Chapter Three

Facility Requirements

Facility Requirements

To properly plan for the future of H.A. Clark Memorial Field, it is necessary to translate forecast aviation demand into the specific types and quantities of facilities that can adequately serve projected demand levels. This chapter uses the results of the forecasts prepared in Chapter Two, as well as established planning criteria, to determine the airfield (i.e., runways, taxiways, navigational aids, marking and lighting) and landside (i.e., hangars, general aviation terminal, aircraft parking apron, fueling, automobile parking and access) 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 as well as when they may be needed to accommodate forecast demands. Having established these facility requirements, alternatives for providing these facilities will be evaluated in Chapter Four to determine the most cost-effective and efficient means for implementation.

PLANNING HORIZONS

The cost-effective, safe, efficient, and orderly development of an airport should rely more upon actual demand at an airport than a time-based forecast figure. Thus, 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.

Over time, the actual activity at the airport may be higher or lower than the annualized forecast portrays. By planning according to activity milestones, the resultant plan can accommodate unexpected shifts or changes in the aviation demand in a timely fashion. The demand-based schedule provides flexibility in development, as the schedule can be slowed or expedited according to actual demand at any given time over the planning period. The resultant plan provides airport officials with a financially-responsible and needs-based program. **Table 3A** presents the planning horizon milestones for each activity demand category. These planning horizons assume the air tour operator scenario presented in Chapter Two.

TABLE 3A
Aviation Demand Planning Horizons
H.A. Clark Memorial Field

	2005	Short Term (± 5 Years)	Intermediate Term (± 10 Years)	Long Term (± 20 Years)
ANNUAL OPERATIONS				
Itinerant	3,840	9,200	12,800	18,900
Local	360	800	1,800	2,900
TOTAL OPERATIONS	4,200	10,000	14,600	21,800
Based Aircraft	13	19	25	34

PEAKING CHARACTERISTICS

Airport capacity and facility needs analyses typically relate to the levels of activity during a peak or design period. The periods used in developing the capacity analyses and facility requirements in this study are as follows:

- **Peak Month** - The calendar month when peak volumes of aircraft operations occur.

- **Design Day** - The average day in the peak month. This indicator is easily derived by dividing the peak month operations by the number of days in a month.

- **Busy Day** - The busy day of a typical week in the peak month. This descriptor is used primarily to determine general aviation transient ramp space requirements.

- **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. However, they do represent reasonable planning standards that can be applied without overbuilding or being too restrictive.

Itinerant Operations Peak Periods

Without an airport traffic control tower, adequate operational information is not available to directly determine peak operational activity at the airport. Therefore, peak period fore-

casts have been determined according to trends experienced at similar airports. Typically, the peak month for activity at general aviation airports approximates 10 to 15 percent of the airport's annual operations. Peak month itinerant operations and total operations were estimated at 12 percent of total annual operations. Current busy day operations were calculated as 1.5 times design day activity. This ratio can be expected to decline as activity increases and becomes more balanced throughout the week. Design hour operations were estimated at 30 percent of design day operations in 2005. This percentage can also be expected to decline slightly as activity increases over the long term. **Table 3B** summarizes the peak operations forecast for the airport.

TABLE 3B
Peaking Characteristics
H.A. Clark Memorial Field

	2005	Short Term (± 5 Years)	Intermediate Term (± 10 Years)	Long Term (± 20 Years)
OPERATIONS				
Itinerant				
Annual	3,840	9,200	12,800	18,900
Peak Month	461	1,104	1,536	2,268
Design Day	15	36	50	73
Busy Day	22	50	67	95
Design Hour	4	10	13	18
Total Airport				
Annual	4,200	10,000	14,600	21,800
Peak Month	504	1,200	1,752	2,616
Design Day	16	39	57	84
Design Hour	5	11	15	20

AIRFIELD CAPACITY

A demand/capacity analysis measures the capacity of the airfield facilities (i.e., runways 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). Annual service volume 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 annual service volume of a single runway configuration is approximately 230,000 operations at general aviation airports similar to H.A. Clark Memorial Field. Since the forecasts for the airport indicate that activity throughout the planning period will remain well below 230,000 annual operations, 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.

CRITICAL 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 defined as the most demanding category of aircraft, or family of aircraft, which conducts at least 500 itinerant operations per year at the airport. Planning for future aircraft use is of particular importance since 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 term potential needs of the airport.

The FAA has established a coding system to relate airport design criteria to the operational and physical characteristics of aircraft expected to use the airport. This airport reference code (ARC) has two components: the first component, depicted by a letter, is the aircraft approach category and relates to aircraft approach speed (operational characteristic); the second component, depicted by a Roman numeral, is the airplane design group and relates to aircraft wingspan (physical characteristic). Generally, aircraft approach speed applies to runways and runway-related facilities, while airplane wingspan primarily relates to separation criteria involving taxiways, taxilanes, and landside facilities.

According to FAA Advisory Circular (AC) 150/5300-13, *Airport Design*, an aircraft's approach category is based upon 1.3 times its stall speed in landing configuration at that aircraft's maximum certificated weight. The five approach categories used in airport planning are as follows:

Category A: 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.

The airplane design group (ADG) is based upon the aircraft's wingspan. The six ADGs used in airport planning 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.

Exhibit 3A summarizes representative aircraft by ARC.

The FAA advises designing airfield facilities to meet the requirements of the airport's most demanding aircraft, or critical aircraft. An aircraft or group of aircraft within a particular Approach Category or ADG must conduct more than 500 operations annually to be considered the critical design aircraft. In order to determine facility requirements, an ARC should first be determined, and then appropriate airport design criteria can be applied. This begins with a review of aircraft currently using the airport and those expected to use the airport through the planning period. H.A. Clark Memorial Field is currently used by a variety of general aviation aircraft. General aviation aircraft using the airport include single and multi-engine aircraft less than 12,500 pounds, which fall within Approach Categories A and B and ADG I. Occasionally, aircraft in ADG II use the airport (such as the Beechcraft King Air 200). Turbojet aircraft use the airport very infrequently. A review of completed instrument flight plans for calendar years 2003, 2004, 2005, and the first quarter of 2006 reveal that turbojet aircraft conducted less than 10 operations annually during this period.

All based aircraft currently fall within ARC A-I and ARC B-I. Representative based aircraft include single-engine Cessna aircraft, although numerous other aircraft makes and models are based at the airport.

The aviation demand forecasts projected the mix of aircraft to use the airport to consist of mainly the single-engine and multi-engine piston-powered aircraft which fall within Approach Categories A and B and ADGs I and II. The turboprop aircraft projected to base at the airport in the future would also fall within similar categories. While two turbojet aircraft are projected to base at the airport by the end of the planning period, business jet aircraft can include a wide range of Approach Categories and ADGs. The newest microjets being developed fall within ARC A-I. The most common business jet in use today, the Cessna Citation, falls within ARC B-II. Some larger business jets fall within ARCs C-I, C-II, D-I, and D-II.

While business jet use of the airport is expected to increase in the future, it is not expected that aircraft in Approach Category C or D will conduct 500 or more annual operations at the airport in the future. Aircraft in these approach categories have conducted less than 10 total operations since 2003 at the airport.

The previous master plan established the ARC B-III design standards for the airport in anticipation of larger aerial tour operator aircraft. The current airfield is designed to ARC B-III standards. This Master Plan recognizes the potential for the establishment of an air tour operation during the period of this Master Plan. There-

04MP12-3A-11/9/07

A-I

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

B-I *less than 12,500 lbs.*

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

B-II *less than 12,500 lbs.*

- **Super King Air 200**
- Cessna 441
- DHC Twin Otter

B-I, B-II *over 12,500 lbs*

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

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** 25, 31, **35**, 45, 55, 60
- Israeli Westwind
- HS 125-400, 700

C-II, D-II

- Cessna Citation III, VI, VIII, X
- **Gulfstream** II, III, **IV**
- Canadair 600
- ERJ-135, 140, 145
- CRJ-200, 700, 900
- Embraer Regional Jet
- Lockheed JetStar
- Super King Air 350

C-III, D-III

- ERJ-170, 190
- eing Business Jet
- B 7-200
- **B 7-300 Series**
- MD 0, DC-9
- Fo er 70, 100
- 9, A320
- ulfstream V
- Global Express

C-IV, D-IV

- **757**
- B 67
- C- 0
- DC -70
- DC 0
- M -11
- 1011

D-V

- **B- 7** Series
- B- 7

Note: Aircraft pictured is identified in bold type.

H. A. CLARK MEMORIAL FIELD

Exhibit 3A
AIRPORT REFERENCE CODES

fore, even though the majority of based aircraft are expected to fall within ARC B-II or below in the future, H.A. Clark Memorial Field should maintain the ARC B-III design standards through the planning period.

AIRFIELD REQUIREMENTS

The analyses of the operational capacity and the critical design aircraft are used to determine airfield needs. This includes runway configuration, dimensional standards, and pavement strength, as well as navigational aids and lighting.

RUNWAY CONFIGURATION

Key considerations in the runway configuration of an airport involve the orientation for wind coverage and the operational capacity of the runway system. The airfield capacity analysis indicated that additional airfield capacity will not need to be considered through the long-term planning horizon.

FAA Advisory Circular 150/5300-13, Change 9, *Airport Design*, recommends that a crosswind runway should be made available when the primary runway orientation provides less than 95 percent wind coverage for any aircraft forecast to use the airport on a regular basis. The 95 percent wind coverage is computed on the basis of the crosswind component not exceeding 10.5 knots (12 mph) for ARC A-I and B-I; 13 knots (15 mph) for ARC A-II and B-II; 16 knots (18 mph) for ARC A-III, B-III, and C-I through D-II; and 20 knots (23 mph) for ARC C-III through D-IV.

H.A. Clark Memorial Field does not have ten years of wind data collected from its AWOS; therefore, wind data collected from the Flagstaff Pulliam Airport was used to produce a wind rose for H.A. Clark Memorial Field. The most recent ten years of wind data from the Flagstaff Pulliam Airport at the time of this analysis was 1993-2002. This data is graphically depicted on the wind rose in **Exhibit 3B**. Runway 18-36 provides 96.1 percent coverage for 10.5 knot crosswinds, 98.4 percent coverage for 13 knot crosswinds, 99.7 percent coverage for 16 knot crosswinds, and 99.9 percent coverage for 20 knot crosswinds. Thus, the existing runway configuration has adequate wind coverage for all sizes and speeds of aircraft. For this reason, an additional runway for crosswind purposes is not necessary.

RUNWAY DIMENSIONAL REQUIREMENTS

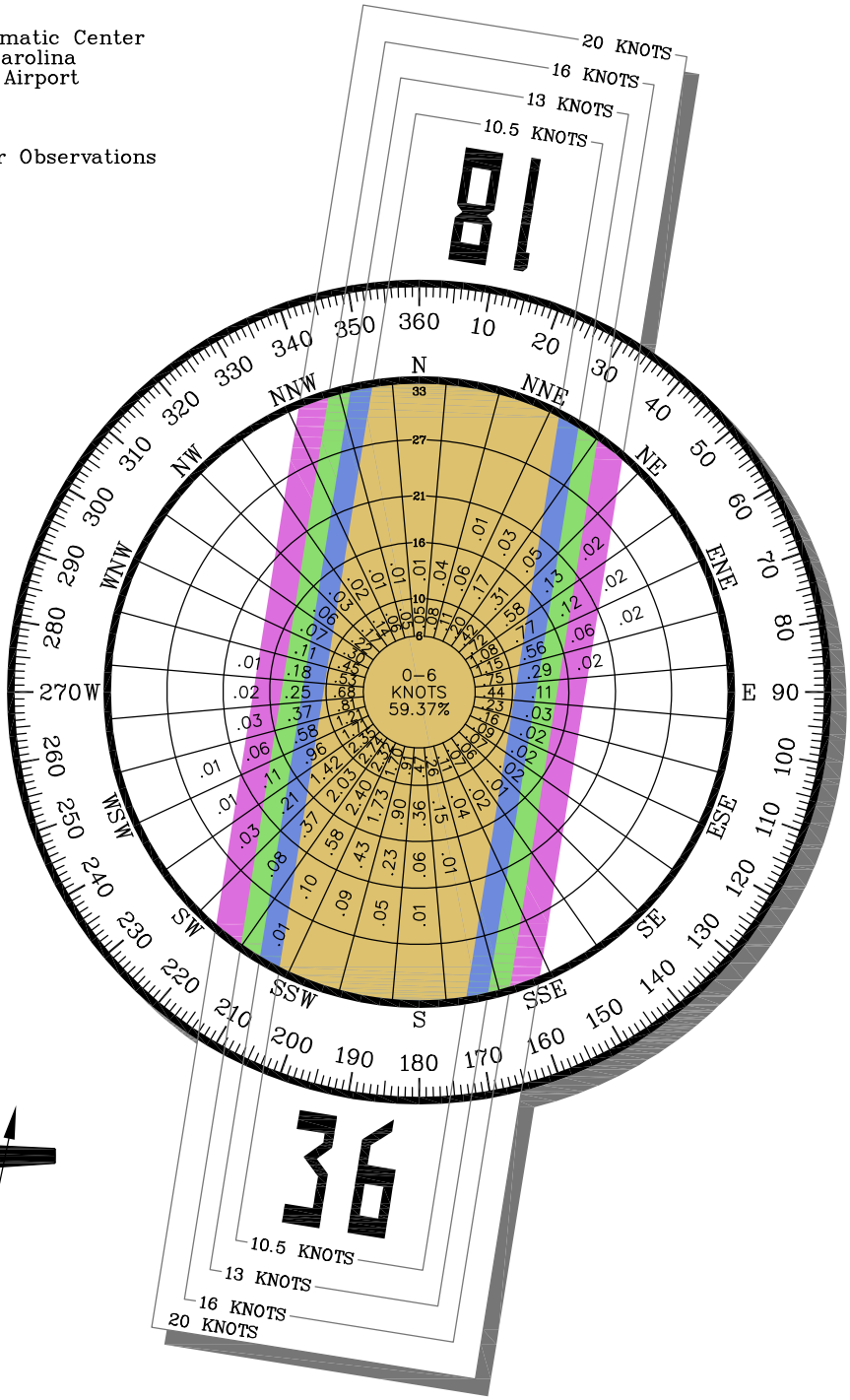
Runway dimensional standards include the length and width of the runway, as well as the dimensions associated with runway safety areas and other clearances. These requirements are based upon the design aircraft, or group of aircraft. The runway length must consider the performance characteristics of individual aircraft types, while the other dimensional standards are generally based upon the most critical airport reference code expected to use the runway. The dimensional

ALL WEATHER WIND COVERAGE

Runway	10.5 Knots	13 Knots	16 Knots	20 Knots
Runway 18–36	*95.36%*	*98.07%*	*99.65%*	*99.95%*

SOURCE:
NOAA National Climatic Center
Asheville, North Carolina
Flagstaff Pulliam Airport
Flagstaff, Arizona

OBSERVATIONS:
77,081 All Weather Observations
1994–2003



NORTH

Magnetic Variance
11° 52' East (April 2006)
Annual Rate of Change
00° 06' West (April 2006)

H.A. CLARK MEMORIAL FIELD

Exhibit 3B
WINDROSE

standards are outlined for the planning period for the primary runway.

Runway Length

The aircraft performance capability is a key factor in determining the runway length needed for takeoff and landing. The performance capability and, subsequently, the runway length requirement of a given aircraft type can be affected by the elevation of the airport, the air temperature, the gradient of the runway, and the operating weight of the aircraft.

The airport elevation at H.A. Clark Memorial Field is 6,685 feet above mean sea level (MSL). The mean maximum daily temperature during the hottest month is 83.7 degrees Fahrenheit. The gradient for Runway 18-36 is 1.0 percent.

Table 3C outlines the runway length requirements for various classifications of general aviation aircraft specific to H.A. Clark Memorial Field. These were derived utilizing the FAA Airport Design Computer Program. This program uses performance figures provided in AC 150/5325-4B, *Runway Length Requirements for Airport Design*. These runway lengths are based upon groupings or "families" of aircraft. As discussed earlier, the runway design required should be based upon the most critical family of aircraft with at least 500 annual operations. As noted above, this included general aviation aircraft within ARC B-II.

TABLE 3C
General Aviation Runway Length Requirements
H.A. Clark Memorial Field

AIRPORT AND RUNWAY DATA	
Airport elevation	6,685 feet
Mean daily maximum temperature of the hottest month	83.7 F
Maximum difference in runway centerline elevation	60 feet
Wet runway	
RUNWAY LENGTHS RECOMMENDED FOR AIRPORT DESIGN	
Small airplanes with less than 10 passenger seats	
75 percent of these small airplanes	5,700 feet
95 percent of these small airplanes	**8,000 feet**
100 percent of these small airplanes	8,000 feet
Small airplanes with 10 or more passenger seats	8,000 feet
Large airplanes of 60,000 pounds or less	
75 percent of these large airplanes at 60 percent useful load	7,900 feet
75 percent of these large airplanes at 90 percent useful load	9,200 feet
100 percent of these large airplanes at 60 percent useful load	11,600 feet
100 percent of these large airplanes at 90 percent useful load	11,600 feet

Chapter Two of AC 150/5325-4B, *Runway Length Requirements for Airport Design*, no changes included.

Small aircraft are defined as aircraft weighing 12,500 pounds or less. Small airplanes make up the vast majority of general aviation activity at H.A. Clark Memorial Field and most other general aviation airports. In particular, piston-powered aircraft make up the majority of the small airplane operations.

According to the table, the present runway length of 6,000 feet is adequate to accommodate 75 percent of these small airplanes. FAA Advisory Circular 150/5325-4B recommends that airports such a H.A. Clark Memorial Field be designed to at least serve 95 percent of small airplanes. The advisory circular further defines the fleet categories as follows:

- **95 Percent of Small Airplane Fleet:** Applies to airports that are primarily intended to serve medium-sized population communities with a diversity of usage and a greater potential for increased aviation activities. This category also includes airports that are primarily intended to serve low-activity locations, small population communities, and remote recreational areas.

- **100 Percent of Small Airplane Fleet:** This type of airport is primarily intended to serve communities located on the fringe of a metropolitan area or a relatively large population community remote from a metropolitan area.

Based upon these definitions, H.A. Clark Memorial Field falls within the 95 percent fleet category. At the airport's temperature and elevation, this would require a runway length of 8,000 feet. According to the FAA planning guidance, this is also the same length recommended to accommodate 100 percent of the small airplane fleet. Thus, Runway 18-36 should be planned to be extended to 8,000 feet in the long-term planning horizon.

This length should also be sufficient to accommodate any potential air tour operators. The largest aircraft currently used regularly in Grand Canyon air tour service in the region is the De Havilland Twin Otter (DH6). This aircraft requires less than 5,000 feet for takeoff at the temperature and altitude of H.A. Clark Memorial Field. Other aircraft used in air tour operations are single-engine and multi-engine piston-powered aircraft. Their runway length requirements are included in the runway length defined above.

An extension to Runway 18-36 is included in this Master Plan for planning purposes only. This is to 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 it is needed. By planning for an 8,000-foot runway, the City and County can take appropriate measures to ensure that there are no hazards or obstacle penetrations to the 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. The Airport Disclosure Map that will be developed for this Master Plan will assume the

potential for this extension at the airport in the future. Separate justification for constructing the runway extension will likely be required outside this Master Plan at the time of implementation. This justification will need to identify those specific users that require a longer runway to operate at the airport. This type of justification is generally built upon letters of support from the specific users requiring the runway extension.

Pavement Strength

An important feature of airfield pavement is the ability to withstand repeated use by aircraft of significant weight. Runway 18-36 is strength-rated at 15,000 pounds single wheel loading (SWL). This is generally adequate for current use. As larger and heavier multi-engine, turboprop and business jet use increases, the pavement should be strengthened up to 30,000 SWL and 60,000 pounds dual wheel loading (DWL) to accommodate these heavier aircraft.

Dimensional Design Standards

Runway dimensional design standards define the widths and clearances required to optimize safe operations in the landing and takeoff area. These dimensional standards vary depending upon the ARC for the runway. **Table 3D** outlines key dimensional standards for the airport reference codes most applicable to H.A. Clark Memorial Field, both now and in the future.

The runway should be planned to maintain critical ARC, which is B-III.

The following considers those areas where standards will need to be met on the existing Runway 18-36:

Runway Width – The current width of Runway 18-36 (100 feet) meets the 100-foot design requirement for ARC B-III.

Runway Safety Area – The runway safety area (RSA) is defined in FAA Advisory Circular 150/5300-13, Change 9, *Airport Design*, as a surface surrounding the runway, prepared or suitable for reducing the risk of damage to airplanes in the event of an overshoot, undershoot, or excursion from the runway. The RSA is centered on the runway and extends beyond either end. The FAA requires the RSA to be cleared and graded, drained by grading or storm sewers, capable of accommodating fire and rescue vehicles, and free of obstacles not fixed by navigational purpose.

The RSA standard for Category B-III aircraft is 400 feet wide and extends 800 feet beyond each runway end. The existing airport layout should allow these standards to be met without affecting any existing airport facilities.

TABLE 3D
Airfield Design Standard
H.A. Clark Memorial Field

	Runway 18-36		
Airport Reference Code (ARC)	**Available (ft.)**	**B-II (ft.)**	**B-III (ft.)**
Runway Width	100	75	100
Runway Safety Area			
Width	300	150	**400**
Length Beyond End	300	300	**800**
Runway Object Free Area			
Width	800	500	800
Length Beyond End	300	300	**800**
Runway Blast Pad			
Width	N/A	95	140
Length	N/A	150	200
Runway Centerline to:			
Holding Position	200	200	200
Parallel Taxiway	400	240	400
Taxiway Width	35	35	**50**
Taxiway Centerline to:			
Fixed or Moveable Object	93	65.5	**93**
Parallel Taxilane	N/A	105	**152**
Taxilane Centerline to:			
Fixed or Moveable Object	50	**57.5**	**81**
Parallel Taxilane	140	97	**140**
Runway Protection Zones -			
One mile or greater visibility			
Inner Width	500	500	500
Length	1,000	1,000	1,000
Outer Width	700	700	700
Not Lower than ¾ mile			
Inner Width	500	**1,000**	**1,000**
Length	1,000	**1,700**	**1,700**
Outer Width	700	**1,510**	**1,510**
Lower than ¾ mile			
Inner Width	500	**1,000**	**1,000**
Length	1,000	**2,500**	**2,500**
Outer Width	700	**1,750**	**1,750**

* Boldface indicates standards not met.

Runway Object Free Area – The object free area (OFA) is an area centered on the runway to enhance the safety of aircraft operations by having an area free of objects, except for objects that need to be located in the OFA for air navigation or ground maneuvering purposes. The OFA must provide clearance of all ground-based objects protruding above the runway safety area (RSA) edge elevation, unless the object is fixed by a function serving air or ground navigation.

For ARC B-III, the OFA extends for 800 feet beyond the runway end, and has a width of 800 feet. Runway 18-36 meets the width standard but currently only extends 300 feet beyond the runway ends. This will need to be

extended to the full 800 feet to comply with B-III design standards in the future.

Aircraft Holding Positions – The current hold positions for Runway 18-36 are marked 200 feet from the runway centerline. The standard for ARC B-III is 200 feet. These hold positions are adequate for the long term.

Runway Protection Zones – The runway protection zone (RPZ) is an area off the runway end that enhances the protection of people and property on the ground. This is best achieved through airport owner control over the RPZs. Such control includes maintaining RPZ areas clear of incompatible objects and activities.

The RPZ is trapezoidal in shape and is centered on the extended runway centerline. The dimensions of the RPZ are a function of the critical aircraft and the approach visibility minimums associated with the runway. All approaches to the airport now are visual as there are no designated instrument approach procedures for the airport. The establishment of an instrument approach procedure at the airport might not change the size of the RPZ. An instrument approach procedure with visibility minimums as low as one mile could be developed for the airport and the size of the RPZ would not change. **Table 3D** depicts the RPZ requirements for runway ends equipped with low-visibility instrument approach procedures. Based upon the capabilities of any instrument approach procedures developed in the future, the RPZs for each runway end would become larger in the future if instrument approach procedures had visibility minimums less than one mile.

TAXIWAY REQUIREMENTS

Taxiways are constructed primarily to facilitate aircraft movements to and from the runway system. Some taxiways are necessary simply to provide access between the aprons and runways, whereas other taxiways become necessary as activity increases at an airport to provide safe and efficient use of the airfield.

As detailed in Chapter One, Runway 18-36 is served by a full-length parallel taxiway with a total of five exit taxiways. **Table 3D** outlines the runway to taxiway centerline separation standards for ARC B-II and B-III. Parallel Taxiway A meets separation standards for up to ARC B-III.

Exit taxiways provide a means to enter and exit the runways at various points on the airfield. The type and number of exit taxiways can have a direct impact on the capacity and efficiency of the airport as a whole. Runway 18-36 has a total of five exit taxiways on the east side of the runway. Exit taxiways are most effective when planned at least 800 feet apart. Each of Runway 18-36's exit taxiways are spaced 800 feet or more from each other. Potential locations for new exit taxiways that may improve capacity or efficiency will be examined in Chapter Four.

Dimensional standards for the taxiways are depicted on **Table 3D**.

Taxiway width and clearance standards are based upon the ADG for a particular runway or taxiway. For Runway 18-36, all taxiways must meet ADG II standards. The parallel taxiways and exit taxiways for Runway 18-36 are 35 feet wide. These taxiways will need to be widened to 50 feet to meet the ADG III standard. **Table 3D** summarizes the clearance standards that should be considered in future development.

Holding aprons improve the efficiency of the taxiway system by allowing an area of the taxiway for aircraft to prepare for departure. This allows aircraft ready for departure to by-pass these aircraft. A holding apron should be planned for each runway end.

NAVIGATIONAL AIDS AND INSTRUMENT APPROACH PROCEDURES

Navigational Aids

Navigational aids are electronic devices that transmit radio frequencies which properly equipped aircraft and pilots translate into point-to-point guidance and position information. The very high frequency omnidirectional range (VOR), Global Positioning System (GPS), and LORAN-C are available for pilots to navigate to and from H.A Clark Memorial Field. These systems are sufficient for navigation to and from the airport; therefore, no other navigational aids are needed at the airport.

Instrument Approach Procedures

Instrument approach procedures consist of a series of predetermined maneuvers established by the FAA for navigation during inclement weather conditions. Currently, there are no established instrument approach procedures for H.A Clark Memorial Field. Therefore, during those times when visibility drops below three miles and/or cloud ceilings are below 1,000 feet MSL, the airport is essentially closed to arrivals.

A GPS modernization effort is underway by the FAA and focuses on augmenting the GPS signal to satisfy requirements for accuracy, coverage, availability, and integrity. For civil aviation use, this includes the continued development of the Wide Area Augmentation System (WAAS), which was initially launched in 2003. The WAAS uses a system of reference stations to correct signals from the GPS satellites for improved navigation and approach capabilities. Where the non-WAAS GPS signal provides for en-route navigation and limited instrument approach (lateral navigation) capabilities, WAAS provides for approaches with both course and vertical navigation. This capability was historically only provided by an instrument landing system (ILS), which requires extensive on-airport facilities. The WAAS upgrades are expected to allow the development of approaches to most airports with cloud ceilings as low as 200 feet above the ground and visibilities restricted to one-half mile, after 2015.

Nearly all new instrument approach procedures developed in the United States are being developed with GPS. GPS approaches are currently categorized as to whether they provide only lateral (course) guidance or a combination of lateral and vertical (descent) guidance. An approach procedure with vertical guidance (APV) GPS approach provides both course and descent guidance. A lateral navigation approach (LNAV) approach only provides course guidance. In the future, as WAAS is upgraded, precision approaches similar in capability to the existing ILS will become available. These approaches are currently categorized as the Global Navigation Satellite System Landing System (GLS). A GLS approach may be able to provide for approaches with one-half-mile visibility and 200-foot cloud ceilings. A GLS would be implemented in lieu of an ILS approach.

Since both course guidance and descent information is desirable for an instrument approach to H.A Clark Memorial Field and GPS does not require the installation of costly navigation equipment at the airport, a GLS should be planned to the Runway 36 end. An APV approach with one-mile visibility minimums is appropriate to Runway 18.

AIRFIELD LIGHTING, MARKING, AND SIGNAGE

There are a number of lighting and pavement marking aids serving pilots using the H.A. Clark Memorial Field. These lighting and marking aids assist pilots in locating the airport during night or poor weather conditions, as well as assist in the ground movement of aircraft.

Identification Lighting

The location of an airport at night is universally indicated by a rotating beacon. The rotating beacon at the airport is located on the top of a metal tower east of Runway 18-36. The rotating beacon is sufficient and should be maintained through the planning period.

Runway and Taxiway Lighting

The medium intensity runway edge lighting (MIRL) currently available along Runway 18-36 will be adequate for the planning period. The taxiway system does not currently have a lighting system. In the short term, medium intensity taxiway lights (MITL) should be planned for all taxiways.

Airfield Signs

Airfield signage assists pilots in identifying their location on the airport. Signs located at intersections of taxiways provide crucial information to avoid conflicts between moving aircraft and potential runway incursions. Directional signage also instructs pilots as to the location of taxiways and apron areas. This directional signage is sufficient and should be maintained through the planning period.

Visual Approach Lighting

In most instances, the landing phase of any flight must be conducted in visual conditions. To provide pilots with visual guidance information during landings to the runway, electronic visual approach aids are commonly provided at airports. Each end of Runway 18-36 is currently equipped with a precision approach path indicator (PAPI-2). These lighting systems should be upgraded to PAPI-4s to better suit large aircraft operations in the future.

Approach and Runway End Identification Lighting

Runway end identifier lights (REILs) are flashing lights located at each runway end that facilitate identification of the runway end at night and during poor visibility conditions. REILs provide pilots with the ability to identify runway ends and distinguish the runway end lighting from other lighting on the airport and in the approach areas. REILs are installed at each end of Runway 18-36. These lighting aids should be maintained through the planning period. To support a GLS approach to Runway 36, a medium intensity approach lighting system with runway alignment indicator lights (MALSR) will be required.

Distance Remaining Signs

Distance remaining signage should be planned for Runway 18-36. These lighted signs are placed in 1,000-foot increments along the runway to notify pilots of the length of runway remaining.

Pilot-Controlled Lighting

H.A. Clark Memorial Field is equipped with pilot-controlled lighting (PCL). PCL allows pilots to control the intensity of the runway lighting using the radio transmitter in the aircraft. PCL also provides for more efficient use of airfield lighting energy. A PCL system turns the airfield lights off or to a lower intensity when not in use. Similar to changing the intensity of the lights, pilots can turn up the lights using the radio transmitter in the aircraft. This system should be maintained through the planning period. The PAPIs and REILs should be added to the PCL system, along with future taxiway lighting.

Pavement Markings

In order to facilitate the safe movement of aircraft about the field, airports use pavement markings, lighting, and signage to direct pilots to their destinations. Runway markings are designed according to the type of instrument approach available on the runway. FAA Advisory Circular 150/5340-1H, *Marking of Paved Areas on Airports*, provides the guidance necessary to design airport markings.

Runway 18-36 currently has nonprecision markings. Nonprecision runway markings identify the runway centerline, threshold, aiming point, and designation. These markings are sufficient for an APV approach to Runway 18. Precision markings would be re-

quired for a GLS approach to Runway 36. Precision markings identify the runway designation, centerline, threshold, aiming point, touchdown zone, and provide side strips.

Holdlines need to be marked on all taxiways connecting to the runway. The holdlines are currently required to be placed 200 feet from the runway centerline. These markings assist in reducing runway incursions as aircraft must remain behind the holdline until taking the active runway for departure.

Taxiway and apron areas also require marking to assure that aircraft remain on the pavement and clear of any objects located along the taxiway/taxilane. Yellow centerline stripes are currently painted on all taxiway and apron surfaces at the airport to provide assistance to pilots in taxiing along these surfaces at the airport. Besides routine maintenance, these markings will be sufficient through the planning period.

HELIPADS

The airport does not have a designated helipad on the main apron area. Helicopters utilize the same areas as fixed-wing aircraft. Helicopter and fixed-wing aircraft should be segregated to the extent possible. Facility planning should include establishing a designated transient helipad at the airport, including providing up to two parking positions. Lighting should be provided to allow safe operation to the helipad at night.

WEATHER REPORTING

The airport has a lighted wind cone that provides pilots with information about wind conditions. A segmented circle provides traffic pattern information to pilots. These facilities are sufficient and should be maintained in the future.

The airport is equipped with an AWOS. The AWOS provides automated weather observations 24 hours per day. The system updates weather observations every minute, continuously reporting significant weather changes as they occur. The AWOS reports cloud ceiling, visibility, temperature, dew point, wind direction, wind speed, altimeter setting (barometric pressure), and density altitude (airfield elevation corrected for temperature). The AWOS is sufficient and should be maintained through the planning period.

REMOTE COMMUNICATIONS FACILITIES

H.A. Clark Memorial Field is not currently equipped with a remote communications outlet (RCO). It is recommended that an RCO be added to the airport. An RCO would provide pilots with a direct communication link to the Albuquerque Air Route Traffic Control Center. This communication link facilitates the opening and closing of flight plans.

AIRPORT TRAFFIC CONTROL

H.A. Clark Memorial Field does not have an operational airport traffic control tower (ATCT); therefore, no formal terminal air traffic control services are available at the airport. Establishment of an ATCT is governed by Title 14 of the Code of Federal Regulation (CFR) Part 170, *Establishment and Discontinuance Criteria for Air Traffic Control Services and Navigational Facilities.*

14 CFR Part 170.13 *Airport Traffic Control Tower (ATCT) Establishment Criteria,* provides the general criteria along with general facility establishment standards that must be met before an airport can qualify for an ATCT. These are as follows:

1. The airport, whether publicly or privately owned, must be open to and available for use by the public as defined in the Airport and Airway Improvement Act of 1982;

2. The airport must be recognized by and contained within the National Plan of Integrated Airport Systems;

3. The airport owners/authorities must have entered into appropriate assurances and covenants to guarantee that the airport will continue in operation for a long enough period to permit the amortization of the ATCT investment;

4. The FAA must be furnished appropriate land without cost for construction of the ATCT; and;

5. The airport must meet the benefit-cost ratio criteria utilizing three consecutive FAA annual counts and projections of future traffic during the expected life of the tower facility. (An FAA annual count is a fiscal year or a calendar year activity summary. Where actual traffic counts are unavailable or not recorded, adequately documented FAA estimates of the scheduled and nonscheduled activity may be used.)

An airport meets the establishment criteria when it satisfies the criterion above and its benefit-cost ratio equals or exceeds one. The benefit-cost ratio is the ratio of the present value of the ATCT life cycle benefits (BPV) to the present value of ATCT life cycle costs (CPV).

The benefits of establishing an ATCT result from the prevention of aircraft collisions, the prevention of other type of preventable accidents, reduced flying time, emergency response notification, and general security oversight. Benefits from preventable collisions are further broken down into mid-air collisions, airborne-ground collisions, and ground collisions. Data collected for analyzing the establishment of an ATCT include scheduled and non-scheduled commercial service, and non-commercial traffic which includes military operations.

Since the cost data fluctuates each year based on new control tower operational cost estimates, development cost estimates, and aircraft operational costs, the benefit/costs analysis

ratios change frequently and cannot be readily determined for the airport in the future The FAA has sole authority over the benefit/cost analysis. Therefore, any analysis must be completed by FAA staff and cannot be developed independently for this Master Plan.

The airport is not expected to reach annual operational levels that support FAA ATCTs at other airports across the country. Therefore, the FAA-funded construction and operation of an ATCT at the airport is unlikely. However, this does not prevent the establishment of an ATCT funded locally or through a federal cost sharing program. Therefore, while the airport is not expected to qualify for an ATCT, for planning purposes, the alternatives analysis will examine alternative locations for the construction of an ATCT at the airport.

LANDSIDE FACILITIES

Landside facilities are those necessary for handling general aviation aircraft and passengers while on the ground. This section is devoted to identifying future landside facility needs during the planning period for the following types of facilities normally associated with general aviation terminal areas:

- Hangars
- Aircraft Parking Apron
- General Aviation Terminal Services

HANGARS

The demand for hangar facilities typically depends on the number and type of aircraft expected to be based at the airport. Hangar facilities are generally classified as T-hangars, and conventional hangars. Conventional hangars can include individual hangars or multi-aircraft hangars. These different types of hangars offer varying levels of privacy, security, and protection from the elements.

Demand for hangars varies with the number of aircraft based at the airport. Another important factor is the type of based aircraft. Smaller single-engine aircraft usually prefer T-hangars, while larger business jets will prefer conventional hangars. Rental costs will also be a factor in the choice.

The airport has three T-hangar storage facilities, providing three storage units. T-hangar space available at the airport totals approximately 1,650 square feet for aircraft storage. Analysis of future T-hangar requirements, as depicted on **Table 3E,** indicates that additional T-hangar positions will be needed as the number of based aircraft grows.

There are currently seven conventional general aviation hangars on the airport totaling approximately 19,750 square feet. This type of hangar is typically used to store multiple aircraft or one or more corporate aircraft.

However, the majority of the conventional hangars at H.A. Clark Memorial Field are used to store a single aircraft. Conventional hangar space will need to be planned to at least accommodate the turbine aircraft forecast to base at H.A. Clark Memorial Field.

Requirements for maintenance and fixed base operator (FBO) hangar area were estimated at 20 percent of the total T-hangar and conventional hangar area. It should be noted that FBO hangars are cross-utilized for storage and aircraft maintenance. They are also sometimes used to store transient aircraft overnight.

Table 3E compares the existing hangar space to the future hangar requirements. It is evident from the table that there is a need for additional enclosed hangar storage space throughout the planning period.

TABLE 3E
Hangar Storage Requirements
H.A. Clark Memorial Field

	Available	Short Term (± 5 Years)	Intermediate Term (± 10 Years)	Long Term (± 20 Years)
Hangar Positions				
T-Hangars	2	8	12	18
Conventional	7	9	10	14
Total Aircraft to be Hangared	9	17	22	32
Hangar Area Requirements				
T-Hangars (s.f.)	1,650	9,200	13,800	20,700
Conventional (s.f.)	19,750	41,400	46,000	64,400
Service Hangar Area (s.f.)	5,530	10,100	12,000	17,000
Total Hangar Area (s.f.)	21,400	60,700	71,800	102,100

*Available service hangar area is a portion of the available conventional hangar total.

AIRCRAFT PARKING APRON

A parking apron should be provided for at least the number of locally based aircraft that are not stored in hangars, as well as transient aircraft. The airport currently provides approximately 40,700 square yards of total apron adjacent to the airport hangar facilities and the airport terminal building. The number of local tie-downs and apron space for the planning period is presented in **Table 3F.**

TABLE 3F
Aircraft Parking Apron Requirements
H.A. Clark Memorial Field

	Available	Existing Need	Short Term (± 5 Years)	Intermediate Term (± 10 Years)	Long Term (± 20 Years)
Non-hangared Based Aircraft		4	2	3	2
Busy Day Itinerant Operations		22	50	67	95
Local Ramp Positions		4	2	3	2
Transient Ramp Positions		6	13	17	24
Total Ramp Positions	31	10	15	20	26
Apron Area (s.y.)	40,700	5,600	8,400	11,200	14,600

FAA Advisory Circular 150/5300-13, *Airport Design*, suggests a methodology by which transient apron requirements can be determined from knowledge of busy-day operations. At H.A. Clark Memorial Field, the number of transient spaces required was determined to be approximately 25 percent of busy-day itinerant operations. A planning criterion of 560 square yards per parking space was used to determine future apron requirements.

The available parking apron should be adequate through the long term, assuming that adequate hangar space is available for based aircraft.

TERMINAL FACILITIES

Terminal facilities are often the first impression of the community that air travelers or tourists will encounter. Terminal facilities at an airport provide space for passenger waiting, a pilots' lounge and flight planning, concessions, management, storage, and various other needs. At H.A. Clark Memorial Field, this is accommodated in a single facility located east of Runway 18-36.

In the future, the existing terminal building may be needed to accommodate an air tour operation as detailed in Chapter Two. The existing terminal facility is ideally suited for an air tour operation as it contains a large lobby area and ticket counters, and has direct access to the terminal apron.

The methodology used in estimating terminal facility needs was based upon the number of airport users expected to utilize the terminal facilities during the design hour, as well as FAA guidelines. Space requirements for terminal facilities were based on providing 90 square feet per design hour itinerant passenger. **Table 3G** outlines the space requirements for terminal services at H.A. Clark Memorial Field through the long term planning horizon.

TABLE 3G
Terminal Facility Requirements
H.A. Clark Memorial Field

	Available	Current Need	Short Term (± 5 Years)	Intermediate Term (± 10 Years)	Long Term (± 20 Years)
Itinerant Operations					
Annual		3,840	9,200	12,800	18,900
Design Hour		4	10	13	18
Passengers per Operation		1.8	2.0	2.2	2.5
Design Hour Passengers		8	18	23	32
Terminal Space (s.f.)	3,000	700	1,600	2,100	2,900
Auto Parking Spaces	25	23	49	66	96

SUPPORT REQUIREMENTS

Various facilities that do not logically fall within classifications of airfield, terminal building, or general aviation facilities have been identified for inclusion in this Master Plan. Facility requirements have been identified for these remaining facilities:

- Automobile Parking
- Security
- 14 CFR Part 139 Certification Requirements
- Aircraft Rescue And Firefighting
- Perimeter Fencing
- Airport Maintenance
- Aircraft Wash Facility
- Aviation Fuel Storage
- Utilities
- Off-Airport Vehicular Access
- On-Airport Vehicular Access

Automobile Parking

Vehicle parking requirements were also examined. Space determinations were based on an evaluation of the existing airport use, as well as industry standards. Vehicle parking spaces were calculated at 50 percent of based aircraft plus the product of design hour itinerant passengers and the industry standard of 2.0 increasing to 2.5 by the end of the planning period to account for the higher activity levels associated with an air tour operation. Automobile parking requirements are summarized in **Table 3G**.

Security

In cooperation with representatives of the general aviation community, the 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 over 12,500 pounds warrant greater security.

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 3H 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.

TABLE 3H
Airport Characteristics Measurement Tool

	Assessment Scale	
Security Characteristic	**Public Use Airport**	**H.A. Clark Memorial Field**
Location		
Within 20 nm of mass population areas [1]	5	0
Within 30 nm of a sensitive site[2]	4	0
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
Runway length less than 5,000 feet, greater than 2,001 feet	4	0
Runway length 2,000 feet or less	2	0
Asphalt or concrete runway	1	1
Operations		
Over 50,000 annual operations	4	0
Part 135 operations	3	0
Part 137 operations	3	0
Part 125 operations	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	4
Totals		**18**

Source: *Security Guidelines for General Aviation Airports*
[1] An area with a total population over 100,000
Sensitive sites include military installations, nuclear and chemical plants, centers of government, national monuments, and/or international ports

Table 3H also ranks H.A. Clark Memorial Field according to this scale. As shown in the table, the H.A. Clark Memorial Field ranking on this scale is 18. Points are assessed for the airport having more than 11 based aircraft, having a runway greater than 5,001 feet in length, having a paved runway surface, for having flight training activities at the airport, having rental aircraft, and for having aircraft maintenance capabilities.

As shown in **Table 3J**, a rating of 18 points places H.A. Clark Memorial Field on the third tier ranking of security measures by the TSA. This rating clearly illustrates the security needs at H.A. Clark Memorial Field. The H.A. Clark Memorial Field ranking could increase to 26 by the Long Term Planning Horizon with based aircraft levels over 26, an air tour (14 CFR Part 139 operation) and based aircraft over 12,500 pounds.

Based upon the results of the security assessment, the TSA recommends nine security enhancements for H.A. Clark Memorial Field. These enhancements are shown in **Table 3J**.

A review of each recommended security procedure is below.

TABLE 3J
Recommended Security Enhancements Based on Airport Characteristics Assessment Results

	Points Determined Through Airport Characteristics Assessment			
Security Enhancements	**> 45**	**25-44**	**15-24**	**0-14**
Fencing	■			
Hangars	■			
Closed-Circuit Television (CCTV)	■			
Intrusion Detection System	■			
Access Controls	■	■		
Lighting System	■	■		
Personal 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 agencies including local,

state, and federal. 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 H.A. Clark Memorial Field, as well as any new enhancements. This document could consist of, but not be limited to, airport and local law enforcement contact information, including alternates when available, and 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 on board 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 terrorist 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 GA 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.

14 CFR Part 139 Certification Requirements

14 CFR Part 139, *Certification and Operations: Land Airports Serving Certain Air Carriers*, as amended, prescribes the rules governing the certification and operation of land airports which serve any scheduled or un-

scheduled passenger operation of an air carrier that is conducted with an aircraft having a seating capacity of more than nine passengers.

Under Part 139 requirements, there are four classes of airports: Classes I, II, III, and IV. Airports serving all types of scheduled operations of large air carrier aircraft, and any other type of air carrier operations, are known as Class I airports. Class II airports are those airports that serve scheduled operations of small air carrier aircraft (10-30 seats) and unscheduled operations of larger air carrier aircraft (more than 30 seats). Class III airports are those airports that serve only scheduled operations of air carrier aircraft with 10-30 seats. Class IV airports would be those airports serving only unscheduled air carrier operations in aircraft with more than 30 seats. These designations are shown in **Table 3K**.

Presently, H.A. Clark Memorial Field is not required to comply with 14 CFR Part 139 as there are currently no scheduled air carrier operations at the airport, nor are there any unscheduled operations by aircraft with more than 30 passengers. Requirements for 14 CFR Part 139 certification in the future will be dependent upon the type of air tour operation established at the airport. Should the air tour operation consist of unscheduled operations by aircraft with 30 or less passenger seats, then the airport will not be required to be certificated under 14 CFR Part 139. However, should aircraft with a larger seating capacity be used, or there are scheduled operations by aircraft with more than nine passenger seats, then the airport would be required to be certificated.

TABLE 3K
Proposed Part 139 Airport Classifications

	Proposed Airport Class			
Type of air carrier operation	**Class I**	**Class II**	**Class III**	**Class IV**
Scheduled Large Air Carrier Aircraft	X			
Unscheduled Large Air Carrier Aircraft	X	X		X
Scheduled Small Air Carrier Aircraft	X	X	X	

Aircraft Rescue and Firefighting (ARFF)

The requirements for Aircraft Rescue and Firefighting (ARFF) equipment and services at an airport are determined by whether the airport is required to be certificated under 14 CFR Part 139 and the size of the aircraft. As discussed above, H.A. Clark Memorial Field is presently not required to be certificated under 14 CFR Part 139; therefore, there is no requirement now for ARFF equipment or facilities. However, the City has acquired an Index A ARFF vehicle and plans to construct an ARFF storage facility in 2006.

The Index A ARFF vehicle will allow the airport to serve scheduled or unscheduled operations by air carrier

aircraft less than 90 feet in length. It is not anticipated that aircraft greater than 90 feet in length will be operating at the airport; therefore, the existing ARFF vehicle and facility should be sufficient to meet the future ARFF needs of the airport through the planning period.

Perimeter Fencing

Perimeter fencing is used at airports to primarily secure the aircraft operations area. The physical barrier of perimeter fencing provides the following functions:

- Gives notice of the legal boundary of the outermost limits of a facility or security-sensitive area.
- Assists in controlling and screening authorized entries into a secured area by deterring entry elsewhere along the boundary.
- Supports surveillance, detection, assessment, and other security functions by providing a zone for installing intrusion-detection equipment and closed-circuit television (CCTV).
- Deters casual intruders from penetrating a secured area by presenting a barrier that requires an overt action to enter.
- Demonstrates the intent of an intruder by their overt action of gaining entry.
- Causes a delay to obtain access to a facility, thereby increasing the possibility of detection.
- Creates a psychological deterrent.
- Optimizes the use of security personnel while enhancing the capabilities for detection and apprehension of unauthorized individuals.
- Demonstrates a corporate concern for facility security.
- Provides a cost-effective method of protecting facilities.
- Limits inadvertent access to the aircraft operations area by wildlife.

The airport perimeter at H.A. Clark Memorial Field is equipped with 6-foot chain-link fencing with three-strand barbed wire on top. An automated gate is located southeast of the Aviation Services of Northern Arizona facility. Five manual access gates are located in various locations around the perimeter of the property. The existing perimeter fence is adequate and should be maintained through the planning period.

Airport Maintenance Building

Presently, there is not a dedicated airport maintenance facility. When maintenance needs to be performed on any of the facilities, equipment is brought in from existing City facilities off airport property. A facility for gen-

eral maintenance activities would assist in the cost-effective and time-efficient maintenance of the airport. Consideration should be given to developing a permanent maintenance facility on the airport. The alternatives analysis will examine optimal locations for the construction of a maintenance building.

Aircraft Wash Facility

Presently, there is not a designated aircraft wash facility on the airport. Consideration should be given to establishing an aircraft wash facility at the airport to collect aircraft cleaning fluids used during the cleaning process.

Aviation Fuel Storage

All fuel storage at the airport is privately-owned and operated. Fuel storage currently totals 8,000 gallons in a single above-ground tank for 100LL Avgas fuel.

Growth in operations and based aircraft will not significantly impact fuel storage requirements. With the existing storage mix, the airport will be able to maintain a two-week supply of 100LL Avgas. A Jet A storage tank should be added in the short term to facilitate future turbine operations.

Utilities

Electrical and water services are available at the airport. Arizona Public Service Company provides electrical service. Water is provided by the City of Williams using the on-airport water tank. Septic systems are in place for sanitary sewer requirements.

Utility extensions to new hangar areas will be needed through the planning period, as well as the availability of sanitary sewer connections to City waste water treatment plants and a connection to City water supply system.

Off-Airport Access

The airport has a single public access point located on the east side of the airport. Aviation Drive currently serves as the airport access road. This should provide adequate access capacity throughout the planning period.

On-Airport Access

Private vehicles regularly use the apron and taxilanes for movement as there is no dedicated interior access road. The segregation of vehicle and aircraft operational areas is supported by FAA guidance established in June 2002. FAA AC 50/5210-20, *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."

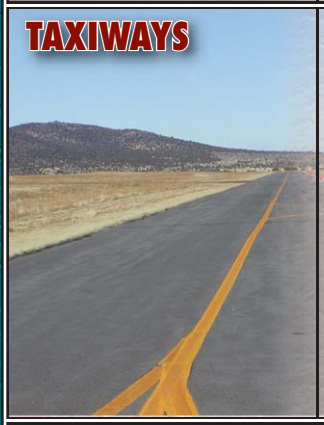
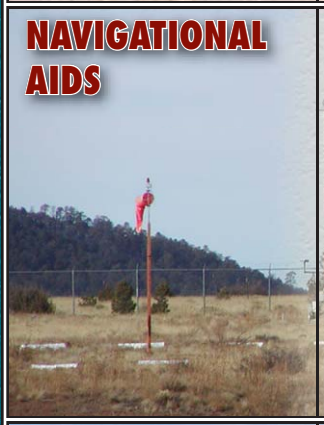
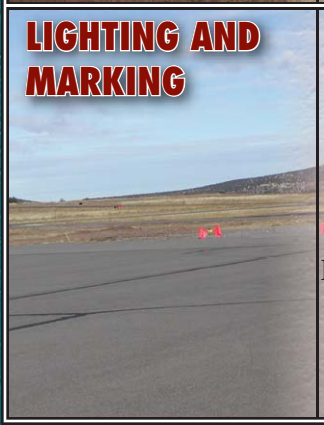
Service roads are typically used to segregate vehicles from the aircraft

operational areas. The alternatives analysis will examine options for interior access roads to serve hangar facilities as well as a service road extending around the runway and airport perimeter for airport maintenance vehicles.

SUMMARY

The intent of this chapter has been to outline the facilities required to meet aviation demands projected for H.A. Clark Memorial Field through the long term planning horizon. A summary of the airfield, and general aviation facility requirements are presented on **Exhibit 3C and 3D**.

Following the facility requirements determination, the next step is to develop a direction for development to best meet these projected needs. The remainder of the Master Plan will be devoted to outlining this direction, its schedule, and its costs.

	EXISTING FACILITY	SHORT TERM NEED	LONG TERM NEED
 **RUNWAYS**	**Runway 18-36** 6,000' x 100' Airport Reference Code B-II 15,000 # Single Wheel Loading	**Runway 18-36** 6,000' x 100' Airport Reference Code B-II 15,000 # Single Wheel Loading	**Runway 18-36** 8,000' x 100' Airport Reference Code B-III 30,000 # Single Wheel Loading 60,000 # Dual Wheel Loading
 **TAXIWAYS**	**Taxiway A** 5 Exits 35' Wide	**Taxiway A** 50' wide Exit Taxiways - 50'wide	**Runway 18-36** Add: High Speed Exit Holding Apron
 **NAVIGATIONAL AIDS**	Automated Weather Observing System	Automated Weather Observing System **Runway 18-36** GLS-RWY 36 APV-RWY 18 **APV** - Approach Procedure with Vertical Guidance **GLS** - Global Navigation Satellite System Landing System	Automated Weather Observing System **Runway 18-36** GLS-RWY 36 APV-RWY 18
 **LIGHTING AND MARKING**	Airport Beacon Segmented Circle Basic Taxiway Marking **Runway 18-36** Precision Approach Path Indicator-2 Non-Precision Markings Runway End Identifier Lights Medium Intensity Runway Lights	Add Medium Intensity Taxiway Lights **Runway 18-36** Add Distance Remaining Signage Precision Approach Path Indicator-4	Medium Intensity Taxiway Lights **Runway 18-36** Add Precision Markings - RWY 36 **MALSR**: Medium Intensity Approach Lighting Systeym w/ Runway Alignment Lighting

	Available	Short Term Need	Intermediate Term Need	Long Term Need
Aircraft Storage Hangar Requirements				
Aircraft to be Hangared	9	17	22	32
T-Hangars	2	8	12	18
Conventional Hangar Positions	7	9	10	14
T-Hangar Area (s.f.)	1,650	9,200	13,800	20,700
Conventional Hangar Storage Area (s.f.)	19,750	41,400	46,000	64,400
Maintenance Area (s.f.)	5,530	10,100	12,000	17,000
Subtotal Conventional Hangar Area (s.f.)	19,750	51,500	58,000	81,400
Total Hangar Area (s.f.)	***21,400***	***60,700***	***71,800***	***102,100***

	Available	Short Term Need	Intermediate Term Need	Long Term Need
Aircraft Parking Apron Requirements				
Single, Multi-Engine Transient Aircraft Positions	16	13	17	24
Apron Area (s.y.)	11,000	7,300	9,500	13,500
Locally-Based Aircraft Positions	15	2	3	2
Apron Area (s.y.)	29,700	1,100	1,700	1,100
Total Positions	31	15	20	26
Total Apron Area (s.y.)	40,700	8,400	11,200	14,600

	Available	Short Term Need	Intermediate Term Need	Long Term Need
Transient Passenger Terminal Facilities				
General Aviation Terminal Building Area (s.f.)	3,000	1,600	2,100	2,900
Other Facilities				
	Aircraft Rescue and Firefighting Facility	Aircraft Wash Rack Jet-A storage Maintenance Facilty Helicopter Parking Spaces	Aircraft Wash Rack Jet-A storage Maintenance Facilty Helicopter Parking Spaces	Aircraft Wash Rack Jet-A storage Maintenance Facilty Helicopter Parking Spaces

Exhibit 3D
LANDSIDE FACILITY REQUIREMENTS