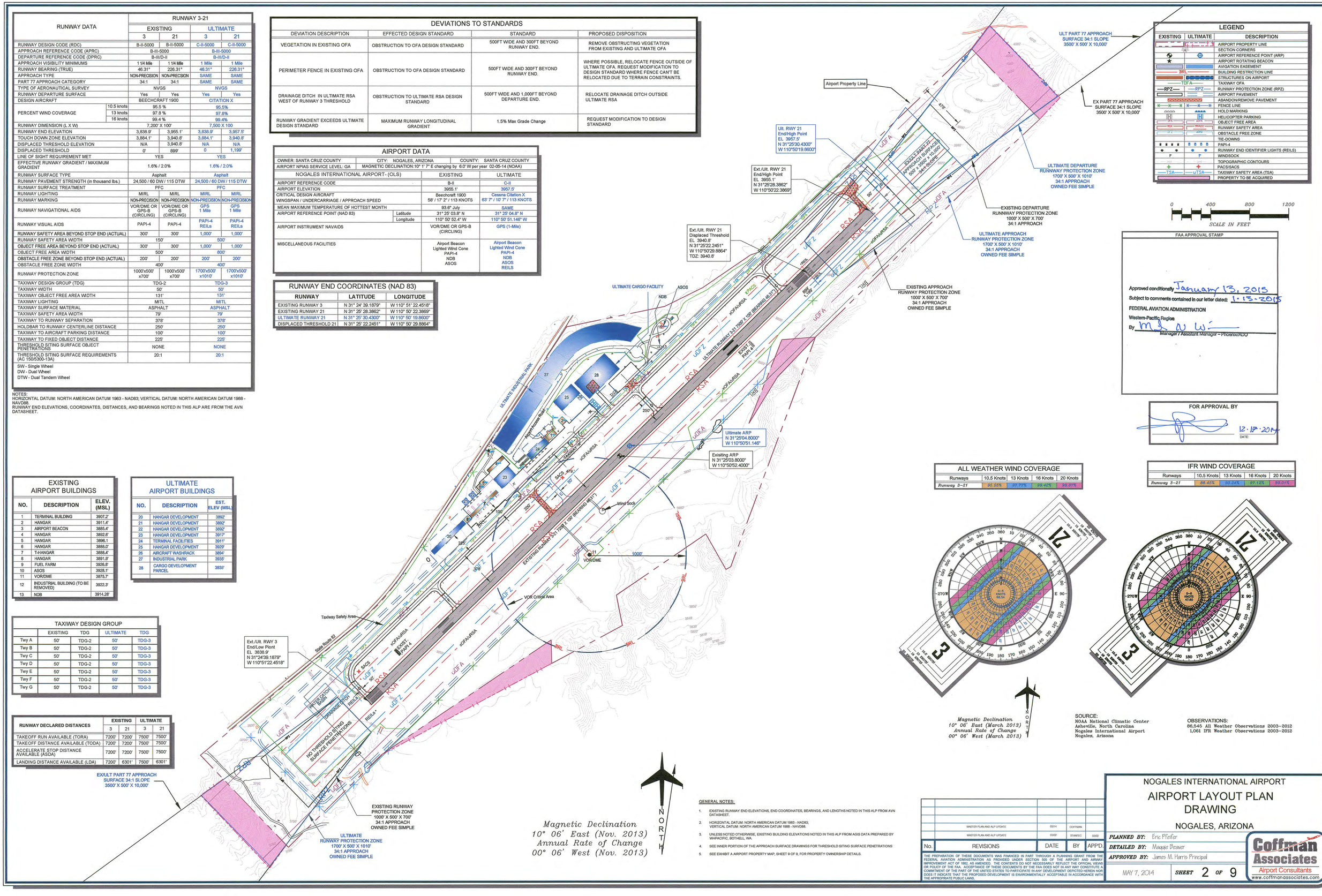
ULTIMATE AIRPORT BUILDINGS

NO.	DESCRIPTION	EST. ELEV (MSL)
20	HANGAR DEVELOPMENT	3892'
21	HANGAR DEVELOPMENT	3892'
22	HANGAR DEVELOPMENT	3892'
23	HANGAR DEVELOPMENT	3917'
24	TERMINAL FACILITIES	3911'
25	HANGAR DEVELOPMENT	3929'
26	AIRCRAFT WASHRACK	3894'
27	INDUSTRIAL PARK	3935'
28	CARGO DEVELOPMENT PARCEL	3935'

TAXIWAY DESIGN GROUP

	EXISTING	TDG	ULTIMATE	TDG
Twy A	50'	TDG-2	50'	TDG-3
Twy B	50'	TDG-2	50'	TDG-3
Twy C	50'	TDG-2	50'	TDG-3
Twy D	50'	TDG-2	50'	TDG-3
Twy E	50'	TDG-2	50'	TDG-3
Twy F	50'	TDG-2	50'	TDG-3
Twy G	50'	TDG-2	50'	TDG-3

RUNWAY DECLARED DISTANCES	EXISTING		ULTIMATE	
	3	21	3	21
TAKEOFF RUN AVAILABLE (TORA)	7200'	7200'	7500'	7500'
TAKEOFF DISTANCE AVAILABLE (TODA)	7200'	7200'	7500'	7500'
ACCELERATE STOP DISTANCE AVAILABLE (ASDA)	7200'	7200'	7500'	7500'
LANDING DISTANCE AVAILABLE (LDA)	7200'	6301'	7500'	6301'



LEGEND

EXISTING	ULTIMATE	DESCRIPTION
		AIRPORT PROPERTY LINE
		SECTION CORNERS
		AIRPORT REFERENCE POINT (ARP)
		AIRPORT ROTATING BEACON
		AVIGATION EASEMENT
BRL	BRL	BUILDING RESTRICTION LINE
		STRUCTURES ON AIRPORT
TOFA		TAXIWAY OFA
RPZ	RPZ	RUNWAY PROTECTION ZONE (RPZ)
		AIRPORT PAVEMENT
		ABANDON/REMOVE PAVEMENT
		FENCE LINE
		HOLD MARKING
		HELICOPTER PARKING
OFA	uOFA	OBJECT FREE AREA
RSA	uRSA	RUNWAY SAFETY AREA
OFZ	uOFZ	OBSTACLE FREE ZONE
		TIE-DOWNS
		PAPI-4
		RUNWAY END IDENTIFIER LIGHTS (REILS)
		WINDSOCK
		TOPOGRAPHIC CONTOURS
		PACS/SACS
TSA	uTSA	TAXIWAY SAFETY AREA (TSA)
		PROPERTY TO BE ACQUIRED

FAA APPROVAL STAMP

Approved conditionally January 13, 2015
Subject to comments contained in our letter dated: 1-13-2015
FEDERAL AVIATION ADMINISTRATION
Western-Pacific Region
By _____
Manager / Assistant Manager – Phoenix ADO

FOR APPROVAL BY

DATE: 12-17-2014

ALL WEATHER WIND COVERAGE

Runways	10.5 Knots	13 Knots	16 Knots	20 Knots
Runway 3–21	95.55%	97.97%	99.42%	99.87%

IFR WIND COVERAGE

Runways	10.5 Knots	13 Knots	16 Knots	20 Knots
Runway 3–21	88.45%	93.34%	97.13%	98.91%

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

OBSERVATIONS:
86,546 All Weather Observations 2003–2012
1,061 IFR Weather Observations 2003–2012

GENERAL NOTES:

1. EXISTING RUNWAY END ELEVATIONS, END COORDINATES, BEARINGS, AND LENGTHS NOTED IN THIS ALP FROM AVN DATASHEET.
2. HORIZONTAL DATUM: NORTH AMERICAN DATUM 1983 - NAD83; VERTICAL DATUM: NORTH AMERICAN DATUM 1988 - NAVD88.
3. UNLESS NOTED OTHERWISE, EXISTING BUILDING ELEVATIONS NOTED IN THIS ALP FROM AGIS DATA PREPARED BY WHPACIFIC, BOTHELL, WA.
4. SEE INNER PORTION OF THE APPROACH SURFACE DRAWINGS FOR THRESHOLD SITING SURFACE PENETRATIONS
5. SEE EXHIBIT A AIRPORT PROPERTY MAP, SHEET 9 OF 9, FOR PROPERTY OWNERSHIP DETAILS.

No.	REVISIONS	DATE	BY	APP'D.
	MASTER PLAN AND ALP UPDATE	03/14	COFFMAN	
	MASTER PLAN AND ALP UPDATE	03/02	STANTEC	03/02

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NOGALES INTERNATIONAL AIRPORT

AIRPORT LAYOUT PLAN DRAWING

NOGALES, ARIZONA

PLANNED BY: Eric Pfeiffer
DETAILED BY: Maggie Beaver
APPROVED BY: James M. Harris Principal

MAY 7, 2014 | *SHEET* 2 *OF* 9

Coffman Associates
Airport Consultants
www.coffmanassociates.com

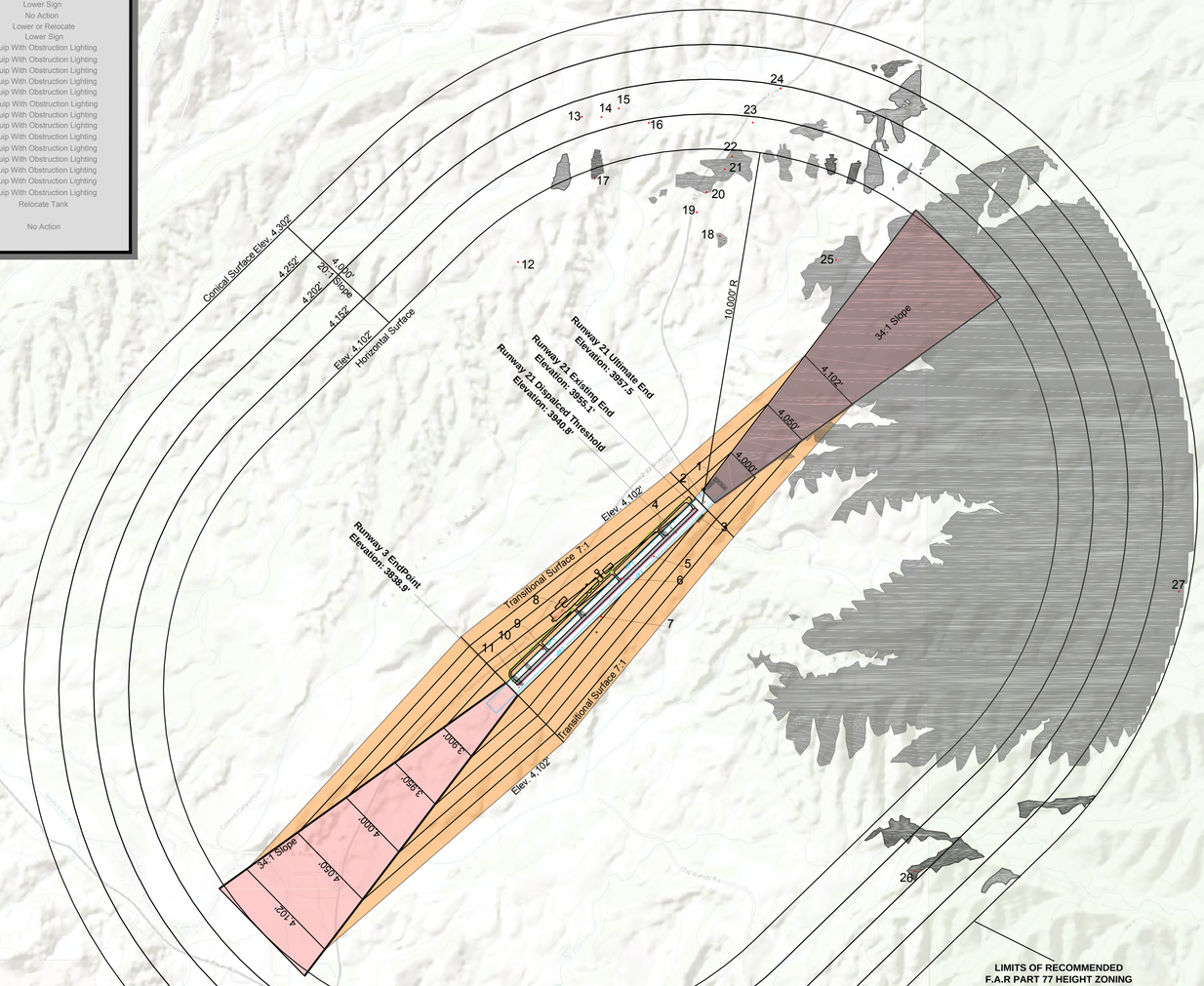
OBSTRUCTION TABLE

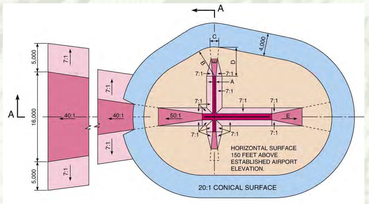
No.	Description	Latitude	Longitude	Top Elevation (msl)	Surface Penetrated	Amount of Penetration	Remediation
1	Tower	31°25'37.02"	110°50'16.00"	3991	Approach	12.34'	Equip With Obstruction Lighting
2	Sign	31°25'28.10"	110°50'24.12"	3955	Primary	3'	Lower Sign
3	Fence	31°25'26.61"	110°50'20.54"	3960	Primary	7"	Relocate Fence
4	Sign	31°25'21.38"	110°50'32.42"	3939	Primary	3'	Lower Sign
5	General Utility	31°25'15.15"	110°50'36.84"	3925	Primary	2'	Lower or Relocate
6	Sign	21°25'9.01"	110°50'47.45"	3906	Primary	2'	Lower Sign
7	Pole	31°25'58.19"	110°50'54.37"	3895	Transitional	5.36'	Obstruction Lighting or Lower Pole
8	Sign	31°24'58.86"	110°50'59.88"	3883	Primary	4'	Lower Sign
9	NAVAID	31°24'39.23"	110°51'13.88"	3858	Primary	4'	No Action
10	General Utility	31°24'43.85"	110°51'18.33"	3849	PRIMARY	3'	Lower or Relocate
11	Sign	31°24'40.58"	110°51'22.33"	3842	PRIMARY	3'	Lower Sign
12	Pole	31°26'39.14"	110°51'20.81"	4110	Horizontal	8'	Equip With Obstruction Lighting
13	Pole	31°27'20.10"	110°50'59.22"	4199	Conical	17.17'	Equip With Obstruction Lighting
14	Pole	31°27'20.14"	110°50'52.71"	4196	Conical	21.81'	Equip With Obstruction Lighting
15	Pole	31°27'22.51"	110°50'46.91"	4188	Conical	7.66'	Equip With Obstruction Lighting
16	Pole	31°27'18.40"	110°50'37.10"	4163	Conical	10.29'	Equip With Obstruction Lighting
17	Windmill	31°27'02.73"	110°50'55.25"	4132	Horizontal	30'	Equip With Obstruction Lighting
18	Pole	31°26'45.84"	110°50'13.97"	4135	Horizontal	33'	Equip With Obstruction Lighting
19	Pole	31°26'52.77"	110°50'21.54"	4133	Horizontal	31'	Equip With Obstruction Lighting
20	Pole	31°26'58.44"	110°50'18.10"	4141	Horizontal	39'	Equip With Obstruction Lighting
21	Pole	31°27'4.94"	110°50'12.00"	4166	Horizontal	3'	Equip With Obstruction Lighting
22	Tower	31°27'8.50"	110°50'6.67"	4165	Horizontal	63'	Equip With Obstruction Lighting
23	Pole	31°27'18.12"	110°50'2.6"	4162	Horizontal	10.84'	Equip With Obstruction Lighting
24	Pole	31°27'23.10"	110°49'39.89"	4223	Conical	16.92'	Equip With Obstruction Lighting
25	Pole	31°26'38.32"	110°49'34.55"	4221	Horizontal	119'	Equip With Obstruction Lighting
26	Tank	31°23'45.11"	110°49'11.61"	4233	Conical	41.7'	Relocate Tank
27	Terrain	31°25'1.68"	110°47'42.63"	4577.19	Conical, Horizontal, Approach	Varies	No Action

Date of Survey: April 2013

LEGEND

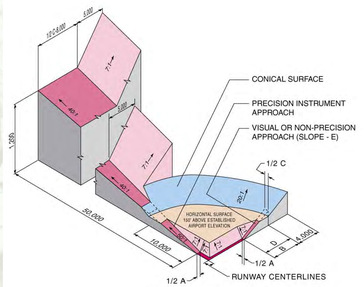
- Terrain Penetrations to Horizontal/Conical Surfaces
- Terrain Penetration to 34:1 Approach Surface
- 34:1 Approach Surface
- Transitional Surface





DIM	ITEM	DIMENSIONAL STANDARDS (FEET)					
		VISUAL RUNWAY		NON-PRECISION INSTRUMENT RUNWAY			PRECISION INSTRUMENT RUNWAY
		A	B	A	B C	B D	
A	WIDTH OF PRIMARY SURFACE AND APPROACH SURFACE WIDTH AT INNER END	250	500	500	500	1,000	1,000
B	RADIUS OF HORIZONTAL SURFACE	5,000	5,000	5,000	10,000	10,000	10,000
		VISUAL APPROACH		NON-PRECISION INSTRUMENT APPROACH			PRECISION INSTRUMENT APPROACH
		A	B	A	B C	B D	
C	APPROACH SURFACE WIDTH AT END	1,250	1,500	2,000	3,500	4,000	16,000
D	APPROACH SURFACE LENGTH	5,000	5,000	5,000	10,000	10,000	*
E	APPROACH SLOPE	20:1	20:1	20:1	34:1	34:1	*

A - UTILITY RUNWAYS
B - RUNWAYS LARGER THAN UTILITY
C - VISIBILITY MINIMUMS GREATER THAN 3/4 MILE
D - VISIBILITY MINIMUMS AS LOW AS 3/4 MILE
* - PRECISION INSTRUMENT APPROACH SLOPE IS 50:1 FOR INNER 10,000 FEET AND 40:1 FOR AN ADDITIONAL 40,000 FEET



ISOMETRIC VIEW OF SECTION A-A

SOURCE: 14 CFR Part 77, Section 77.25, Civil Airport Imaginary Surfaces.

0 2000 4000 6000

SCALE IN FEET

NORTH

Magnetic Declination
10° 06' East (Nov. 2013)
Annual Rate of Change
00° 06' West (Nov. 2013)

GENERAL NOTES:

1. EXISTING RUNWAY END ELEVATIONS, END COORDINATES, BEARINGS, AND LENGTHS NOTED IN THIS ALP FROM AVN DATASHEET.
2. HORIZONTAL DATUM: NORTH AMERICAN DATUM 1983 - NAD83; VERTICAL DATUM: NORTH AMERICAN DATUM 1988 - NAVD88.
3. UNLESS NOTED OTHERWISE, EXISTING BUILDING ELEVATIONS NOTED IN THIS ALP FROM AGIS DATA PREPARED BY WHPACIFIC, BOTHELL, WA.
4. SEE INNER PORTION OF THE APPROACH SURFACE DRAWINGS FOR THRESHOLD SITING SURFACE PENETRATIONS
5. SEE AIRPORT PROPERTY MAP, SHEET 9 OF 9, FOR PROPERTY OWNERSHIP DETAILS.

No.	REVISIONS	DATE	BY	APPD.
	MASTER PLAN AND ALP UPDATE	02/14	COFFMAN	
	MASTER PLAN AND ALP UPDATE	03/02	STANTEC	03/02

THE PREPARATION OF THESE DOCUMENTS WAS FINANCED IN PART THROUGH A PLANNING GRANT FROM THE FEDERAL AVIATION ADMINISTRATION AS PROVIDED UNDER SECTION 505 OF THE AIRPORT AND AIRWAY IMPROVEMENT ACT OF 1982, AS AMENDED. THE CONTENTS DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICY OF THE FAA. ACCEPTANCE OF THESE DOCUMENTS BY THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT OF THE PART OF THE UNITED STATES TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED HEREIN NOR DOES IT INDICATE THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE IN ACCORDANCE WITH THE APPROPRIATE PUBLIC LAWS.

NOGALES INTERNATIONAL AIRPORT

AIRPORT AIRSPACE DRAWING

NOGALES, ARIZONA

PLANNED BY: Eric Pfeifer
DETAILED BY: Maggie Beaver
APPROVED BY: James M. Harris Principal

MAY 7, 2014

SHEET 3 ***OF*** 9

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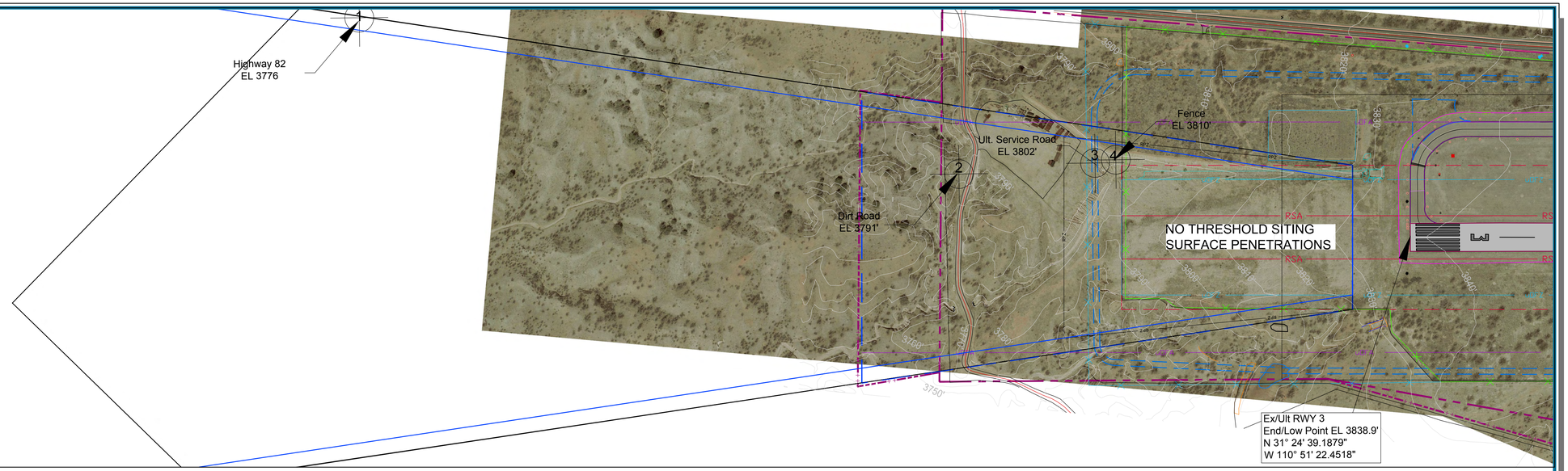

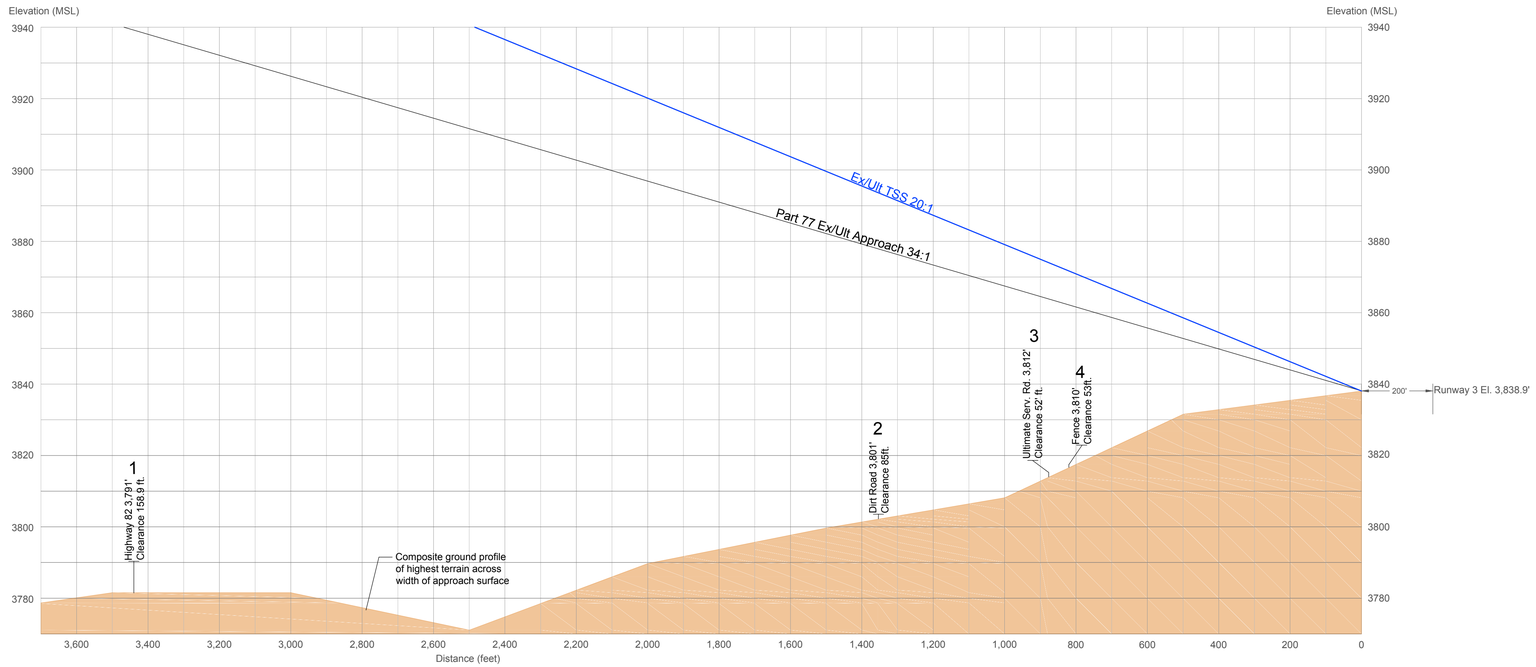

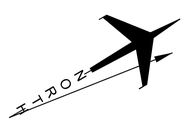

Magnetic Declination
10° 06' East (Nov. 2013)
Annual Rate of Change
00° 06' West (Nov. 2013)

HORIZONTAL SCALE 0 200 400 600
SCALE IN FEET

VERTICAL SCALE 0 20 40 60
SCALE IN FEET

EXISTING/ULTIMATE OBSTRUCTION TABLE							
No.	Description	Top Elevation	Distance from Exist RW End	Offset from Centerline	Approach Penetration	TSS Penetration	Remediation
None							

SURVEY DATE APRIL 2013

GENERAL NOTES:

1. EXISTING RUNWAY END ELEVATIONS, END COORDINATES, BEARINGS, AND LENGTHS NOTED IN THIS ALP FROM AVN DATASHEET.
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VERTICAL DATUM: NORTH AMERICAN DATUM 1988 - NAVD88.
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No.	REVISIONS	DATE	BY	APP'D
	MASTER PLAN AND ALP UPDATE	03/14	COFFMAN	
	MASTER PLAN AND ALP UPDATE	03/02	STANTEC	03/02

NOGALES INTERNATIONAL AIRPORT

INNER PORTION OF THE RUNWAY 3 APPROACH DRAWING

NOGALES, ARIZONA

PLANNED BY: Eric Pfeifer
DETAILED BY: Maggie Beaver
APPROVED BY: James M. Harris Principal

MAY 7, 2014 ***SHEET*** 4 ***OF*** 9

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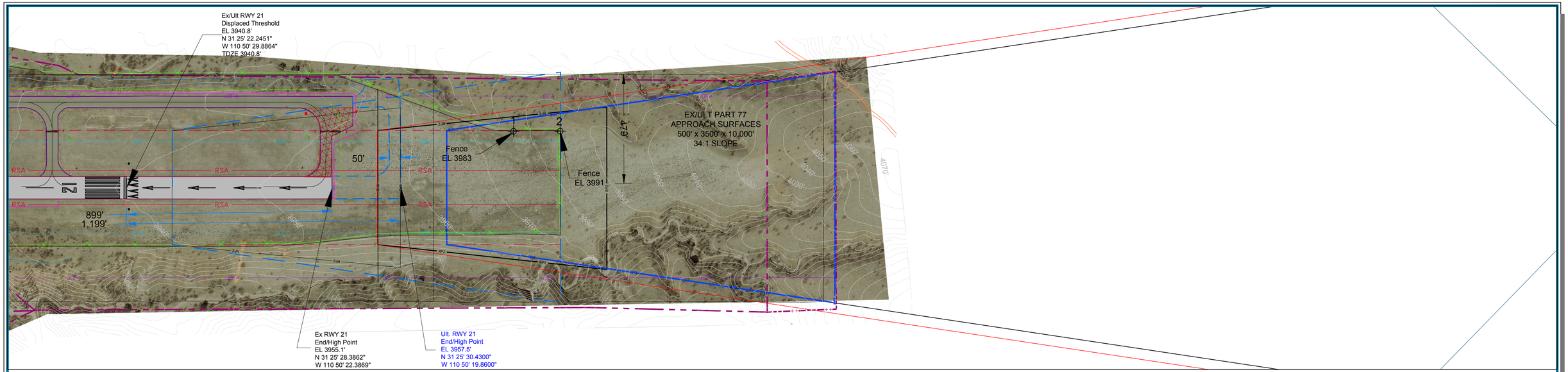

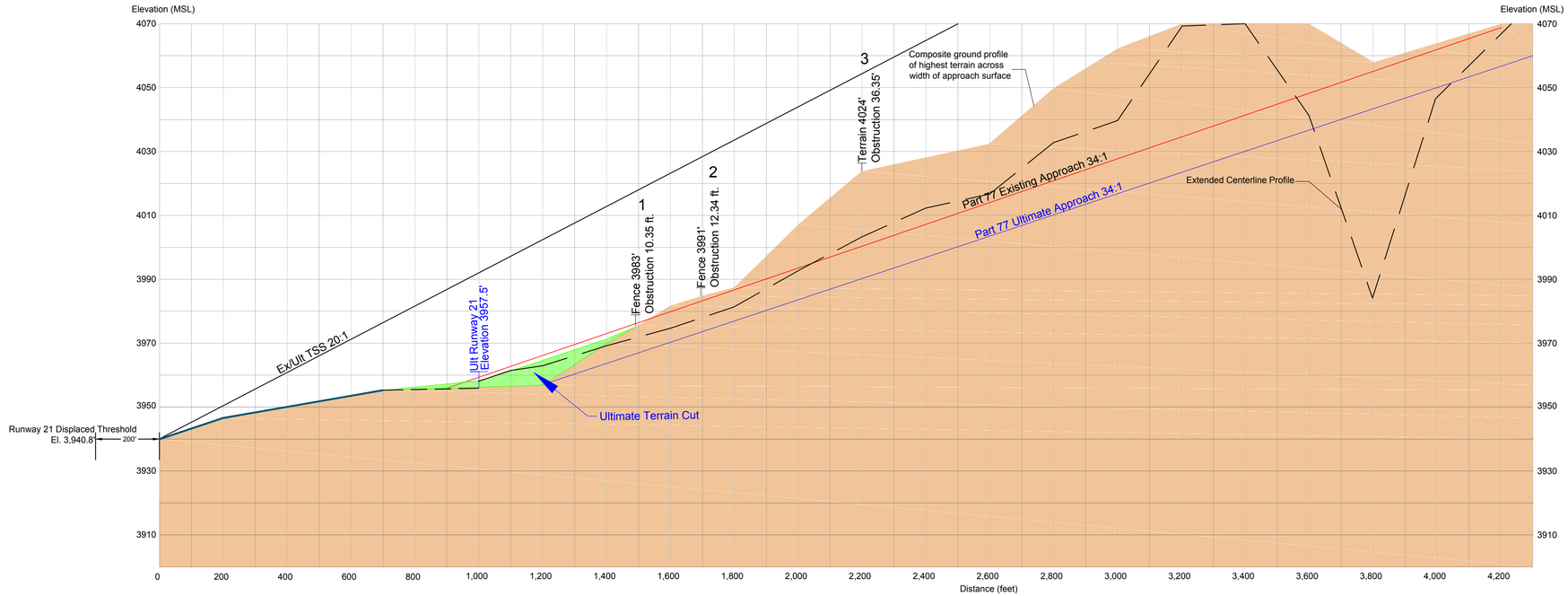

EXISTING/ULTIMATE OBSTRUCTION TABLE							
No.	Description	Top Elevation	Distance from Exist RW End	Offset from Centerline	Approach Penetration	TSS Penetration	Remediation
1	Fence	3,983'	1,691'	246	10.35'	N/A	Clears TSS, NAR
2	Fence	3,991'	1,894'	246	12.34'	N/A	Clears TSS, NAR
3	Terrain	4,024'	2,200'	505	36.35'	N/A	Clears TSS, NAR

ALL DISTANCE MEASUREMENTS IN FEET
NAR - NO ACTION REQUIRED
SURVEY DATE OF APRIL 2013

GENERAL NOTES:

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No.	REVISIONS	DATE	BY	APP'D
	MASTER PLAN AND ALP UPDATE	02/14	COFFMAN	
	MASTER PLAN AND ALP UPDATE	03/02	STANTEC	03/02

TRUE NORTH

Magnetic Declination
10° 06' East (Nov. 2013)
Annual Rate of Change
00° 06' West (Nov. 2013)

HORIZONTAL SCALE 0 200 400 600
SCALE IN FEET

VERTICAL SCALE 0 20 40 60
SCALE IN FEET

NOGALES INTERNATIONAL AIRPORT

INNER PORTION OF THE RUNWAY 21 APPROACH DRAWING

NOGALES, ARIZONA

PLANNED BY: Eric Pfeifer
DETAILED BY: Maggie Beaver
APPROVED BY: James M. Harris Principal

MAY 7, 2014 | SHEET 5 OF 9

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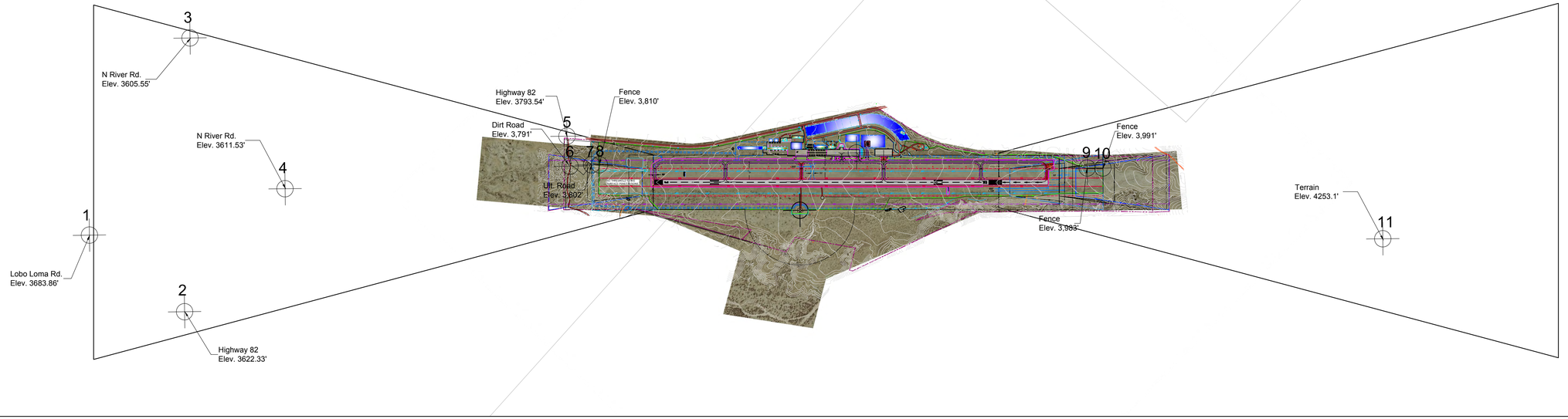
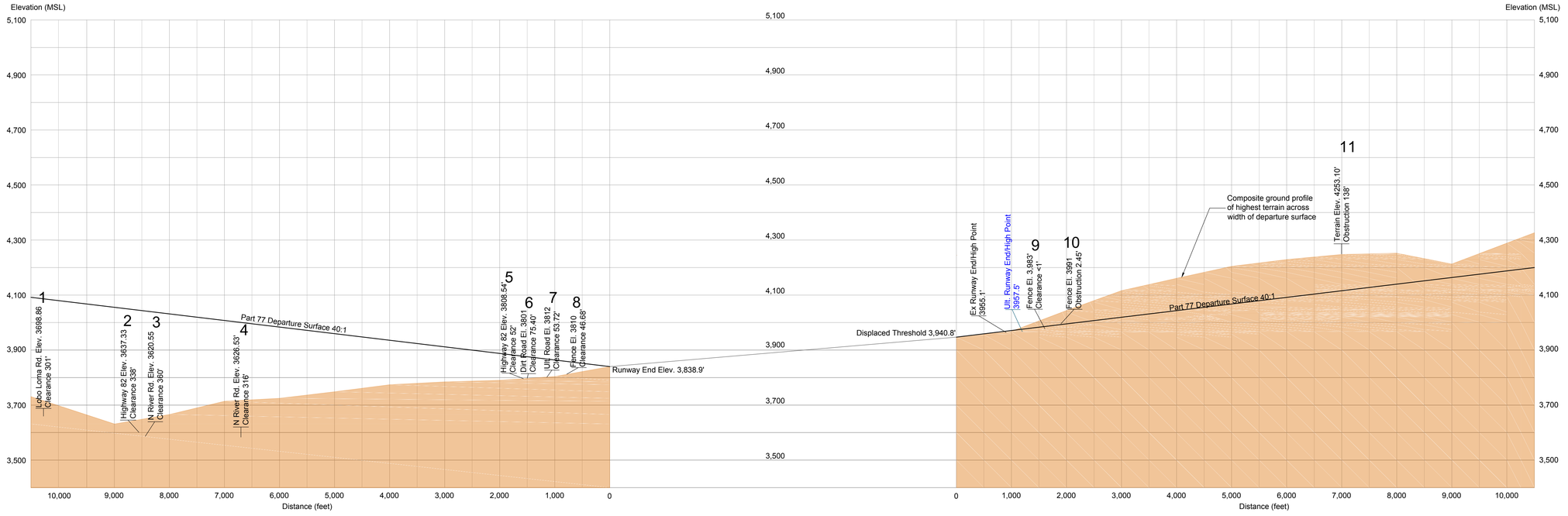
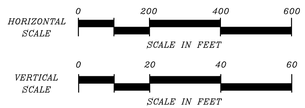




Magnetic Declination
10° 06' East (Nov. 2013)
Annual Rate of Change
00° 06' West (Nov. 2013)



RUNWAY 21 EXISTING/ULTIMATE DEPARTURE OBSTRUCTION TABLE

No.	Description	Top Elevation	Distance from Exist RW End	Offset from Centerline	Departure Penetration	Remediation
	None					

RUNWAY 3 EXISTING/ULTIMATE DEPARTURE OBSTRUCTION TABLE

No.	Description	Top Elevation	Distance from Exist RW End	Offset from Centerline	Departure Penetration	Remediation
10	Fence	3,991'	1,904'	247'	2.45'	NAR
11	Terrain	4,253'	7,000'	715'	138'	NAR

ALL DISTANCE MEASUREMENTS IN FEET
NAR = NO ACTION REQUIRED
SURVEY DATE OF APRIL 2013

GENERAL NOTES:

1. EXISTING RUNWAY END ELEVATIONS, END COORDINATES, BEARINGS, AND LENGTHS NOTED IN THIS ALP FROM AVN DATASHEET.
2. HORIZONTAL DATUM: NORTH AMERICAN DATUM 1983 - NAD83;
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3. UNLESS NOTED OTHERWISE, EXISTING BUILDING ELEVATIONS NOTED IN THIS ALP FROM AGIS DATA PREPARED BY WHPACIFIC, BOTHELL, WA.
4. SEE INNER PORTION OF THE APPROACH SURFACE DRAWINGS FOR THRESHOLD SITING SURFACE PENETRATIONS
5. SEE AIRPORT PROPERTY MAP; SHEET 9 OF 9, FOR PROPERTY OWNERSHIP DETAILS.

No.	REVISIONS	DATE	BY	APPD.
	MASTER PLAN AND ALP UPDATE	02/14	COFFMAN	
	MASTER PLAN AND ALP UPDATE	03/02	STANTEC	03/02

NOGALES INTERNATIONAL AIRPORT

RUNWAY DEPARTURE SURFACE DRAWING

NOGALES, ARIZONA

PLANNED BY: Eric Pfeifer
DETAILED BY: Maggie Beaver
APPROVED BY: James M. Harris Principal

MAY 7, 2014

SHEET 6 ***OF*** 9

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LEGEND

EXISTING	ULTIMATE	DESCRIPTION
		AIRPORT PROPERTY LINE
32 33 54		SECTION CORNERS
		AIRPORT REFERENCE POINT (ARP)
		AIRPORT ROTATING BEACON
		AVIGATION EASEMENT
BRL		BUILDING RESTRICTION LINE
		STRUCTURES ON AIRPORT
TOFA		TAXIWAY OFA
RPZ	RPZ	RUNWAY PROTECTION ZONE (RPZ)
		AIRPORT PAVEMENT
		ABANDON/REMOVE PAVEMENT
		FENCE LINE
		HOLD MARKING
H	H	HELICOPTER PARKING
OFA	uOFA	OBJECT FREE AREA
RSA	RSA(U)	RUNWAY SAFETY AREA
OFZ	uOFZ	OBSTACLE FREE ZONE
		TIE-DOWNS
		PAPI-4
		RUNWAY END IDENTIFIER LIGHTS (REILS)
		WINDSOCK
3860	3860	TOPOGRAPHIC CONTOURS
		PACS/SACS
TSA	uTSA	TAXIWAY SAFETY AREA (TSA)
		PROPERTY TO BE ACQUIRED

EXISTING AIRPORT BUILDINGS

NO.	DESCRIPTION	ELEV. (MSL)
1	TERMINAL BUILDING	3907.2'
2	HANGAR	3911.4'
3	AIRPORT BEACON	3885.4'
4	HANGAR	3892.6'
5	HANGAR	3896.1
6	HANGAR	3888.0'
7	T-HANGAR	3888.4'
8	HANGAR	3891.9'
9	FUEL FARM	3926.8'
10	ASOS	3928.1'
11	VOR/DME	3875.7'
12	INDUSTRIAL BUILDING (TO BE REMOVED)	3922.3'
13	NDB	3914.28'

ULTIMATE AIRPORT BUILDINGS

NO.	DESCRIPTION	EST. ELEV (MSL)
20	HANGAR DEVELOPMENT	3892'
21	HANGAR DEVELOPMENT	3892'
22	HANGAR DEVELOPMENT	3892'
23	HANGAR DEVELOPMENT	3917'
24	TERMINAL FACILITIES	3911'
25	HANGAR DEVELOPMENT	3929'
26	AIRCRAFT WASHRACK	3894'
27	INDUSTRIAL PARK	3935'
28	CARGO DEVELOPMENT PARCEL	3935'

Ext./Ult. RWY 21
Displaced Threshold
EL 3940.8'
N 31°25'22.2451"
W 110°50'29.8864"
TDZ: 3940.8'

Ultimate ARP
N 31°25'04.8000"
W 110°50'51.146"

Exisiting ARP
N 31°25'03.8000"
W 110°50'52.4000"

ULTIMATE CARGO FACILITY
ASOS
NDB
ULTIMATE INDUSTRIAL PARK
ULTIMATE RUNWAY 3-21 7500' X 100' (BEARING 46.31°)
EXISTING RUNWAY 3-21 7200' X 100' (BEARING 46.31°)
TAXIWAY 'A'
EXIST. PAPI 4
VOR/DME
xOFA/uRSA
uOFA
uOFZ
RSA
BRL
TOFA
RPZ
REIL
899'
1,199'
250'
479'
200'
100'
225'
378'
50'

Magnetic Declination
10° 06' East (Nov. 2013)
Annual Rate of Change
00° 06' West (Nov. 2013)

NORTH

0 200 400 600
SCALE IN FEET

GENERAL NOTES:

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5. SEE AIRPORT PROPERTY MAP, SHEET 9 OF 9 FOR PROPERTY OWNERSHIP DETAILS.

No.	REVISIONS	DATE	BY	APPD.
	MASTER PLAN AND ALP UPDATE	02/14	COFFMAN	
	MASTER PLAN AND ALP UPDATE	05/02	STANTEC	05/02

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NOGALES INTERNATIONAL AIRPORT

TERMINAL AREA PLAN

NOGALES, ARIZONA

PLANNED BY: Eric Pfeifer
DETAILED BY: Maggie Beaver
APPROVED BY: James M. Harris Principal

MAY 7, 2014 | ***SHEET*** 7 ***OF*** 9

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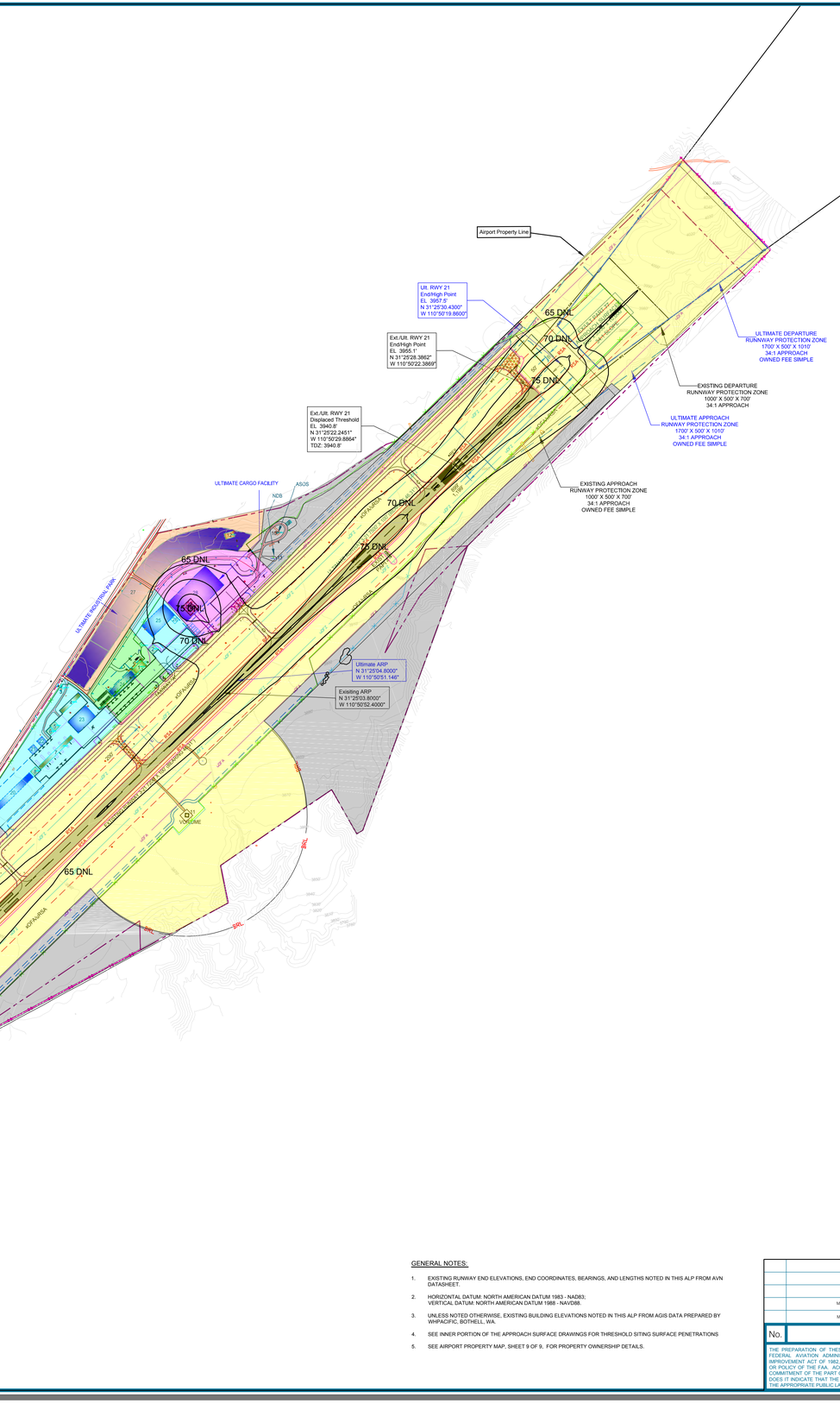
LAND USE LEGEND

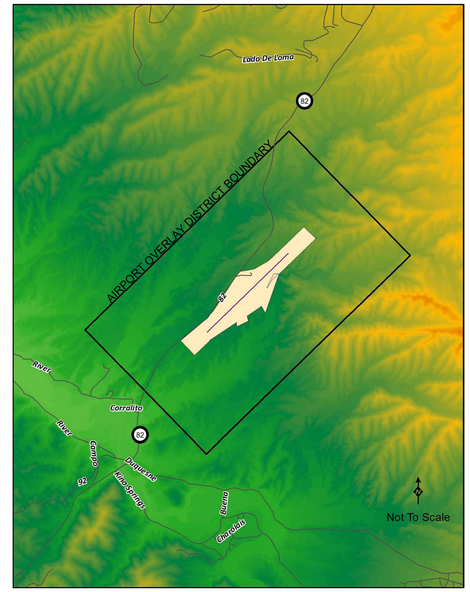
- Air Cargo
- General Aviation
- Terminal Services
- Airfield Operations
- Airfield Support
- Industrial Park



LEGEND

EXISTING	ULTIMATE	DESCRIPTION
		AIRPORT PROPERTY LINE
		SECTION CORNERS
		AIRPORT REFERENCE POINT (ARP)
	N/A	AIRPORT ROTATING BEACON
		AVIGATION EASEMENT
BRL 35'		BUILDING RESTRICTION LINE
		STRUCTURES ON AIRPORT
N/A		ABANDON BUILDING
		STRUCTURE OFF AIRPORT
		CRITICAL AREA
		AIRPORT PAVEMENT
N/A		ABANDON/REMOVE PAVEMENT
		FENCE LINE
		HOLD MARKING
		HELICOPTER PAD
OFA	OFA	OBJECT FREE AREA
RSA	RSA	RUNWAY SAFETY AREA
OFZ	OFA	OBSTACLE FREE ZONE
POFZ	POFZ	PRECISION OBSTACLE FREE ZONE
RPZ		RUNWAY PROTECTION ZONE
	N/A	TIE-DOWNS
		PAPI-4
		RUNWAY END IDENTIFIER LIGHTS (REILS)
		WINDSOCK
		TOPOGRAPHIC CONTOURS

AIRPORT OVERLAY DISTRICT ZONE INSET



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10° 06' East (Nov. 2013)
Annual Rate of Change
00° 06' West (Nov. 2013)

NORTH

0 400 800 1200
SCALE IN FEET

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No.	REVISIONS	DATE	BY	APP'D.
	MASTER PLAN AND ALP UPDATE	02/14	COFFMAN	
	MASTER PLAN AND ALP UPDATE	03/02	STANTEC	03/02

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NOGALES INTERNATIONAL AIRPORT

AIRPORT LAND USE PLAN

NOGALES, ARIZONA

PLANNED BY: Eric Pfeifer
DETAILED BY: Maggie Beaver
APPROVED BY: James M. Harris Principal

MAY 7, 2014

SHEET 8 ***OF*** 9

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Airport Consultants
www.coffmanassociates.com

LEGEND

EXISTING	ULTIMATE	DESCRIPTION
		AIRPORT PROPERTY LINE
		SECTION CORNERS
		AVIGATION EASEMENT
	BRL 35'	BUILDING RESTRICTION LINE
		AIRPORT PAVEMENT
N/A		ABANDON/REMOVE PAVEMENT
		FENCE LINE
RPZ		RUNWAY PROTECTION ZONE
		PROPERTY TO BE ACQUIRED

PROPERTY TABLE

Parcel	Deed Reference	Acres	Date Acquired	Funding Source	Aquisition Type
1	DOCK 705 PAGE 383	24.38	1995	F,S,L	FEE SIMPLE
2	BOOK 26 PAGE 130-131	60.75	1942	L	FEE SIMPLE
3	DOCK 145 PAGE 142	156.79	1928	L	FEE SIMPLE
4	BOOK 26 PAGE 132	33.44	1942	L	FEE SIMPLE
5	DOCK 673 PAGE 331	70	1995	F,S,L	FEE SIMPLE
6	Unknown	6.31	TO BE ACQUIRED		
7	DOCK 705 PAGE 382	19.04	1996	F,S,L	FEE SIMPLE
8	DOCK 705 PAGE 382	5.05	TO BE ACQUIRED	F,S,L	FEE SIMPLE
9	DOCK 705 PAGE 382	1.84	TO BE ACQUIRED	F,S,L	FEE SIMPLE
10	Unknown	8.86	TO BE ACQUIRED	F,S,L	FEE SIMPLE

0 400 800 1200

SCALE IN FEET

N O R T H

Magnetic Declination
10° 06' East (Nov. 2013)
Annual Rate of Change
00° 06' West (Nov. 2013)

GENERAL NOTES:

1. EXISTING RUNWAY END ELEVATIONS, END COORDINATES, BEARINGS, AND LENGTHS NOTED IN THIS ALP FROM AVN DATASHEET.
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No.	REVISIONS	DATE	BY	APPD.
	MASTER PLAN AND ALP UPDATE	02/14	COFFMAN	
	MASTER PLAN AND ALP UPDATE	03/02	STANTEC	03/02

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NOGALES INTERNATIONAL AIRPORT

AIRPORT PROPERTY MAP

NOGALES, ARIZONA

PLANNED BY: Eric Pfeifer
DETAILED BY: Maggie Beaver
APPROVED BY: James M. Harris Principal

MAY 7, 2014

SHEET 9 ***OF*** 9

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Appendix C

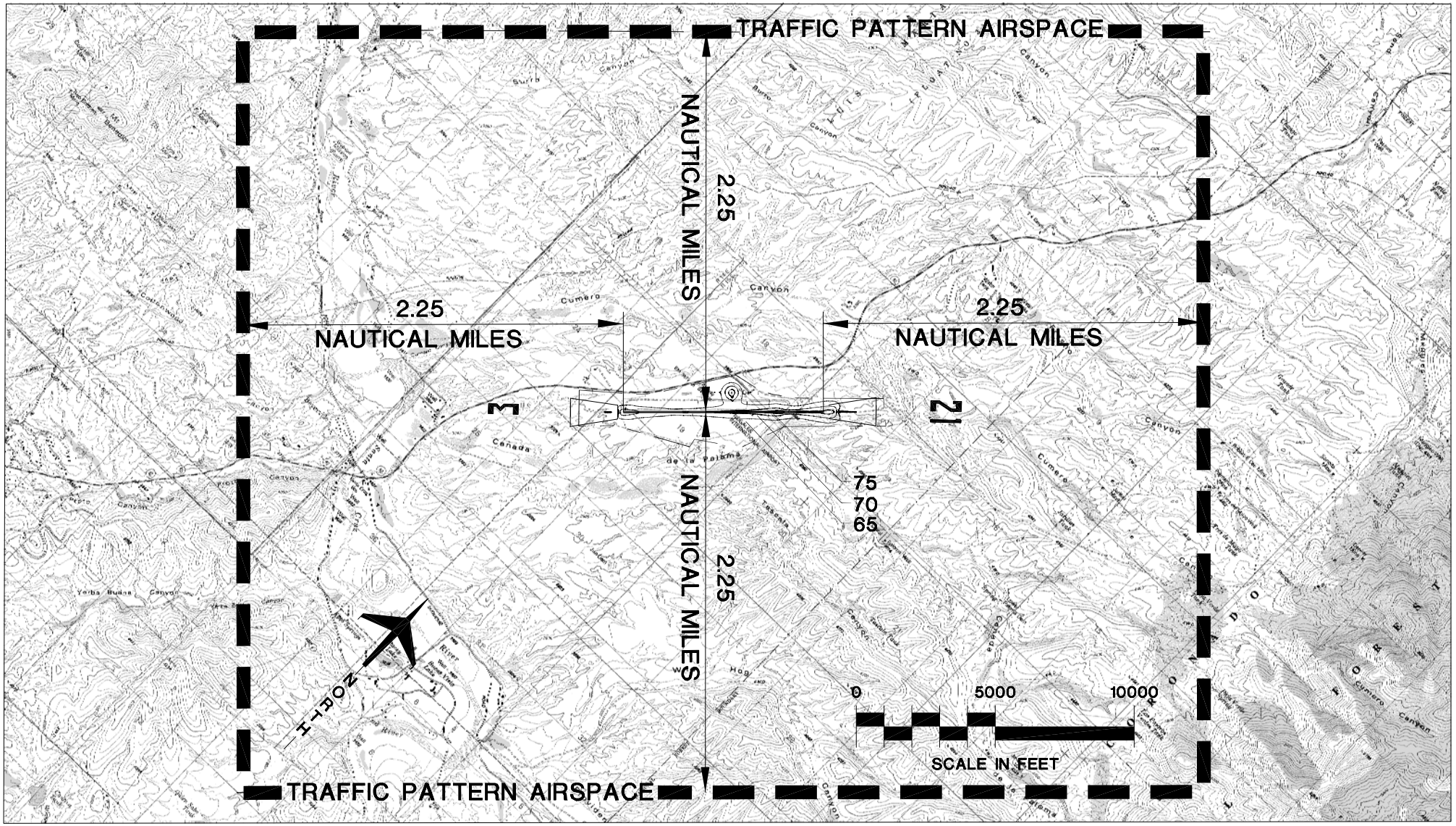
PUBLIC AIRPORT DISCLOSURE MAP

Appendix C
PUBLIC AIRPORT DISCLOSURE MAP

The State of Arizona provides for the disclosure of aviation activities to prospective buyers of real estate. In 1997, the State adopted legislation allowing airport sponsors to identify Airport Influence Areas (AIA) around public and commercial airports. The establishment of an AIA is voluntary and requires a public hearing. The boundary of the AIA must be recorded with the county in which the airport is located.

In addition, the 1999 Arizona State Legislature adopted legislation (Arizona Revised Statutes [A.R.S.] §28-8486) requiring the State's Department of Real Estate to prepare and maintain a series of maps depicting the traffic pattern airspace of each public airport in the state. These maps are to be provided to the public on request. The intent of the maps is to provide disclosure of the location of the airport as well as the potential influence the airport may have on the surrounding property.

As a part of the master plan process, the public airport disclosure map was updated and is included within this appendix.



NOTES:

1. This map has been prepared inaccordance with the Arizona Revised Statutes, Section 28–8486, relating to Public Airport Disclosure.
2. Traffic Pattern Airspace Boundaries have been established in accordance with the guidelines provided in the FAA Order JO 7400.2G
3. The Airport Noise Contours have been developed with the Integrated Noise Model (Version 7.0d) and are based on the Total Annual Operations (Take–offs and Landings) of 19,060.
4. 1 Nautical mile = 6,080 feet or 1, 516 statute miles.
5. Base map derived from electronic USGS quadrangles Nogales, AZ., Rio Rico, AZ., Cumero Canyon, AZ., Kino Springs, AZ.,

LEGEND:

- TRAFFIC PATTERN AIRSPACE
- 65 — NOISE CONTOURS DAY NIGHT LEVEL (DNL)
- EXISTING AIRPORT PROPERTY LINE
- EXTENDED RUNWAY CENTERLINE

NOGALES INTERNATIONAL AIRPORT

PUBLIC AIRPORT DISCLOSURE MAP

NOGALES, ARIZONA

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April 14, 2014	SHEET 1 OF 1

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