

# ELOY MUNICIPAL AIRPORT



## Facility Requirements

To properly plan for the future of Eloy Municipal Airport, it is necessary to translate forecast aviation demand into the specific types and quantities of facilities that can adequately serve this identified demand. This chapter uses the results of the forecasts conducted in Chapter Two, as well as established planning criteria, to determine the airside (i.e., runways, taxiways, navigational aids, marking and lighting) and landside (i.e., terminal building, 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, 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 to determine the most cost-effective and efficient means for implementation.

### *PLANNING HORIZONS*

The 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 for Eloy Municipal Airport that take into consideration the reasonable range of aviation demand projections prepared in the previous chapter.



It is important to consider that the actual activity at the airport may be higher or lower than projected activity levels. By planning according to activity milestones, the resulting plan can accommodate unexpected shifts, or changes, in the area's aviation demand. It is important that the plan accommodate these changes so that airport staff can respond to unexpected changes in a timely fashion. These milestones provide flexibility, while potentially extending this plan's useful life if aviation trends slow over time.

The most important reason for utilizing milestones is that they allow the

airport to 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 actual demand at any given time during the planning period. The resulting plan provides airport officials with a financially responsible and need-based program. **Table 3A** presents the planning horizon milestones for each aircraft activity category. The planning milestones of short, intermediate, and long term generally correlate to the five, ten, and 20-year periods used in the previous chapter.

<b>TABLE 3A Planning Horizon Activity Levels Eloy Municipal Airport</b>				
	<b>2009</b>	<b>Short Term</b>	<b>Intermediate Term</b>	<b>Long Term</b>
<b><i>Itinerant Operations</i></b>				
General Aviation	9,900	10,500	12,200	16,400
Military	100	100	100	100
<b>Total Itinerant</b>	<b>10,000</b>	<b>10,600</b>	<b>12,300</b>	<b>16,500</b>
<b><i>Local Operations</i></b>				
General Aviation	18,550	20,300	22,300	29,000
<b>Total Local</b>	<b>18,550</b>	<b>20,300</b>	<b>22,300</b>	<b>29,000</b>
<b>TOTAL OPERATIONS</b>	<b>28,550</b>	<b>30,900</b>	<b>34,600</b>	<b>45,500</b>
<b>TOTAL BASED AIRCRAFT</b>	<b>41</b>	<b>50</b>	<b>60</b>	<b>100</b>

## ***AIRFIELD PLANNING CRITERIA***

The selection of appropriate Federal Aviation Administration (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 de-

fine the design parameters for the airport. The critical 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 design standards are used to plan many airside and land-side components. These future standards must be considered now to en-

sure that short term development does not preclude the long range 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 (ADG) and relates to aircraft wingspan and tail height (physical characteristics). Generally, aircraft approach speed applies to runways and runway-related facilities, while aircraft wingspan and tail height primarily relates to separation criteria involving taxiways, taxilanes, and landside facilities. **Exhibit 3A** summarizes representative aircraft by ARC.

According to FAA Advisory Circular (AC) 150/5300-13, Change 14, *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 ADG is based upon either the aircraft’s wingspan or tail height, whichever is greater. For example, an aircraft may fall in ADG II for wingspan at 70 feet, but ADG III for tail height at 33 feet. This aircraft would be classified under ADG III. **Table 3B** describes the six ADGs used in airport planning.

<b>TABLE 3B</b>		
<b>Airplane Design Groups</b>		
<b>Airplane Design Group</b>	<b>Tail Height (feet)</b>	<b>Wingspan (feet)</b>
I	Less than 20	Less than 49
II	Greater than 20 but less than 30	Greater than 49 but less than 79
III	Greater than 30 but less than 45	Greater than 79 but less than 118
IV	Greater than 45 but less than 60	Greater than 118 but less than 171
V	Greater than 60 but less than 66	Greater than 171 but less than 214
VI	Greater than 66 but less than 80	Greater than 214 but less than 262

Source: FAA AC 150/5300-13, Change 14, *Airport Design*

The FAA recommends designing airport functional elements to meet the requirements for the most demanding ARC for that airport. The majority of

aircraft currently operating at the airport are small single engine aircraft weighing less than 12,500 pounds. The airport also has a number of tur-

boprop aircraft operations due to its regular use by Skydive Arizona.

In order to determine airfield design requirements, the critical aircraft and critical ARC should first be determined, and then appropriate airport design criteria can be applied. This process begins with a review of aircraft currently using the airport and those expected to use the airport through the long term planning period.

### **CRITICAL AIRCRAFT**

As previously discussed, the critical design aircraft is defined as the most demanding category or family of aircraft which conducts at least 500 annual operations at the airport. In some cases, more than one specific make and model of aircraft comprises the airport's critical design aircraft. For example, one category of aircraft may be the most critical in terms of approach speed, while another is most critical in terms of wingspan. The majority of the 41 aircraft currently based at the airport fall within approach categories A and ADG I. Skydive Arizona, the airport's primary user, operates five different types of aircraft including the DHC-6 Twin Otter (ARC A-II), Shorts SC.7 Skyvan (ARC A-II), McDonnell Douglas DC-3 (ARC A-III), Beechcraft 18 (ARC A-II), and a Pilatus PC-6 Porter (ARC A-II). It has been indicated that there is potential in the future for Skydive Arizona to operate a Lockheed C-130 Hercules, which is an ARC C-IV aircraft.

An examination of aircraft that have filed flight plans operating either to or from Eloy Municipal Airport over the past year indicates limited use by turboprop aircraft, which included the Beechcraft King Air 100 (ARC B-I), and no reported jet operations. Flight plan data was acquired for this study from the subscription service *Airport IQ*. The data available includes documentation of flight plans that are opened or closed on the ground at the airport. Flight plans that are opened or closed from the air are not credited to the airport. Therefore, it is likely that there are more turboprop and potentially some jet operations at the airport that are not captured by this methodology.

### **Critical Aircraft Design Conclusion**

Eloy Municipal Airport is currently utilized by all types of general aviation aircraft ranging from small single engine piston-powered aircraft up to turboprop aircraft. The largest based aircraft in terms of ARC will often account for the design standard to be applied to the airport. The largest aircraft currently based at Eloy Municipal Airport is the McDonnell Douglas DC-3 aircraft operated by the sky diving operator, which is categorized as an ARC A-III aircraft. According to Skydive Arizona, the DC-3 does not reach the 500 or more annual operation threshold to make it the airport's critical aircraft. The most demanding aircraft in the Skydive Arizona fleet that conducts more than 500 annual operations is the DHC-6 Twin Otter, an ARC A-II aircraft.

<p><b>A-I</b></p> 	<ul style="list-style-type: none"> <li>• Beech Baron 55</li> <li>• <b>Beech Bonanza</b></li> <li>• Cessna 150</li> <li>• Cessna 172</li> <li>• Cessna Citation Mustang</li> <li>• Eclipse 500</li> <li>• Piper Archer</li> <li>• Piper Seneca</li> </ul>	<p><b>C-I, D-I</b></p> 	<ul style="list-style-type: none"> <li>• Beech 400</li> <li>• <b>Lear 25, 31, 35, 45, 55, 60</b></li> <li>• Israeli Westwind</li> <li>• HS 125-400, 700</li> </ul>
<p><b>B-I</b> <i>less than 12,500 lbs.</i></p> 	<ul style="list-style-type: none"> <li>• Beech Baron 58</li> <li>• Beech King Air 100</li> <li>• Cessna 402</li> <li>• <b>Cessna 421</b></li> <li>• Piper Navajo</li> <li>• Piper Cheyenne</li> <li>• Swearingen Metroliner</li> <li>• Cessna Citation I</li> </ul>	<p><b>C-II, D-II</b></p> 	<ul style="list-style-type: none"> <li>• Cessna Citation III, VI, VIII, X</li> <li>• <b>Gulfstream II, III, IV</b></li> <li>• Canadair 600</li> <li>• ERJ-135, 140, 145</li> <li>• CRJ-200, 700, 900</li> <li>• Embraer Regional Jet</li> <li>• Lockheed JetStar</li> </ul>
<p><b>B-II</b> <i>less than 12,500 lbs.</i></p> 	<ul style="list-style-type: none"> <li>• <b>Super King Air 200</b></li> <li>• Cessna 441</li> <li>• DHC Twin Otter</li> </ul>	<p><b>C-III, D-III</b></p> 	<ul style="list-style-type: none"> <li>• ERI-170, 190</li> <li>• Boeing Business Jet</li> <li>• B 727-200</li> <li>• <b>B 737-300 Series</b></li> <li>• MD-80, DC-9</li> <li>• Fokker 70, 100</li> <li>• A319, A320</li> <li>• Gulfstream V</li> <li>• Global Express</li> </ul>
<p><b>B-I, B-II</b> <i>over 12,500 lbs.</i></p> 	<ul style="list-style-type: none"> <li>• Super King Air 350</li> <li>• Beech 1900</li> <li>• Jetstream 31</li> <li>• Falcon 10, 20, 50</li> <li>• Falcon 200, 900</li> <li>• <b>Citation II, III, IV, V</b></li> <li>• Saab 340</li> <li>• Embraer 120</li> </ul>	<p><b>C-IV, D-IV</b></p> 	<ul style="list-style-type: none"> <li>• <b>B-757</b></li> <li>• B-767</li> <li>• C-130</li> <li>• DC-8-70</li> <li>• DC-10</li> <li>• MD-11</li> <li>• L1011</li> </ul>
<p><b>A-III, B-III</b></p> 	<ul style="list-style-type: none"> <li>• DHC Dash 7</li> <li>• <b>DHC Dash 8</b></li> <li>• DC-3</li> <li>• Convair 580</li> <li>• Fairchild F-27</li> <li>• ATR 72</li> <li>• ATP</li> </ul>	<p><b>D-V</b></p> 	<ul style="list-style-type: none"> <li>• <b>B-747 Series</b></li> <li>• B-777</li> </ul>

Note: Aircraft pictured is identified in bold type.



The analysis also examined the itinerant aircraft operating at the airport. At non-towered airports, determining a reasonable operational count by aircraft type can be difficult. Data provided by *Airport IQ* gave an indication of the types of transient aircraft utilizing the airport. As previously discussed, this database recorded several transient operations by turboprop aircraft in ARC B-I; however, reported operations were well below the 500 annual operations threshold. Given these considerations, the current critical aircraft at Eloy Municipal Airport is the DHC-6 Twin Otter that falls within ARC A-II design criteria.

The aviation demand forecasts indicate the potential for growth in jet and turboprop aircraft activity at the airport. This includes the addition of 10 based turboprops and six based jets through the long term planning period. Itinerant business jet and turboprop activity can also be expected to increase at the airport due to the potential for increased support of aviation use in the airport's service area. Future jet and turboprop aircraft which could base and/or operate at the airport will likely include Beechcraft King Air turboprops and small to medium size business jets such as the Cessna Mustang very light jet (VLJ), Cessna 560XL (Citation Excel), and the Hawker Beechjet 400. These aircraft are included in approach category B.

In addition, the potential exists for Skydive Arizona to operate the Lockheed C-130 (ARC C-IV) turboprop aircraft in the future provided that the airfield is designed to meet the demands of the aircraft. Considering the

future transient aircraft mix and the potential for the Lockheed C-130 aircraft, ultimate planning should conform to ARC C-IV design standards. If during the alternatives analysis it is determined that ARC C-IV design standards are not feasible, the airfield should be designed to at least ARC B-II design standards to meet the needs of increased business jet activities anticipated to occur at Eloy Municipal Airport.

The airfield facility requirements outlined in this chapter correspond to the design standards described in FAA's AC 150/5300-13, Change 14, *Airport Design*. The following airfield facilities are outlined to describe the scope of facilities that would be necessary to accommodate the airport's role throughout the planning period.

## ***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). 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 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 Eloy Municipal Airport. 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.

## ***AIRSIDE REQUIREMENTS***

Airside requirements include the need for those facilities related to the arrival and departure of aircraft. The adequacy of existing airside facilities at Eloy Municipal Airport has been analyzed from a number of perspectives, including:

- Runways
- Safety Area Design Standards
- Taxiways
- Airfield Lighting, Marking, and Signage
- Navigational Aids and Instrument Approach Procedures
- Weather Reporting Aids
- Air Traffic Control

## **RUNWAYS**

Runway conditions such as orientation, length, pavement strength, and width at Eloy Municipal Airport were analyzed. From this information, re-

quirements for runway improvements were determined for the airport.

## **Runway Orientation**

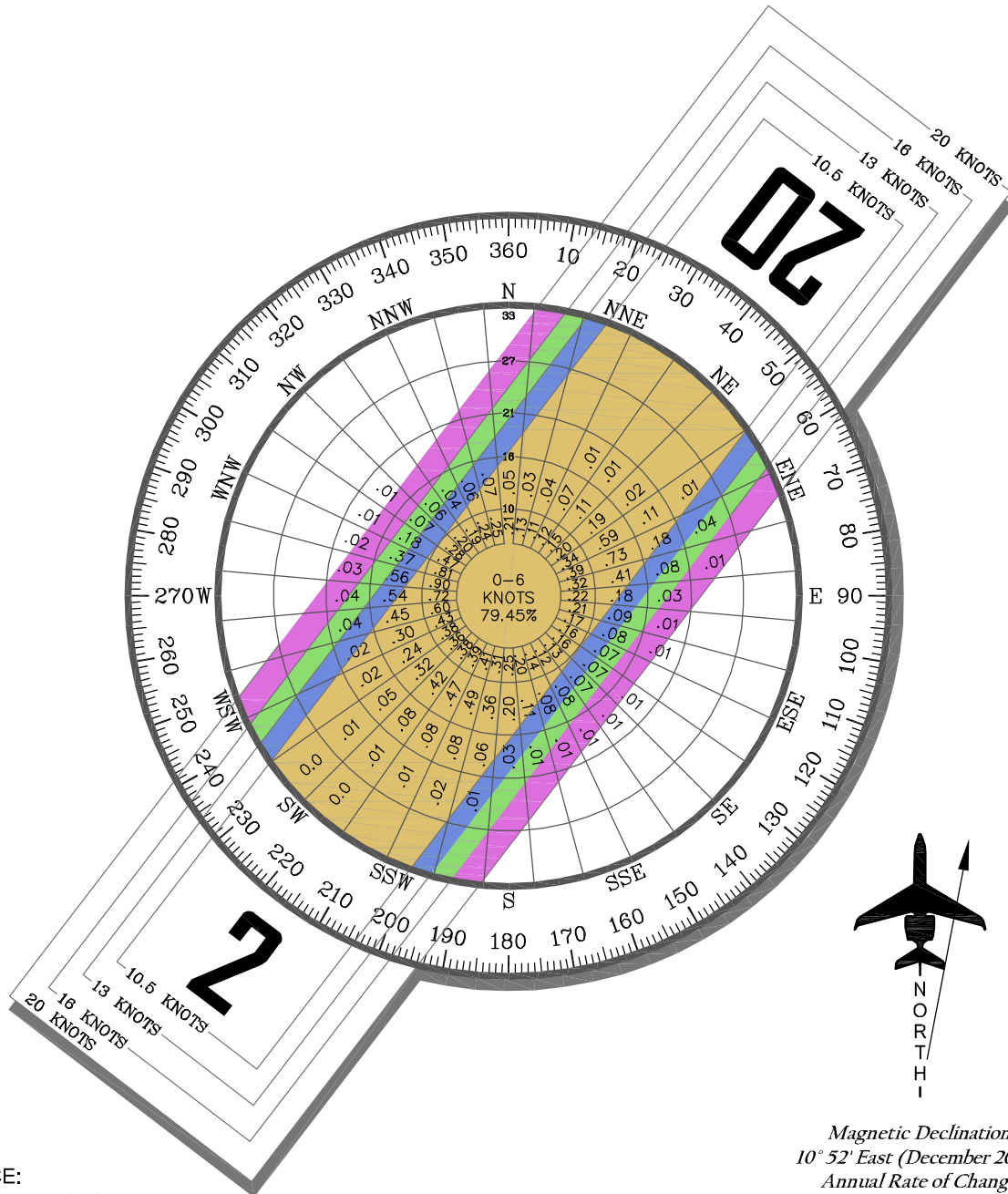
The airport is served by Runway 2-20, orientated in a northeast/southwest manner. For the operational safety and efficiency of an airport, it is desirable for the primary runway to be orientated as close as possible to the direction of the prevailing wind. This reduces the impact of wind components perpendicular to the direction of travel of an aircraft that is landing or taking off (defined as a crosswind).

FAA AC 150/5300-13, Change 14, *Airport Design*, recommends that a crosswind runway should be made available when the primary runway orientation provides for less than 95 percent wind coverage for specific crosswind conditions. 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 C-I through D-II; and 20 knots for ARC A-IV through D-VI.

Wind data necessary for this analysis was not available at Eloy Municipal Airport. Therefore, data was obtained from the AWOS-3 weather station at Casa Grande Municipal Airport, which is located approximately 13 nautical miles northwest of Eloy Municipal Airport. This data is graphically depicted on the wind rose on **Exhibit 3B**.

# ALL WEATHER WIND COVERAGE

Runways	10.5 Knots	13 Knots	16 Knots	20 Knots
Runway 2-20	96.16%	98.33%	99.72%	99.95%



Coffman, Associates R:\CAD\ Hopkins\DA\MP\E50 (Eloy)\Exhibits\E50 Exhibit 3B.dwg Printed Date: 12-30-09 11:26:49 AM L Johnson

**SOURCE:**  
 NOAA National Climatic Center  
 Asheville, North Carolina  
 Casa Grande Municipal Airport (CGZ)  
 Casa Grande, Arizona

**OBSERVATIONS:**  
 268,546 All Weather Observations  
 1992-2009

*Magnetic Declination*  
 10° 52' East (December 2009)  
 Annual Rate of Change  
 00° 06' West (December 2009)



As depicted on the exhibit, primary Runway 2-20 provides 96.16 percent wind coverage for 10.5 knot crosswinds, 98.33 percent at 13 knots, 99.72 percent at 16 knots, and 99.95 percent at 20 knots. As evidenced on the exhibit, Runway 2-20 provides greater than 95 percent wind coverage for the current and future critical design aircraft. Therefore, no additional runway orientations should be planned at the airport.

### Runway Length

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

- Mean maximum temperature of the hottest month
- Airport elevation
- Runway gradient
- Critical aircraft type expected to use the airport
- Stage length of the longest nonstop destination (specific to larger aircraft)

The mean maximum daily temperature of the hottest month for Eloy Municipal Airport is 105 degrees Fahrenheit (F). The airport elevation is 1,513 feet above mean sea level (MSL). The runway end elevation difference is six feet for Runway 2-20, resulting in a longitudinal gradient of 0.2 percent, which conforms to FAA design standards. For aircraft in approach categories A and B, the runway longitudinal gradient cannot exceed two percent. For aircraft in approach categories C and D, the maximum allowable longitudinal runway gradient is 1.5 percent.

The first step in evaluating runway length requirements is to determine general runway length requirements for the majority of aircraft operating at the airport. Many operations at Eloy Municipal Airport consist of small aircraft weighing less than 12,500 pounds. According to runway length adjustment charts in AC 150/5325-4B, *Runway Length Requirements for Airport Design*, when adjusting for the elevation and temperature at Eloy Municipal Airport, 95 percent of small aircraft can operate on a 3,800-foot long runway. At 3,900 feet, Runway 2-20 exceeds this length requirement. The 95 percent of the small aircraft fleet category applies to airports that are primarily intended to serve medium size population communities with a diversity of usage and a greater potential for increased aviation activities.

A second category, 100 percent of the small aircraft fleet, applies to airports that are primarily intended to serve communities located on the fringe of a metropolitan area or a relatively large population remote from a metropolitan area. As it was discussed in previous chapters, the Phoenix metropolitan area is anticipated to grow closer to the City of Eloy in the future, potentially placing it within this 100 percent of the fleet category. The runway length requirement for 100 percent of the fleet at Eloy's elevation and temperature is 4,500 feet. **Table 3C** outlines the runway length requirements for various classifications of aircraft that utilize Eloy Municipal Airport.

Based upon the forecast of aircraft fleet mix through the long range planning period, Runway 2-20 should be

designed to accommodate current aircraft using the airport, including the DHC-6 Twin Otter, as well as larger aircraft such as the Lockheed C-130 and various business jet aircraft. Ac-

ording to Skydive Arizona, Runway 2-20's length of 3,900 feet would accommodate the Lockheed C-130 takeoff and landing requirements.

<b>TABLE 3C</b>	
<b>Runway Length Requirements</b>	
<b>Eloy Municipal Airport</b>	
<b>Airport and Runway Data</b>	
Airport elevation	1,513
Mean daily maximum temperature of the hottest month	105 degrees F
Maximum difference in runway centerline elevation	6 feet
<b>Runway Length Recommended for Airport Design</b>	
<i>Small airplanes with less than 10 passenger seats</i>	
95 percent of these small airplanes	3,800
100 percent of these small airplanes	4,500
Small airplanes with 10 or more passenger seats	4,800
<i>Large airplanes of 60,000 pounds or less</i>	
<b>75 percent of business jets at 60 percent useful load</b>	<b>5,200</b>
75 percent of business jets at 90 percent useful load	8,000
100 percent of business jets at 60 percent useful load	6,900
100 percent of business jets at 90 percent useful load	11,100
Source: Chapters Two and Three of AC 150/5325-4B, <i>Runway Length Requirements for Airport Design</i>	

The majority of business jets fall within ADG I and II and range between approach categories B through D. According to the analysis presented in **Table 3C**, 75 percent of large airplanes weighing less than 60,000 pounds with 60 percent useful load require 5,200 feet of runway length. To accommodate 100 percent of business jets at 60 percent useful load, the runway should be at least 6,900 feet long. Aircraft types that make up this category include the Cessna 650 and 750, Challenger 600, and several models of Lear jets, which fall into approach categories C and D. While a longer runway could be desirable for some aircraft operators, it is not

needed for the majority of aircraft operations at Eloy Municipal Airport at the current time. Future operations are projected to include an increasing share of business jets that fall within 75 percent of the business jet fleet. Given these considerations, analysis in the following chapter will examine the potential for extending Runway 2-20 to at least 5,200 feet. This runway length will accommodate most all small to medium sized business jet aircraft from a Cessna Citation I up to a Learjet 45. It should be clearly understood, however, that any runway extension will require specific aircraft operational justification prior to FAA funding assistance.

## **Runway Width**

Primary Runway 2-20 is currently 75 feet wide, which meets ADG II design standards. Ultimately, the critical design aircraft falls within ADG IV, which has a runway width requirement of 150 feet. As such, Runway 2-20 should be widened to 150 feet in the future.

## **Runway Strength**

The officially published pavement strength rating for Runway 2-20 is 27,500 pounds single wheel loading (SWL). As previously mentioned, SWL refers to the aircraft weight based upon the landing gear configuration with a single wheel on each landing strut. Pavement core samples have not been evaluated to determine the runway's dual wheel loading (DWL) pavement strength. DWL includes the design of aircraft landing gear with additional wheels on each landing gear strut which distributes more of the aircraft weight on the runway and taxiway surfaces; thus, the surface itself can support a greater total aircraft weight.

The strength rating of a runway does not preclude aircraft weighing more than the published strength rating from using the runway. All federally obligated airports must remain open to the public, and it is typically up to the pilot of the aircraft to determine if a runway can support their aircraft safely. An airport sponsor cannot restrict an aircraft from using the runway simply because its weight exceeds the published strength rating. On the

other hand, the airport sponsor has an obligation to properly maintain the runway and protect the useful life of the runway.

According to the FAA publication, *Airport/Facility Directory*, "Runway strength-rating is not intended as a maximum allowable weight or as an operating limitation. Many airport pavements are capable of supporting limited operations with gross weights in excess of the published figures." The directory goes on to say that those aircraft exceeding the pavement strength should contact the airport sponsor for permission to operate at the airport.

The strength rating of a runway can change over time. Regular usage by heavier aircraft can decrease the strength rating, while periodic runway resurfacing can increase the strength rating. The current strength rating of Runway 2-20 is adequate to serve the existing mix of aircraft. The ultimate design aircraft, Lockheed C-130, can weigh up to 155,000 pounds when landing. Core samples of the runway should be studied to determine whether the existing pavement will accommodate this DWL weight. If it is determined that the runway is not strong enough to support the C-130 operations, the runway should be strengthened up to 155,000 pounds DWL.

## **SAFETY AREA DESIGN STANDARDS**

The FAA has established several safety surfaces to protect aircraft opera-

tional areas and keep them free from obstructions that could affect the safe operation of aircraft. These include the runway safety area (RSA), object free area (OFA), obstacle free zone (OFZ), and runway protection zone (RPZ). The dimensions of these safety areas are dependent upon the critical aircraft and, thus, the ARC of the runway. The current critical aircraft is in ARC A-II, as previously determined. Ultimate planning should continue to conform to ARC C-IV design standards if feasible. At a minimum, the airfield should conform to A-II/B-II design standards. The existing ARC A-II safety areas are depicted on **Exhibit 3C**.

### **Runway Safety Area**

The RSA is defined in FAA AC 150/5300-13, Change 14, *Airport Design*, as a “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.” The RSA is centered on the runway, dimensioned in accordance to the approach speed of the critical aircraft using the runway. The FAA requires the RSA to be cleared and graded, drained by grading or storm sewers, capable of accommodating the design aircraft and fire and rescue vehicles, and free of obstacles not fixed by navigational purpose.

The FAA has placed a higher significance on maintaining adequate RSAs at all airports due to recent aircraft accidents. Under Order 5200.8, effective October 1, 1999, the FAA estab-

lished a *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.

ARC A-II standards for runways with not lower than  $\frac{3}{4}$ -mile approach visibility minimums require RSAs to be 150 feet wide, extending 300 feet beyond the runway end. For ARC C-IV, standards require RSAs to be 500 feet wide, extending 1,000 feet beyond the runway end. As depicted on **Exhibit 3C**, no objects appear to obstruct the existing RSA. Analysis in the next chapter will further examine the RSAs associated with each runway.

### **Object Free Area**

The runway OFA 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 OFA is centered on the runway, extending out in accordance to the critical aircraft design category utilizing the runway.

FAA standards for ARC A-II OFAs regarding runways call for the OFA to be 500 feet wide and extend 300 feet beyond each runway end, matching the length of the RSA, only wider. As



**LEGEND**

- Airport Property Line
- City Owned Property
- ▭ Runway Protection Zone (RPZ)
- Object Free Area (OFA)
- Runway Safety Area (RSA)
- Obstacle Free Zone (OFZ)
- Uncontrolled Safety Areas



shown on **Exhibit 3C**, the OFA falls within airport property.

Ultimately, Runway 2-20 will need to conform to ARC C-IV design standards, which call for the OFA to have a width of 800 feet and extend 1,000 feet beyond each runway end. These OFA dimensions would encompass current privately owned property beyond the airport property boundary, resulting in potential obstructions. Alternatives for mitigating ultimate obstructions to the OFA will be analyzed in Chapter Four.

### **Obstacle Free Zone**

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

The FAA's criterion for runways utilized by small airplanes (those weighing less than 12,500 pounds) with approach speeds greater than 50 knots requires a clear OFZ to extend 200 feet beyond the runway ends, by 250 feet wide (125 feet on either side of the runway centerline). The OFZ width increases to 400 feet (200 feet on either side of the runway centerline) for runways serving aircraft over 12,500 pounds. Currently, Runway 2-20 meets the 400-foot width to accommo-

date aircraft weighing more than 12,500 pounds.

### **Runway Protection Zone**

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 approaching aircraft, as well as people and property on the ground. The dimensions of the RPZ vary according to the visibility requirements serving the runway and the type of aircraft operating on the runway.

Eloy Municipal Airport does not have published instrument approaches at this time; therefore, all approaches to the runway are conducted visually without the aid of instruments. The corresponding RPZ dimension calls for a 500-foot inner width, extending outward 1,000 feet to a 700-foot outer width on each runway end. **Exhibit 3C** depicts the RPZs for each runway end.

The majority of the existing RPZs for Runway 2-20 are fully contained on existing airport property. A portion of each RPZ extends beyond airport property over privately owned vacant land. If a lower than one mile visibility approach was implemented on either end of Runway 2-20 in the future, the corresponding RPZ would widen and encompass additional area outside existing airport property.

Whenever possible, the airport should maintain positive control over the RPZ

through fee simple acquisition; however, aviation easements (acquiring control of designated airspace rights within the RPZ) can be pursued if fee simple acquisition is not feasible. According to records, there are no aviation easements controlling areas of the

existing RPZs that extend outside airport property. **Table 3D** presents existing and ultimate RPZ dimension data as well as other airfield requirements discussed in the previous sections.

<b>TABLE 3D Airfield Design Standards Eloy Municipal Airport</b>		
	<b>Existing Runway 2-20</b>	<b>Ultimate Runway 2-20</b>
Airport Reference Code (ARC)	A-II/B-II	C-IV
Approach Visibility Minimums	None	One-Mile
Runway Length (feet)	3,900	5,200
Runway Width (feet)	75	<b>150</b>
Runway Safety Area		
Width (feet)	150	<b>500</b>
Length Beyond Runway End (feet)	300	1,000
Object Free Area		
Width (feet)	500	<b>800</b>
Length Beyond Runway End (feet)	300	1,000
Obstacle Free Zone		
Width (feet)	400	400
Length Beyond Runway End (feet)	200	200
Runway Protection Zone		
Inner Width (feet)	500	500
Outer Width (feet)	<b>700</b>	<b>1,010</b>
Length (feet)	1,000	<b>1,700</b>
Runway Centerline to:		
Holding Positions (feet)	<b>200</b>	<b>250</b>
Parallel Taxiway Centerline (feet)	<b>240</b>	<b>400</b>
Taxiways		
Width (feet)	35	<b>75</b>
Object Free Area Width (feet)	131	<b>259</b>
Centerline to Fixed or Moveable Object (feet)	65.5	<b>129.5</b>
Source: FAA AC 150/5300-13, Change 14, <i>Airport Design</i>		
* <b>Boldface indicates existing conditions do not meet standards.</b>		

## TAXIWAYS

Taxiways are constructed primarily to facilitate aircraft movements to and from the runway system. Some taxiways are necessary simply to provide access between the aprons and run-

ways, 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, the taxiway system at Eloy Municipal Airport

consists of a full-length parallel Taxiway A and entrance/exit taxiways serving Runway 2-20. All existing taxiways are 40 feet wide.

Consideration should be given to the addition of taxiways, as needed, to improve airfield circulation, efficiency, and safety. If Runway 2-20 were to be extended, additional taxiway pavement should be constructed and another exit taxiway added.

Taxiway width is determined by the ADG of the most demanding aircraft to use the taxiway. As mentioned previously, the current critical aircraft for the airport falls within ADG II. FAA criteria call for a width of 35 feet for taxiways serving aircraft within ADG II. As previously discussed, all taxiways on the airfield have a width of 40 feet. The ultimate ADG IV taxiway width design requirement is 75 feet. Further study in the next chapter will analyze the possibilities of additional taxiways.

FAA AC 150/5300-13, Change 14, *Airport Design*, also discusses separation distances between aircraft and various areas on the airport. The separation distances are a function of the approaches approved for the airport and the runway's designated ARC. Under current and ultimate conditions for Runway 2-20 (ARC A-II and approaches not lower than one mile), parallel taxiways would need to be at least 240 feet from the Runway 2-20 centerline. Aircraft parking areas are required to be at least 250 feet from the runway centerline. Taxiway A (as identified in Chapter One) is located 200 feet southeast of the runway centerline. The aircraft parking apron is

located 300 feet southeast of the runway centerline.

Ultimate separation standards will need to conform to ARC C-IV design standards, which call for a runway/taxiway separation distance of 400 feet and a runway/aircraft parking area separation distance of 500 feet. Alternatives for conforming to these design standards will be discussed in the next chapter.

## **AIRFIELD LIGHTING, MARKING, AND SIGNAGE**

There are a number of lighting and pavement marking aids serving pilots using the airport. These aids assist pilots in locating the airport and runway at night or in poor visibility conditions. They also assist in the ground movement of aircraft.

### **Airport Identification Lighting**

The location of the airport at night is universally indicated by a rotating beacon. For civil airports, a rotating beacon projects two beams of light, one white and one green, 180 degrees apart. The existing beacon is currently inoperable and should be restored or replaced.

### **Runway and Taxiway Lighting**

Runway identification lighting provides the pilot with a rapid and positive identification of the runway and its alignment. Runway 2-20 is equipped with medium intensity run-

way lighting (MIRL). The MIRL system will be adequate to serve the runway and should be maintained through the planning period. MIRL should be installed along any future runway extension.

The taxiway system is not currently equipped with a lighting system. During the course of the planning period, MITL should be installed along all taxiways. This system is vital for safe and efficient ground movements of aircraft during nighttime and/or poor weather conditions.

### **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. Currently, Runway 2-20 is equipped with two-box precision approach path indicator (PAPI-2); however, these systems are inoperable at this time. These lighting systems should be restored or replaced with four-box PAPI systems. The four-box systems are better to serve faster aircraft because they are more visible.

### **Runway End Identification Lighting**

Runway end identification 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 the runway ends and distinguish the runway end lighting from other lighting on the airport and in the approach areas. The FAA indicates that REILs should be considered for all lighted runway ends not planned for a more sophisticated approach lighting system. The REILs presently installed on each end of Runway 2-20 are inoperable and should be restored.

### **Pilot-Controlled Lighting**

Eloy Municipal Airport is equipped with pilot-controlled lighting (PCL). With PCL, a pilot can control the intensity of airfield lights from their aircraft through a series of clicks with their radio transmitter. PCL also provides for more efficient use of energy. This system should be maintained through the planning period.

### **Airfield Signage**

Airfield identification signs assist pilots in identifying their location on the airfield and directing them to their desired location. 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. Currently, the airfield is equipped with signage referring to runway and taxiway designations and runway exits. Holding position and routing/directional signage is not available. Future planning should consider implementing these

airfield signs to better accommodate aircraft movement on the airfield.

### **Distance Remaining Signs**

Distance remaining signage should be planned for Runway 2-20. These lighted signs are placed in 1,000-foot increments along the runway to notify pilots of the length of runway remaining.

### **Pavement Markings**

Runway markings are designed according to the type of instrument approach available on the runway. FAA AC 150/5340-1F, *Marking of Paved Areas on Airports*, provides guidance necessary to design airport markings. Runway 2-20 is served by basic markings. In the future, non-precision markings should be planned for this runway.

The current hold positions associated with Runway 2-20 are marked 120 feet from the runway centerline, which do not meet the ARC A-II standard of 200 feet. Future planning will consider relocating the hold position markings to the ultimate ARC C-IV design standard of 250 feet.

## **NAVIGATIONAL AIDS AND INSTRUMENT APPROACH PROCEDURES**

Airport and runway navigational aids are based on FAA recommendations, as defined in DOT/FAA Handbook 7031.2B, *Airway Planning Standard*

*Number One*, and FAA AC 150/5300-2D, *Airport Design Standards, Site Requirements for Terminal Navigation Facilities*.

### **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 Eloy Municipal Airport. 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 are a series of predetermined maneuvers established by the FAA using electronic navigational aids that assist pilots in locating and landing at an airport during low visibility and cloud ceilings. At Eloy Municipal Airport, there are no published precision or non-precision approaches. Only on rare occasions does the visibility drop below three miles and/or cloud ceilings fall below 1,000 feet MSL resulting in the need for an instrument approach.

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 enroute 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 ILS, which requires extensive on-airport facilities. After 2015, the WAAS upgrades are expected to allow for 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.

Nearly all new instrument approach procedures 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 (LNAV) approach only provides course guidance. In the future, as WAAS is upgraded, precision approaches similar in capability to an instrument landing system (ILS) approach 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.

Both course guidance and descent information is desirable for an instrument approach to each end of Runway 2-20 at Eloy Municipal Airport. The GPS APV approach does not require the installation of costly navigation equipment at the airport and will provide the airport with adequate instrument approach capabilities.

## **WEATHER REPORTING AIDS**

Eloy Municipal Airport has a lighted wind cone and segmented circle. The lighted wind cone provides information to pilots regarding wind conditions, such as direction and speed. The segmented circle consists of a system of visual indicators designed to provide traffic pattern information to pilots. A wind cone and segmented circle are required since the airport is not served by an airport traffic control tower (ATCT). These should be maintained throughout the planning period.

Two types of automated weather observing systems are currently deployed at airports across the country. Automated Surface Observation Systems (ASOS) and Automated Weather Observation Systems (AWOS) both measure and process surface weather observations 24 hours per day, with reporting varying from one minute to hourly. These systems provide near real-time measurements of atmospheric conditions.

ASOS systems are typically commissioned by the National Weather Service, while AWOS systems are often commissioned by the FAA. Future consideration should be given to the

installation of an AWOS at Eloy Municipal Airport in order to provide current weather conditions at the airport.

## **AIR TRAFFIC CONTROL**

As previously mentioned, Eloy Municipal Airport is not served by an ATCT. Forecast operational levels are not expected to approach the level necessary to justify federal funding for the construction and/or operation of an ATCT. Generally, airports must experience more than 100,000 operations to be considered for an ATCT facility. Most airports do not qualify for a federally funded ATCT until operations exceed 150,000. As such, the development of an ATCT will not be considered as a part of this study.

## **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 service areas:

- Aircraft Storage Hangars
- Aircraft Parking Apron
- General Aviation Services
- Support Requirements

## **AIRCRAFT STORAGE 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. T-hangars are typically nested single aircraft storage units which provide a more economical aircraft storage solution for aircraft owners. Conventional hangars can include standard individual box hangars or multi-aircraft hangars. These different types of hangars offer varying levels of privacy, security, and protection from the elements. Aircraft storage units at Eloy Municipal Airport are presently made up of T-hangars and multi-aircraft conventional hangars.

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, more expensive and sophisticated aircraft will prefer conventional hangars. The weather also plays a role in the demand for hangar facilities. The hot summers that are experienced in the Eloy area create a high demand for enclosed or shaded parking spaces. Rental costs will also be a factor in the choice.

There are a total of 39 aircraft stored in hangars that are located both on and off airport property. On-airport property hangar area totals approximately 36,400 square feet. Each on-airport hangar is fully occupied with anywhere from single to multiple aircraft stored in a single unit. Several off-airport hangars provide additional storage space of approximately 60,300 square feet. The majority of the off-airport hangar space is cross-utilized

for aircraft storage and maintenance or other aircraft services. Taking into account each aircraft currently stored in the hangars results in 39 aircraft storage positions. Airport management has indicated that there is an aircraft hangar waiting list for storage space at the airport.

An analysis of future aircraft storage hangar requirements examined the

number of storage units and the size of storage units typical for the future aircraft fleet mix of Eloy Municipal Airport. The planning standards for future stored aircraft include 1,200 square feet per single engine aircraft, 2,500 square feet per multi-engine and turbine aircraft, and 1,500 square feet per rotorcraft. The future aircraft storage hangar requirements analysis is summarized on **Table 3E**.

<b>TABLE 3E</b>					
<b>Hangar Storage Requirements</b>					
<b>Eloy Municipal Airport</b>					
	<b>Available</b>	<b>Current Need</b>	<b>Short Term</b>	<b>Intermediate Term</b>	<b>Long Term</b>
<b>BASED AIRCRAFT</b>					
Piston	33		39	45	71
Turbine	8		10	13	24
Rotor	0		1	2	5
Total	41		50	60	100
<b>AIRCRAFT TO BE HANGARED</b>					
Piston		31	36	40	63
Turbine		8	10	13	24
Rotor		0	1	2	5
Total		39	47	55	92
<b>HANGAR POSITIONS</b>					
Total Hangar Positions	39	39	47	55	92
<b>HANGAR AREA REQUIREMENTS (s.f.)</b>					
Total Hangar Area	96,700	57,200	69,700	83,500	143,100
Maintenance Area	15,000	7,175	8,750	10,500	17,500

The analysis shows that existing hangar storage space of 96,700 square feet exceeds the short and intermediate term demand; however, this is the result of either under-utilized storage space due to single aircraft stored in hangars that could potentially be used for the storage of multiple aircraft or hangar space being cross-utilized for other aircraft services or the storage of materials other than aircraft.

The airport has two businesses that conduct general aviation aircraft

maintenance services, one of which is located off-airport property. Hangar space dedicated by these two businesses to maintenance services totals approximately 15,000 square feet. Requirements for a maintenance area were estimated at 175 square feet per based aircraft resulting in a long term need for 17,500 square feet of general aviation maintenance service hangar area.

## AIRCRAFT PARKING APRON

A parking apron should be provided for at least the number of locally based aircraft that are not stored in hangars. It should also be capable of accommodating transient aircraft during the busy day of the peak month. The 18,950 square-yard apron at Eloy Municipal Airport has 28 tiedown positions, two of which are occupied by locally based aircraft.

FAA AC 150/5300-13, *Airport Design*, suggests a methodology by which

transient apron requirements can be determined from knowledge of busy-day itinerant operations. At Eloy Municipal Airport, the number of transient spaces required was determined to be approximately 17.5 percent of busy-day itinerant operations. A planning criterion of 360 square yards per small local aircraft parking space and 500 square yards per transient parking space was used to determine future apron requirements. The number of local and itinerant tiedowns and apron space for the planning period is presented in **Table 3F**.

	<b>Available</b>	<b>Current Need</b>	<b>Short Term</b>	<b>Intermediate Term</b>	<b>Long Term</b>
Based Aircraft in Tiedowns		2	3	5	8
Busy Day Itinerant Operations		50	53	61	82
Local Apron Positions	--	2	3	5	8
Transient Apron Positions	--	9	9	11	14
Total Apron Positions	28	11	12	16	22
Apron Area (s.y.)	18,950	5,100	5,700	7,200	10,100

While this analysis indicates that Eloy Municipal Airport has adequate apron area, additional marked apron positions will be needed in the long term planning horizon.

## GENERAL AVIATION SERVICES

General aviation service facilities are often the first impression of the community that air travelers or tourists will encounter. General aviation service facilities at an airport provide space for passenger waiting, a pilots' lounge and flight planning, concessions, management, storage, and various other needs. Eloy Municipal Air-

port does not currently have a dedicated general aviation services provider.

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 Eloy Municipal Airport through the long term planning horizon.

<b>TABLE 3G General Aviation Terminal Area Facilities Eloy Municipal Airport</b>					
	<b>Available</b>	<b>Current Need</b>	<b>Short Term</b>	<b>Intermediate Term</b>	<b>Long Term</b>
General Aviation Services Building Area (s.f.)	--	1,000	1,000	1,200	1,600
Design Hour Itinerant Passengers	--	11	11	13	18
Auto Parking Spaces	29	30	32	38	57

Automobile parking at Eloy Municipal Airport is made up of a paved vehicle parking lot at the airport entrance consisting of 24 spaces, five spaces located immediately east of the water tank, and a large gravel parking lot between Hangar #1 and Hangar #5. Vehicle parking requirements were examined based on an evaluation of existing airport use, as well as industry standards. Vehicle parking spaces were calculated at 25 percent of based aircraft, plus the product of design hour itinerant passengers and the industry standard of 1.8. Automobile parking requirements are summarized in **Table 3G**.

### **SUPPORT REQUIREMENTS**

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

- Airport Access
- Interior Access
- Aviation Fuel Storage
- Aircraft Wash Facility
- Perimeter Fencing
- Aircraft Rescue and Firefighting

- Airport Maintenance Building
- Utilities
- Security

### **Airport Access**

In airport facility planning, both on- and off-airport vehicle access is important. For the convenience of the user (and to provide maximum capacity), access to the airport should include (to the extent practical) connections to the major arterial roadways near the airport.

Access to Eloy Municipal Airport is available via Tumbleweed Road, which extends south from the airport where it intersects with State Highway 84 (Casa Grande-Picacho Highway).

The capacity of a roadway is the maximum number of vehicles that can pass over a given section of roadway during a given time period. It is normally preferred that a roadway operate below capacity to provide reasonable flow and minimize delay to the vehicles using it.

As with the airfield, the means of describing the operational efficiency of a given roadway segment is defined in

terms of six descriptive service levels. These various levels of service (LOS) range from A to F and are defined as follows:

- **LOS A** – Free flowing traffic with minimal delays.
- **LOS B** - A stable flow of traffic, with occasional delays due to the noticeable presence of others in the traffic stream.
- **LOS C** – Still stable flow, but operations become more significantly affected by the traffic stream. Periodic delays are experienced.
- **LOS D** – Flow becomes more high density, and speed and freedom to maneuver become severely restricted. Regular delays are experienced.
- **LOS E** – Maximum capacity operating conditions. Delays are extended and speeds are reduced to a low, relatively uniform level.
- **LOS F** – Forced flow with excessive delays. A condition where more traffic is approaching a point than can traverse the point.

Level of Service “D” is generally considered as the threshold of acceptable traffic conditions during peak periods in an urban area and is commonly used by Pinal County in transportation planning.

According to information included in the *City of Eloy Small Area Transportation Study*, Tumbleweed Road will not exceed LOS A through 2030. The long-range recommended development plan for Tumbleweed Road includes widening it from two to four lanes to accommodate anticipated traffic increases.

## **Interior Access**

Occasionally, private vehicles 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 paved service road extending around the runway and airport perimeter for airport maintenance vehicles.

## **Aviation Fuel Storage**

Skydive Arizona owns a self-service fuel storage facility with the capacity to hold 6,000 gallons of 100LL Avgas and 6,000 gallons of Jet A fuel. This fuel is utilized by based and transient aircraft. Skydive Arizona as well as other off-airport operators also have private fuel storage facilities, which are not used for public fuel vending.

Fuel storage requirements are typically based upon keeping a two-week supply of fuel during an average month; however, more frequent deliveries can reduce the fuel storage capacity requirement. Historic fuel sale information was not available from Eloy Municipal Airport; therefore, fuel sale information from similar general aviation airports was used to determine average fuel flowage per operation. An average of 2.6 gallons per piston operation was used to project Avgas fuel storage requirements.

Turbine aircraft operations at Eloy Municipal Airport are comprised mainly of turboprop fixed wing aircraft used by Skydive Arizona. Skydive Arizona has private fuel storage for these aircraft, resulting in the self-service Jet A fuel delivery system to be used primarily by itinerant turbine aircraft. As the Phoenix metropolitan area continues to develop towards the

City of Eloy and surrounding areas, and with the shift in the active general aviation aircraft fleet mix towards a greater increase of turbine aircraft, additional activity from turbine aircraft can be expected.

Projections of future Jet A fuel storage requirements were based upon a ratio of 160 gallons per turbine operation. Turbine operations other than those conducted by Skydive Arizona were estimated at two percent of annual operations currently, increasing to approximately five percent of the annual operations in the long term planning horizon.

100LL Avgas and Jet A fuel storage requirements are summarized in **Table 3H**. Available fuel storage meets the current demand levels at Eloy Municipal Airport, but will need to be expanded over the planning horizon.

<b>TABLE 3H Fuel Storage Requirements Eloy Municipal Airport</b>					
	<b>Available</b>	<b>Current Need</b>	<b>Short Term</b>	<b>Intermediate Term</b>	<b>Long Term</b>
<b>Two-Week Fuel Storage Requirements</b>					
100LL Avgas (gal)	6,000	4,100	4,400	4,900	6,300
Jet A (gal)	6,000	3,200	4,500	6,700	17,900

### **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.

### **Perimeter Fencing**

Perimeter fencing is used at airports primarily to 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 majority of the airport perimeter is equipped with eight-foot security fencing with three-strand barbed-wire. A portion of the perimeter is equipped with four-foot barbed-wire fencing. The hangar and apron area are protected by six-foot chain link fencing. An electronic access gate is located at the airport's entrance south of the water tank. Manual access gates are located at various locations in the hangar area and along the airport's perimeter. Those portions of the airport's perimeter equipped with barbed-wire fencing should be updated to eight-foot security fencing.

### **Aircraft Rescue And Firefighting**

Eloy Municipal Airport is not currently served by a dedicated aircraft rescue and firefighting facility (ARFF). The airport is provided with rescue and fire assistance from the Eloy fire district, which is located approximately three miles south of the airport. Federal regulations do not require ARFF services to be located on the airport. ARFF services are required only at FAA-certified airports providing scheduled passenger service with greater than nine passenger seats. Unless federal regulations change, there will not be a regulatory requirement for ARFF facilities on the airport. Emergency services will continue to be met with off-airport vehicles. Therefore, no additional requirements for ARFF services are needed at Eloy Municipal Airport.

## **Airport Maintenance Building**

Presently, there is not a dedicated airport maintenance facility at the airport. Consideration should be given to developing a maintenance facility for the storage of maintenance equipment and to provide work areas for maintenance personnel.

## **Utilities**

Electrical, water, and telecommunications services are available at the airport. Sanitary sewer output is handled by septic tanks. A new 1.0 million gallon water tank is being constructed at the airport to improve water flow. Utility extensions to new hangar areas will be needed through the planning period.

## **Security**

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 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 3J** summarizes the recommended airport characteristics and ranking criterion. The TSA suggests

that an airport rank its security posture according to this scale to deter-

mine the types of security enhancements that may be appropriate.

<b>TABLE 3J Airport Characteristics Measurement Tool</b>		
<b>Security Characteristics</b>	<b>Assessment Scale</b>	
	<b>Public Use Airport</b>	<b>Eloy Airport</b>
<b>Location</b>		
Within 20 nm of mass population areas <sup>1</sup>	5	0
Within 30 nm of a sensitive site <sup>2</sup>	4	0
Falls within outer perimeter of Class B airspace	3	0
Falls within boundaries of restricted airspace	3	0
<b>Based Aircraft</b>		
Greater than 101 based aircraft	3	0
26-100 based aircraft	2	2
11-25 based aircraft	1	0
10 or fewer based aircraft	0	0
Based aircraft over 12,500 pounds	3	3
<b>Runways</b>		
Runway length greater than 5,001 feet	5	0
Runway length less than 5,000 feet, greater than 2,001 feet	4	4
Runway length 2,000 feet or less	2	0
Asphalt or concrete runway	1	1
<b>Operations</b>		
Over 50,000 annual operations	4	0
Part 135 operations	3	0
Part 137 operations	3	3
Part 125 operations	3	0
Flight training	3	0
Flight training in aircraft over 12,500 pounds	4	0
Rental aircraft	4	0
Maintenance, repair, and overhaul facilities conducting long-term storage of aircraft over 12,500 pounds	4	4
<b>Totals</b>		<b>17</b>
Source: <i>Security Guidelines for General Aviation Airports</i>		
<sup>1</sup> An area with a total population over 100,000		
<sup>2</sup> Sensitive sites include military installations, nuclear and chemical plants, centers of government, national monuments, and/or international ports		

**Table 3J** also ranks Eloy Municipal Airport according to this scale. As shown in the table, the Eloy Municipal Airport ranking on this scale is 17. Points are assessed for the airport having more than 26 based aircraft, having based aircraft over 12,500 pounds, having a runway greater than 2,001 feet in length but less than 5,001 feet, having a paved runway

surface, having Part 137 agricultural operations, and for conducting maintenance and repair on large aircraft.

As shown in **Table 3K**, a rating of 17 points places Eloy Municipal Airport in the second tier ranking of security measures by the TSA. This rating clearly illustrates that emerging security needs are recommended at Eloy

Municipal Airport as the activity at the airport grows. The Eloy Municipal Airport ranking could easily extend into the third tier with the addition of

aircraft flight training, rental or charter services. Several of these activities could be expected to occur during the planning period of this study.

<b>TABLE 3K Recommended Security Enhancements Based on Airport Characteristics Assessment Results</b>				
<b>Security Enhancements</b>	<b>Points Determined Through Airport Characteristics Assessment</b>			
	<b>&gt; 45</b>	<b>25-44</b>	<b>15-24</b>	<b>0-14</b>
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*

Based upon the results of the security assessment, the TSA recommends 13 potential security enhancements for Eloy Municipal Airport should the airport ultimately fall within the third tier. These enhancements are shown in **Table 3K**.

A review of each recommended security procedure is below.

**Access Controls:** To delineate and adequately protect security areas from unauthorized access, it is important to consider boundary measures such as fencing, walls, or other physical bar-

riers, electronic boundaries (e.g., sensor lines, alarms), and/or natural barriers. Physical barriers can be used to deter and delay the access of unauthorized persons onto sensitive areas of airports. Such structures are usually permanent and are designed to be a visual and psychological deterrent as well as a physical barrier. As it was previously discussed, the majority of the airport's perimeter is equipped with security fencing. The portions of the airport perimeter that are not currently equipped with security fencing should be updated to enhance access control.

**Lighting System:** Protective lighting provides a means of continuing a degree of protection from theft, vandalism, or other illegal activity at night. Security lighting systems should be connected to an emergency power source, if available.

**Personal ID System:** This refers to a method of identifying airport employees or authorized tenant access to various areas of the airport through badges or biometric controls.

**Vehicle ID System:** This refers to an identification system which can assist airport personnel and law enforcement in identifying authorized vehicles. Vehicles can be identified through use of decals, stickers, or hang tags.

**Challenge Procedures:** This involves an airport watch program which is implemented in cooperation with airport users and tenants to be on guard for unauthorized and potentially illegal activities at Eloy Municipal Airport. This is particularly important at airports with significant “through-the-fence” operations as there are typically more access points to the airport’s perimeter, which can result in easier entry for unauthorized individuals.

**Law Enforcement Support:** This involves establishing and maintaining a liaison with appropriate law enforcement agencies at the local, state, and federal levels. 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 enforce-

ment 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 Eloy Municipal Airport, as well as any new enhancements. This document could consist of, but is 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 se-

curity 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 general aviation aircraft include: ensuring that door locks are consistently used to prevent unauthorized access or tampering with the air-

craft; using keyed ignitions where appropriate; storing the aircraft in a hangar, if available; 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.

## ***SUMMARY***

The intent of this chapter has been to outline the facilities required to meet potential aviation demands projected for Eloy Municipal Airport through the planning horizon. A summary of the airside and landside requirements is presented on **Exhibits 3D** and **3E**.

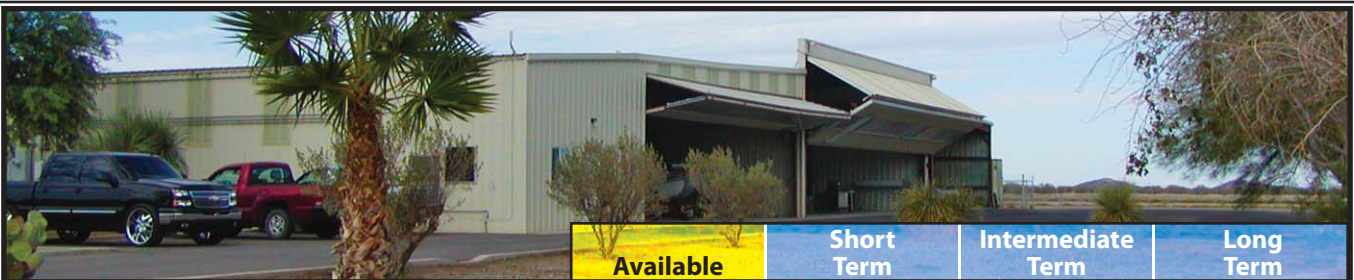
Following the facility requirements determination, the next step is to determine a direction of development which best meets these projected needs through a series of airport development alternatives. The remainder of the Master Plan will be devoted to outlining this direction, its schedule, and its cost.

	Available	Short Term Need	Long Term Need
 <p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Runway</b></p>	<p><b>Runway 2-20</b> 3,900' x 75' Asphalt 27,500 #SWL ARC - A-II</p>	<p><b>Runway 2-20</b> 3,900' x 100' Asphalt 27,500 #SWL Improve RPZs ARC A-II</p>	<p><b>Runway 2-20</b> 5,200' x 150' Asphalt 27,500 #SWL 155,000 #DWL ARC C-IV*  * if feasible</p>
 <p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Taxiways</b></p>	<p><b>Taxiway A</b> 40' Wide Full Length Parallel 200' Runway Separation Distance 3 Entrance / Exit Taxiways</p>	<p><b>Taxiway A</b> 40' Wide Full Length Parallel 240' Runway Separation Distance 5 Entrance / Exit Taxiways Holding Aprons</p>	<p><b>Taxiway A</b> 75' Wide Full Length Parallel 400' Runway Separation Distance 6 Entrance / Exit Taxiways Holding Aprons</p>
 <p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Navigational Aids</b></p>	<p>GPS VOR LORAN-C</p>	<p>GPS APV Approach One-Mile Visibility (both ends)</p>	<p>Same</p>
 <p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Lighting, Marking, And Weather</b></p>	<p>Rotating Beacon (out of service) Lighted Wind Cone Segmented Circle PCL  <b>Runway 2-20</b> Basic Markings MIRL PAPI-2 (out of service) Hold Positions - 130' REILs (out of service)</p>	<p>Restore Rotating Beacon Install AWOS Add MITL on all Taxiways  <b>Runway 2-20</b> Restore PAPI-2s &amp; REILs Non-Precision Markings Hold Positions - 200'</p>	<p>Add Distance Remaining Signage  <b>Runway 2-20</b> Upgrade to PAPI-4s Hold Positions - 250'</p>

APV: approach procedure with vertical guidance  
 ARC: airport reference code  
 AWOS: automated weather observation station  
 DWL: aircraft with dual-wheel type landing gear  
 GPS: global positioning system  
 MIRL: medium intensity runway lighting  
 MITL: medium intensity taxiway lighting  
 PAPI: precision approach path indicator

PCL: pilot-controlled lighting  
 REIL: runway end identifier lighting  
 RPZ: runway protection zone  
 SWL: aircraft with single-wheel tandem type landing gear  
 VOR: very high frequency omni-directional range





	Available	Short Term	Intermediate Term	Long Term
<b>AIRCRAFT STORAGE HANGARS</b>				
Total Hangar Positions	39	47	55	92
Total Hangar Storage Area (s.f.)	96,700	69,700	83,500	143,100
Maintenance Area (s.f.)	15,000	8,750	10,500	17,500



	Available	Short Term	Intermediate Term	Long Term
<b>AIRCRAFT PARKING APRON</b>				
Transient Ramp Positions	--	9	11	14
Local Ramp Positions	--	3	5	8
Total Ramp Positions	28	12	16	22
Apron Area (s.y.)	18,950	5,700	7,200	10,100



	Available	Short Term	Intermediate Term	Long Term
<b>GENERAL AVIATION SERVICE FACILITIES</b>				
General Aviation Services Area (s.f.)	NA	1,000	1,200	1,600
Automobile Parking Spaces	29	32	38	57



	Available	Short Term	Intermediate Term	Long Term
<b>FUEL STORAGE (TWO-WEEK REQUIREMENTS)</b>				
100LL Avgas (gal.)	6,000	4,400	4,900	6,300
Jet A (gal.)	6,000	4,500	6,700	17,900

<b>OTHER</b>				
	None	Wash Rack Enhanced Security Measures	Perimeter Service Road	Maintenance Facility