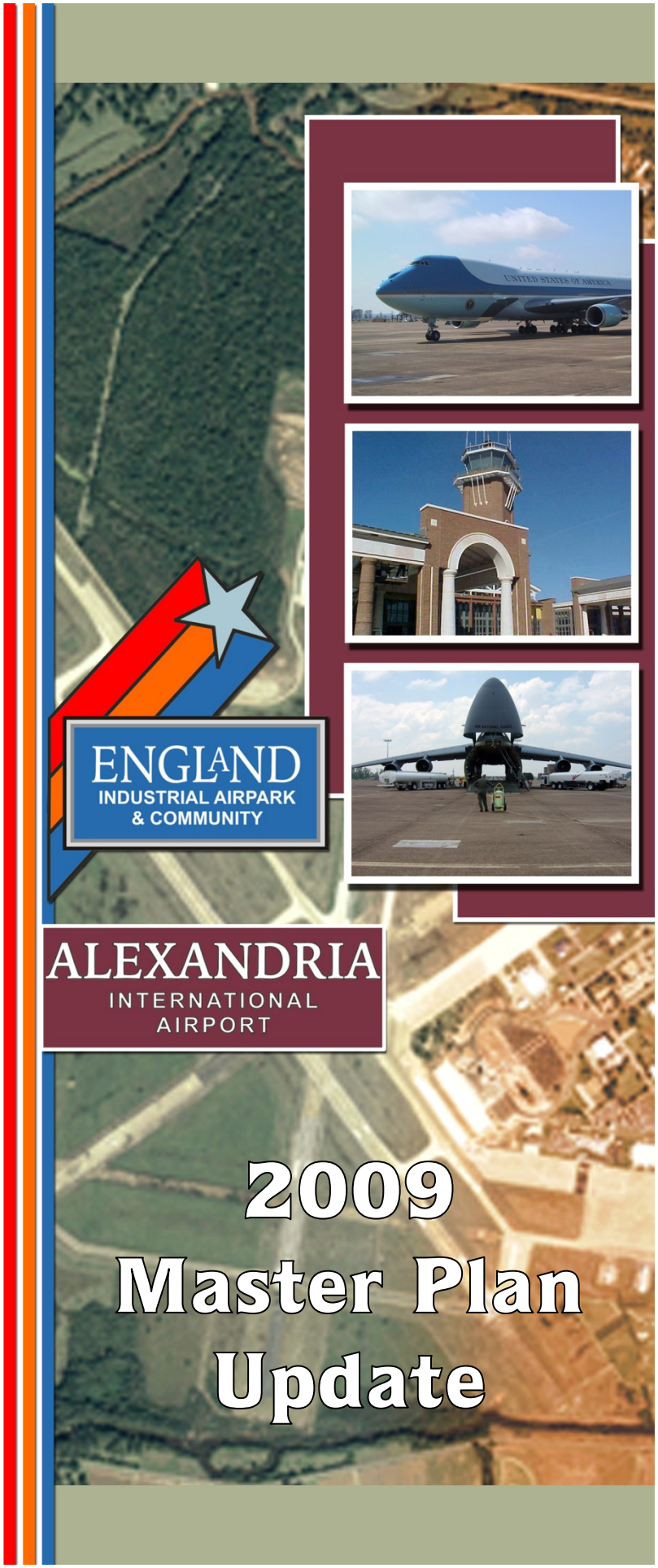


Chapter 4
Demand/ Capacity and Facility Requirements

Chapter 4
Demand Capacity/Facility Requirements

One of the key purposes of this Master Plan Update is to build upon the framework and recommendations identified during earlier planning efforts at AEX. As part of the master planning process, the consultant team capitalized on multiple opportunities in the form of Authority Workshops, a stakeholder visioning session, review of previous documents and plans, and interviews with staff to better characterize the future vision for Alexandria International Airport and England Airpark. A summary of the visioning component of this study is included in the appendices volume of this report.

Based upon the vision for AEX/England Airpark, an evaluation of aviation and non-aviation demand, operational requirements and capacity were identified to determine facility requirements. This information provides the basis for the types and quantities of facilities necessary to meet short and long-term needs over the twenty-year planning period. Using FAA guidance and applicable local design standards and guidelines, airfield, support and landside facilities were identified in an effort to establish the long term role for AEX/England Airpark within the State of Louisiana and the US marketplace.

It has and continues to be the intent of the England Authority to address a number of macro trends which are impacting not just of the United States but the world economy as well. The Authority is currently working to address the cost of energy and alternative energy sources, the impact of climate change, the effects of Louisiana's coastal loss, the airport's role as a disaster relief center as well as the re-emergence of the Central Louisiana region as a transportation nexus within the southeast United States.

Therefore, this chapter identifies the adequacy of existing facilities, needed new facilities and the anticipated time frame for development in conjunction with the England Authority's long-range plans. This information was used to develop several airside and landside alternatives in **Chapter 5** to address the short and long-term role of AEX/England Airpark within the state of Louisiana and US aviation system.

4.1 PHYSICAL PLANNING CRITERIA

Airport physical planning criteria, as outlined in **FAA Advisory Circular (AC) 150/5300-13**, is based primarily on the most demanding aircraft or group of aircraft which use the airport on a regular (at least 500 operations[1]) basis. Further, the critical aircraft reference code is that which represents the lowest maximum allowable crosswind.

AEX is a commercial service airport with flights to Houston, Atlanta, Dallas, Memphis, and other airports within the southern and central United States. The airport also accommodates the US Marshals Service and military training exercises associated with military installations throughout the south. Based upon continued commercial globalization, military training and deployment demands, and disaster relief efforts, it is anticipated that the role of the airport will expand to accommodate limited commercial international operations within the twenty-year planning period. The airport's future role both nationally and internationally will define the aircraft fleet mix and airfield design criteria used to develop future development options.

4.1.1 Airport Role and Service Level

AEX is included in the National Plan of Integrated Airport System (NPIAS) published by the US Department of Transportation (DOT). Within the NPIAS, the FAA defines the role of public use airports as essential to meet the needs of civil aviation and to support the Department of Defense (DOD) and U.S. Postal System. Each airport's role is classified as one of five basic service levels: commercial service - primary, commercial service - non-primary, reliever, transport and General Aviation (GA). These levels describe the type of service that the airport is expected to provide the community during the NPIAS five-year planning period. It also represents the funding categories determined by Congress to assist in airport development. AEX is categorized as a Commercial Service Primary Airport, based upon data collected and transmitted to Congress by the Secretary of Transportation for the 2009-2013 planning period, the most recent edition of the NPIAS.

Because the airport includes the England Airpark, it has become a transportation and business nexus for the Central Louisiana area. In addition to the 70 plus businesses located within the Airpark, AEX is home to a fixed based operator, Million Air of Alexandria, which provides 24/7 refueling, maintenance, aircraft parking, flight training and pilot and passenger amenities to users of the airport. The airport is also home to commercial operations associated with American, Atlantic Southeast, Continental and Northwest airlines. The airport is equipped with large paved aprons allowing it to accommodate wide-body commercial and military aircraft including the L1011, B747, KC135, C-17, and C-5. Because of the airport's location and its facilities, AEX served as emergency disaster relief and response center during Hurricane's Katrina and Rita for Coast Guard, Air Force, Louisiana National Guard and other military and civilian operations in support of the relief efforts in 2005. In 2008, AEX once again fulfilled this role during Hurricane Gustav. It is now considered a major relief point by LaDOTD and the Army North

[1] FAA Order 5090.3C, *Field Formulation of the National Plan of Integrated Airport Systems (NPIAS)*, defines substantial use as scheduled commercial service or at least 500 total aircraft operations a year.

Command. It is anticipated that the airport will continue to expand on this role and its development as an intermodal transportation hub since it is a rally point for commercial, cargo and military operations.

In addition to commercial, corporate, and GA traffic, military operations represent a significant percentage of operations at AEX. The Authority has a commercial relationship with the US Army to provide a variety of services including training and transport. The US Army pays approximately $1.6 million dollars and has invested over $60 million in infrastructure improvements. The England Authority obtains significant annual revenue associated with this commercial lease agreement. It is anticipated that as the war in the Middle East comes to an end that military related operations and exercises will return to pre-war levels. Further, based upon discussions with 259th ATC and JRTC representatives as well as the installation of the precision approach radar (PAR), PAR approach training exercises associated with the C130, C17A and T1 training aircraft will increase beyond pre-war levels.

As a result of the recent fuel crisis, airlines are in the process of restructuring their operations and evaluating the long-term use of more fuel efficient and larger passenger aircraft. This trend was considered in the air taxi operations forecast, which assumes that with an increase in passenger demand available aircraft seats will also increase through the use of larger aircraft. Therefore, even as operations decrease, apron area requirements may increase to accommodate larger aircraft requirements.

4.1.2 Airport Reference Code and Fleet Mix

The FAA has established an airport reference code (ARC) to define the operational characteristics of the most demanding aircraft using the airport. The ARC consists of two components: the aircraft approach speed, which is based upon 1.3 times the aircraft's stall speed in landing configuration, and airplane design group (ADG), which relates to the aircraft wingspan and tail height. Generally, aircraft approach speed applies to runways and runway-related facilities, while wingspan and tail height relates to runway and taxiway width and separation criteria involving taxiways, taxilanes and landside facilities.

TABLE 4-1
FAA AIRCRAFT CLASSIFICATION CRITERIA

Aircraft Approach Category	Approach Speed (Knots)	Airplane Design Group	Wingspan (ft)	Tail Height (ft)
A	< 91	I	< 49	< 20
B	91 < 121	II	49 < 79	20 < 30
C	121 < 141	III	79 < 118	30 < 45
D	141 < 166	IV	118 < 171	45 < 60
E	166	V	171 < 214	60 < 66
		VI	214 < 262	66 < 80

Source: FAA Advisory Circular (AC) 150/5300-13

Based aircraft and operational fleet mix data was determined for the base year 2007 using several sources including FAA Air Traffic Data, FAA approved *2007 FAR Part 150 Study*, airport

comparative traffic reports, and data provided by the 259th ATC. The future fleet mix was adjusted as required to reflect industry trends including the introduction of very light jets, aircraft fractional ownership, and demand by long-range commercial aircraft. A sample of aircraft that typically use AEX is provided in **Exhibit 4-1**, *Aircraft Classifications.*

Critical Aircraft

As outlined in **Chapter 3**, *Aviation Forecasts*, FAA approved *2007 FAR Part 150 study* provided operational breakdowns by itinerant and local operations. This in combination with recent information from the ATCT and FAA Enhanced Traffic Management System data for 2007 and 2008 were used to determine the types and frequency of operations. This information was compared to AEX's existing fleet mix data which was used as the baseline for the fleet mix forecast through 2027. Each category was projected outward based upon a combination of historical data, local and global trends, discussions with users, data provided in the FAA Approved *FAR Part 150 Study* as well as information obtained from the 259th ATC as shown in **Table 4-2**. Based upon the existing and forecast demand, the operational breakdown by specific aircraft was determined using a combination of AEX *FAR Part 150* data as well as DOT Form 41 data for the years 2000 through August 2008. This resulted in over 500 annual operations associated with ARC D-V aircraft as noted in **Table 4-3**.

Typically, future planning considers the needs of potential aviation demand in conjunction with capital improvement decisions. The FAA requires that runways, taxiways and apron areas be designed according to the wingspan requirements of the most demanding aircraft likely to operate within a functional area of the airport. For example, taxilanes providing access to T-Hangar facilities are normally developed to accommodate ADG I or II aircraft requirements since they serve smaller single-engine and multi-engine piston aircraft, whereas runways and taxiways must be designed to accommodate the critical aircraft standards. In the case of AEX, Runway 14-32 is designed to accommodate D-V standards (B747, L1011, A330 and A340 aircraft) and Runway 18-36 is designed to D-IV standards (DC-10). It is important to note that at the time of this writing, discussions with military operators indicated that helicopter operations may exceed forecast operations through the twenty-year planning period. As a result, facilities were designed to accommodate operations beyond forecast levels.

Class A Small single-engine, gross wt. 12,500 lbs.

MOONEY OVATION

CESSNA 152/172
BEECHCRAFT BONANZA
CESSNA 182/210
MOONEY 201
PIPER CHEROKEE

Class B Small twin-engine, gross wt. 12,500 lbs.

KING AIR 350

BEECHCRAFT BARON
MITSUBISHI MU-2
CESSNA CITATION I
CESSNA 310/402
PIPER NAVAJO
KING AIR 90/100/200/350

Class C Large aircraft, gross wt. 12,500 lbs. to 300,000 lbs.

GULFSTREAM IV

GULFSTREAM III/IV
LEAR 35/55
SAAB 340
CESSNA CITATION II
FALCON 20/50/90
BOEING 727/737/767
DOUGLAS DC-9/MD-80

Class D Large aircraft, gross wt. more than 300,000 lbs.

BOEING 747

AIRBUS A300/310/340
BOEING 747
DOUGLAS DC-8/MD-11
LOCKHEED L-1011

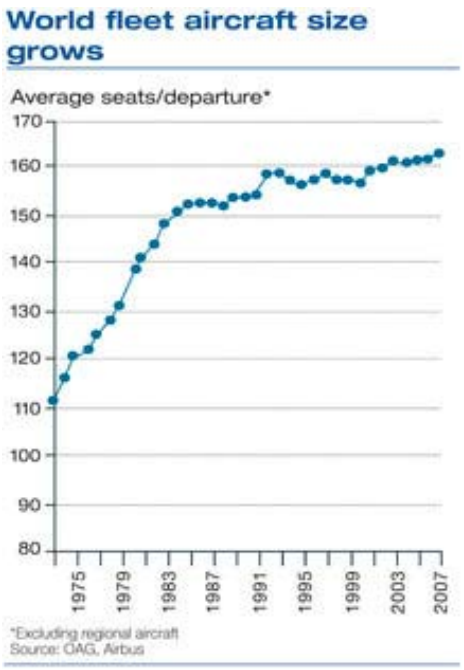
EXHIBIT 4-1
AIRCRAFT CLASSIFICATIONS

TABLE 4-2 FLEET MIX OPERATIONS FORECAST											
Year	**Total Ops**	**Single-Engine Piston**		**Multi-Engine Piston**		**Turbo Prop**		**Jet**		**Rotorcraft**	
		Ops	**% of Total Ops**	**Ops**	**% of Total Ops**	**Ops**	**% of Total Ops**	**Ops**	**% of Total Ops**	**Ops**	**% of Total Ops**
2007	50,618	9,334	18.44%	4,394	8.68%	17,393	34.36%	19,374	38.27%	121	0.24%
2012	85,859	7,822	9.11%	4,602	5.36%	16,597	19.33%	56,272	65.54%	567	0.66%
2017	89,336	4,842	5.42%	3,466	3.88%	16,911	18.93%	63,527	71.11%	590	0.66%
2022	91,558	3,891	4.25%	3,314	3.62%	16,728	18.27%	67,048	73.23%	586	0.64%
2027	93,513	3,002	3.21%	3,002	3.21%	16,468	17.61%	70,452	75.34%	580	0.62%

Sources: 259th ATC, AEX Comparative Reports, FAR Part 150 Study (2005), and The LPA Group Incorporated, 2009

The breakdown of aircraft by type is based upon historic operational data for calendar year 2007 and the FAA's Enhanced Traffic Management System output for the same year. According to historic data, aircraft retirements accelerated in 2006 due primarily to rising fuel costs, higher capacity, and overall age. The demand for larger aircraft is a trend that is likely to continue. According to the *EADS 2007-2027 Airbus Global Market Forecast* as well as aircraft fleet changes by major air carriers, the trend has been to replace:

- L1011 aircraft with B767-400ER and A330-300
- B727-100/200/300 and DC-10s with B757-200, A319, A320 and CRJ200 aircraft
- MD80s/737-classic models (100/200/300) with A320s and 737-600/700/800 & 900 series, and
- B767, A310, A300 & DC10s replaced by B787, A330, A350, and B777.



Source: EADS 2000-2027 Global Forecast, 2008

"The need for larger aircraft, across the whole spectrum of aircraft size, is all too evident when one considers the record load factors witnessed worldwide in recent years. Airports, air traffic control and other essential infrastructure are being constantly pushed to provide more and more capacity. In addition, emerging markets, under pressure from their population to provide air transport at the lowest cost per seat, continue to increase demand even further. This is why larger, modern, high performance aircraft, which offer greater capacity per take-off or landing

slot, are good both for the airlines and the environment, in terms of both the resulting reduction in fuel burn and, consequently emissions"[2].

Regional aircraft, single-aisle and twin aisle aircraft are also getting bigger. Some of the top reasons why commercial and freight aircraft have moved to larger aircraft includes:

- "Traffic is expected to triple within next 20 years
- Global hub cities are getting bigger, inhabitants richer and more internationally mobile;
- People live in and want to go to global hub cities;
- Passengers want more comfort and cheaper flights;
- New large aircraft offer better economics;
- New large aircraft are more eco-efficient;
- Diminishing return on additional frequency;
- Airport congestion, especially at hub airports, worsening; and
- Airport capacity improvements are becoming more and more limited"[2].

According to manufacturers, there is a backlog for 70 seat or greater regional aircraft especially for airlines operating in dense markets (i.e. Dallas, Atlanta, Houston, etc.). Further increased frequencies associated with small regional aircraft have negatively impacted hub operations by causing greater passenger delays and impacting airport operations. Encouraging the use of larger and more efficient aircraft will allow airports to grow while possibly limiting expensive infrastructure improvements (i.e. additional jet ways, apron, etc.).

In addition to the regional market, the proportion of larger single aisle and twin aisle aircraft has been increasing since the late 1990s. Although fuel costs have had a negative impact on both domestic and international operations, air carriers are continuing to trade-up to larger and more fuel efficient models. Northwest and Delta are in the process of upgrading their aircraft to provide higher load factors and decrease operating costs, and American Eagle, Atlantic Southeast Airlines, and Comair have firm orders for delivery of CRJ-700s as early as 2008.

Based upon these trends, it is anticipated that older aircraft currently operating at AEX will likely be phased out over the twenty-year planning period and replaced by larger and more efficient models. In reviewing aircraft operations through August 2008, it became evident that B737-200/300 models are being replaced by the B737-600/700/800 models and DC 10s and B767s are being replaced by A330-300 models. Based upon historic and forecast operations and fleet mix data obtained from the FAR Part 150 and FAA Enhanced Traffic Management System Counts for the years 2007 and 2008 (January – August), the following fleet mix breakdown was developed for key forecast years.

[2] EADS 2007-2026 Airbus Global Market Forecast, 2008

TABLE 4-3
FLEET MIX BREAKDOWN BY AIRCRAFT TYPE

Aircraft	ARC	Years			
		2007	2012	2017	2027
A124 - Antonov AN-124 Russian	C-VI	2	2	2	2
Airbus A320/321-300 series	C-III	0	346	424	470
Airbus 330-300/340-500 series	D-V	8	43	75	98
B703 - Boeing 707-300	C-III	2	0	0	0
Boeing 737-200/300/400	C-III	869	356	120	9
Boeing 737-600/700/800	C-III	501	613	712	770
B744 - Boeing 747-400	D-V	47	256	444	575
Boeing 757-200/300	C-III	2	0	0	0
B763 - Boeing 767-300	D-IV	89	53	0	0
DC10 - Boeing (Douglas) DC 10-10/30/40	D-IV	22	12	0	0
DC9	C-III	12	10	3	0
MD80 - Boeing (Douglas) MD 80 Series	C-III	114	89	0	0
L101 - Lockheed L-1011 Tristar	D-IV	10	0	0	0
MD11 - Boeing (Douglas) MD 11	D-IV	17	0	0	0
Subtotal Air Charter		**1,695**	**1,780**	**1,780**	**1,924**
E135 - Embraer ERJ 135/140/Legacy	C-II	530	426	206	0
E145 - Embraer ERJ-145	C-II	1,439	1,276	1,026	555
E45X - Embraer ERJ 145 EX	C-II	81	6	205	370
SF34 - Saab SF 340	C-II	5,466	4,259	3,592	1,850
CRJ2 - Bombardier CRJ-200/Challenger 800	C-II	3,230	2,662	1,681	925
Embraer ERJ 170	C-II	0	852	1,500	2,775
CRJ-700/701/702	C-II	7	1,065	2,052	2,775
Subtotal Air Taxi		**10,753**	**10,646**	**10,262**	**9,250**
B732 - Boeing 737-200/VC96	C-III	10	11	12	14
MD10	C-III	2	2	2	3
BE99 - Beech Airliner 99	B-II	6	7	7	8
GA Jet (Gulfstreams II/III/IV/V & Learjet 35/45/60)	C&D-II/III	7,195	9,151	15,986	22,814
GA Turbine	Various	7,244	7,886	8,529	9,506
GA Piston	Various	13,581	13,465	8,469	5,704
Subtotal Freight and General Aviation		**28,038**	**30,522**	**33,004**	**38,049**
Military Helicopter	Various	121	501	528	528
Military Jet (T1,37,38, 45, TEX, Tornado, etc)	C-I & II	4,955	6,978	7,234	7,234
Military Piston	A-I & II	150	619	652	652
Military Turbine	Various	71	296	312	312
C130	C-IV	4,532	4,738	4,880	4,880
C5	D-VI	88	363	382	382
SH330/360	B-II	73	302	318	318
C17A[1]	C-IV	142	29,114	29,984	29,984
Subtotal Military		**10,132**	**42,911**	**44,290**	**44,290**
Total[2]		**50,618**	**85,859**	**89,336**	**93,513**

Notes:
[1]According to data provided in FAA approved Part 150 Study and from military personnel, C17 training operations are anticipated to increase to approximately 37,440 over current operations. This is expected throughout the planning period.
[2]May not exactly sum due to rounding.
Sources: FAA Air Traffic Enhanced Management System, 2000, 2007 and 2008; 259th ATC 2007 and 2008 data, AEX Comparative Traffic Data, JP Airline Fleets International, Individual Airline/Carrier aircraft on order, and The LPA Group Incorporated, 2008

4.2 DEMAND CAPACITY ANALYSIS

The purpose of performing demand/capacity analyses is to compare existing airfield capacity in its current configuration to forecast demand and determine the type and timing of capacity improvements, if required, over the twenty-year planning period. This was accomplished by comparing the theoretical operational capacity with projected activity levels. If a shortfall was identified, airfield improvements may be necessary to create the operational capacity to accommodate future demand.

Airport capacity is defined by the Federal Aviation Administration (FAA) as an estimate of the number of aircraft that can be processed through the airfield system during a specific period with acceptable levels of delay. Estimates of existing airfield capacity at AEX were developed in accordance with the methods presented in **FAA Advisory Circular (AC) 150/5060-5**, *Airport Capacity and Delay*. This methodology does not account for every possible situation at an airport, but rather the most common situations observed at U.S. airports when this AC was adopted.

The capacity AC provides a methodology for determining the hourly runway capacity, the annual service volume (ASV) and average expected delays. Each of these factors was calculated for existing conditions and for key years over the twenty-year planning period. An airport's hourly runway capacity expresses the maximum number of aircraft that can be accommodated under conditions of continuous demand during a one-hour period. It should be noted that the hourly capacity cannot be sustained for long periods or an airport will experience substantial increases in delay. The ASV estimates the annual number of operations that the airfield configuration should be capable of handling with minimal delays. The ASV considers that over a 12-month period a variety of conditions are experienced, including periods of high volume and low volume activity. The average anticipated delay was based on a ratio of the forecast demand to the calculated ASV. These calculations, using the aforementioned FAA methodology, were based upon the airfield configuration as well as operational and meteorological characteristics, which are described in detail within the following sections.

4.2.1 Airspace Capacity

Airspace capacity is an essential element of any airport, especially with respect to maintaining existing and proposed operational characteristics. As noted in the FAA approved *1998 Master Plan*, the determination of airspace capacity is critical for the development of airside and landside capacity. As previously illustrated in **Exhibit 2-7** of this report, the airspace surrounding AEX is relatively complex due to restricted airspace associated with Fort Polk Army Base, i.e., R-3804A, which is located approximately 40 miles to the southeast, Military Operations Areas (MOAs) and alert areas located to the north, south, and west of the airpark. However, aircraft are not necessarily restricted from operating within these areas, and are advised to contact the controlling agency for clearance to enter.

AEX is located within the eastern portion of an 80-mile long airspace corridor formed by two MOAs. The corridor ranges in width from 22 to 36 miles. AEX's location in relation to the MOAs allows for instrument approaches to Runways 14, 32, 18 and 36.

The Central Louisiana airspace lies within the jurisdictional oversight of the Houston Center Air Route Air Traffic Control Center (ARTCC). As noted in the FAA approved *1998 Master Plan* and verified with airport staff, control of some of this airspace has been delegated to the military through written agreements. The Houston ARTCC also has an agreement with the England Authority related to the 259th ATC squadron's operation of the air traffic control tower at the airport.

Typically an FAA terminal radar approach control (TRACON) facility oversees IFR traffic. The main function of a TRACON is to control the airspace around airports with high traffic density. The TRACON area of coverage is approximately 35-mile radius from the airport. However, in the case of AEX, TRACON type facilities are provided by the Fort Polk Army Radar Approach Control (ARAC) facility. The Fort Polk ARAC provides approach and departure control service at AEX through operating agreements with the Houston ARTCC and AEX Air Traffic Control. As a result of this coverage as well as the addition of a precision approach radar system at AEX, a high level of safety and control exists.

Since the FAA approved *1998 Master Plan*, capacity of the airspace surrounding AEX has neither increased nor decreased. Although training operations are expected to exceed pre-war (2000) training levels, the existing airspace is still expected to adequately accommodate future operations especially due to advances in radar control, aircraft navigational equipment and pilot training procedures. This, however, does not remove the potential for some occasional airspace conflicts associated with operations at the other facilities or associated obstructions. While none of these facilities have a direct airspace conflict, the potential application of Category I and II instrument approaches to Runways 14-32 and 18-36 will require careful planning. This will be considered to a greater degree of detail within **Chapter 6**, *Airpark Alternatives*. Based upon existing conditions, there is currently no known hazard at this time which impacts air navigation surrounding AEX.

4.2.2 Airfield Demand/Capacity Analysis

Airfield demand/capacity analyses seek to identify at what point, if any, during the 20-year planning period that an unacceptable level of delay would be experienced by airport users. This analysis compares forecast annual aircraft operations to a theoretical airfield capacity. If a shortfall is identified, airfield improvements may be required to accommodate future demand. The Federal Aviation Administration (FAA) has developed a standard methodology, given in **FAA Advisory Circular (AC) 150/5060-5**, *Airport Capacity and Delay*, to determine this theoretical airfield capacity. This methodology accounts for the most common airfield layouts observed at U.S. airports. The *Capacity* AC provides a systematic approach for determining the hourly runway and annual airfield capacities, as well as the projected average hourly and annual delays. Each of these was calculated for existing conditions as well as for key study years over the twenty-year planning period. The results of which are described by the following sections.

Hourly Runway Capacity

An airport's hourly runway capacity is the maximum number of aircraft that can be accommodated under conditions of continuous demand during a one-hour period. It should be

noted that typical hourly capacity cannot be sustained over long periods without substantially increasing delays. However, AEX historically has not faced any significant delays to commercial or general aviation traffic even when required to facilitate the surge[3] of an international combat brigade in less than 96 hours or when accommodating disaster relief efforts. This is primarily the result of runway alignments, airspace, NAVAIDs and adequate taxiway entry and exit points.

In evaluating current hourly runway capacity at AEX, several factors were considered:

- **Runway Configuration:** The number of runways at an airport and how they are positioned in relation to one another determines how many arrivals and departures can occur within an hour. For example, if an airport has two runways that are oriented parallel to each other then it is generally possible to have arrivals and departures to both runways at the same time. However, if the two runways intersect, an aircraft departing on one runway must wait for operations on the other to be completed prior to starting its takeoff.

  AEX's airfield configuration consists of two intersecting runways, 14-32 and 18-36. Runway 14-32 is the primary runway equipped with a Cat I ILS approach to Runway 14 and GPS approach to Runway 32. Runway 18-36 is equipped with GPS approaches to either runway end, but is primarily used as a VFR runway.

  Because of the location of the terminal and apron facilities, departures are primarily to the north (Runways 32 and 36) and arrivals are primarily to the south (Runways 14 and 18). Landings to the south and departures to the north have historically resulted in shorter taxi distances especially associated with air taxi and air charter operations.

  Operations to the north are expected to remain the predominant pattern because of the high usage of the southern apron areas. Further, construction of the partial parallel taxiway to Runway 18-36 is anticipated to increase the usage of Runway 18-36 by more than 20 percent, thus increasing the overall capacity of Runway 14-32.

- **Runway Utilization:** Within the Capacity AC, runway utilization provides the weighted average of runway use for visual flight rule and instrument flight rule conditions. The 2007 runway utilization rates at AEX were obtained through consultation with the ATCT staff and historical wind data. Runway utilization rates for air charter, air taxi and general aviation operations are anticipated to remain stable throughout the twenty-year planning period. However, with the construction of the partial parallel taxiway adjacent to Runway 18-36 as well as the increase in military night vision operations, utilization of Runway 18-36 is expected to increase. The 259th ATC squadron estimates that operations on Runway 18-36 will increase by at least 15 percent. Thus, utilization of Runway 18-36 by the year 2012 will equal 30 percent with 22 percent operating on Runway 18, and the remaining eight (8) percent operating on Runway 32.

[3] As part of England Authority's commercial contract with the US Army, the airport must be able to accommodate the surge of an international combat brigade (approximately 29 aircraft) during a 96 hour period including fueling.

Runway 14-32 still remains the primary runway for both commercial and general aviation operations averaging an overall utilization rate of 70 percent. Runway 14-32 will still be used for military training operations, especially those associated with T-1 and A-10 aircraft precision approach radar (PAR) training missions specifically because of the multiple instrument approaches to either runway. Runway utilization rates for the year 2007 (base year) and 2012 are provided in **Tables 4-4** and **4-5**, respectively. Based upon discussions with the 259th ATC, runway utilization has not significantly changed from the levels reported in the FAA approved *2007 FAR Part 150 Study*. In 2007, overall runway utilization was 53 percent on Runway 14, 32 percent on Runway 32, 11 percent on Runway 18 and 4 percent on Runway 36.

TABLE 4-4
2007 RUNWAY UTILIZATION RATES

Runway	Fixed Wing		Rotary Wing	
	Departure	Arrival	Departure	Arrival
14	45%	62%	15%	85%
32	40%	23%	85%	15%
18	11%	11%		
36	4%	4%		
Total	100%	100%	100%	100%

Sources: FAR Part 150 Study, 259th ATC, AEX comparative report data, and The LPA Group Incorporated, 2008

With the anticipated increase in military operations associated with both night vision and precision approach training procedures, runway utilization percentages for the year 2012 were estimated as follows.

TABLE 4-5
2012 RUNWAY UTILIZATION RATES

Runway	Fixed Wing				Rotary Wing	
	Departure	Arrival	Departure	Arrival	Departure	Arrival
14	45%	62%	35%	53%	15%	85%
32	40%	23%	35%	17%	85%	15%
18	11%	11%	22%	22%		
36	4%	4%	8%	8%		
Total	100%	100%	100%	100%	100%	100%

Sources: FAR Part 150 Study, 259th ATC, AEX comparative report data, and The LPA Group Incorporated, 2008

- **Aircraft Mix Index:** In the *Capacity* AC, the FAA classifies aircraft at an airport based on their maximum certified operational weight. The mix index is a calculated ratio of the aircraft fleet based upon a weight classification system. As the number of heavier aircraft increases, so does the mix index. The hourly runway capacity decreases as the mix index increases because the FAA requires that heavier aircraft be spaced further apart from other aircraft for safety reasons.

The mix index is for determining airfield capacity is based upon the sum of the percent of Class "C" aircraft plus three times the percent of Class "D" aircraft operations. Aircraft fleet mix classifications are outlined in **Table 4-6.**

TABLE 4-6
AIRCRAFT FLEET MIX CLASSIFICATIONS

Aircraft Classification	Maximum Takeoff Weight (lbs)	Number of Engines	Wake Turbulence Classification	Sample Aircraft
A	12,500 or less	Single	Light	Cessna 150, Piper PA-28, Eclipse 500
B	12,500 or less	Single	Small	Beech King, Cessna Citation, Beech Barron
C	12,500-300,000	Multi	Large	Learjet, Gulfstream, DC-9, B737, B727, C-130
D	Over 300,000	Multi	Heavy	B747, L1011, C-135 and C-141

Source: FAA Advisory Circular 150/5060-5, Airport Capacity and Delay,, and The LPA Group Incorporated, 2008

Over the planning period, AEX is expected to see an increase in the number of operations by heavier aircraft, and thus the mix index will likely increase as shown in Table 4-7. The base year fleet mix index and fleet mix forecast for key years, according to information obtained from airport management, Air Traffic Control, Fort Polk, Little Rock AFB and the FAA approved 2007 FAR Part 150 Noise Study, growth in larger commercial, air taxi and air charter, and military aircraft is expected throughout the twenty-year planning period.

TABLE 4-7
AIRCRAFT FLEET MIX

Year	FAA Aircraft Classification				Mix Index =%C+3*(%D)
	A	B	C	D	
2007	29.65%	8.87%	38.61%	1.27%	42.43%
2012	13.10%	21.34%	62.67%	2.90%	71.37%
2017	13.97%	22.83%	60.81%	2.39%	67.99%
2022	14.89%	24.03%	58.75%	2.34%	65.76%
2027	15.92%	25.39%	56.43%	2.27%	63.23%

Sources: AEX ATCT 2007, AEX Comparative Traffic Reports, FAR Part 150 Study and The LPA Group Incorporated, 2008

- **Percentage of Aircraft Arrivals:** An arriving aircraft occupies a runway longer than a departing aircraft. The hourly runway capacity, therefore, decreases as the percentage of aircraft arrivals increases. At AEX, the percentage of aircraft arrivals is expected to remain at 50 percent throughout the planning period.

- **Percentage of Touch-and-Go Operations:** Pilots routinely practice landings and takeoffs by conducting touch-and-go operations, which involves an aircraft landing and then immediately departing without ever coming to a complete stop. This training exercise takes less time to conduct than normal landings where the aircraft departs the runway; therefore, as

the number of touch-and-go operations increase, so too does the hourly runway capacity. Touch and go operations at AEX are limited to general aviation and military fixed wing operations. According to ATC and the Part 150 Study, percentage of touch and go operations on Runways 18-36 and 14-32 for the base year were as follows:

TABLE 4-8
TOUCH AND GO OPERATIONS
CALENDAR YEAR 2007

Runway	General Aviation	Military Fixed Wing*
14	25%	75%
32	25%	25%
18	25%	0%
36	25%	0%
Total	100%	100%

*Notes: * Military fixed wing touch and go operations limited to Runway 14-32 due to availability of precision instrument approach.*
Sources: 259th ATC,2007, FAR Part 150 Study, 2005, and The LPA Group Incorporated, 2008

As noted in **Table 4-8**, military operations are currently limited to Runway 14-32 due to the precision approach. However, based upon planned increases in local training operations provided by the 259th ATC and FAA approved *2007 FAR Part 150 Study*, it is anticipated that the overall percentage of touch and go military operations on Runway 14-32 will decrease due to a shift in operations to Runway 18-36.

The use of Runway 18-36 for touch and go training will also increase as part of the military's Night Vision Goggle (NVG) training. Runway 18 is the primary runway designated for these operations, which will be associated with C-130 aircraft from Little Rock AFB and C-17 aircraft from Jackson, MS and are estimated to equal 120 per week. Further, local military operations associated with random steep training exercises are anticipated to be shifted to Runway 18-36 to allow for increased use of Runway 14-32 for civilian commercial operations. However, military touch and go training operations primarily associated with the installation of the military precision approach radar (PAR approach) will still occur on Runway 14-32, and are anticipated to account for approximately 1,600 operations in 2010 increasing to 1,852 annually thereafter. Based upon this data, anticipated touch and go operation percentages for the years 2010-2027 are provided in **Table 4-9**.

TABLE 4-9 TOUCH AND GO OPERATIONS CALENDAR YEARS 2012-27		
Runway	**General Aviation**	**Military Fixed Wing**
14	25%	25%
32	25%	15%
18	25%	50%*
36	25%	15%
Total	100%	100%

*Notes: * Military fixed wing touch and go operations primarily associated with random steep approach and nigh vision goggle training.*
Sources: 259th ATC,2007, FAR Part 150 Study, 2005, and The LPA Group Incorporated, 2008

- **Meteorological Conditions:** During periods of clear weather conditions, with few clouds and mild winds, pilots can operate based upon visual observation of other aircraft. As weather conditions deteriorate (which could include high winds or low visibility due to fog or low clouds), pilots have to rely on instrumentation to operate safely. The *Capacity* AC considers two operating conditions based upon meteorological conditions – Visual Flight Rules (VFR) and Instrument Flight Rules (IFR). During IFR periods, aircraft are spaced further apart, which lowers the hourly runway capacity.

  Historically, winds at AEX are less than five (5) knots approximately 69 percent of the time, which allows traffic flow in any direction. When winds exceed five knots, 15 percent of the time it favors Runways 14 and 18 (south flow) and 15 percent of the time it favors Runways 32 and 36 (north flow). The current runway configuration also provides 98 percent wind coverage under all weather conditions. VFR conditions and IFR conditions occur approximately 87 percent and 11 percent of the time, respectively. IFR conditions are usually associated with morning fog or thunderstorms. Periodically, IFR conditions exceed the minimums approximately two (2) percent of the time, which requires the airfield to be closed[4].

  For the purposes of determining aircraft performance and runway length requirements, the mean maximum temperature of the hottest month, based upon more than twenty years worth of data, is 91.9 degrees Fahrenheit. It was determined based upon existing and forecast operations that wind, ceiling and visibility requirements do not limit or place undue constraints on AEX operations.

- **Taxiway Configuration:** The number of taxiways impacts the hourly runway capacity by influencing when an arriving aircraft will be able to exit the runway after slowing to a safe taxiing speed. The *Capacity* AC defines optimum ranges for the distance a taxiway should be from the runway arrival end.

[4] National Climatic Data Center (NCDC) and National Oceanic and Atmospheric Administration (NOAA), Station 72248 – Alexandria, Louisiana, (1997-2006), ~70,000 observations

Taxiway A provides full parallel access to Runway 14-32 and is equipped with five (5) conventional connector taxiways. Consequently, only the northern portion of Runway 18-36 is served by a parallel taxiway, Taxiway B, with two (2) conventional connector taxiways along the runway. Since the previous FAA approved master plan, Taxiway F has been closed as part of the airfield development. **Table 4-10** designates the connector taxiways associated with Runways 14-32 and 18-36. Since the distance between the connector taxiways ranges between 1,300 feet and 2,800 feet, it was assumed that there are sufficient connector taxiways available at AEX to maximize the exit capacity of both runways.

TABLE 4-10
TAXIWAY EXIT LOCATIONS

Taxiway Exit	Distance from Runway 14 Threshold	Distance from Runway 32 Threshold
A (14 End)	-	9,352 ft
A1	2,375 ft	6,977 ft
A2	5,338 ft	4,014 ft
F (CLOSED)	6,078 ft	3,274 ft
A3	7,937 ft	1,415 ft
A (32 End)	9,352 ft	-
Taxiway Exit	**Distance from Runway 18 Threshold**	**Distance from Runway 36 Threshold**
B (18 End)	-	7,001 ft
B1	2,000 ft	5,001 ft
F (CLOSED)	4,220 ft	2,781 ft

Source: The LPA Group Incorporated, 2008.

Considering these various factors, the *Capacity* AC methodology was used to calculate the hourly capacities under both VFR and IFR conditions, as shown in **Table 4-11.** These two values were then used to calculate the weighted hourly runway capacity for each of the key study year. This weighted hourly runway capacity takes into account the percent of time each meteorological condition occurs. Over the planning period, there is a decrease in the overall weighted hourly runway capacity related to the expected increase in operations by heavier aircraft (i.e., an increase in the mix index) and distribution of touch and go operations among Runways 14-32 and 18-36.

TABLE 4-11 HOURLY CAPACITY			
Year	**VFR Hourly Runway Capacity (Operations/Hour)**	**IFR Hourly Runway Capacity (Operations/Hour)**	**Weighted Hourly Runway Capacity (Cw)**
Base Year			
2007[1]	77	57	63
Forecast			
2012[2]	77	56	61
2017[2]	77	56	61
2022[2]	77	56	61
2027[2]	77	56	61

Notes:
[1]Mix Index was 42.43%, Runway 14-32 was at 60% arrival rate, and Runway 18-36 was 40% arrival rate. Used Graphics 5 and 9 to determine Weighted Runway Capacity
[2] Mix Index ranged from 63.23% to 71.37%, Runway 14-32 was still at 60% arrival rate, and Runway 18-36 was still at 40% arrival rate.
Sources: FAA AC 150-5060-5, Airport Capacity and Delay

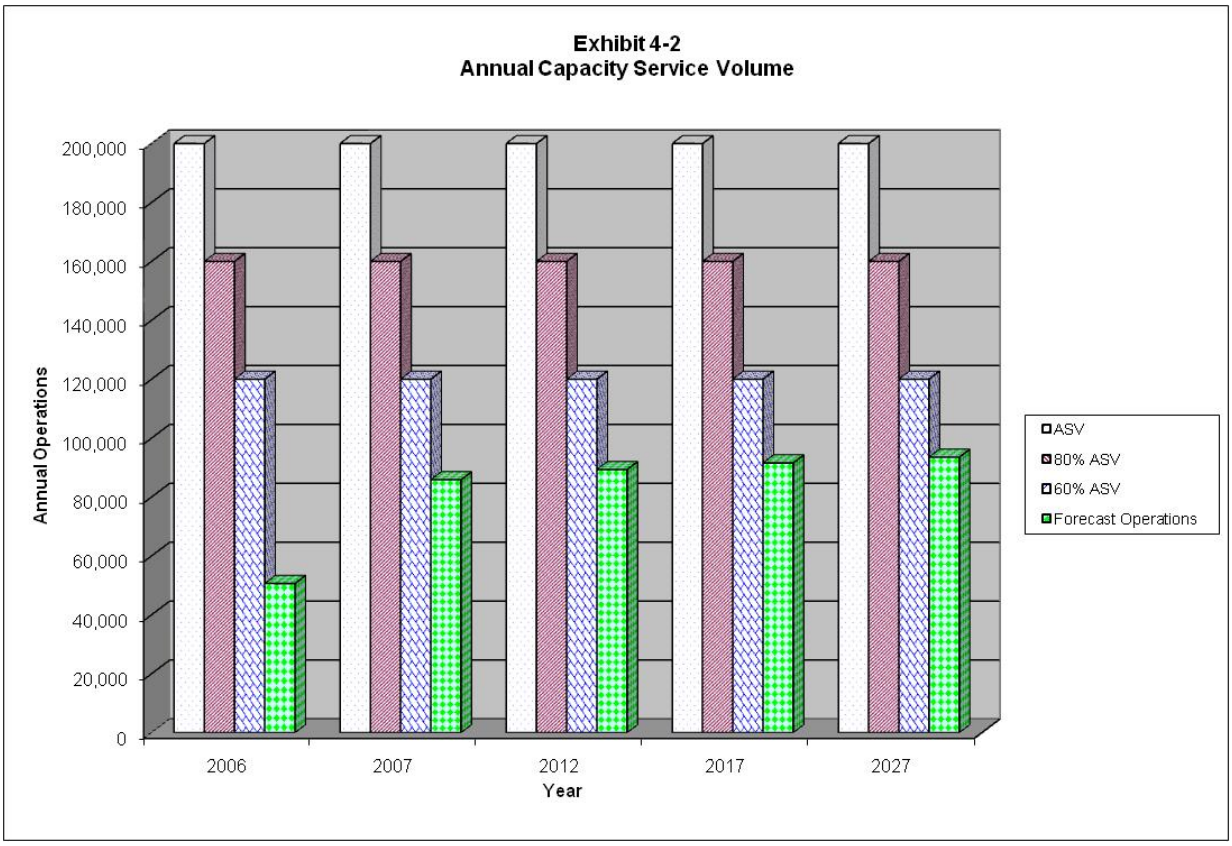
Theoretical Annual Airfield Capacity

The FAA *Capacity AC* uses the calculated weighted hourly runway capacity to determine a theoretical annual airfield capacity, which the FAA has defined as the annual service volume (ASV). The ASV estimates the annual number of operations that the airfield configuration should be capable of handling with minimal delays over a one-year period. This methodology takes into account that a variety of conditions are experienced at an airport throughout a year, including some high-volume activity periods as well as periods of relatively low activity. **Table 4-12** shows the results of the ASV calculations for the base year of 2007 as well as for every five-year period over the planning period.

Additionally, this table and **Exhibit 4-2** show the comparison of the projected annual operational demand to the theoretical ASV. According to guidelines in **FAA Order 5090.3B**, *Field Formulation of the National Plan of Integrated Airport Systems*, once the actual demand exceeds 60 percent of the calculated ASV, planning studies should be undertaken to increase the airfield capacity. Due to the length of time it takes to implement some types of airfield developments, this early planning facilitates the construction of capacity enhancing facilities to meet the anticipated demands. Based on the operational forecasts developed in **Chapter 3**, AEX will not exceed the airport's ASV during the planning period, nor will it exceed the planning threshold of 60 percent. However, as part of this master plan study, future improvements were identified to address potential long-term shortfalls.

TABLE 4-12 ANNUAL AIRFIELD CAPACITY			
Year	**Annual Operations**	**Annual Service Volume**	**Capacity Level**
Base Year			
2007	50,618	205,151	24.67%
Forecast			
2012	85,859	245,505	34.97%
2017	89,336	248,034	36.02%
2022	91,558	240,861	38.01%
2027	93,513	244,412	38.26%

Sources: FAA AC 150-5060, Airport Capacity and Delay, 259th ATC (2007), FAR Part 150 Study (2005) and The LPA Group Incorporated,2009



Source: The LPA Group Incorporated, 2009

Annual Aircraft Delay

The average anticipated delay is based upon a ratio of the forecasted demand to the calculated ASV. This ratio is used as a guide for planning future airfield improvements. The FAA acknowledges in the *Capacity* AC that the level of delay that is acceptable to a particular airport

may differ from the level deemed acceptable at a similar airport. It is important to note that it is not only the delay time that determines acceptability, but also the frequency of these delays.

Several methods exist for estimating anticipated delay levels. One method involves using a variety of charts in the *Capacity* AC to estimate the average delay per aircraft based upon the ratio of annual demand to ASV. This delay per aircraft would then be used to calculate the annual delay for all operations. Another method utilizes software developed by the FAA (*Airport Design Software, Version 4.2d*) to determine the projected delay values. For this study, the anticipated delay, presented in **Table 4-13,** was determined using the FAA software. The increase in anticipated delay is related to the increase in mix index associated with the projected increase in operations by heavier aircraft starting in 2010.

TABLE 4-13
ANNUAL AIRCRAFT DELAY

Year	Average Delay per Aircraft (Min.)		Minutes of Annual Delay (000)	
	Low	High	Low	High
Base Year				
2007	0.1	0.2	5	10
Forecast				
2012	0.2	0.4	20	40
2017	0.2	0.4	20	41
2022	0.2	0.5	20	52
2027	0.2	0.5	22	54

Sources: FAA Airport Design Software, Version 4.2D and The LPA Group Incorporated, 2008

Through 2027, the average delay per aircraft and total annual delay values do not indicate that the airport users will experience significant delays. It should be noted that this does not imply that capacity related delays will not occur during certain peak times. However, since a significant portion of operations, especially associated with military training, are expected to occur during the evening hours (sunset to sunrise), it is unlikely that delay will impact operations at AEX during the twenty-year planning period. Still if a change in operations does occur, then developments should be considered to improve the situation.

Summary of Capacity and Delay

This chapter has analyzed the existing and future capacity of the airfield system at AEX. A summary of these results is given in **Table 4-14**. This analysis has shown that significant planning for capacity shortfalls is unwarranted within the forecast twenty-year planning period. It should be noted that if aviation activity exceeds that of the approved forecast the need for capacity enhancements would be amplified. Facility improvements to address such a capacity shortfall, which could include additional taxiways or a new runway, will be evaluated in the next steps of this study. The following section, *Facility Requirements*, will delineate the various facilities required to properly accommodate forecast operational levels. That information, in addition to the capacity analysis, will provide the basis for formulating the alternative

development concepts for the airport, and ensure that the new recommended development plan can adequately accommodate the long-term aviation requirements.

TABLE 4-14
SUMMARY OF AIRFIELD CAPACITY ANALYSIS

	2007	2012	2017	2022	2027
Hourly Capacity					
VFR Capacity Base (Operations/Hour)	77	77	77	77	77
IFR Capacity Base (Operations/Hour)	57	56	56	56	56
Weighted Hourly Capacity	63	61	61	61	61
Annual Airfield Capacity					
Annual Operations	50,618	85,859	89,336	91,558	93,513
Annual Service Level	205,151	245,505	248,034	240,861	244,412
Capacity Level					
Average Delay per Aircraft (Min.)					
High	0.2	0.4	0.4	0.5	0.5
Low	0.1	0.2	0.2	0.2	0.2
Minutes of Annual Delay (000)					
High	10	40	41	52	54
Low	5	20	20	20	22

Sources: FAA Airport Design Software, Version 4.2D, FAA AC 150-5060, Airport Capacity and Delay,259th ATC (2007), FAR Part 150 Study (2005) and The LPA Group Incorporated,2008

4.3 FACILITY REQUIREMENTS

Since the 1992 transfer of property from the DOD to the England Authority, the Authority has developed, through several master plans and noise studies, a long-term vision of the future. As part of the master plan process, previous studies were reviewed to identify recommendations and completed projects. However, the primary focus of this plan was to identify and recommend short and intermediate-term development to improve air transport access and air safety while maximizing land use development in an effort to generate resources for both the England Airpark and the Central Louisiana region. An important component of the England Authority's long-term vision is to become an intermodal transportation hub for the Central Louisiana Market in addition to expanding on its current role as an emergency preparedness and staging area for local, national and world events (i.e. hurricanes, international conflicts, military and humanitarian aid, etc.).

Thus, based upon current and forecast trends within the industry and the Authorities' long-term plans, the facility requirements section identified both the airfield and landside requirements needed to not only accommodate forecast demand but to identify projects which will accommodate the overall vision of the Airpark. Improvements identified were not based strictly on the conservative forecast of potential demand but also the results of the sustainable development analysis, which considered the world market place, fluctuations in energy costs, etc.

in order to provide the Authority a flexible plan for future development which may or may not occur within the twenty-year planning timeframe. This flexibility has historically allowed AEX to accommodate for unforeseen events, both natural and manmade, which cannot be forecast.

In an effort to provide the England Authority with an effective plan for future development, airpark and airport facility requirements were identified based upon the Authorities strategic vision as well FAA, LA DOTD, local planning and zoning guidance. Facility surpluses and deficiencies were identified for the base year 2007, and subsequently for every five years thereafter throughout the twenty-year planning period (i.e., 2012, 2017, 2022, and 2027).

4.3.1 Data Management

Given the long history of this facility, the England Authority has accumulated a history of as-built drawings, plans, and studies pertaining to the future development of AEX and its associated airpark facilities. This library of information is contained in various forms and formats (both hard copy and electronic formats). In the future, the England Authority should invest in transferring some of this historical information into the Geographic Information System (GIS) format. All new plans, designs, and as-built drawings should also be provided in GIS format as part of future project deliverables.

Geographic Information Systems are computer-based software that links geographic features on a map with various databases. GIS may be used by the Authority for a number of purposes, including the inventory and maintenance of airport facilities, preparation for emergency services, planning for airport improvements, the inventory of airport property, and the inventory of sensitive environmental areas.

During the short-term planning period, the Authority should implement a new GIS system in accordance with the FAA's latest guidance and information contained in **AC 150/5300-18**, *General Guidance and Specifications for Aeronautical Surveys: Airport Survey Data Collection and Geographic Information System Standards*. At a minimum, the Airport Layout Plan should be converted to this format in conjunction with the project. The process of setting up the GIS system should consist of the following components:

- GIS Needs Assessment
- Identification and Purchase of Equipment and Software
- Identify Data for Transfer into GIS Format
- GIS System Implementation and Training

4.3.2 Airpark Facility Requirements

The purpose of the Landside Requirements section is to assess the physical capacity of the Airpark, including current land uses, utilities, circulation and development constraints, and to identify infrastructure modifications necessary to support proposed development. In addition to information on site improvements, this section outlines the specific development quantities associated with the design concepts summarized in the Alternatives Refinement section.

Land Uses

The England Airpark campus is a predominantly low-density mixed use complex with industrial, residential, commercial, and recreational elements. Most active businesses are aviation-related, offering services ranging from commercial air travel and car rentals to aircraft services, cargo transport service, and flight instruction.

The Airpark has several high quality commercial and recreational amenities that cater to visitors and travelers, including restaurants, accommodations, and golf. The public Links of the Bayou Golf Club is a member of Louisiana's Audubon Golf Trail and part of the Audubon Cooperative Sanctuary for Golf Courses. The emerging hospitality focus of the Airpark revolves around the acclaimed boutique hotel, Parc England, and the adjacent upscale Bistro on the Bayou restaurant. The signature open space at the Airpark is Heritage Park, which celebrates the long history of England Air Force Base and its famous military unit, the "Flying Tigers" of the 23rd Fighter Wing.

The FAA approved *1993 England Air Force Base Reuse Plan* established the initial vision for redevelopment of the base. Overall, the Reuse Plan recommended the long-range development of a regional transportation and industrial park facility that accommodates commercial, general and military aviation. The plan included aviation, aviation-related and non-aviation commercial, industrial and public tenants that can sustain the community with jobs and income.

The Future Land Use Plan developed as part of this reuse process identifies an airport operating area that includes major airside facilities. Adjacent to and to the east of airside facilities are aviation-related commercial and industrial uses. The plan designates land west of the runways as a future expansion area. The core of the Airpark includes institutional uses, surrounded by light industrial, office space, transportation and warehousing. The eastern sites of the Airpark would transition from dilapidated dormitories to light industrial and office uses. Military operations would continue in the northern portion of the Airpark.

The Airpark still maintains a military link, functioning as an Intermediate Staging Base for the Joint Readiness Training Center at nearby Fort Polk. In conjunction with its $1.6 million commercial lease and in support of the critical deployment and power projection capabilities of Fort Polk, the Army constructed two major facilities at England Airpark: the Fixed Wing Aircraft Parking and Hazardous Cargo Loading Aprons and the Arrival/Departure Passenger Processing Facility for military personnel.
In addition to ongoing aviation activities, the Airpark hosts about 50 industrial tenants, including Union Tank Car, one of the nation's leading rail car manufacturers; Integrated Packaging Corporation, the nation's largest minority-owned manufacturer of corrugated cardboard packaging; and Delta Beverage, the regional distributor for PepsiAmericas.

England Airpark's institutional anchors include the American Red Cross; the LSU Health Sciences Center, Huey P. Long Hospital, Outpatient Center; the St. Rita Catholic Daycare Center; the National Guard; and the Justice Prisoner and Alien Transportation System (JPATS)

operated by the United States Marshals Service. The Learning Center for Rapides Parish represents a major educational and workforce training asset for England Airpark.

The Airpark currently has 21 vacant buildings available for lease. Many of these buildings are in small to medium sized configurations and are designed for industrial or office purposes. It is important to note that the airport is a self funding facility generating all of its operating and a significant portion of its capital improvement funding through building and land leases, thus supporting the sustainability of the existing Airpark Campus. As noted in the *Existing Conditions Inventory (***Chapter 2***)*, some current uses are likely to remain in the foreseeable future due to revenue generating potential, long-term lease agreements, or historic character.

These ongoing uses and the existing grid of streets form the framework for continued growth on the site. As described more fully below, the overall design of the Town Core promotes an infill development approach in which proposed buildings fill critical gaps along corridors or on strategic parcels to create a more consistent and complete development environment. The design also sites new buildings to maximize use of the existing street network, parking, and recreational and open space amenities.

Along with a framework of existing land uses and physical and natural systems, the Airpark has a series of design elements on which to build, including a landscape master plan and a signage and brand identity plan. The Patterns for Development section incorporates these place-making precedents.

On-site Facilities

Within its built-out core, the Airpark has the grid of connected streets and linear green spaces to support pedestrian-scale traditional town and neighborhood development. The intent of the development concepts is to use the existing road structure where possible and to propose road closures or additions as necessary to improve circulation and connectivity.

Overall, the intensity of current Airpark development in the Town Core is relatively low, thus permitting existing utility infrastructure, including electrical (Cleco Corporation), telephone (Bell South), cable (Suddenlink Communication) and water, sewer, and natural gas service (City of Alexandria) to absorb the increased demand associated with additional development.

Circulation

As noted earlier, the Airpark has a strong internal street grid at the core of the site. However, additional vehicular and pedestrian activity generated by new development will increase volumes at major intersections, such as Vandenburg/England and Frank Andrews/Chappie James. To improve intersection capacity and safety, as well as visually enhance strategic gateways, it is recommended that two single-lane, landscaped roundabouts of approximately 130 feet in diameter be developed at Vandenburg/England and Frank Andrews/Chappie James in support of a future Town Core design effort.

The Airpark has two additional vehicular gateways that act as external focal points: the Air Base Road/England Road or "front gate" intersection to the north; and the "backgate" at the intersection of Vandenburg Road and Bayou Rapides Parish Road. Unsightly conditions west of Air Base Road detract from the northern entry experience and pose a major aesthetic challenge to the Airpark. Enhanced design for the Air Base Road/England Road intersection, including landscaping, lighting, paving and signage is recommended.

Access from the south along Vandenburg Road is less of an aesthetic issue, but the lack of convenient north-south routes in the area funnels considerable traffic to this corridor. Increased vehicular volumes along Vandenburg Road warrant traffic calming techniques, such as the proposed roundabout at the England Road/Vandenburg intersection, and corridor treatments along Vandenburg to buffer adjacent residential uses from traffic impacts and to create a cohesive physical identity along the roadway. The south gateway should also feature enhanced landscaping, lighting, paving and signage components.

The Development Programming section below describes specific road closures and improvements associated with the development concepts.

Development Restrictions

Many of the Airpark's major land uses are likely to remain in the foreseeable future due to revenue generating potential, long-term lease agreements, limitations on the transfer or disposition of property or historic character.

Within the Airpark, several current land uses constrain development opportunities, including the fuel tank farm site in the central portion of the Town Core. The site poses a safety hazard, security risk and an aesthetic shortcoming affecting nearby sites and the airside recommendations propose its relocation to an area near the south aviation apron.

Other physical constraints include areas exposed to risk or nuisance from adjacent aviation and military operations, including the no-build blast zones that surround "hot pads" used for ordinance transfer, runway protection zones for commercial aircraft, Air Installation Compatible Use Zones associated with military aircraft, noise zones, and the no-build zone around Federal Aviation Administration (FAA) radar facility in the southern portion of the Airpark. Where feasible, the Strategic Land Use Framework presented in Chapter 5, Airpark Alternatives, should address the relocation of facilities, such as the FAA radar, to permit more intense development or identifies land use patterns that are a compatible fit with adjacent aviation and military activities.

Though not a constraint, the adjacency of sporadic industrial operations to existing or future residential and commercial activities creates another major visual challenge for the Airpark. The design concepts described below and the Patterns for Development section highlight site planning and design techniques to minimize unsightly views and better blend industrial facades with other buildings.

Adjacent Properties

Land to the north of the Airpark between the Authority boundary and LA Highway 1 consists of a primarily rural mix of encumbered lands, private property, and institutional uses, such as St. Mary's Training School. Land along Air Base Road on the eastern boundary is in small lot private residential use. As noted earlier, conditions in this area detract from the physical character of the Airpark's northern entry. Bayou Rapides and its vegetative buffer effectively separate the residential uses and golf course from primarily rural adjacent lands. Land to the south of the Airpark along LA Highway 496 is also mostly in large lot private ownership with an institutional presence from the State of Louisiana and the City of Alexandria Sports Complex. Farther south LA Highway 28 continues to evolve toward a denser pattern of residential subdivisions and supporting commercial activities. Uses such as the Wal-Mart Super Center and the upscale Lakes District subdivision are solidifying this highway as a major mixed use corridor. The eventual extension of Versailles Boulevard through the Lakes District should accelerate this growth. Land on the Airpark's west boundary along Jimmy Brown Road is in much less of a state of flux. Property is predominantly in large lot holdings with agricultural uses.

Relatively few land use controls affect the private lands surrounding England Airpark. The Rapides Parish Police Jury, the parish legislative body, has, however, adopted the Airbase Landing District Ordinance regulating land uses near airside operations. It is recommended that future uses on privately-owned property that would complement landside development opportunities, reduce visual conflicts, protect future aviation operations, and minimize exposure to aviation-related hazards be addressed in the Strategic Land Use Framework presented in **Chapter 6** of this report.

Development Programming

The Development Programming section includes more specific information on site improvements, including supporting transportation and parking, building preservation and removal, and proposed development quantities.

The development programming information focuses on the four strategic areas of the Airpark identified for more detailed site planning:

- The England Estates neighborhood in the southern portion of the Airpark along Vandenburg Drive;
- The Town Core that extends along Frank Andrews Boulevard between the Alexandria International Airport commercial terminal and the intersection of England Drive and Airbase Road; and
- The Westside Business/Industrial Campus east of Jimmy Brown Road and north of Bayou Rapides Road.
- The Educational campus northeast of the passenger terminal area.

England Estates

The residential programming component for England Estates includes:

- 113 single family lots (50'-65' Width x 100'-180' Length; Min..13 AC, Max. .3 AC)
- 73 townhouses; and
- Three two-story apartment buildings with a total of 150 units

Though the concept retains the existing roadway structure, the following street re-configurations and improvements, along with pedestrian amenities are required to support proposed residential redevelopment:

- the introduction of a limited access lane with an auto barrier and vegetative buffer parallel to Vandenburg between Royce Drive and Schilling Drive;
- two new streets lining the linear park between Royce Drive and Schilling Drive;
- Eleven (11) alleyways (16' Width) to create rear vehicular access to single family lots and townhouses;
- Four (4) access driveways and associated parking for three multi-family buildings;
- Single-sided sidewalks (Min of 5' Width) along the lane parallel to Vandenburg; and
- Double-sided sidewalks (Min of 5' Width) along the four existing streets and two park lining streets.

Additional recreational amenities for the concept include three linear green space parcels and approximately one acre for an unprogrammed community gathering space.

Town Core

Given the size and complexity of the Town Core concept, the analysis of the site began by organizing the existing land uses, streets and parking into a series of 14 parcels. The Development Programming Summary (**Table 4-15**) identifies parcel numbers that correspond with Town Core design concept presented in Chapter 5. The table displays information on existing building size, proposed building footprint size, proposed building height, existing and proposed parking, and proposed green space amenities.

The Town Core contains a total of 61 existing major structures (See **Exhibit 4-3**, *Existing Buildings*). Based on an analysis of building condition and functional obsolescence, as well as strategic long-term redevelopment potential, the planning team recommended a total of 34 structures for removal (See **Exhibit 4-4**, *Buildings to Be Removed*).

The remaining structures and associated parking (See **Exhibit 4-5**, *Buildings and Parking to Remain*) form the physical framework for the infill development that guides the Town Core concept.

As shown in **Table 4-15**, the concept retains a total of 394,106 square feet of existing building space and proposes an additional 1,534,300 square feet of new building space for a total

inventory of 1,928,406 square feet. The site also includes a total of 1,795,530 square feet of supporting surface parking.

As redeveloped, the Town Core would have the following new programming elements:

- an additional 204 apartments units at an average size of 1,200 square feet;
- 177,700 square feet of office space;
- 140,800 square feet of educational space;
- 79,850 square feet of retail/commercial space;
- 98,000 square feet of residential space;
- 50,400 square feet of mixed use space (ground floor retail and upper story residential); and
- 527,300 square feet of industrial/warehousing space

The concept also includes 518,019 square feet or 11.9 acres of additional green space.

ENGLAND
INDUSTRIAL AIRPARK & COMMUNITY

Alexandria International Airport
MASTER PLAN UPDATE 2009

EXHIBIT 4-3
EXISTING BUILDINGS

0 100 200 400

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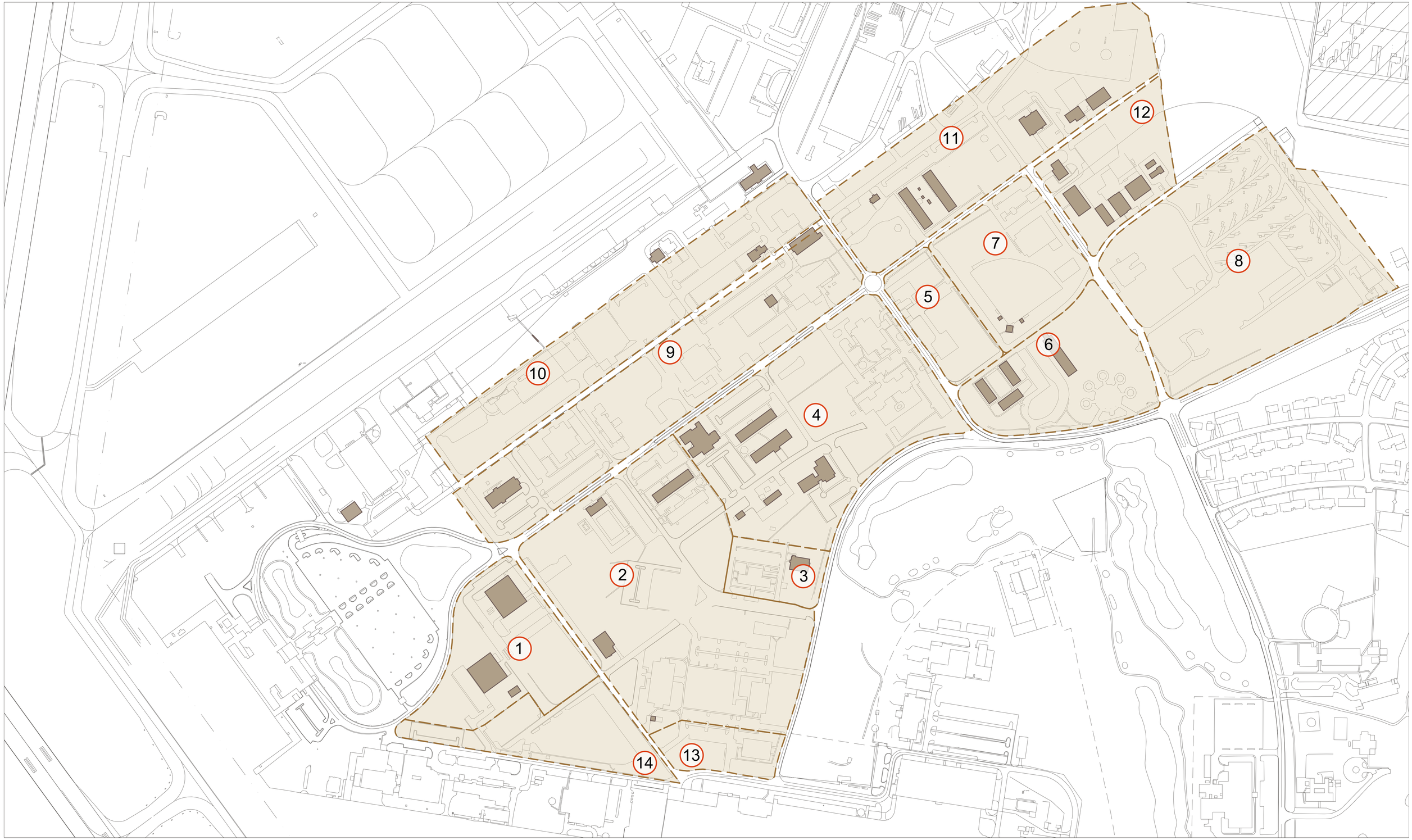

ENGLAND
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Alexandria International Airport
MASTER PLAN UPDATE 2009

EXHIBIT 4-4
BUILDINGS TO BE REMOVED

0 100 200 400

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Parcels	Area (acres)	BLDG	Area (sqft)
1	8.8	A	20,100
		B	16,595
2	25.2	A	25,190
		B	40,006
		C	24,140
		D	8,121
3	2.8	A	16,320
4	19.9	A	11,484
		B	16,000
		C	38,000
5	3.9		
6	9.3		
7	9.1	A	Baseball
		B	23,294
8	22.6	A	7,746
		B	5,600
9	16.9	A	17,077
		B	7,418
		C	17,602
		D	21,647
10	14.7	A	7,800
		B	34,326
		C	6,645
11	17.4		
12	4.2	A	7,200
		B	No Bldg.
		C	6,020
13	2.8	A	10,500
14	6.2		
Mil		A	41,087
		B	10,500
		C	1,426
		D	4,800
		E	3,434,176
		F	5,472
		G	3,731
		H	10,152

ENGLAND
INDUSTRIAL AIRPARK & COMMUNITY

Alexandria International Airport
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EXHIBIT 4-5
BUILDINGS AND PARKING TO REMAIN

0 100 200 400

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TABLE 4-15
DEVELOPMENT PROGRAMMING SUMMARY

Parcel No.	Bldg No.	Existing Total Bldg. (SF)	Existing Parking Area (SF) to remain	Proposed Bldg. Footprint (SF)	Proposed Bldg. # of Stories	Proposed Total Bldg. (SF)	Proposed Parking Area (SF)	Proposed Greenspace (SF)	Proposed Greenspace (acres)	Land Use	Remarks
1	A (606)	20,100								Industrial	Building to remain in short to mid-term
	B (610)	16,595								Office	Building to remain in short to mid-term
				35,000	3	105,000				Office, Future	Signature office building opportunity
							85,000			Parking	
	Subtotal	**36,695**	**0**	**35,000**	**3**	**105,000**	**85,000**		**0.0**		
2	A (1103)	25,190								Education	Building to remain
	B (1901)	40,006								Residential	Building to remain
	C (1912)	24,140								Education	Building to remain
	D (1910)	8,121								Utility / Office	Building to remain
			53,486							Parking	
			23,352							Parking	23,352sf parking assumes +/- 50% shared with Parcel 13
				30,000	2	60,000				Education	
				35,500	2	71,000				Education	
				27,500	2	55,000				Education	
				33,800	2	67,600				Education	
				14,000	2	28,000				Education	
							45,800			Parking	
							34,000			Parking	
								98,650	2.3	Greenspace	Campus quad
								12,800	0.3	Buffer	
	Subtotal	**97,457**	**76,838**	**140,800**	**10**	**281,600**	**79,800**	**111,450**	**2.6**		
3	A (1803)	16,320		0		0				Office	No new facilities proposed
			28,587							Parking	
										Buffer	Quantity included in Parcel 4 data
	Subtotal	**16,320**	**28,587**	**0**	**0**	**0**	**0**		**0.0**		
4	A (1801)	11,484								Institutional	Building to remain in short to mid-term

TABLE 4-15
DEVELOPMENT PROGRAMMING SUMMARY

Parcel No.	Bldg No.	Existing Total Bldg. (SF)	Existing Parking Area (SF) to remain	Proposed Bldg. Footprint (SF)	Proposed Bldg. # of Stories	Proposed Total Bldg. (SF)	Proposed Parking Area (SF)	Proposed Greenspace (SF)	Proposed Greenspace (acres)	Land Use	Remarks
	B (1150)	16,000								Commercial	Building to remain
	C (Hotel)	38,000								Commercial	Building to remain
			43,845							Parking	
			44,289							Parking	
			8,996							Parking	
				22,800	2	45,600				Commercial	
				12,000	1	12,000				Commercial	
				12,000	1	12,000				Commercial	
				21,000	2	42,000				Commercial	
				25,000	2	50,000				Office, Future	Church site
				25,000	2	50,000				Office / High-Tech	
				6,800	1	6,800				Office	
							33,400			Parking	
							33,400			Parking	
							13,000			Parking	
							37,500			Parking	
								132,904	3.1	Greenspace	Linear Park. 132,904sf includes greenspace shared with Parcel 3
	Subtotal	**65,484**	**97,130**	**124,600**	**11**	**218,400**	**117,300**	**132,904**	**3.1**		
5							71,600			Parking	Parking to support hospitality, restaurant, and recreation
								9,750	0.2	Buffer	
								6,400	0.1	Buffer	
								22,120	0.5	Buffer	
	Subtotal	**0**	**0**	**0**	**0**	**0**	**71,600**	**38,270**	**0.9**		
6											Open space with amphitheater, gathering space with focal element & splash pad
						2,250				Recreation	Amphitheater stage
								20,635	0.5	Buffer	
	Subtotal	**0**	**0**	**0**	**0**	**2,250**	**0**	**20,635**	**0.5**		

TABLE 4-15
DEVELOPMENT PROGRAMMING SUMMARY

Parcel No.	Bldg No.	Existing Total Bldg. (SF)	Existing Parking Area (SF) to remain	Proposed Bldg. Footprint (SF)	Proposed Bldg. # of Stories	Proposed Total Bldg. (SF)	Proposed Parking Area (SF)	Proposed Greenspace (SF)	Proposed Greenspace (acres)	Land Use	Remarks
7	A	Baseball								Recreation	Baseball field to remain
	B (1408)	23,294								Recreation	Building to remain
			36,341							Parking	
						5,000				Recreation	Support services for recreation (concessions, restrooms)
								14,400	0.3	Recreation	Tennis courts
								28,672	0.7	Buffer	
	Subtotal	**23,294**	**36,341**	**0**	**0**	**5,000**	**0**	**43,072**	**1.0**		
8	A (1500)	13,021								Office	Building to remain
	B (1518)	5,600								Institutional	Building to remain
				14,000	2	28,000				Residential	2-story residential over 1-story parking. Total 24 apartments at average 1200sf. Parking at 2 per unit
				45,400	2	90,800				Residential	2-story residential over 1-story parking. Total 75 apartments at average 1200sf. Parking at 2 per unit
				38,600	2	77,200				Residential	2-story residential over 1-story parking. Total 64 apartments at average 1200sf. Parking at 2 per unit
				20,800	2	41,600				Mixed Use	1-story residential over 1-story retail. Total 17 apartments at average 1200sf. Parking at 2 per unit
				14,800	2	29,600				Mixed Use	1-story residential over 1-story retail. Total 12 apartments at average 1200sf. Parking at 2 per unit
				14,800	2	29,600				Mixed Use	1-story residential over 1-story retail. Total 12 apartments at average 1200sf. Parking at 2 per unit
				12,050	1	12,050				Commercial	
							11,725			Parking	
							12,000			Parking	
							202,135			Parking	Parking and circulation for residential & retail
								100,593	2.3	Greenspace	Residential/retail quad
								64,595	1.5	Buffer	
	Subtotal	**18,621**	**0**	**160,450**	**13**	**308,850**	**225,860**	**165,188**	**3.8**		

TABLE 4-15
DEVELOPMENT PROGRAMMING SUMMARY

Parcel No.	Bldg No.	Existing Total Bldg. (SF)	Existing Parking Area (SF) to remain	Proposed Bldg. Footprint (SF)	Proposed Bldg. # of Stories	Proposed Total Bldg. (SF)	Proposed Parking Area (SF)	Proposed Greenspace (SF)	Proposed Greenspace (acres)	Land Use	Remarks
9	A (904)	17,077								Club	Building to remain
	B (1205)	7,418								Office	Building to remain
	C (1203)	17,602								Industrial	Building to remain; improve façade fronting Frank Andrews Blvd
	D (1211)	21,647								Recreation	Building to remain
			56,418							Parking	
			45,566							Parking	
				50,300	1	50,300				Office	Class A office opportunity
				17,800	1	17,800				Office	Class B office opportunity
				18,900	1	18,900				Industrial	Showroom / Distribution
				18,900	1	18,900				Industrial	Showroom / Distribution
				17,800	1	17,800				Office	Class B office opportunity
							42,000			Parking	
							11,500			Parking	
							14,000			Parking	
								6,500	0.1	Greenspace	Class A office courtyard
	Subtotal	**63,744**	**101,984**	**123,700**	**5**	**123,700**	**67,500**	**6,500**	**0.1**		
10	A (524)	7,800								Institutional	Building to remain
	B (806)	34,326								Industrial	Building to remain
	C (1213)	6,645								Industrial	Building to remain
			56,238							Parking	
			117,701							Parking	
				39,500	1	39,500				Industrial	
				25,000	1	25,000				Industrial	
							34,800			Parking	
							18,000			Parking	
	Subtotal	**48,771**	**173,939**	**64,500**	**2**	**64,500**	**52,800**	**0**	**0.0**		
11				80,000	1	80,000				Industrial	Warehouse
				80,000	1	80,000				Industrial	Warehouse

TABLE 4-15
DEVELOPMENT PROGRAMMING SUMMARY

Parcel No.	Bldg No.	Existing Total Bldg. (SF)	Existing Parking Area (SF) to remain	Proposed Bldg. Footprint (SF)	Proposed Bldg. # of Stories	Proposed Total Bldg. (SF)	Proposed Parking Area (SF)	Proposed Greenspace (SF)	Proposed Greenspace (acres)	Land Use	Remarks
				80,000	1	80,000				Industrial	Warehouse
				80,000	1	80,000				Industrial	Warehouse
							336,238			Parking	Service yard for warehouses
	Subtotal	**0**	**0**	**320,000**	**4**	**320,000**	**336,238**	**0**	**0.0**		
12	A (1442)	7,200								Educational	Building to remain in short to mid-term
	B	No Bldg.								n/a	Building to remain in short to mid-term
	C (1434)	6,020								Commercial	Building to remain in short to mid-term
				56,000	1	56,000				Industrial	Warehouse
				14,000	1	14,000				Industrial	
				35,000	1	35,000				Industrial, Future	
							72,000			Parking	
	Subtotal	**13,220**	**0**	**105,000**	**3**	**105,000**	**72,000**	**0**	**0.0**		
13	A (1905)	10,500									Buildings to remain
			22,647								22,647sf parking assumes +/- 50% shared with Parcel 2
	Subtotal	**10,500**	**22,647**	**0**	**0**	**0**	**0**	**0**	**0.0**		
14			93,777							Parking	Parking to support campus
			34,477							Parking	Parking for aviation support uses
			21,712							Parking	Parking for aviation support uses
	Subtotal	**0**	**149,966**	**0**	**0**	**0**	**0**		**0.0**		
Summary											
	Totals	**394,106**	**687,432**	**1,074,050**		**1,534,300**	**1,108,098**	**518,019**	**11.9**		

Source: EDAW, Inc.

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As with the England Estates concept, the Town Core redevelopment seeks to reuse as much of the existing roadway as possible. The following street re-configurations and improvements, along with pedestrian amenities, however, are required to support proposed development:

- closure of the east-west road (Miller Avenue) bisecting Heritage Park (Parcels 5 and 7);
- closure of six (6) interior streets within the proposed Market Square (Parcel 8);
- closure of northern half of easternmost street within proposed Market Square (Parcel 8)
- closure of Vandenburg Drive north of Frank Andrews Blvd (Parcel 11);
- closure of easternmost segment of street north and parallel to Frank Andrews Blvd, north of proposed warehouse development (Parcel 11);
- introduction of five (5) access driveways to proposed Market Square (Parcel 8);
- extension of street (Kegleman Blvd) north and parallel to Frank Andrews Blvd, bisecting existing parking lot adjacent to existing Recreation Center building (Parcels 9 and 10); and
- introduction of truck access off of Air Base Road, connecting to Industrial area near Union Tank Car facility and eastern end of Frank Andrews Blvd (Parcels 11 and 12).

Table 4-16, Site Improvement Summary, displays additional information on proposed street, trails, and pedestrian connections.

TABLE 4-16
SITE IMPROVEMENT SUMMARY

Linear Feet	Miles	Improvement	Notes
2,015	0.4	Proposed Primary Roads	Primary vehicular access
333	0.1	Proposed Roads	Secondary vehicular access
2,840	0.5	Proposed Truck Routes	Heavy Truck Access
11,500	2.2	Pedestrian Circulation	Sidewalks, promenades throughout Airpark
5,220	1.0	Trails	Dedicated pedestrian recreation trails

Source: EDAW, Inc.

Westside Business/Industrial Campus

The proposed industrial/business campus consists of 822 acres organized into approximately 31 25-acre parcels. The campus has three separate vehicular access points and an internal system of circulation to serve parcels (See **Exhibit 4-6**, Westside Industrial Park). As described previously in the Strategic Land Use Framework, full development of this area into a contiguous and readily accessible industrial complex requires the acquisition of three in-parcels of land and the improvement and extension of a distribution and heavy truck corridor along Jimmy Brown Road from Highway 1 to Bayou Rapides Road.

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NOTES:
- 822 Acre Industrial Park
- 31 Parcels
- Approximate Parcel Size = 25 Acres

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Alexandria International Airport
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EXHIBIT 4-6
WESTSIDE BUSINESS/INDUSTRIAL CAMPUS

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4.3.3 Airside Facility Requirements

Using the results of both the demand capacity analysis and aviation activity forecasts combined with FAA airfield planning criteria, economic trends and the Authority's vision, airfield facility requirements for the key planning years (2007, 2012, 2017, 2022 and 2027) were identified. These requirements were then compared to existing facilities in order to determine if a surplus or deficiency exists within the short, intermediate or long-term planning ranges. Airfield facility needs evaluated, but not limited to, included:

- Runways, taxiways/taxilanes, and aprons (length, width, size and\or strength),
- Airfield lighting and marking,
- Airfield energy efficiency,
- Aircraft parking aprons (size & strength),
- Enhanced navigational aids (electronic and visual), and
- Security Requirements

Aviation forecasts were used as a basis for the analysis of the airfield facility needs. However, due to the volatile nature of operations especially over the long-term, facility needs were also evaluated based upon current and anticipated trends in conjunction with the overall strategic vision of the Airpark.

Runway Design Requirements

Runways and taxiways typically represent the largest portion of the airfield property, and are the driver for airfield development. AEX is equipped with two runway pavement strips designated as Runways 14-32 and 18-36. Runway 14-32 is the primary runway and has a runway length and width of 9,352 feet x 150 feet. Runways 14 and 32 are each equipped with an additional 1,000 feet of pavement beyond each threshold of which 400 feet of pavement is designated as a blast pad and the remaining 600 feet, which is unmarked, according to the FAA approved *1998 Master Plan* was identified as an overrun. Runway 18-36 is designated as an additional primary runway based upon **FAA AC 150/5325-4B**, *Runway Length Analysis*, and is 7,001 feet x 150 feet wide. Runway 18-36 is also equipped with marked blast pads of approximately 400 feet x 200 feet and 400 feet x 150 feet, respectively.

Runway shoulders provide resistance to blast erosion and are also used to accommodate the passage of maintenance and emergency equipment. Paved shoulders are recommended for runways that accommodate Airport Design Group (ADG) III and higher aircraft,[5] thus applicable to both runways at AEX. For ARC D-IV runways such as Runway 18-36, the runway shoulder width requirement is 25 feet, and for ARC D-V runways such as Runway 14-32, the runway shoulder width requirement is 35 feet. Since neither runway provides paved shoulders for its entire length, any project to rehabilitate or extend the runways should include compliance with the applicable runway shoulder criteria.

[5] FAA AC 150/5300-13, Chapter 8, Paragraph 803.

A key element in defining facility needs, specifically runway length and width requirements, is establishing development guidelines that are directly associated with the size and type of aircraft activity that the airport currently and is expected to serve during the planning period. According to the *Airport Improvement Program Handbook*, **Order 5100.38C** – June 28, 2005, Pages 56-57, **FAA Order 5090.3C**, *Field Formulation of NPIAS*, and **FAA AC 150/5325-4B**, *Runway Length Requirements for Airport Design*, more than one critical aircraft (most demanding) may control the design of any specific airport's different facility features, such as runway length, strength of paved areas, or lateral separations in airfield layout. For instance, pavement strength and layout are frequently dependent upon different aircraft. Airport dimensional standards (such as runway length, width, separation standards, surface gradients, etc.) should be selected which are appropriate for the critical aircraft that will make substantial use of the airport during the planning period. Substantial use means either 500 or more itinerant operations or scheduled service. The critical aircraft may be a single aircraft or a composite of the most demanding characteristics of several aircraft. The critical aircraft (or composite aircraft) is used to identify the appropriate ARC for airport design criteria as contained in **AC 150/5300-13**, *Airport Design*.

Runway length needs at AEX were addressed in previous studies including the FAA approved *1998 Airport Master Plan* and FAA approved *1993 Base Reuse Plan*. Runway length needs are driven by existing and projected commercial and charter passenger, military and cargo demand in addition to disaster relief requirements. As a result, Congress has appropriated $750 thousand for the extension of Runway 14-32 to 12,000 feet.

According to FAA Guidance as denoted in **AC 150/5325-4B**, *Runway Length Requirements for Airport Design*, the "design objective for the main primary runway is to provide a runway length for all airplanes that will regularly use it <u>without</u> causing operational weight restrictions"[6]. In the case of an airport with two primary runways, the operational objectives are to:

1. "better manage the existing traffic volume;
2. accommodate forecast growth, and
3. mitigate noise impacts associated with the existing primary runway".

In these cases, the additional primary runway should be designed to the same length and design standards as the primary runway. If, however, the additional primary runway cannot be designed to the same standards as the primary runway then it should be designed to accommodate the runway length of the most demanding aircraft regularly using it without causing operational weight restrictions.

As stated earlier, the overall trend worldwide is a shift to larger commercial aircraft to accommodate greater economies of scale. Since the extension of the primary runway has already been approved by the FAA, existing and forecast critical aircraft were identified, and operational requirements, based upon **FAA Advisory Circulars 150/5300-13** and **150/5325-4B**, determined. Fleet mix demands over the twenty-year planning period were identified based upon the airport's

[6] Section 103, Primary Runways, **FAA Advisory Circular 150/5325-4B**, *Runway Length Requirements for Airport Design*, July 1, 2005, page 3.

role in Gulf Coast disaster relief, the fact that air carriers are transitioning to larger, more fuel efficient and longer range aircraft, the England Authority's long-term vision, as well as the overall economic trend toward globalization. Utilizing fleet mix demands for the next five and twenty-year periods, facility requirements, including runway length requirements, were determined utilizing standard FAA design criteria.

Primary Runway

Runway 14-32 is designated as the primary runway, and is currently equipped with a Category I precision approach on Runway 14 and non-precision approach to Runway 32. AEX is also home to a precision approach radar system, which is the only one of its kind within the region. Flight training operations associated with the PAR approach at AEX according to the 259th ATC is expected to equal approximately 400-600 operations per month. The increased training operations, especially related to military training, is primarily the result of its requirement as part of the flight training syllabus. The 1998 approved Master Plan and Airport Layout Plan shows an extension of Runway 14-32 to 12,000 feet to accommodate the critical aircraft at the time, a Boeing 747-200.

In reviewing commercial passenger, charter and air cargo operations at AEX, carriers have been shifting to newer and larger aircraft to accommodate increasing passenger loads while offering point to point service to long-range domestic and foreign hubs. Among air carrier and regional operators, the trend to shift from Embraer 135/145 and CRJ-200 aircraft (40 seat configurations) to Embraer 170 and CRJ-700 aircraft (70+ seat configurations) has been ongoing. As noted, several operators at AEX, including Delta, Atlantic Southeast, American Eagle, etc. already have orders for the CRJ-700, which are expected to be incorporated into the national fleet as early as 2008/2009. Charter operators such as Ryan Air International and Miami Air International have been upgrading their fleet from the older B737-200/300 models to B737-600/700 and 800 models. There has also been a shift, especially with regard to wide-body aircraft, from the older DC-10s, B747-200s and B767s to the B747-400, Airbus 330 and 340 models. In reviewing, historic and recent aircraft operations at AEX from 2000 through 2008, a marked shift in aircraft has occurred from the older Boeing and McDonnell Douglas models to the newer Boeing 737-600-800, B747-400 and Airbus 330-300 and 340-200/300 aircraft. Further, aircraft manufacturer forecasts and industry data illustrates that this trend is likely to continue through the foreseeable future.

Further, in reviewing historic origin and destination airfields associated with charter aircraft operations, the number of origin and destination airfields at a distance of 1,000 nautical miles or greater has more than tripled from the year 2000. In addition, operations to over eight domestic and international airfields with distances ranging from 1,670 to 6,655 nautical miles have also increased. Origin and destination airports based upon 2007 FAA Form 41 data, historic airport data, as well as current military operations are provided in **Table 4-17**.

TABLE 4-17 2007 ORIGIN AND DESTINATION AIRFIELDS						
Airfield, City and State	**Distance from AEX (in nautical miles)**					
	>500	**500 to 1000**	**1000 to 1500**	**1500 to 2000**	**> 2000**	**International (>3000)**
SHV, Shreveport, LA	94					
MEM, Memphis, TN	257					
LIT, Little Rock AR	204					
AUS, Austin, TX	273					
MSY, New Orleans, LA	143					
ATL, Atlanta, GA	435					
HRL, Harlingen TX	407					
LRD, Laredo TX	427					
SAT, San Antonio TX	325					
CSG, Columbus GA	395					
DFW, Dallas Ft Worth, TX	247					
OKC, Oklahoma City OK	352					
STL, St. Louis MO	457					
CLE, Cleveland OH		795				
IAD, Dulles International, VA		870				
DQF, Williams Gateway, Phoenix AZ		995				
MSP, Minneapolis St. Paul MN		813				
ABQ, Albuquerque, NM		741				
RAP, Rapid City SD		910				
YNG, Youngstown OH		826				
MSP, Minneapolis St. Paul MN		813				
ORD, Chicago O'Hare IL		676				
ELP, El Paso TX		709				
RFD, Rockford IL		672				
BUF, Buffalo NY		959				
TUS, Tucson AZ		941				
POB, Pope AFB Fayetteville NC		718				
OMA, Omaha NE		619				
IND, Indianapolis IN		588				
GYY, Gary/Chicago IL		664				
MDT, Harrisburg PA		934				
TOL, Toledo OH		745				
PIT, Pittsburgh PA		812				
MIA, Miami FL		727				
CLT, Charlotte NC		628				
BGR, Bangor ME			1,376			
BOS, Boston, MA			1,225			
PSM, Portsmouth NH			1,251			
SWF, Stewart Newburgh NY			1,078			
JFK, New York NY			1,067			
MIB, Minot AFB ND			1,101			
OAK, Oakland CA			1,513			
EWR, Newark NJ			1,053			

TABLE 4-17 2007 ORIGIN AND DESTINATION AIRFIELDS						
Airfield, City and State	**Distance from AEX (in nautical miles)**					
	>500	**500 to 1000**	**1000 to 1500**	**1500 to 2000**	**> 2000**	**International (>3000)**
NZY, North Island NAS San Diego CA			1,258			
DQK, Fort Drum NY			1,090			
BDL, Windsor Locks CT			1,146			
DQF, Phoenix AZ			1,000			
STT, Charlotte USVI				1,687		
SJU San Juan PR				1,634		
TCM, MaChord AFB Tacoma WA				1,670		
SEA, Seattle WA				1,672		
TCM, Tacoma WA				1,672		
PAED, Elmendorf AFB, AK					3,526	
HIK, Hickam AB HI					2,845	
RMS, Ramstein Germany						4,376
ICN, Seoul Korea						6,146
DNA, Kadena AB Japan						6,655

Sources: FAA Form 41 Data, 2007, Historic Air Charter records, JRTC operational bases, and the LPA Group Incorporated, 2008

Thus, based upon existing and forecast operations and fleet mix, the critical aircraft for Runway 14-32 will remain an ARC D-V, which consists of a combination of the B747-400, A330 and A340 families of aircraft. However, the B747-400 is designated as the critical aircraft for Runway 14-32 since it is anticipated to break the substantive use threshold of 500 annual operations within the next five years.

Although the B747-400 was determined to be the most demanding aircraft based upon FAA use requirements, it should be noted that charters, like regional jets operators, should be provided the flexibility to interchange similar aircraft models with like performance characteristics and operating weights according to demand and need. Based upon history and discussions with users and operators, the aircraft useful load for passenger charter operations is expected to remain around 95 percent[7]. Further, longer range domestic and international operations are also anticipated to increase as a result of military training and deployment requirements.

Although FAA has already approved and Congress allocated funding to the extension of Runway 14-32 to 12,000 feet, it was necessary to determine the future aircraft's critical runway length requirements in the absence of significant weight restrictions, especially in light of AEX's role as a disaster relief staging center, based upon FAA runway length prerequisites. Using the guidance outlined in Chapter 4, *Runway Lengths for Regional Jets and Those Airplanes with Maximum Certificated Takeoff Weight of more than 60,000 Pounds (27,200 KG)* of **AC**

[7] The passenger load factor for Air Charter operations will remain 100% throughout the planning period. However, useful load refers to the entire load (i.e. passengers, fuel and cargo). Based upon the average haul lengths, it is anticipated that aircraft will regularly operate at Maximum Takeoff Weight (MTOW). However, as noted in **Appendix B**, *Runway Length Justification*, at MTOW, the B747-400 will require a takeoff length of 12,778 feet based upon FAA runway length determination criterion.

150/5325-4B, it was necessary to determine both the most demanding takeoff and landing runway length requirements and then apply any runway length adjustments associated with Alexandria International Airport (i.e. temperature, airport pressure, airport elevation, pavement condition, grade changes, etc). Since the B747-400 is anticipated to be the most widely used and demanding aircraft over the planning period, this aircraft was used to determine both the critical runway takeoff and landing length requirements based upon the current 95 percent useful load. Applying FAA runway length guidance, manufacturer FAR Takeoff and Landing Length requirements, and adjusting for temperature, maximum difference in runway centerline elevations, airport elevation, wet pavement, etc., a runway length of 11,816 feet is required, which would be rounded to 12,000 feet since it is exceeds the 300-foot threshold required in the AC. Thus, the already approved and funded[8] runway extension to 12,000 feet is warranted in support of the future critical aircraft as shown in **Table 4-18**. Aircraft design characteristic information, graphics and calculations based upon **AC 150/5325-4B** are provided in **Appendix B** of this report.

As noted, Runway 14-32 is equipped with a precision approach to Runway 14. Because of its role as a disaster relief staging and command center and as a commercial reliever during IFR conditions[9], it is recommended that the Runway 14 approach, in conjunction with the recommended runway extension, be upgraded to a Category II precision approach (CAT II). This will allow aircraft to operate below ¾ mile visibility, and at lower decision and threshold crossing heights. The installation of a Category II approach will require an upgrade of the current approach lighting to ALSF-2 and the installation of in-pavement centerline approach lighting. Although CAT II procedures require special authorization by FAA, the airport's unique roles as an intermodal staging base, disaster relief staging and command center, weather reliever and commercial intermodal transportation hub support the lower minima requirements.

[8] Congress has already appropriated $750 million for the extension for Runway 14-32 to 12,000 feet.
[9] During review of historic DOT Form 41 data (2000-April 2008) and discussions with 259th ATC, during severe IFR conditions cargo and commercial aircraft enroute to Houston, Dallas, Memphis, etc have been diverted to AEX.

TABLE 4-18 RUNWAY LENGTH REQUIREMENTS B747-400 AT 95 PERCENT MTOW	
Design Condition	**Data**
Airplane	747-400 (PW4056)
Mean daily maximum temperature of hottest month at airport[1]	91.9° Fahrenheit (33.27° C) [1]
Airport Elevation[2]	89 feet above MSL
Maximum design landing weight[3]	574,000 pounds
Maximum design takeoff weight[3]	875,000 pounds
95% design takeoff weight[3]	831,250 pounds
Maximum difference in runway centerline elevations[2]	4.2 feet (Rwy 32 = 88.5 ft; Rwy 14 = 84.3 ft)
FAR Landing Field Length Requirements	
ISO Landing Length Requirements[3] flaps at 30 degrees	6,234 feet
Adjusted Length for Elevation (dry pavement)	6,273 feet
Adjusted Length for wet pavement conditions	7,214 feet
Recommended Landing Length Required[4]	**7,200 feet**
FAR Takeoff Field Length Requirements	
Takeoff Length with 20 degree flap setting @ 92°F[3]	10,171 feet
Adjusted Takeoff Length for Elevation (dry pavement)[4]	10,234 feet
Adjusted Takeoff Length for runway grade change	10,275 feet
Adjusted Takeoff Length for wet pavement	11,816 feet
Recommended Takeoff Length Required	**12,000 feet**

Notes:
[1] Obtained from 10+Years of NOAA Temperature Data (1996-2007)
[2] Obtained from 1998 Airport Layout Plan and Survey Data
[3] Data obtained from B747-400 Airplane Characteristics for Airport Planning
[4] Graphic FAR Takeoff Runway Length Requirements – Standard Day + 33°F
Wet pavement conditions = 1.15 * Dry Pavement requirements.
Sources: Boeing Industries B747-400 Airplane Characteristics for Airport Planning AC (December 2002), National Oceanic and Atmospheric Administration, 2007, FAA AC 150/5325-4B, 1998 Airport Layout Plan, URS Greiner, AirNav.com and The LPA Group Incorporated, 2008

Operators desiring lower than CAT I minimums require OpSpecs authorization for air carrier operations or a Letter of Authorization (LOA) for Part 91 operations. According to FAA Memorandum *Interim Criteria for Precision Approach Obstacle Assessment and Category II/III Instrument Landing System (ILS) Requirements*, December 21, 2007, the lowest authorized minimums allowed by **Order 8260.3**, *U.S. Terminal Instrument Approach Procedures (TERPS)*, are shown in **Table 4-19**. However, higher minimums may be required based upon environmental factors within the airport vicinity or due to other flight standard requirements.

TABLE 4-19 LOWEST PUBLIC CAT II MINIMUMS	
Height above Threshold (HATh) (ft)	**Runway Visibility Range (RVR) (ft)**
101-140 (01-40 adjustment)	1200
141-180 (41-80 adjustment)	1600
181-199 (81-99 adjustment)	1800

Sources: FAA Memorandum *Interim Criteria for Precision Approach Obstacle Assessment and Category II/III Instrument Landing System (ILS) Requirements*, December 21, 2007 and **FAA Order 8260.3**, *US Terminal Instrument Approach Procedures*.

Detailed mandatory facility requirements for individual CAT II instrument landing systems (ILS) and the new Local Area Augmentation System requirements are outlined within the "Approach and Navigational Aid" section of this chapter.

Secondary Primary Runway

According to FAA criteria, if 95% wind coverage cannot be captured by the primary runway alone then a crosswind runway should be constructed. In the case of AEX, 10.5 kts, 13 kts, 16 kts, and 20 kts crosswind components were analyzed. After evaluating AEX's wind data for the past ten years, it was determined that the airport could achieve 95% wind coverage by using either of its two active runways. As a result, Runway 18-36 is designated as an additional primary runway. Typically, according to **AC 150/5325-4B**, *Runway Length Analysis*, the runway length for additional primary runways are dependent upon the runway service type and user:

RUNWAY LENGTH FOR ADDITIONAL PRIMARY RUNWAYS

Runway Service Type, User	Runway Length for Additional Primary Runway Equals
Capacity Justification, Noise Mitigation, Regional Jet Service	100% of the Primary Runway
Separating Airplane Classes – Commuter, Turboprop, General Aviation, Air Taxis, etc.	Recommended runway length for the less demanding airplane design group or individual design airplane.

Source: Table 1-2, Runway Length for Additional Primary Runway, FAA AC 150/5325-4B, 07/01/2005

In reviewing the previous master plan documentation, the critical design aircraft for Runway 18-36 was designated as the DC-10 (ARC D-IV). In reviewing existing and future aircraft fleet usage over the twenty-year planning period, operations associated with the DC-10 aircraft, which went out of production in 1989, have been replaced by the B737 and the A320 models. Further, as discussed within the Demand/Capacity section of this chapter, the use of Runway 18-36 by both corporate general aviation and military operations, specifically the C-130, are forecast to increase in the short-term. According to **AC 15/5325-4B**, Table 1-3, the runway length for an additional primary runway related to non-scheduled runway service[10] should equal 100 percent of the recommended runway length determined for the critical aircraft or family of aircraft that

[10] Non-scheduled runway service refers to revenue flights, including charter flights that are not operated in regular scheduled service, and all non-revenue flights incident to such flights. For Federally funded programs, such as AIP, there must be at least 500 annual itinerant operations and 100% of the class.

will primarily use this runway (i.e. 500 plus annual operations). Currently, the B737-300 model is the critical aircraft for runway length associated with Runway 18-36, which has an ARC of C-III. However, the design requirements for Runway 18-36 will remain a D-IV because of its continued substantive use by C-130, C-17 and GA/corporate aircraft, specifically the Learjet 60 and Gulfstream II, IV and V aircraft.

Applying the runway length requirements associate with the B737-300 aircraft resulted in a runway length with wet pavement of approximately 8,800 feet as shown in **Table 4-20**. Supporting information including calculation adjustments associated with temperature, elevation, wet pavement, etc., FAR/JAR takeoff and landing graphics and tables are provided in **Appendix B** of this report.

TABLE 4-20
RUNWAY LENGTH REQUIREMENTS B737-300
AT MAXIMUM TAKEOFF WEIGHT

Design Condition	Data
Airplane	737-300 (CFM56-3B-2 Engines@ 22,000 lbs)
Mean daily maximum temperature of hottest month at airport[1]	91.9° Fahrenheit (33.27° C) [1]
Airport Elevation[2]	89 feet above MSL
Maximum design landing weight[3]	114,000 lbs[2]
Maximum design takeoff weight[3]	139,500 lbs[2]
Maximum difference in runway centerline elevations[2]	3.3 feet
FAR Landing Field Length Requirements	
ISO Landing Length Requirements at Flaps 40[3]	4,600 feet
Adjusted Length for Elevation (dry pavement)	4,629 feet
Adjusted Length for wet pavement conditions	5,323feet
Recommended Landing Length Required[4]	**5,400feet**
FAR Takeoff Field Length Requirements	
ISO Takeoff Length at 15° Flap[3]	~6,500 feet
Adjusted Takeoff Length for Temperature and Elevation (dry pavement)	7,627 feet
Adjusted Takeoff Length for runway grade change	7,660 feet
Adjusted Takeoff Length for wet pavement	8,808 feet
Recommended Takeoff Length Required	**8,800 feet**

Notes:
[1] Obtained from 10 Years of NOAA Temperature Data (1996-2007)
[2] Obtained from 1998 Airport Layout Plan and Survey Data
[3] Data obtained from B737Airplane Characteristics for Airport Planning, December 2005
Wet pavement conditions = 1.15 * Dry Pavement requirements.
Sources: [1]*National Oceanic and Atmospheric Administration, 1996-2007*
[2]*Boeing 737Design Manual, and airport survey data, 2007*
Boeing Industries, 737-100/200/300/400/500/600/700/800 and 900 Airplane Characteristics for Airport Planning AC (December 2005), National Oceanic and Atmospheric Administration, 2007, FAA AC 150/5325-4B, 1998 Airport Layout Plan, URS Greiner, AirNav.com and The LPA Group Incorporated, 2008

However, B737-300 aircraft are no longer in production and are slowly being phased out for the newer B737-700. In reviewing charter operations from 2002 through August 2008, the number of B737-100/200 and 300 model aircraft have slowly been declining and replaced by the new

737-700/800 and 900 models. It is, therefore, anticipated based upon discussions with existing users of the older model aircraft including Ryan Air, Miami Air International and the U.S. Marshall's service that over the twenty-year planning period operations will continue to shift to the newer Boeing models. As of 2007, the B737-700 model represents approximately 30 percent of current air charter operations. Since it is anticipated that any extension of Runway 18-36 will not occur before the mid-term (2012-2017) timeframe, any proposed extension should be based upon the newer models. Thus, an extension of approximately 1,007 feet for a total available length of 8,008 feet is recommended for Runway 18-36 as shown in **Table 4-21** with support information provided in **Appendix B**.

TABLE 4-21
RUNWAY LENGTH REQUIREMENTS B737-700
AT MAXIMUM TAKEOFF WEIGHT

Design Condition	Data
Airplane	737-700 (CFM56-7B24 Engines at 24,200 lb SLST)
Mean daily maximum temperature of hottest month at airport[1]	91.9° Fahrenheit (33.27° C) [1]
Airport Elevation[2]	89 feet above MSL
Maximum design landing weight[3]	129,200 lbs[2]
Maximum design takeoff weight[3]	154,500 lbs[2]
Maximum difference in runway centerline elevations[2]	3.3 feet
FAR Landing Field Length Requirements	
ISO Landing Length Requirements – Flaps 40[3]	4,700 feet
Adjusted Length for Elevation (dry pavement)	4,729feet
Adjusted Length for wet pavement conditions	5,439feet
Recommended Landing Length Required[4]	**5,400feet**
FAR Takeoff Field Length Requirements	
ISO Takeoff Length[3]	5,906 feet
Adjusted Takeoff Length for Temperature and Elevation (dry pavement)	6,930 feet
Adjusted Takeoff Length for runway grade change	6,963 feet
Adjusted Takeoff Length for wet pavement	8,008 feet
Recommended Takeoff Length Required	**8,008 feet**

Notes:
[1] Obtained from 10 Years of NOAA Temperature Data (1997-2008)
[2] Obtained from 1998 Airport Layout Plan and Survey Data
[3] Data obtained from B737-100/200/300/400/500/600/7000/800 and 900 Airplane Characteristics for Airport Planning
* ISO landing length according to manual was for all temperatures, so no adjustment needed
Wet pavement conditions = 1.15 * Dry Pavement requirements.
Sources: Boeing Industries, 737-100/200/300/400/500/600/700/800 and 900 Airplane Characteristics for Airport Planning AC (December 2005), National Oceanic and Atmospheric Administration, 2007, FAA AC 150/5325-4B, 1998 Airport Layout Plan, URS Greiner, AirNav.com and The LPA Group Incorporated, 2008

Runway Overruns, Blast Pads and Clearways

In Chapter 8, *The Physical Plan*, of the 1998 Airport Master Plan Report, recommended the addition of 1,000 foot clearways beyond the thresholds of Runways 14, 32, 18, and 36 to provide an additional 1,000 feet of takeoff distance available (TODA) using the declared distance guidelines. These distances are shown in **Table 4-22**.

TABLE 4-22 DECLARED DISTANCE RECOMMENDATIONS 1998 AIRPORT MASTER PLAN REPORT ALEXANDRIA INTERNATIONAL AIRPORT AND ENGLAND INDUSTRIAL AIRPARK				
Declared Distance Standards	**Runway 14**	**Runway 32**	**Runway 8**	**Runway 36**
Takeoff Run Available (TORA)	12,000 ft	12,000 ft	7,001 ft	7,001 ft
Takeoff Distance Available (TODA)	13,000 ft	13,000 ft	8,001 ft	8,001 ft
Accelerated-Stop Distance Available (ASDA)	12,000 ft	12,000 ft	7,001 ft	7,001 ft
Landing Distance Available (LDA)	12,000 ft	12,000 ft	7,001 ft	7,001 ft

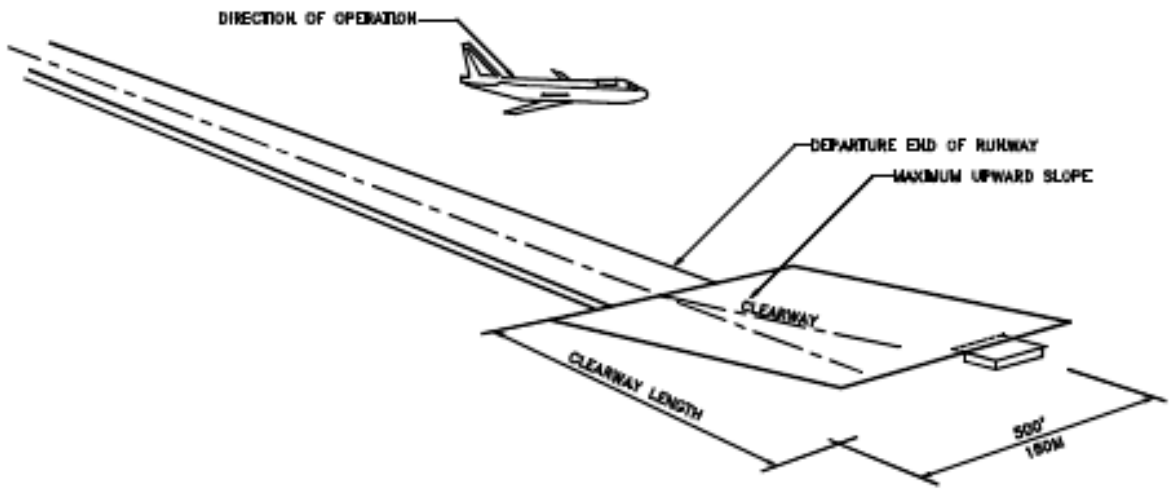
Source: 1998 Airport Master Plan Report, Alexandria International Airport and England Industrial Park, Greiner Inc, 1998

- The TORA refers to the length of the runway less any length of runway unavailable and/or unsuitable for takeoff runway computation.
- The TODA includes the TORA plus the length of any remaining runway and/or clearway beyond the far end of the TORA.
- The ASDA includes the length of runway plus the length of any stopway (or overrun) beyond the far end of the runway less any length of runway and stopway unavailable and/or unusable for runway stop length calculations.
- LDA is the length of the runway less any length of runway unavailable and/or unusable for landing distance computations.

A clearway is defined as an area connected to and extending beyond the runway end available for the completion of takeoff operation of a turbine powered aircraft. A clearway increases the allowable airplane operating takeoff weight without increasing runway length. However, adequate safety area must exist beyond the clearway for it to be considered as part of the takeoff length available (TODA).

The dimensions of a clearway are approximately 500 feet wide by 1000 feet long. A clearway may be provided only if no object or terrain protrudes through the clearway plane, which is a slope of 1.25 percent. However, a clearway is typically not paved and the area over which the clearway lies need not be suitable for abandoned takeoff operations. In other words, a clearway is an unpaved area where aircraft perform their rotation beyond the V_1 decision speed as shown in **Exhibit 4-7**.

Exhibit 4-7
Runway Clearway



Source: FAA Advisory Circular 150/5300-13, Change 13, Chapter 3, Figure 3-7

Since an extension of Runway 14-32 to 12,000 feet is already approved[11] and an extension of Runway 18-36 to 8,008 feet is also recommended, a clearway cannot be implemented on either Runway Strips 14-32 or 18-36 because adequate safety area beyond the clearway does not exist with the proposed extension.

Runways 14, 32, 18, and 36 are also currently equipped with blast pads. Blast pads provide blast erosion protection beyond the runway ends, and are not considered as part of any declared distance calculations. Blast pad pavement is not designed to the same strength as the runway, but is designed to accommodate the passage of maintenance and emergency equipment. The existing blast pad dimensions and FAA requirements are shown in **Table 4-23**. Runways 14, 32, and 36 all have non-standard blast pad widths for their respective aircraft design group. Thus, as part of any runway extensions and overlay projects, standardized blast pad pavement and associated markings need to be installed.

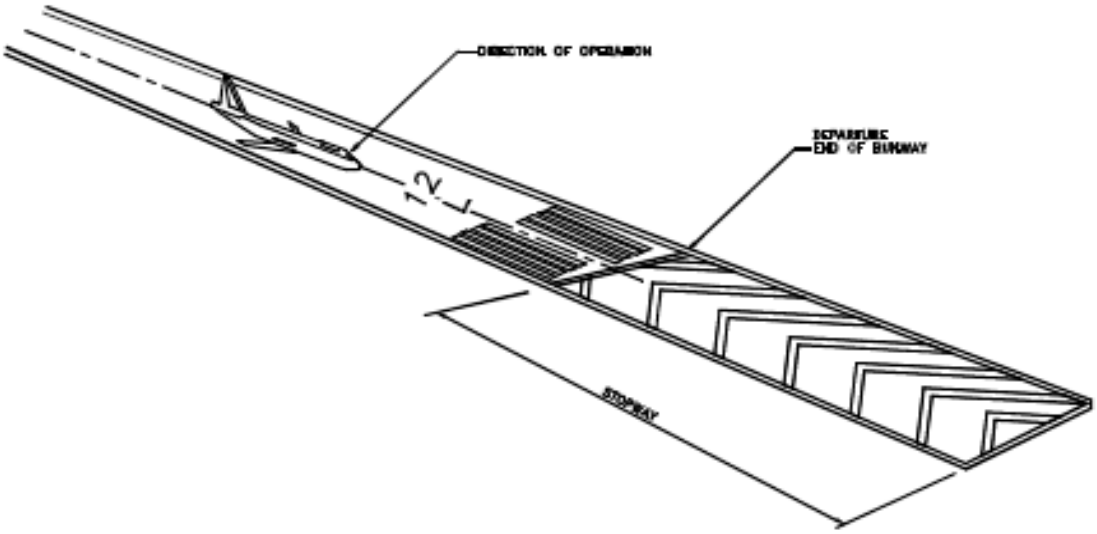
[11] Previously FAA approved documents (i.e. 1994 Base Reuse Plan, 1998 Master Plan, and 2007 FAR Part 150 Study) all recommended an extension of Runway 14-32 to 12,000 feet. As a result, the US Congress has already appropriated $750 thousand for the construction of the Runway 14-32 extension.

TABLE 4-23 MINIMUM BLAST PAD DIMENSIONS		
Runway	Width (in feet)	Length (in feet)
Existing Dimensions		
14	150	400
32	150	400
18	200	400
36	150	400
FAA Requirements		
D-IV	200	200
D-V	220	400

Sources: FAA AC 150/5300-13 and Airport Survey Data, 2008

As mentioned, Runways 14, 32 and 36 are equipped with 400 foot blast pads as well as an additional 600 feet of pavement designated in the previous master plan as overruns. According to military design guidelines, the typical paved overrun dimension is 125 feet wide by 200 feet in length. As designated by the FAA, stopways and overruns are interchangeable. Stopways are defined as a paved area which is beyond the takeoff runway and is used for the deceleration of an aircraft during an aborted takeoff. The pavement strength of a stopway does not have to equal the runway pavement strength, but must be able to support an airplane during an aborted takeoff without causing structural damage while also supporting emergency and maintenance equipment. Further, a stopway must be at least as wide as the runway, its length is determined by available area, runway safety area requirements, and the critical aircraft's balanced field length requirements, and it is marked with yellow chevrons designating that the pavement strength is less than that of the runway. However, to be able to consider a stopway in declared distance calculations (ASDA), adequate runway safety area must be available beyond the end of the stopway. **Exhibit 4-8** provides a sample of a stopway.

Exhibit 4-8
Runway Stopway



Source: FAA Advisory Circular 150/5300-13, Change 13, Chapter 3, Figure 3-8

Because of safety area limitations on all four runways, 220 x 400 and 200 x 200 foot blast pads, respectively, should be constructed on Runways 14 and 18 in conjunction with the runway extensions[12]. Although a stopway, overrun and clearway cannot be implemented beyond any of the runways because of safety area limitations and terrain, it is still recommended that the England Authority rehabilitate the full 1,000 feet of pavement prior to the runway thresholds of Runways 32 and 36 and designate the entire area as blast pad. Further, since the pavement strength of the 1000-foot blast pad will be less than the runway pavement and should not be used for landing, takeoff or taxiing, it should be marked with yellow chevrons as denoted in **AC 150/5340-1J**, *Standards for Airport Markings*. This project is recommended because of the airport's high use by heavy commercial and military aircraft. Paving the initial 1,000 feet of the safety area could provide an added level of protection especially for heavy aircraft during poor visibility or wet/contaminated pavement conditions as well as limiting aircraft damage as a result of runway excursions.

However, the FAA has made it clear that it does not agree with the use of declared distances in the case of a runway extension unless adequate safety area cannot be obtained. It is, therefore, not recommended that the use of declared distances be implemented at AEX since it may

[12] As part of the US Congressional appropriation, blast pad reconstruction on Runways 14 and 32 were included in the cost.

jeopardize the approved extension of Runway 14-32 as well as the recommended extension of 18-36.

Runway Pavement Strength

Because of use, Runways 14-32 and 18-36 are designated with different airport reference codes associated with their critical aircraft and primary use. As designated in the 1998 FAA approved airport layout plan, the ARC code for Runway 14-32 was a D-V. In reviewing the existing and future critical aircraft operations for the twenty-year planning period, the ARC code for Runway 14-32 will remain a D-V because of the continued use of the B747-400 aircraft. Runway 18-36 is currently designed to accommodate ADG D-IV aircraft, which includes commercial, corporate and military operations. As noted, the design requirements for Runway 18-36 should remain a D-IV due to its use by faster corporate aircraft including the Gulfstream IV and V and the Learjet 60 as well as its continued use by the C-130 for night training operations.

An important feature of airfield pavement is the ability to withstand repeated use by aircraft of significant weight. At AEX, this includes small general aviation aircraft to large commercial jets with maximum takeoff weights exceeding 800,000 pounds. Runway 14-32's pavement consists of concrete with a concrete overlay and grooved surface. According to the previous Master Plan, runway friction test evaluations were performed by USAF Engineering and Services Center, Tyndall Air Force Base in 1987 and 1989. Further according to the Department of Defense Flight Information Publication, IFR-Supplement for the United States, dated July 25, 1991, the pavement strength was rated at 850,000 pounds for a double dual tandem landing gear (i.e. B-747-400) and 840,000 pounds for a twin, delta tandem landing gear (i.e. C-5)[13].

Runway 18-36 is also constructed of concrete, and had an overlay in 1995/96. The present runway pavement strength, based upon landing gear configuration, for both Runways 14-32 and 18-36 are provided in **Table 4-25**.

[13] Department of Defense Flight Information Publication, IFR-Supplement for the United States, July 25, 1991 and Airport Master Plan Report, Alexandria International Airport & England Industrial Airpark, Greiner, Inc. January 2008.

TABLE 4-25 RUNWAY PAVEMENT STRENGTHS		
Landing Gear Configuration	**Runway 14-32**	**Runway 18-36[1]**
Single Wheel	81,000 lbs.	75,000 lbs.
Double Wheel	180,000 lbs.	130,000 lbs.
Double Tandem	330,000 lbs.	191,000 lbs.
Dual Double Tandem	850,000 lbs.	502,000 lbs.
Twin, Delta Tandem (C-5)	840,000 lbs.	N/A

Note: [1]Runway 18-36 north of intersection of Taxiway A has been strengthened to the same pavement level as Runway 14-32
Sources: Department of Defense Publication, July 1991, and FAA form 5010 data, 2008.

It is important to note that in addition to C-5 military operations, the airfield currently accommodates C-17 and C-130 operations, which each have unique landing gear configurations of Triple Tandem (TRT) and Single Tandem (ST), respectively. Still, according to USAF Records, 1992, and recent upgrades, Runway 14-32 and 18-36 can accommodate these aircraft operations and any other aircraft operating today (including the Antonov-124 and 225).

Since the completion of the previous Master Plan, the military has invested approximately $60 million at AEX in accordance with its commercial lease obligations, including the rehabilitation of Runway 18-36, construction of parallel Taxiway B, and new hot pad sites (which are used for ordinance loading and unloading) near the threshold of Runway 18. Typically military operations are not used to determine commercial airport design requirements. However, in the case of AEX, the military not only plays a large part in the airport's operations but in its overall funding and typically participates in selected airfield funding projects. Further, due to continued use by military aircraft on both Runways 14-32 and 18-36 throughout the planning period, pavement strength upgrades are recommended as part of any pavement rehabilitation and extension project.

AEX is heavily used as emergency disaster relief and response center for the region and for associated training operations. During Hurricanes Katrina, Rita, and Gustav, large, heavy transport aircraft, like the C-5, were used to bring emergency supplies to the airport, which were transferred for distribution to smaller fixed wing and rotorcraft aircraft such as the C-130, CH47-Chinook and UH-60 Blackhawk. Because of the airport's use as a disaster relief and military staging area in conjunction with its commercial functions, it is recommended that all pavement including Runway 18-36, associated taxiways and aprons be strengthened to accommodate a dual double tandem weight of approximately 850,000 lbs. At the time of this writing, Runway 18-36 pavement north of the intersection of Taxiway A has already been strengthened to this higher demand level. Therefore, it is recommended that the remainder of Runway 18-36 be strengthened in the short term to this same level, thus allowing the full use of the runway during emergency or disaster relief operations.

Runway Shoulder Pavement: Runways 14-32 and 18-36 are not equipped with paved shoulders. According to **AC 150/5300-13**, runways which are designed for Group C-III or greater aircraft should have paved shoulders. Runway shoulders are used to provide blast erosion resistance, accommodate maintenance and emergency equipment as well as the occasional use by an aircraft veering from the runway. According to design guidance, shoulder dimensions for group D-IV and V runways are 25 feet and 35 feet, respectively.

The strength of the shoulder pavement is dependent upon the most demanding aircraft as well as the heaviest existing or future emergency/maintenance vehicle. For design groups III and IV, the minimum bituminous concrete surface thickness is 2 inches or 3 inches for groups V and VI over an aggregate sub base. If constructed of Portland Cement concrete, the minimum recommended thickness is 5 inches.[14] Since both Runways 14-32 and 18-36 accommodate heavy commercial and military aircraft operations, it is recommended as part of any overlay or improvements to Runways 18-36 and 14-32 that shoulders be constructed to run the full length of both runways.

Runway Blast Pads: Runways 14-32 and 18-36 are equipped with a combination of paved blast pads and overruns beyond each threshold. The purpose of an overrun is to accommodate emergency and maintenance equipment as well as the weight of an aircraft during an aborted takeoff operation. During the airfield inventory inspection as well as discussions with airport management, this pavement on both runway strips is in poor condition. Thus, it is recommended that the overrun and blast pad pavements be rehabilitated to safely accommodate both aircraft and emergency equipment and decrease the impact of foreign debris (FOD) on aircraft operations. Again, as part of the recommended extension projects, pavement strengthening and overlays are recommended.

Runway Safety Area Requirements

The safety area criteria consist of the areas around the runway and departure surfaces designed to protect aircraft during landing, taking off, or operating on the runway. These surfaces consist of the Runway Safety Area (RSA), Runway Object Free Area (ROFA), and Runway Protection Zones (RPZ).

Table 4-26 presents the FAA standard dimensions for these areas at AEX. These criteria are used to facilitate the discussions in this section.

[14] FAA AC 150/5300-13, *Airport Design*, Chapter 8, page 78

TABLE 4-26 EXISTING RUNWAY SAFETY AREA DIMENSIONS				
Design Standard	**Runway 14-32 FAA Standards (ARC D-V)**		**Runway 18-36 FAA Standards (ARC D-IV)**	
	Runway 14	**Runway 32**	**Runway 18**	**Runway 36**
Runway Safety Areas (in feet)				
Width	500	500	500	500
Length (Beyond Runway end)	1,000	1,000	1,000	1,000
Object Free Areas (in feet)				
Width	800	800	800	800
Length (Beyond Runway end)	1,000	1,000	1,000	1,000
Runway Protection Zones (in feet)				
Visibility	½-Mile	1-Mile	1-Mile	1-Mile
Inner Width	1,000	500	500	500
Outer Width	1,750	1,010	1,010	1,010
Length	2,500	1,700	1,700	1,700

Sources: AC 150/5300-13 and The LPA Group Incorporated, 2008.

Runway Safety Area (RSA)

The Runway Safety Area (RSA) is centered on the runway centerline and is a FAA-mandated surface that shall be: (a) cleared and graded and have no potentially hazardous ruts, humps, depressions, or surface variation; (b) drained by grading or storm sewers to prevent water accumulation; (c) capable, under dry conditions, of supporting snow removal equipment, aircraft rescue and firefighting equipment, and the occasional passage of an aircraft without causing structural damage. The RSA must be free of objects, except for those that need to be located in the safety area because of their function. RSA deficiencies cannot be modified or waived similar to other airport standards.

At AEX, standard RSA lengths and widths are provided beyond each runway end. Interestingly, Runway ends 14, 32, and 36 provide RSA for the entire length in the form of combined paved runway blast pad/overrun/stopway, all of which are in poor pavement condition. Although the overrun/stopway cannot be used for available stop declared distance calculations, rehabilitation of this pavement beyond the blast pads on Runways 36 and 32 is recommended and should be marked with yellow chevrons. Although this pavement cannot be used for either takeoff or landing calculations, it does provide an additional level of safety in the event of an aircraft overrun[15].

[15] According to military clear zone requirements, the first 1,000 feet of the 3,000 foot clear zone length should be graded.

In conjunction with planned and recommended runway length improvements, adequate safety areas of 500 x 1000 feet should be obtained through the relocation of the airport perimeter roads, fences and property acquisition.

Runway Object Free Area (ROFA)

The Runway Object Free Area (ROFA) is centered on the runway centerline. Standards for the ROFA require clearing the area of all ground objects protruding above the RSA edge elevation. Except where precluded by other clearing standards, it is acceptable to place objects that need to be located in the ROFA for air navigation or aircraft ground maneuvering purposes and to taxi and hold aircraft in the ROFA. Objects, which are non-essential for air navigation or aircraft ground maneuvering purposes, should not to be placed in the ROFA. This includes parked airplanes and agricultural operations.

An evaluation of the ROFAs was conducted in accordance with the applicable design standards for each runway, both of which require ROFA dimensions of 800 feet wide, extending 1,000 feet beyond the runway end. At AEX, the ROFA is standard beyond all runway ends and the airport continues to maintain the ROFAs clear of vegetation and other objects. However, a small portion of the ROFA beyond Runway 36 extends over the Bayou Rapides waterway which runs along Bayou Rapides Road, although this does not represent a non-standard condition for the ROFA. Therefore, no ROFA improvements are recommended for the airport at this time.

Since plans for the extension of Runway 14-32 are already in place and an extension of Runway 18-36 is also recommended, incompatible vegetation, objects and other uses should be removed from the ROFAs associated with these runways during construction.

Runway Protection Zone (RPZ)

A Runway Protection Zone (RPZ) is a two-dimensional trapezoidal shaped area beginning 200 feet from the usable pavement end of a runway. The primary function of this area is to preserve and enhance the protection of people and property on the ground. The size or dimension of the RPZ is dictated by guidelines set forth in **FAA AC 150/5300-13**, *Airport Design*, and is based on the approach visibility minimums to the specific runway end as shown in **Table 4-26,** Existing Runway Safety Area Dimensions.

Airports are also required to maintain control of each runway's RPZ either through ownership or easement. Such control includes keeping the area clear of incompatible objects and activities. While not required, this control is much easier to achieve and maintain through the acquisition of sufficient property interests in the RPZs.

Runway 14 is currently equipped with a CAT I ILS providing ½ mile visibility for aircraft approach and landings. It is recommended because of its use as the primary runway and weather conditions that the runway be upgraded to a CAT II precision approach. Since visibility is already below ¾ statute mile then the RPZ dimensions will remain.

Runways 18, 36 and 32 are all equipped with global positioning system non-precision approaches providing 1-statute mile visibility. However, the existing RPZs beyond Runway ends 14, 18 and 36 currently extend beyond airport property. Control of the property is exercised through the use of easements. Conversely through the acquisition of approximately 42 acres of land across Bayou Rapides Road, the entire RPZ beyond Runway 32 is now located on airport property.

The FAA is currently in the process of implementing the use of Local Area Augmentation System (LAAS) equipment at selective airports around the country (i.e. Memphis, TN). Although FAA continues to support (ground based) ILS and continues to deploy localizer and glideslope antenna equipment, it is expected that some type of GPS approach will replace this system in the future. The LAAS system has been determined to be more cost effective since it requires less ground based equipment to provide a higher approach capability. Thus, it is recommended in the long-term that the airport acquire property and protect the approach surfaces to Runways 32, 18 and 36 to accommodate CAT I precision approaches. Because of the location of military operating and restricted areas south of the airfield, the use of the precision approach to Runway 36 may be limited when the restricted areas (RAs) and military operating areas (MOAs) are designated as "hot" or active. Otherwise, when the area is designated as "cold" or inactive, operations will be allowed as long as constant contact and coordination with DOD controllers is maintained.

Thus, in conjunction with both planned and recommended improvements, property acquisition of the future RPZ areas through either purchase or avigation easement is recommended to limit potential incompatible development (including homes, places of worship, schools, etc). This will allow the airport to maintain control of the approach surface, and avoid the installation of incompatible development.

Taxiway System Requirements

Taxiways are constructed to facilitate the movement of aircraft around the airfield. Taxiway width and separation requirements are determined by the wingspan of the most critical aircraft likely to use facilities on the airport. For example, taxiways providing access to the runway should be designed to accommodate the applicable critical aircraft, ARC D-IV for Runway 18-36 and ARC D-V for Runway 14-32.

At AEX, Runway 14-32 is equipped with a full-length parallel taxiway, Taxiway A, to the east, and Runway 18-36 is equipped with a partial parallel taxiway, Taxiway B, along the northeastern half of the runway. Based upon information from airport management and recent aerial imaging, the actual pavement width of Taxiways A through E and associated connectors is 75 feet, which satisfies FAA design standard requirements for ADGs IV and V. Taxiways F and G are closed.

Design standards for the separation distances between runways and parallel taxiways are based upon the airplane design group (ADG) for that particular runway as well as instrument approach capability. For Runway 14-32 which is designated as an ADG-V, the required runway-taxiway

separation was determined based upon the runway elevation and approach visibility minimums. Since the elevation of Runway 14-32 is less than the FAA criteria elevation of 1,345 feet MSL and the approach visibility minimums are equal to or less than ½-mile, the required runway-taxiway separation is 500 feet. A comparison of FAA separation standards and existing runway-taxiway separation is as follows:

EXISTING RUNWAY-TAXIWAY SEPARATION

FAA Standards (below 1,345 feet MSL)		Existing Runway-Taxiway Separation	
D-IV	D-V	Runway 14-32*	Runway 18-36
400 ft	500 ft	800/500 feet	400 feet

*Note: 800 ft separation between Runway 14-32 and Taxiway north of terminal apron; 500 ft separation from terminal apron to threshold of Runway 32.

According to FAA criteria, the airfield currently meets and, in places, exceeds runway-taxiway separation requirements. As part of the Runway 14-32 extension, it is further recommended that Taxiway A be extended to provide continuous parallel access with at least a 500-foot runway to taxiway separation.

Runway 18-36 has a partial parallel taxiway. The previous master plan update recommended the construction of a parallel taxiway southeast of the runway. However, with the construction of the Hot Pads, this option is no longer feasible. Construction of partial parallel Taxiway B supports aircraft movement to and from the Runway 18 and provides access to the Military/Cargo apron. This taxiway was constructed as part of the 2006 Military/Cargo apron construction, and is in excellent condition. As part of the recommended extension of Runway 18 to the north, it is further recommended that Taxiway B be extended to provide access to the new threshold.

Taxiways E, F, and G are closed for aircraft use at this time due to their poor pavement conditions; however, the airport is currently in the process of rehabilitating the portion of Taxiway E between the Runway 36 threshold and Taxiway A. The rehabilitation of this portion of Taxiway E is necessary to accommodate landings on Runway 18, thus, allowing aircraft to exit at the Runway 36 end. Further, Taxiway E provides access to Runway 14-32, hot pads and the north apron (military) during military deployments at AEX. It is anticipated that this portion of Taxiway E will be reopened in early 2009. Rehabilitation of the remaining portion of Taxiway E, as well as Taxiways G and F, is not needed since the land in currently reserved for future industrial development.

In conjunction with planned runway improvements, an additional parallel taxiway west of Runway 14-32 is recommended to allow access to previously undeveloped portions of the airfield. Further, as described in the 1998 Master Plan Update, the "S" curve on Taxiway A, located at the intersection with the terminal apron, is an undesirable feature that would be impracticable to correct due to cost and other impacts. Therefore, due to existing facilities, development of a parallel taxiway west of Runway 14-32 should be constructed in conjunction with the future extension of the runway.

FAA AC 150/5300-13, *Airport Design*, dictates the requirements for taxiway shoulder widths. Taxiway shoulders reduce the possibility of blast erosion and foreign object debris (FOD) ingestion by jet engines when the engine overhangs the edge of the taxiway pavement. Paved shoulders are recommended for taxiways that accommodate Airport Design Group (ADG) III and higher,[16] which includes both Runways 14-32 and 18-36. For taxiways that serve ADG-IV aircraft, the taxiway shoulder width requirement is 25 feet. For taxiways that serve ADG-V aircraft, a taxiway shoulder width of 35 feet is required. During a physical inventory of the airfield, paved shoulder areas were not located along the full lengths of Taxiways A, B, and associated "stub" taxiways. Therefore, any taxiway pavement rehabilitation project or new taxiway development should include taxiway shoulders in compliance with design standards shown in **Table 4-27**.

TABLE 4-27
TAXIWAY REQUIREMENTS

Taxiway	ARC	Width Requirement	Shoulder Requirement
Taxiway A and Connectors	D-V	75 ft.	35 ft.
Taxiway B and Connectors	D-V	75 ft.	35 ft.
Taxiway C	D-V	75 ft.	35 ft.
Taxiway D	NA	Pavement Removed	Pavement Removed
Taxiway E	D-V	75 ft.	25 ft.
Taxiway F	D-V	Closed	Closed
Taxiway G	D-IV	Closed	Closed

Source: The LPA Group Incorporated, 2008.

Aircraft Holding Bays

Holding bays, also known as aircraft run-up pads, as described in Chapter 2 are engine run-up areas with bypass taxiways. These areas are used primarily for engine run-up checks or for aircraft holding for IFR clearance. The use of holding aprons also allows for increases in airfield capacity since it allows aircraft to bypass other aircraft which are not ready for departure. The airport is equipped with two holding bays, one at either end of Taxiway A and designed to accommodate D-V aircraft. The northwest holding bay consists of approximately 18,000 SY of pavement, and the southern holding bay of approximately 16,600 SY of pavement. In addition, a portion of Taxiway A was widened near Taxiway A-1 by DOD by approximately 105 feet to accommodate A-10 aircraft.

In 2006, portions of Taxiway A were refurbished and, thus, the pavement is considered in good condition. Additional holding aprons are recommended associated with both an extension of Runway 18-36 as well as a parallel taxiway west of Runway 14-32. Although the airport does not and is not anticipated to have any capacity issues during the planning period, the addition of hold bays allows for greater flexibility of movement, especially since the airport caters to a varied fleet mix, and provides for additional parking and operating areas during critical

[16] FAA AC 150/5300-13, Chapter 8, Paragraph 803.

emergency evacuation or deployment events. Thus, as part of any proposed taxiway pavement rehabilitation or construction, the addition of several holding bays is warranted.

Additional Airfield Facilities

In addition to the runways and taxiways, multiple other facilities and equipment are located on the airfield to provide the safest operating environment possible. This section will discuss the requirements for instrument approaches first since any anticipated changes in the currently published approaches could potentially affect certain requirements for other airfield facilities, such as lighting and markings. Additionally, improvements and upgrades that could improve service or that may benefit the airport were also identified.

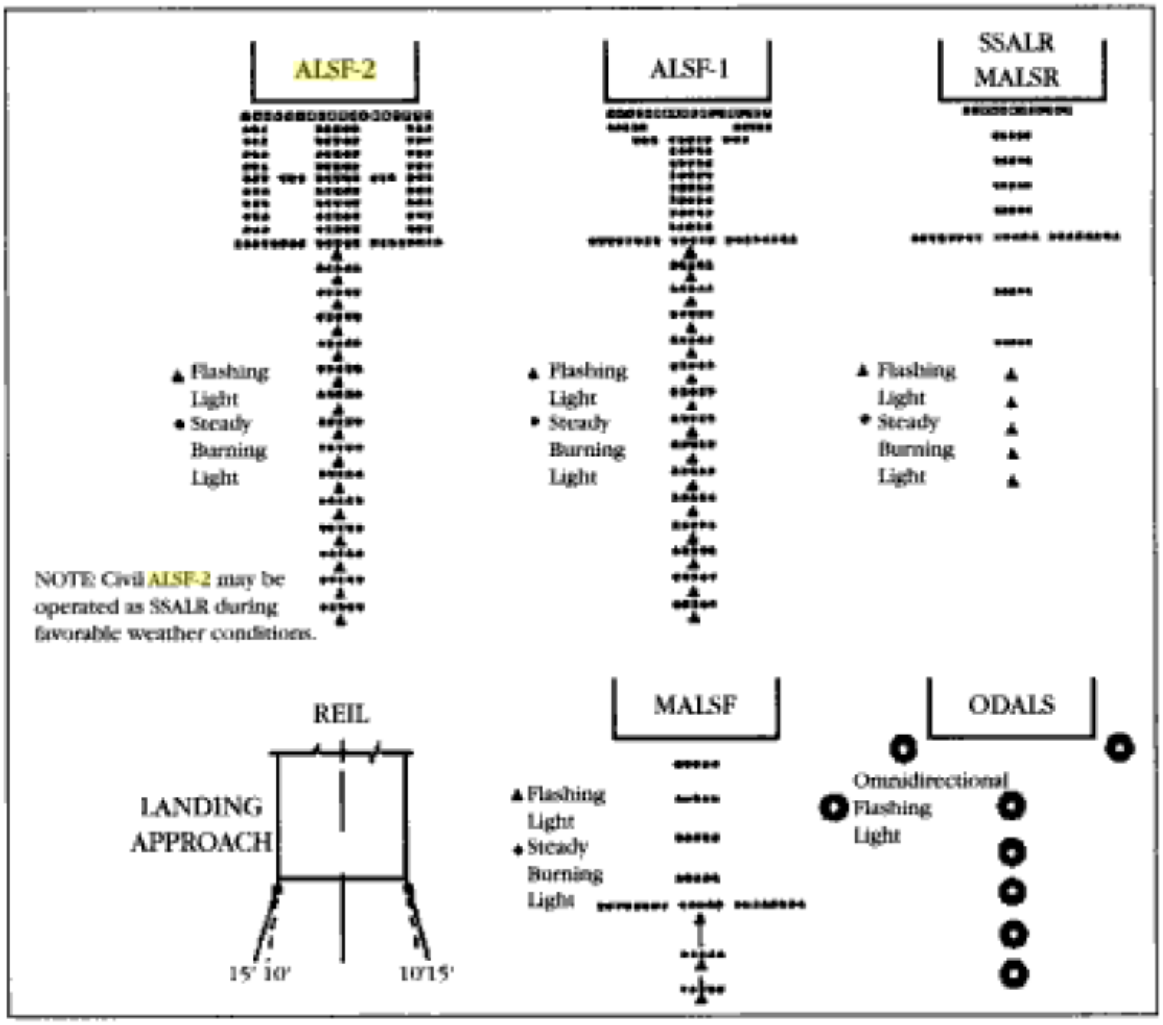
Navigational Aids

As noted in Chapter 2, Existing Conditions, AEX is equipped with a variety of navigational aids (NAVAIDS) which aid pilots during landing and takeoff procedures. NAVAIDS are designated as either electronic or visual as defined below:

- Electronic NAVAIDS provide electronic guidance related to an instrument approach. An instrument approach is defined as a series of predetermined maneuvers which allows a pilot to perform an approach under IFR conditions from initial approach to landing or until a point where visual approach can be made. Electronic NAVAIDs include localizer and glideslope antennas, non-directional beacons (NDBs), VHF omnidirectional range with distance measuring equipment (VOR/DME), VHF omnidirectional range with tactical aircraft control and navigation (VORTAC), and precision approach radar (PAR).

- Visual NAVAIDs give pilots vertical guidance based upon the color of lights that are visible in the multi-box units. A visible approach is defined as an approach conducted on an IFR flight plan that authorizes the pilot to proceed visually and clear of clouds to the airport. For CAT I precision approaches, the runway must be equipped with a medium intensity approach lighting system (MALSR). For CAT II/III approaches, a high intensity approach lighting system with sequenced flashers (ALSF-2) is required as shown in **Exhibit 4-9**. Other visual NAVAIDS include four-box, precision approach slope indicators (PAPIs), visual approach slope indicators (VASIs), runway end identification lights (REILs), high intensity runway lighting (HIRLs) and medium intensity runway lighting (MIRLs).

EXHIBIT 4-9
APPROACH LIGHTING SYSTEMS



Source: Airport Planning and Management, Dr. Seth Young, 2005

Published instrument approaches currently available at AEX include:

- Instrument Landing System (ILS/LOC) approach to Runway 14
- RNAV GPS approach to Runway 14
- RNAV GPS approach to Runway 18
- RNAV GPS approach to Runway 32
- RNAV GPS approach to Runway 36
- VOR/DME or GPS approach to Runway 14
- VOR/DME or GPS approach to Runway 32

An instrument landing system (ILS) allows pilots to use the airport during poor visibility or ceiling conditions. As noted, only Runway 14 is equipped with a CAT I ILS approach. An

instrument approach (ILS) can be classified as one of three types: CAT I, CAT II or CAT III. The visibility, ceiling and runway visual range limitations for each are provided in **Table 4-28**.

TABLE 4-28
INSTRUMENT LANDING SYSTEM

Type	Ceiling	Visibility	Runway Visual Range (RVR)
CAT I	≥200 feet	≥1/2 statute mile	
CAT II	<200 feet and ≥100 feet	<1/2 statute mile	≥1,200 feet
CAT III*	<100 feet	<1/2 statute mile	≤ 1,200 feet

*Note: * FAA-approved Surface Movement Guidance and Control System (SMGCS) Plan is required to conduct ground movement of aircraft below 1,200 feet RVR with specialized lighting systems and/or vehicle guidance requirements below 600 feet RVR.*

Sources: FAA.gov, Airport Planning, Instrument Approach Data and Definitions and The LPA Group Incorporated, 2008

Because of its continued use as a base for emergency disaster relief operations as well as military training and deployment, it is recommended that as part of the extension of Runway 14-32 that the instrument approach be upgraded to a CAT II ILS. FAA will require upgrading the simplified short approach lighting system with runway alignment indicator lights (SSALR) to an ALSF-2 system and in pavement centerline approach lights to before allowing minimums to decrease to less than 200 feet and ½ statute mile. Further, as part of the extension, the glideslope antenna will also need to be relocated to the northwest.

In conjunction with upgrading the approach on Runway 14, a Localizer Performance with Vertical Guidance (LPV) approach is recommended for Runway 32. The LPV approach initially will provide 250 foot height above touchdown (HAT) and approximately ¾ statute mile visibility (RVR). In conjunction with this approach, REILs should be added to Runway 32 to accommodate this approach.

At some point it is expected, however, that ground based navigation will be replaced with some type of GPS system (wide area augmentation system (WAAS) or local area augmentation system (LAAS)). Thus, in conjunction with long-range recommendations to increase the length of Runway 18-36 from 7,001 to 8,008 feet, a transition from the older localizer and glideslope ground based ILS to a LAAS system should be considered. A LAAS is defined as 'a ground-based augmentation to GPS that focuses its service on the airport area (approximately a 20-30 mile radius) for precision approach, departure procedures and terminal area operations. A LAAS provides a level of accuracy up to one-meter in both the horizontal and vertical axis; thus, allowing with the addition of visual NAVAIDS (i.e. ALSF-2) a precision approach as low as CAT II/III. Therefore, a CAT I precision approach is recommended on both Runways 32 and 18 in conjunction with the installation of a LAAS system and the recommended extension of Runway 18-36.

According to the previous approved master plan, a precision instrument approach could not be implemented on Runway 36 primarily due to the proximity of restricted airspace (R-3801 B-C) and military operating areas south of the airport. However, based upon discussions with military air traffic controllers, operations are allowed within the restricted areas and military operating

areas when these areas are designated as "cold" or inactive. However, coordination is required between military ATC and pilots when traversing the area(s). Therefore, a CAT I precision approach is also recommended on Runway 36 to provide an additional level of flexibility to future airport operations.

Precision Approach Radar (PAR)

A PAR approach was recently installed at AEX south and west of Runway 14-32. The PAR "is a type of radar guidance system designed to provide lateral and vertical guidance to an aircraft pilot for landing, until the missed approach point is reached. Controllers monitoring the PAR displays observe each aircraft's position and issue instructions to the pilot that keep the aircraft on course during final approach. It is similar to an ILS but requires control instructions. A type of PAR instrument approach includes a ground controlled approach (GCA). Precision approach radars are most frequently used at military air traffic control facilities, and radars can provide precision guidance to a distance of 10 to 20 miles."[17]

It is anticipated, based upon discussions with Air Traffic Control and review of the military pilot training flight syllabus that use of the PAR approach will be significant, approximately 400-600 operations monthly, since it is the only such radar within the region. No additional lighting or navigational equipment above and beyond what is installed is required. However, to accommodate the recommended southwest parallel taxiway, the PAR approach equipment will need to be relocated in the future. Locations for the relocated PAR approach equipment will be discussed in more detail within the Alternatives Section of this report.

[17] Wikipedia Free Encyclopedia, Precision Approach Radar.

Long-Range Radar

The FAA maintains a long-range en route radar facility (Fixed Position Surveillance Model 20 Series FPS-20 Series) in the southwest corner of the airport property (see photo). Long range radar is used to provide additional radar coverage as well as track and monitor the movement of enroute aircraft operating between terminals within the continental United States. FAA had plans to decommission these facilities and rely on secondary surveillance radar which is dependent upon an aircraft's transponder for altitude, identification and position information.

However, with the events of September 11, both the FAA and DOD have reconsidered the usefulness of this equipment. Still, many of these facilities have exceeded their useful life by more than 20-years. Therefore, FAA is evaluating options for rehabilitating or replacing these systems through the surveillance life extension programs (SLEPs) as well as identifying gaps in domestic radar coverage.

According to FAA, the location of this type of facility should be located at least 2,000 feet from any building or object that might cause signal reflections and at least one-half mile from other electronic equipment. Therefore, structural development within the 2,000-foot radius depicted in **Exhibit 4-10,** *Development Constraints***,** is prohibited in the Airpark, particularly if it is constructed of a reflective surface that may cause radar signal interference. Since the current radar location limits on-airport property development, it is recommended that the facility be relocated to another site. off airport property, at a location identified by the FAA, which will allow sufficient clearance, security, line-of-sight and transmission requirements while limiting its impact on future airport development.

During the course of this study, the airport also raised the question of locating a high radiation facility in proximity to playgrounds and other outdoor recreation areas.

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Alexandria International Airport
Master Plan Update 2009

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Development Constraints

Exhibit
4-10

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Radio-Navigational Aids

Aircraft on approach to AEX may utilize several radio-navigational aids located on and near the airport. Radio navigational aids (i.e. NDBs and VORs) are ground based equipment which emits a signal which can be used by pilots to identify location and bearing, and area used to assist pilots during approach, departure and over-flight procedures. VOR stations may also be equipped with distance measuring equipment which will allow a suitable receiver to determine the exact distance to or from the station. VORs may also transmit local weather information generated by an automated surface observing system (ASOS). Several radio-navigational aids are located within the airport vicinity including:

- Alexandria VORTAC
- Polk VORTAC
- Sawmill VOR/DME
- Marksville NDB
- Bunkie NDB
- Gator NDB
- Winnfield NDB

The Alexandria VORTAC is located approximately four (4) NM southeast of the airfield. Two published VOR/DME approaches are provided for Runways 14 and 32. Although it is recommended that the approaches to Runways 14 and 32 be upgraded to CAT I and CAT II, it is further recommended that the VOR/DME non-precision approach remain on Runway 14-32 to allow for its continued use by general aviation aircraft.

Airfield Lighting

Airfields are typically equipped with a variety of lights primarily used for airport identification as well as air and ground operations during nighttime, instrument meteorological conditions or other low-light conditions. All airfield lighting at AEX is provided from one main electrical vault and several additional generators which are located within an open area between Runways 14-32 and 18-36. In 1996 as part of taxiway and runway lighting upgrades, new wiring was installed and all wiring, regulators, etc in the vault were replaced. However, at least half of the old airfield wiring in the ground which dates back to the England Airbase is not being used and should be removed. Thus, in conjunction with airfield improvements, obsolete ground wiring should be removed. Further, existing wiring diagrams and data should be included in a GIS data management system to facilitate the implementation of future electrical projects.

As mentioned in the inventory chapter, the airport is equipped with a rotating beacon which is located on the air traffic control tower (ATCT) on the central east side of the airfield. The beacon identifies the location of the airport and projects two beams of sequenced flashing lights. The beacon is in good condition, and no major improvements are likely to be required in the twenty-year planning period. Periodic maintenance, however, will be warranted at least every five years. The beacon is continuously operated during nighttime and during instrument conditions.

Runways and taxiways have several lighting systems, some of which are based upon the published runway approaches. Runway 14-32 is equipped with High Intensity Runway Lights (HIRLs) as recommended for instrument approach runways. Further, Runway 14 is equipped with a Simplified Short Approach Lighting System (SSALR) as part of the ILS instrument approach system, and Runway 32 is equipped with Runway End Identifier Lights (REILs). All lighting associated with Runway 14-32 is in good condition. However, to accommodate a CAT II precision approach on Runway 14, the approach lighting needs to be updated to an approach lighting system with sequenced flashing lights (ALFS-2) as well as in-pavement centerline approach lighting to allow for reduced visibility on approach. Initially, as mentioned an LPV non-precision approach is further recommended for Runway 32.

The previous master plan recommended CAT I precision approaches on Runways 18 and 32. Thus, in reviewing the viability of upgrading the approaches, it is recommended that CAT I precision approaches be implemented on Runways 32, 18 and 36 in conjunction with the recommended extension of Runway 18 and the installation of a LAAS system. Runways 18, 36, and 32 are currently equipped with HIRLs and REILs. In order to accommodate precision approaches to Runways 18, 36 and 32, approach lighting systems (either SSALR or MALSR) will need to be installed. However, as noted earlier, an LPV approach will be implemented on Runway 32 initially. The installation of a CAT I precision approach on Runways 18 and 36 in conjunction with a runway extension allows the airport to accommodate operations during conditions when Runway 14-32 is unavailable either as a result of construction or accident. Further, since Runway 18-36 is designated as a secondary primary runway, it would provide higher airfield capacity since it allows the use of more than one runway during instrument meteorological conditions.

In an effort to promote sustainable development at AEX, taxiway lights have been recently upgraded to Light Emitting Diode (LED) Medium Intensity Taxiway Lights (MITLs) on all active taxiways. All taxiway lighting is considered to be in good condition, thus no upgrades are required at this time. MITLs should continue to be provided with any new taxiway development at AEX. Apron and taxiway lighting is provided by high wattage metal halide or high pressure sodium fixtures mount on mast poles or adjacent buildings. The airport is not equipped with taxiway or taxilane centerline lighting.

To date, FAA is still in the process of testing the use of LED approach lighting systems specifically related to the MALSR and results have appeared promising according to William J. Hughes Technical Center. These lights are currently being tested on runways at Phoenix Sky Harbor and Grand Forks International Airports. Further testing is also being done on the use of LED steady burning white lamps to replicate existing PAR-38 lamps and in-pavement lamps. These LED lights are currently designed to screw directly into the existing lamp holders; thus not requiring any significant upgrades. Further, the FAA is also evaluating the ability of LED lights to mimic the MALSR flasher.

Based upon the FAA's cost benefit analysis on the replacement of PAR-56 incandescent lamps with LED lamps for all MALSR threshold light applications, the study concluded that the

national savings associated with the LED lighting technology would be approximately $24.7 million and the costs of the change would be recouped in approximately two (2) years.[18]

Apron Facilities

AEX has four apron areas (North, South, Military/Air Cargo and Helicopter Parking) on the east side of the airfield providing parking and movement areas for military, charter, commercial and general aviation operations as shown in **Exhibit 4-11**. All apron areas are composed of concrete, and pavement conditions range from very good to fair/poor. It is recommended that periodic maintenance of all apron areas be performed at least every ten years to maintain the integrity of the areas use and limit potential foreign object and debris (FOD) that could negatively impact aircraft and ground operations. Any rehabilitation and overlay will require re-marking of the facilities, and possibly lighting upgrades depending upon the project.

North Apron

The North Apron consists of approximately 22.6 acres of paved concrete and is located east of Runway 18-36 and south of Taxiway B. The overall function of the North Apron is to provide aircraft parking and equipment storage for adjacent facilities as well as accommodate aircraft operations. A portion of the North Apron adjacent to the military/cargo apron had been rehabilitated. However, it is required that the remainder of the north apron pavement, including pavement adjacent to the terminal facilities, be rehabilitated to provide adequate strength for aircraft operations.

South Apron

The South Apron is located along the southeastern portion of the airfield near the FBO, T-Hangar and commercial hangar facilities. It consists of approximately 55.7 acres of concrete, and was determined to be primarily in fair to good condition. However, as noted in the inventory section, the eastern portion of the apron between the commercial apron and newly-renovated FBO Terminal is in need of repair. The England Authority already has plans to rehabilitate this portion of the pavement within the short-term. In addition to this planned improvement, it is recommended that periodic maintenance be performed at least every ten years or sooner depending upon aircraft use and pavement conditions.

[18] FAA Navigation Systems, Lighting Systems Group, Light Emitting Diodes, June 14, 2007 (http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/techops/navservices/lsg/led/

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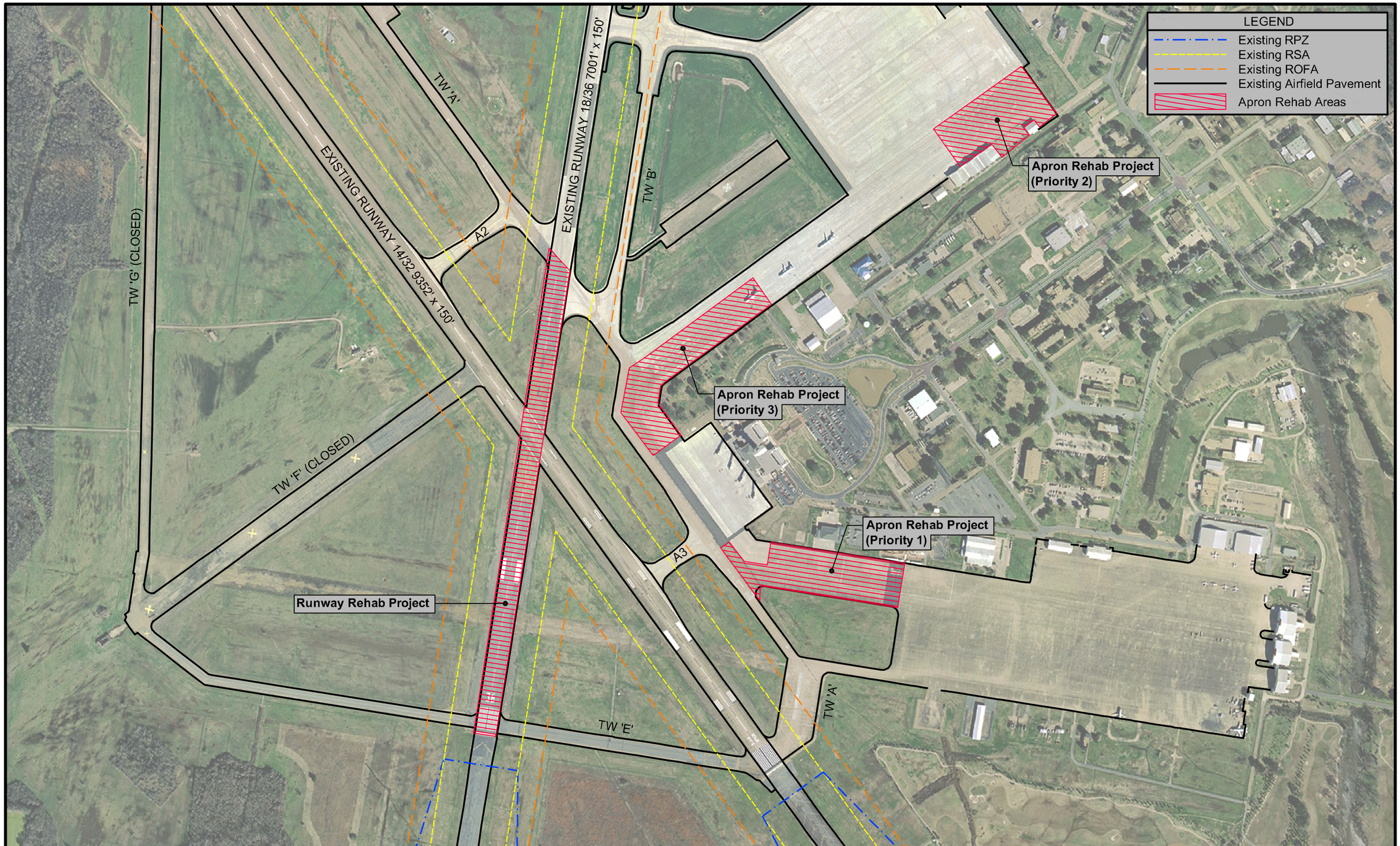

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Alexandria International Airport
Master Plan Update 2009

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Apron Rehabilitation Areas

Exhibit
4-11

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Military/Cargo Apron

The military cargo area is located to the north and west of the North Apron and Taxiway C. The apron was constructed by the military in 2006/2007, and is used for the loading and off loading of military personnel, cargo, equipment, supplies, etc. during deployments and emergency relief operations. The military cargo apron is approximately 33.1 acres, and pavement is in excellent condition. It is the responsibility of the Military for maintaining and replacement of this pavement in the future. A portion of the ramp that parallels the apron along the northeast corner of the apron is planned for rehabilitation according to Authority's capital improvement plan. Since this apron was recently constructed, pavement overlay or rehabilitation is unlikely to be needed prior to 2022 unless structural damage occurs prior to this date.

Helicopter Parking Apron

A portion of the old concrete runway system north of the North Apron and west of the Military/Cargo Apron is currently used for helicopter parking and as a fixed refueling point (FARP). This area consists of approximately 3.2 acres of concrete pavement in poor condition. Since it is anticipated that helicopter operations will continue to increase throughout the planning period in conjunction with the airport's role as a disaster relief staging area, additional paved parking and fueling facilities are needed to accommodate demand. Rehabilitation and expansion of the existing pavement or construction of a new apron area to accommodate at least 20 parked helicopters ranging in size from a Bell 206, Sikorsky UH-60 and Boeing CH-47, Chinook. Potential helicopter parking and associated development will be evaluated as part of the *Airpark Alternatives Analysis* (**Chapter 6**).

Hot Pads / Ammunitions Storage Area

As described in **Chapter 2**, *Existing Facilities Inventory*, there are three concrete apron areas (Hot Pads H1, H2, and H3) near the threshold of Runway 18 that are utilized for military ordinance loading and unloading. The remote location of these pads protects personnel in the event of an accidental detonation, should one occur. Hot Pads H1 and H2 are also equipped with concrete ammunition storage areas for ordinance deliveries, which are outfitted with a lightning protection system. The hot pad locations and offset requirements are illustrated in **Exhibit 4-10**. It is the responsibility of the Military for maintaining and replacement of this pavement in the future.

It is anticipated that the hot pad locations at AEX are sufficient to accommodate existing and forecast military deployments and deployment training exercises throughout the remainder of the planning period. Specifically because during deployments, Runway 18-36 is used exclusively for military aircraft taxiing between the military apron, hot pads, and Runway 14-32; therefore aircraft can safely load/unload ordinances at the hot pads shortly before takeoff and after landing. However, as illustrated in **Exhibit 4-10**, there are specific protective offsets from the hot pads which need to be considered in the planning and development of airport facilities including:

- Inhabited Building Distance (IBD) – The minimum distance permitted between an inhabited building and an ammunition or explosives location (i.e., hot pad) for the protection of administration, quarters, industrial and other similar areas within a garrison or installation.[19]
- Glass Break – The potential for glass breakage is present, thus blast resistant windows must be used.

As a result, as part of the commercial contract with the Military, no building development can be constructed within the glass break area. AEX has also secured an easement for the portion of the hot pad offsets which extend off airport property to prevent future incompatible development.

Airfield Signage

As described in **Chapter 2**, *Existing Facilities Inventory*, AEX has a number of illuminated airfield signs to display instruction and guidance information to aircraft, as stipulated in **FAA AC 150/5340-18D**, Standards for Airport Sign Systems. Standard airfield signage is used to indicate an intersection of or an entrance to a runway, taxiway, or other critical movement area. In addition to standard signage, both Runways 14-32 and 18-36 are equipped with runway distance remaining signs, which are characterized by single, double-sided white numerical inscriptions that are used by pilots as a reference to indicate the remaining distance, of runway available in thousands of feet. Other signage includes mandatory instruction signs which are identified by a red background and white inscription, and directional signage indicated by a yellow background and black inscriptions. Most of these signs consist of taxiway directional signs with arrows to an exit or entry to a taxiway. These signs are typically multi-modular with an accompanying location sign identified by a black background and yellow inscriptions of the taxiway designator.

In conjunction with recommended improvements including runway extensions, taxiway extensions and construction, and approach upgrades, additional lighted approach, distance to go, identification and other associated signage will need to be added to the airfield. Further, the additional power requirements may impact the existing electrical vault and generator capacities. Thus, in conjunction with any lighting or power improvement on the airfield, an evaluation of the existing vault's capacity must be evaluated. A detailed evaluation of the current electrical vault and generator facilities is provided within the airfield support facilities section of this report.

Pavement Markings

Airport pavements are marked with painted lines and numbers in order to aid in the identification of the runways from the air and to provide information to the pilot during the approach phase of flight. There are three standard sets of markings used depending on the type of runway:

- Visual - For runways with only visual or circle to land procedures. These markings consist of runway designation markers and a centerline stripe.

[19] Department of the Army Pamphlet 385-65, Explosive and Chemical Site Plan Development and Submission (February 1, 2008).

- Non-precision - For runways to which a straight-in, non-precision instrument approach has been approved. These markings consist of runway designation markers, a centerline stripe, and threshold markings.
- Precision - For runways with a precision instrument approach. These markings consist of the non-precision markings plus aiming point markings, touchdown zone stripes, and side stripes indicating the extent of the full strength pavement.

Depending on the type of aircraft activity and physical characteristics of the pavement, additional markings may be required for any of the three categories above. The FAA also allows markings on a runway to be upgraded at any time to include elements that are not required, but may be deemed to enhance safety. Runway pavement and displaced threshold markings are painted white, while taxiway pavement markings are painted yellow. Taxiways generally have a centerline and pavement edge stripes, plus holding line markings at the entrance to a runway. **FAA AC 150/5340-1H**, *Standards for Airport Markings*, contains the precise details of these markings.

Runway 14-32 is marked as a precision instrument approach runway, and Runway 18-36 is marked as a non-precision instrument approach runway. As part of the recommendation to upgrade Runways 18 and 32 to provide CAT I precision approach capabilities, upgrades to precision approach markings will be required. Although Runway 36 will remain a non-precision approach, the full length of the runway should be marked for precision approach for a precision approach.

Also in conjunction with recommended extensions, construction and rehabilitation of taxiway and apron pavement, yellow centerline and edge markings will need to be provided on all active taxiways and associated pavement. Further, as noted earlier, pavement prior to the blast pads on Runways 14, 36 and 32 if rehabilitated should be marked with yellow chevrons to designate weaker pavement than the primary runways. All other markings at this time are in good condition, but as part of any overlay or recommended improvement as well as periodic maintenance (every 10 years) precise marking requirements based upon **FAA AC 150/5340-1H** will need to remain.

4.3.4 Airfield Energy Efficiency and Sustainability

One of the FAA's key goals is to improve airfield energy efficiency through various upgrades to aging lighting and navigational facilities, investigating new methods for developing longer-sustaining pavements and markings, encouraging airports to purchase fuel-efficient or alternative energy vehicles, and improving airfield capacity. By focusing on these types of activities, long-term cost savings to the airport and operators can be realized, in addition to the environmental benefits to the community, which can then be used to pay for other needed airport improvements. The England Authority has taken several steps in improving the energy efficiency and sustainability of not only airfield facilities but landside development as well. The airport is actively pursuing alternative energy sources, and has recently upgraded all taxiway lighting to high efficiency, low emission diodes (LEDs). Further investigation concerning the use of non-critical airfield spaces as candidates for alternative energy development including the use of solar panels, wind turbines, etc. which would be integrated into the electrical vault system as well as providing backup generation for the Passenger Terminal Facilities was considered as part of the Airpark Alternatives Analysis.

4.3.5 Landside Facility Requirements

Landside facilities provide an interface between the air and ground transportation methods and include terminal facilities, aircraft hangars, aircraft parking aprons, automobile parking and support facilities including drainage, access, and utilities. Landside requirements also evaluated the property needed to accommodate future Airpark development based upon highest and best use of existing property. An overview of adjacent parcels was also undertaken to identify property required for inclusion into the airport property envelope to meet FAA design criteria.

In support of the Authority's efforts to maximize sustainable development and generate revenue for airport activities, the following landside characteristics were evaluated including:

- Land uses
- Development restrictions related to the transfer or disposition of property, current leases or adjacency to Airpark facilities
- On-going military activities
- General development areas as identified in the Reuse Plan
- Ownership patterns and the physical condition of adjacent properties
- Building conditions, to include the identification of structures to be removed
- Overall site circulation and external connections
- Condition and ownership of adjacent properties
- On-site parking
- Infrastructure capacity
- Open space and recreation amenities
- Design and place-making elements

Since the previous Reuse Plan provided a thorough inventory of the Airpark's facilities, this section focused on verifying baseline data and recent landside improvements including the passenger terminal, general aviation and airpark facilities as well as identifying building

conditions and Airpark property. This information was used to provide a baseline for both airside and landside development alternatives outlined in **Chapter 6** of this report.

Commercial Passenger Terminal Facilities

The passenger terminal building at AEX represents the interface between ground and air transportation. The airport itself, and specifically the passenger terminal building, serves as the gateway to the community and generally forms a visitor's first impression of the community the airport serves. It is important to provide a terminal complex that provides a safe, efficient, and comfortable environment for transferring passengers and their baggage. To accomplish this, essential elements for ticketing, passenger processing, baggage handling, security inspection areas, etc. must be incorporated. Support facilities, such as food service, car rental, gift shops, rest rooms, and management/other offices, are also needed within the terminal.

As described in **Chapter 2**, *Existing Facilities Inventory*, a new passenger terminal was recently constructed at AEX and was open for business in December 2007. The four-gate terminal is comprised of three levels totaling 107,187 square feet of space, with approximately 80,000 square feet under air conditioning and 35,000 square feet of covered open space in the lower level bag makeup area. The new terminal provides all of the amenities of a modern commercial service terminal including an integrated Air Traffic Control Tower (ATCT). The new passenger commercial terminal has won several awards associated with design and construction, and is enjoyed by residents and visitors alike.

Facilities and space associated with the new terminal include:

- Four (4) Passenger Gates
- 8 Acres of Terminal Apron
- 107,187 square feet of Terminal Enclosed Space, and
- 1,237 spaces Terminal Parking (Public, Rental and Employee)

As required by **FAA AC 150/5060-6B**, *Airport Master Plans*, ultimate (beyond year 2027) passenger terminal complex space requirements were calculated based on accommodating 159 peak hour enplanements/passengers. Long-term requirements were determined for passenger gates, apron frontage, terminal enclosed space (ticket counters, holdrooms, circulation, security, restaurant, restrooms, baggage, etc.), and automobile parking.

Applying regional/air taxi passenger demand through the year 2027, passenger terminal requirements presented herein were identified.

Passenger Gates

Aircraft parking positions/gates are dependent upon the number of airlines providing service, peak hour traffic, passengers per flight, and aircraft average occupancy times. Aircraft occupancy times are dependent upon passenger deplanement and enplanement peak hour(s), aircraft turnaround time, and aircraft type. Further, consideration must also be given to overnight parking requirements either at a gate location or on the adjacent terminal apron.

In evaluating demand over the twenty-year planning period in conjunction with shifts in aircraft fleet mix, it was determined that the existing four gate configuration would accommodate peak hour demand as shown in **Chapter 3**, *Aviation Activity Forecasts (***Table 3.42***)*. This was based upon the assumption that as enplanements increase operators would convert to larger regional jets with 70-seat or more average capacity. Thus, any requirement for additional gates beyond the mid-term planning period is deemed unnecessary unless an unforeseen change in regional operations (i.e. introduction of new operator) occurs. The terminal was designed and constructed to allow for easy expansion, thereby allowing new gates to be constructed if demand warrants.

Terminal Enclosed Space

The new passenger terminal is approximately 107,000 square feet providing an open and airy atmosphere, which is well liked by users. The open concept takes full advantage of natural light, thus limiting the need for supplemental lighting. Again, based upon peak hour passenger demand, the size and configuration of the terminal building can accommodate users throughout the planning period unless a major change in commercial operations occurs. However, as mentioned earlier, the terminal can be expanded if ultimately needed. Furthermore, the unique configuration of the terminal allows passengers to wait outside security in a centralized seating area before entering the holdroom/gate area shortly before departure (see photo), thereby reducing the need for multiple gates.

Terminal Apron

Based upon forecast peak hour regional operations of four aircraft, two small and two medium, the current apron area of approximately eight (8) acres will accommodate long-term operations. In addition, due to the location and configuration of the terminal apron, parking is currently available to accommodate overflow or overnight regional aircraft parking requirements as well as accommodate future expansion needs if necessary. Still according to forecast demand, the current apron facilities are anticipated to accommodate regional traffic demand beyond the twenty-year planning period. If additional overnight aircraft parking is required, it may be

accommodated on the expanded South Apron area adjacent to Million Air of Alexandria's new FBO facilities.

Automobile Parking

Automobile parking adjacent to the terminal facilities includes public, ready/return rental car, taxi/public transportation as well as employee parking. As described in **Chapter 2**, the main passenger auto parking lot is located north of the terminal and has a total capacity of approximately 717 spaces. The first two rows of this lot are reserved for rental car returns and handicap parking. The remaining area is used for both short and long-term parking. The rental car ready lot is located due east of the main terminal. Employee parking has been located to two lots west of the newly renovated FBO terminal. The first employee lot is located between the ARFF facility and the FBO terminal. This lot provides approximately 40 spaces, and is used by ARFF, Million Air of Alexandria (FBO) and terminal employees. A second employee lot has been designated across the street from the first lot, which contains approximately 60 spaces.

Public Parking

According to the **AC 150/5360-9 and 13**, only 225 public parking spaces are required to accommodate annual enplaned passengers. However, based upon discussions with staff and site visits, approximately 65 to 75 capacity occurs during heavy peak user periods (see picture), which represents approximately 491 parking spaces (655 public parking spaces multiplied by 75%). Even during off peak hours, terminal parking demand ranges between 295 (40%) and 328 (50%) parking spaces. As a result, the FAA methodology could not be used to determine long-term parking requirements.

Therefore to accurately predict future public parking demand, a ratio of public parking to annual passenger enplanements was developed. Assuming that 50 percent of the main parking lot, which consists of 655 public parking spaces, is full during most of the year and dividing by regional passenger enplanements resulted in a factor of 0.0025 parking spaces per annual passenger enplanement. Applying this ratio to forecast passenger enplanements for key forecast years resulted in a demand for 617 total public parking spaces by the year 2027 as shown in **Table 4-29**.

TABLE 4-29 AUTOMOBILE PARKING REQUIREMENTS				
Requirements	**Existing**	**2017**	**Ultimate (2027)**	**Surplus/(Deficit)**
Regional Passenger Enplanements	129,005	177,610	246,980	
Terminal Parking Spaces				
Terminal Public Parking[1]	655	444	617	38
Overflow Parking[2]	350	0	0	350
Ready/Return Rental Cars[3]	129	178	245	(116)
Employee[4]	100	208	289	(189)
Total Terminal Area Parking Spaces	**1,234**	**830**	**1151**	83
Terminal Area Auto Parking (Acres)				
Public (58.67 SY)	12.18	5.41	7.5	4.68
Rental Car (35.27 SY)	0.94	1.29	1.77	(0.83)
Employee (62.44 SY)	1.29	2.71	3.76	(2.47)
Total Acreage	14.41	9.41	13.03	1.38

Notes:
[1]Terminal Public Parking refers to main parking area minus rental car return parking spaces.
[2]Overflow Parking refers to spaces adjacent to FBO terminal facilities
[3]Ready/Return Parking includes rental car parking in the main terminal parking area and adjacent to the terminal facility
[4]Employee parking consists of both parking lots used by ARFF/Million Air and Passenger Terminal Employees.
1 acre = 4,840 SY
Sources: AC 150/5360-9, Planning and Design Guidelines for Non-hub Airports, and AC 150-5360-13, Planning and Design Guidelines for Airport Terminal Facilities, and The LPA Group Incorporated, 2008

Although based upon forecast demand, it is unlikely that additional parking capacity will be required in the next 10 years, airport management as part of their land use development plan has designated the parking lot adjacent to Neel Kearby Blvd adjacent to the FBO terminal as overflow parking, which provides an additional 350 public parking spaces.

According to **FAA AC 150/5360-9**, *Planning and Design of Airport Terminal Facilities at Non-Hub Locations*, and **FAA AC 150/5360-13**, *Planning and Design Guidelines for Airport Terminal Facilities*, typically 40 square yards per parking space is used to determine parking requirements. However, in evaluating existing parking acreage and available parking spaces at AEX, the public, rental car and employee parking space requirements were determined as follows:

- Public Parking = approximately 59 SY per Parking Space
- Rental Car Ready/Return = 35 SY per Parking Space
- Employee Parking = 63 SY per Parking Space

This deviation from the FAA standards is primarily the result of heavy truck parking and other large vehicle requirements. Applying these factors to forecast parking requirements resulted in a parking area for rental car and employee parking over the long-term planning period.

Rental Car Parking

At small airports, rental car parking requirements are typically 10 cars per each rental car operation. However, in the case of AEX, historical demand for rental cars is much higher. The FAA approved *1998 Master Plan* calculated that rental car demand was approximately 0.00099 per annual passenger enplanement. Applying this factor over the twenty-year planning period resulted in 245 rental car spaces required by the year 2027. However, the Airport Authority is already in the progress of expanding rental car facilities east of the terminal facility; therefore, it is anticipated that the rental car deficit shown in **Table 4-29** will be accommodated by this development.

Employee Parking

Employee parking, according to **AC 150/5360-13** typically represents 10 to 20 percent of total terminal public parking requirements. However, based upon the planned development at AEX, this employee parking ratio is unrealistic. Therefore, a more realistic ratio of approximately 46 percent was used to calculate long-term employee parking demand. Applying this ratio to calculated total public parking requirements over the twenty-year period results in 289 employee spaces required by 2027.

General Aviation (GA) Facility Requirements

General aviation facilities include aircraft apron and parking areas, aircraft storage, fixed based operator, maintenance, repair and overhaul and cargo facilities and associated access and vehicle parking requirements. Requirements were based not only on projected demand, but current and forecast market conditions and the long-term vision for AEX. Facility requirements are expressed in terms of gross area to identify excess or deficits in long-term capacity. This assessment quantifies future development items needed to maintain an adequate level of service, function, and operation at the airport using demand level triggers to identify a timeline for improvements.

At the time the previous master plan was written, England Jet Center was the fixed based operator (FBO). However, since it was relatively new to the airport, the master plan could not project long-term general aviation (GA) requirements. Instead the master plan documentation identified generalized requirements and identified areas around the FBO facility for future development.

Since the completion of the previous master plan, the England Jet Center was replaced by the current FBO, Million Air of Alexandria. Million Air has been at the airport for several years, and, thus, provided historical data which was used to project long-term GA requirements. GA facility requirements are the result of conversations conducted during on-site inspections and interviews with FBO and airport personnel. Aviation activity forecasts presented in **Chapter 3** of this report provided the foundation for the identification of long-term GA requirements.

However, the GA facility requirements at AEX are unique primarily because of the type and manner in which Million Air provides services at the airport. Million Air is a full-service FBO

providing 100LL and Jet A fuel to GA, commercial and transient military operations. In addition providing such GA facilities as catering, rental car and courtesy car services, flight training, aircraft towing and emergency services, etc., the FBO also provides services and overflow apron parking space to military, commercial and cargo aircraft operators. As a result, allowances were incorporated into the determination of GA facility requirements where noted, so as to not discount the demands of the FBO.

Aircraft Storage

GA storage requirements typically include T-Hangar, Commercial hangars, and apron storage as defined below:

- T-Hangar Storage – A T-hangar is a fully enclosed building housing one individual stall that is capable of storing one aircraft, typically a single-engine or light multi-engine aircraft. All T-hangar facilities at AEX are managed by the airport. T-hangars are the preferred storage method for owners of small aircraft. However, at AEX, only 15 percent of based aircraft are stored within the T-hangar facilities.

- Commercial Hangar Storage – Larger hangars designed to accommodate several small aircraft or one very large aircraft. They are typically occupied by aviation related businesses or by larger corporations for the storage and maintenance of their own turboprop or jet aircraft. However, in the case of AEX, approximately 85 percent of all based aircraft, single-engine, multi-engine, turboprop, jet and helicopter are stored in commercial hangar facilities.

- Based Apron Storage – Based apron storage is comprised of apron tie-down and based ramp parking. Typically, a small percentage of small based aircraft owners prefer the low-cost tie-down storage option as opposed to paying the more expensive monthly rent for hangar space.

- Transient Apron Storage – The transient apron is typically located adjacent the airside main entrance to an FBO facility. This area is utilized for the temporary parking of aircraft that visit the airport for a short period of time, e.g. to drop off or to pick up passengers or to get fuel.

T-Hangars

There is one T-Hangar facility on the airport located on the south side of the South Apron. The T-Hangar building includes 10 bays and is approximately 14,000 square feet (sf). Users of T-Hangar/Box hangars typically include single and multi-engine piston fixed wing aircraft and small rotorcraft. However, AEX is unlike most airports since the majority (85 percent) of based aircraft are housed in large commercial hangars. The remaining six are housed in the T-hangar facilities. According to staff, the T-hangar was constructed approximately 10 years ago, and has never been fully rented. This is because AEX is surrounded by a number of small, GA airports who offer extremely low T-hangar rental rates, which attract private small aircraft owners.

Thus, evaluating existing T-hangar use to based aircraft forecasts, it is unlikely that additional T-hangars will be required during the planning period as shown in **Table 4-30**.

TABLE 4-30
LONG RANGE T-HANGAR REQUIREMENT

Year	Forecast Based Aircraft[1]	15% SE	Total Required	Existing Availability	Surplus (Deficit)
2007	40	6 Bay	6 Bay	10 Bays	4 Bays
2012	42	6 Bay	6 Bay	10 Bays	4 Bays
2017	44	7 Bay	7 Bay	10 Bays	3 Bays
2022	47	7 Bay	7 Bay	10 Bays	3 Bays
2027	49	7 Bay	7 Bay	10 Bays	3 Bays

Notes: 1According to Airport Staff, approximately 46 aircraft are based at AEX as of January 2009. Of which, 6 are based in the T-hangars and the remaining within the Commercial hangar facilities.
Source: The LPA Group Incorporated, 2008.

Commercial Hangars

Based aircraft commercial/corporate hangar storage is provided in several hangar facilities adjacent to the South Apron. Since many of those hangars are occupied by private tenants, the number of hangared aircraft in 2007 was assumed to represent full hangar capacity. Thus, any additional based aircraft after 2007 would require new hangar storage facilities at AEX. As noted, approximately 85 percent of based aircraft are housed within commercial hangars. To determine commercial aircraft storage requirements, the historic ratio of 85 percent was applied to forecast based aircraft as shown in **Table 4-31**. In addition, based upon discussions with airport staff, it was determined that based aircraft have increased from 40 in 2007 to 46 in 2009, which is above the forecast levels. Thus, applying the forecast average annual growth rates to this number resulted in a demand for an additional 10 spaces by 2027.

TABLE 4-31 LONG RANGE COMMERCIAL HANGAR REQUIREMENT						
Year	**Forecast Based Aircraft**	**Hangar Storage Space Demand (85%)**	**Surplus (Deficit)**	**Updated Forecast based upon 2009 Aircraft**	**Hangar Storage Space Demand (87%)**	**Surplus (Deficit)**
2007[1]	40	34	0 Aircraft	40	34	0 Aircraft
2009[2]	41	35	(1 Aircraft)	46	40	(6 Aircraft)
2012	42	36	(2 Aircraft)	47	40	(6 Aircraft)
2017	44	37	(3 Aircraft)	48	41	(7 Aircraft)
2022	47	40	(6 Aircraft)	50	43	(9 Aircraft)
2027	49	42	(8 Aircraft)	51	44	(10 Aircraft)
AAGR	0.61%			1.26%		

Notes:
[1] For future hangar planning purposes, the number of hangared aircraft in 2007 was assumed to represent full hangar capacity; thus, any additional based aircraft after 2007 would require new hangar storage facilities at AEX.
[2]Updated based aircraft obtained from airport management
Source: The LPA Group Incorporated, 2008.

Apron Requirements

As noted earlier, AEX is equipped with four interconnected apron areas: South Apron, commercial passenger terminal apron, North Apron and Military/Air Cargo Apron, each of which accommodate specific facilities and operations. The South Apron area is approximately 55.7 acres (270,000 SY) and is composed of concrete. The apron accommodates primarily GA operations and facility requirements are included for T-hangar and maintenance hangar/shop and storage facilities in addition to the FBO's facilities including a small portion of pavement used for based and transient GA aircraft storage.

Other portions of the South Apron are used for aircraft maneuvering and as overflow parking areas for military, commercial, and cargo aircraft. The determination of apron space requirements is based specifically on GA facility requirements only. This information may be used to identify FBO lease property requirements as well as development opportunities adjacent to the apron for future GA development.

With the recent relocation of Million Air of Alexandria's terminal facility to the northwest corner of the South Apron, there is not adequate apron frontage to accommodate transient aircraft parking requirements. This is especially problematic because of the limited access to and from the apron, and the size and type of aircraft that typically use the South Apron (i.e. MD-11, B747, Saab 340, Gulfstream III and Vs, Learjet 60s, etc.). This issue in conjunction with other proposed development shows a deficit in the amount, suitability and location of existing

apron facilities. Typically based and transient aircraft requirements are determined using **FAA AC 150/5300-13**, *Appendix 5*. However, it has already been determined that all based aircraft are currently and forecast to remain housed in hangars. As a result, based aircraft apron requirements were not determined.

Transient Aircraft Apron Requirement

Transient apron space is intended for short-term aircraft parking, usually for no longer than 24 hours. According to **FAA AC 150/5300-13**, *Airport Design*, *Appendix 5*, apron parking demand is generally based upon ½ the peak hour parking demand. However, since GA transient aircraft typically stay longer than one (1) or two (2) hours, ½ the peak day transient operations was used to determine transient apron parking requirements. The AC also recommends allowing an area of 360 SY per each transient aircraft. However, since transient aircraft parking demand includes aircraft ranging in size from small single-engine to corporate jets and turbine rotorcraft, an average of 1,200 SY was used to provide adequate area to accommodate a variety of transient operations.

Applying forecast transient peak day parking demand to average apron area demand resulted in transient aircraft parking apron requirement of 8,400 SY by the year 2027 as presented in **Table 4-32**.

TABLE 4-32
TRANSIENT AIRCRAFT APRON REQUIREMENT

Year	Transient Peak Day Operations	Peak Day Parking Requirements (Spaces)	Apron Required (SY)
2007	9	4	4,800
2012	10	5	6,000
2017	12	6	7,200
2022	13	7	8,400
2027	14	7	8,400

Sources: FAA AC 150/5300-13, Appendix 5, and The LPA Group Incorporated, 2009

Summary of GA Apron Requirements

Table 4-33 summarizes the overall GA apron requirements associated with transient aircraft parking demand and hangar apron requirements. Commercial hangar requirements, according to FAA design requirements, should equal hangar square footage requirements. As shown, approximately 81,200 SY of apron would be required to accommodate aircraft demands by the end of the twenty-year planning period. General aviation demand should be considered in the development of the South Apron alternatives. Although the South Apron consists of approximately 270,000 SY of concrete, additional apron space is required to accommodate transient aircraft parking adjacent to the FBO facilities. Further, development on and adjacent to the South Apron is limited as a result of the long-range radar facility's clear zone requirements. Until the long-range radar is relocated or decommissioned, it will impact development contiguous to and use of the existing apron itself.

TABLE 4-33 SUMMARY OF GA AIRCRAFT APRON REQUIREMENTS					
Year	**Transient Aircraft Parking Apron (SY)**	**Conventional Apron Requirements[1] (SY)**	**T-Hangar Apron Requirements[2] (SY)**	**Total Apron Requirements (SY)**	**Surplus (Deficit) (SY)**
2007	4,800	54,400	0	59,200	210,800
2012	6,000	64,000	0	70,000	200,000
2017	7,200	65,600	0	72,800	197,200
2022	8,400	68,800	0	77,200	192,800
2027	8,400	70,400	0	78,800	191,200

Notes:
[1]Conventional Apron requirements are based upon an estimated aircraft size of 1,600 SY and is equal to total conventional hangar space requirement, and are based upon updated 2009 based aircraft requirements
[2]T-Hangar facilities do not require apron space
Source: FAA AC 150/5300-13, Airport Design, and The LPA Group Incorporated, 2009

Fixed Based Operator Facility Requirements

As mentioned earlier, Million Air of Alexandria is the FBO operator at AEX. The FBO Terminal is located within Building 2106, the former passenger terminal building. The facility was recently renovated and opened in November 2008. Other buildings operated by the FBO to fulfill its operations and requirements include: Buildings 2102, 2505, 2504, 2503, 2528, 2526, and associated ramp space. The FBO provides a variety of services to GA, commercial, military and cargo operators including providing fuel to daily commercial operators and transient military aircraft.

General Aviation Pilot and Passenger Terminal Requirements

GA pilot and passenger requirements are typically accommodated by the FBO, thus segregating GA and commercial passengers. The FBO Terminal provides the following amenities: a pilot lounge, sleep room, conference rooms, rental and courtesy cars, vending machines, restrooms, pilot supplies, catering, etc.

Since GA operations are anticipated to remain more than 30 percent of total operations over the planning period, adequate facilities should be made available to accommodate anticipated demand. According to **AC 150/5300-13** and GA Terminal Guidelines, peak hour local and itinerant operations from Chapter 3 were used to develop peak GA passenger demand.

To estimate the peak hour/passenger demand, the following assumptions were made:

- The peak hour GA operations forecast from **Table 3-55** was used to calculate terminal space.
- Since arriving and departing GA passengers and pilots could use the terminal facility at the same time, the number of peak hour operations was not adjusted.
- Pilot and passenger requirements were applied as shown in **Table 4-34**:

TABLE 4-34 GA PILOT AND PASSENGER REQUIREMENTS	
Operation	**Pilot/Passengers**
GA Small Local	1
GA Large Local	5
AT	9
Transient Small	3
Transient Large	7

Sources: AC 150/5300-13 and AC 150/5360-9

- An area of 150 SF was used for each passenger/pilot to determine the terminal space requirements. This value per passenger/pilot incorporates all functions of a full service GA terminal building which is calculated as follows:
  - 80 square-feet for public areas including circulation, structure, and utilities.
  - 50 square-feet for FBO areas including service counter and office space.
  - 20 square-feet for pilot areas including lounge, flight planning, etc.

Applying pilot and passenger requirements as shown in **Table 4-34** to local and itinerant peak hour operations, the following FBO terminal requirements are required as shown in **Table 4-35**.

TABLE 4-35 GA PILOT AND PASSENGER TERMINAL REQUIREMENTS					
Year	**Peak Hour Itinerant Aircraft**	**Peak Hour Local Aircraft**	**Total Aircraft**	**Peak Hour Passengers**	**Terminal Requirements (SF)**
2007	1	1	2	8	1,200
2008	1	2	3	13	1,950
2012	1	2	3	13	1,950
2017	1	2	3	13	1,950
2022	1	2	3	13	1,950
2027	1	2	3	13	1,950

Source: The LPA Group Incorporated, 2008

Based upon the methodology above and shown in **Table 4-36**, the existing FBO terminal area is more than sufficient to accommodate GA passenger demand throughout the remainder of planning period.

FBO Automobile Parking Requirement

The demand for automobile parking spaces at FBO facilities is generally associated with the airport's total number of based aircraft owners, visiting GA passenger and pilots (i.e., peak hour passengers and pilots), and FBO employees. Parking for the FBO is available in front of and adjacent to the FBO Terminal. Additional parking is available in the overflow lot located across Billy Mitchell Boulevard.

To determine automobile parking facility requirements, the following assumptions and methodology was used based upon peak hour GA operations.

- The based aircraft and unadjusted peak hour GA operations forecasts from Chapter 3 were used to determine the FBO automobile parking demand.
- Passenger parking spaces were determined as follows:
  - 2.5 spaces for each peak hour itinerant passenger, and
  - Two (2) spaces for each Large Local Passenger Operation
- The total number of full-time and part-time FBO employees (20 full-time and 5 part-time) was applied to all years of the FBO automobile parking demand.

TABLE 4-36
FBO AUTOMOBILE PARKING REQUIREMENT

Year	Based Aircraft Requirement	Itinerant Aircraft Requirement	FBO Employee Requirement	Total Parking Requirement
2007	0 Spaces	18 Spaces	25 Spaces	43 Spaces
2012	2 Spaces	18 Spaces	25 Spaces	45 Spaces
2017	2 Spaces	18 Spaces	25 Spaces	45 Spaces
2022	2 Spaces	18 Spaces	25 Spaces	45 Spaces
2027	2 Spaces	18 Spaces	25 Spaces	45 Spaces

Source: The LPA Group Incorporated, 2008.

As shown in **Table 4-36**, a requirement of 45 FBO automobile parking spaces was identified to accommodate the demands of based aircraft owners, visiting passengers and pilots, and employees by the end of the planning period. No additional FBO automobile parking facilities are required during the planning period.

Maintenance, Repair and Overhaul

Currently at AEX, the demand for new aircraft maintenance facilities is difficult to predict because of uncertain economic conditions in the United States and the struggling airline industry as a whole, which has resulted in cost-reduction measures across the board for Maintenance Repair and Overhaul (MRO) facilities and services. According to the FAA's report, *Practices and Perspectives in Outsourcing Aircraft Maintenance* (March 2003), rather than conducting the majority of aircraft maintenance in-house, airlines are increasingly outsourcing heavy aircraft maintenance to specialized third-party providers. In the years since the FAA's report was published, significant MRO facility development has occurred at airports in foreign countries, such as El Salvador, where mechanics are paid much less than in the United States; consequently, the foreign MRO facilities provide reduced-price maintenance options for several U.S. carriers. However, a recent increase in aircraft maintenance violations by U.S. carriers has caused the FAA to impose steep fines and Congress is now considering more stringent inspection standards for foreign MRO facilities and employees (e.g., drug and alcohol testing). As a result,

some U.S. carriers, including Southwest Airlines, have decided to conduct all future aircraft maintenance in the United States.[20]

Additionally, as discussed in **Chapter 3**, *Aviation Activity Forecasts*, there are currently 14 manufacturers of very light jets (VLJs), such as the Eclipse Jet and Cessna Citation Mustang, which are primarily intended for general aviation and corporate users.[21] The *FAA Aerospace Forecasts, 2007-2020*, predicts that 6,300 VLJs will be in operation by 2020. Subsequently VLJ manufacturers are developing maintenance/sales centers at airports throughout the United States in order to adequately serve VLJ users. For example, Eclipse Jet recently opened facilities in Van Nuys, California, Albuquerque, New Mexico, Gainesville, Florida, and Albany, New York.

As described above, these recent trends in the airline and VLJ industries are important considerations for attracting a new MRO tenant to AEX. URS Greiner's report, *Commercial Aircraft Hangar Study Phase I* (June 23, 1998), recommended future marketing efforts in order to determine the realistic demand for MRO facility development at AEX. With Congress considering more stringent inspection standards for foreign MRO facilities and employees, and the anticipated growth in VLJ aircraft, there may be a high demand for MRO facility development at 'shovel-ready' airports in the United States, such as AEX. Since airlines are increasingly reducing in-house aircraft maintenance activities in order to reduce costs, AEX's marketing efforts should be geared towards attracting third-party MRO tenants that provide heavy aircraft maintenance for multiple airlines, and/or VLJ manufacturers. Therefore, **Chapter 6**, *Airpark Alternatives Analysis*, will identify areas of the airport for potential MRO development.

Air Cargo

Typically at non-hub facilities, air cargo is carried in the lower compartments of passenger aircraft and processed through the terminal. In cases where there is significant air cargo volume, a separate building may be needed. The building should be located within reasonable proximity to the passenger terminal building to facilitate the movement of cargo. As noted in both Chapters Two and Three of this report, the majority of air cargo is provided via belly freight on either regional or air charter aircraft. In reviewing DOT Form 41 data as well as AEX comparative air traffic reports, a few small cargo carriers do use the airport. However, the amount of freight processed at AEX has historically not warranted a separate facility.

Although cargo tonnage is forecast to increase over the twenty-year period, it still not anticipated to require a cargo processing facility, absent a major generator of demand. This is primarily due to the fact that the majority of processed air cargo at AEX is related to military operations (average 20 million pounds), and, therefore, is processed through JRTC facilities located on the military/air cargo apron.

[20] Smith, Geri and Justin Bachman, "U.S. Airlines Outsource Majority of Repairs," Business Week, April 2008.
[21] VLJs are a relatively new product line of small jets (5 to 6 seats) that cost substantially less than typical business jet aircraft in terms of both acquisition and operating costs. According to www.very-light-jet.com, there are currently 14 manufacturers of VLJs.

Still the airpark is home to about 50 industrial tenants including Union Tank Car, Integrated Packaging Corporation, and Delta Beverage. Thus, based upon anticipated airpark development and the Authority's vision for the Airpark's long-term development, it is recommended that the Authority continue to market potential industrial and commercial users and air cargo operators. Therefore, as part of the alternatives analysis, a site should be reserved for potential future air cargo facility development.

Justice Prisoner and Alien Transportation System (JPATS)

As noted in the inventory chapter, JAPATS is operated by the United States Marshals service at AEX and is one of the largest prisoner/alien transporters in the world. JPATS average approximately 270,000 prisoner/alien transports per year of which approximately 1,506 operations were attributed to AEX in 2007. The JPATS loading and unloading activities occur on the North Apron ramp area and within Building 525. The North Apron area is located to the west of the recently constructed Military/Air Cargo Apron and is approximately 22.6 acres (~109,384 SY). The US Marshals service currently occupies eight (8) acres of land including Building 525, adjacent apron, storage and auto parking.

Since operations associated with the JPATS/Air Marshals service cannot be accurately predicted over the twenty-year planning period, forecast operations are anticipated to remain at 2007 levels throughout the planning period. The US Marshals service currently operates three (3) MD-80 aircraft, and, based upon discussions, is anticipated to continue to utilize B737 aircraft throughout the planning period. Since the North Apron exceeds the parking requirements associated with the loading and unloading of prisoners/aliens related to JPAT operations, no additional apron area will be required unless JPAT operations increase by more than 50 percent over current demand. With the exception of periodic maintenance, it was determined that JPAT facilities at AEX can accommodate anticipated demand beyond the twenty-year planning period.

Military

As noted in both **Chapters Two** and **Three**, 20 percent of all aviation activity at the airport has historically been associated with military activity due to a commercial lease between the England Authority and the US Army. At AEX, military activities are primarily associated with training activity and troop movements. A military/air cargo apron was recently constructed along the north side of the north apron as well as a troop processing facility. AEX is also used as the main training facility for the Joint Readiness Training Command (JRTC), which operates in conjunction with Fort Polk and Camp Beauregard to perform simulated war and troop logistics maneuvers. Since the new military/air cargo apron encompasses approximately 33.1 acres and both the apron and processing facilities are new, it is not anticipated based upon information obtained from the JRTC and other military users that additional facilities will be required to accommodate anticipated mission requirements. Additionally AEX is also used for emergency mobilization including the loading and unloading of supplies; therefore, property should be reserved for expansion and development if needed.

Helicopter Parking Areas

AEX had infield areas located east of Taxiway B and north of the north apron facilities which were designated for helicopter parking. As noted in the apron pavement evaluation, this pavement is currently unusable. The north, south, terminal and military/air cargo aprons are primarily designed to accommodate fixed wing operations. The airport currently does accommodate rotor wing aircraft on these aprons, but specific locations are not permanently designated for overnight or long-term parking.

Based upon historic operations and forecast demand associated with commercial, GA and military/emergency relief operations, it is recommended that an area of significant size be developed adjacent to the north and air cargo/military aprons to assist in the loading and unloading of supplies. Further, because of size variations and operating requirements associated with rotor wing compared to fixed wing operations, separation of parking facilities is highly recommended to limit potential hazards to operators and equipment. As part of the alternatives process, locations and sizing requirements associated with existing and future rotor wing operations will be evaluated including the installation of related support facilities.

Aviation Industrial

As noted during the airport inventory process, several additional aviation industrial facilities reside within the Airpark and are under the control of the England Authority. Facilities include workshops, hangars, storage areas, and other aviation facilities with direct access to the airfield. These facilities are located both to the south and east of the North Apron as well as contiguous to the South Apron. As part of any on-airport development options, the age and condition of these facilities need to be evaluated for highest and best use. Further, if necessary, existing tenants may need to be relocated to provide better access and use of existing aviation facilities. The England Authority should continue to market to potential tenants and provide available properties for development. As part of the alternatives analysis, consolidation of aviation industrial facilities may be considered as part of long-term development.

Aviation Support

Several other facilities are important to keeping the airport operational and for provision of key capabilities at AEX. The airport is designated under **14 CFR Part 139** as a Class I airport with an ARFF index of D. Since the airport caters to both large scheduled and non-scheduled operations, support facilities must meet specific operating thresholds. This section identifies the aviation related facilities required to comply with the operating and safety thresholds as well as considering improvements necessary to accommodate forecast demand, the airport's long-term role, as well as the England Authority's vision for the Airpark as a whole.

Air Traffic Control Tower

The air traffic control Tower is co-located with the commercial service terminal on the southeast side of the airfield. The tower is operational 24 hours per day and is staffed by the DOD and Louisiana Air National Guard 259th Air Traffic Control Squadron personnel. The ATCT personnel manage aircraft flying within the controlled airspace including the terminal area as well as vehicle and aircraft ground operations within the defined movement areas. Fort Polk

Approach Control works with the AEX ATCT by providing local approach and departure air traffic services.

Both the ATCT and Passenger Terminal facilities are new. The new location and orientation of the ATCT was determined using **FAA Order 6480.4**, *Airport Traffic Control Siting Criteria*. The new tower location allows controllers to view the entire airfield including the proposed thresholds of Runways 14 and 18 to the north. The tower was relocated as part of the terminal project since its previous location provided controllers inadequate depth perception along the northwest portion of the airfield, which would only become worse with the recommended extension. Thus, based upon discussions with tower personnel, no improvements are necessary to improve the view of the airfield even with the recommended extension of Runway 18 and various taxiway improvements. In conjunction with the Authority's planned long-term development, the old tower site is planned to be redeveloped as a park and observation area.

Wind Cones and Weather Facilities

As described in **Chapter 2**, *Existing Facilities Inventory*, the weather reporting capability at AEX is comprised of an Automated Surface Observing System (ASOS), located on the southwest side of Runway 14, near the glideslope, approximately 1,000 feet from the threshold. ASOS is a modern weather reporting system which measures meteorological data and gathers updated weather conditions every minute, then automatically transcribes and broadcasts the conditions via a designated radio frequency, telephone, and the internet. As a result, the weather reporting capability of the ASOS is sufficient for aircraft operations at this time. However, if a parallel taxiway is ultimately constructed on the west side of Runway 14-32, relocation of the ASOS would be necessary.

AEX currently has five lighted wind cones located on the airfield. Each runway is equipped with a wind cone positioned near each threshold, and there is an additional wind cone located within the midfield between the thresholds of Runways 18 and 14. Wind cones located near the end of Runway 18 and in the centerfield location are both supplemented with segmented circles. Therefore, AEX provides sufficient visual landing aids and no additional facilities are required at this time.

Airport Drainage

Pan American Engineers-Alexandria, Inc. completed an extensive field survey of existing drainage structures at Alexandria International Airport and the interrelated areas of England Airpark from the period of June 1999 through February 2000. The survey work included locating the structures, evaluating structural conditions and assessing general drainage at the airport. Existing storm sewers were hydraulically evaluated relative to established design criteria. Closed circuit remote video taping was performed for all structures crossing under active taxiways and runways by Wastewater Services, Inc, a subcontractor to PAE.

Based upon that information, which was compiled and extensively evaluated as documented and referenced in the *Master Drainage Report*, it was determined that the existing drainage system has largely reached the end of its useful design life and is incapable of meeting current design

criteria with respect to hydraulic capacity. The drainage in the South Apron area is the only drainage system that does appear to be in reasonably good structural condition with adequate hydraulic inlet and conveyance capacity.

The airport infield areas rely on a storm sewer system with only a few catch basin inlets and smaller storm sewer pipes to drain these large grassed areas. The system functions at present only because large sump areas are available to retain and detain storm water runoff until after the storm event passes. In consideration of the existing structures structural and hydraulic condition, abandonment of most structures in place and installation of a ditch-culvert drainage system is recommended for these areas.

Installation of a main storm sewer intercept draining towards the south into Bayou Rapides is recommended for the South Apron and terminal area. This storm sewer system equipped with a 6' x 6' RCBC outfall will reduce the amount of storm water runoff discharged into the commercial and business district of England Airpark, thus improving drainage in this area. This work is recommended to be completed as Phase 1 of a three phase project.

Phase 2 and 3 would replace the infield drainage systems with open ditches and culvert crossings, draining directly to Bayou Rapides where possible. This system will function better hydraulically, will be less costly to construct and will be easier to maintain. It is recommended that the digitized aerial mapping of the airport be completed and that all three phases of the project be designed under Phase 1 to reduce project costs, to ensure coordination of all project phases and to refine the estimated project costs. The estimated total project costs for all three phases based upon this study is $5.927 million dollars with each phase costing approximately $2 million each. It is anticipated that this will be accomplished during the intermediate-term development period of the airside capital improvement program

Proposed improvements are designed to integrate into modifications at the airport proposed in the master plan. Drainage infrastructure improvements must be made either simultaneously with or before any modifications or extensions are made to the taxiways, runways and aprons. While no items were identified in the study which were categorized as “emergency” in nature, the current condition of the drainage system warrants that the drainage improvements project be submitted for funding through the Airports Improvement Program (AIP) as a high priority project.

Electrical Vault

The airport is equipped with one electrical vault as well as two backup generators, which provide all airfield lighting. The generator to the north of the vault is capable of providing electricity for half the airfield; whereas the generator to the south of the vault can support the whole airfield. The vault building is home to a backup generator, transformers, circuit protection, relay board, etc. as well as a transfer switch for airfield lighting, signage and PAPI. As additional electrical systems were installed, the vault building was expanded to approximately 1,148 SF.

Although the previous master plan recommended the relocation and construction of a new vault facility, it is unnecessary since the vault was reconstructed approximately ten years ago in conjunction with an airfield lighting upgrade. Further, when the military installed the Hot Pads, the electrical vault was reinforced in case of an explosion on the pads. However, the two generators were not reinforced to withstand a potential blast, and its location within the central airfield provides ease of maintenance access. Thus, it is recommended to the sensitive nature of the electrical equipment that additional protection is provided to the backup generators.

All wiring, regulators, etc, are in good condition within the vault. However, as part of the lighting project, it was determined that old and obsolete electrical wiring is located throughout the airfield grounds. Thus, in conjunction with the installation of additional "green"energy options (LED airfield lighting, LED lighting transformer, regulators and other circuitry, use of solar panels, wind turbines, etc) and other airfield development, unused wiring should be removed and existing and new wiring should be documented into a GIS data system.

Security Requirements and Fencing

According to Title 14 Code of Federal Regulations (CFR) Part 139 (14 CFR Part 139), AEX is designated as a Class I airport since it accommodates scheduled and unscheduled large air carrier aircraft (30+ seats) and scheduled small (10-30 seats) air carrier aircraft. As such, security operations and facilities must meet both 14 CFR Part 139 and 49 TSA 1542 security requirements and facilities for commercial service airports. As mentioned within Chapter Two of this report, the level of security enhancements required beyond those outlined in **TSA: Part 1542**, *Airport Security*, may be determined through the use of a vulnerability assessment.

Based upon Transportation Security Administration and FAA requirements, AEX is designated as a Security Category IV airport. Security categories are based upon the amount of traffic flow, security strategic importance and personnel needs. Traffic flow is a major determining factor in the determination of the Airport security category. Commercial Airports with high levels of traffic, near a large population center, etc. typically have a Security Category level of X or I. Commercial Airports located further away from city centers with lower traffic volumes are typically categorized as Categories II, III and IV. Commercial airport security levels are defined as follows:

- Category X Airports = These airports have the highest level of security, and are required to meet all TSA 1542 requirements. Airport Police, Aviation Administrators and associated personnel and equipment required to detect explosives are required to be readily available as well as high level of staffing. Category X airports typically have 24 hour security staffing, are equipped with various levels of cameras and alarms, require different levels of security badging and access, etc.

- Category I Airports = Small communities near large cities are often given a Category I designation. These airports, like Category X, are required to have all resources available but do not necessarily have to have them available on demand. A staffing shortage could

result in a delay of staffing but all services need to respond to and prevent security breaches.

- Category II Airports = Small communities are given a Category II designation. This designation is given to airports serving less traffic than Category I airports. Some resources (i.e. police) may not be available at the airport, and, therefore, are provided by the nearest city or county. Bomb sniffing equipment and heavy weapons may not be available, and would likely be provided by the City's police force. Staffing emergencies are more likely and the security checkpoint cannot guarantee that an officer of the same gender is available.

- Category III Airports = Small communities (i.e. Grand Junction CO) are sometimes given a Category III designation. This is given to communities too far from large airports to be of any large interest as a potential target. These communities often do not have the resources to cope with severe attack and heavy staffing of security personnel is not required. As with Category II airports, personnel of both genders may not always available.

- Category IV Airports = Any city that flies into a Category X, I, II or III airport is required to have security screening no matter how small that airport is. Category IV airports are typically the smallest airports often having only one (1) security checkpoint and less than four terminal gates. Category IV airports often have no special secured areas (SIDA, Sterile, etc.) and are characteristically the size of a municipal airport.

In general, an airport that has a high level of traffic, near a high level of commerce, hotels, or major infrastructure (i.e. dams, military bases, and/or historical landmarks) is likely to be classified at a higher security level than a similarly sized airport not located near a city center (i.e. population less than 100,000).[22] The most relevant reason an airport is forced to change their security status from a Category IV to a Category III is the result of commercial service associated with aircraft providing 61 or more seats. Based upon this requirement, it is anticipated that AEX's airport security category will be upgraded to a Security Category III.

As part of the security upgrade, the airport would be required to have a Complete Security Program with the following listed items added to their Airport Security Plan.

"(a) Complete Airport Security program. Except as otherwise approved by TSA, each airport operator regularly serving operations of an aircraft operator or foreign air carrier described in §1544.101(a)(1) or §1546.101(a) of this chapter, must include in its security program the following:

(1) The name, means of contact, duties, and training requirements of the ASC required under §1542.3.

[22] Wikipedia Library, Airport Security Categories, September 2008

(2) [Reserved]

(3) A description of the secured areas, including-

(i) A description and map detailing boundaries and pertinent features;

(ii) Each activity or entity on, or adjacent to, a secured area that affects security;

(iii) Measures used to perform the access control functions required under §1542.201(b)(1);

(iv) Procedures to control movement within the secured area, including identification media required under §1542.201(b)(3); and

(v) A description of the notification signs required under §1542.201(b)(6).

(4) A description of the AOA, including-

(i) A description and map detailing boundaries, and pertinent features;

(ii) Each activity or entity on, or adjacent to, an AOA that affects security;

(iii) Measures used to perform the access control functions required under §1542.203(b)(1);

(iv) Measures to control movement within the AOA, including identification media as appropriate; and

(v) A description of the notification signs required under §1542.203(b)(4).

(5) A description of the SIDA's, including-

(i) A description and map detailing boundaries and pertinent features; and

(ii) Each activity or entity on, or adjacent to, a SIDA.

(6) A description of the sterile areas, including-

(i) A diagram with dimensions detailing boundaries and pertinent features;

(ii) Access controls to be used when the passenger-screening checkpoint is non-operational and the entity responsible for that access control; and

(iii) Measures used to control access as specified in §1542.207.

(7) Procedures used to comply with §1542.209 regarding fingerprint-based criminal history records checks.

(8) A description of the personnel identification systems as described in §1542.211.

(9) Escort procedures in accordance with §1542.211(e).

(10) Challenge procedures in accordance with §1542.211(d).

(11) Training programs required under §§1542.213 and 1542.217(c)(2), if applicable.

(12) A description of law enforcement support used to comply with §1542.215(a).

(13) A system for maintaining the records described in §1542.221.

(14) The procedures and a description of facilities and equipment used to support TSA inspection of individuals and property, and aircraft operator or foreign air carrier screening functions of parts 1544 and 1546 of this chapter.

(15) A contingency plan required under §1542.301.

(16) Procedures for the distribution, storage, and disposal of security programs, Security Directives, Information Circulars, implementing instructions, and, as appropriate, classified information.

(17) Procedures for posting of public advisories as specified in §1542.305.

(18) Incident management procedures used to comply with §1542.307.

(19) Alternate security procedures, if any, that the airport operator intends to use in the event of natural disasters, and other emergency or unusual conditions.

(20) Each exclusive area agreement as specified in §1542.111.

(21) Each airport tenant security program as specified in §1542.113.

In addition, Security Documentation (SD) 1542-01-07M, SD 1542-01-10E, SD 1542-14-08E, SD 1542-04-09, SD 1542-04-10 would likely apply to a greater extent as CAT III due to the Complete Program (requirement). Further, according to the FAA, there will be no change in the airport's Part 139 Operating Certificate with the upgrade from a Security Category IV to a III"[23].

[23] Transportation Security Administration Guidelines 1542, Airport Security, 2008

The existing airfield is protected using a six-foot chain link fence topped with three (3) strands of barbed wire. Access to the airfield is limited to authorized personnel who are either equipped with magnetic key cards or wireless remotes located within authorized airport vehicles. As part of any proposed development, access control to airfield, terminal and critical components and facilities at the airport will need to be protected. As a result, any proposed development will include access and security recommendations.

The passenger terminal consists of three specific areas: public, non-public and sterile. A sterile area as defined in the airport security program as that area which provides passengers access to boarding aircraft and to which access is generally controlled by TSA. Sterile areas include passenger screening and may also include revenue-generating facilities which may be impacted during high threat. Terminals should be designed to limit locations for concealment for either an object or a person as well as prevent through the use of physical or electronic deterrents public access to non-public or sterile facilities. Access to secure areas within AEX's passenger terminal can only be obtained by individuals that possess the appropriately authorized magnetic access card or if they are accompanied by the appropriately authorized individual(s). The airport is currently equipped with only one passenger security checkpoint and checked baggage screening facilities. If, however, enplanements increase as expected in conjunction with Airpark development, it is likely that the airport will be upgraded to a Security Category III in the future. This will require additional badging requirements to limit access to security identification areas within the AOA, as well as additional security checkpoints, equipment, in-line baggage facilities as well as personnel.

In addition, if not already in place, an Airport Tenant Security Program (ATSP) area should also be specified in an agreement between the airport operator and the tenant, which specifies the measures by which the tenant will perform specified security functions, as authorized by the TSA under 49 CFR 1542.113. In the case of the military apron, security in this area must also meet not only TSA but also Department of Defense (DOD) security requirements to limit unauthorized access to these facilities.

Therefore, in conjunction with any planned improvements, access control including fencing and the establishment of secure identification areas (SIDAs) and sterile areas both within the commercial passenger terminal and airside will be needed to maintain the long-term safety and security of airport staff, users and passengers. Security improvements are identified as part of the Alternatives Analysis within Chapter 5 of this report.

Fuel Storage Requirements

As described in **Chapter 2**, *Existing Facilities Inventory*, the primary fuel bulk storage area is located in the northeast quadrant of the airport in an area referred to as the fuel farm. The fuel farm is comprised of several large-volume fuel storage tanks – some of which are currently not usable due to their condition. Relocation of the fuel farm to a more secure location on the airfield is recommended as a result of new airport security recommendations.

Fuel is transported to and from the fuel farm area to aircraft via a variety of fuel delivery trucks that are leased and operated by Million Air. The trucks are not registered for transport on public roadways; however, this scenario is currently unavoidable due to the remote location of the fuel farm area in relation to the secure apron areas. Although the roads are officially designated as private roads, they are used by the public. Fuel trucks are required to briefly travel on these roads to and from the fuel farm until they reach North Apron Drive. North Apron Drive leads into the north entrance of the north apron and allows access into the secure airfield. The total distance from the fuel tanks to the north apron is approximately 0.50 miles. After the fuel delivery trucks enter the north apron, they are driven south across the north apron past the terminal apron area and then east to the South Apron area. The trucks are then staged within a concrete paved area located in the northeast corner of the south apron area.

The total required fuel truck travel distance from the fuel farm to the staging area is approximately two miles. The normal operation of transporting fuel to and from the remote fuel farm area to the staging area is lengthy and cumbersome. It requires fuel delivery trucks to traverse public roads including England Drive via the airport's "front gate", Vandenburg Drive, and Chanute Drive to access the existing airfield tanks. According to **FAA AC 150/5360-9**, *Planning and Design of Airport Terminal Building and Nonhub Locations*, access to the fuel farm should be separate from the airport's primary entrance road. Further, TSA **49 CFR Part 1542** discourages the use of the main airport entrance road for trucks and other vehicles which carry flammable, explosive, chemical or radioactive materials especially within 300 feet of the passenger terminal facilities.

The current fuel truck route also could cause a major environmental impact to the airport if a fuel spill occurs since it requires trucks to pass a number of institutional, commercial and recreational facilities. For these reasons, the relocation of the fuel farm should be considered. As a result, the purpose of the fuel farm requirements analysis herein is twofold: (1) to identify general siting characteristics for a relocated fuel farm, and (2) to determine the potential storage capacity of a relocated fuel farm for Jet-A and 100 LL (in gallons).

Fuel Farm Siting Characteristics

The selection of a new fuel farm location must be based on several factors including accessibility, security, expansion capability, and design-related criteria (tank regulations, FAA separation criteria, etc.). Each of these factors is described below as it pertains to the selection of a new fuel farm location at AEX. **Chapter 6**, *Airpark Alternatives*, assesses potential sites for the relocated fuel farm.

Accessibility

Fuel farm accessibility is a key factor, especially when large tanker trucks must be utilized to fill the tanks. As such, the following must be considered:

- tanker accessibility from local roads,
- maneuverability within the fuel farm area,
- location relative to the fuel service provider (FBO), and

- location relative to the highest concentration of aircraft operations/fueling.

Opportunities for siting a new fuel farm at AEX should be investigated which do not require use of the airport's main entrance road (Frank Andrews Boulevard). Additionally, access to and within the fuel farm should be able to accommodate frequent tanker traffic and sufficient area for tanker maneuvering; thus the construction of a loop road or roundabout is recommended within the fuel farm area.

Furthermore, if a feasible site exists for locating the fuel farm within close proximity to the fuel service provider (Million Air) and the highest concentration of aircraft operations/fueling (the passenger terminal apron), operating costs for Million Air's fuel delivery trucks can be greatly reduced. Since Million Air's fuel delivery trucks are not registered for use on public roads, the new fuel farm should also provide direct access to AEX's secure apron areas preferably through an internal roadway network.

Security

According to the Transportation Security Administration's (TSA) *Recommended Security Guidelines for Airport Planning, Design, and Construction* (June 15, 2006), fuel farms should be placed in a remote location of the airport. Security fences should surround the fuel tanks, and should be controlled whenever possible to monitor all movements, including authorized traffic. Closed Circuit Television (CCTV) monitoring, alarms, and sensing should be considered in and around fuel farms and storage tanks to alert law enforcement/security personnel of potential intruders or tampering.[24]

Consistent with the TSA's recommendations, the new fuel farm at AEX should be located in a remote portion of the airport property, away from public access areas and within a secure fenced-in area. Security systems should also be provided to restrict and monitor access, such as electronic gates and CCTV cameras. Further, it is recommended that access be limited to required personnel, and personnel badges should be shown at all times. Since Million Air is open 24 hours-a-day, locating the new fuel farm within the line-of-sight of Million Air's terminal would provide added security benefit.

Expansion

In order to accommodate unforeseen increases in airport activity, the fuel farm site should incorporate sufficient area to accommodate future expansion capability. As a result, the selection of space-constrained areas on the airport property should be avoided.

Design Criteria

The design and siting criteria for fuel farms depends upon the specific types of tanks installed, in addition to applicable federal, state, and local regulations. At AEX, the fuel service provider (Million Air) currently uses several large welded steel tanks (American Petroleum Institute API-650 tanks) to store fuel. With any new fuel farm development, it is desirable to continue using large API-650 welded steel tanks. For these types of tanks, the American Petroleum

[24] TSA's *Recommended Security Guidelines for Airport Planning, Design, and Construction* (June 15, 2006).

Institute guidance, *Welded Steel Tanks for Oil Storage* (API-650), establishes the minimum requirements for material, design, fabrication, erection, etc. The National Fire Protection Association (NFPA) guidance, *Flammable and Combustible Liquids Code* (NFPA-30), establishes the minimum separations between fuel tanks and buildings, property lines, and other tanks. However, it is noted that the guidance in these publications is subject to local codes and preferences of the airport owner.

Therefore, interviews with manufacturers of API-650 tanks were conducted to determine generalized sizing, siting, and design characteristics for a new fuel farm at AEX, as highlighted below:

- In Louisiana, it is better to install lower-profile tanks that can sustain strong winds. As an example, the typical size of a 400,000-gallon tank may be 50 feet wide by 30 feet tall.
- Fuel tank separations from buildings, property lines, and other tanks are based on local codes and airport preferences; however, a separation of at least 8 to 10 feet between tanks is typically acceptable.
- Spill containment features can be in the form of walls, dikes, etc., and are based on local codes.
- In order to prevent vapor separation, the use of a suction roof system is acceptable for a Jet-A fuel storage tank.

As a result, these types of fuel farm features, and support facilities such as pumping and staging areas, will be incorporated in the alternatives analysis in Chapter 5. Other FAA separation criteria will also be considered in the alternatives analysis.

Fuel Farm Storage Requirements

The purpose of the analysis below is to determine the storage requirements associated with a relocated fuel farm facility at AEX. Fuel storage requirements were determined based upon maintaining an average two-week supply of both Jet-A and 100 LL fuel. To begin the analysis, the forecast of operations by aircraft type were grouped according to their associated fuel usage as shown below and in **Table 4-37**:[25]

- **Jet-A –** Itinerant Air Carrier, Itinerant Air Taxi, Itinerant, Regional/Commuter, Itinerant General Aviation, and Itinerant Military
- **100 LL –** Local General Aviation

[25] Million Air does not typically provide services to local military operations; thus, local military operations were not included in the determination of fuel storage requirements.

TABLE 4-37 FORECAST OPERATIONS (BY TYPE)								
Year	Jet A Operations					100 LL Operations		
	Air Carrier	Regional/ Commuter	Itinerant GA	Itinerant Military	Total Jet A	Itinerant GA	Local GA	Total 100 LL
2007	1,695	10,753	2,045	4,435	18,928	2,968	23,025	25,993
2008	1,719	10,950	2,229	5,683	20,581	2,974	23,347	26,321
2012	1,780	10,646	3,039	6,193	21,658	2,998	24,656	27,680
2017	1,780	10,262	4,240	6,193	22,475	3,029	26,459	29,488
2022	1,924	9,909	5,693	6,193	23,718	3,061	28,364	31,425
2027	1,924	9,250	7,447	6,193	24,814	3,094	30,406	33,500

Sources: Million Air of Alexandria Fuel Flowage Data, 2007 and The LPA Group Incorporated, 2008

According to Million Air, current average day sales of Jet-A fuel consist of approximately 10,175 gallons, and average day sales of 100 LL fuel consist of less than 1,000 gallons. 2007 fuel flowage data including average month and gallons per operation is illustrated in **Table 4-38**.

TABLE 4-38 2007 FUEL FLOWAGE AND EXISTING FUEL STORAGE				
Month	**JET-A**	**AVGAS**	**MOGAS**	**DIESEL**
Jan	242,987	5,347	798	663
Feb	251,705	4,513	647	667
Mar	410,635	6,102	629	796
Apr	295,166	7,000	636	622
May	278,886	5,523	661	634
Jun	291,728	5,906	628	637
Jul	295,928	5,013	617	588
Aug	307,358	5,648	560	522
Sep	264,754	4,886	386	469
Oct	309,863	4,989	462	731
Nov	458,427	4,830	542	1,000
Dec	306,747	3,966	546	874
Tot	3,714,184	63,723	7,116	8,203
Av Month	309,515	5,310	593	684
2007 Gallons/Ops	**196.22**	**2.45**		
EXISTING FUEL STORAGE				
JET	**Tank A**	**Tank B**	**Trucks**	**Total**
JET	215,000	230,000	60,000	505,000
AV	30,000		1,200	31,200
MO	500			500
DIESEL	500			500

Source: Million Air of Alexandria, 2007

As such, a gallons/operations ratio was calculated for the baseline 2007 year using the average day fuel sales provided by Million Air. These ratios were applied to the 100 LL and Jet-A operations forecasts in **Table 4-37** to determine the fuel storage requirements for AEX during an average two-week (**Annual Requirement ÷ 26**) as shown in **Table 4-39**.

- Jet-A Ratio = Approximate Annual Flowage (3,714,184) ÷ 2007 Annual Operations (18,928) = **196.22**
- 100 LL Ratio = Approximate Annual Flowage (63,723) ÷ 2007 Annual Operations (25,993) = **2.45**

TABLE 4-39
FUEL STORAGE REQUIREMENTS

Year	Jet-A Gallons		100 LL Gallons	
	Annual Requirement	Average Two-Week Requirement	Annual Requirement	Average Two-Week Requirement
2007	3,713,777	142,838	63,723	2,451
2008	4,038,064	155,310	64,528	2,482
2012	4,249,341	163,436	67,795	2,607
2017	4,409,665	169,603	72,292	2,780
2022	4,653,525	178,982	77,040	2,963
2027	4,868,595	187,254	82,126	3,159

Source: The LPA Group Incorporated, 2008.

Based upon the methodology above, approximately 187,254 gallons of Jet-A storage and 3,159 gallons of 100 LL storage would be required to provide an average two-week supply of fuel at AEX by the end of the twenty-year planning period. As mentioned earlier, in order to accommodate unforeseen increases in activity, the fuel farm should be developed in an area that permits future expansion capability.

However, it is important to note when determining fuel storage requirements that during Hurricane Katrina, the airport pumped approximately 600,000 gallons of fuel in one month. Second, as part of England Authority's commercial lease with the US Army, during surge requirements, the Authority or its representative must have the ability to pump approximately 4 million gallons of Jet A fuel in a 96 hour period to accommodate 29 flights associated with deployment of an international brigade.

Aircraft Rescue and Fire Fighting

On airport aircraft rescue and fire fighting facilities are required for any commercial airport under 14 CFR Part 139. According to FAA commercial airport data, dated 9/15/2008, AEX is designated as a Class I Commercial Airport with an ARFF Index of D based upon existing charter operations. Index D is associated with aircraft more than 160 feet but less than 200 feet in length that average five or more operations per day. Although an increase in B747-400 and C-

5 operations is forecast throughout the twenty-year planning period, it is not anticipated to break the five average daily operations threshold as outlined in **14 CFR Part 139.315**, *Aircraft Rescue and Fire Fighting Index Determination*, required for an Index E.

Minimum ARFF requirements for an ARFF Index D as outlined in **14 CFR Part 139.317 and 319**, *Aircraft Rescue and Fire Fighting*, are as follows:

- One vehicle carrying either:
  - 500 pounds of sodium-based dry chemical or halon 1211; or
  - 450 pounds of potassium based dry chemical and water with a commensurate quantity of aqueous fire fighting foam (AFFF) to total 100 gallons, for simultaneous dry chemical and AFFF foam application

- Two vehicles carrying an amount of water and the commensurate quantity of AFFF so that the total quantity of water for foam production carried by all three vehicles is at least 4,000 gallons

- Each aircraft rescue and firefighting vehicle used to comply with Index B, C, D and E requirements with a capacity of at least 500 gallons of water for foam production shall be equipped with a turret with a discharge capacity of at least 500 gallons per minute but not more than 1,200 gallons per minute depending upon the vehicle water tank capacity.

- Each aircraft rescue and firefighting vehicle carrying dry chemical or halon 1211 must meet one of the following minimum discharge rates:
  - Discharge through a hand line = 5 pounds per second,
  - Discharge through a turret = 16 pounds per second.

- Each vehicle shall be equipped with two-way voice radio communications providing contact to: other emergency vehicles; ATCT; and other fire rescue stations as specified in the airport emergency plan.

- All vehicles must be painted or marked to optimize daytime and nighttime visibility and identification as well as have flashing or rotating beacon.

- ARFF personnel will be alerted via siren, alarm or other means. Further, within 3-minutes from the time of the alarm at least one required ARFF vehicle shall reach the midpoint of the farthest runway serving air carrier aircraft from its assigned post or reach any other specified point of comparable distance on the movement area which is available to air carriers and begin application of foal, dry chemical or halon 1211. Within 4-minutes from the time of the alarm, all other required vehicles must reach the site and begin application of foam, dry chemical or Halon 1211,

- All ARFF personnel shall be equipped with protective clothing and equipment needed to perform their duties; and basic emergency care. Further, all rescue and firefighting personnel must participate in at least one live-fire drill every 12 months.

- All ARFF personnel are to be properly trained, and will include initial and recurrent training in airport familiarization, aircraft familiarization, safety operations, equipment use, application of extinguishing agent, firefighting operations for both structural and aircraft rescue, cargo hazards,

- Sufficient rescue and firefighting personnel must be available during all air carrier operations to meet response times, operate vehicles and meet minimum agent discharge rates

- The airport must also ensure that all roads which are designated for ARFF vehicles are maintained in a condition that will support those vehicles under all-weather conditions.

The ARFF facility at AEX was constructed in 2004 and is located adjacent to Billy Mitchell Blvd adjacent to the south apron. As stated in Chapter 2, the ARFF facility is operational 7 days, 24 hours per day. Two 24-hour shifts with 6 firefighters and 1 captain are available at all times. ARFF personnel at the time of this writing consist of 16 full time and 5 part time employees. AEX ARFF equipment includes five fire trucks equipped with water, foam and dry chemical agents. Four additional vehicles supplement the fire-fighting vehicles and assist with general emergency response. In reviewing both ARFF equipment and agents at AEX, the airport exceeds the minimum Index D requirements. However, since at least one ARFF vehicle is nearing its useful life, it is recommended that a new ARFF vehicle be acquired during the next two years. With the exception of new vehicle acquisition, it is anticipated that only general maintenance requirements will be needed unless a significant change in aircraft fleet mix or operations occurs.

4.4 SUMMARY OF FACILITY REQUIREMENTS

Table 4-40 provides a summary of the airside facility requirements that were determined necessary to satisfy demand presented earlier in this study. The order in which these improvements are listed is not meant to imply a priority or phasing of these projects. Essentially, this table includes the minimum facility requirements over the 20-year planning period. During the alternatives analysis, the full development potential of areas at AEX will be considered even if it exceeds the minimum levels identified in this analysis. This will be considered the ultimate development scenario. Looking beyond these minimum requirements should provide the England Authority with information in order to make appropriate decisions if growth in one activity area increases faster than projected.

TABLE 4-40 SUMMARY OF FACILITY REQUIREMENTS	
Runways	1. Provide a primary runway length of 12,000 feet 2. Provide secondary primary runway length of 8,008 feet 3. Provide 35-foot paved shoulders on Runway 14-32 4. Provide 25-foot paved shoulders on Runway 18-36 5. Rehabilitate pavement on Runway 18-36 south of Runway 14-32 intersection 6. Construct blast pads on prior to new Runway 14 and 18 thresholds 7. Rehabilitate blast pads prior to Runways 32 and 26 8. Conduct routine pavement maintenance on all runways
Taxiways	1. Install 35-foot shoulders on Taxiways A, B and E 2. Extend Taxiway B north in conjunction with Runway 18 Extension 3. Extend Taxiway A north in conjunction with Runway 14 Extension 4. Construct Parallel Taxiway west of Runway 14-32 5. Provide designated run-up area at each runway end 6. Conduct routine pavement maintenance on all taxiways
Airfield Facilities	1. Implement a nonprecision/LPV approach on Runway 32 2. Upgrade approach lighting (ALSF-2) and install in-pavement centerline lighting on Runway 14 to provide CAT II approach 3. Relocate Glideslope Antenna 4. Install LAAS system to provide future Category I instrument approaches to Runways 32, 18 and 36 5. Install approach lighting system to Runways 32, 18 and 36 in conjunction with installation of precision approaches. 6. Install additional signage related to Runway and Taxiway Improvements 7. Periodic remarking of all airfield pavements 8. Relocate existing wind cone or install new ones along Runways 18 and 14 9. Rehabilitate portions of North Apron pavement 10. Rehabilitate portions of South Apron pavement 11. Expand South Apron pavement
Airport Support Facilities	1. Remove old electrical ground wiring and document existing electrical wiring. 2. Implement recommendations of Master Drainage Plan 3. Relocate and expand fuel farm 4. Relocate PAR Approach and ASOS 5. Relocate Long-Range Radar facility off airport
Land Acquisition	1. Obtain property for Runway 14 and 18 extensions 2. Obtain property related to precision approach RPZs on Runways 14, 18 and 36

Source: The LPA Group Incorporated, 2008.