2013

Lake Wales Municipal Airport Master Plan

March 2013

Table of Contents

Chapter 1 – Existing Conditions

Introduction 1-1
Airport Setting 1-1
Meteorological Conditions 1-2
Based Aircraft and Activity Counts 1-4
Airfield Environment 1-7
Airspace and Air Traffic Control 1-17
Airport Facilities 1-17
Airport Infrastructure 1-21
Conclusion 1-22

Chapter 2 – Aviation Activity Forecasts

Overview 2-1
Previous Aircraft and Activity Projections 2-1
Industry Trends and Forecasting Approach 2-3
Projections of Based Aircraft 2-4
Projected Based Aircraft Fleet Mix 2-6
Projections of Annual Aircraft Operations 2-8
Types of Aircraft Operations 2-11
Comparison to FAA Terminal Area Forecasts 2-14
Summary of Activity Forecasts 2-14

Chapter 3 - Demand/Capacity and Facility Requirements

Introduction 3-1
Capacity Assessment 3-1
Planning and Design Criteria 3-3
Runway Requirements 3-5
Taxiway System Requirements 3-13
New Instrument Approach Procedures 3-16
Airfield Environment 3-18
Airport Facilities 3-24
Land Access, Automobile Parking, and Utility Infrastructure 3-29
Wildlife Hazard Site Visits and Assessments 3-31
Master Drainage and Pollution Prevention Plans 3-31
Land Acquisition 3-32
Summary of Facility Requirements 3-32

Chapter 4 – Airport Alternatives Analysis

Introduction 4-1
Airfield Development Alternatives 4-1
Landside Development Alternatives 4-9

Chapter 5 – Airport Layout Plan Drawings

Introduction	5-1
Cover Sheet	5-1
Data Sheet	5-1
Airport Layout Plan	5-2
Terminal Area Plans	5-2
Data Sheet	5-2
Inner Portion of the Approach Surface Drawings	5-2
Future FAR Part 77 Airspace Surfaces	5-3
Extended Approach Zone Profiles	5-4
Existing Land Use Map	5-4
Property Map	5-4
Summary of Additions to the ALP Set since Last Update	5-5

Chapter 6 – Capital Improvement Program

Introduction	6-1
Development Phasing	6-1
Capital Improvement Program	6-4
Implementation	6-19
Airport Development Funding	6-21
Summary	6-22

List of Appendices

Detailed Cost Estimates	Appendix A
Common Aviation Acronyms	Appendix B
Meetings and Workshops	Appendix C

Existing Conditions

INTRODUCTION

The Federal Aviation Administration (FAA) and Florida Department of Transportation (FDOT) require airports receiving development grants to conduct periodic updates of their planning documents. The last master plan conducted for the Lake Wales Municipal Airport was completed in 2004. Since that time, there have been changes in the environment surrounding the Airport, the aviation industry, and the City of Lake Wales' vision for the Airport. In planning for the new vision, the City recently acquired 60 additional acres of land for the extension of the primary runway.

The Airport's master plan serves a variety of functions, including projecting future aviation activity, being a tool for financial planning, and guiding adjacent land uses. Consequently, the primary objective of this master plan is to create a 20-year development program that will maintain a safe, efficient, economical, and environmentally acceptable airport facility for the City of Lake Wales. By achieving this objective, the document will provide guidance to satisfy the aviation demand in a financially feasible and responsible manner.

This airport master plan was prepared in accordance with the requirements of the FAA, FDOT, and the needs of the City of Lake Wales. All portions of this document are based on the criteria set forth in the FAA Advisory Circulars (AC) 150/5070-6B, Change 1, "Airport Master Plans," AC 150/5300-13 "Airport Design," and the FDOT "Guidebook for Airport Master Planning."

AIRPORT SETTING

The Airport lies within the City of Lake Wales limits. Positioned in the center of Polk County, the City comprises of nearly 20 square miles of land located approximately 47 miles southwest of Orlando and 50 miles east of Tampa. Bordering counties include Pasco, Sumter, Lake and Orange Counties to the north; Osceola County to the east; Okeechobee, Highlands, Hardee and Manatee Counties to the south; and Hillsborough County to the west.

Location

The Airport is on the west side of the City just south of State Road 60. Current airport property consists of 545 acres of land with an airfield elevation of 127 feet above mean sea level. Public access to the Airport is via Airport Road, a part of Polk County's dedicated road system, which runs south off State Road 60.

History

The initial development of the airfield began in 1928 by the City of Lake Wales. During World War II, the Airport became an auxiliary field to the Sarasota Army Airfield. During that time the Army Corps of Engineers improved the facility and it was known as the Lake Wales Army Airfield for training replacement fighter pilots. After the war effort, the airfield became a civilian airport again.

Administration

The Airport is owned and operated by City of Lake Wales with responsibility of the facilities falling under the City's Public Services Department, which reports directly to the City Manager. There is an Airport Authority of seven appointed members that advise the Commissioners on Airport matters. On site management is provided by the Fixed Base Operator (FBO) who, at the

appointment of the City Manager, serves as the de facto Airport manager and facilitates day to day operations of the Airport facility.

Role in National Air Transportation System

Lake Wales Municipal Airport is designated by the FAA as a publicly owned, public-use facility. Under the Airport and Airways Improvement Act, the Secretary of Transportation is required to publish a national plan for the development of public-use airports. This plan is published as the National Plan of Integrated Airport Systems (NPIAS) and includes all commercial service, reliever (high capacity general aviation airports in metropolitan areas), and select general aviation airports.

The most recent NPIAS (2011-2015) classifies Lake Wales Municipal as a general aviation facility. The general aviation designation is given to airports that provide essential air service to mostly rural areas. General aviation facilities are an important component of the nation's airport system, providing air services to approximately one-fifth of the United States' population. **Figure 1-1** identifies Lake Wales Municipal amongst other Florida Airports listed in the NPIAS.

A recent FAA report, entitled *General Aviation Airports: A National Asset*, further typified general aviation airports into four categories based on existing activity measures, such as based aircraft and the number and type of flights. This report categorized the Lake Wales Municipal airport as a basic general aviation field. Airports in this category are generally recognized by the report to serve critical aeronautical functions within their local and regional market.

State System Plan

Lake Wales Municipal Airport is also one of 11 public-use airports in the Central Florida Region of the Florida Aviation System Plan (FASP). The state system plan designates facilities as either commercial or community airports and then subcategorizes them based on the role they serve. All of the Airports in this region are designated as community airports.

The most recent system plan (2005 FASP) lists Lake Wales Municipal as an airport providing business, recreational, and sport services. As detailed in the aviation activity forecasts chapter, the Airport's services and users have evolved. In recent years the Airport has experienced increasing activity by business and recreational aircraft, facilitated more flight training activities, and has become a supportive element of growing regional tourism. Ultimately the system plan will need to be updated to reflect the increasing role the Airport plays in Florida's general aviation industry.

METEOROLOGICAL CONDITIONS

Because weather plays such an important role in the operation of aircraft, it must be considered in a number of different airfield design parameters. The following sections document the area's climate and wind characteristics.

Climate

Lake Wales Municipal Airport has an elevation of 127 feet above mean sea level and is located between the Gulf of Mexico and the Atlantic Ocean on Florida's Central Ridge. The average high temperature is 93 degrees Fahrenheit in both July and August, while the average low is 49 degrees Fahrenheit in January. Rainfall in this area occurs during all seasons; however, it is

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LAKE WALES MUNICIPAL AIRPORT
LAKE WALES, FLORIDA

FEDERAL AND STATE SYSTEM PLAN MAPS

FIGURE

1-1

more abundant during the summer when daily showers are common. Historic data shows an average 50 inches of rainfall on an annual basis.

Wind Coverage

The FAA recommends that sufficient runways be provided to achieve 95 percent wind coverage, which is computed based on a crosswind not exceeding 10.5 knots (12 mph) for aircraft with an Airport Reference Code (ARC) of A-I and B-I; 13 knots (15 mph) for ARC A-II and B-II; 16 knots (18 mph) for ARC A-III, B-III and C-I through D-III; and 20 knots (23 mph) for ARC A-IV through D-VI. If 95 percent wind coverage is not provided at an airport for the maximum crosswind component, then a crosswind runway should be considered. The existing and future critical aircraft for Lake Wales Municipal, as well as the associated ARC criteria, is addressed in the facility requirements chapter.

FAA AC 150/5300-13 "Airport Design" states that a period of at least ten consecutive years of wind data should be examined when carrying out an airfield wind coverage evaluation. Wind coverage calculations also need to take into account the different ceiling and visibility minimums associated with aircraft operations. Therefore data for all weather, visual flight rule (VFR), and instrument flight rule (IFR) conditions were analyzed. Since wind data from the Airport is not currently collected by the National Weather Service, official data from Lakeland Linder Regional Airport was utilized. Only the 10.5 and 13 knot crosswind components were calculated using the FAA's online Standard Wind Analysis tool. **Table 1-1** tabulates the wind coverage computations from this analysis. **Figure 1-2** graphically depicts the combined all weather wind rose for the Airport.

BASED AIRCRAFT AND ACTIVITY COUNTS

Different sources were utilized to evaluate historic data related to activity at the Airport. This included reviewing the previous master plan, as well as FAA and state records for historic based aircraft and operations. This information along with current industry trends is essential for the development of new activity forecasts. It is also important to examine these existing documents to understand past long-range planning efforts for the Airport.

Based Aircraft

A number of sources contain historic based aircraft information for the Airport. These include the 2004 Airport Master Plan, annual FAA Airport Master Record (Form 5010), FAA Terminal Area Forecast (TAF), and the Florida Aviation System Plan (FASP). Unfortunately, most of these do not accurately reflect the current level of aircraft based at the Airport. For the 2004 Master Plan, a count of 48 aircraft was made in 2002. However, this was prior to the Airport being completely destroyed and subsequently closed after the 2004 hurricane season. Because the Airport was closed for some time in order to rebuild, a number of planes left. Current airport records and a count made for this study confirmed 22 based aircraft at Lake Wales Municipal in 2011.

Table 1-1. Wind Coverage

	Crosswind Component	
	10.5 knots (12 mph)	13 knots (15 mph)
All Weather Conditions		
Runway 6-24	96.68%	98.49%
Runway 17-35	92.34%	95.87%
Combined	99.06%	99.84%
VFR Conditions (ceiling > 1,000 feet and visibility > 3 miles)		
Runway 6-24	96.74%	98.53%
Runway 17-35	92.13%	95.76%
Combined	99.05%	99.84%
IFR Conditions (ceiling 200 to 1,000 feet and visibility 0.5 to 3 miles)		
Runway 6-24	94.96%	97.43%
Runway 17-35	95.35%	97.51%
Combined	99.11%	99.80%

Source: National Climatic Data Center: Lakeland Linder Regional Airport – January 2000 to December 2009.

Aircraft Operations

An aircraft operation is counted as either one landing or one takeoff. Further, a touch and go operation is counted as two operations, since the aircraft technically lands and immediately takes off. Generally, there are two types of recorded aircraft operations: local and itinerant. According to the FAA definition, local operations are those arrivals or departures performed by aircraft that remain in the Airport traffic pattern or are in sight of the Airport. This generally covers the area within a 20 nautical mile radius of the airfield. Itinerant operations are arrivals or departures other than local operations performed by either based or transient aircraft.

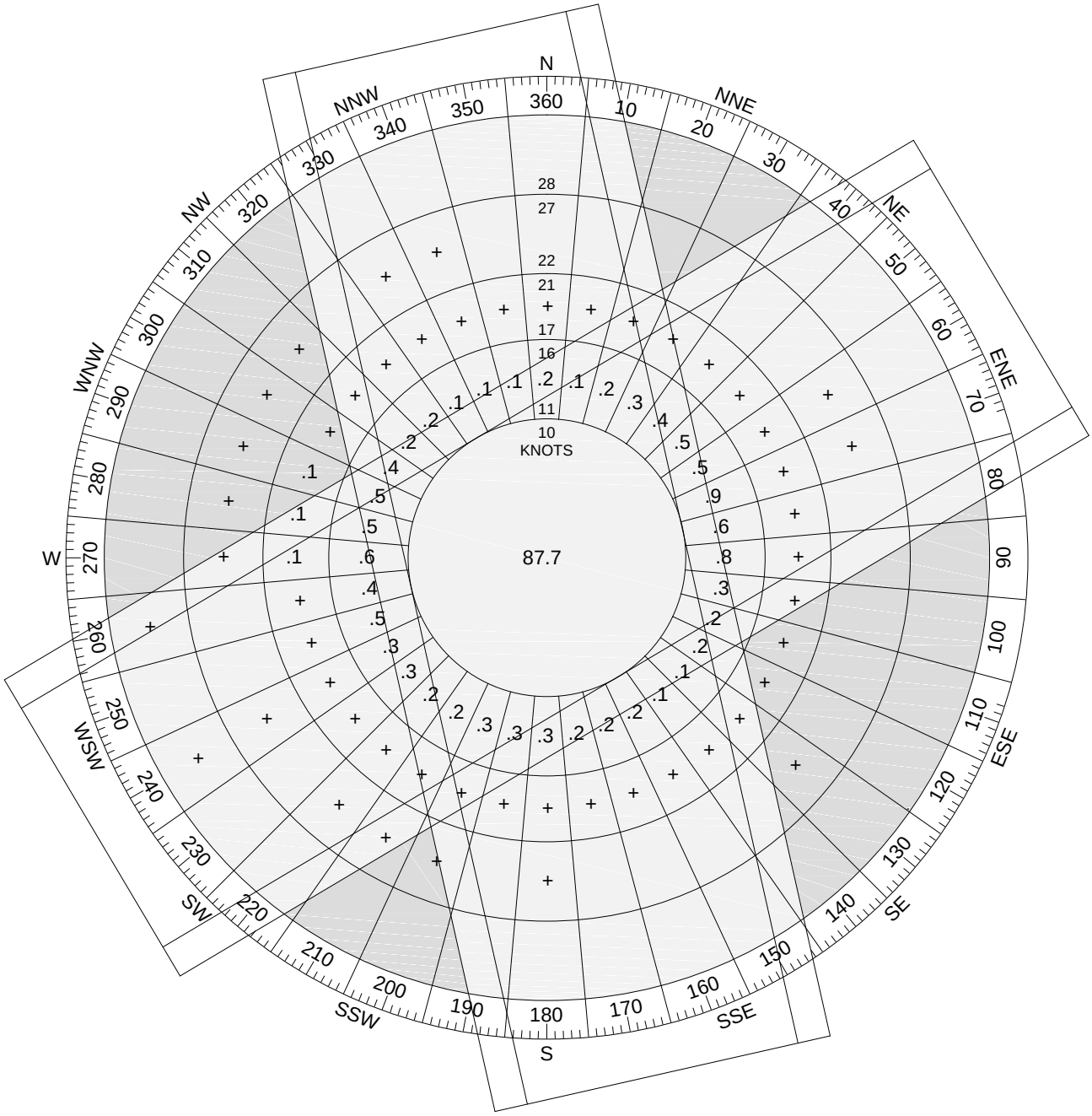
Since there is no air traffic control tower at Lake Wales Municipal, the recorded operations are only estimates. As with most general aviation airports, if these estimates are not updated regularly, then the previous year's count is typically carried over. This has been the case for Lake Wales and has resulted in historic operations that are not reliable. Most sources show the 2002 figure from the 2004 Airport Master Plan as the last true estimate made. Since the rebuilding of the Airport, the on-site management keeps a log of the aircraft activity. This is provided as a monthly report to both the City and Airport Authority. For 2011 these reports totaled 22,206 annual operations. **Table 1-2** presents historical and existing activity counts.

Table 1-2. Based Aircraft Activity Counts

Year	Based Aircraft	Annual Operations
2002	48	20,000
2011	22	22,206

Source: 2004 Airport Master Plan, airfield counts, & monthly reports

ALL WEATHER WIND ROSE



ALL WIND DATA SUMMARY

Crosswind Component Knots (MPH)	Runway 06-24	Runway 17-35	Combined Coverage
10.5 (12)	96.68%	92.34%	99.06%
13 (15)	98.49%	95.87%	99.84%

Station: Lakeland, Florida # 72211
Source: National Climatic Data Center (NOAA)
Period of Observations: 2000 - 2009

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LAKE WALES MUNICIPAL AIRPORT
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ALL WEATHER WIND ROSE

FIGURE

1-2

AIRFIELD ENVIRONMENT

Airfield facilities generally include those required to support the movement and operation of aircraft. While this most certainly involves the Airport's runway and taxiway system, it also includes the available instrument approaches, airfield lighting; pavement markings; takeoff and landing aids; and airfield signage. **Figure 1-3** illustrates a number of these facilities.

Aircraft Movement Areas

The aircraft movement areas include any paved or unpaved surfaces that enable aircraft to move to and from the runway environment. In addition to the physical characteristics of the runway and taxiway environment, there are other safety-related criteria. These criteria are defined not only in FAA AC 150/5300-13, but also by Federal Aviation Regulations (FAR) Part 77, "Objects Affecting Navigable Airspace." The specific criteria for each of these protective surfaces will be discussed in subsequent chapters.

Runway 6-24

The primary runway, Runway 6-24, is 3,999 feet in length and 100 feet in width. Constructed of asphaltic concrete, the most recent improvements to the pavement surface were in 1978. In 2008, FDOT published a pavement report for Lake Wales Municipal based on surveys and field work conducted in 2006. The Pavement Condition Index (PCI) assigned to Runway 6-24 resulted in a fair rating. During the visual inspection conducted for this study in late 2011 it was noted that portions of the runway had various types of cracking, some raveling, and numerous places with vegetative growth in the cracks as well as in the pavement joints along the entire length.

Currently the weight bearing capacity published for the runway is 15,000 pounds for aircraft with single wheel type landing gear. Since no recent testing of the pavement has been conducted and the source for the current rating not documented, the actual strength is not known.

Runway 17-35

Runway 17-35 is the crosswind runway that has a published length of 3,859 feet and a width of 75 feet. The entire length of this runway was overlaid with asphalt in 1997. The FDOT pavement study assigned PCI ratings that show the asphalt surface to be in good condition. As with the primary runway, the weight bearing capacity published for Runway 17-35 is 15,000 pounds for aircraft with single wheel type landing gear. While no testing was conducted after the overlay in 1997, the current rating reflects the minimum strength based on the pavement section which is greater than the current limitation of the runway to serve small airplanes exclusively (12,500 pounds or less).

Taxiway A

The full length parallel taxiway to Runway 6-24 is actually made up of two separate partial parallel taxiways. Taxiway A is the eastern half connecting the approach end of Runway 24 to a point just west of the runway intersection. With a pavement width of 40 feet, Taxiway A has a runway centerline to taxiway centerline separation of 400 feet. The FDOT pavement report documents the entire asphalt taxiway in satisfactory condition. A visual inspection conducted in 2011 verified the satisfactory condition with only minor cracking, raveling, and vegetative growth in joints noted.

FIGURE 1-3

EXISTING FACILITIES

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Taxiway B

Taxiway B provides access off both runways to the fixed base operator (FBO) area. The alignment runs north from Runway 6-24 just east of the runway intersection, ties into the west side of the FBO aircraft parking apron, then turns west to tie into Runway 17-35 north of the runway intersection. The asphalt taxiway width is 35 feet and has been documented in good condition in the FDOT pavement report. This is due to a recent rehabilitation project and the condition was verified during the 2011 visual inspection.

Taxiway C

Taxiway C connects the runway intersection with the intersection of Taxiways A and B. In the absence of a full length parallel taxiway to Runway 17-35, this taxiway provides bypass capability between the runways and the FBO area. At 35 feet, the asphalt taxiway is in good condition according to the FDOT pavement report. As with Taxiway B, this is due to a recent rehabilitation project and the condition was verified during the visual inspection conducted in 2011.

Taxiway D

The western half of the full length parallel taxiway to Runway 6-24 is currently designated as Taxiway D. This is primarily due to the fact that Taxiway D is closer to Runway 6-24 with a centerline to centerline spacing of 200 feet. However, like Taxiway A, the asphalt pavement of Taxiway D is 40 feet wide and documented in the FDOT pavement report as having a satisfactory condition. The visual inspection conducted in 2011 showed only minor cracking and some vegetative growth, which verified the satisfactory condition.

Hangar Taxiway and Taxilanes

There is one taxiway and two taxilanes off the northern most end of Runway 17-35 which provide access to the two clearspan hangars and two t-hangar buildings on this end of the airfield. These pavements vary in width and condition. The taxiway (currently designated as Taxiway B1) that comes directly off the approach end of Runway 17 is 30 feet wide and considered in fair condition according to the FDOT pavement study. The two taxilanes in this area run parallel to Runway 17-35, on each side of the hangar facilities. The taxilane closest to Runway 17-35 is 25 feet wide with a centerline separation of 225 feet. The taxilane on the far side of the hangar buildings is only 20 feet wide. For the two taxilanes parallel to Runway 17-35, the northern portion of these surfaces are documented as fair in the FDOT pavement study. The southern half of these asphalt taxilanes are not included in the FDOT study since there were built as part of the Airport's hurricane recovery effort, which was after the FDOT pavement study inventory. These newer taxilanes are considered to be in excellent condition. The visual inspection showed that the older portions of these asphalt taxilanes to be in the condition documented with some cracking and vegetative growth.

Instrument Approaches

During times of inclement weather, instrument approaches enable pilots to safely descend into the Airport environment for landing. There are a number of different instrument approaches that can be established, each with specific limitations. As the height of clouds and visibility deteriorate, the necessity for instrument approaches increases. When the cloud ceiling is greater than 1,000 feet above ground level (AGL) and the visibility is greater than three statute

miles, the conditions are considered visual and pilots can operate under visual flight rules (VFR). In VFR conditions, no published approaches are required for an aircraft to safely land at an airport. However, once the cloud ceiling is less than 1,000 feet AGL and/or the visibility is less than three statute miles, pilots must operate under instrument flight rules (IFR). Additional air traffic control services are provided to pilots during IFR conditions. During the arrival phase, instrument approaches are what allow a pilot to safely navigate to and land on a runway.

Categories of Instrument Approaches

There are two basic categories for instrument approaches: precision and non-precision. Both precision and non-precision approaches provide course guidance to the runway centerline they serve. The degree of horizontal guidance increases with the sophistication of the instrument approach aid, which is reflected through the minimum operating parameters for each approach. The primary difference between a precision and non-precision approach is that the precision approach will also have vertical guidance for a specific runway end. This allows an aircraft to descend safely on a fixed glideslope signal, even when the runway environment is not yet in sight.

All instrument approaches have heights published that dictate how low a pilot can descend without the runway environment in sight before having to abandon the approach and try again. For precision approaches this is called the decision height and for non-precision approaches, it is referred to as the minimum descent altitude (MDA). Both heights are published in the number of feet above the intended runway's touchdown zone elevation. In addition, every instrument approach has minimum visibility requirements, measured in feet or miles, at which an instrument approach can be attempted. For either type of approach, if visual contact cannot be made before the decision height or missed approach point, then the aircraft must execute a missed approach and either try again or go to an alternate airport.

Published Approaches for Lake Wales Municipal

Currently, Lake Wales Municipal has published straight-in, non-precision instrument approaches to both ends of Runway 6-24. Both are area navigation (RNAV) procedures based on Global Positioning Satellites (GPS). GPS is a satellite-based navigation system that consists of a network of satellites known as a constellation. This constellation provides a celestial reference for determining the position of any point on or above the Earth's surface. By analyzing the time delays of signals received from these satellites, air based receivers are able to determine latitude, longitude, and altitude.

For each end of Runway 6-24, there are both localizer performance (LP) and lateral navigation (LNAV) minimums established. On the Runway 6 end, these approaches provide an MDA of 374 feet above the Runway 6 threshold elevation (500 feet above mean sea level) and one mile visibility for all aircraft types. On the Runway 24 end, the approaches are published at 458 feet above the Runway 24 threshold elevation (580 feet above mean seal level) and one mile visibility. Slightly higher visibility minimums apply to the larger and higher performance aircraft on approach to Runway 24.

The RNAV/GPS also provides circling approach minimums which define the MDA and visibility minimums for the different aircraft categories to remain clear of obstacles. The difference is that the circling approach, with its higher minimums, allows an aircraft to approach and establish visual contact with the Airport environment in less than visual conditions. Once in the vicinity,

the pilot can then maneuver the aircraft to set up a final approach and land on any runway end, unless specific restrictions are published.

At Lake Wales Municipal there is also a stand-alone circling approach published which is based on the Lakeland VHF Omni-Directional Radar Beacon (VOR) and Distance Measuring Equipment (DME). The VOR is a ground-based electronic navigation aid transmitting signals called radials. The DME portion allows pilots to determine their distances to or from the Lakeland VOR, which is 21.4 nautical miles to the northwest of the Airport. While the VOR/DME circling approach has slightly higher minimums than the RNAV/GPS circling approaches, they provide some ability for aircraft not equipped with GPS navigation equipment to make approaches in less than VFR conditions. **Figure 1-4** through **Figure 1-6** present the current published approach charts for the Airport.

Airfield Lighting

Proper airfield lighting is required at all airports that are utilized for nighttime operations. The existing lighting systems at the Airport allow aircraft operations at night and are supported by equipment in the airfield electric vault. The vault is located east of Airport Road and north of Taxiway A.

Identification Lighting

Rotating beacons universally indicate the location and presence of an airport at night or in adverse weather conditions. The rotating beacon tower at Lake Wales Municipal is located just north of the airfield electrical vault. This tower is equipped with an optical rotating system that projects two beams of light, one green and one white, 180 degrees apart. The beacon, which is in good condition, is continuously operated during nighttime hours and when the airfield is under instrument conditions through the use of a photocell.

Runway Lighting

Runway lights allow pilots to identify the edges of the runway and assist them in determining the length remaining during periods of darkness and restricted visibility. These lighting systems are classified according to their intensity or brightness. Runway 6-24 is equipped with Medium Intensity Runway Lights (MIRL). This system, as well as the taxiway lights, can be activated by pilots through the Common Traffic Advisory Frequency (CTAF) frequency 122.8 MHz.

The MIRLs for Runway 6-24 consist of base mounted light fixtures on cans placed 10 feet from the edge of the runway. The cables run between the fixtures in conduit and overall this lighting system is considered to be in good condition. For both ends of Runway 6-24, the lights have split globes with yellow showing for the last 2,000 feet of runway in each direction. A 10 kilowatt regulator in the airfield electrical vault powers the Runway 6-24 lighting circuit.

As part of the runway lighting system, the identification of the runway ends and thresholds are critical to a pilot during landing and takeoff. Therefore, runway ends are equipped with special lighting configurations to aid in their identification. The ends of Runway 6-24 are identified with four inboard threshold lights on each side. These threshold lights have a two-color (red/green) lens, placed outward from the runway edge. When landing, the green half of the lens faces the approaching aircraft, indicating the beginning of usable runway. The red half of the lens faces

LAKE WALES, FLORIDA

AL-6516 (FAA)

11237

RNAV (GPS) RWY 6
LAKE WALES MUNI (X07)

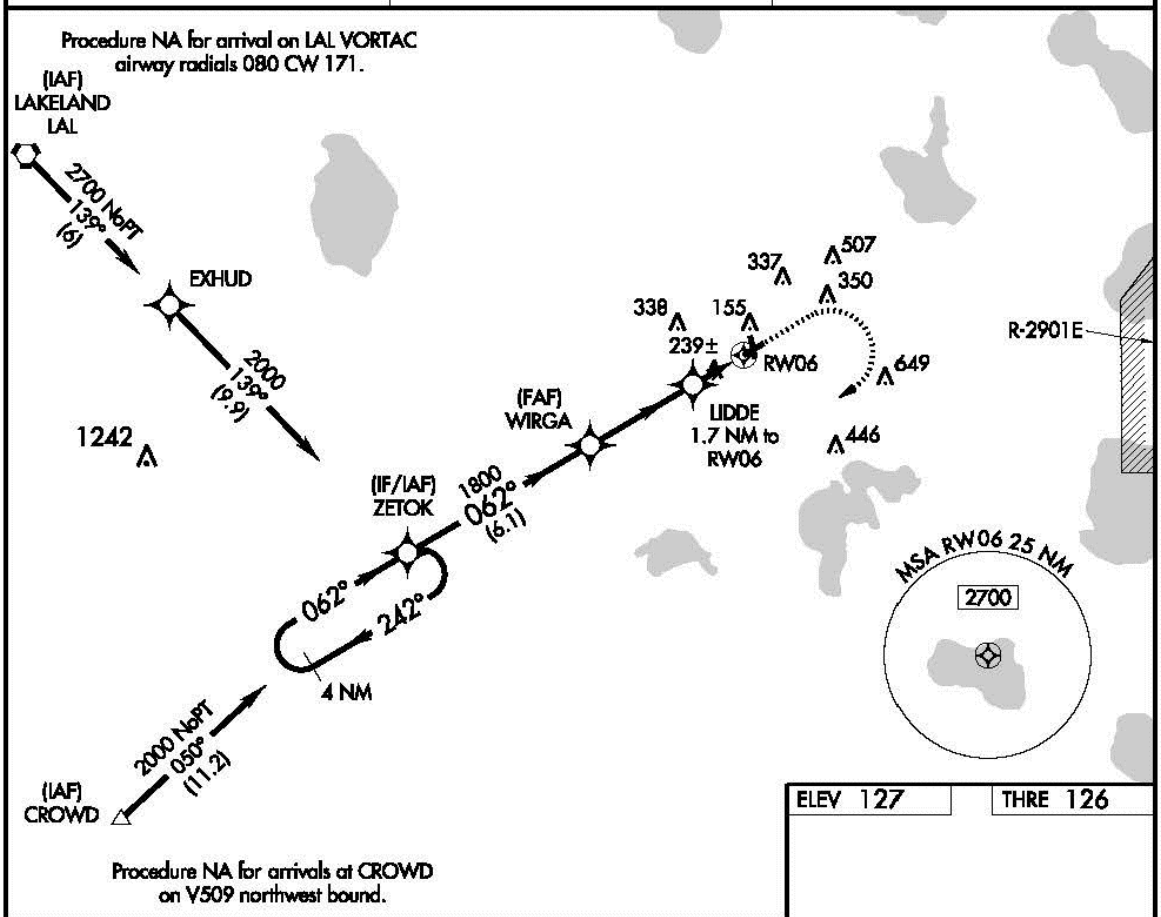
WAAS CH 49023 W06A	APP CRS 062°	Rwy ldg 3999 THRE 126 Apt Elev 127

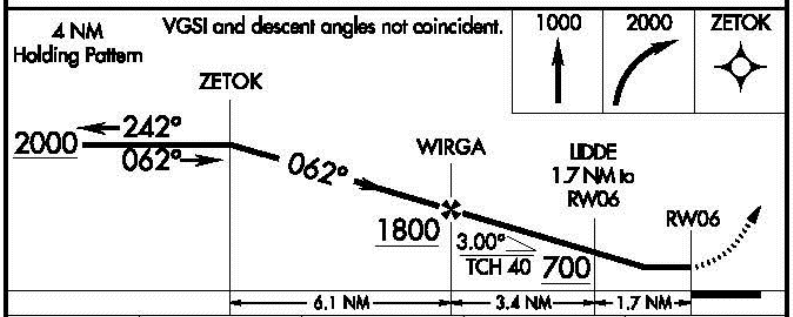
NA

DME/DME RNP-0.3 NA. Procedure NA at night. Visibility reduction by helicopters NA. When local altimeter setting not received, use Bartow altimeter setting and increase all MDA 40 feet, and increase LP and LNAV Cats C and D visibility ⅛ mile.

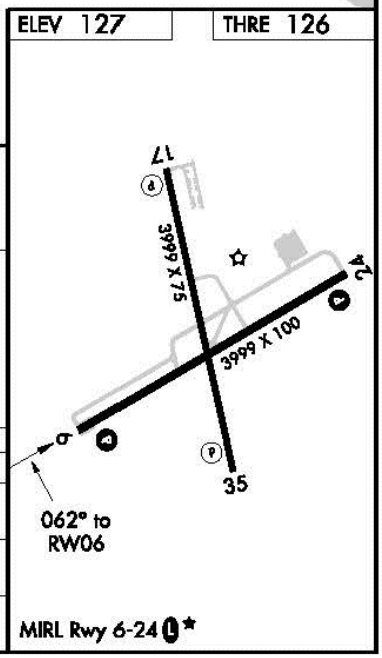
MISSED APPROACH: Climb to 1000 then climbing right turn to 2000 direct ZETOK and hold.

AWOS-3	TAMPA APP CON	UNICOM
124.225	120.65 290.3	122.8 (CTAF)





CATEGORY	A	B	C	D
LP MDA	500-1 374 (400-1)			
LNAV MDA	500-1 374 (400-1)			
CIRCLING	560-1 433 (500-1)	620-1 493 (500-1)	620-1½ 493 (500-1½)	680-2 553 (600-2)



LAKE WALES, FLORIDA
Orig 25AUG11

27° 54'N-81° 37'W

LAKE WALES MUNI (X07)
RNAV (GPS) RWY 6

SE-3, 26 JUL 2012 to 23 AUG 2012

SE-3, 26 JUL 2012 to 23 AUG 2012

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LAKE WALES, FLORIDA

GPS APPROACH - RUNWAY 6

FIGURE

1-4

LAKE WALES, FLORIDA

AL-6516 (FAA)

11237

RNAV (GPS) RWY 24
LAKE WALES MUNI (XØ7)

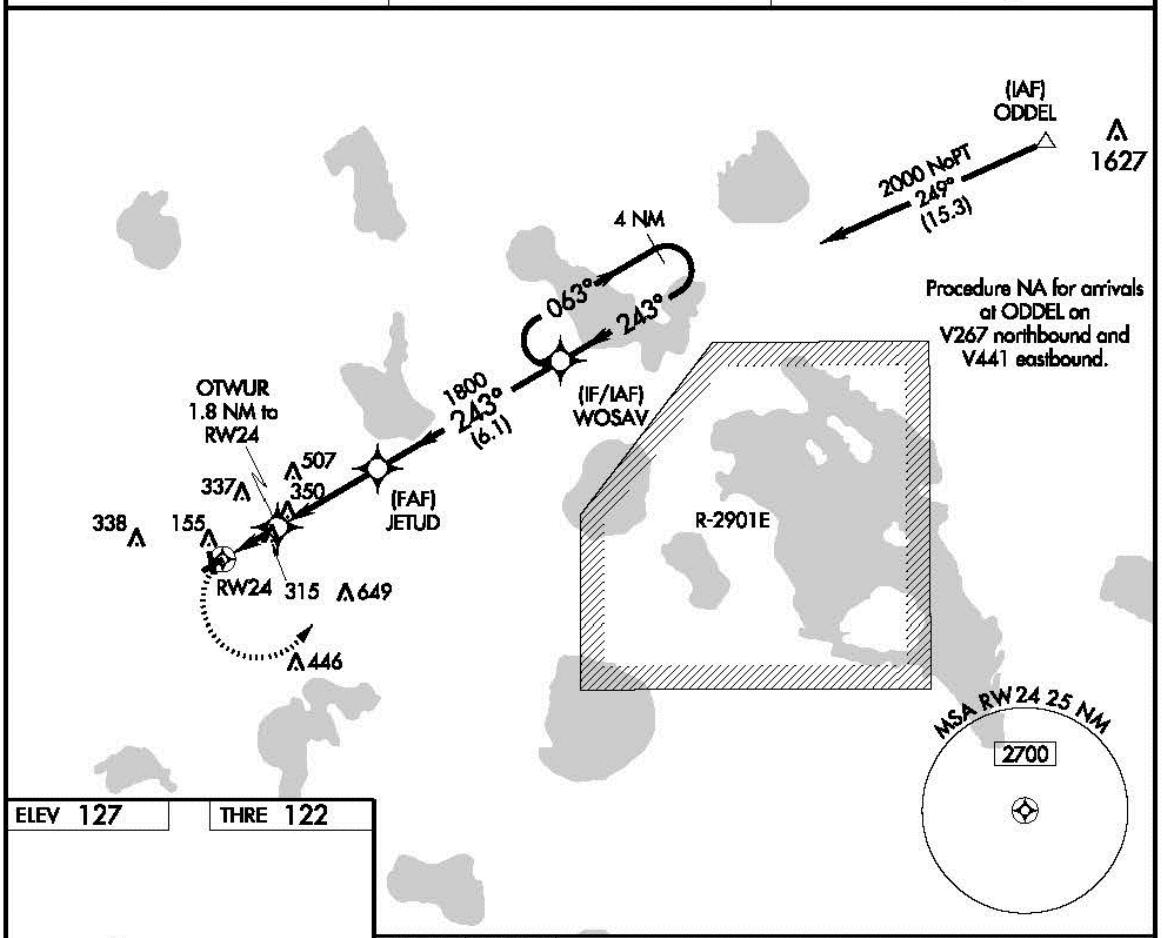
WAAS CH 40323 W24A	APP CRS 243°	Rwy ldg 3999 THRE 122 Apt Elev 127

DME/DME RNP-0.3 NA. Procedure NA at night. Visibility reduction by helicopters NA. When local altimeter setting not received, use Bartow altimeter setting and increase all MDA 40 feet.

NA

MISSED APPROACH: Climbing left turn to 2000 direct WOSAV and hold.

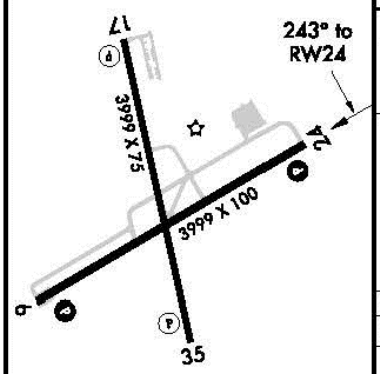
AWOS-3	TAMPA APP CON	UNICOM
124.225	120.65 290.3	122.8 (CTAF) L*



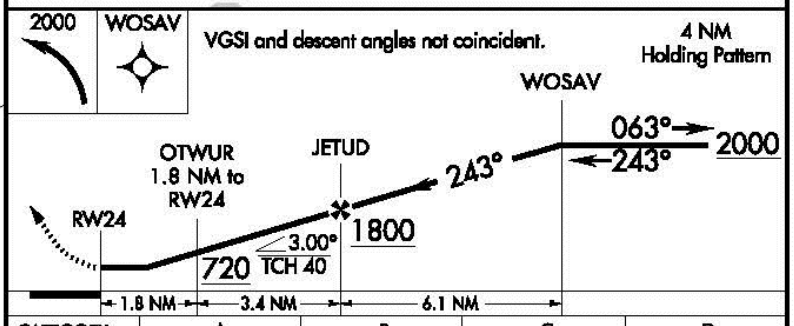
SE-3, 26 JUL 2012 to 23 AUG 2012

SE-3, 26 JUL 2012 to 23 AUG 2012

ELEV 127 | THRE 122



MIRL Rwy 6-24 L*



CATEGORY	A	B	C	D
LP MDA	580-1 458 (500-1)		580-1½ 458 (500-1½)	580-2 458 (500-2)
LNAV MDA	580-1 458 (500-1)		580-1½ 458 (500-1½)	580-2 458 (500-2)
CIRCLING	580-1 453 (500-1)	620-1 493 (500-1)	620-1½ 493 (500-1½)	680-2 553 (600-2)

LAKE WALES, FLORIDA
Orig 25AUG11

27° 54'N-81° 37'W

LAKE WALES MUNI (XØ7)
RNAV (GPS) RWY 24

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LAKE WALES MUNICIPAL AIRPORT
LAKE WALES, FLORIDA

GPS APPROACH - RUNWAY 24

FIGURE 1-5

LAKE WALES, FLORIDA

AL-6516 (FAA)

11237

VOR/DME-B

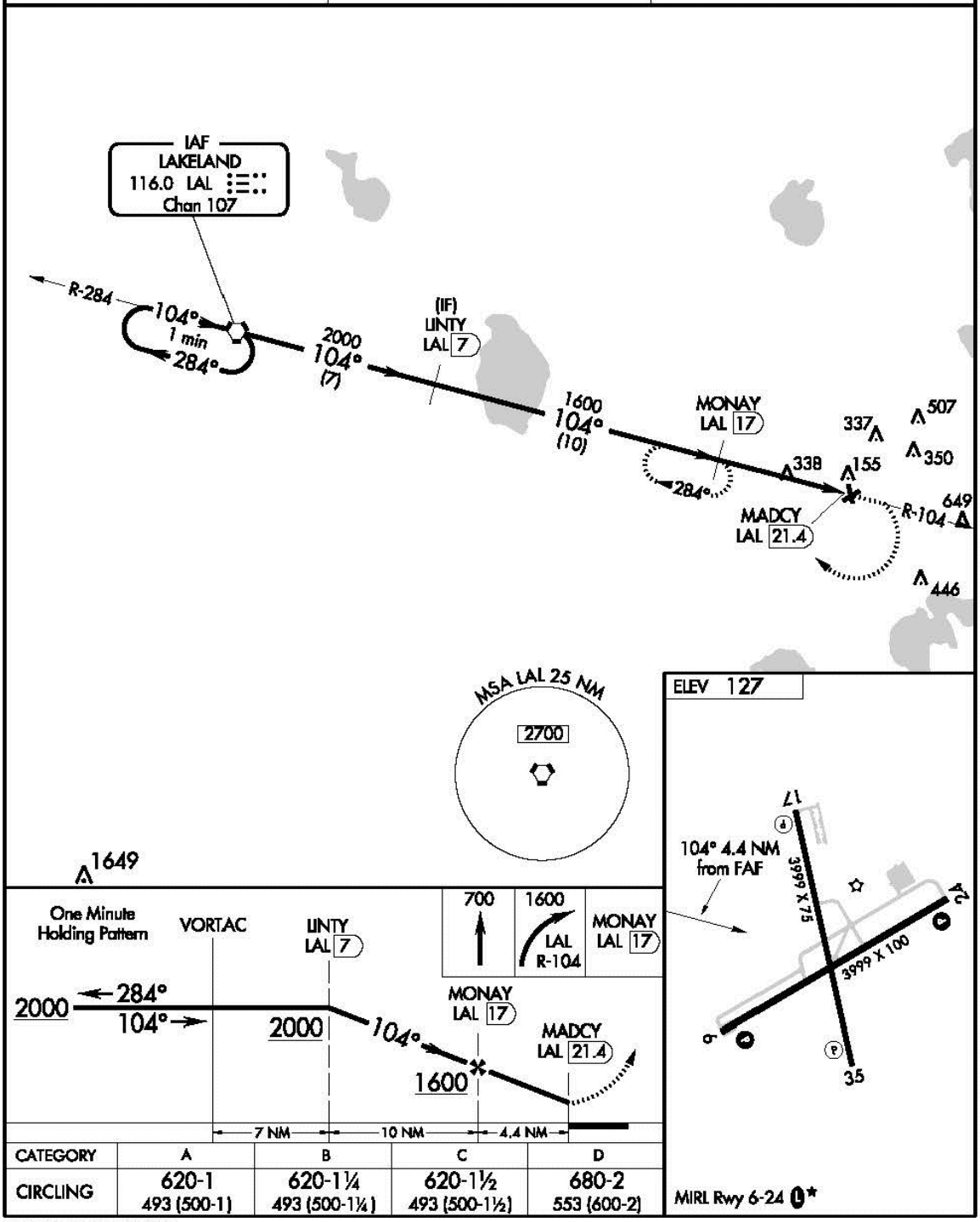
LAKE WALES MUNI (X07)

VORTAC LAL	APP CRS	Rwy ldg	N/A
116.0	104°	TDZE	N/A
Chan 107		Apt Elev	127

When local altimeter setting not received, use Bartow altimeter setting and increase all MDA 40 feet. Procedure NA at night.

MISSED APPROACH: Climb to 700 then climbing right turn to 1600 on LAL VORTAC R-104 to MONAY/LAL 17 DME and hold.

AWOS-3	TAMPA APP CON	UNICOM
124.225	120.65 290.3	122.8 (CTAF)



CATEGORY	A	B	C	D
CIRCLING	620-1 493 (500-1)	620-1¼ 493 (500-1¼)	620-1½ 493 (500-1½)	680-2 553 (600-2)

SE-3, 26 JUL 2012 to 23 AUG 2012

SE-3, 26 JUL 2012 to 23 AUG 2012

LAKE WALES, FLORIDA
Amdt 3 25AUG11

27° 54'N-81° 37'W

LAKE WALES MUNI (X07)
VOR/DME-B

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LAKE WALES MUNICIPAL AIRPORT
LAKE WALES, FLORIDA

VOR/DME CIRCLING APPROACH

FIGURE

1-6

the aircraft on takeoff, indicating the end of usable runway. There are no edge lights on Runway 17-35.

Taxiway Lighting

All four of the taxiways are equipped with Medium Intensity Taxiway Lights (MITL). The MITLs east of Runway 17-35 have been installed using base mounted light-emitting diode (LED) light fixtures on cans placed nine feet from the taxiway edge. Each are considered to be in good condition and powered by a 15 kilowatt regulator (Taxiway T2 circuit) located in the electrical vault. The MITLs of Taxiway A west of Runway 17-35, as well as all of the fixtures for Taxiway D are traditional incandescent and considered to be in fair condition. These older lights, which are stake mounted with the cable directly buried in-between each fixture are powered by a 7.5 kilowatt regulator (Taxiway T1 circuit) in the electrical vault.

Pavement Markings

Pavement markings delineate the various movement areas of the airfield. Runway 6-24 has designation numbers, centerline striping, side stripes, and aiming point markers for both ends. All runway markings are painted white, but only the designation markings which identify the magnetic azimuth of the runway, are outlined in black. Currently the markings for Runway 6-24 are faded and difficult to see under certain conditions.

Runway 17-35 has designation numbers, centerline striping, and a threshold bar at the Runway 35 end. These markings, which are white with a black outline, are in excellent condition as they were redone in 2011. The threshold bar for Runway 35 indicates the beginning of useable pavement since the threshold was relocated 140 feet to provide the proper runway safety area. The pavement in front of the threshold bar is now designated as a blast bad and has the appropriate yellow chevrons, which are also outlined in black. The blast pad markings are also in excellent condition.

All of the taxiways and hangar taxilanes have visible centerline stripes with holding position markings located at the intersections with the runways. These markings ensure that taxiing aircraft have the proper wingtip clearance and indicate the areas protected for runway operations. All of the taxiway and taxilane markings are yellow with most very faded and in poor to fair condition. The exceptions are those on Taxiways B and C which are in fair condition and include taxiway edge markings.

Takeoff and Landing Aids

There are a number of different takeoff and landing aids at the Airport, which are described below. As with the runway and taxiway lighting, any of the takeoff or landing aids that emit light are pilot controlled through the CTAF frequency.

Visual Glide Slope Indicators

There are a number of systems installed at airports which provide an indication of the aircraft's relation to the proper glideslope. At Lake Wales Municipal, Precision Approach Path Indicator (PAPI) systems have been installed on all four runway ends. PAPIs provide the pilot with visual descent information during an approach to a runway. These lights are typically visible from 5 miles during the day and up to 20 miles or more at night. PAPIs use a light bar unit that is installed in a single row perpendicular to the runway edge. The lights project a beam of white light in the upper segment and red light in the lower segment. Depending on the aircraft's angle

in relation to these lights, the pilot will receive a combination that indicates his position relative to the desired 3.0 degree glideslope.

Both ends of Runway 6-24 were previously equipped with operable 4-light PAPI systems. At this time however, none of the Runway 6-24 PAPI units are working and the units have been disconnected from the runway lighting circuit/regulator. The inoperable PAPI system intended to support arrivals to Runway 6 is located on the right side of the runway approximately 1,000 feet beyond the Runway 6 threshold when viewed by approaching aircraft. The inoperable PAPI system on Runway 24 has a similar spatial relationship to the Runway threshold as the PAPI system on Runway 6 except the Runway 24 PAPI is located on the left side of the runway when viewed by approaching aircraft.

Both ends of Runway 17-35 have functioning 2-light PAPI systems that are considered to be in excellent condition. The system for Runway 17 is located on the right side of the runway while the one for Runway 35 is on the left. The Runway 17-35 PAPI units are controlled by a 10 kilowatt regulator.

Wind Indicators

Perhaps the most basic takeoff and landing aid is the windsock, which indicates wind direction and speed. Currently, there is one internally illuminated windsock which is located just southwest of the runway intersection as part of the Airport's segmented circle. The segmented circle helps pilots identify the location of the windsock.

There are also three smaller, unlit supplemental windsocks at the Airport. They are located to the left of the Runway 24 end, to the right of the Runway 17 end, and to the right of the Runway 35 end. While the windsocks are considered to be in good condition, the one adjacent to Runway 35 is missing the actual windsock fabric.

Automated Weather Observing System

The Airport has an Automated Weather Observing System (AWOS) III located on the southeast side of the airfield. The AWOS III is an All Weather Inc. unit which reports the airfield altimeter setting, wind data, temperature, dew point, visibility, and cloud/ceiling data, as well as the time the data was collected. Pilots can receive this information on the assigned radio frequency (124.225 MHz) or through the dedicated telephone number (863) 678-1334. Currently the AWOS III observations are not being collected by the National Weather Service due to equipment limitations.

Airfield Signage

As part of the airfield lighting system, the Airport has a number of internally illuminated airfield signs. These include mandatory instruction, location, direction, and destination signs. The mandatory signs include the holding position signs which delineate to a pilot the limits of the runway environment. These signs are located on the left side of each connector taxiway, adjacent to the runway holding position markers. There are also still a few unlit airfield signs along Taxiway A and along portions of Runway 17-35. This includes the holding position sign at the approach end to Runway 17, which is not required to be lighted since Runway 17-35 is unlit. While one sign is currently damaged, most are in excellent condition.

AIRSPACE AND AIR TRAFFIC CONTROL

Controlled airspace is referred to as Class A, B, C, D, or E and uncontrolled airspace as Class G. Generally speaking, Class A airspace begins at 18,000 feet above mean sea level (AMSL), continues upward, and is used to manage enroute aircraft traffic. Class B airspace surrounds the nation's busiest airports such as the Orlando and Tampa International Airports. Class C surrounds airports with high traffic levels, but not as high as Class B airports. Examples of airports with Class C airspace within Central Florida include the Sarasota-Bradenton and Daytona Beach International Airports. Class D surrounds those airports with an air traffic control tower (ATCT) not located in Class B or C airspace. Class E airspace is any other controlled airspace. Pilots are usually in radio contact with some portion of the FAA air traffic control (ATC) network. This ATC network consists of air route traffic control centers (ARTCC), terminal approach control facilities (TRACON), ATCTs, and flight service stations (FSS). **Figure 1-7** depicts a generalized view of the different airspace classifications and their relationships.

Regardless of the fact that Lake Wales Municipal is a non-towered airport, a portion of the airspace above the Airport is controlled. This airspace, which is designated as Class E, begins at 700 feet above ground level (AGL) and extends upward to 17,999 feet AMSL, where it meets with the overlying controlled airspace (Class A). The uncontrolled airspace between the surface and 699 feet AGL is designated as Class G airspace. **Figure 1-8** depicts Lake Wales airspace environment as it is depicted on the FAA's Aeronautical Sectional chart.

As a non-towered airport, the CTAF (also called the UNICOM or Aeronautical Advisory Station) is used for communication between the aircraft operating to and from the airfield. The Class E airspace over Lake Wales Municipal enables aircraft to transition between the airfield and the enroute environment. There are also a number of Military Operations Areas (MOA) and Restricted Areas to the south and east of the airfield. The only one that overlaps the Airport is the Lake Placid North MOA, which has a floor of 7,000 feet AMSL when it is active.

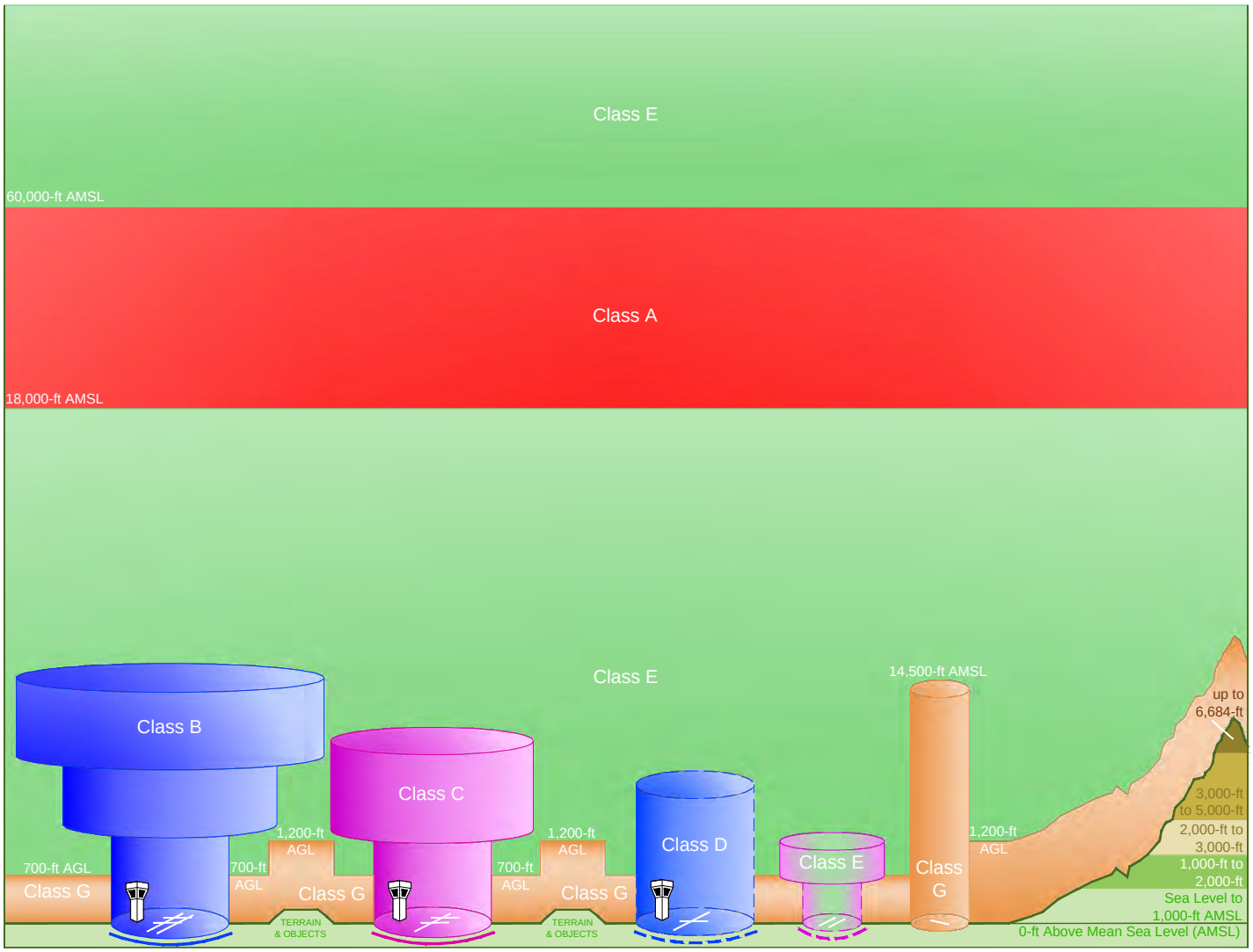
The Airport's approach profiles extend upward and outward starting 200 feet from the ends of Runway 6-24 and Runway 17-35. The size and slope of the approach surface is determined by the type of approach available or planned for a particular runway end. There are to be no objects, either natural (vegetation) or manmade (structures) that should penetrate these sloping surfaces. The criteria for the approach profiles are set forth in Federal Aviation Regulation (FAR) Part 77. Requirements for the approach surfaces to each runway end will be addressed in the facility requirements chapter.

AIRPORT FACILITIES

Nearly every facility at Lake Wales Municipal is located on the northeast side of the Airport property. This area is bounded by Runway 6-24 to the south and Runway 17-35 to the west. The aircraft noted in and around each facility are based on field observations conducted in 2011 and confirmed by airport records. The Airport facilities are illustrated in Figure 1-3.

General Aviation Terminal

To the northeast of the runway intersection is the 12,000 square foot main general aviation terminal building for the Airport. Known as the Curtis D. Ammons, Jr. Center for Aviation, this



Communication Requirements and Weather Minimums

	Class A	Class B	Class C	Class D	Class E	Class G
Minimum Pilot Qualification	Instrument Rating	Student *	Student *	Student *	Student *	Student *
Entry Requirements	IFR: ATC Clearance VFR: Operations Prohibited	ATC Clearance	IFR: ATC Clearance VFR: Two-Way Communication w/ ATC	IFR: ATC Clearance VFR: Two-Way Communication w/ ATC	IFR: ATC Clearance VFR: None	None
VFR Visibility Below 10,000 AMSL **	N/A	3 Statute Miles	3 Statute Miles	3 Statute Miles	3 Statute Miles	Day: 1 Statute Mile Night: 3 Statute Miles
VFR Cloud Clearance Below 10,000 AMSL	N/A	Clear of Clouds	500 Below 1,000 Above 2,000 Horizontal	500 Below 1,000 Above 2,000 Horizontal	500 Below 1,000 Above 2,000 Horizontal	500 Below 1,000 Above 2,000 Horizontal ***
VFR Visibility 10,000 AMSL and Above **	N/A	3 Statute Miles	3 Statute Miles	3 Statute Miles	5 Statute Miles	5 Statute Miles
VFR Cloud Clearance 10,000 AMSL and Above	N/A	Clear of Clouds	500 Below 1,000 Above 2,000 Horizontal	500 Below 1,000 Above 2,000 Horizontal	500 Below 1,000 Above 1 Statute Mile Horizontal	1,000 Below 1,000 Above 1 Statute Mile Horizontal
Airport Application	N/A	• Radar • Instrument Approaches • Weather • Control Tower • High Density	• Radar • Instrument Approaches • Weather • Control Tower	• Instrument Approaches • Weather • Control Tower	• Instrument Approaches • Weather	
Special VFR Permitted?	No	Yes	Yes	Yes	Yes	N/A

* Prior to operating within Class B, C, or D airspace (or Class E airspace with an operating control tower), student, sport, and recreational pilots must meet the applicable FAR Part 61 training and endorsement requirements. Solo student, sport, and recreational pilot operations are prohibited at those airports listed in FAR Part 91, Appendix D, Section 4.

** Student pilot operations require at least 3 statute miles visibility during the day and 5 statute miles visibility at night.

*** Class G VFR cloud clearance at 1,200 AGL and below (day): clear of clouds.

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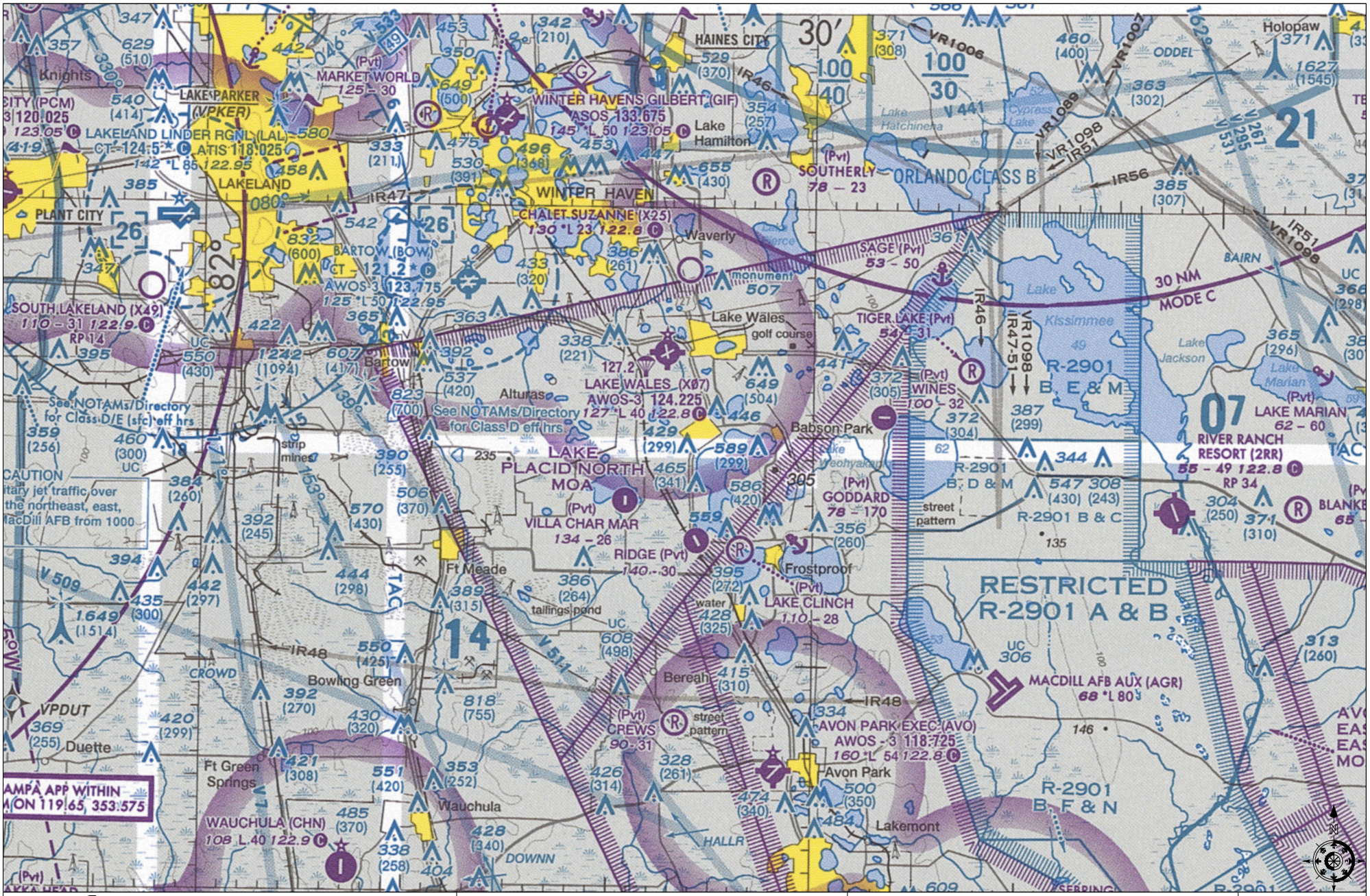
LAKE WALES MUNICIPAL AIRPORT
LAKE WALES, FLORIDA

GENERAL AIRSPACE CATEGORIES

FIGURE

1-7



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LAKE WALES MUNICIPAL AIRPORT
LAKE WALES, FLORIDA

LAKE WALES REGIONAL AIRSPACE

FIGURE
1-8

facility houses the FBO services as well as a commercial skydiving operation and other services approved by the City, FAA, or third parties. The FBO portion of this facility provides public restrooms, a seating/lounge area, and pilot briefing room. There is also a small office for the on-site Airport Manager and some storage space. The rest of the terminal is utilized by the commercial sky dive company and related commercial businesses for the operation of their businesses. Existing space, both in and around the GA terminal building, is currently reserved for future revenue development initiatives.

On the airside of the building there is a 30 foot deep overhang which provides 4,500 square feet of covered space opening out to the aircraft parking area and Taxiway B. There are 20 regular and one handicap automobile parking spaces in the paved lot on the landside of the terminal.

Hangar Facilities

Starting on the north side of the airfield, there are four hangar buildings between Runway 17-35 and Airport Road. The northernmost is 3,900 square foot clearspan hangar referred to as Corporate Hangar 1. Currently there is one rotorcraft stored in this hangar. Just south and across the taxiway is Corporate Hangar 2. This 2,520 square foot clearspan hangar houses a mix of three ultralight and light sport aircraft. Both Corporate Hangar 1 and Corporate Hangar 2 are part of the FBO lease. To the south are two new eight unit t-hangars which are owned by the City and store 16 single-engine aircraft.

Aircraft Parking Apron

There are two paved aircraft parking areas. The first is the asphalt area around the general aviation terminal that provides approximately 22,500 square feet of space. This terminal apron is considered to be in excellent condition. A DeHavilland Twin Otter based at the Airport by the sky dive operator is stored on this apron outside of the terminal facility. The rest of the space is typically used by itinerant aircraft, including five dedicated tiedown spots.

The other paved aircraft parking apron is to the north of Taxiway A on the easternmost side of the airfield. There are 18 aircraft tiedown positions on this approximately 90,000 square foot asphalt apron. The east aircraft apron was rated as being in fair condition in the 2008 FDOT Pavement Study. Currently there is only one single-engine aircraft stored on the tiedown apron.

Aviation Fuel Storage

On the west side of the tiedown apron are two above ground aviation fuel storage tanks. Each tank holds 10,000 gallons and are composed of double wall construction. One tank contains 100LL Avgas and the other Jet A. To conduct aircraft fueling, aircraft pull directly up to the tanks as there are no fueling trucks at the Airport. The card reading machine to operate the self service pumps is located with the Avgas tank, which is the one closest to Taxiway A. Both tanks are considered to be in good condition.

Airfield Security

Currently the active airfield is enclosed by a combination of security fencing and vegetative/natural barriers. As recommended by the FAA, FDOT, and Transportation Security Administration (TSA), the security fencing around the airfield consists of six foot high chain link fence with three strands of barb wire on top.

There are two electric gates both of which use proximity cards for access. These electric gates include a 24 foot cantilever gate between the automobile parking and aircraft parking apron at the general aviation terminal and a 16 foot cantilever gate off Airport Road for access to the hangars on the north side of the airfield. There is also a pedestrian gate located just south of the general aviation terminal building at the corner of the automobile parking lot. The perimeter fencing also includes a number of other locked swing gates, which do not have an electric opening system. These gates are in various locations around the perimeter for maintenance or other uses, including access to fire hydrants off Airport Road. Most of these gates are not used very often.

A number of floodlights have been installed around the Airport facilities for both security and convenience. For the general aviation terminal and hangar buildings, the floodlights are mounted to the side of each facility. For the terminal automobile parking lot and tiedown apron area, the floodlights are mounted on masts 38 feet above the ground.

Other Aviation Facilities

The Airport has an airfield electrical vault that distributes power to the airfield lighting circuits. The vault, which measures 10 feet by 12 feet, is located to the east of Airport Road, north of Taxiway A, and just south of the rotating beacon tower. As described previously, the vault houses a 15 kilowatt, two 10 kilowatt, and a 7.5 kilowatt regulators, each of which are considered to be in good condition. In addition, the enclosure houses the required meter, main disconnect, and breaker panels, as well as overhead lighting and an exhaust fan. There is also a lighting control panel and L-854 radio control panel to facilitate pilot control of the airfield lighting. Power to the electrical vault is via a drop from the overhead service that comes into the Airport property from the northeast behind the Florida Army National Guard facilities.

Non-Aviation Facilities

There are two non-aviation parcels located at the Airport on the east side (landside) of Airport Road. On the north end across from the four hangars is a campground. This 2.3 acre parcel is leased to a third party through the FBO leasehold. The campground is considered a temporary use of the land by the City of Lake Wales The other parcel is further south off Airport Road, almost across from the general aviation terminal. The Florida Army National Guard occupies this 7.2 acres site which has a couple of buildings, automobile parking lot, and various paved vehicle/equipment storage areas.

AIRPORT INFRASTRUCTURE

A number of the proposed developments in this study will require the extension of the electric power and water utilities, as well as provide provisions for wastewater service. The information in this section was determined from past planning studies and the utility providers. It should be noted that prior to any development at the Airport, detailed utility surveys or drawings will need to be obtained.

Electric Power

All of the electric power for airport facilities is provided by the overhead distribution lines that run south down Airport Road from the main transmission lines along State Road 60. These distribution lines run down the east side of Airport Road to the campground where they turn to run along the backside of the campground leasehold and then down behind the Florida Army

National Guard Facilities. The lines come into the area behind the tiedown apron and electrical vault. All of the electrical power for the airfield facilities west of Airport Road is via underground extensions of the overhead lines. Progress Energy provides all electric service to the Airport.

Water and Wastewater

Currently water service is provided to all of the buildings on airport property. For the four hangar buildings on the north side of the airfield, the water service is limited to outdoor hose spigots because none of these facilities have restrooms or sinks. The general aviation terminal building utilizes a septic tank system since there are no sanitary sewer lines currently serving the Airport. The water service is provided by City of Lake Wales Utilities Department via a small domestic on-airport well and water treatment facility which is located just east of the electrical vault.

All of the existing aviation and non-aviation parcels on the northeast of the Airport have access to fire hydrants. The hydrant system, as well as any other non-domestic water service is provided by the non-potable well and water storage system located on the east side of the Airport property, behind the Florida Army National Guard. This facility was constructed as part of the rebuilding effort after the 2004 hurricane season in order to provide the proper fire flow to the new facilities.

CONCLUSION

The above descriptions do not provide an exhaustive account for every specific detail and facet of the Lake Wales Municipal Airport. The purpose of this inventory was to provide general facility data for subsequent analyses. For example, the aviation activity forecasts chapter will analyze the historic data with industry trends in order to project the based aircraft and operational activity.

Aviation Activity Forecasts

OVERVIEW

This chapter presents projections of aviation activity that will be used as the basis for facility planning at the Lake Wales Municipal Airport. The objective of forecasting is to estimate future levels of airport activity from which the demand for facilities can be derived. By comparing the demand for future facilities with existing facilities, it is possible to identify any deficiencies. Thus, these forecasts serve as the foundation of the master planning process.

The standard planning period for an airport master plan is 20 years. Since this study was primarily conducted in 2012, forecasts are presented for 2017, 2022, and 2032 as the key planning periods are generally considered at the five, ten, and 20-year horizons. The forecast for based aircraft and operations use data obtained through 2011. The development of the forecasts also includes analyses of historic data and industry trends from the Federal Aviation Administration (FAA) and the Florida Department of Transportation (FDOT). This has been supplemented by information obtained during interviews with airport management, tenants, and users to derive a more complete picture of operational activities and emerging trends at Lake Wales Municipal.

PREVIOUS AIRCRAFT AND ACTIVITY PROJECTIONS

Three previous forecasts of aviation activity for Lake Wales Municipal exist. These include the 2004 Airport Master Plan, the Florida Aviation System Plan 2025 (FASP), and the 2011 FAA Terminal Area Forecasts (TAF). Each of these are summarized below for comparison purposes. In fact, a direct comparison to the FAA TAF is required as part of the FAA review process. This comparison is included at the end of the chapter.

2004 Airport Master Plan

The last planning document conducted specifically for Lake Wales Municipal was the 2004 Airport Master Plan. The number of based aircraft and total annual operations from that study are shown below.

Table 2-1. 2004 Airport Master Plan

		Based Aircraft	Annual Operations
Base Year			
	2002	48	20,000
Forecast			
	2007	51	21,270
	2012	53	22,674
	2022	59	27,908

Source: 2004 Airport Master Plan.

Based aircraft and annual operations were projected to increase at an overall average annual rate of 1.0 and 1.7 percent, respectively. It should be noted that these forecasts were created before the airport was completely devastated during the 2004 hurricane season. As a result, the based aircraft projection is completely unrealistic since the airport lost over one half of the based tenants during the recovery. However, the annual operations projected are very representative of the level occurring at the airport today.

Florida Aviation System Plan

The Florida Aviation System Plan (FASP) helps guide the development of Florida's public airports. This plan is necessary to ensure that airports work together effectively as a statewide transportation system, provide a link to the global air transportation network, and effectively interface with regional surface transportation. As such, the Aviation Office of FDOT maintains these activity forecasts for all publicly-owned, public-use airports in the state.

The 2011 FASP projects aviation activity through 2029 using a top-down approach. In simplest terms, the overall growth for the state is broken down by analyzing the historic trends for each of the nine planning regions and then for the individual airports within each region. At the core of the state's aviation forecasts are the various trends related to population and employment, as these socioeconomic factors have high correlations with the demand for aviation services. Overall, the 2011 FASP projects an average annual growth rate of 2.0 percent for based aircraft and 1.5 percent for annual operations.

Table 2-2. 2011 Florida Aviation System Plan

	Based Aircraft	Annual Operations
Base Year		
2009	21	7,000
Forecast		
2017	25	7,885
2022	27	8,495
2029	31	9,428

Source: 2011 Florida Aviation System Plan.

The discouraging part of the 2011 FASP is that for annual operations, the significant increase in aircraft activity recorded in 2010 and 2011 are not included in the projections; given the base year is 2009. Airport records indicated that aeronautical operations increased over 300 percent during this time period, most likely as a result of facilities being renovated or replaced after the devastating 2004 hurricane.

FAA Terminal Area Forecasts

Terminal Area Forecasts (TAF) are prepared each year by the FAA for the nation's airport facilities to help the agency with various planning and budget needs. The TAF includes forecasts for those airports which are active in the National Plan of Integrated Airport System (NPIAS), including non-towered facilities.

Forecasts in the FAA TAF are calculated utilizing a number of methods. Typically, projections are developed using regression analysis with various national economic indicators as the independent variables. **Table 2-3** depicts the based aircraft and annual aircraft operations published in the 2011 TAF for Lake Wales Municipal.

It is interesting to note that the level of based aircraft and the number of annual operations are expected to remain the same through the year 2030. No explanation is given for the zero growth projections; however, it is most likely that the FAA did not dedicate resources to appropriately forecast aeronautical activities at X07 as the result of the facility having historically low operational totals. Also the based aircraft figure is lower than the actual number recorded over the past several years.

Table 2-3. 2011 FAA Terminal Area Forecast

	Based Aircraft	Annual Operations
Base Year		
2009	16	20,000
Forecast		
2017	16	20,000
2022	16	20,000
2030	16	20,000

Source: 2011 FAA Terminal Area Forecasts.

INDUSTRY TRENDS AND FORECASTING APPROACH

General aviation encompasses all segments of the aviation industry except for the activity that is conducted by scheduled airlines or the military. Examples include pilot training, law enforcement flights, medical transportation, aerial surveys, aerial photography, agricultural spraying, advertising, and various forms of recreation, not to mention business, corporate, and personal travel. Since the 2004 Airport Master Plan, there have been a number of changes in the general aviation industry.

Between 2001 and 2003 the general aviation industry declined, due primarily to an economic downturn and impacts from the tragic events of September 11th. This resulted in a decrease in the number of general aviation aircraft shipments and activity. Further, the lingering effects of September 2001 only made the situation worse for general aviation, which to some extent is still affecting the industry today.

However, between 2003 and 2007, the industry experienced robust growth, largely due to advances in aircraft and navigation technologies, which created new product offerings and services during a period with an overall good economy. These included widespread use of Global Positioning Satellites (GPS) applications in the cockpit, for airport navigational aids, and instrument approaches. This period also resulted in the emergence of very light jet aircraft and the introduction of an entirely new category; the light sport aircraft. These new product offerings and services bolstered most every segment of the general aviation industry. Unfortunately, by the end of 2008, there was little to no growth in the general aviation industry. The very light jet industry was hit hardest as nearly every manufacturer went bankrupt. Likewise, most segments of the industry experienced losses as the overall economy continued to decline though the Great Recession.

Through the end of 2011, the industry was still struggling, but a number of positive signs are on the horizon, including the re-emergence of a number of very light jet manufacturers. Despite the downturn in general aviation, the light sport aircraft segment has grown both in the number of aircraft and the activity they generate. Although jet operations declined after the negative press during the 2008-09 corporate bailouts, many other non-Fortune 500 companies use private aircraft for business. In fact, tens of thousands of small and medium sized companies use general aviation as an essential part of their businesses and many industry indicators project business jet activity to lead the recovery expected over the next couple of years.

Each year the FAA prepares projections in their Aerospace Forecasts for a number of the leading aviation and aerospace indices. While there have been fluctuations in the industry as described above, overall the 2011 FAA Aerospace Forecasts project positive growth for the next

20 years. According to the 2011 FAA Aerospace Forecasts, the overall number of active general aviation aircraft is expected to increase 0.9 percent annually through 2031. Even more encouraging is that the number of hours flown by general aviation aircraft is projected to increase 2.2 percent annually through the same period. The FAA industry forecasts assume that much of the growth will be attributed to the resurgence of business and corporate traffic, as well as the continued popularity of the light sport aircraft. After the significant lows experienced in 2009, the FAA projects steady increases in the utilization rates through 2031. These forecasts are partially based on the fact that the business jet and light sport aircraft fleets are increasing in size.

As described in later sections, a number of approaches were applied to forecast aviation activity. Today, general aviation growth at an airport relies on many factors including the level of service offered, competitive pricing, airfield characteristics, local area attractiveness, and pilots' perception of these amenities. As a result, these forecasts assume that the City of Lake Wales City Commissioners, City staff, airport management, fixed base operator (FBO), and other tenants will actively support all aviation activity and initiate the appropriate measures to proactively maintain as well as improve the airport as necessary to meet demand. In fact, the City of Lake Wales and the Airport Authority are already programing development to better support the tourism and business economies as well general aviation users.

PROJECTIONS OF BASED AIRCRAFT

The number of aircraft owners projected to use Lake Wales Municipal as their base is an important consideration when planning facilities. The based aircraft forecast will directly influence the type and number of aircraft storage facilities and apron tiedowns needed. Projections of based aircraft also provide one indication of the anticipated growth in flight activity that is expected to occur at the airport. For Lake Wales, growth in the number of based aircraft is expected to occur during the planning period. The following methods were considered for estimating this growth.

Historic Growth

A common technique for projecting the number of based aircraft is to simply apply the historic growth rate experienced over a set timeframe. However, as documented in the inventory chapter, the current number of based aircraft at the airport is significantly lower than prior years due to the hurricane damage in 2004 and subsequent closure of the airport for repairs. City airport records and a count made during this study confirmed 22 based aircraft at Lake Wales Municipal in 2011. When this is compared to the count of 48 aircraft in 2002, it is not possible to use the historic period to provide a projection of future growth potential.

Previous Growth Projections

While historic based aircraft counts cannot be used in this study, there were the basis of the projected annual growth (1.0 percent) in the 2004 Airport Master Plan as shown in **Table 2-1**. This was considered a conservative forecast as the general aviation industry was predicted to recover and there were 30 people on the hangar waiting list at that time. Regardless, when the average annual growth from the 2004 Airport Master Plan was applied to the 2011 figure, the result is a projection of 27 aircraft by 2032.

As described, the 2011 FASP projects an overall growth of 2.0 percent annually. If that rate is applied to the based aircraft count for 2011, the result would be 33 aircraft by the end of the planning period. This estimate, along with the projection using the 2004 Airport Master Plan growth, is reflected in **Table 2-4**.

National Active Fleet Forecasts

The next forecast of based aircraft for Lake Wales applies the growth expected in the nation's number of active general aviation aircraft. This data was obtained from the 2011 FAA Aerospace Forecasts, which shows the number of active general aviation aircraft (in the nation) increasing at an average of 0.9 percent through 2031. Applying this growth rate to the 2011 count results in 27 based aircraft by the end of the planning period as shown in **Table 2-4**.

Table 2-4. Comparison of Based Aircraft Projections

	Historic Growth	Previous Master Plan	Statewide System Plan	National Active Fleet	Adjusted Forecast
Base Year					
2011	22	22	22	22	22
Forecast					
2017	13	23	25	23	28
2022	8	25	27	24	31
2032	4	27	33	27	37

Source: Hoyle, Tanner & Associates, Inc., 2012.

Selected Based Aircraft Forecast

The previous projections of based aircraft vary from slightly less than one percent growth each year to two. In each case however; the overall projections for the 20-year planning period are somewhat limited. This results from a couple of factors, the most significant of which is the fact that over half of the based aircraft were lost after the 2004 hurricane season and the struggle to replace facilities during a sluggish economy. Additionally, lack of funding for a runway extension caused some potential high profile tenants to stop considering Lake Wales for relocation of their operations. However, as the economy picks up and funding becomes available for needed airfield improvements the Airport will be in a strong position to reestablish strong and diverse growth of based aircraft.

For a number of years Lake Wales Municipal maintained a hangar waiting list. Prior to the hurricanes, this waiting list of 30 people illustrated the strong demand for facilities at the airport. This would have likely resulted in additional based aircraft if new hangar facilities could have been provided at that time. Instead, it took a number of years for the City to replace all of the airport facilities that were destroyed with new ones meeting the proper building codes.

Currently there is only one person on the official hangar waiting list. Traditionally, this list has been maintained only for those desiring t-hangar space. However, there are two corporations that are ready to build large clearspan hangars at the airport. Written requests from each have been provided to the City in an effort to start the process of developing the proposed 8,000 and 10,000 square foot hangars. Combined, the requests for these facilities are to provide storage for one jet aircraft, two multi-engine aircraft, and one rotorcraft, with the potential for one or two more aircraft shortly after they are constructed.

Additionally, it is important to consider the location of the airport within the state of Florida. As described previously, Lake Wales Municipal is one of 11 public-use airports in the Central Florida Region of the FASP. In the 2011 FASP, the Central Florida Region is shown as above the state average for both based aircraft and annual operations. In fact, where the state is

projected to have an overall average annual growth of 1.5 percent for based aircraft, Lake Wales Municipal is projected at 2.0 percent.

In order to develop a forecast of based aircraft which is truly unconstrained, the documented potential for these additional aircraft in the immediate future must be considered. Therefore, it is realistic for there to be at least four additional based aircraft at Lake Wales Municipal in the next couple of years, assuming the aforementioned hangars can be constructed. Likewise, it is entirely possible for one or two more aircraft to be based at the airport by the end of the short term planning period (2017). Therefore, a total of six additional aircraft are projected by 2017, which effectively doubles the growth projected in the 2011 FASP. Regardless, if the two new hangars requested are constructed, and the City continues to make other improvements at the airport, it is entirely possible for the short term growth to be even greater.

In any forecasting effort, the near term is the easiest to predict as there are less unknowns. This combined with the very cyclical nature of the general aviation industry cannot be ignored, especially since the industry is very susceptible to fluctuating economic conditions. As such, the growth expected for the short term planning horizon cannot be projected throughout the 20-year planning period. A more realistic approach would be to then apply the expected growth rate from the 2011 FASP for the intermediate and long term planning periods. This results in an overall growth rate of 2.6 percent annually which is reflected in the "Adjusted Forecast" shown in Table 2-4.

PROJECTED BASED AIRCRAFT FLEET MIX

Projecting the types of based aircraft is necessary since different aircraft require different facilities. Overall, the future based aircraft fleet mix was determined by studying the projections of the national fleet and comparing that to the aircraft types currently at Lake Wales Municipal. For the short term planning period, significant consideration was given to the current requests for additional hangar space that are on file with the City.

The Nation's Active General Aviation Fleet

Every year, the nation's active general aviation fleet is published as part of the FAA Aerospace Forecasts. In 2010 there were 224,172 active general aviation aircraft. This figure is down from those posted since 2005. However, by 2031, the FAA predicts this figure to increase to 270,920 aircraft. While the FAA provides counts for a number of aircraft categories, they have been simplified into the five shown in **Table 2-5**. Within the single-engine grouping is the single-engine piston, experimental, and light sport aircraft categories. The multi-engine group contains both piston and turboprop models as the rotorcraft group contains both piston and turbine models. The jet category covers all ranges of turbojet general aviation aircraft, from the newer very light jets to the heaviest business jets.

Table 2-5. Forecast of Nation's Active Fleet

	2010 Fleet	2031 Fleet	Average Annual Growth Rate
Single-Engine	76.50%	71.90%	0.60%
Multi-Engine (piston & turboprop)	11.40%	9.60%	0.10%
Jet	5.20%	10.10%	4.20%
Rotorcraft	4.50%	6.40%	2.60%
Other (gliders, balloons, etc.)	2.40%	2.00%	-0.10%

Source: 2011 FAA Aerospace Forecasts.

The FAA projects a noticeable growth in the jet category. Several reasons exist to support this anticipated growth. While the use of business aircraft fell off sharply in recent years, jet aircraft use by smaller companies is expected to recover and increase as various charter, lease, time-share, partnership, and fractional ownership agreements provide different options for these aircraft to obtain high utilization rates. Businesses rely on general aviation transport because it provides safe, efficient, flexible, and reliable transportation. Fractional ownership offers consumers a more efficient use of time by providing faster point-to-point travel times and the ability to conduct business while flying, as well as minimum enplaning and deplaning hassles.

The continuing popularity of travel by general aviation aircraft is also due to the ability to use smaller, less-congested airports located closer to the final destination. A large part of this is due to the expanded application of GPS technologies in navigation, but more specifically the myriad of new runway specific instrument approach procedures that have been established at even the smallest airports. In the FAA's projections, jet aircraft models including the expected re-introduction of new very light jets are expected to replace a number of the piston aircraft in the future, especially those typically in the multi-engine group. Hence the reason the multi-engine group shows virtually no growth while the jets are expected to be over 10 percent of the active general aviation fleet by 2031.

Finally, while growth in the single-engine category seems small, the actual numbers projected are quite significant given the share this group represents in the overall number of the nation's active general aviation fleet. In fact, there is a substantial increase in the number of light sport aircraft expected across the nation. By 2031, the FAA predicts that the 6,996 of these aircraft registered in 2010 will increase to 13,870. The popularity of these aircraft is important to consider given current fuel prices and the desirable flying conditions in Florida for such aircraft.

Lake Wales Municipal Airport Based Aircraft Fleet Mix

The current based aircraft at Lake Wales Municipal is 91.0 percent single-engine and 4.5 percent for both multi-engine and rotorcraft. Throughout the planning period, the mix of aircraft is expected to remain predominately single-engine. In addition to the traditional single-engine aircraft, it is expected that the popular light sport aircraft could be based at Lake Wales Municipal.

The more significant changes expected in the short term are the additional multi-engine and future jet aircraft that will be based at the airport. While the overall national fleet is not expected to show much growth in the multi-engine category, there are the two multi-engine aircraft previously mentioned that the owner desires to hangar at Lake Wales. For the based jets, the figures shown are realistic given the jet owner ready to base at Lake Wales and considering that the FAA has predicted that turbojet technology is at the point where it is truly feasible as a replacement to the more traditional piston fleet. Likewise, due to its flexibility, utilization, and popularity, some rotorcraft are also expected to be based at the airport in the near future.

Table 2-6. Forecast of Based Aircraft Fleet Mix

	2011	2017	2022	2032
Single-Engine	20	21	23	25
Multi-Engine (piston & turboprop)	1	3	3	4
Jet	0	2	3	5
Rotorcraft	1	2	2	3
Other (gliders, balloons, etc.)	0	0	0	0
Total	**22**	**28**	**31**	**37**

Source: Hoyle, Tanner & Associates, Inc., 2012.

As with most airports, the single and multi-engine categories are predominantly comprised of Beech, Cessna, Mooney, and Piper models. For the turboprops and multi-engine aircraft, the aircraft based at Lake Wales will be similar to the DeHavilland Twin Otter that is currently based at the airport. The types of based jets anticipated would be the small to medium sized business jet aircraft and/or some of the newer very light jet aircraft.

PROJECTIONS OF ANNUAL AIRCRAFT OPERATIONS

General aviation operations are divided into the categories of local or itinerant. Local operations are those arrivals or departures performed by aircraft that remain in the airport traffic pattern or are within sight of the airport. This covers an area within a 20 nautical mile radius of the airfield. Local operations are most often associated with training activity and flight instruction. Itinerant operations are arrivals or departures other than local operations, performed by either based or transient aircraft.

Recreational flying and training activities make up the majority of the local operations. The FAA defines an operation as either a single aircraft landing or takeoff. Under this definition, touch and go training procedures are considered two local operations (one arrival and one departure). Itinerant general aviation operations are typically comprised of private, business/corporate, and air charter transportation flights. A discussion on the split between these types of operations is included in a subsequent section. It is important to note that operational counts in recent years as indicated an uptick in activity associated with the growing tourism market in the Lake Wales area. While it may be somewhat unclear how regional tourism will affect the demand at X07 over the planning period, it is a valid assumption that tourist-based activity will be a significant portion of X07's activity in the coming years.

Historic Growth

As with the based aircraft forecasts, the first projection considered extrapolating the future levels of aircraft operations employing the historic growth. The historic levels of annual operations are estimates given there is no air traffic control tower at the airfield. However, since 2008, the FBO has provided monthly reports which detail the different types of activity at the airport. When the historic annual operations from the last master plan are compared to the activity through 2011, the average annual growth is 1.2 percent. If this rate were used to project future operations, the activity would reach 28,364 by 2032 as shown in **Table 2-7**.

Previous Growth Projections

Annual operations in the 2004 Airport Master Plan were projected to have an average growth rate of 1.7 percent over the 20-year planning period. This projection, which was based on the national trends at the time, actually resulted in a slightly higher growth rates as the forecast moved from the initial, intermediate, and long term planning horizons. What is interesting to note, is the fact that 22,386 annual operations were projected for 2011 and the FBO activity reports documented 22,206 for the same year. As such, the growth from the previous master plan was applied to the FBO count for 2011. This results in an estimate of 31,638 annual operations by 2032, shown in Table 2-7.

While the historic data contained in the 2011 FASP is questionable, the growth projected is worth considering. Between 2009 and 2029 activity is expected to have an average annual growth of 1.5 percent. This is significant when the overall growth for the entire state of Florida is

1.6 percent for the same period. Applying the 1.5 percent to the operations documented in 2011 yields 30,357 operations by 2032.

National General Aviation Activity Growth

General aviation operations at those airports with either an FAA or federal contract air traffic control tower are documented in the 2011 FAA Aerospace Forecasts. Since 2000, general aviation operations at these facilities have declined, much of which was attributed to the impacts that September 11th, then rising insurance, increases in fuel costs, and most recently the slow economy had on the industry. However, starting with figures for 2012, the FAA sees an end to this decline and projects growth in general aviation operations at an average annual rate of 1.5 percent through 2032. Even more encouraging is the FAA's projection for the utilization of the nation's general aviation fleet. While the hours flown by active aircraft have also declined since 2000, a recovery is expected at a slightly higher rate than that projected for traffic at towered facilities. When applied to the 2011 operations at Lake Wales, the national growth in active general aviation aircraft (2.2 percent annually) results in 35,070 annual operations by the end of the 20-year planning period.

Operations per Based Aircraft

Another forecast was generated by assigning a representative level of operations for each based aircraft. For non-towered airports, this methodology is recommended by the FAA to project the level of activity using the forecast of based aircraft. For general aviation airports in the NPIAS, the FAA recommends using 637 operations per based aircraft. Applying this figure to the current based aircraft count results in 14,014 annual operations for 2011. Based on the recent level of activity, this does not appear realistic.

Conversely, if the activity documented by the FBO reports for 2011 is divided by the current based aircraft count (22) the result is 1,009 operations per based aircraft. While this is significantly higher than the operations per based aircraft suggested by the FAA, it was considered as an option to estimate the significant itinerant traffic at the airport.

Table 2-7. Comparison of Annual Aircraft Operations Projections

	Historic Growth	Previous Master Plan	Statewide System Plan	National Growth	Operations per Based Aircraft
Base Year					
2011	22,206	22,206	22,206	22,206	22,206
Forecast					
2017	23,810	24,569	24,281	25,303	28,252
2022	25,235	26,730	26,158	28,212	31,279
2032	28,346	31,638	30,357	35,070	37,333

Source: Hoyle, Tanner & Associates, Inc., 2012.

Selected Forecast of Aircraft Operations

Each projection of annual operations considered for Lake Wales Municipal is based on accepted methodologies. Therefore, selection of a preferred forecast largely depends on the data used and how the associated assumptions fit actual airport activity. This is certainly a challenge at non-towered airports where no official activity logs exist. Along these lines, it must be determined whether or not there are any constraints to growth embedded in the individual projections of future activity.

With respect to constraints, the most conservative projection of annual operations was created by applying the historic growth. While the airport has seen some growth since the 2004 Master Plan, the potential was severely impacted by the hurricane damage and subsequent rebuilding of airport facilities. As shown in Table 2-7, the overall activity would only increase by 6,140 annual operations over the next 20 years. If adequate facilities are provided and maintained, most general aviation airports in Florida would grow more than suggested by the historical figures. This is especially true for Lake Wales given the current demand for additional hangars and the airport's ability to keep pace with the overall growth expected statewide. For these reasons the projection based on historic growth was excluded from further consideration.

At the other end of the spectrum, the operations per based aircraft methodology results in the highest projection of activity. This forecast was eliminated since the data could be questioned. In short, while this approach is commonly used at non-towered airport, it is felt that the projection of based aircraft cannot adequately explain the level of itinerant activity occurring now or in the future. While the overall projection is not unrealistic, the number of operations per based aircraft exceeds the highest category in the FAA's tiered levels.

As indicated previously, the forecast using the growth rate from the 2004 Airport Master Plan resulted in a nearly identical level of operations for 2011. However, the projection was primarily based on industry trends through 2002 and could easily be considered outdated. While the activity through 2011 was fairly representative, the fact remains that the industry continually changes and the next 20-year projection cannot hinge on trends immediately following the turn of the century and September 11th. Therefore, this projection was not selected.

The projection based on the most recent Florida statewide system plan needs to be analyzed further. In the 2011 FASP, Lake Wales Municipal is projected to grow at a rate that is just under that for the state overall. This is significant given that Florida is one of the leading states in the nation for general aviation. However, it cannot be overlooked that the historic data contained in the 2011 FASP is not representative of the actual activity levels. Not only are the figures for 2011 nearly a third of those documented, the statewide system plan also indicates that airport operations continually declined through 2009. While there was certainly a period of rebuilding, the overall projected growth is questioned since the system plan does not properly recognize the airport's success and growth. Therefore, the forecast using the statewide system plan growth was rejected.

As discussed in the following section, itinerant operations are a significant contributor of the activity at Lake Wales today. This trend is expected to continue as the airport has no immediate constraints to accommodating a variety of aircraft operations or activities. Growth throughout the planning period will only be limited to the dynamics impacting the general aviation industry as a whole. As such, the national growth projected in the 2011 FAA Aerospace Forecasts provides the best balance in what could realistically occur at the airport, without constraining the overall projections.

Therefore, the annual operations projection based on national trends has been selected for use in this study. The continued increases in activity after recovering from the complete shutdown in 2004 support this projection. Likewise, more and more aircraft operators are showing an interest in the airport, including businesses and corporations that would like to use or even base aircraft at the airfield. It is expected for these trends to continue, especially given the ongoing development in Lake Wales and other areas surrounding the airport. Over the past ten years, the population within the city limits has increased 44 percent and nearly another six square miles incorporated into the City. In addition the City continues to promote the airport as well as key economic development programs for the area. There has also been the opening of

Legoland in 2011 and in the beginning of 2012, construction of the first phase of the CSX Intermodal Terminal began just to the northwest of the airport. Combined, these initiatives and developments will have a positive effect on the airport by providing incentives for new opportunities, increasing the local tourism industry, and expanding the overall economic base.

TYPES OF AIRCRAFT OPERATIONS

The following sections address the types of aviation activity that will make up the forecasted operations. This includes a break out of the local, itinerant, and instrument operations. Further analyses include determining the operational aircraft fleet mix and estimates of the activity peaks for the planning period.

Local versus Itinerant Split

There are only a few sources where the activity has been split between local and itinerant operations. The 2004 Airport Master Plan estimated an operational split of 70 percent local and 30 percent itinerant for 2002. It was then anticipated that local operations would continue to exceed itinerant ending in a split of 65 percent local and 35 percent itinerant by 2022. Similarly, while the 2011 FAA TAF has a fixed level of operations projected for the airport, the historical split since 1994 was 70/30, which is projected through 2030.

Over the past couple of years, the number of itinerant operations has increased significantly. Based on the discussions with airport and FBO management, much of the increase is due to flight training activity which originates from other airports since there is no flight school currently at Lake Wales. Even though these flights come from surrounding facilities such as the Kissimmee Gateway Airport, they still conduct a number of local operations, primarily in the form of touch and goes. In other words, they generate both local and itinerant operations for the airport. In addition, there has also been a marked increase in the number of business and other non-recreational uses, including agricultural flying.

Table 2-8 depicts the current estimate of 65 percent local and 35 percent itinerant operations. It is anticipated that the shift towards more itinerant operations will continue over the new 20-year planning period. While flight training will continue to be a predominant generator of activity, the demand for hangar space provides an indication that the resident population of the airport will also grow. However, based aircraft growth does not typically increase the level of local operations like flight training.

Table 2-8. Forecast of Local versus Itinerant Operations

	Local Operations		Itinerant Operations		
	Total	% of Total	Total	% of Total	Total
Base Year					
2011	14,434	65%	7,772	35%	22,206
Forecast					
2017	15,182	60%	10,121	40%	25,303
2022	16,927	60%	11,285	40%	28,212
2032	19,289	55%	15,781	45%	35,070

Source: Hoyle, Tanner & Associates, Inc., 2012.

Additionally, a number of other factors indicate that itinerant operations will grow. Expected increases in business aviation and other forms of general aviation for point-to-point transportation (including the re-emergence of the very light jets) will also generate more itinerant

operations. All of this is further bolstered by the fact that the airport remains an attractive destination for many pilots, both business and pleasure. Therefore, throughout the planning period it is anticipated that there will be a continued shift towards more itinerant operations.

Instrument Operations

A separate count of the instrument operations conducted is important to evaluate future facility requirements. Given the limited data available, the best way to project the number of actual instrument operations is to apply the known weather data for the area.

The weather observations collected from the Lakeland Linder Regional Airport were analyzed for the periods when the conditions for instrument flight rules (IFR) were observed. These periods are when there is less than visual flight rules (VFR) but greater than poor visibility and ceiling (PVC) conditions. The PVC category is defined as when the cloud ceiling is less than 200 feet AGL and/or the visibility is less than one half a statute mile. While current instrument and avionics technology allow operations to occur during PVC conditions, basic IFR conditions are still an industry benchmark for most approaches.

Over the ten years of data for Lakeland, IFR conditions have been observed 4.6 percent of the time. The results of applying this figure to the current and future annual operations are shown in the summary table found at the end of this chapter. Most likely the number of instrument operations shown for 2011 did not occur; however, the purpose for these figures is to illustrate the number of operations that could be impacted by weather each year.

Operational Fleet Mix

Operational fleet mix is an important factor in determining the needs for airfield improvements. While the airport supports all types of aircraft, a majority of the current operations are conducted by single-engine and multi-engine aircraft. Because there are no records kept on the actual operational mix, the current operational fleet mix percentages were developed based on information provided by airport management, FBO management, and other airport users.

Information from the 2011 FAA Aerospace Forecasts was then utilized to project how the operational fleet mix would change over the next 20 years. With the exception of the piston multi-engine aircraft and other category (includes gliders and balloons), the FAA anticipates increases in the operation of all general aviation aircraft. As described previously for the active fleet, the most significant growth is expected in the jet category and the light sport aircraft segment of the single-engine category.

The active general aviation mix was subjectively analyzed based upon the current operational fleet mix for the airport and the trends expected to occur locally. For the most part the projections reflected in **Table 2-9** follow the national trend. Essentially, single-engine aircraft will continue to conduct a majority of the activity; however, a considerable growth in jet aircraft activity and to a lesser extent rotorcraft operations will occur over the planning period.

Table 2-9. Projected Operational Fleet Mix

	2011	2017	2022	2032
Single-Engine	12,435	13,411	14,106	15,781
Multi-Engine (piston & turboprop)	7,772	8,856	9,874	10,521
Jet	1,110	1,771	2,821	7,014
Rotorcraft	889	1,265	1,411	1,754
Other (includes gliders and balloons)	0	0	0	0
Total	22,206	25,303	28,212	35,070

Source: Hoyle, Tanner & Associates, Inc., 2012.

For the jets, this activity will predominantly include a number of the light to medium sized business jets which have a maximum allowable takeoff weight between 10,000 and 60,000 pounds. This group includes the Cessna Citation, Dassault Falcon, and Raytheon Hawker type jet aircraft that currently operate into Lake Wales Municipal. In addition, the jet activity will also see an increase in the activity by existing and newer very light jets (under 10,000 pounds) and the occasional larger business jet over 60,000 pounds.

Where Lake Wales Municipal differs from the national trends is in the multi-engine category. This is due to the number of operations conducted for skydiving, which typically use the DeHavilland Twin Otter (turboprop) aircraft. This activity is expected to continue due to the recent growth in skydiving activity as well as the interests to base additional multi-engine turboprops at the airport. Rotorcraft activity will be based on the potential for a second helicopter to be based at the airport in the near term but will also include activity conducted by rotorcraft that may not be based at the airfield. Examples include law enforcement, emergency medical operators, and/or state forestry operations, not to mention business interest and tourist activities. As these activities grow, a dedicated helipad should be considered at the field.

Peak Activity Estimates

Annual projections provide a good overview of the activity at an airport, but may not reflect operational characteristics of the facility. In many cases, facility requirements are not driven by annual demand, but rather by the capacity shortfalls and delays experienced during peak times. Therefore forecasts are developed for the peak month, the average day in the peak month, and the peak hour of the peak day.

Based on the historic monthly activity reports since 2008, the airport has experienced peak traffic levels during different times of the year. While this includes some peaks during the summer and end of the year, the majority have occurred around the months of March and April. Operations during the peak month have accounted for 12.4 percent of the annual operations when the average of the busiest month for the past four years is considered. It is assumed that this peaking characteristic will continue throughout the planning period.

The values for average day peak month and for the peak hour were then calculated using the methodology in FAA Advisory Circular 150/5360-13, “Planning and Design Guidelines for Airport Terminal Facilities.” Under this methodology, the average day peak month is derived by taking the number of operations calculated for the peak month and dividing that figure by the number of days in the peak month. In this case, 30 days were utilized. There is no data available to determine the peak hour operations at the airport. Therefore it was estimated that 15 percent of the average day peak month would best represent the number of peak hour operations. The calculations of peak activity are included **Table 2-10**.

Table 2-10. Forecast Peak Activity

	Total Annual Operations	Peak Month	Average Day Peak Month	Peak Hour ADPM
Base Year				
2011	22,206	2,754	92	14
Forecast				
2017	25,303	3,138	105	16
2022	28,212	3,498	117	17
2032	35,070	4,349	145	22

Source: Hoyle, Tanner & Associates, Inc., 2012.

COMPARISON TO FAA TERMINAL AREA FORECASTS

If an airport is included in the FAA Terminal Area Forecasts, any new aviation activity forecasts need to be reviewed and approved by the agency before they can be applied to further analyses. During this review the FAA looks to see if the based aircraft and annual operations forecasts differ from the TAF by less than ten percent in the five year and 15 percent in the ten year planning period. Regarding the forecast approval criteria for general aviation airports, an FAA Memorandum dated December 23, 2004 states, "Where the 5 or 10-year forecast does not exceed 100,000 total annual operations or 100 based aircraft, then it does not need headquarters review, and should be provided for use in the annual update of the TAF." While this is the case for Lake Wales, a comparison of the selected forecasts to those in the 2011 FAA TAF is included in **Table 2-11**.

Table 2-11. Comparison Forecasts

	Selected Forecast	2011 FAA TAF	Difference
Based Aircraft			
Base Year (2011)	22	16	38%
5 Year (2017)	28	16	75%
10 Year (2022)	31	16	94%
Annual Operations			
Base Year (2011)	22,206	20,000	11%
5 Year (2017)	25,303	20,000	27%
10 Year (2022)	28,212	20,000	41%

Source: Hoyle, Tanner & Associates, Inc., 2012.

The forecast of based aircraft exceeds the limits stated by the FAA. However, for the past couple of years, the TAF has only recorded 16 based aircraft at Lake Wales Municipal. While this may have been true in past years, the current count for 2011 is 22 aircraft. Regardless, even if the base year figure was correct, the TAF shows the number of based aircraft remaining at 16 each year, through 2030, but gives no reason for why no growth is shown.

With respect to operations, the selected forecasts also exceed the FAA thresholds. As is true for a number of general aviation airports in the FAA TAF, the projection of annual operations is static. In the case for Lake Wales Municipal, the operations are set at 20,000 throughout the entire TAF planning period, which is also not realistic and below those currently conducted. As previously mentioned, the inappropriate straight-lined forecast of aeronautical operations for X07 provided by the FAA is most likely the result of the FAA not dedicating appropriate resources to forecasting activity at the airfield.

SUMMARY OF ACTIVITY FORECASTS

Table 2-12 presents an overview of the selected forecasts. In summary, the data and methods used to forecast aviation demand for the airport are consistent with those used by the FAA and other general aviation airports around the nation. The forecasts presented in this study are considered to reasonably reflect the activity anticipated at Lake Wales Municipal through 2032 given the information analyzed and available during this study.

Table 2-12. Summary of Activity Forecasts

	2011	2017	2022	2032
Based Aircraft				
Single-Engine	20	21	23	25
Multi-Engine (piston & turboprop)	1	3	3	4
Jet	0	2	3	5
Rotorcraft	1	2	2	3
Other (gliders, balloons, etc.)	0	0	0	0
Total	**22**	**28**	**31**	**37**
Operations				
Local	14,434	15,182	16,927	19,289
Itinerant	7,772	10,121	11,285	15,781
Total	**22,206**	**25,303**	**28,212**	**35,070**
Total Instrument Operations	1,021	1,164	1,298	1,613
Peak Activity				
Peak Month Operations	2,754	3,138	3,498	4,349
Average Day Operations	92	105	117	145
Peak Hour Operations	14	16	17	22

Source: Hoyle, Tanner & Associates, Inc., 2012.

Capacity Assessment and Facility Requirements

INTRODUCTION

To ensure that the Lake Wales Municipal Airport will adequately accommodate demand expected during the 20-year planning period, this chapter establishes the facility requirements for the future development of the airfield. The principal challenge facing any growing airport is that of meeting future development requirements. Airport development is costly, and since each project is typically planned to last many years, care must be taken to ensure that each project will help satisfy the projected level of airport needs.

CAPACITY ASSESSMENT

The Federal Aviation Administration (FAA) methodology delineated in Advisory Circular (AC) 150/5060-5, Change 2, "Airport Capacity and Delay," was used to assess the runway capacity. This analysis evaluates airfield configuration, aircraft fleet mix, meteorological conditions, and aviation activity to generate capacity calculations during periods of both visual and instrument meteorological conditions. Combined, these allow the airfield capacity to be expressed in terms of the hourly and annual service volume of the runway system.

Operating Characteristics

Each of the characteristics described below have impacts on how aircraft operate to and from the runway environment. For the capacity analysis, each characteristic was based on a typical day at the airport, given the current physical features.

Airfield Configuration

The two runways at Lake Wales Municipal intersect nearly perpendicular to each other. As documented, the orientation of these runways provides the required wind coverage.

Only Runway 06-24 has a full length parallel taxiway; however, as addressed in the taxiway system requirements of this chapter, the western end of this taxiway is non-standard. For Runway 17-35 there are only a few connector taxiways tying the east side of the runway into different airport facilities. Access to and from the ends of Runway 17-35 requires aircraft to back taxi along the runway. The lack of an adequate taxiway system significantly decreases the Runway 17-35 capacity since it increases the time and distance an aircraft has to travel to clear the runway for another user, thus increasing runway occupancy times.

Aircraft Mix Index

The operational fleet influences an airfield's capacity based upon differing aircraft requirements. As an aircraft's size and weight increases, so does the time needed for it to slow to a safe taxiing speed or to achieve the needed speed for takeoff. Therefore, a larger aircraft generally requires more runway occupancy time than a smaller aircraft.

For this reason, aircraft classifications are used to determine the mix index, which is a component used in calculating the airfield capacity elements. At Lake Wales Municipal, the current and future activity consists of Class A, B, and C aircraft. It should be noted that these capacity classes differ from the Aircraft Approach Categories described in subsequent sections of this chapter.

In the FAA calculations Class C and D aircraft are used to determine the aircraft mix index. Class C aircraft include those which are greater than 12,500 pounds but less than 300,000 pounds. Even though there are business jets less than 12,500 pounds operating at the airport, for planning purposes, all of the jet aircraft in the operational fleet mix will be considered as Class C aircraft. This helps creates a more conservative evaluation of the current and future

runway capacity. Therefore, using the FAA formula and the operational fleet mix forecast, the aircraft mix index for the planning period will range from 5 to 20.

Meteorological Conditions

As weather conditions deteriorate, pilots must rely on instruments to define their position both vertically and horizontally. Capacity is lowered during such conditions because aircraft are spaced further apart when they cannot see each other. Also, some airfields may have limitations with respect to instrument approach capability. For capacity calculations, the FAA defines three general weather categories, based upon the height of the clouds above ground level and visibility as:

- Visual Flight Rules (VFR): Cloud ceiling is greater than 1,000 feet above ground level (AGL) and visibility is at least three statute miles. All airports are able to operate under these conditions.

- Instrument Flight Rules (IFR): Cloud ceiling is at least 500 AGL but less than 1,000 feet AGL and/or visibility is less than three statute miles but more than one statute mile. Aircraft operations are limited if the aircraft and the airport are not equipped with the proper instrument facilities.

- Poor Visibility and Ceiling (PVC): Cloud ceiling is less than 500 feet AGL and/or visibility is less than one statute mile. Most airports, even those with precision instrument capabilities, have limited operations during these conditions.

Using the meteorological data collected for this study, the Lake Wales area experiences VFR conditions 94.7 percent of the time, IFR conditions 4.6 percent of the time, and PVC conditions 0.7 percent of the time.

Airfield Capacity Calculations

The FAA methodology for capacity analysis involves a step-by-step process that addresses the factors discussed above. From these, various measures of the airfield's capacity can be determined, including the hourly capacity of the runways and the annual service volume.

The maximum number of operations that the airfield can accommodate in one hour is measured by the hourly capacity of the runway environment. The FAA methodology includes a series of graphs and tables that are chosen based upon the runway configuration and whether VFR or IFR conditions are being evaluated. The airport's aircraft mix index is also utilized; however, since it does not increase significantly over the course of the planning period, the resulting hourly capacities for Lake Wales Municipal are relatively constant.

During VFR conditions the airport is estimated to be capable of supporting up to 104 operations per hour. During IFR conditions this figure drops to as low as 58 operations per hour. Given these values, the annual service volume (ASV) or theoretical limit of operations that an airport can support annually, is obtained. For Lake Wales Municipal, the ASV ranges from the current high of 163,045 to a low of 159,814 operations at the end of the planning period. The slight reduction in ASV results from the increase in jet activity expected.

The percent at which an airfield is operating can be shown by comparing the calculated ASV to the existing or forecast level of operations. Based upon FAA Order 5090.3B, "Field Formulation of the National Plan of Integrated Airport Systems (NPIAS)," an airport should begin to address capacity related issues once the operational demand exceeds 60 percent of the ASV. The capacity levels for Lake Wales Municipal are shown in **Table 3-1**.

Table 3-1. Airfield Capacity Levels

	Annual Operations	Annual Volume	Capacity Level
Base Year			
2011	22,206	163,045	14%
Forecast			
2017	25,303	162,238	16%
2022	28,212	161,356	18%
2032	35,070	159,814	22%

Source: Hoyle, Tanner & Associates, Inc., 2012.

While the airport does not reach the 60 percent of capacity threshold, it should be noted that the runway capacity for the airfield is well below its potential. Using the most general FAA calculations for an airfield configuration like Lake Wales Municipal's, the ASV could be as high as 230,000 annual operations. The specific calculations for Lake Wales Municipal are much lower than this primarily due to the limited taxiway systems to both runways. Essentially, the runway occupancy times for non-touch and go operations is increased due to the lack of a full length parallel to Runway 17-35 and the limited entrance and exit points along both runways.

Conclusion

The FAA's methodology shows that Lake Wales Municipal should not experience any runway related capacity problems during the planning period. It should be noted that this is only with respect to the number of operations the runway system can accommodate in a given year. This does not include other airport facilities such as aircraft parking, hangar, general aviation terminal space, automobile parking, or utilities which are addressed in subsequent sections.

PLANNING AND DESIGN CRITERIA

In order to determine facility requirements, existing airport facilities must be evaluated against the expected aircraft activity. However, before that can be done, it is necessary to identify the FAA criteria for the planning and design of airports. Such criteria is a key element in defining airport development needs as most facilities are directly associated with the size and type of aircraft using the airport.

The FAA critical aircraft for airport planning and design is the most demanding aircraft conducting or expected to conduct a minimum of 500 operations each year. Once the critical aircraft has been determined, an Airport Reference Code (ARC) is established based on specific characteristics of that aircraft.

The characteristics defining the ARC are the approach speed and physical aircraft size. The ARC is identified using an alphanumeric designation, a letter designation followed by a Roman numeral. The letter designator is used to identify the Approach Category and the Roman numeral designates the Design Group in terms of tail height and wingspan. **Table 3-2** and **Table 3-3** delineate the criteria used in defining Aircraft Approach Categories and Aircraft Design Groups according to FAA AC 150/5300-13 Change 17, "Airport Design."

Table 3-2. Aircraft Approach Categories

Category	Approach Speed (knots)
A	< 91
B	91 – 120
C	121 – 140
D	141 – 165
E	> 165

Source: FAA AC 150/5300-13 Change 17.

Table 3-3. Aircraft Design Groups

Design Group	Wingspan (ft)	Tail Height (ft)
I	< 49	< 20
II	49 – 78	20 – 29
III	79 – 117	30 – 44
IV	118 – 170	45 – 59
V	171 – 213	60 – 65
VI	214 – 262	66 – 80

Source: FAA AC 150/5300-13 Change 17.

Currently, Runway 06-24 accommodates both Design Group I and II aircraft. While a majority of the larger aircraft operations are conducted by the DeHavilland DHC-6-300 Twin Otter (ARC of A-II), there are also a number of light to medium sized business jet operations which occur at the airport in support of business or tourism activities. Examples of the jet aircraft include a number of the Cessna Citation and Raytheon Hawker models, as well as the Dassault Falcon series of business jets. However, due to some of the current limitations on Runway 06-24, including the overall length, the Twin Otter is considered the current critical aircraft for the primary runway. Even though the Twin Otter has a maximum allowable takeoff weight of 12,500 pounds with a single wheel landing gear configuration, Runway 06-24 is not limited to operations by small aircraft exclusively. The FAA defines small aircraft as those weighing 12,500 pounds or less.

In the near future, the ARC for Runway 06-24 will change to B-II once the improvements required to support the current types of aircraft are completed. For illustrative purposes, the medium sized Dassault Falcon 900 series of business jets have been selected as the representative current critical aircraft. While there are a number of other business jet models with an ARC of B-II using the airfield, the Falcon series has been selected due to its heavier weight and higher tail height. Many of the Falcon aircraft, including the heavier 900 series, have maximum allowable takeoff weights around 45,500 pounds with a dual wheel landing gear configuration. As reflected in the activity forecasts, the number and even size of the business jet aircraft operating in and out of Lake Wales Municipal will increase throughout the planning period. It is even likely that some of the larger and heavier business jet aircraft will conduct operations, but not at a level high enough to change the future ARC for Runway 06-24 beyond B-II.

Now and into the foreseeable future, Runway 17-35 can only provide the proper design criteria to accommodate B-I aircraft with the small airplanes exclusively limitation. While larger aircraft do use the runway on occasion, this practice is limited and only at the pilot's discretion. As such, the runway is capable of safely accommodating nearly every single-engine piston and

multi-engine piston aircraft, as well as a number of twin turboprops. Since this is not expected to change throughout the course of the planning period, the Beechcraft King Air B100 has been selected as the representative critical aircraft for Runway 17-35. This aircraft, which has a maximum allowable takeoff weight of 11,800 pounds and a single wheel landing gear configuration, was selected since it is one of the largest and most popular of the B-I aircraft under 12,500 pounds.

Table 3-4. Lake Wales Municipal Airport Reference Codes

	Existing	Future
Runway 06-24	A-II DeHavilland DHC-6-300 Twin Otter	B-II Dassault Falcon 900
Runway 17-35	B-I Beechcraft King Air B100	Same Same

Source: Hoyle, Tanner & Associates, Inc., 2012.

RUNWAY REQUIREMENTS

As the primary airfield component, a runway must have the proper length, width, and strength to safely accommodate the critical aircraft expected. FAA advisory circulars and specific aircraft performance data provide guidelines to determine the ultimate runway length required. Runway width requirements are delineated in FAA AC 150/5300-13 Change 17. These and other design standards are based on the critical aircraft's Approach Category, Design Group, and the runway's approach visibility minimums.

Pavement strength is predicated upon the critical aircraft's weight and how that weight is distributed through the landing gear. Projects to rehabilitate runway pavements are routinely conducted every 15 to 20 years after the previous major rehabilitation, strengthening, or new construction. These projects, which repair damage to the runway pavement resulting from normal wear, need to be conducted even at airports with regular pavement maintenance programs, including crack sealing and surface seal coats.

In addition to the physical characteristics of the runway, there are a number of other safety-related criteria including the requirement for a Runway Safety Area, Runway Object Free Area, Runway Protection Zones, and Obstacle Free Zone. The FAA definitions for these surfaces are:

Runway Safety Area (RSA) - A defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overrun, or veer off the runway. The RSA needs to be: (1) cleared and graded with no potentially hazardous ruts, humps, depressions, or other surface variations; (2) drained by grading or storm sewers to prevent water accumulation; and (3) capable, under dry conditions of supporting the occasional passage of aircraft without causing structural damage to the aircraft. Finally, the RSA must be free of objects, except for those that need to be located in the safety area because of their function.

Runway Object Free Area (ROFA) - The 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 non-essential for air

navigation or aircraft ground maneuvering purposes are not to be placed in the ROFA. This includes parked airplanes.

Runway Protection Zone (RPZ) - A RPZ, or clear zone as it was formerly named, 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. Airports are required to maintain control of each runway's RPZ. 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.

Obstacle Free Zone (OFZ) - The OFZ is a three-dimensional volume of airspace centered on the runway that supports the transition of ground to airborne operations (or vice versa). The OFZ clearing standards prohibit taxiing, parked airplanes, and other objects, except frangible navigational aids or fixed-function objects (such as signage), from penetrating this zone. Precision instrument runways also require inner-transitional and precision OFZs. If there is an approach lighting system, then an inner-approach OFZ is also required.

Runway Length Analysis

It is mandatory to utilize FAA criteria for calculating runway lengths when a project is intended to request or receive federal funding. FAA AC 150/5325-4B, "Runway Length Requirements for Airport Design" provides the current standards and methodologies for computing runway length requirements. This methodology and another accepted technique were utilized to calculate the runway length required for the aircraft expected to operate on Runway 06-24 in the future.

Runway Length Requirements Advisory Circular

The FAA AC utilizes aircraft weight to categorize the methodologies for conducting runway length analyses. Using FAA approved aircraft flight manuals, AC 150/4325-4B provides performance curves to determine the runway length required for airports supporting operations of turbojet powered aircraft weighing between 12,500 and 60,000 pounds. For aircraft over 60,000 pounds length is determined by utilizing the individual aircraft performance charts. Since none of the future critical aircraft will weigh more than 60,000 pounds, that element of the FAA methodology was not applied.

Specific data, which include mean daily maximum temperature (of the hottest month), airport elevation, useful load factor, maximum difference in runway centerline elevation, and typical weather conditions are required for the analyses. The temperature of the hottest month and airfield elevation determine the density altitude, which adversely impacts runway length requirements. As the airfield elevation and/or average temperature increases, the minimum required runway length must increase due to the increased density altitude. The historic weather data for the area consistently showed July and August as the hottest months of the year, with both documented as having a mean high temperature of 93°F. The airfield elevation is 127 feet above mean sea level (AMSL).

Useful load refers to the difference between an aircraft's maximum allowable weight and the empty weight. As such, the useful load factor provides an indication of the amount of passengers, cargo, and fuel carried by an aircraft. In the FAA's runway length calculations there are the options of selecting a 60 and 90 percent useful load factor. Basically, the heavier the aircraft (higher useful load percentage) the more runway length required. Because of the airport's southeastern location within the nation, stage lengths of 1,000 miles, 1,500 miles, or even longer (to get to the west coast) are realistic operations. Therefore, trip lengths of 1,000 miles would not be uncommon on a regular basis. However, the type of jet aircraft expected to

operate at Lake Wales Municipal Airport can fly greater distances than that; therefore, both the 60 and 90 percent useful loads were calculated.

The FAA performance curves for jet aircraft weighing 12,500 to 60,000 pounds are split into the categories of 75 and 100 percent of the fleet. AC 150/4325-4B provides lists of the general aviation jet aircraft that represent 75 percent of the fleet flying in the U.S. This list combined with a second list represents 100 percent of the U.S. business jet fleet. It is stated that aircraft in the 75 percent group require 5,000 feet or less of runway under standard atmospheric conditions (59°F at sea level). The remaining 25 percent all require runways greater than 5,000 feet using standard atmospheric conditions.

For determining the future runway length requirements, both the 75 and 100 percent of the fleet categories were analyzed. As stated previously, this is due to the fact that it is anticipated that the growth in business jet operations will include some of the larger and heavier jets in the future. The FAA's 100 percent of the fleet table includes the larger Cessna Citation, Bombardier Challenger, Dassault Falcon, Learjet, and Hawker series business jets. Many of these aircraft have conducted operations into the airport and are expected to increase activity over the course of the 20-year planning period.

Applying local conditions to the 75 percent of the fleet with a 60 percent useful load performance curves yields an initial runway length of 4,700 feet. The 90 percent useful load curve yields an initial runway length of 6,950 feet. Adjustments to the runway length calculations are also required under the FAA AC methodology. The adjustments provide increases for takeoff or landing operations, but not for both, as the increases cannot be cumulative. Applying the adjustments results in a runway length requirement of 5,405 feet for a 60 percent useful load and 7,010 feet for the 90 percent useful load. For 100 percent of the fleet a runway length requirement of 5,610 feet for the 60 percent useful load and 8,785 feet for the 90 percent useful load are required after applying the adjustments. These lengths are summarized in **Table 3-5**.

Table 3-5. FAA Runway Length Recommendations

Useful Load	75 Percent of the Fleet	100 Percent of the Fleet
60 Percent	5,405'	7,010'
90 Percent	5,610'	8,785'

Note: Calculations for aircraft weighing 12,500 to 60,000 pounds.
Source: FAA AC 150/4325-4B (figures 3-1 and 3-2).

Runway Length Analysis Using Balanced Field Length

Performance data from the aircraft manufacturers was also used to analyze the runway lengths required for specific models of the business jet aircraft that fall within the 12,500 and 60,000 pound range. Within this group are 38 of the most popular business jet aircraft today, each of which have an ARC that is within the future designation of B-II for Lake Wales Municipal. These aircraft are listed alphabetically in **Table 3-6** along with their runway length requirements.

Two different runway lengths have been shown for each aircraft. The first is the Balanced Field Length. This length is published by the manufacturers of each aircraft using the standard atmospheric conditions (59°F at sea level) on a flat and dry runway. Because the elevation at Lake Wales Municipal is only 127 feet AMSL, these values can be considered, but only as a best case scenario, as temperatures are rarely around 59°F. In fact, while Lake Wales

Municipal certainly experiences 59°F and lower temperatures, these typically only occur at night during a few months of the year.

The second number is the Required Length at Lake Wales Municipal which is based on the specific airport elevation, temperature, and gradient of Runway 06-24. In all cases these lengths are longer due to the climate of the local area. This is an important consideration as these figures represent the runway length required for the aircraft to be able to depart Lake Wales Municipal without weight restrictions. Such weight restrictions are usually in the form of fuel or passenger loads which can greatly diminish the utilization of the aircraft. It is safe to say that business jet users do not like to operate or base their aircraft at airfields that require them to take a weight penalty or to make intermediate stops for fuel.

Recommended Runway Length

Additional runway length is currently required at Lake Wales Municipal. For 75 percent of the fleet (between 12,500 and 60,000 pounds) at a 60 percent useful load, the FAA methodology requires a minimum runway length of 5,405 feet. Similarly, the average length required at Lake Wales Municipal for the specific jet aircraft analyzed in **Table 3-6** is 5,237 feet. Given the current length of 3,999 feet, Runway 06-24 should be extended at least 1,238 to 1,406 feet as soon as practicable.

The existing length of Runway 17-35 is considered adequate for the entire planning period. At 3,859 feet, this runway length is capable of accommodating nearly every aircraft within the runway's ARC designation of B-I (small aircraft exclusively). This includes the Beechcraft King Air B-100 which is the representative B-I aircraft. The King Air B-100 as well as other common B-I aircraft such as the Beechcraft King Air 90s, Cessna 310s, Cessna 414/425, and Twin Turbo Commander type models all can operate at their maximum allowable takeoff weight in the hottest conditions on 3,859 feet.

It should be mentioned again at this point that a re-emergence of the very light jet aircraft is expected over the course of the 20-year planning period. Much like the first very light jet aircraft certified, these aircraft use new processes such as composite construction to create light airframes with small jet engine technology. While the recommended runway length for Runway 6-24 of 5,400' feet is considered to be appropriate based on the activity forecast developed for this analysis, there could potentially be a need for an even longer runway based on unique and un-forecasted demand. Such demand could include a large tenant seeking to establish operations at the airfield to support maintenance, repair, and overhaul (MRO) services, aircraft painting, or aircraft sales for aircraft more demanding of airfield facilities than those currently forecasted.

Table 3-6. Specific Runway Lengths for Jets Weighting 12,500 to 60,000 Pounds

Aircraft	Airport Reference Code (ARC)	Maximum Takeoff Weight (pounds)	Balanced Field Length (Ft)	Required Length at Lake Wales (Ft)
Beechcraft Premier	B-I	12,500	3,792	4,505
Beechjet 400A	B-I	16,100	4,290	5,089
Citation Bravo	B-II	14,800	3,600	4,280
Citation CJ1	B-II	10,700	3,280	3,905
Citation CJ2	B-II	12,500	3,420	4,069
Citation CJ3	B-II	13,870	3,450	4,104
Citation Encore	B-II	16,630	3,490	4,151
Citation Excel	B-II	18,700	3,415	4,063
Citation I	B-I	11,850	3,080	3,671
Citation II	B-II	14,100	3,450	4,104
Citation III	B-II	22,200	5,150	6,097
Citation Sovereign	B-II	30,000	3,694	4,390
Citation Ultra	B-II	16,300	3,180	3,788
Citation V (560)	B-II	15,900	3,160	3,764
Citation XLS	B-II	20,200	3,590	4,268
Falcon 10	B-I	18,740	4,500	5,335
Falcon 200	B-II	32,000	5,200	6,156
Falcon 2000	B-II	35,000	5,815	6,877
Falcon 2000EX	B-II	41,300	5,634	6,665
Falcon 20-5	B-II	29,100	5,820	6,883
Falcon 20F	B-II	28,600	4,900	5,804
Falcon 50	B-II	40,780	5,200	6,156
Falcon 50EX	B-II	39,700	4,890	5,792
Falcon 900	B-II	45,500	5,300	6,273
Falcon 900B	B-II	45,500	4,930	5,839
Falcon 900C	B-II	45,500	4,935	5,845
Falcon 900DX	B-II	46,700	4,890	5,792
Falcon 900EX	B-II	48,300	5,215	6,173
Hawker 125-1000	B-II	36,000	5,250	6,214
Hawker 125-800	B-II	28,000	5,380	6,367
Hawker 125-800XP	B-II	28,000	5,030	5,956
Hawker 4000	B-II	39,500	5,068	6,001
Hawker 400XP	B-I	16,300	3,906	4,639
Hawker 750	B-II	27,000	4,696	5,565
Hawker 900XP	B-II	28,000	4,965	5,880
Learjet 28/29	B-I	15,000	3,050	3,635
MU-300 Diamond	B-I	14,360	4,300	5,101
Sabreliner 40	B-I	18,650	4,900	5,804

Source: Aircraft manufacturers, industry databases, and aircraft performance manuals.

The industry goal is to make personal aviation more efficient and affordable by providing an option to the traditional commercial air passenger market and allowing access to the nation's extensive system of small airports. It is purely speculative at best when such aircraft may operate at Lake Wales Municipal on a regular basis. Regardless, these aircraft will not replace the current business jet aircraft flying today as they are a completely different product and geared to a different end user. In fact, the FAA's Aerospace Forecasts expect the very light jets to replace a number of the piston general aviation fleet, including those in the multi-engine group.

With any major runway extension, the FAA requires that an Environmental Assessment be undertaken. The need for a longer runway at Lake Wales was identified in the 2004 Airport Master Plan. As a result, funding was obtained to conduct the require Environmental Assessment for not only the extension of Runway 06-24, but also for the required parallel taxiway improvements and extension. The result of that study was the issuing of a Finding of No Significant Impact and Record of Decision by the FAA Orlando Airport District Office (ADO) on October 15, 2008.

The 2008 Environmental Assessment was funded by a grant from the Florida Governor's Office of Tourism, Trade, and Economic Development (OTTED). Afterwards, the remaining monies and additional Legislative Appropriations used to purchase the land required for the runway extension (60 acres), design the runway/taxiway extension, prepare the bidding documents, obtain the required permits (including wetland mitigation fees), and obtain bids on the project. Bids were received on December 22, 2010 with the lowest, responsive bidder at $4.3 million. An additional $0.5 million (total project of $4.8 million) is required to provide the required construction RPR services, construction administration, testing, and record drawings. At the beginning of 2012, the City was still pursuing different sources of funding to complete the construction phase of the runway/taxiway extension project, which would also correct the non-standard RSA and non-standard parallel taxiway, both of which are described later in this chapter.

Finally, it is also important to mention that under Florida law, all developments are subject to permit review under Chapter 380, Florida Statutes if the character, magnitude, or location would have a substantive effect upon the health, safety, or welfare of the citizens of Florida. This is known as the Development of Regional Impact (DRI) process. Fourteen different types of development activities may qualify as a DRI, including airports, if certain numerical thresholds are reached. Expansion of an existing runway facility by 25 percent or 50,000 square feet is one of the thresholds that would trigger the DRI process. However, this only applies to commercial service airports or general aviation airports that have regularly scheduled flights. While the proposed extension is greater than 25 percent of the current length, Lake Wales Municipal does not have any regularly scheduled flights nor is it expected to in the future. Therefore, the DRI process is not required, which was documented as part of the Environmental Assessment study completed in 2008.

Runway Width Requirements

Criteria contained in FAA AC 150/5300-13 Change 17, states that runways with either an ARC of A-II or B-II are required to have a width of 75 feet when the runway is visual or if it does not have lower than ¾ mile instrument approach visibility minimums. Therefore, at 100 feet, the current width of Runway 06-24 is adequate. However, future plans to improve the instrument approach minimums to either end of Runway 06-24 to lower than ¾ mile would increase the width requirement to 100 feet. Therefore, the current width of Runway 06-24 needs to be preserved throughout the planning period. The current construction plans to extend Runway

06-24 maintain the 100 foot width as well as providing ten foot stabilized runway shoulders to match the existing conditions.

Due to the proximity of the different hangars on the east side of Runway 17-35, it is not possible to have any instrument approaches established to this runway. The possibility for better instrument approaches is discussed in a later section. Therefore, with an ARC of B-I (small airplanes exclusively) and only visual approach capability, the current 75 foot width of Runway 17-35 exceeds the 60 foot width required.

Runway Pavement Strength

Runway 06-24 has a published weight bearing capacity of 15,000 pounds for aircraft with single wheel type landing gear. As stated in the inventory, the actual strength is not known since there has been no recent testing of the pavement nor is the source of the current rating known. What is known is that some of the larger B-II jet aircraft shown in Table 3-6 have a maximum allowable takeoff weight approaching 50,000 pounds. This includes the Falcon 900 series aircraft, which is the future critical aircraft for the airfield with a dual wheel landing gear configuration.

Regardless of the pavement strength, the current surface has various types of cracking, some raveling, and numerous places with vegetative growth in the cracks as well as in the pavement joints along the entire length. The 2008 Florida Department of Transportation (FDOT) pavement report documented that microsurfacing of the asphalt runway surface was required immediately to improve the fair pavement rating for Runway 06-24. The current construction plans to extend Runway 06-24 also include improvements to the existing runway surface to not only improve these conditions, but also to ensure adequate strength for the aircraft currently using the runway. To date, the existing runway surface has not been improved and based on the predicted Pavement Condition Index (PCI) in the FDOT report, Runway 06-24 should have deteriorated to a poor rating in 2010 and a very poor rating between 2015 and 2016.

As with the primary runway, Runway 17-35 has a published weight bearing capacity of 15,000 pounds for aircraft with single wheel type landing gear. While no testing was conducted after the overlay in 1997, the current rating reflects the minimum strength based on the pavement section which is greater than the current limitation of the runway to serve small airplanes exclusively (12,500 pounds or less). Likewise, the pavement surface is considered to be in good condition according to the 2008 FDOT pavement report. However a rehabilitation of the Runway 17-35 surface was recommended by 2015. Given the last improvements to this runway were in 1997 and that the PCI rating is predicted to decrease to fair by 2017, a rehabilitation should be planned for the first part of the intermediate planning period. For both runways, a routine pavement maintenance program should also be established to address normal wear.

Runway Safety Criteria

The size of the RSA, ROFA, RPZ, and OFZ are a function of the Approach Category and Design Group as well as the minimums associated with the most critical approach to each runway. Under the current conditions of ARC A-II, with visual and not lower than 1 statute mile approach visibility minimums, Runway 06-24 requires a 150 foot wide RSA (75 feet either side of the runway centerline) that extends 300 feet beyond each runway end. While most of Runway 06-24 has a standard RSA, currently there is only 118 feet of RSA length prior to the Runway 24 threshold due to a drop in terrain. In addition to the non-standard grade, there is also vegetation which protrudes above the RSA that is beyond 118 feet from the runway end. This non-standard RSA condition, as documented in the annual FDOT airport inspection, must be corrected as soon as possible.

The current ROFA for Runway 06-24 needs to be 500 feet wide (250 feet either side of the runway centerline) and also extend 300 feet beyond each runway end. Unlike the RSAs, the ROFA does not have a required grade, rather only that it is clear of any object that would protrude above the adjacent RSA edge elevation. On the Runway 06 end, there is some minor vegetation penetrating the southwest corner of the ROFA. Conversely, the Runway 24 end has vegetation penetrating nearly the entire width of the ROFA. This line of vegetation pretty much coincides with the area of standard versus non-standard RSA which is 118 feet from the runway threshold. Removal of the vegetative ROFA penetrations needs to occur as soon as possible.

Under the current conditions the RPZs for both runway ends are the same. Beginning 200 feet beyond the end of the area usable for takeoff or landing, the RPZs need to have an inner width of 500 feet, an outer width of 700 feet, and an overall length of 1,000 feet. Since the primary purpose of the RPZ is to prevent incompatible uses or activities directly off each runway end, there is no set elevation for the RPZ. Currently only a small portion of the RPZ on the Runway 24 end extends off airport property, just beyond the Peace Creek Drainage Canal. Regardless, both ends currently maintain the criteria required for the RPZs.

The OFZ for Runway 06-24 needs to be 400 feet wide and extend 200 feet beyond each runway end. As with the ROFA, there is some vegetation within the OFZ on both ends of Runway 06-24. These obstructions will be address as part of the full FAR Part 77 Imaginary Surfaces in sections that follow.

Regardless of when the ARC for Runway 06-24 changes to B-II, if an instrument approach with lower than ¾ mile visibility minimums is established to either runway end, the runway safety criteria will change significantly. At that time, Runway 06-24 will require a 300 foot wide RSA and 800 foot wide ROFA, extending 600 feet beyond each runway end. In addition, any runway end receiving improved instrument approach capabilities will need a larger RPZ. For B-II runways with visual and not lower than one mile visibility minimums the dimensions for an inner width of 500 feet, an outer width of 700 feet, and an overall length of 1,000 feet would remain the same. However, for A-II or B-II runways with lower than ¾ mile visibility minimums the RPZ inner width increases to 1,000 feet, the outer width to 1,750 feet, and the overall length to 2,500 feet. The ability to accommodate all of the future imaginary safety surfaces for Runway 06-24 will be evaluated as part of the airport alternatives analysis in the next chapter.

The base OFZ dimensions for Runway 06-24 will not change in the future; however, if a future precision approach is established with lower than ¾ mile visibility minimums, inner-transitional and precision OFZ surfaces would also be required. The inner-transitional surface criteria would be based on the type of precision approach established and the most demanding wingspan of the aircraft using the runway. The precision OFZ is a defined volume of airspace 800 feet wide and 200 feet from the threshold.

It should also be noted that and Environmental Assessment would likely need to be conducted prior to the establishment of a precision approach procedure to Runway 06-24. This study would include determining whether the proper runway safety criteria can be met for the precision instrument approach.

Table 3-7. Existing and Future Runway Safety Criteria

	Runway Safety Area	Runway Object Free Area	Runway Protection Zone	Runway Obstacle Free Zone
Runway 06-24				
Existing	150' W 300' BY	500' W 300' BY	500' x 700' x 1,000'	400' W 200' BY
Future	300' W 300'-600' BY	800' W 600' BY	500' x 700' x 1,000' & 1,000' x 1,750' x 2,500'	400' W 200' BY
Runway 17-35				
Existing/Future	120' W 240' BY	250' W 240' BY	250' x 450' x 1,000'	250' W 200' BY

Notes: W - Wide, BY = Beyond
Source: Hoyle, Tanner & Associates, Inc., 2012.

For Runway 17-35, the safety criteria required for the current and future ARC of B-I (small airplanes exclusively) will not change. This is due to the fact that there is not enough space along the sides of this runway to establish any type of instrument approach procedure. Now and in the future, Runway 17-35 requires a 120 foot wide RSA and 250 foot wide ROFA, both extending 240 feet beyond each runway end. Both runway ends require a RPZ that starts 200 feet beyond the end of the area usable for takeoff or landing. These RPZs need to have an inner width of 250 feet, an outer width of 450 feet, and an overall length of 1,000 feet. In addition, the OFZ needs to be 250 feet wide and extend 200 feet beyond the runway end.

Currently Runway 17-35 has the proper RSA, ROFA, and OFZ surfaces required for the same existing and future conditions. As for the RPZs, on the north side, the Runway 17 RPZ extends beyond airport property. Within the limits of the RPZ there are a few commercial activities, including a fire station. Based on the information obtained, none of these facilities are residences or considered places of public assembly. To the south, the Runway 35 end is similar to Runway 24 in that while the RPZ extends beyond the current airport property, the proper criteria are maintained.

TAXIWAY SYSTEM REQUIREMENTS

The purpose of any taxiway system is to support the operational activity and enhance the safety of aircraft ground movements. Taxiways also act to enhance the capacity of the existing runway system by allowing aircraft to move on and off the active runway system in an efficient fashion. A good taxiway system is designed to provide freedom of movement to and from the runways and between aviation facilities at an airport. Such a system is essential at non-towered airports such as Lake Wales Municipal. Taxiway systems include parallel taxiways, entrance/exit taxiways, by-pass taxiways, taxiway run-up areas, hangar taxilanes, and apron taxilanes.

Currently most of the airport is required to have taxiways and taxilanes that meet the criteria for Design Group II aircraft. The current exceptions being the taxiway and two taxilanes off the northern most end of Runway 17-35 which only provide access to the two clearspan hangars and two t-hangar buildings intended to serve Design Group I aircraft. Design Group II taxiways need to be 35 feet wide, have a 79 foot wide Taxiway Safety Area (TSA), and 131 foot wide

Taxiway Object Free Area (TOFA). In addition, Design Group II taxilanes require an object free area of 115 feet wide. Design Group I taxiways only need to be 25 feet wide, have a 49 foot wide TSA, 89 foot wide TOFA, and a taxilane object free area of 79 feet wide. The TSA, TOFA, and taxilane object free areas are all centered on the alignment they are associated with to provide the proper wingtip clearance and setbacks required for safe ground operations.

For parallel taxiways, the taxiway centerline to runway centerline separation varies based on the ARC and type of instrument approach. Under the current conditions, Runway 06-24 requires a 240 foot separation for Design Group II with not lower than ¾ mile visibility minimums. In the future, this centerline separation needs to increase to 300 feet to support Design Group II aircraft and the potential for lower than ¾ mile visibility minimums. A minimum centerline separation of 150 feet is required for any parallel taxiway serving Runway 17-35 now or in the future since this runway cannot physically support an instrument approach procedures with lower than ¾ mile visibility minimums. For both runways at Lake Wales Municipal, FAA criteria recommend the optimal connector or exit taxiways are within 2,000 to 4,000 feet from a runway threshold. Each taxiway within this range should also be separated by at least 750 feet to be considered an exit for landing operations.

Taxiway A

As the eastern half of the full length parallel taxiway to Runway 06-24, Taxiway A connects the approach end of Runway 24 to a point just west of the runway intersection. Both the pavement width and runway centerline to taxiway centerline separation exceed the requirements for the existing and future conditions. The 2008 FDOT pavement report documented the entire taxiway in satisfactory condition which was confirmed during the visual inspection conducted in 2011. A rehabilitation of this taxiway should not be required until the first part of the long term planning period.

Taxiway B

Taxiway B has the proper width and object free area to accommodate the movement of Design Group II aircraft. While all portions of the taxiway have been rated in good condition, the 2008 FDOT pavement report predicts one section to be in fair condition and the others at the low end of the satisfactory rating by 2017. Therefore, rehabilitation of Taxiway B will be required during the first half of the long term planning period.

Taxiway C

With a width of 35 feet and serving as a connector taxiway to the runway intersection, Taxiway C has the proper design criteria to accommodate Design Group II aircraft. The asphalt is considered in the upper end of the good condition rating and forecast by FDOT to be in the middle of the satisfactory rating by 2017. As such, a rehabilitation of the Taxiway C surface is not expected until nearly then end of the 20-year planning horizon.

Taxiway D

Taxiway D provides the western half of the full length parallel taxiway to Runway 06-24. While the pavement width exceeds that required for the movement of Design Group II aircraft, the offset from Runway 06-24 does not. With a current centerline to centerline spacing of 200 feet, Taxiway D does not provide the proper offset to Runway 06-24 for the current or future condition. A Notice to Airman (NOTAM) should be published for this condition until this portion of the parallel taxiway can be relocated. This NOTAM would inform the operators of Design Group II aircraft about the substandard condition, especially during times of limited visibility.

The current satisfactory condition of Taxiway D is forecasted by FDOT to be in fair condition by 2017. Even though the pavement surface would not need any rehabilitation until the end of the intermediate planning period or later, the offset from Runway 06-24 needs to be addressed immediately. As indicated previously, the environmental review and design required to relocate Taxiway D has been completed. As soon as funding is available, this portion of the Runway 06-24 parallel taxiway system will be relocated to provide the proper centerline to centerline spacing required now and in the future.

Hangar Taxiway and Taxilanes

At 30 feet wide, the taxiway (currently designated as Taxiway B1) which connects to the Runway 17 end exceeds the Design Group I requirement of 25 feet. This taxiway also provides the proper taxiway object free area width of 89 feet for Design Group I aircraft. For the two taxilanes, a width of only 20 feet is required if the taxilane is one-way and serves only Design Group I aircraft. Both hangar taxilanes meet this minimum requirement. Similarly, one-way taxilanes serving t-hangars only require an object free area of 75 feet centered on the taxilane. This minimum criteria is met for the two taxilanes providing access to the east and west sides of the t-hangar buildings.

For the taxilane on the west side of the t-hangars, the centerline to centerline spacing with Runway 17-35 is currently 225 feet, which exceeds the requirement for 150 feet. However, this taxilane would need to be relocated if it is intended to be extended and serve as a parallel taxiway to Runway 17-35, even though it has the proper width for a Design Group I taxiway. The relocation would be required because as a parallel taxiway, the object free area would increase to 89 feet, which is currently not available between the taxilane and t-hangar buildings. The need to extend and therefore relocate this taxilane will be addressed as part of the airport alternatives analysis in the next chapter.

Only a part of the pavement for the hangar taxiway and taxilanes was evaluated by FDOT since the portions serving the southernmost t-hangar building were constructed after the pavement study. The newer pavement is considered to be in excellent condition and would not require any rehabilitation until the end of the 20-year planning period. Conversely, the older portions were forecasted by FDOT to be in poor condition by 2011. The report recommended that microsurfacing of the asphalt taxiway and taxilane surfaces be conducted immediately, which at that time was 2008. Therefore, the rehabilitation of the taxiway and taxilane pavements needs to occur as soon as funding is available in the short term planning period.

New Taxiways and Taxilanes

Typically, airports with the level and type of operations similar to those at Lake Wales Municipal are sufficiently served by one parallel taxiway for each active runway. As described in previous sections, while Runway 06-24 has a parallel taxiway on the north side, the western end does not meet the current or future centerline separation standard. For Runway 17-35, the lack of a parallel taxiway system significantly affects the occupancy time of the runway since aircraft must continue to the runway end, back taxi, or both in order to clear the runway environment. Full length parallel taxiways are also a minimum requirement for runways with a precision instrument approach procedure and recommended for those runways with any non-precision instrument approach procedure.

At least one full length parallel taxiway needs to be provided to each runway. Ultimately full or even partial parallel taxiways may be needed on both sides of the two runways to provide proper airfield access. This of course will depend on which portions of the airport property are developed. While it is not certain when additional airfield access would be required, the

planning for such facilities is important. Even if construction occurs beyond the 20-year planning period, such airfield access must be planned now to ensure the proper space and setbacks are preserved. In fact, Design Group II criteria should be considered for some of the future parallel taxiway systems to Runway 17-35. Specifically, the setbacks that would be necessary to ensure unrestricted ground movements of Design Group II aircraft around the airfield. This will be evaluated further in the airport alternatives analysis, especially as it relates to the future aviation development areas.

Various taxilanes will be required to access future airfield facilities as they are developed. This includes apron taxilanes to provide access to areas of the airfield developed during the planning period. The final configuration will be dependent upon the ultimate hangar sites and aircraft parking apron areas while the taxilane widths will depend on the intended use by different aircraft. The layouts of these additional taxiways and taxilanes will be depicted on the final Airport Layout Plan (ALP) drawings.

Run-Up Areas

The FAA recommends that each taxiway serving a runway end provide either a bypass taxiway or run-up area. Such features provide space for holding airplanes, for whatever reason, to delay their entrance onto the runway, while allowing other aircraft to bypass. Designated run-up areas for both runways should be planned as part of the parallel taxiway systems described above. Additionally, blast pads off each end of the primary runway, Runway 6-24 should be implemented to provide erosion protection off the runway ends from jet and other high performance aircraft.

NEW INSTRUMENT APPROACH PROCEDURES

Lake Wales Municipal currently has a straight-in, non-precision instrument approach published to each end of Runway 06-24. Both are area navigation (RNAV) procedures based on Global Positioning Satellites (GPS). For each end there are both localizer performance (LP) and lateral navigation (LNAV) minimums established.

On the Runway 06 end, these approaches provide a minimum descent altitude of (MDA) of 374 feet above the Runway 06 threshold elevation (500 feet above mean sea level) and one mile visibility for all aircraft types. On the Runway 24 end, the approaches are published at 458 feet above the Runway 24 threshold elevation (580 feet above mean seal level) and one mile visibility. Slightly higher visibility minimums apply to the larger and higher performance aircraft on approach to Runway 24.

The RNAV/GPS also provides higher, circling approach minimums which allow an aircraft to approach and establish visual contact with the airport environment in less than visual conditions. Once in the vicinity, the pilot can then maneuver the aircraft to set up a final approach and land on any runway end, unless specific restrictions are published. There is also a stand-alone circling approach based on the Lakeland VHF Omni-Directional Radar Beacon (VOR) and Distance Measuring Equipment (DME). While the VOR/DME circling approach has slightly higher minimums than the RNAV/GPS circling approaches, they provide some ability for aircraft not equipped with GPS navigation equipment to make approaches in less than VFR conditions.

While these approaches are good, they are still somewhat limited with respect to the ability of aircraft to get into the airfield during certain conditions. The capability of an airport to accommodate all traffic is greatly enhanced if the airfield has multiple instrument approaches established. As documented by the meteorological data collected for this study, the Lake Wales area experiences less than visual conditions 5.3 percent of the time. Given the different

instrument approaches available due to GPS technology, improved instrument approach procedures should be planned.

While instrument procedures are runway end specific, the authorization to establish any new approach begins with an Airport Airspace Analysis. The subsequent approval process of the ALP drawings created as part of this study will include an Airport Airspace Analysis conducted by the FAA to determine the ability of the runways to accommodate the desired instrument approach minimums proposed. To start, this master plan study identifies the various standards required for each specific approach desired to the different runway ends. When the actual instrument procedure is requested by the airport sponsor, all requirements, including the proper environmental review, desired approach minimums, whether circling approach procedures are desired, the survey needed to support the procedure, and the approved ALP must be provided to the FAA. The following sections as well as other sections of this chapter discuss these requirements, which are also reflected on the final ALP drawing set.

Precision Instrument Approach Capability

A precision instrument approach would greatly enhance the ability of the airfield to accommodate operations during poor weather conditions. However, the setbacks required for such an approach take up a large amount of space on all sides of the runway, especially the approach surface required prior to the precision runway threshold. This and the other imaginary surfaces related to different instrument approaches are discussed at the end of this section.

While GPS technology has made precision instrument approaches possible without the need for expensive on-airport equipment, there are still other airfield improvements required to establish the approach. Because of these improvements and the significant spatial requirements, only one precision instrument approach, to Runway 06-24, should be planned for Lake Wales Municipal.

Plans for a precision instrument approach (procedure providing course and vertical path guidance) require a Vertically Guided Airport Airspace Analysis Survey. Information pertaining to the details of this survey requirement is found in FAA AC 150/5300-18B, “General Guidance and Specifications for Submission of Aeronautical Surveys to NGS: Field Data Collection and Geographic Information System (GIS) Standards.” Essentially, this AC provides the specifications for the collection of airport survey data through field and office methodologies in support of aeronautical information and airport engineering surveys. It also explains how to submit data to the FAA, which is ultimately forwarded to the National Geodetic Survey (NGS) for quality control purposes.

Other requirements for establishing precision instrument approaches with less than ¾ statute mile visibility minimums include upgrades in runway lighting, pavement markings, and other approach aids. And as described previously, precision approaches also require increases in the various runway safety criteria including the establishment of an inner-approach OFZ, precision OFZ, and full length parallel taxiway. Finally, while precision approaches are not listed as an action normally requiring an Environmental Assessment, the environmental representative from the FAA Orlando ADO should be contacted during the initial stages of establishing the approach. As mentioned in previous sections, some level of environmental review is anticipated given the conditions off the east end of Runway 06-24 with respect to proving the proper RSA and ROFA.

Establishment of Additional Straight-In Non-Precision Instrument Approaches

From an airspace and GPS technology perspective, there are no reasons why straight-in non-precision GPS approaches could not be developed to either end of Runway 17-35.

Unfortunately, the spatial requirements around the physical runway environment at the airport are a problem. Nearly every airport building precludes the possibility of establishing any instrument approach procedures to Runway 17-35, unless each of those facilities is relocated. For this reason, no additional non-precision approach procedures will be considered.

FAR Part 77 Imaginary Surfaces

The airspace around airports is protected by the imaginary surfaces defined in Federal Aviation Regulation (FAR) Part 77, "Objects Affecting Navigable Airspace." When combined, the five different imaginary surfaces of this federal regulation protect the ability for aircraft to safely fly into and out of an airport. These surfaces are enforced through local planning and land use jurisdictions to control the type and height of objects in the vicinity of the airport. The specific imaginary surfaces, which must be protected from obstructions, include:

Primary Surface – A rectangular area symmetrically located about each runway centerline and extending a distance of 200 feet beyond each runway threshold. Width of the Primary Surface is based on the type of approach a particular runway has, while the elevation follows, and is the same as that of the runway centerline, along all points. For Runway 06-24 the current width is 500 feet and would increase to 1,000 feet when a precision instrument approach procedure is established. For Runway 17-35 the current and future Primary Surface width is 250 feet.

Horizontal Surface – A level oval-shaped area situated 150 feet above the established airport elevation, extending 5,000 or 10,000 feet outward, depending on the runway category and approach procedure available. Currently both ends of Runway 06-24 already require a Horizontal Surface with a radius of 10,000 feet due to the existing instrument approach procedures. For Runway 17-35 the current and future Horizontal Surface radius is 5,000 feet.

Conical Surface – Extends outward for a distance of 4,000 feet beginning at the outer edge of the Horizontal Surface, and sloping upward at a ratio of 20:1.

Approach Surface – These surfaces begin at the end of the Primary Surface (200' beyond the runway threshold) and slope upward at a ratio determined by the runway category and type of instrument approach available to the specific runway end. The width and elevation of the inner end conforms to that of the Primary Surface while Approach Surface width and length to the outer end are governed by the runway category and instrument approach procedure available.

For both ends of Runway 06-24, the current approach slopes extend out 10,000 feet at a slope of 34:1 to an outer width of 3,500 feet. For any future precision approach, the approach surface to the runway end with the procedure would extend out 10,000 feet at a slope of 50:1 and then an additional 40,000 feet at a slope of 40:1 to an outer width of 16,000 feet.

For both ends of Runway 17-35, the current and future approach slopes extend out 5,000 feet at a 20:1 ratio to an outer width of 1,250 feet.

Transitional Surface – A sloping area beginning at the edges of the Primary and Approach Surfaces and sloping upward and outward at a 7:1 slope.

AIRFIELD ENVIRONMENT

A number of facilities are necessary to support the operations of the airfield environment. Airfield lighting is required for airports intended to be utilized for nighttime operations as well as for operations during less than visual meteorological conditions. These along with pavement markings, navigational aids, and signage are addressed in the following sections.

Runway Lighting

Medium Intensity Runway Lights (MIRLs) are installed on Runway 06-24 and operated through the Common Traffic Advisory Frequency (CTAF). MIRLs are required on most runways with non-precision or precision instrument approaches while High Intensity Runway Lights (HIRL) are required for those runways with precision instrument approach capability using Runway Visual Range (RVR) based minimums. Since RVR based minimums are not expected to be a part of the precision approach planned for Runway 06-24 in the future, the existing MIRLs will support the new precision instrument procedure planned.

As documented earlier, the current runway lighting system consists of base mounted light fixtures on cans with conduit. Once the runway is extended, the future runway edge lights should also include a can and conduit type of installation. The extension would also require new threshold light fixtures on the end that is extended. When the runway is extended, the option of installing light-emitting diode (LED) runway lights should be considered. If LEDs are allowed by the funding agency, then the existing incandescent runway light fixtures would also have to be changed. This option would make the MIRL circuit much more efficient and sustainable.

The single 10 kilowatt regulator which currently powers the runway lighting circuit may need to be upgraded or replaced when the additional fixtures for the runway extension are added to the circuit. The decision will depend on the final electrical design of the runway circuit once the runway lighting improvements are made.

For Runway 17-35, the installation of MIRL fixtures should be programmed since the airport supports nighttime operations for all aircraft. This system should include base mounted LED fixtures on cans with conduit. While stake-mounted lights with direct buried cable save money in the short term, they eventually need to be completely replaced due to the impacts of the environment. The Runway 17-35 system should include threshold light fixtures and would require a separate regulator in the electrical vault.

Taxiway Lighting

Each of the existing taxiways are equipped with Medium Intensity Taxiway Lights (MITL). As documented, the MITLs east of Runway 17-35 have been installed using base mounted LED light fixtures on cans and are considered to be in good condition. However, those west of Runway 17-35 are only considered to be in fair condition with stake mounted fixtures and the cable buried directly in the ground. These older, incandescent lights should be replaced with base mounted LED light fixtures with conduit when the non-standard parallel taxiway is relocated.

Some MITLs should also be installed along the taxiway that ties into the north end of Runway 17-35. These fixtures should be considered as part of the Runway 17-35 lighting project and would only require a few fixtures east of the runway pavement. This would facilitate the transition of lighting from the airfield environment to the different hangars off this taxiway and the taxilanes in this area, many of which may have floodlighting.

MITLs should also be included as part of any future taxiway projects, including any connector taxiways. These systems should utilize LED fixtures for efficiency and sustainability. Likewise, all future taxiway lighting systems should be of a can and conduit type of installation and will require regulators to be added to the airfield electrical vault.

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.

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 markings, 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. For example, the FAA requires aiming point markings on any visual or non-precision runway that is greater than 4,000 feet and used by jet aircraft. 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. FAA guidelines state that all taxiways should have centerline markings and runway holding position markings whenever they intersect with a runway.

In addition to the FAA requirements, FDOT has required black outlines on all “critical” pavement markings placed on light colored pavements since October 2004. This includes oxidized asphalt as well as concrete surfaces. FDOT critical markings include: numerals, threshold bars, arrows and arrowheads, centerline stripes, and holding position markings.

Runway 06-24

Runway 06-24 has the proper pavement markings for a non-precision runway, including aiming point markers and side stripes. Currently these markings are faded and require repainting. While the markings are adequate for any future non-precision approaches, they will obviously need to be redone once improvements to the runway length are made and the threshold(s) moved. When a precision approach is established, the addition of touchdown zone markings will also be required. Once redone, runway markings typically last for ten years; however, there are a number of variables that could significantly shorten that period. Therefore, periodic remarking will be required.

Runway 17-35

The current markings for Runway 17-35 are adequate and in excellent condition. However, periodic remarking will be required over the course of the 20-year planning period.

Taxiways and Taxilanes

With the current non-precision instrument approaches and ARC designation of A-II (or B-II), any taxiway serving Runway 06-24 requires the holding position markings to be offset 200 feet, perpendicular to the runway centerline. Currently the east side of Taxiway A, and both Taxiways B and C all have the holding position markings in the proper location. However, the holding positions on Taxiway D at the Runway 06 end and on Taxiway A west of Runway 17-35 are only at 150 feet from the runway centerline. This is the result of the substandard parallel

taxiway offset on this side of the airfield and needs to be corrected as soon as possible. A NOTAM should be published for this condition until the parallel taxiway and holding position marking can be relocated. This NOTAM would inform the operators of Design Group II aircraft about the substandard condition, especially during times of limited visibility. Once a precision instrument approach is established to Runway 06-24, the holding position markings will have to move out to a 250 foot perpendicular offset.

For Runway 17-35, the ARC designation of B-I (small airplanes exclusively) with only visual approaches require the holding position markings to be offset 125 feet. Currently Taxiway B and the taxiway that connects to the Runway 17 end each have holding position markings offset 125 feet from the Runway 17-35 centerline. Where Taxiway A crosses Runway 17-35, the holding position markings on both sides of the runway are offset at 150 feet.

With the exception of Taxiways B and C, all of the taxiway and taxilane markings need to be remarked as soon as possible as they are very faded. However, the remarking of Taxiways B and C should be considered at the same time to improve their visibility and so that all of the existing taxiway markings are on the same schedule for the periodic remarking that will be required. Any new taxiways, taxilanes, and aprons should, at a minimum, have the appropriate centerline and holding position markings required by the FAA.

Finally, while not required at Lake Wales, the FAA created criteria to enhance the taxiway centerline markings on those taxiways that directly connect to a runway. These markings are a safety enhancement to reinforce situational awareness and minimize the potential for runway incursions. Therefore, enhanced centerline markings should be included as part of any future remarking of the taxiways connecting to Runway 06-24 or Runway 17-35. Doing so would provide an additional visual cue to alert pilots of an upcoming runway holding position marking.

Takeoff and Landing Aids

Over the course of the planning period, some of the various takeoff and landing aids described at Lake Wales Municipal will either need to be replaced or relocated. The following sections describe those facilities that will need upgrading and new equipment that is required.

Precision Approach Lighting Systems

As part of the establishment of a precision approach to Runway 06-24, an approach lighting system will be required. A Medium-intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR) is recommended for precision approaches which have decision heights as low as 200 feet and visibility minimums of ½ mile. At the time the precision approach is established, the number of approaches under actual instrument conditions will need to be determined in order to justify the need for the approach lighting system. Given that there are less than visual conditions 5.3 percent of the time, a MALSR system should be planned for the future precision approach end of Runway 06-24.

The establishment of this approach lighting system will also require that an inner-approach OFZ be provided. This surface would start at the end of the runway OFZ and maintain the same 400 foot width out to a point 200 feet beyond the last fixture in the approach lighting system. The airspace protected by the inner-approach OFZ follows that of the FAR Part 77 Approach Surface for a precision instrument runway (50:1 slope).

Runway End Identification Lights

Runway End Identification Lights (REIL) provide pilots with a rapid and positive visual identification of the approach end of the runway during night, instrument, and marginal weather conditions. REILs also aid in identification of the runway end in areas having featureless terrain

like that found around Lake Wales Municipal. REIL systems consist of a pair of synchronized white flashing lights which are situated on each side and abeam of the runway end threshold lights.

Unidirectional REIL systems have the beam axis orientated 15 degrees outward from a line parallel to the runway edge and inclined at an angle of 10 degrees upward, facing the approaching aircraft. Unidirectional REILs should be planned to both ends of Runway 17-35 as part of the project to light this runway with LED MIRLs.

There are also omnidirectional REIL systems which are one of the recommended approach lighting systems in FAA AC 150/5300-13 Change 17 for non-precision approaches with not lower than one mile visibility minimums. These units, called Omnidirectional Approach Lighting Systems (ODALS), are also less expensive than other more complex approach lighting systems recommended. Therefore, ODALS should be considered for the end of Runway 06-24 that does not receive the precision instrument approach. The end of Runway 06-24 with ODALS will also need to preserve the requirement of the inner-approach OFZ described previously.

Visual Glide Slope Indicators

Visual descent information use to be provided to pilots using Runway 06-24 via the 4-light Precision Approach Path Indicator (PAPI) systems installed for each end. However, as described, these systems are no longer functional and have been disconnected from the runway lighting circuit. New 4-light PAPI systems need to be installed on both ends of Runway 06-24 as soon as possible. Considering the runway extension required, it may be more efficient to install the new units as part of that project, to include the required regulator.

No improvements are need for Runway 17-35 since there is a 2-light PAPI system installed to each end and both are in excellent condition, including the regulator.

Automated Weather Observing System

Information from the Automated Weather Observing System (AWOS) III can only be obtained from the assigned radio frequency or through the dedicated telephone number. Requests have been made to explore the option of making the AWOS III data available to the FAA's Weather Message Switching Center (WMSCR) through the National Airspace Data Interchange Network (NADIN). To do so requires the installation of additional equipment including a small satellite dish for data transmission. Once connected to the NADIN, the AWOS III data will be available to all Flight Service Stations, air traffic control facilities, the National Weather Service, and other third party sources such as WSI, Meteorlogix, DUATS, the Weather Channel, and other internet based weather resources.

The AWOS III at Lake Wales is an All Weather Inc. unit. All Weather Inc. can provide the additional equipment for this service. During the first half of 2012, the equipment was estimated at $2,700 and is eligible for federal funding. This fee includes the first year of service. Afterwards the annual service fee is $600 (2012 rate). Because of the recurring costs, the decision to pursue such an upgrade to the airport's current AWOS III system will be more of an operational cost decision versus a pure facility or capital improvement decision.

Wind Indicators

The primary windsock which is internally illuminated and part of the airport's segmented circle, is in good shape. Over the course of the planning period, only the periodic replacement of the actual windsock, light, and the repainting of the segmented circle panels will be required.

Similarly, the three unlit supplemental windsocks at the airport will only need to have the windsocks replaced occasionally. This is certainly true for the one located adjacent to Runway 35 as it is currently missing the actual windsock fabric.

Airfield Signage

Currently there are a number of illuminated signs installed as part of the various runway and taxiway lighting circuits. However there are a few unlit signs along Taxiway A and along portions of Runway 17-35. This includes the holding position sign at the approach end to Runway 17, which is not required to be lighted since Runway 17-35 is unlit. These signs should all be replaced with illuminated signage, especially the Runway 17-35 holding position sign at the Runway 17 end, once that runway is lit. At that time, the current designation of this taxiway as Taxiway B1 should also be re-evaluated as this designation would only be correct if a parallel taxiway on the east side of Runway 17-35 was constructed and designated as Taxiway B. The potential for this taxiway will be evaluated as part of the airport alternatives analysis in the next chapter.

In the future, the addition of lighted airfield signage will be imperative to ensure the efficient and safe movement of aircraft to and from the runway environment. As projected in the activity forecasts, the increase in operations will include an increase in itinerant traffic, which increases the number of pilots not familiar with Lake Wales Municipal. Airfield signage should be added with each runway and taxiway lighting project and at a minimum, should include the mandatory runway holding position signs. Additional location and direction signs would facilitate the safe ground movement of aircraft, especially since Lake Wales Municipal is a non-towered airport.

Runway distance remaining signs should be considered as part of the project that extends Runway 06-24 to its ultimate length. These signs, which are located along the sides of the runway provide a quick reference to pilots on the length available for takeoff or landing operations. While preferred on the left side of the runway, the most economical option is to utilize double-faced signs on one side of the runway. Under this option, the signs should be placed to the left side of the runway end used most often. This would most likely also be the end of Runway 06-24 that receives the precision instrument approach.

Ground Communications

An improvement to the communications between aircraft on the ground at Lake Wales Municipal with air traffic control facilities should be considered. Currently pilots conducting instrument arrivals into Lake Wales Municipal must either cancel their instrument flight plans in the air before landing or by telephone once on the ground (within a specified amount of time). Instrument departures out of Lake Wales Municipal require pilots to telephone the Flight Service Station for a “void if not off by” time to properly obtain instrument clearance.

At non-towered airports like Lake Wales Municipal, it is possible for a Remote Communications Outlet (RCO) or a Remote Transmitter/Receiver (RTR) facility to be installed to enhance the ground communications described above. Both systems utilize a VHF radio to extend the ability for aircraft on the ground to make radio contact with either a Flight Service Station or air traffic control facilities. In fact, RCOs are used to link ground communications with Flight Service Stations while RTRs connect to air traffic control facilities. For Lake Wales Municipal, the ground communications would best be served by the installation of a RCO. Unfortunately, the number of operations requiring this service would not justify the costs associated with a full RCO.

An alternative system would be the installation of a Ground Communication Outlet (GCO). Unlike the larger RCOs or RTRs, a GCO utilizes a transceiver, antennae, and dedicated

telephone line to provide the link between aircraft on the ground and the desired Flight Service Station or air traffic control facility. The GCO equipment is typically installed in the airfield electrical vault. Pilots can activate the GCO equipment from the aircraft using their radio microphone. The GCO system would then dial the pre-established Flight Service Station or air traffic control facility. Once connected, the pilot can communicate directly from the aircraft to the facility via the VHF radio link.

It should be noted that such a system requires coordination between the airport sponsor and the intended facility for communication to be made. The FAA's Air Traffic Division, Requirements Branch reviews each request for a GCO. Depending on their decision, additional coordination with the various facilities would then be required before the system could be installed and activated. The costs associated with installing a GCO system was quoted at just around $20,000 during the first half of 2012. This equipment is eligible for federal funding and as indicated would require at least one dedicated phone line. As such, the monthly service cost associated with the phone line will make the GCO system both an operational and capital improvement decision.

AIRPORT FACILITIES

The following sections address the various airport facilities required to support the expected activity. These include the requirements for general aviation terminal space, hangar facilities, aircraft parking areas, aviation fuel storage, airfield security fencing, and other support facilities required to better support the growing business and tourism activity at the airport, as well as the existing general aviation traffic.

General Aviation Terminal Space Requirements

A general aviation terminal provides space for offices, waiting areas, flight planning, concessions, storage, and other amenities for pilots and passengers. General aviation terminals also provide the first and last impression of the airport and local area that pilots and passengers experience. While the current facility supports the current level of operations, additional space will be required before the end of the 20-year planning period. This additional space will also depend on how and where future airfield facilities are constructed. The visibility and access to the services described above are essential. Therefore, future airfield improvements and the developable space available will have a significant influence on location of the additional terminal space, while activity levels will dictate the need for that space.

The following analysis was conducted to estimate what amount of space should be considered to accommodate the pilots/passengers expected during the planning period. For this, an estimate of the peak hour pilots/passengers is necessary to determine the number of people that would use the general aviation terminal facilities during a one-hour period. To estimate the peak hour pilots/passengers, the following methodology was applied with the results shown in **Table 3-8**.

- The number of operations conducted during the peak hour of the average day during the peak month was calculated using data from the forecast chapter. It was assumed that arriving and departing general aviation pilots/passengers could use the terminal at the same time. Likewise, both local and itinerant operations would require terminal space at the airport.

- The number of peak hour operations was reduced by 25 percent to eliminate most of the activity attributed to touch and go operations. While training

operations require terminal space (flight planning, meeting with flight instructor, restrooms, etc.), not all have a direct relationship.

- The adjusted peak hour operations (arriving or departing) were estimated to have an average of two people on board (pilots and passengers).

- An area of 100 SF was used for each peak hour pilot/passenger to determine the terminal space requirements. This value accommodates all functions of a full service general aviation terminal building including FBO counter space, waiting area, snack room, office space, pilot's lounge, restrooms, training area, circulation space, etc.

Table 3-8. General Aviation Terminal Space

	Peak Hour Operations	Adjusted Operations	Number of People	Total Terminal Space (sf)
Base Year				
2011	14	10.5	21	2,100
Forecast				
2017	16	12	24	2,400
2022	17	12.8	25.5	2,550
2032	22	16.5	33	3,300

Source: Hoyle, Tanner & Associates, Inc., 2012.

Since the current general aviation terminal only provides approximately 2,000 square feet of space for the public FBO services, an expansion of the existing facility and/or a second facility will be required during the planning period. This expansion will be necessary especially as the demand for additional aviation and FBO services continues to increase from developments in the area surrounding the airport. This demand includes, but is not limited to the overall increases in population, area businesses, citrus industry, and CSX Intermodal Terminal Facility, as well as from Legoland, the Bok Tower Gardens, Chalet Suzanne, and other area attractions. Moving forward, business- and tourism-based aeronautical activities are expected to be a large driver facility improvement at the Airport.

Aircraft Hangar Requirements

Hangars are one of the most desirable means for aircraft storage at any airport when offered at reasonable rates. Most hangar space is primarily utilized by the aircraft based at the airfield with only a small percentage used by itinerant traffic (usually for maintenance or occasional overnights). In general, hangar types include a combination of the following facilities:

T-hangars – A fully enclosed building housing individual stalls, each capable of storing one aircraft, typically a single-engine or a light multi-engine aircraft.

Clearspan Hangars – A fully enclosed building typically capable of holding multiple aircraft. These are often referred to as storage or box hangars.

Corporate Hangars – Similar to clearspan hangars, but typically have an attached office. These hangars may only store one aircraft each.

Shade Hangars – A structure with a protective roof but no walls, typically capable of holding numerous aircraft each. These are often referred to as aircraft shelters or shade ports.

Currently 91 percent or 20 of the 22 based aircraft are stored in hangars at Lake Wales Municipal. If additional facilities are constructed, it is expected that this high percentage of based aircraft stored in hangars will continue throughout the planning period. This is supported by the fact that only two based aircraft are stored outside on the airport's two apron areas. In addition, the City does have one person on the official hangar waiting list and two corporations that are ready to build hangar facilities. Florida's environment (sun and rain) also contributes to the desire for hangar facilities by aircraft owners. Therefore, 14 new hangar spaces (34 total), will be required by the end of the planning period.

Of the 20 based aircraft stored in hangars, 16 are stored in the t-hangars and 4 in clearspan hangars. It is expected that of the 14 new hangar spaces required, approximately six would desire t-hangar space. This is assumed using the forecasted mix of based aircraft and the fact that most owners of single-engine or light multi-engine aircraft prefer t-hangars.

While the t-hangar figure is pretty straightforward, the number of aircraft stored in clearspan hangars varies depending on size and who owns the hangar. Some clearspan hangars may house a multitude of aircraft if operated by a fixed base operator (FBO) while private or corporate clearspan hangars may only store a single aircraft. At minimum, a sufficient mix of large and small clearspan hangars should be planned to accommodate the eight aircraft projected to be stored in this type of facility.

For reasons stated above, a number of hangar facilities, exceeding the minimum identified, will be reflected on the final ALP drawing set. This provides flexibility for the City when moving forward with the development of any hangar facilities. Ultimately, each will be based on the availability of funds, demand at that time, and the business decisions of the tenants using these facilities.

Aircraft Parking Apron Requirements

Currently 9 percent or 2 of the 22 based aircraft are parked outside. This includes the only multi-engine aircraft currently based at the airport as well as a single-engine model.

For planning purposes, based and itinerant aircraft apron requirements are usually considered separately since they serve different functions. Because parking areas typically accommodate both itinerant and based aircraft, the two will be analyzed independently and then combined. Aircraft parking areas are typically divided between small and large aircraft, defined as:

Small Aircraft – An outdoor parking space with tie-down capability, sized to accommodate single-engine and light multi-engine aircraft.

Large Aircraft – Spaces on a paved apron suitable for parking the larger turboprop multi-engine aircraft and business jets.

Formulas to estimate the apron space required for based and itinerant aircraft parking are provided in FAA AC 150/5300-13 Change 17. The following sections describe the FAA methodology.

FAA Methodology for Based Aircraft Parking Area

A minimum area of 300 square yards (SY) should be applied to each single-engine and light multi-engine based aircraft expected to be parked on an apron. For planning purposes, the FAA recommends increasing this value by ten percent for expansion over the following two year

period. However, the multi-engine parked outside at Lake Wales is a much larger DeHavilland DHC-6-300 Twin Otter. While not defined as a large multi-engine aircraft, it does require more space than the minimum 300 SY recommended for light multi-engine based aircraft. Therefore, the recommendation was doubled for the Twin Otter. The result then using this methodology is that 990 SY of apron space is required for the two based aircraft currently stored outside.

As stated in the previous section, it is assumed that the airport will continue to have a higher percentage of aircraft stored in hangars. It is estimated that the same percentage of the based aircraft parking demand will be met through the use of hangar facilities by the end of the planning period. Therefore, of the 37 based aircraft projected by 2032, only nine percent or three total aircraft will need apron space. It was also assumed that the one additional based aircraft that will be stored outside will be a small aircraft.

FAA Methodology for Itinerant Aircraft Parking Area

Itinerant apron space is intended for relatively short-term parking periods, usually less than 24 hours (possibly overnight), as they are primarily for transient aircraft. When possible, such aprons should also be located as to provide easy access to FBO, fueling, and ground transportation facilities. For planning purposes, the FAA provides a detailed approach to calculate the total number of peak day itinerant aircraft that can be expected on the ramp at any given time.

For Lake Wales Municipal, this was calculated using the operations forecasts, expected local versus itinerant splits, and operational fleet mix figures from the aviation activity forecasts chapter. Once calculated, the minimum area of 360 SY per itinerant aircraft parking area was applied for the each of the smaller aircraft, while 1,000 SY was applied for the larger turboprops and jet aircraft expected. This resulted in 6,160 SY of itinerant apron space required in 2011 and 13,600 SY by 2032.

Combined, it was calculated that a minimum total of 7,150 SY or 64,350 square feet (SF) of aircraft parking apron is needed now and 14,920 SY or 134,280 SF in the future. The inventory documented that there is approximately 112,500 SF of space from the two paved apron areas. This amount was reduced from the calculated needs in order to estimate the additional aircraft parking apron requirements for the planning period.

Options to provide the additional apron space for the planning period, which includes expanding into new areas of the airport property, will be addressed in the airport alternatives chapter. Because the FAA methodology is based on minimum requirements and recognizes the fact that local conditions vary from airport to airport, the ALP for the airport will depict additional paved aircraft apron space. Many of these improvements will be based on the availability of funds, demand at that time, or even the business decisions of the tenants expected to occupy these facilities. Likewise, since there are numerous ways to configure such parking areas, the layouts shown on the ALP and Terminal Area Plan will reflect development that is well beyond that required to meet the activity forecasts of the 20-year planning period.

Table 3-9. Summary of Aircraft Parking Apron Requirements

	2011	2032
Based Aircraft		
Number of Aircraft on Apron	2*	3*
Area Required for Based Aircraft	990 SY	1,320 SY
Itinerant Aircraft		
Small Aircraft on Peak Day	6	10
Area Required for Small Aircraft	2,160 SY	3,600 SY
Large Aircraft on Peak Day	4	10
Area Required for Large Aircraft	4,000 SY	10,000 SY
Total Apron Area Required	**7,150 SY**	**14,920 SY**
Apron Area Available in 2011	112,500 SF	112,500 SF
Surplus (+) / Deficit (-)	+48,150 SF	-21,780 SF

Note: *Includes double the space for the larger DeHavilland DHC-6-300 Twin Otter stored outside.
Source: Hoyle, Tanner & Associates, Inc., 2012.

The existing general aviation terminal apron should not require any rehabilitation until the end of the 20-year planning period. However, the 2008 FDOT pavement report recommended that microsurfacing of the east aircraft apron and entrance taxilane surface be conducted in 2008 before the pavement deteriorates to the poor condition forecasted in the same report to occur by 2014.

The installation of apron floodlighting is recommended as it provides additional safety for night operations and security for parking. Floodlighting was included on the general aviation terminal ramp when it was constructed and a recent security project installed floodlighting for the east aircraft apron. Floodlighting should be considered mandatory for any future apron projects, especially given that the airport is used for nighttime operations on a regular basis.

Aviation Fuel Storage Requirements

The current self-serve 10,000 gallon 100LL Avgas and Jet A tanks provide sufficient volume for the quantity sold without needing excessive deliveries to replenish the on-hand supply. However, as operations increase and additional portions of the airport are developed, a second fuel tank site will be required.

The physical layout of the airport reveals that much of the future aviation development will most likely occur in the northwest portion of the airport property. Since the current fuel tanks are located on the east side of the airport, many future facilities may be quite a distance away; therefore, a second fuel tank site needs to be planned. Another option would be to utilize mobile refuelers to dispense fuel around the different airport locations. However this option would require the City or FBO to provide the manpower to operate and maintain two fuel trucks in addition to the initial acquisition of the equipment. Regardless, it is believed that in the future the current or possibly another FBO may decide to utilize fuel trucks. This is primarily based on the fact that many of the jet aircraft owners and operators are not inclined to self fuel their aircraft.

Airfield Security Fencing Requirements

As the airport continues to grow, the permanent separation between the airside and landside operations needs to be maintained. While the current combination of fencing, gates, and vegetative barriers is sufficient, additional security fencing will be required as new facilities are developed.

The extent of such airfield security fencing will largely depend on the airport development alternatives selected in the following chapter. While the City will be responsible for a majority of the security improvements, the plans for any private hangar or facility development must include how the site will work with respect to the overall airfield security. Ultimate site plans for each facility must include acceptable fencing and access gate modifications to ensure the proper separation between airside and landside operations.

Any new or relocated airfield security fencing must adhere to the recommendations by the FAA, FDOT, and Transportation Security Administration (TSA). This includes the minimum use of six foot high chain link fence with three strands of barb wire on top. In addition, the various automobile and pedestrian gates must have adequate equipment for the City to control access.

Airfield Electrical Vault

The current airfield electrical vault is in good condition and should have the space required to house the additional regulators and panels for the airfield lighting and electronic navigational aids proposed over the 20-year planning period. Additional electrical equipment would most likely require modifications to the existing structure to include suitable racks above the existing regulators. Future electrical designs conducted as part of the various runway and taxiway improvement projects will determine the equipment and vault modifications required.

Aircraft Rescue and Fire Fighting

Aircraft Rescue and Fire Fighting (ARFF) services are dictated by the type and level of operations conducted. The FAA uses an index based on the longest commercial service aircraft conducting five or more daily departures. Because Lake Wales Municipal does not have any airline, regional/commuter, or charter aircraft that conduct five or more daily departures, the airport is not required to have on-site ARFF facilities.

Currently the Lake Wales Fire Department provides the fire and rescue services for the airport. The Main Station is located in the Municipal Services Center on W. Central Avenue, just east of the intersection of U.S. 27 and W. Central Avenue. This places the station at three driving miles from the airport.

LANDSIDE ACCESS, AUTOMOBILE PARKING, AND UTILITY INFRASTRUCTURE

An integral yet often overlooked aspect of an airport's operation is that which is not related to aircraft or air travel. The landside facilities such as local street access, airport circulation roads, automobile parking, and utilities are equally critical to development. Likewise, the airside components addressed previously are dependent upon the availability of the proper landside features. The following sections address these elements.

Landside Access

The only direct landside access to the current airport facilities is provided via Airport Road, which runs directly south off State Road 60. Approximately 1,000 feet of this two lane road lies between State Road 60 and the airport property line. Overall, Airport Road is in good condition; however, a portion of the off-airport section is very poor. This is due to the at grade crossing of

the CSX railroad, where the transition between the road, the active CSX railroad, and an abandoned rail spur are uneven and very hazardous. Vehicles must use extreme caution and a slow rate at this crossing to avoid having the vehicle bottom out. Since this is part of Polk County's dedicated road system, the need to improve this rail crossing immediately needs to be communicated to both the County and FDOT.

There is no dedicated vehicle or even pedestrian access to the east aircraft apron area, which includes the aviation fuel tanks. When tankers come to replenish the tanks, they must drive on a dirt path between the end of Airport Road and Taxiway A. They then drive down Taxiway A a couple of hundred feet to access the east aircraft apron area. As such, landside access which does not conflict with aircraft movements on Taxiway A or the east aircraft apron is needed. Direct access will also be required to support any future airport facilities located in this portion of the airfield. Alternatives to provide this automobile access are addressed in the following chapter.

Currently there is no landside access into any other portions of the airfield. While it is not expected for the entire airport property to be developed within the 20-year planning horizon, plans should be made to preserve future access corridors. Of particular importance is to provide the ability to access the northwest corner of the airfield. Options for future airport access will be evaluated in the airport alternatives chapter, especially as it relates to the various airfield setback requirements and physical environment of the airport property.

Automobile Parking

At many general aviation airports, a number of automobiles are parked in the hangar facilities while the aircraft are in use. In some cases, vehicles are left on the aircraft parking apron during a flight or trip. This practice should be avoided whenever possible as it only increases the number of automobiles on the airside of the airport as well as the risk of an incursion between an aircraft and a vehicle. For these reasons alone, automobile parking is an important facility to provide at an airport.

There is no dedicated automobile parking for the hangars off the north end of Runway 17-35. The automobiles must also utilize portions of the taxiway connecting to the Runway 17 end or the two taxilanes to access their facilities. Unfortunately, due to the taxiway and taxilane object free areas, as well as the right-of-way for Airport Road, there is no immediate area in this part of the airport that could provide automobile parking. The limited options that might exist will be evaluated in the next chapter in an effort to reduce and/or eliminate the mix of automobile traffic and aircraft ground movements.

For any future facilities an adequate amount of space shall be allotted for automobile parking. This includes separate parking lots for any clearspan or t-hangar facilities, despite the fact that owners or users of these facilities typically want to park their automobiles in the hangars.

Utility Infrastructure

The ability to provide the utilities (electric power, water, and wastewater) to future facilities is an important consideration since the associated costs can be a significant portion of the overall development. Even areas only expected to support aircraft hangars require utilities. For example, if no water or wastewater services are provided, than the hangar cannot obtain a certificate of occupancy and/or fire flow requirements may not be met. This limits the use and therefore the types of tenants that may lease the facilities from the City. Nearly every company and many private entities require adequate utilities to conduct various activities in their facilities. Without, the buildings may only be limited to the storage of aircraft and even then, only if the fire code is satisfied.

Therefore, extending the appropriate utilities for future facilities should be included as part of the project providing the landside access into a parcel or new development area. While this is pretty straightforward for electric power, the current potable and non-potable (for fire flow) water capacities are limited to the small wells and storage systems on the east side of the airport. It is fairly certain that these existing wells cannot support the full build out of the northeast corner of the airport property. Similarly, the ability handle wastewater can be provided through the continued use of septic tank systems; however, this is not recommended. Septic systems take up a lot of valuable space on the airfield that is also needed for the required stormwater drainage features, as well as the facility itself. Therefore, both existing and future airfield developments need to have sanitary sewer service. Opportunities to partner with other developments adjacent to the airport property should be considered in order to offset the significant costs associated with extending water and sewer lines to the airport.

WILDLIFE HAZARD SITE VISITS AND ASSESSMENTS

The FAA has had a wildlife hazard management program in place for more than 50 years. This program focuses on mitigating wildlife hazards on or near airports through habitat modification, harassment technology, and research. The program continues to evolve and includes a number of advisory circulars, best management practices, and resources to assist airports. Currently only FAR Part 139 airports which have had a “triggering event” are required to conduct a Wildlife Hazard Assessment.

While Lake Wales Municipal is not a Part 139 airport, nor have they had a “triggering event,” the FAA still encourages and is making funding available for all NPIAS general aviation airports to conduct either a Wildlife Hazard Site Visit or Assessment. Under the current recommendations, Lake Wales Municipal would be categorized as a Group 3 airport. These airports are those which are classified as having 0 to 19 based jets or 10,000 to 29,999 annual operations. The FAA is currently recommending that all Group 3 airports have at least a Wildlife Hazard Site Visit initiated by 2017. Unfortunately, the details of this program, including requirements of the site visit have yet to be published by the FAA. Therefore, some form of a Wildlife Hazard Site Visit or Assessment should be programmed to occur in the short term planning period and the budget updated as more information becomes available on the actual requirements.

MASTER DRAINAGE AND POLLUTION PREVENTION PLANS

Currently development at Lake Wales Municipal is done on a permit-by-permit basis with respect to the stormwater requirements of the Southwest Florida Water Management District. During the short term planning period, a Master Drainage Plan for the airport should be developed which includes the different development projects proposed in this master plan. A Master Drainage Plan would evaluate past permits, existing impervious surfaces, the airfield environment (including existing drainage features, basins, soil types, etc.), and the future impervious areas envisioned for development. Combined these elements would create a conceptual drainage permit for the entire airport development program, which would help the City to streamline the permitting process of the individual projects as they are designed.

The U.S. Environmental Protection Agency (EPA) developed a program under the Clean Water Act to regulate certain high priority stormwater sources. As such, discharges of stormwater from industrial facilities (which includes most airports) must be covered by a National Pollutant Discharge Elimination System (NPDES) permit. Even if there is no active construction, an airport which discharges stormwater to navigable waters of the U.S., waters of the contiguous

zone, or the ocean triggers the need for a NPDES Stormwater Multi-Sector General Permit for Industrial Activities.

Airports qualify under Sector S "Air Transportation Facilities" of the Multi-Sector Permit. A "navigable" water is a highly debated term within the text of the Clean Water Act; however, in Florida it is safe to assume that there is a requirement to file a Notice of Intent (NOI) for a Multi-Sector General NPDES permit.

A requirement of the NPDES permit is to have a Stormwater Pollution Prevention Plan (SWPPP). A SWPPP is applicable to the standard operations of an airport, as well as for individual construction projects. In addition, a Spill Prevention, Control, and Countermeasure (SPCC) plan may need to be included in the SWPPP. As opposed to a SWPPP, which is a tool used to prevent spills, a SPCC plan addresses what to do if a spill occurs.

While the requirement for an overall airport SWPPP can be accommodated by individual project permits, the development of such a plan is a proactive step for the City to consider. In addition to helping manage the activities of the various facilities at the airport, a SWPPP will also facilitate obtaining NPDES construction permits for future development projects. The SPCC plan is required if more than 1,320 gallons (cumulative for all airport facilities) or more of oil of any kind or in any form (including, but not limited to petroleum, fuel oil, sludge, and oil refuse) is stored above ground.

LAND ACQUISITION

Whenever possible, the option to acquire additional property for aviation related development and to ensure future land use compatibility must be considered by the City. Even though there are options to develop the current airport property, the potential for non-compatible development around the airport will always exist. In short, as development pressure builds in the areas surrounding the airport, the window of opportunity for the City to acquire any additional land at a reasonable cost diminishes. For these reasons, consideration must be given to the identification of a future property envelope that the airport should secure to address demand and development needs beyond the master planning horizon.

If possible, it is recommended that sufficient property interests be obtained for the RPZs of the airport. At a minimum, the City should obtain control of the property within all future RPZs as this is a specific requirement set forth in FAA AC 150/5300-13 Change 17. If the City cannot purchase the property within the areas of the RPZ, then land use controls should be implemented or agreements such as avigation easements obtained. The amount of land or options that should be considered will be addressed in the airport alternatives chapter.

SUMMARY OF FACILITY REQUIREMENTS

Table 3-10 provides a summary of the facility requirements that were determined necessary to satisfy the forecasts of aviation demand. Essentially, this table includes the minimum improvements required over the 20-year planning period. Some additional facilities will also be planned and included as part of the final ALP drawing set and Capital Improvement Program to enhance the airport. The order in which these improvements are listed does not have any relation to the priority or phasing of such projects.

Table 3-10. Summary of Facility Requirements

Runways
Extend Runway 06-24 at least 1,238 to 1,406 feet with LED MIRLs
Rehabilitate Existing Runway 06-24 Pavement Surface
Rehabilitate Runway 17-35 Pavement Surface
Periodic Runway Pavement Maintenance
Proper RSA/ROFA/OFZ Standards to Runway 06-24
Taxiways
Rehabilitate Taxiways and T-hangar Taxilanes
Relocate Non-Standard Taxiway D
Extend Parallel Taxiway to Runway 06-24 with LED MITLs
Parallel Taxiway to Runway 17-35 with LED MITLs
Taxiway/Taxilane Access to New Facilities
Aircraft Run-up Areas
Periodic Taxiway Pavement Maintenance
Airfield Environment
Environmental Assessment for Runway 06-24 Precision Approach
Conduct Vertically Guided Airport Airspace Analysis Survey
Periodic Clearing of Runway Obstructions
Install LED MIRL System on Runway 17-35
Periodic Remarking of All Airfield Pavements
MALSR for Precision Approach to Runway 06-24
Unidirectional REILs for both ends of Runway 17-35
PAPI 4-light Systems on both ends of Runway 06-24
NADIN Equipment for AWOS III
Illuminated Airfield Signage (as required)
Distance Remaining Signs on Runway 06-24
Ground Communications Outlet Equipment
Airport Facilities
Additional General Aviation Terminal Space (1,300 SF)
T-hangar Units (at least 6)
Clearspan Hangar Space (for at least 8 aircraft)
Rehabilitate General Aviation Terminal Aircraft Parking Apron
Rehabilitate East Aircraft Parking Apron
Additional Aircraft Parking Apron Space (21,780 SF)
Second Aviation Fuel Storage Area (100LL Avgas and Jet A)
Airfield Security Fencing (as required)
Other Facilities
Landside Access and Parking to East Aircraft Apron Area
Landside Access and Parking to New Development Areas
Parking for Hangars off North End of Runway 17-35
Extend City Utilities to Existing and Future Development Areas
Wildlife Hazard Site Visit and/or Assessment
Master Drainage Plan
Stormwater Pollution Prevention Plan (SWPPP)
Spill Prevention, Control, and Countermeasure Plan (SPCC)

Source: Hoyle, Tanner & Associates, Inc., 2012.

Airport Alternatives Analysis

INTRODUCTION

It is the primary objective of this chapter to outline a logical development plan for the Lake Wales Municipal Airport (X07) capable of meeting the Airport's needs over the planning period as well as satisfy the ultimate development goals of the City of Lake Wales. Through the alternatives analysis, an overall development plan can be identified which essentially provides a planning level framework to inform future airport development decisions. Further, while the facility requirements identified the optimum airport improvements that would be desired, it is the alternatives section that analyzes both the viability of meeting the identified need as well as how best to undertake the improvements from an operational, construction, and financial feasibility perspective.

It should be pointed out here that any development proposed evolves from an analysis of projected needs over a set timeframe. Even though the needs were determined by reliable methods, it cannot be assumed that future events will not change these needs. The Lake Wales Municipal Airport should be developed so that the facilities accommodate the demand identified and minimize any operational constraints.

Potential development alternatives have been created for the future improvements previously identified as necessary facility requirements, as well as those improvements identified as being of long-term strategic importance. Ultimately, the goal is to establish a preferred development plan for the Airport which ensures competitiveness and financial solvency for the Airport while providing the surrounding community with the greatest overall benefit.

Only those concepts considered in depth are presented in this chapter. The alternative concepts that required such analysis include:

- Airfield Development
  - Future Runway 06-24 Runway Extension
  - Precision Approach Capability
  - Future Taxiway Configuration
- Landside Development
  - On Airport Land Use Plan
  - Aeronautical Facilities
  - Non-Aeronautical Facilities

Key evaluation criteria varies based upon the concept being considered, but at a minimum each alternative includes safety and compliance with Federal Aviation Administration (FAA) and Florida Department of Transportation (FDOT) standards.

AIRFIELD DEVELOPMENT ALTERNATIVES

Airfield facilities are, by their very nature, the focal point of an airport complex. Because of their role, and the fact that they physically dominate a great deal of an airport's property, airfield facility needs are often the most critical factor in the determination of viable airport development alternatives. Specifically, the runway and taxiway systems of an airfield generally require the greatest commitment of land area and often have the greatest influence on the identification and development of other airport facilities.

The potential for physical expansion of an airport to accommodate airfield development is the primary factor that determines development in the long term. The runway and taxiway systems directly affect the efficiency of aircraft movements both on the ground and in the surrounding airspace – not only within the airfield's terminal area, but the regional airspace as well. The

runway and taxiway systems also impact the size and type of aircraft an airfield can regularly facilitate.

The following sections of this report outline a variety of development options when looking specifically at the airfield and its necessary facilities and spatial requirements to facilitate safe and efficient aircraft operations. Other landside development concepts will be presented and analyzed in subsequent sections of this report; building on the foundation created by selecting a preferred airfield alternative up front.

Extension of Runway 06-24

When the need for additional runway length was identified in the last master plan, three alternatives were evaluated. As recommended in the current facility requirements, each reflected the ultimate runway length of 5,400 feet. Critical to the evaluation of these options are the ability to provide the required Runway Safety Area (RSA), Runway Object Free Area (ROFA), and Runway Protection Zone (RPZ) criteria. Each of the Runway 06-24 extension alternatives included a future precision approach to Runway 06 and a straight-in non-precision approach to Runway 24.

An immediate impact to any runway extension to the northeast would be the impact to the known wetland areas located just east of the developed airfield. In addition, the current runway configuration is such that the required runway visibility zone would start to impact the new general aviation terminal building if the runway were extended too far to the northeast.

Ultimately the alternative to extend Runway 06-24 to the southwest was carried forth into the environmental review process and design phase. Unfortunately, the FDOT inspections verified after the design and bidding process that the full safety area on the Runway 24 end was not adequately provided. In fact, an additional 182 feet of RSA prior to the runway would be required to meet the proper design standards of 300 feet prior to the landing threshold and beyond a runway end. Should the future precision approach to Runway 06 obtain visibility minima below ¾-statute mile, the RSA required prior to and beyond each end of the Runway would increase to 600 feet. These issues create a problem given the known wetland areas found just east of the Runway 24 threshold. However, it has been determined that the existing design drawings, to ultimately extend Runway 06-24 to 5,400 feet in total length, could be modified do illustrate the implementation of a displaced threshold on Runway 24 and declaration of the available runway lengths for operations on both Runway 06 and Runway 24 which would ensure the required RSA is provided for operations on either runway.

Based on the prior planning and design efforts for the southwesterly extension of Runway 06-24 to 5,400 feet in total length, the availability and suitability of land, and the overall operational benefits, the extension of Runway 06-24 to the southwest is recognized as the preferred development option. However, as previously identified, the Airport should remained positioned for an even longer extension in the future should specific market demands be supportive of such an initiative.

Precision Approach Alternatives Analysis

The implementation of a precision instrument approach to a runway has significant spatial impacts with regards to developable land surrounding the runway system. The most restrictive of these impacts is the expansion of the Part 77 Primary Surface's width from 500 feet to 1,000 feet and the resultant relocation of the Part 77 Transitional Surface, which extends outwards and upwards from the edge of the primary surface at a slope of 7:1. In order to maintain the most sterile airspace environment around an airfield, future facilities must be planned to be located outside of the primary surface and under the limits of the transitional surface.

Currently the only published instrument procedures at the Airport are the two straight-in, non-precision approaches to each end of Runway 06-24. Should either end of Runway 06-24 acquire a precision instrument approach and the runway be required to adhere to the more stringent airspace protection requirements provided in CFR Part 77, approximately 50.5 currently developable acres surrounding the Runway would become part of the primary surface and subsequently be off limits the majority of development interest. **Figure 4-1** depicts the relationship between the primary surfaces required for both non-precision and precision instrument approaches to Runway 6-24 at X07. Given the Airport's existing land holdings however, and the desirability of a precision instrument approach to serve an increasing number of jet aircraft, a precision instrument approach to at least one end of Runway 06-24 should be established in the future.

To determine which runway end of Runway 6-24 to which to establish a precision instrument approach in the future, a variety of criteria must be reviewed. Initially, the wind environment of the airport is of concern as the precision approach should be located so as to maximize its utility in all weather conditions, especially inclement weather. Based on the wind data collected for this master planning effort, **Table 4-1** illustrates that Runway 24 is favored slightly more during all weather conditions and that the Runways likely experience similar levels of traffic during instrument flight rule (IFR) conditions.

The second consideration is the geographic location of the airfield – specifically, the proximity and alignment of Runway 06-24 with the downtown area of Lake Wales. Any approach to Runway 24 would bring aircraft directly over the most populated areas of the City and increase the potential for airspace obstructions and noise impacts to the community. An approach developed to Runway 06 however would ensure aircraft remain over largely unpopulated rural areas with limited airspace threats.

Table 4-1. Runway Usage

	All Weather Conditions	IFR Conditions
Runway 06	48%	50%
Runway 24	52%	50%

Source: National Climatic Data Center: Lakeland Linder Regional Airport – January 2000 to December 2009.

Lastly, ground maneuvering of aircraft should be considered when determining to which runway end a precision approach should be provided. Generally speaking, the runway end with the most sophisticated approach will experience the majority of operations as pilots often prefer to land on such runways when the airfields operational condition permits. Given the decision to extend Runway 06-24 to the southwest, a precision approach to Runway 06 would best serve landing aircraft by minimizing taxing times required to access the terminal apron areas upon arrival. A precision approach to Runway 24 would likely require the majority of aircraft to exit the Runway at a point past the FBO terminal area and then taxi back to gain access, thereby requiring more fuel burn my aircraft while on the ground.

Based on these conditions, Runway 6 is recognized as the preferred runway end for the future precision instrument approach to the Airport.

Taxiway System Alternatives

A number of sections in this report have addressed the need to ultimately construct at least one parallel taxiway to each runway. Currently there is enough space to construct parallel taxiways on either side of the two runway alignments. However, since each parallel taxiway is an expensive improvement to undertake, the criteria and development of any portion must be

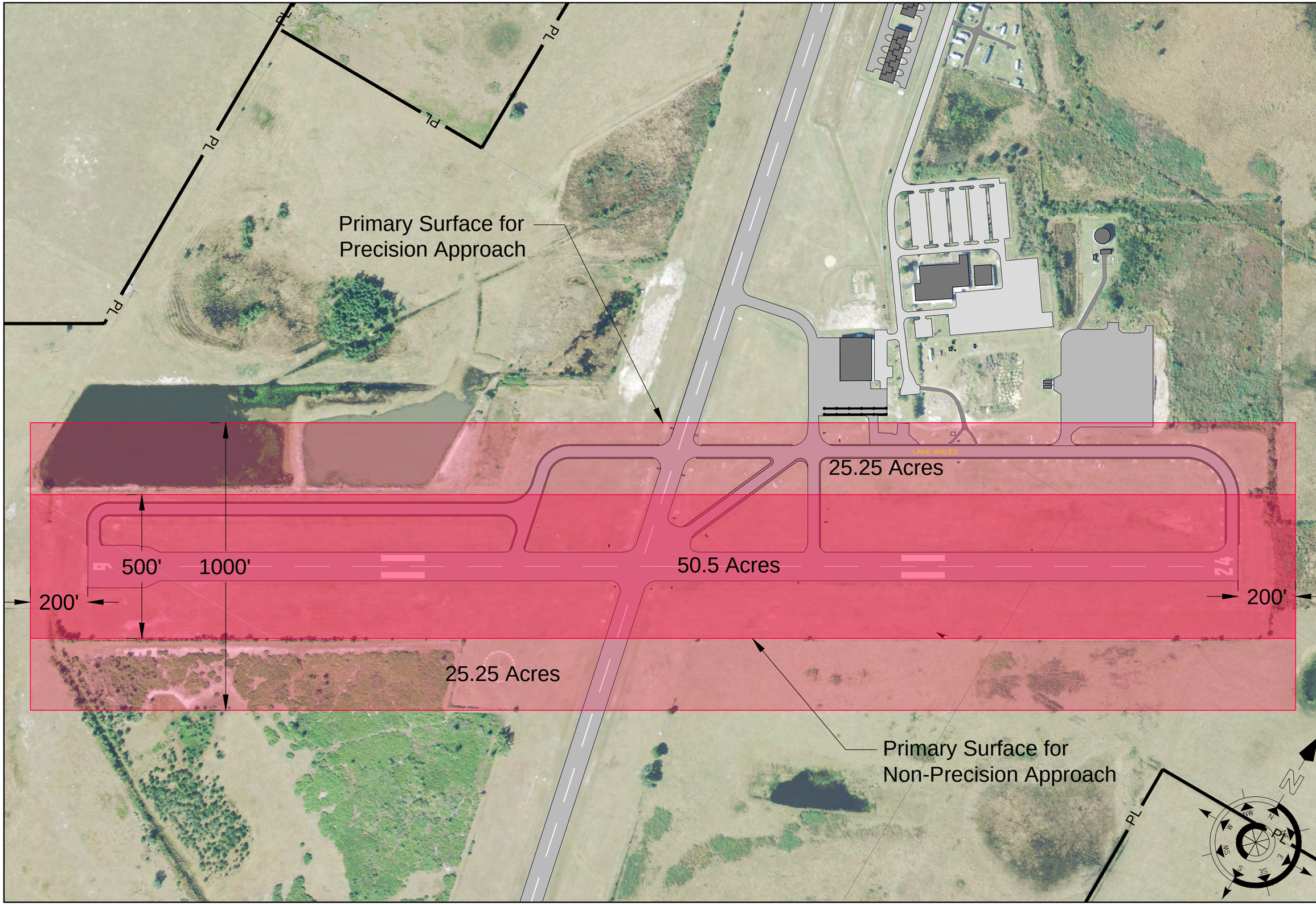

FIGURE 4-1

PRECISION APPROACH IMPACT TO RUNWAY 6-24 PRIMARY SURFACE

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evaluated and prioritized. The following sections describe multiple taxiway improvement alternatives available to the airport

Taxiway System Development – Alternative 1

Figure 4-2 depicts the first taxiway system development alternative for X07 and includes the removal of Taxiway D, extension of Taxiway A to the relocated Runway 06 end, and a new partial length parallel taxiway to the west of Runway 17-35 and north of Taxiway A. The removal of Taxiway D and extension of Taxiway A is required to meet runway separation standards defined by the FAA. The extended Taxiway A is shown to maintain a 400 foot centerline to centerline separation from Runway 06-24 so as to enable the development of a precision approach to Runway 06 with visibility minimums below ¾-statute mile. Taxiway A is planned to be 35 feet wide to support ADG-II aircraft. In this alternative, the new partial length parallel taxiway west of Runway 17-35 is intended to support ADG-I aircraft exclusively with a width of 25' and a separation from Runway 17-35, which caters to small aircraft less than 12,500 lbs., of only 150 feet.

This development option would improve ground maneuvering of aircraft on the airfield, better meet airport design standards, and make land with airfield access available for future development. However, this alternative would not permit ADG-II aircraft movements around the entire airfield, as some taxiway areas would be designed for smaller ADG-I aircraft exclusively.

Taxiway System Development – Alternative 2

Figure 4-3 depicts the second taxiway system development alternative for X07. This alternative includes the same removal of Taxiway D and extension of Taxiway A discussed in Alternative 1 above for the purpose of better supporting the future precision approach capabilities of Runway 06-24 and operations by ADG-II aircraft. In this alternative however, a new taxiway to improve access to Runway 17-35 is located on the east side of the Runway and connects the Runway 17 end to an expanded terminal apron and Taxiway A. This future taxiway is design to ADG-II standards to allow for operations by Group II aircraft. As such, the taxiway centerline is planned to be offset from the existing T-hangars found directly east of the Runway 17 end by 65.5 feet in accordance with ADG-II clearance standards resulting in a centerline separation from Runway 17-35 of 200 feet. The expansion to the terminal apron shown in this alternative represents an additional 54,500 square feet of apron pavement of which over 36,000 square feet would outside of the taxiway safety area and available for aircraft tie-down storage. This would serve to correct an existing operational safety issue which occurs when an aircraft is parked on the west side of the FBO building and within the existing Taxiway B object free area.

Taxiway System Development – Alternative 3

Figure 4-4 depicts the third taxiway system development alternative for X07. This alternative builds off of the proposed taxiway improvements presented in the previous alternatives. Specifically, this alternative includes the removal of Taxiway D and extension of Taxiway A as previously discussed, a full length parallel taxiway east of Runway 17-35, a partial length parallel taxiway west of Runway 17-35, and removal of Taxiway C. Under this alternative, all taxiways are designed for ADG-II aircraft with exception to the portion of Runway 17-35's full length parallel taxiway found south of Runway 06-24. While this southeastern quadrant of the airfield is not likely to be developed for aeronautical use during the planning period, a full length parallel taxiway to Runway 17-35 will improve the safety and operational efficiency of aircraft operations on that runway. The partial parallel taxiway located to the west of Runway 17-35 is planned to have a centerline separation from the Runway of 164.5 feet. This distance ensures

LEGEND

Proposed Taxiway

Proposed Demo

FIGURE 4-2

AIRFIELD DEVELOPMENT ALTERNATIVE #1

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LEGEND

Proposed Taxiway

Proposed Demo

N

FIGURE 4-3

AIRFIELD DEVELOPMENT ALTERNATIVE #2

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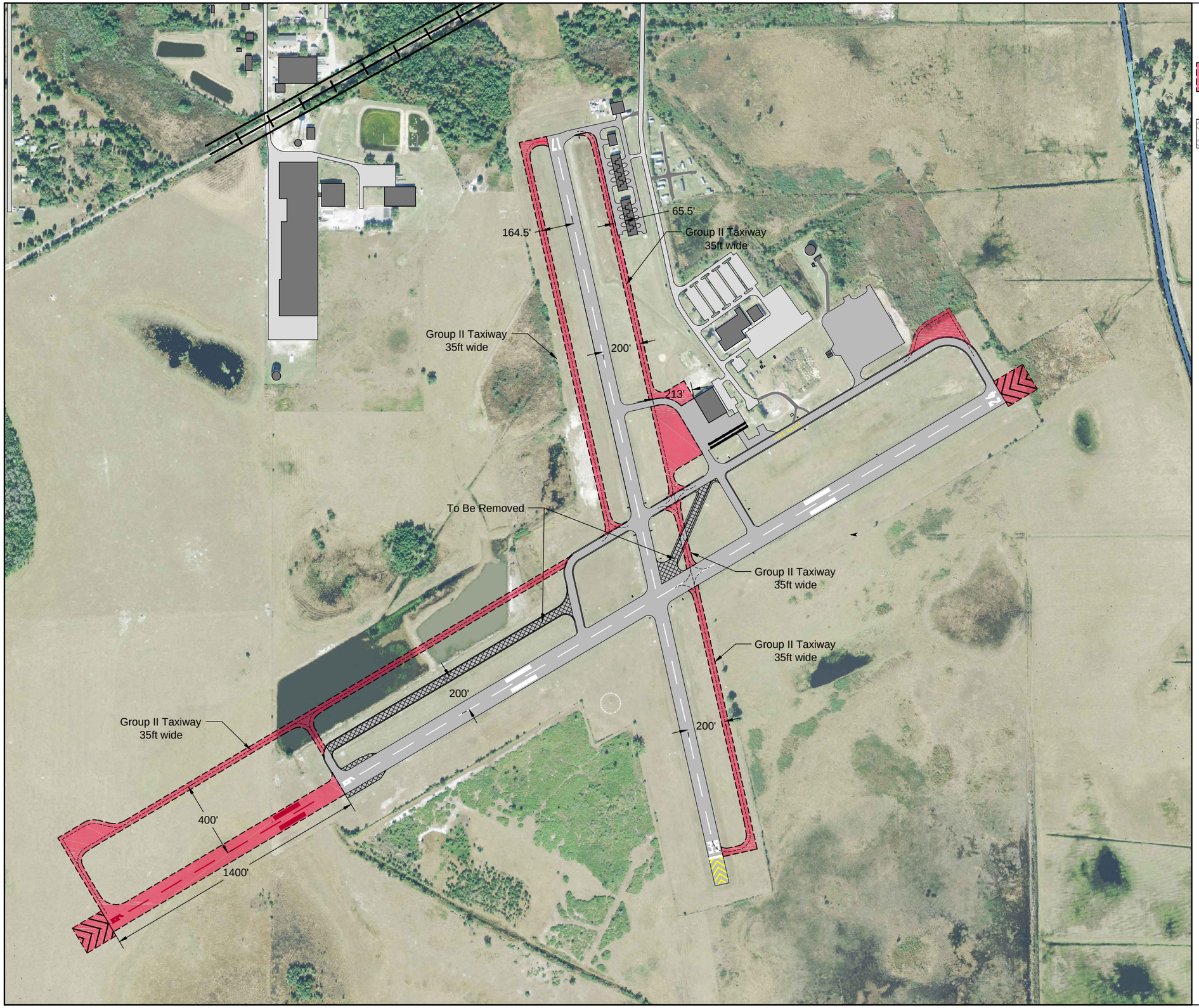

LEGEND

Proposed Taxiway

Proposed Demo

N

FIGURE 4-4

AIRFIELD DEVELOPMENT ALTERNATIVE #3

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LAKE WALES, FLORIDA

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that an ADG-II aircraft operating on the taxiway does not impact the obstacle free zone associated with Runway 17-35, while maximizing the developable landside areas.

Preferred Development Alternative for the Taxiway System

Taxiway system development alternative 3 was identified as the preferred development option for the airport. The improved operational efficiencies and developable landside areas inherent to this development alternative will best meet the Airport's infrastructure needs during the planning period as well as position the airport for economic success by maximizing the utility of airfield property and development opportunities. Furthermore, Alternative 3 can allow for phased development over time so as to meet the aeronautical and operational demands as they arise.

Table 4-2. Taxiway System Development Alternatives Summary

	Taxiway System Alternatives		
	1	2	3
Additional Taxiway/Apron Pavement (Sq. Yd.)	27,212	34,183	50,702
Airfield Pavement to be Removed (Sq. Yd.)	9,255	9,255	11,890
Compliant with FAA Design Standards	Yes	Yes	Yes
Permits ADG II Movement Around Developable Airfield	No	Yes	Yes
Maximizes Airfield Capacity	No	No	Yes

LANDSIDE DEVELOPMENT ALTERNATIVES

Considering the seemingly endless range of possibilities for land side development areas at Lake Wales Municipal Airport, broad alternatives were first developed in their long range configuration to a limited extent of detail, so as to gauge their overall feasibility and reasonableness. These were then narrowed to individual concepts according to their ability to meet the aeronautical needs of the Lake Wales Municipal Airport throughout the planning period, as well as position the Airport as a catalyst for economic development in the region, resulting in the following development alternatives. Once a preferred development option is identified, it will be refined and used as the basis for the Airport Layout Plan presented in subsequent chapters of this report.

Each development alternative presented in the following sections remains on existing airport property, and no recommendations for future property acquisition are made. Each development alternative depicts a mix of hangar spaces; including, T-Hangars, conventional hangars, executive hangars (conventional hangars with office space), and large corporate or multi-aircraft hangars. Such aviation related development is naturally provided for on lands immediately adjacent to existing or proposed taxiway infrastructure at the Airport and accessible via a public roadway network. However, not all of airport property meets these criteria. Specifically, portions of airport property found south of Runway 6-24 and east of South Airport Road are not ideally suited for aviation related development. Land south of Runway 6-24 is not easily accessible and has no public utilities in near proximity from which to extend to any new development. Coordination and discussion with City officials however indicated that a solar energy array may be a suitable use for these properties. As depicted in all airfield development alternatives, approximately 102.5 acres has been identified for this purpose. Development of a solar array to supplement the Airport's energy requirements could significantly reduce the overall cost to operate the facility and support a more solvent airport operation. Airport property

located east of South Airport Road is not contiguous with the airfield and therefore incapable of supporting aviation related development. Although, this land could be well suited for airport compatible commercial or industrial development which would not require any airfield access. Despite the low lying and potentially flood prone characteristics of this site, developed properties could be build up and stormwater managed effectively in this area.

It should be noted that any significant development at the Lake Wales Municipal Airport will likely require the expansion and extension of public utilities; to include at a minimum, electric power, water, and wastewater systems.

Landside Development – Alternative 1

Figure 4-5 presents the first landside development alternative for the Airport. This alternative provides for 40 T-hangar units (over 50,000 square feet), 30 conventional hangars intended for small aircraft (nearly 80,000 square feet), 26 executive hangars for small to midsize aircraft (over 150,000 square feet), four multi-aircraft hangars to support aviation businesses (over 40,000 square feet), and a future FBO expansion to support expanded operations by the FBO or to provide for a restaurant opportunity (over 8,000 square feet). In addition to the non-aeronautical land uses previously discussed, landside development alternative one also provides for 20 acres for commercial/industrial use just south of the old mattress factory.

Landside Development – Alternative 2

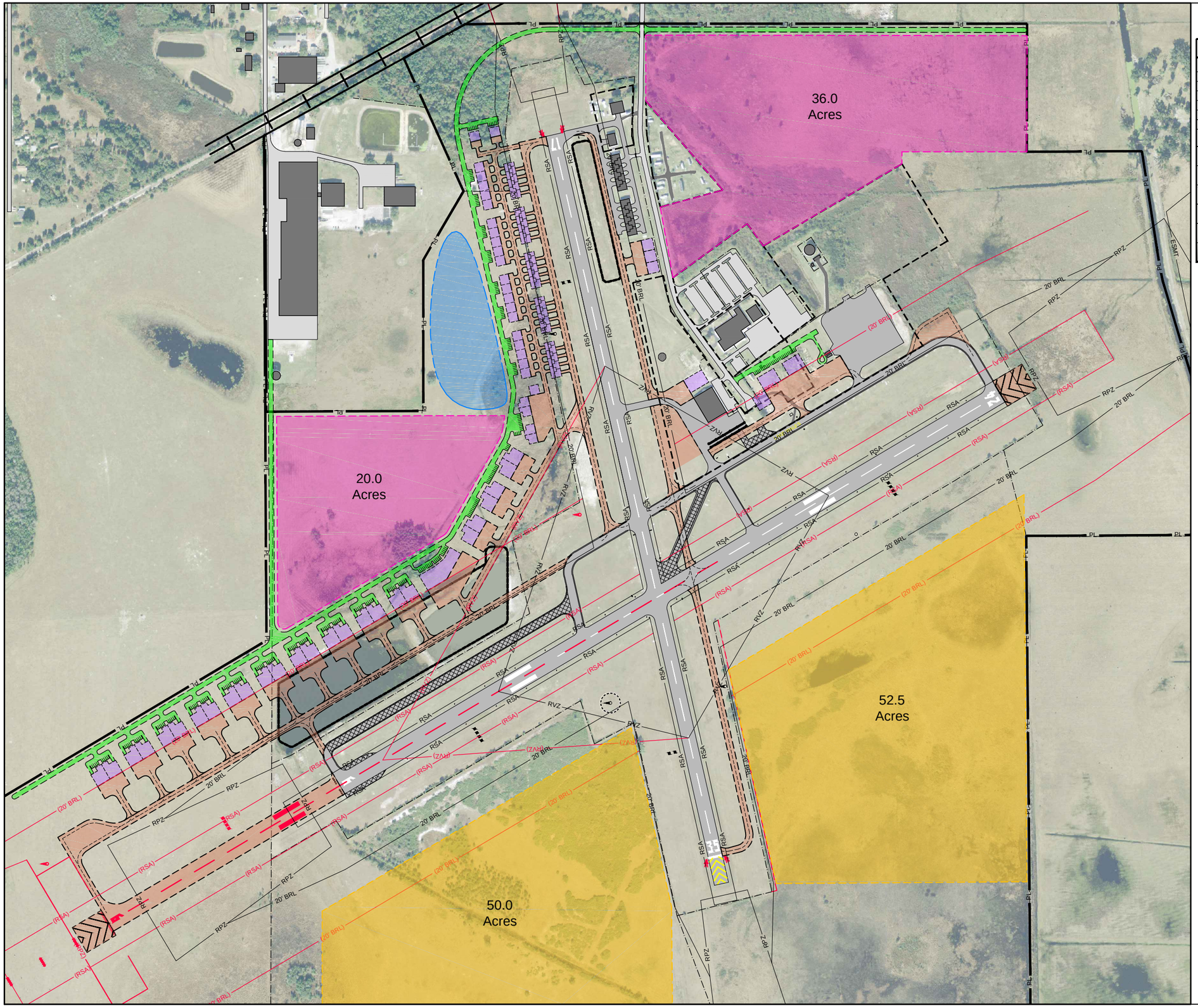
Figure 4-6 depicts the second landside development alternative for the Airport. Unlike alterative one discussed above, this alternative provides for no additional T-hangar units at the airport, but rather focuses on a robust conventional hangar park for small aircraft, executive hangar spaces, and significant space for aeronautical businesses such as aircraft maintenance repair and overhaul services (MRO), flight schools, aircraft sales, etc. Specifically this alternative shows 55 conventional hangars measuring 50-feet by 50-feet in size (137,500 square feet), three 60-foot by 60-foot hangars (10,800 square feet), 22 executive hangars (over 130,000 square feet), nearly 106,000 square feet of large multi-aircraft hangar space adjacent to expansive aircraft parking aprons, and a future FBO expansion building.

Landside Development – Alternative 3

Figure 4-7 depicts the third landside development alternative for the Airport. This alternative is strongly focused on providing T-hangar units and executive style hangars at the Airport. Specifically, this alternative allows for 80 individual T-Hangar (102,050 square feet) units accessible by both Groups I and II aircraft, and 36 executive hangars (214,200 square feet) primarily intended for Group II aircraft. Additionally, Alternative three depicts 17 small box hangars ranging in size from 50’x50’ to 60’x60’ totaling 49,700 square feet, and 5 large multi-unit hangars totaling (95,527 square feet).

Landside Development – Alternative 4

Figure 4-8 depicts the fourth landside development alternative for the Airport. This alternative blends elements of Alternative 1 and Alternative 2 to provide ample T-hangar and conventional hangar storage, while maximizing the opportunity for large multi-aircraft hangar and private apron spaces which may reasonably be required by aviation business that desire to locate to Lake Wales Municipal in the future.



LEGEND

EXISTING	PROPOSED	DESCRIPTION
PL	N/A	PROPERTY LINE
BRL	(BRL)	BUILDING RESTRICTION LINE
RVZ	(RVZ)	RUNWAY VISIBILITY ZONE
RSA	(RSA)	RUNWAY SAFETY AREA
RPZ	(RPZ)	RUNWAY OBJECT FREE ZONE
	N/A	LEASED PROPERTY
		PAVED AIRFIELD SURFACES
N/A		PAVEMENT TO BE REMOVED
		PUBLIC ROADS
		ON-AIRPORT BUILDINGS
N/A		COMMERCIAL/INDUSTRIAL DEVELOPMENT
N/A		RENEWABLE ENERGY DEVELOPMENT
N/A		PROPOSED STORMWATER FEATURE

FIGURE 4-5

LANDSIDE DEVELOPMENT ALTERNATIVE #1

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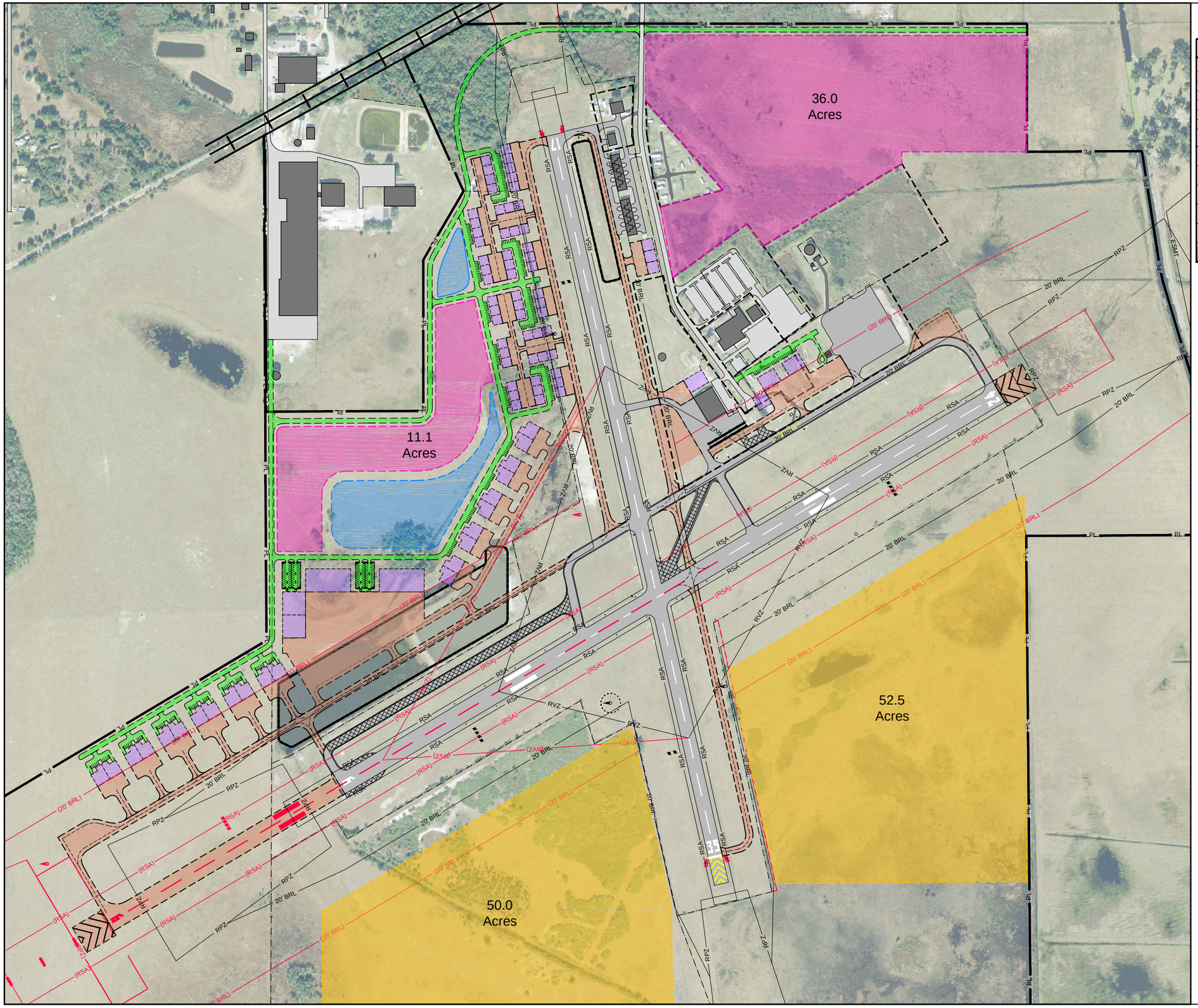

LEGEND

EXISTING	PROPOSED	DESCRIPTION
PL	N/A	PROPERTY LINE
BRL	(BRL)	BUILDING RESTRICTION LINE
RVZ	(RVZ)	RUNWAY VISIBILITY ZONE
RSA	(RSA)	RUNWAY SAFETY AREA
RPZ	(RPZ)	RUNWAY OBJECT FREE ZONE
	N/A	LEASED PROPERTY
		PAVED AIRFIELD SURFACES
N/A		PAVEMENT TO BE REMOVED
		PUBLIC ROADS
		ON-AIRPORT BUILDINGS
N/A		COMMERCIAL/INDUSTRIAL DEVELOPMENT
N/A		RENEWABLE ENERGY DEVELOPMENT
N/A		PROPOSED STORMWATER FEATURE

FIGURE 4-6

LANDSIDE DEVELOPMENT ALTERNATIVE #2

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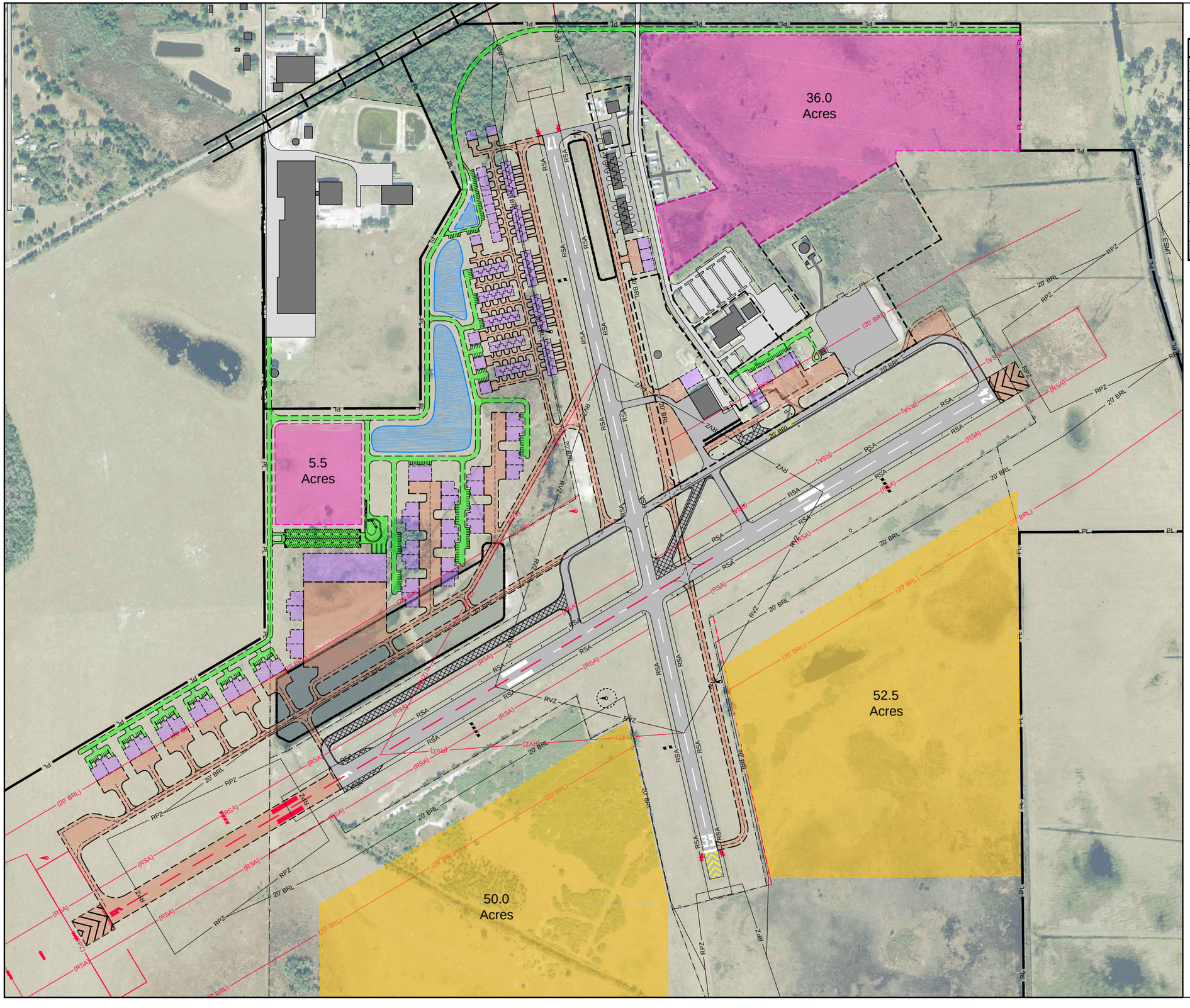

LEGEND

EXISTING	PROPOSED	DESCRIPTION
PL	N/A	PROPERTY LINE
BRL	(BRL)	BUILDING RESTRICTION LINE
RVZ	(RVZ)	RUNWAY VISIBILITY ZONE
RSA	(RSA)	RUNWAY SAFETY AREA
RPZ	(RPZ)	RUNWAY OBJECT FREE ZONE
	N/A	LEASED PROPERTY
		PAVED AIRFIELD SURFACES
N/A		PAVEMENT TO BE REMOVED
		PUBLIC ROADS
		ON-AIRPORT BUILDINGS
N/A		COMMERCIAL/INDUSTRIAL DEVELOPMENT
N/A		RENEWABLE ENERGY DEVELOPMENT
N/A		PROPOSED STORMWATER FEATURE

FIGURE 4-7

LANDSIDE DEVELOPMENT ALTERNATIVE #3

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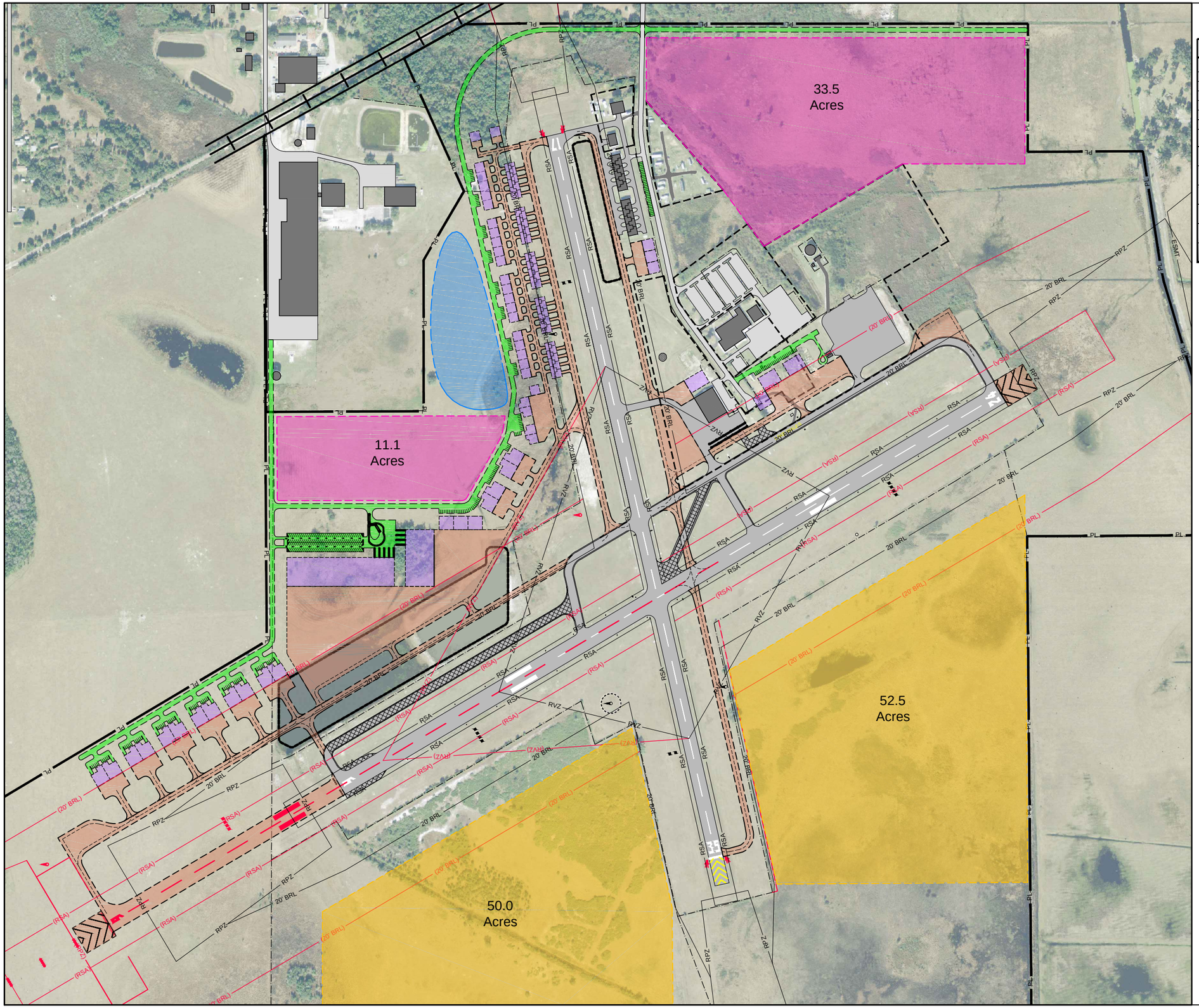

LEGEND

EXISTING	PROPOSED	DESCRIPTION
PL	N/A	PROPERTY LINE
BRL	(BRL)	BUILDING RESTRICTION LINE
RVZ	(RVZ)	RUNWAY VISIBILITY ZONE
RSA	(RSA)	RUNWAY SAFETY AREA
RPZ	(RPZ)	RUNWAY OBJECT FREE ZONE
	N/A	LEASED PROPERTY
		PAVED AIRFIELD SURFACES
N/A		PAVEMENT TO BE REMOVED
		PUBLIC ROADS
		ON-AIRPORT BUILDINGS
N/A		COMMERCIAL/INDUSTRIAL DEVELOPMENT
N/A		RENEWABLE ENERGY DEVELOPMENT
N/A		PROPOSED STORMWATER FEATURE

FIGURE 4-8

LANDSIDE DEVELOPMENT ALTERNATIVE #4

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Preferred Landside Development Alternative

Alternative 4 was selected as the preferred landside development option as it was determined to present the best overall mix of development opportunities for the Airport while remaining flexible and phaseable. **Table 4-3** presents a summary of landside development shown with each landside development alternative.

Table 4-3. Landside Development Alternatives Summary

	Landside Alternative			
	1	2	3	4
T-Hangar Units	40	Zero	80	40
- Square Footage	51,030	Zero	102,050	51,030
Small Box Hangars (50'x50' - 60'x60')	30	58	17	30
- Square Footage	79,277	148,300	49,700	79,277
Executive Hangars (75'x70' + Office)	26	22	36	16
- Square Footage	154,700	130,900	214,200	95,200
Large Box Hangars (> 60'x60")	3	7	5	8
- Square Footage	40,080	105,616	95,527	164,498
Additional Aircraft Pavement (Taxilane/Apron) (Sq. Yd.)	55,978	75,334	77,810	88,340
Additional Roadway (Sq. Yd.)	42,354	51,710	54,641	43,972
Hangar Square Feet per Roadway Linear Foot	7.68	7.44	8.45	8.87
Aviation Area Outparcel Development	20 Acres	11.1 Acres	5.5 Acres	11.1 Acres
Commercial/Industrial Development Area	36 Acres			
Renewable Energy Development Area	102.5 Acres			

Source: Hoyle, Tanner & Associates, Inc., 2012.

Airport Layout Plan Drawings

INTRODUCTION

This chapter describes the Airport Layout Plan (ALP) drawing set developed for the 20 year planning period of this master plan. These plans identify areas needed for aviation related development during and beyond the planning horizon, as well as the available land on the airport which should be reserved for future revenue streams resulting from non-aviation related development. The plan will also serve as a reference for the County to evaluate existing and/or future obstruction disposition in conjunction with Federal Aviation Administration (FAA) criteria. The ALP set presented becomes the official development plans for the Airport, which may be amended over time to reflect changes in the airfield environment or the demand affecting future facilities.

The ALP set consist of twelve (12) separate drawings which have been prepared on a computer assisted drafting system to graphically depict the recommended airfield improvements, imaginary surfaces, and the layout of future facilities. This ALP set is compliant with all pertinent criteria established by the FAA in Advisory Circular (AC) 150/5070-6B, *Airport Master Plans*¸ and AC 150/5300-13, *Airport Design*. Specifically, this drawing set includes:

- Cover Sheet
- Data Sheet
- Airport Layout Plan
- Terminal Area Plan 1
- Terminal Area Plan 2
- Runway 6 Inner Portion of the Approach Surface Drawing
- Runway 24 Inner Portion of the Approach Surface Drawing
- Runway 17-35 Inner Portion of the Approach Surface Drawing
- Future FAR Part 77 Airspace Surfaces 1
- Future FAR Part 77 Airspace Surfaces 2
- Extended Approach Surface Profiles
- Existing Land Use Map
- Property Map

This chapter presents a halfsize (11”x17”) version of the drawings with a brief discussion of each. A full-sized (22”x34”) ALP set is provided in conjunction with this report.

COVER SHEET

The Cover Sheet serves as an introduction to the ALP set. This sheet includes the name of the Airport, a location map, vicinity map, and an index of drawings included in the ALP set. Additionally this sheet identifies current City of Lake Wales commissioners by name and district.

DATA SHEET

The Data Sheet is typically included in an ALP set when adequate space is not available on the ALP sheet to include all the necessary tabular information about the Airport and its facilities, as was the case for this project. The Data Sheet includes a variety of information relative to the

Airport and its runways, taxiways, instrument approach capabilities, and operational conditions. The Data Sheet is presented in **Drawing 2**.

AIRPORT LAYOUT PLAN

The ALP is the primary planning document for the Airport and is a graphic representation, to scale, of existing and proposed Airport facilities, their location, dimensional and clearance data, and the overall infrastructure of the Airport including runways, taxiways, and aprons. This information is presented on **Drawing 3**. Once approved by the FAA and the FDOT, the ALP becomes the official guidance for the City of Lake Wales for how to manage the development of the Airport while meeting state and federal obligations, ensuring the economic goals of the City are realized, and providing the greatest possible public benefit. The FAA refers to the ALP when considering grant applications for development assistance at the Airport as well as when analyzing the aeronautical impacts from some off-airport development in the near vicinity of the Airport.

TERMINAL AREA PLANS

The Terminal Area Plan presents an enlarged area of the ALP and illustrates existing and proposed building and apron facilities in greater detail. The Terminal Area Plan generally seeks to present a detailed view of the terminal building, aircraft parking aprons, automobile parking areas, general aviation (GA) and corporate hangars, and non-aviation development areas. For Lake Wales Municipal's ALP, two separate Terminal Area Plans were developed to highlight future development across multiple areas of the airfield

Terminal Area Plan #1

The first Terminal Area Plan includes the portion of the airfield found north of Runway 6-24 and adjacent to the existing and extended Taxiway A. These areas include the current FBO terminal building and apron as well as the remote tie-down apron. The remainder of the property depicted in this Terminal Area Plan is currently undeveloped. Future development includes a mix of GA, corporate, and industrial aviation uses. The first terminal area plan for the Airport is presented in **Drawing 4**.

Terminal Area Plan #2

Terminal Area Plan number two includes airport property found on either side of Runway 17-35 and north of Runway 6-24. While some development currently exists on the east side of Runway 17-35, a considerable amount of land is available to the west of the Runway for future aviation related development. The majority of development depicted in this area is indicative of general aviation operations by smaller Group I aircraft, though some future hangars depicted would be suitable for Group II aircraft. The second terminal area plan for the Airport is shown in **Drawing 5**.

INNER PORTION OF THE APPROACH SURFACE DRAWINGS

The inner portion of the approach surface drawings display the existing and future approach surface configurations and their interaction with airport and off-airport environs. The extended runway centerline ground profiles and the critical point profiles are shown for terrain clearance purposes. Notable objects of height are identified in both the plan and profile views in each plan and are tabulated with object height and penetration information as well as future mitigation efforts if required. These drawings are supplemental to the Part 77 Airspace Surface drawings.

the plan and profile views for each runway end beginning 200' prior to a runway

Runway 6 Inner Portion of the Approach Surface Plan

The plan and profile views depicting the inner portion of the existing and future Runway 6 approach surfaces are found on **Drawing 6** of the ALP set. This drawing illustrates the planned extension of Runway 6-24 to the southwest by 1,401 feet and the relocation of the approach surface and threshold siting surface. These surfaces are also shown to become more shallow in the future as would be required for the establishment of a precision approach to the Runway 6 end. Analysis of the inner portion of the Runway 6 approach surface shows that the approach zone is free of obstructions in both the existing and future conditions.

Runway 24 Inner Portion of the Approach Surface Plan

The plan and profile views depicting the inner portion of the existing and future Runway 24 approach surfaces are shown on **Drawing 7**. Despite the overall development plan for the airport calling for the improvement of the runway safety area prior to the Runway 24 edge of pavement and threshold as a means to mitigate the currently substandard RSA dimensions at the Runway 24 approach end, the origination point of the approach surface and threshold siting surface remain unchanged. Only the Airport's security fence was identified as an obstruction to the inner portion of the Runway 24 approach. The fence, which demarcates the outer limit of the existing RSA, is shown to penetrate the future approach surface (AS) and threshold siting surface (TSS). As such, the fence should be relocated along with RSA improvement so as to ensure the area remains clear of obstructions and suitable for the occasional passage of aircraft.

Runway 17-35 Inner Portion of the Approach Surface Plan

The plan and profile views depicting the inner portion of the existing and future approach surfaces for Runway 17 and Runway 35 are depicted on **Drawing 8**. No critical obstructions were identified for these runway ends which would affect the existing airfield condition or future development plans.

FUTURE FAR PART 77 AIRSAPCE SURFACES

Federal Aviation Regulations (FAR) Part 77, *"Objects Affecting Navigable Airspace,"* prescribes airspace standards which establish criteria for evaluating navigable airspace. Airport imaginary surfaces are established relative to the Airport and its runways. The size of each imaginary surface is based on the runway category with respect to existing and proposed visual, non-precision, or prevision approaches for that runway. The space and dimensions of the respective approach surfaces are determined by the most demanding, existing or proposed, approach for each runway. The imaginary surfaces definitions include:

Primary Surface

The primary surface is a rectangular area symmetrically located about the runway centerline and extending a distance of 200 feet beyond each runway end. The elevation of the primary surface is the same elevation as the nearest point of the runway.

Horizontal Surface

The horizontal surface is an oval shaped area situated 150 feet above the published airport elevation. Its dimensions are determined by circles, either 5,000 feet or 10,000 feet in radius depending on the sophistication and utility of the runway, which are centered about the midpoint

of each end of the primary surface. These circles are then connected by lines of tangent to enclose the limits of the horizontal surface.

Conical Surface

The conical surface is a sloped area originating at the edge of the horizontal surface and extending outward and upward at a slope of 20:1 for a horizontal distance of 4,000 feet.

Transitional Surfaces

These surfaces extend outward and upward at right angles to the runway centerline and centerline extended at a slope of 7:1 from the sides of the primary surface as well as from the sides of the approach surface. Transitional surfaces for those portions of the prevision approach, which project through and beyond the limits of the conical surface, extend a distance of 5,000 feet measured horizontally from the edge of the approach surface at right angles to the Runway centerline.

Approach Surface

This surface begins at the ends of the primary surface and slopes upward at a predetermined ratio while at the same time flaring out horizontally. The width and elevation of the inner ends conform to that of the primary surface, while the slope, length, and outer width are determined by the runway service category and existing or proposed instrument approach capabilities.

The future Part 77 airspace plan is depicted on **Drawings 9** and **10** of the ALP set.

EXTENDED APPROACH ZONE PROFILES

Drawing 11 depicts the profile view of the future Part 77 approach surface as depicted on the Part 77 Airspace Surfaces drawings. While similar to the inner plan and profile view of the approach ends, this drawing illustrates the profile view of the approach surface along its entire length and at a larger scale. Roadways and other critical structures lying under the approach surface are identified; however, no obstructions were identified in the outer portions of the approaches to the Lake Wales Airfield.

EXISTING LAND USE MAP

The purpose of the existing land use plan is to identify the land uses currently surrounding the Airport so as to inform discussion about airport growth and development as well as the growth and development of properties surrounding the Airport. Additionally, a review of existing land uses surrounding the Airport enables the analysis of the Airport's land use compatibility. The majority of land surrounding the Lake Wales Municipal Airport is designated for either conservation or agricultural use, though some limited residential, commercial, and industrial uses do exist in the vicinity of the Airport. **Drawing 12** depicts the existing land use condition in the vicinity of the Airport.

PROPERTY MAP

The airport property map is intended to depict the areas of existing airport sponsor ownership and areas proposed for ownership or release. The map also shows easement, buildings, aprons, fences, roads, and other features of concern. Parcels are shown for depiction purposed only and this map is not intended to be used for survey or land acquisition purposes. Property information includes ownership, date of acquisition, and federal involvement if applicable. While no properties are identified for future acquisition by the Airport, three future aviation easements

are proposed. These easements are reflective of the portions of the Airport's runway protection zones falling outside of current airport property. **Drawing 13** depicts the existing property information for the Airport.

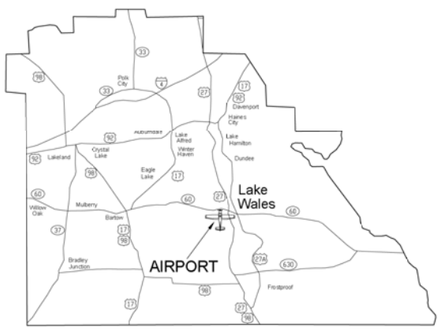
SUMMARY OF ADDITIONS TO THE ALP SET SINCE LAST UPDATED

Since the last ALP update a variety of development actions have been added to, or removed from, the current ALP set. These changes are itemized below.

- Relocated Runway 24 Threshold
- Removal of Taxiway C
- No longer showing southerly extension to Runway 17-35
- No longer showing land acquisition
- No longer showing secondary parallel taxiway south of Runway 6-24
- Now showing extensive aviation development in northwest quadrant of airfield.

LAKE WALES MUNICIPAL AIRPORT
LAKE WALES, FLORIDA

AIRPORT LAYOUT PLAN
DRAWING SET



Vicinity Map

Location Map

CITY COMMISSIONERS

Michael Carter - Mayor, Seat 3

Jonathan Thornhill - Seat 1

Terrye Howell - Seat 2

Betty Wojcik - Seat 4

Christopher Lutton - Seat 5

FAA AIP# 3-12-0040-014-2011

MARCH 2013

INDEX OF DRAWINGS

1	COVER SHEET
2	DATA PLAN
3	AIRPORT LAYOUT PLAN
4	TERMINAL AREA PLAN #1
5	TERMINAL AREA PLAN #2
6	RUNWAY 06 INNER PORTION OF THE APPROACH SURFACE PLAN
7	RUNWAY 24 INNER PORTION OF THE APPROACH SURFACE PLAN
8	RUNWAY 17-35 INNER PORTION OF THE APPROACH SURFACE PLAN
9	FUTURE FAR PART 77 AIRSPACE SURFACES #1
10	FUTURE FAR PART 77 AIRSPACE SURFACES #2
11	EXTENDED APPROACH ZONE PROFILES
12	LAND USE MAP
13	AIRPORT PROPERTY MAP

PLANS PREPARED BY:

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AIRPORT SPONSOR APPROVAL

THIS AIRPORT LAYOUT PLAN DRAWING SET IS APPROVED BY:

SIGNATURE_____ DATE_____

NAME:_____

TITLE:_____

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RUNWAY DATA

ITEM	RUNWAY 06/24				RUNWAY 17/35			
	EXISTING		PROPOSED		EXISTING		PROPOSED	
RUNWAY CATEGORY	GENERAL AVIATION		SAME		UTILITY		SAME	
RUNWAY DIMENSIONS (L x W)	3,999' x 100'		5,400' x 100'		3,859' x 75'		SAME	
TRUE BEARING	N 59° 18' 40.0635" E		SAME		N 12° 40' 56.2409" W		SAME	
EFFECTIVE GRADIENT (%)	0.11		0.07		0.05		SAME	
RUNWAY SAFETY AREA DIMENSIONS (WIDTH / LENGTH BEYOND RUNWAY END)	150' / 300'		300' / 600'		120' / 240'		SAME	
MAX RUNWAY ELEVATION (AMSL)	126.88'		SAME		126.36'		SAME	
PAVEMENT TYPE	ASPHALT		SAME		ASPHALT		SAME	
PAVEMENT STRENGTH (x 1,000 LBS.)	15.0 SINGLE WHEEL		50.0 SINGLE WHEEL		15.0 SINGLE WHEEL		SAME	
DESIGN AIRCRAFT	DEHAVILLAND DHC-6-300 TWIN OTTER		DASSAULT FALCON 900		BEECHCRAFT KING AIR B100		SAME	
RUNWAY LIGHTING	MIRL		SAME		NONE		MIRL	
RUNWAY MARKING	NON-PRECISION		PRECISION		VISUAL		SAME	
TAXIWAY LIGHTING	MITL		SAME		MITL		SAME	
RUNWAY DESIGN CODE (RDC)	A-II-4000		B-II-2400		A-I-Vis		SAME	
	RW 06	RW24	RW 06	RW 24	RW 17	RW 35	RW 17	RW 35
TYPES OF INSTRUMENT APPROACH	GPS (LP,LNAV), VOR	GPS (LP,LNAV), VOR	GPS (LPV, LP, LNAV), VOR	SAME	VOR	VOR	SAME	SAME
APPROACH VISIBILITY MINIMUMS	1 MILE	1 MILE	<3/4 MILE But >1/2 MILE	SAME	VISUAL	VISUAL	SAME	SAME
NAVIGATIONAL AIDS	GPS / VOR	GPS / VOR	SAME	SAME	VOR	VOR	SAME	SAME
VISUAL AIDS	PAPI	PAPI	PAPI / MALSR	PAPI / ODALS	PAPI	PAPI	SAME	SAME
FAR PART 77 APPROACH CATEGORY	NON-PRECISION	NON-PRECISION	PRECISION	SAME	VISUAL	VISUAL	SAME	SAME
APPROACH SLOPE	34:1	34:1	50:1	SAME	20:1	20:1	SAME	SAME
RUNWAY END COORDINATES LAT:	27° 53' 25.551" N	27° 53' 45.655" N	27° 53' 18.506" N	SAME	27° 53' 59.079" N	27° 53' 21.775" N	SAME	SAME
RUNWAY END COORDINATES LONG:	81° 37' 31.672" W	81° 36' 53.276" W	81° 37' 45.125" W	SAME	81° 37' 19.192" W	81° 37' 09.880" W	SAME	SAME
RUNWAY END ELVATION	125.95'	121.43'	123.64'	SAME	123.53'	122.40'	SAME	SAME
DISPLACED THRESHOLD COORDINATES LAT:	N/A	N/A	N/A	27° 53' 44.677" N	N/A	N/A	N/A	N/A
DISPLACED THRESHOLD COORDINATES LONG:	N/A	N/A	N/A	81° 36' 55.142" W	N/A	N/A	N/A	N/A
DISPLACED THRESHOLD ELEVATION	N/A	N/A	N/A	121.43'	N/A	N/A	N/A	N/A

AIRPORT DATA

DESCRIPTION		EXISTING	FUTURE
AIRPORT ELEVATION (AMSL)		127'	SAME
AIRPORT REFERENCE POINT	LAT.	27° 53' 37.700" N	27° 53' 35.559" W
	LONG.	81° 37' 13.400" W	81° 37' 17.257" W
MEAN MAXIMUM TEMPERATURE (HOTTEST MONTH)		93°	SAME
AIRPORT ROLE (NPIAS)		GENERAL AVIATION	SAME
LAND OWNED IN FEE		544.07 ACRES	SAME
EASEMENTS		14.5 ACRES	
MAGNETIC VARIATION		5.41° WEST	5' WEST / YR.

Existing On-Airport Facility Data

Bldg. ID	Description	Height
1	Corporate Hangar 1	20' ±
2	Corporate Hangar 2	17' ±
3	8-Unit T-Hangar	16' ±
4	8-unit T-Hangar	16' ±
5	General Aviation Terminal	25' ±
6	Florida Army National Guard	26' ±
7	Water Storage Tank Associated with Non-Potable Well	30' ±
8	Airport Self-Service Fuel Tanks	10' ±

Future Facility Data

Bldg. ID	Description	Height
A	50' x 50' General Aviation Hangar	20' ±
B	8-Unit T-Hangar with Jet Pods	15' ±
C	50' x 55' General Aviation Hangar	20' ±
D	60' x 60' General Aviation Hangar	20' ±
E	Twin 50' x 45' Executive Hangar + Office	20' ±
F	Twin 75' x 70' Executive Hangar + Office	20' ±
G	75' x 75' General Aviation Hangar	20' ±
H	Commercial/Industrial Aviation Hangar	20' ±
I	100' x 75' General Avaition Hangar	20' ±
J	Restaurant	20' ±

EXISTING DECLARED DISTANCES

	RUNWAY 06	RUNWAY 24	RUNWAY 17	RUNWAY 36
TAKE-OFF RUNWAY AVAILABLE (TORA)	3,999'	3,999'	3,859'	3,859'
TAKE-OFF DISTANCE AVAILABLE (TODA)	3,999'	3,999'	3,859'	3,859'
ACCELERATED STOP DISTANCE AVAILABLE (ASDA)	3,999'	3,999'	3,859'	3,859'
LANDING DISTANCE AVAILABLE (LDA)	3,999'	3,999'	3,859'	3,859'

Note: No declared distances are published currently.

PROPOSED DECLARED DISTANCES

	RUNWAY 06	RUNWAY 24	RUNWAY 17	RUNWAY 36
TAKE-OFF RUNWAY AVAILABLE (TORA)	5,400'	5,400'	3,859'	3,859'
TAKE-OFF DISTANCE AVAILABLE (TODA)	5,400'	5,400'	3,859'	3,859'
ACCELERATED STOP DISTANCE AVAILABLE (ASDA)	5,400'	5,400'	3,859'	3,859'
LANDING DISTANCE AVAILABLE (LDA)	5,400'	5,400'	3,859'	3,859'

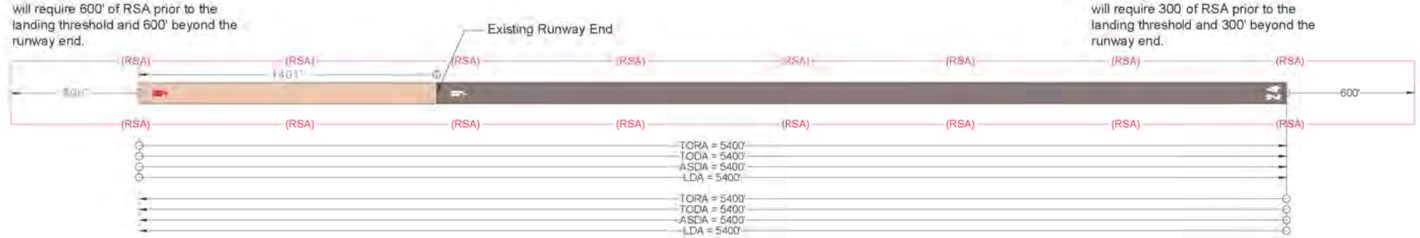
ABBREVIATIONS

AGL	Above Ground Level
AS	Approach Surface
AWOS	Automated Weather Observing System
BRL	Building Restriction Line
CONC	Concrete
DWL	Dual Wheel Loading
EL	Elevation
EX	Existing
FE	Future Easement
FUT	Future
GA	General Aviation
GPS	Global Positioning System
LAT	Latitude
MALSR	Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights
MIRL	Medium Intinsity Runway Lights
MITL	Medium Intensity Taxiway Lights
NPIAS	National Plan of Integrated Airport Systems
ODALS	Omnidirectional Approach Path Indicators
OFA	Object Free Area
OFZ	Obsacle Free Zone
PAPI	Precision Approach Path Indicator
PREC	Precision
PT	Point
RPZ	Runway Protection Zone
RSA	Runway Safety Area
RW	Runway
SF	Square Feet
SUP	Supplemental
SWL	Single Wheel Loading
T/W	Taxiway
TBD	To Be Determined
TDZE	Touchdown Zone Elevation
TN	True North
TSA	Taxiway Safety Area
TSS	Threshold Siting Surface

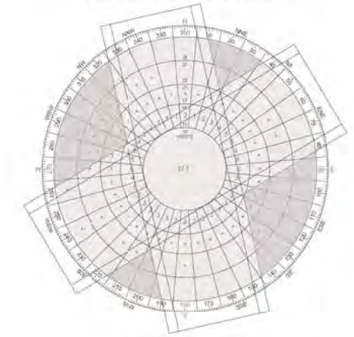
Future Declared Distances Graphic

NOTE:
Future operations on Runway 6 will require 600' of RSA prior to the landing threshold and 600' beyond the runway end.

NOTE:
Future operations on Runway 24 will require 300 of RSA prior to the landing threshold and 300' beyond the runway end.



ALL WEATHER WIND ROSE

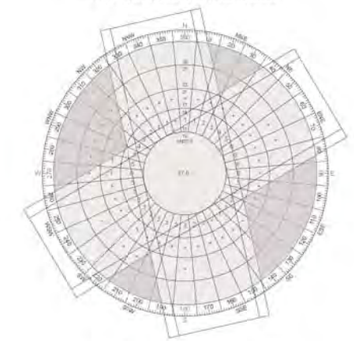


ALL WIND DATA SUMMARY

Crosswind Component Knots (MPH)	Runway 06-24	Runway 17-35	Combined Coverage
10.5 (12)	98.18%	92.34%	99.18%
13 (15)	99.44%	99.31%	99.44%

Station: Lakeland, Florida # 72211
Source: National Climatic Data Center (NOAA)
Period of Observations: 2000 - 2009

VFR WEATHER WIND ROSE

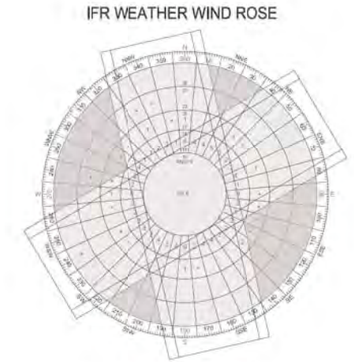


VFR WIND DATA SUMMARY

Crosswind Component Knots (MPH)	Runway 06-24	Runway 17-35	Combined Coverage
10.5 (12)	99.19%	92.73%	99.19%
13 (15)	99.62%	99.79%	99.98%

Station: Lakeland, Florida # 72211
Source: National Climatic Data Center (NOAA)
Period of Observations: 2000 - 2009

IFR WEATHER WIND ROSE



IFR WIND DATA SUMMARY

Crosswind Component Knots (MPH)	Runway 06-24	Runway 17-35	Combined Coverage
10.5 (12)	98.18%	95.50%	99.17%
13 (15)	97.43%	97.51%	99.98%

Station: Lakeland, Florida # 72211
Source: National Climatic Data Center (NOAA)
Period of Observations: 2000 - 2009

REV	DESCRIPTION	DR. BY	CHKD. BY	APPD. BY	DATE

PROJECT NO. 855714

FAA AIP# 3-12-0040-014-2011

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DES. BY ZEN | DR. BY ZEN | CHKD. BY WJM

DATE: MARCH 2013

SCALE: N/A

LAKE WALES MUNICIPAL AIRPORT
LAKE WALES, FLORIDA

AIRPORT LAYOUT PLAN
DATA SHEET

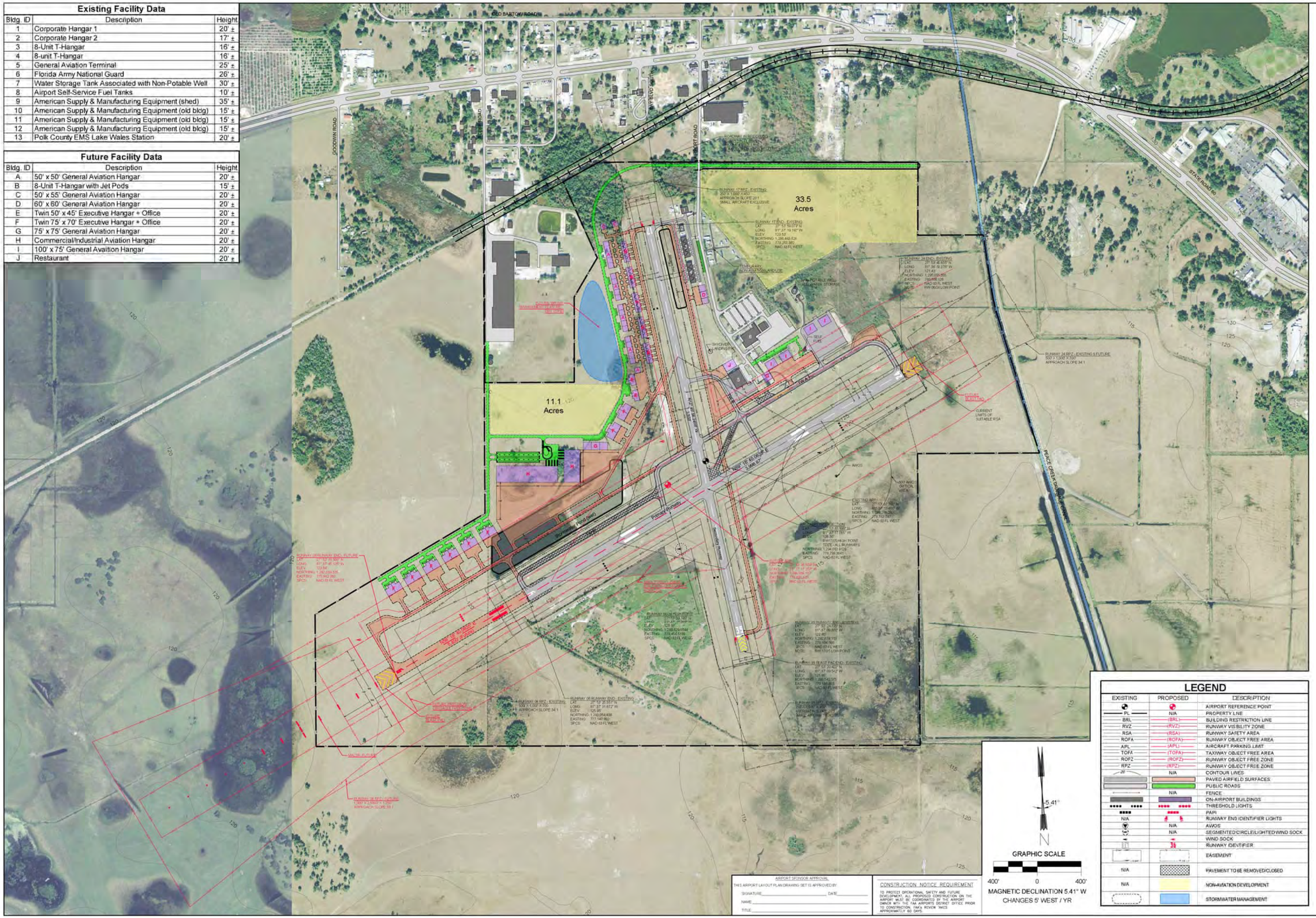
DRAWING
2

Existing Facility Data

Bldg. ID	Description	Height
1	Corporate Hangar 1	20' ±
2	Corporate Hangar 2	17' ±
3	8-Unit T-Hangar	16' ±
4	8-unit T-Hangar	16' ±
5	General Aviation Terminal	25' ±
6	Florida Army National Guard	26' ±
7	Water Storage Tank Associated with Non-Potable Well	30' ±
8	Airport Self-Service Fuel Tanks	10' ±
9	American Supply & Manufacturing Equipment (shed)	35' ±
10	American Supply & Manufacturing Equipment (old bldg)	15' ±
11	American Supply & Manufacturing Equipment (old bldg)	15' ±
12	American Supply & Manufacturing Equipment (old bldg)	15' ±
13	Polk County EMS Lake Wales Station	20' ±

Future Facility Data

Bldg. ID	Description	Height
A	50' x 50' General Aviation Hangar	20' ±
B	8-Unit T-Hangar with Jet Pods	15' ±
C	50' x 55' General Aviation Hangar	20' ±
D	60' x 60' General Aviation Hangar	20' ±
E	Twin 50' x 45' Executive Hangar + Office	20' ±
F	Twin 75' x 70' Executive Hangar + Office	20' ±
G	75' x 75' General Aviation Hangar	20' ±
H	Commercial/Industrial Aviation Hangar	20' ±
I	100' x 75' General Avaition Hangar	20' ±
J	Restaurant	20' ±



LEGEND

EXISTING	PROPOSED	DESCRIPTION
		AIRPORT REFERENCE POINT
PL	N/A	PROPERTY LINE
BRL	(BRL)	BUILDING RESTRICTION LINE
RVZ	(RVZ)	RUNWAY VISIBILITY ZONE
RSA	(RSA)	RUNWAY SAFETY AREA
ROFA	(ROFA)	RUNWAY OBJECT FREE AREA
APL	(APL)	AIRCRAFT PARKING LIMIT
TOFA	(TOFA)	TAXIWAY OBJECT FREE AREA
ROFZ	(ROFZ)	RUNWAY OBJECT FREE ZONE
RPZ	(RPZ)	RUNWAY OBJECT FREE ZONE
20	N/A	CONTOUR LINES
		PAVED AIRFIELD SURFACES
		PUBLIC ROADS
	N/A	FENCE
		ON-AIRPORT BUILDINGS
		THRESHOLD LIGHTS
		PAPI
N/A		RUNWAY END IDENTIFIER LIGHTS
	N/A	AWOS
	N/A	SEGMENTED CIRCLE/LIGHTED WIND SOCK
		WIND SOCK
	36	RUNWAY IDENTIFIER
		EASEMENT
N/A		PAVEMENT TO BE REMOVED/CLOSED
N/A		NON-AVIATION DEVELOPMENT
		STORMWATER MANAGEMENT

AIRPORT SPONSOR APPROVAL

THIS AIRPORT LAYOUT PLAN DRAWING SET IS APPROVED BY:

SIGNATURE_____ DATE_____

NAME_____

TITLE_____

CONSTRUCTION NOTICE REQUIREMENT

TO PROTECT OPERATIONAL SAFETY AND FUTURE DEVELOPMENT, ALL PROPOSED CONSTRUCTION ON THE AIRPORT MUST BE COORDINATED BY THE AIRPORT OWNER WITH THE FAA AIRPORTS DISTRICT OFFICE PRIOR TO CONSTRUCTION. FAA'S REVIEW TAKES APPROXIMATELY 60 DAYS.

REV	DESCRIPTION	DR. BY	CHKD. BY	APPD. BY	DATE

PROJECT NO. 855714

FAA AIP# 3-12-0040-014-2011

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DES. BY ZEN | DR. BY ZEN | CHKD. BY WJM

SCALE: 1" = 400' | DATE: MARCH 2013

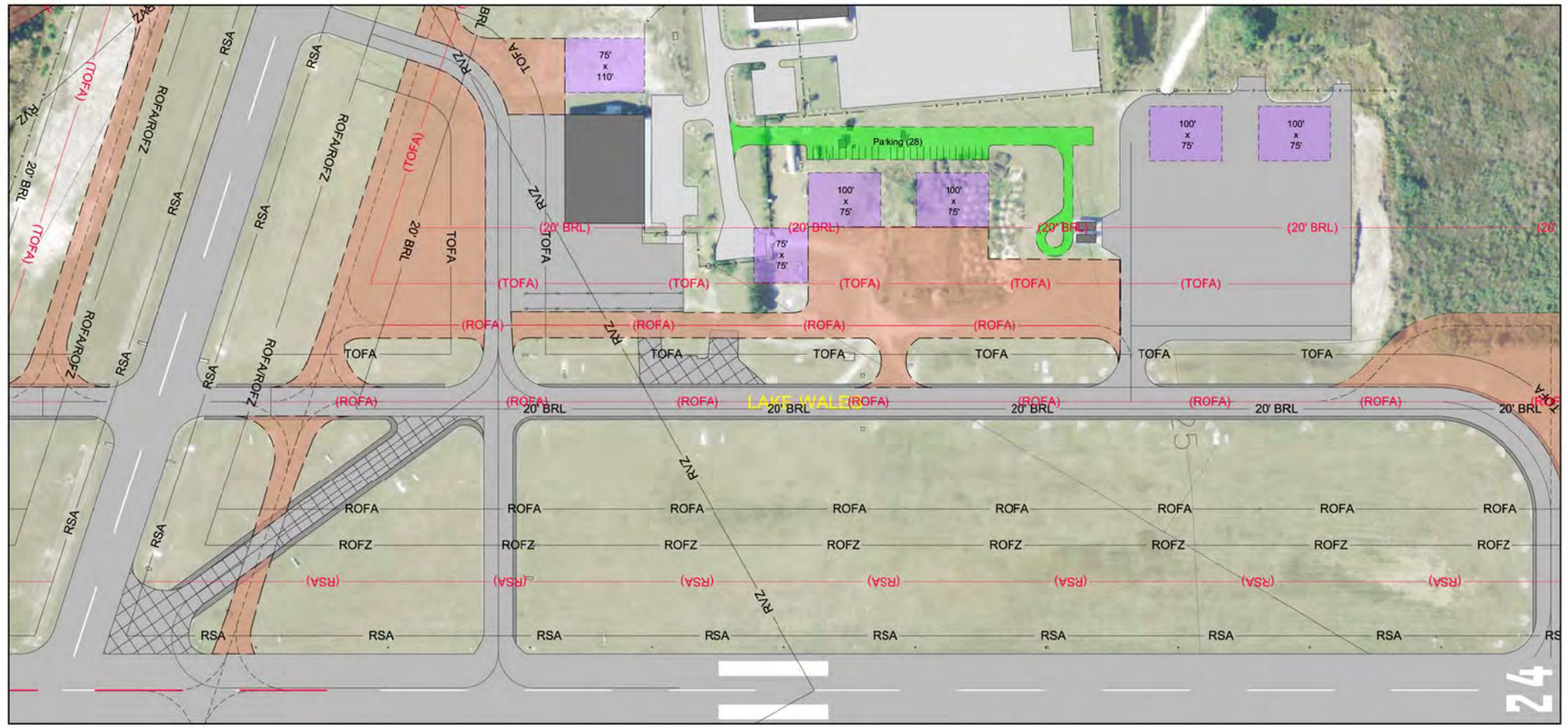
LAKE WALES MUNICIPAL AIRPORT
LAKE WALES, FLORIDA

AIRPORT LAYOUT PLAN

DRAWING 3

LEGEND

EXISTING	PROPOSED	DESCRIPTION
		AIRPORT REFERENCE POINT
PL	N/A	PROPERTY LINE
BRL	(BRL)	BUILDING RESTRICTION LINE
RVZ	(RVZ)	RUNWAY VISIBILITY ZONE
RSA	(RSA)	RUNWAY SAFETY AREA
ROFA	(ROFA)	RUNWAY OBJECT FREE AREA
APL	(APL)	AIRCRAFT PARKING LIMIT
TOFA	(TOFA)	TAXIWAY OBJECT FREE AREA
ROFZ	(ROFZ)	RUNWAY OBJECT FREE ZONE
RPZ	(RPZ)	RUNWAY OBJECT FREE ZONE
20	N/A	CONTOUR LINES
		PAVED AIRFIELD SURFACES
		PUBLIC ROADS
	N/A	FENCE
		ON-AIRPORT BUILDINGS
		THRESHOLD LIGHTS
		PAPI
N/A		RUNWAY END IDENTIFIER LIGHTS
	N/A	AWOS
	N/A	SEGMENTED CIRCLE/LIGHTED WIND SOCK
		WIND SOCK
	36	RUNWAY IDENTIFIER
		EASEMENT
N/A		PAVEMENT TO BE REMOVED/CLOSED
N/A		NON-AVIATION DEVELOPMENT
		STORMWATER MANAGEMENT



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DES. BY ZEN | DR. BY ZEN | CHKD. BY WJM

DATE: MARCH 2013

SCALE: 1" = 100'

LAKE WALES MUNICIPAL AIRPORT
LAKE WALES, FLORIDA

TERMINAL AREA PLAN #1

DRAWING

4

REV	DESCRIPTION	DR. BY	CHKD. BY	APPD. BY	DATE

PROJECT NO. 855714

FAA AIP# 3-12-0040-014-2011

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web: www.hoyletanner.com

CHKD. BY WJM

DR. BY ZEN

DES. BY ZEN

SCALE: 1" = 100'

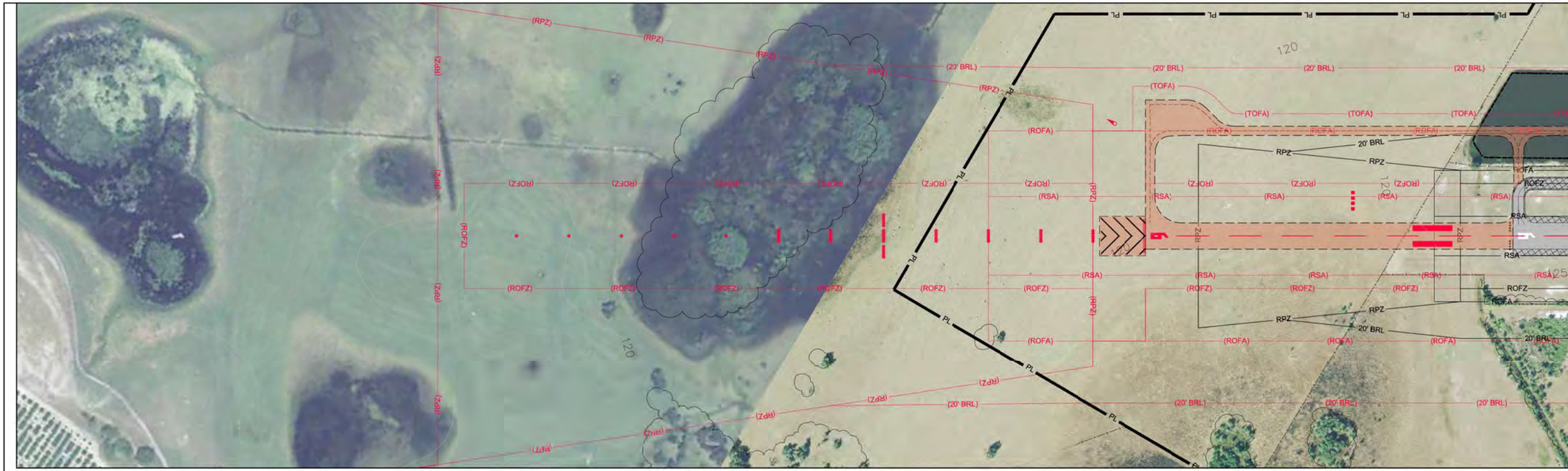
DATE: MARCH 2013

LAKE WALES MUNICIPAL AIRPORT
LAKE WALES, FLORIDA

TERMINAL AREA PLAN #2

DRAWING 5

SHEET 4 OF 13

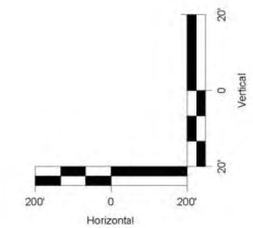


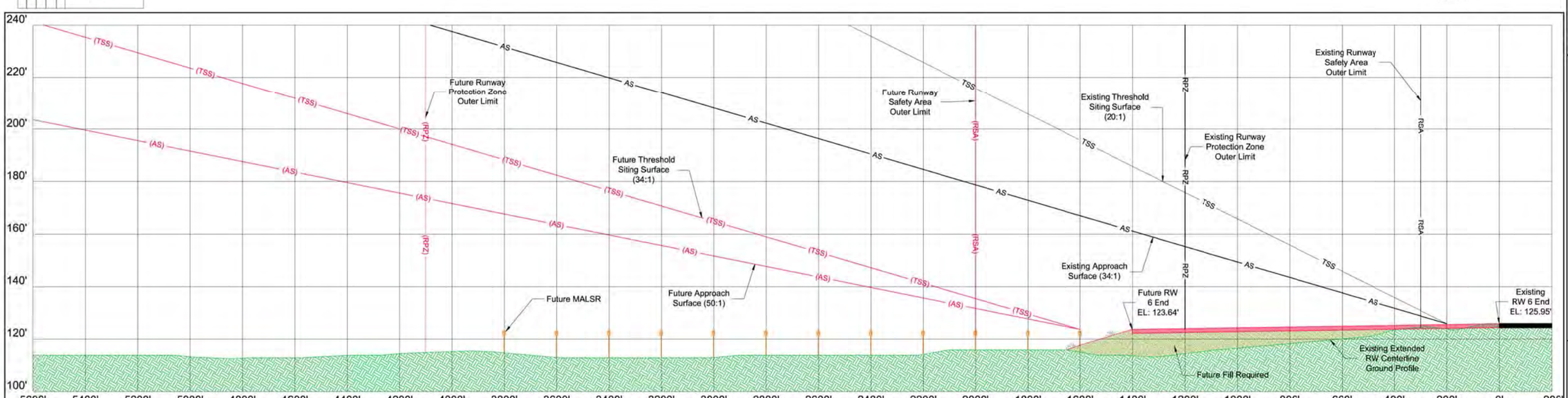
RUNWAY 6 PLAN VIEW

LEGEND

- ROADWAYS
- RAILROAD
- BUILDINGS
- TRESS
- FENCES

NO IDENTIFIED OBSTRUCTIONS





RUNWAY 6 PROFILE VIEW

REV	DESCRIPTION	DR. BY	CHKD. BY	APPD. BY	DATE

PROJECT NO. 855714

FAA AIP# 3-12-0040-014-2011

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DES. BY ZEN | DR. BY ZEN | CHKD. BY WJM

DATE: MARCH 2013

SCALE: 1" = 200'

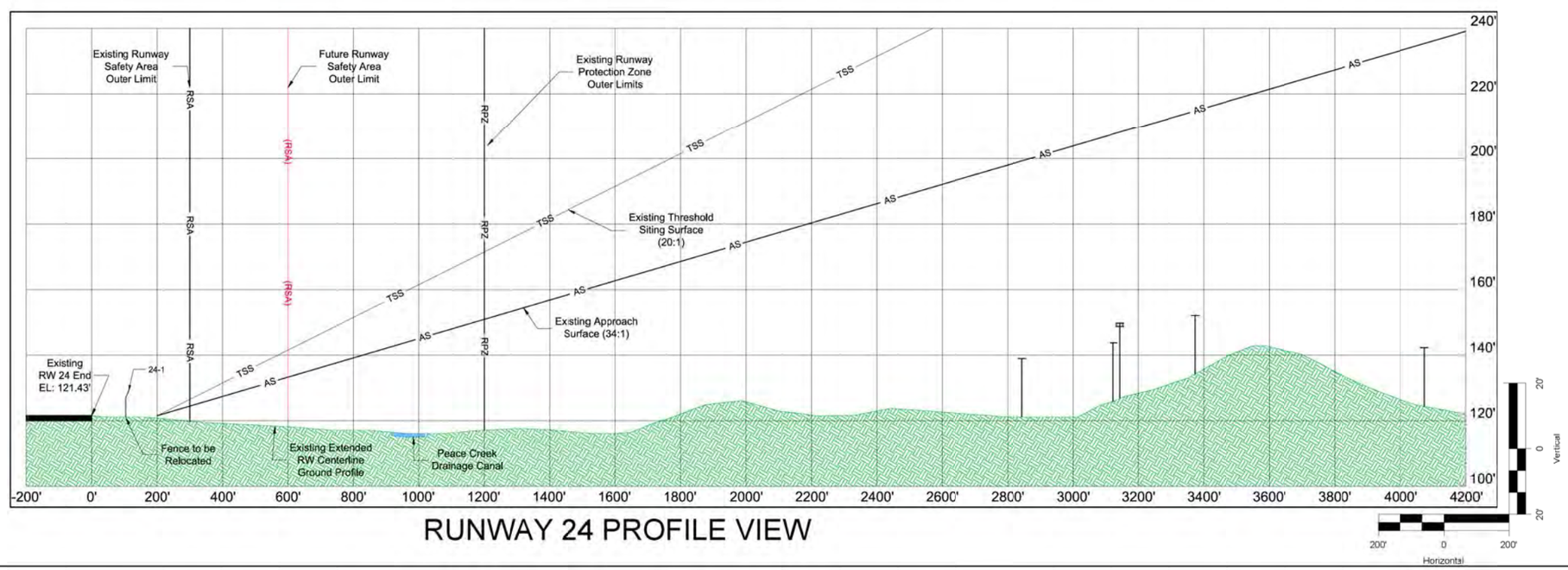
LAKE WALES MUNICIPAL AIRPORT
LAKE WALES, FLORIDA

INNER PORTION OF THE APPROACH PLAN AND PROFILE - RW 6

DRAWING 6

RUNWAY 24 PLAN VIEW

RUNWAY 24 OBSTRUCTION TABLE					
KEY	DESCRIPTION	ELEVATION (AMSL)	PART 77 APPROACH SURFACE ELEVATION (AMSL)	APPROACH SURFACE PENETRATION (FT)	DISPOSITION
24-1	FENCE	129.43	121.43	8.00	RELOCATE



RUNWAY 24 PROFILE VIEW

LEGEND

- ROADWAYS
- RAILROAD
- BUILDINGS
- TRESS
- FENCES

REV	DESCRIPTION	DR BY	CHKD BY	APPD BY	DATE

PROJECT NO. 855714

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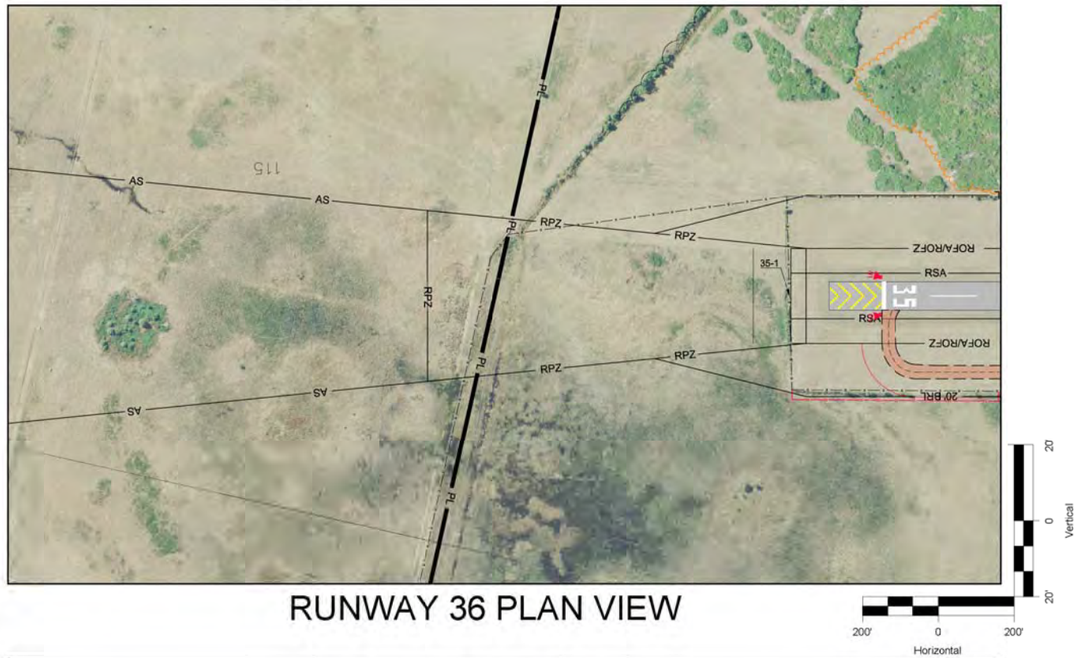
DATE: MARCH 2013

SCALE: 1" = 200'

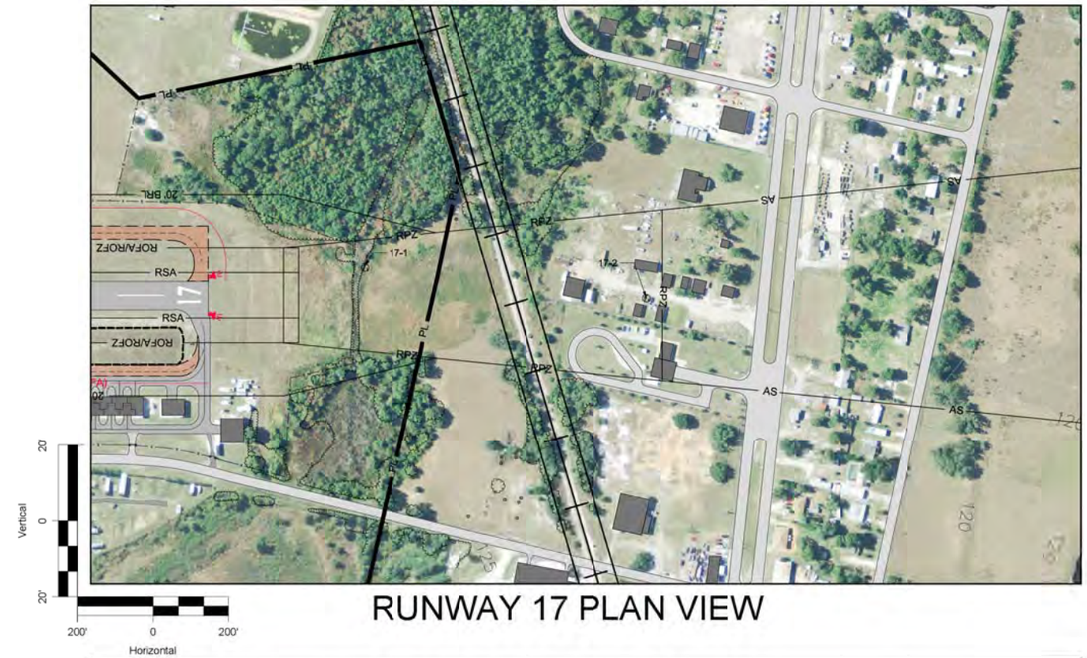
LAKE WALES MUNICIPAL AIRPORT
LAKE WALES, FLORIDA

INNER PORTION OF THE APPROACH PLAN AND PROFILE - RW 24

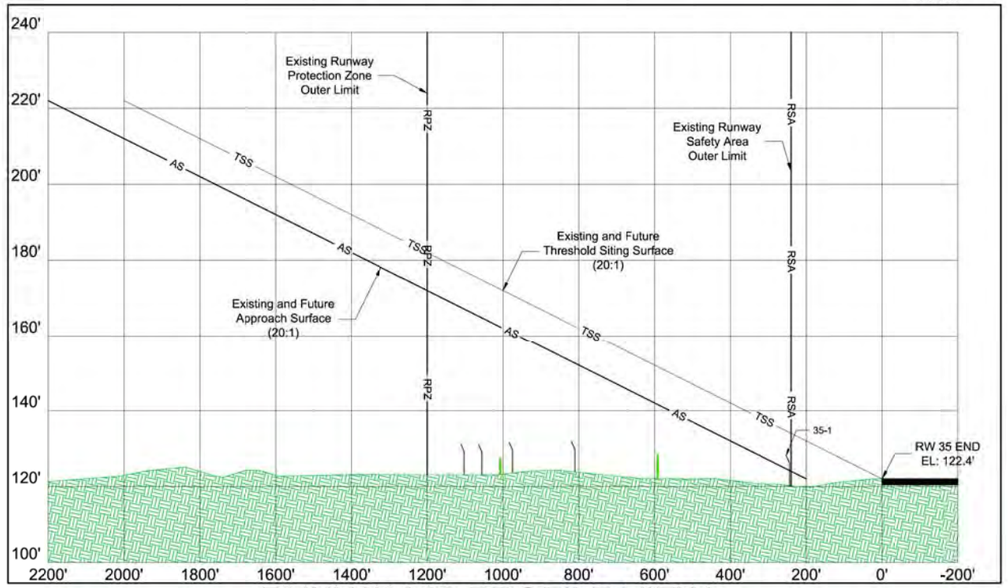
DRAWING 7



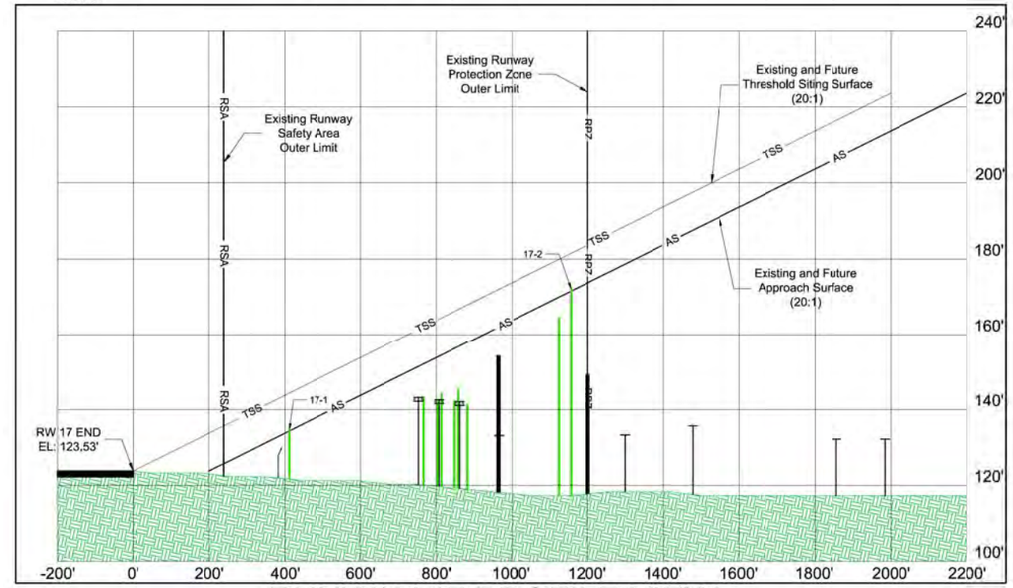
RUNWAY 36 PLAN VIEW



RUNWAY 17 PLAN VIEW



RUNWAY 36 PROFILE VIEW



RUNWAY 17 PROFILE VIEW

RUNWAY 35 OBSTRUCTION TABLE					
KEY	DESCRIPTION	ELEVATION (AMSL)	PART 77 APPROACH SURFACE ELEVATION (AMSL)	APPROACH SURFACE PENETRATION (FT)	DISPOSITION
35-1	FENCE	126.4	122.4	4.00	APPLY TSS

RUNWAY 17 OBSTRUCTION TABLE					
KEY	DESCRIPTION	ELEVATION (AMSL)	PART 77 APPROACH SURFACE ELEVATION (AMSL)	APPROACH SURFACE PENETRATION (FT)	DISPOSITION
17-1	TREE	134.5	130.70	3.80	REMOVE/TOP TREE
17-2	TREE	172	151.29	20.71	APPLY TSS

LEGEND

- ROADWAYS
- RAILROAD
- BUILDINGS
- TRESS
- FENCES

REV	DESCRIPTION	DR. BY	CHKD. BY	APPD. BY	DATE

PROJECT NO. 855714

FAA AIP# 3-12-0040-014-2011

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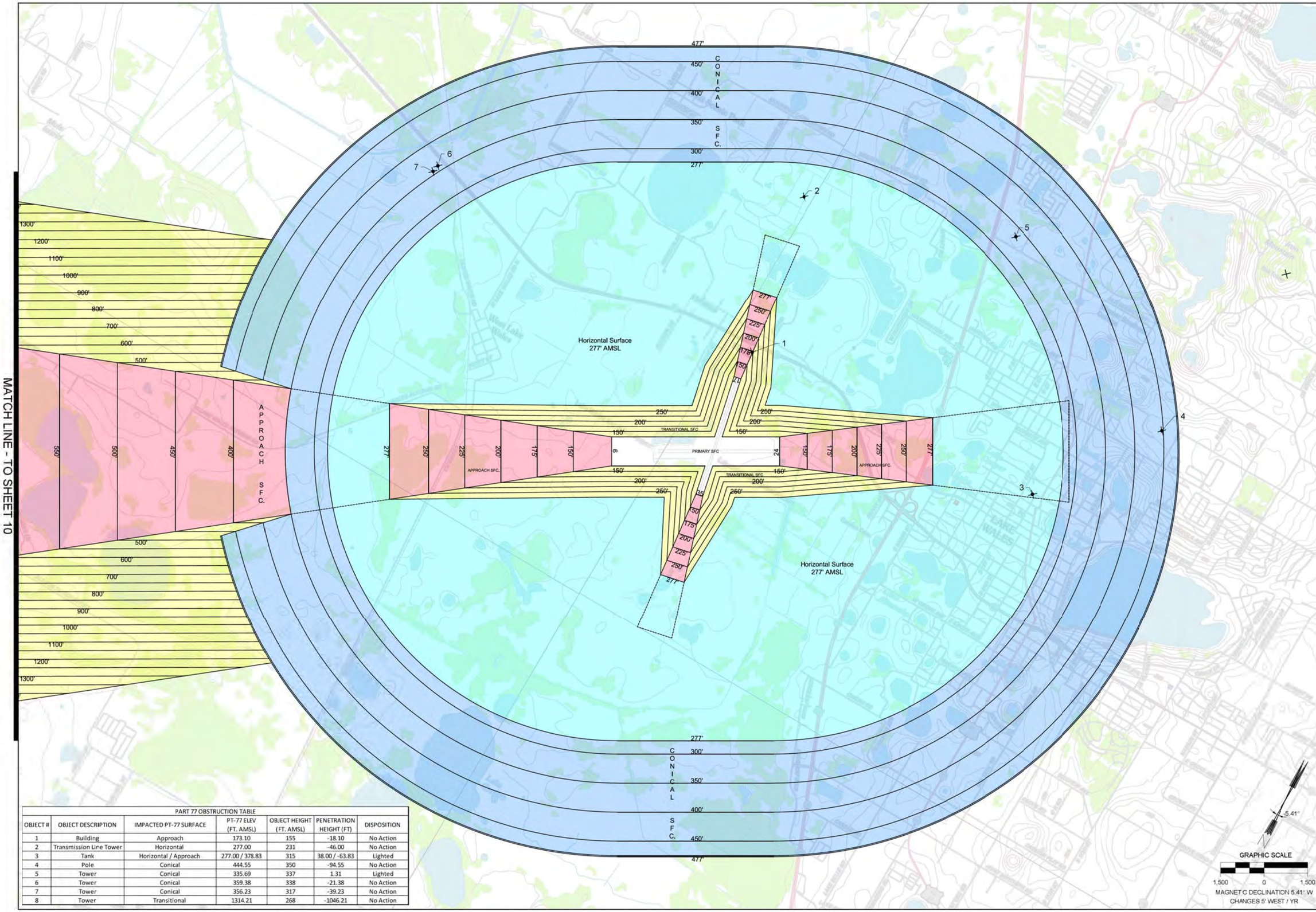
DATE: MARCH 2013

SCALE: 1" = 200'

LAKE WALES MUNICIPAL AIRPORT
LAKE WALES, FLORIDA

INNER PORTION OF THE APPROACH PLAN AND PROFILE - RW 17/35

DRAWING 8



PART 77 OBSTRUCTION TABLE						
OBJECT #	OBJECT DESCRIPTION	IMPACTED PT-77 SURFACE	PT-77 ELEV (FT. AMSL)	OBJECT HEIGHT (FT. AMSL)	PENETRATION HEIGHT (FT)	DISPOSITION
1	Building	Approach	173.10	155	-18.10	No Action
2	Transmission Line Tower	Horizontal	277.00	231	-46.00	No Action
3	Tank	Horizontal / Approach	277.00 / 378.83	315	38.00 / -63.83	Lighted
4	Pole	Conical	444.55	350	-94.55	No Action
5	Tower	Conical	335.69	337	1.31	Lighted
6	Tower	Conical	359.38	338	-21.38	No Action
7	Tower	Conical	356.23	317	-39.23	No Action
8	Tower	Transitional	1314.21	268	-1046.21	No Action

REV	DESCRIPTION	DR BY	CHKD BY	APPD BY	DATE

PROJECT NO. 855714

FAA AIP# 3-12-0040-014-2011

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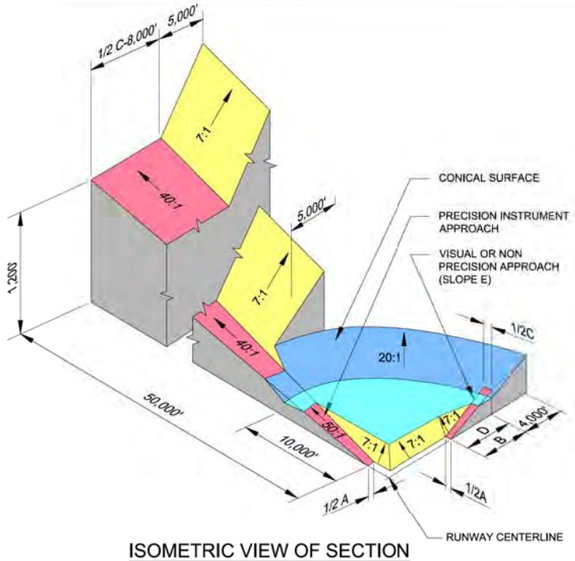
DATE: MARCH 2013

SCALE: 1" = 1500'

LAKE WALES MUNICIPAL AIRPORT
LAKE WALES, FLORIDA

PART 77 AIRSPACE #1

DRAWING 9



ISOMETRIC VIEW OF SECTION

DIM	ITEM	DIMENSIONAL STANDARDS (FEET)					
		VISUAL RUNWAY		NON-PRECISION INSTRUMENT RUNWAY			PRECISION INSTRUMENT RUNWAY
		A	B	A	B: C	B: D	
A	WIDTH OF PRIMARY SURFACE AND APPROACH SURFACE WIDTH AT INNER END	250	500	500	500	1,000	1,000
B	RADIUS OF HORIZONTAL SURFACE	5,000	5,000	5,000	10,000	10,000	10,000
		VISUAL RUNWAY		NON-PRECISION INSTRUMENT RUNWAY			PRECISION INSTRUMENT RUNWAY
		A	B	A	B: C	B: D	
C	APPROACH SURFACE WIDTH AT END	1,250	1,500	2,000	3,500	4,000	16,000
D	APPROACH SURFACE LENGTH	5,000	5,000	5,000	10,000	10,000	*
E	APPROACH SLOPE	20:1	20:1	20:1	34:1	34:1	*

A - UTILITY RUNWAYS
B - RUNWAYS LARGER THAN UTILITY
C - VISIBILITY MINIMUMS GREATER THAN 3/4 MILES
D - VISIBILITY MINIMUMS AS LOW AS 3/4 MILE
E - PRECISION INSTRUMENT APPROACH SLOPE IS 50:1 FOR INNER 10,000 FEET AND 40:1 FOR AN ADDITIONAL 40,000 FEET

FEDERAL AVIATION REGULATIONS PART 77, STATES THAT A STRUCTURE IS PRESUMED TO HAVE A SUBSTANTIAL ADVERSE EFFECT UPON THE SAFE AND EFFICIENT USE OF NAVIGABLE AIRSPACE IF ITS HEIGHT EXCEEDS THE FOLLOWING STANDARDS:

1. A HEIGHT OF FIVE HUNDRED (500) FEET ABOVE GROUND LEVEL AT THE SITE OF THE OBJECT ANYWHERE IN THE STATE.
2. A HEIGHT THAT IS TWO HUNDRED (200) FEET ABOVE GROUND LEVEL OR ABOVE THE ESTABLISHED AIRPORT ELEVATION, WHICHEVER IS HIGHER, WITHIN THREE (3) NAUTICAL MILES OF THE ESTABLISHED REFERENCED POINT OF A PUBLIC-USE AIRPORT, EXCLUDING HELIPORTS, AND THE HEIGHT INCREASES IN THE PROPORTION OF ONE HUNDRED (100) FEET FOR EACH ADDITIONAL NAUTICAL MILE OF DISTANCE FROM THE AIRPORT UP TO A MAXIMUM OF FIVE HUNDRED (500) FEET.
3. A HEIGHT WITHIN A TERMINAL OBSTACLE CLEARANCE AREA, INCLUDING AN INITIAL APPROACH SEGMENT, A DEPARTURE AREA, AND A CIRCLING APPROACH AREA, AS DEFINED BY FEDERAL LAWS AND REGULATIONS, WHICH WOULD RESULT IN THE VERTICAL DISTANCE BETWEEN ANY POINT ON THE OBJECT AND AN ESTABLISHED MINIMUM INSTRUMENT FLIGHT ALTITUDE WITHIN THAT AREA OR SEGMENT TO BE LESS THAN THE REQUIRED OBSTACLE CLEARANCE.
4. A HEIGHT WITHIN AN EN ROUTE OBSTACLE CLEARANCE AREA, AS DEFINED BY FEDERAL LAWS AND REGULATIONS, INCLUDING TURN AND TERMINATION AREAS, OF A FEDERAL AIRWAY OR APPROVED OFF-AIRWAY ROUTE, THAT WOULD INCREASE THE MINIMUM OBSTACLE CLEARANCE ALTITUDE.
5. THE SURFACE OF A TAKEOFF AND LANDING AREA OF A PUBLIC-USE AIRPORT OR ANY IMAGINARY SURFACE AS ESTABLISHED BY FAR PART 77. HOWEVER, NO PART OF THE TAKEOFF OR LANDING AREA ITSELF WILL BE CONSIDERED TO BE AN OBSTRUCTION.

NOTE: FAR PART 77 IMAGINARY SURFACES ARE AS SHOWN ON THIS SHEET LAKE WALES MUNICIPAL AIRPORT. THESE SURFACES ARE DEPICTED BASED UPON EXISTING AND ULTIMATE AIRPORT DEVELOPMENT.

PART 77 OBSTRUCTION TABLE

OBJECT #	OBJECT DESCRIPTION	IMPACTED PT-77 SURFACE	PT-77 ELEV (FT. AMSL)	OBJECT HEIGHT (FT. AMSL)	PENETRATION HEIGHT (FT)	DISPOSITION
1	Building	Approach	173.10	155	-18.10	No Action
2	Transmission Line Tower	Horizontal	277.00	231	-46.00	No Action
3	Tank	Horizontal / Approach	277.00 / 378.83	315	38.00 / -63.83	Lighted
4	Pole	Conical	444.55	350	-94.55	No Action
5	Tower	Conical	335.69	337	1.31	Lighted
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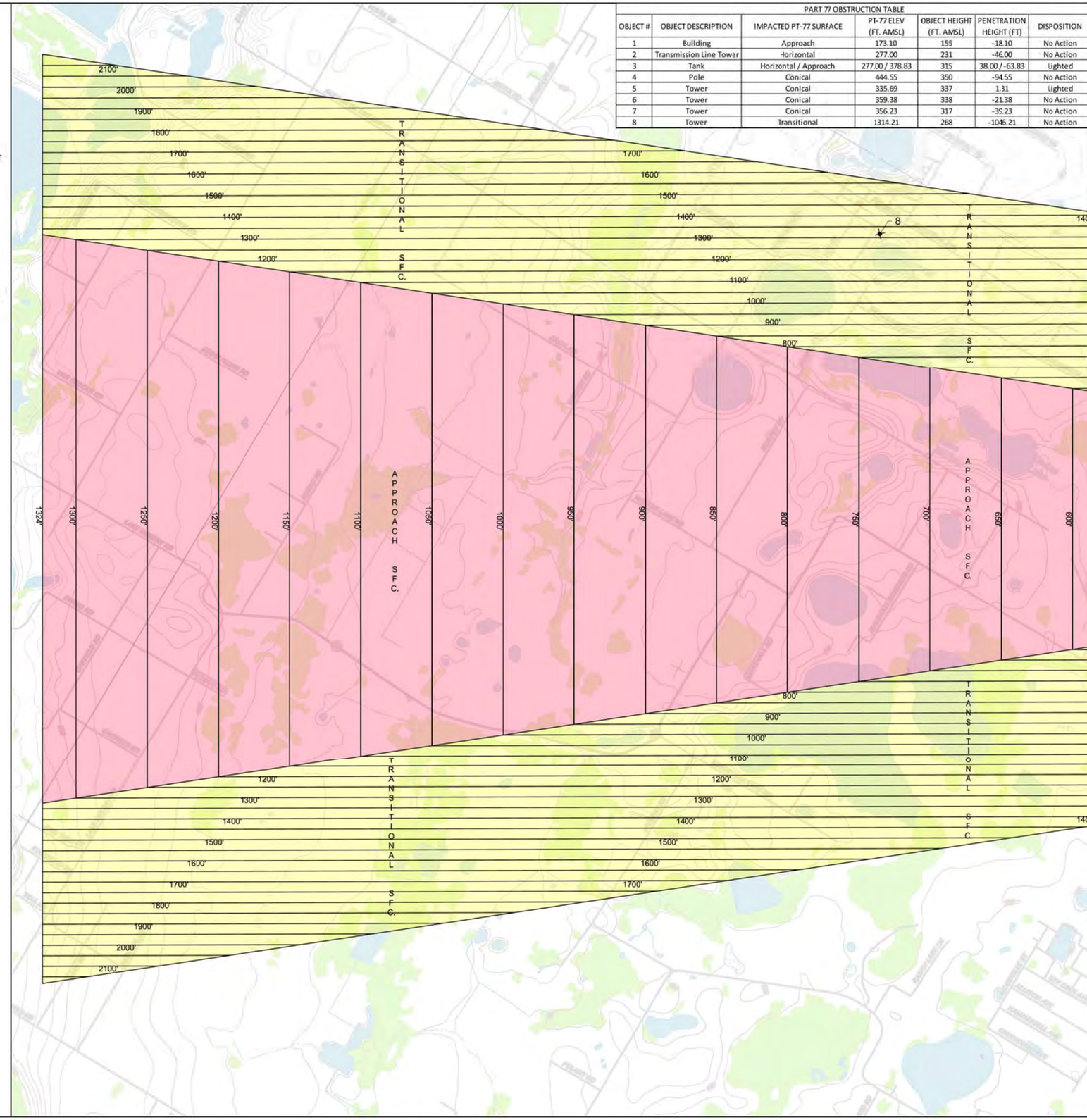
7	Tower	Conical	356.23	317	-39.23	No Action
8	Tower	Transitional	1314.21	268	-1046.21	No Action



REV	DESCRIPTION	DR. BY	CHKD. BY	APPD. BY	DATE

PROJECT NO. 855714

FAA AIP# 3-12-0040-014-2011

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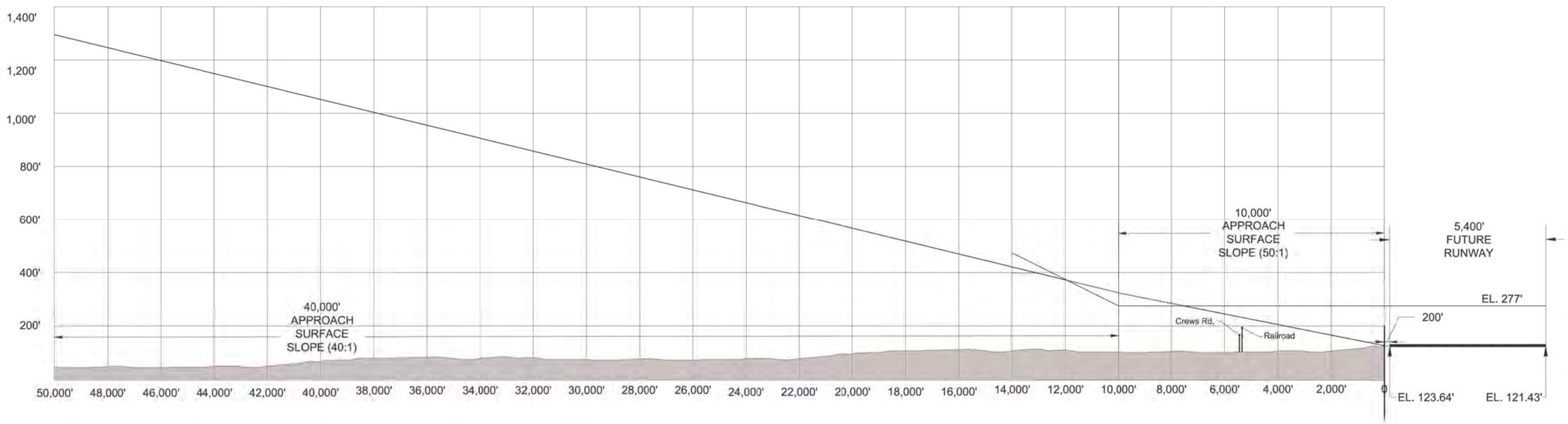
DR. BY ZEN
CHKD. BY WJM
DES. BY ZEN
DATE: MARCH 2013
SCALE: 1" = 1500'

LAKE WALES MUNICIPAL AIRPORT
LAKE WALES, FLORIDA

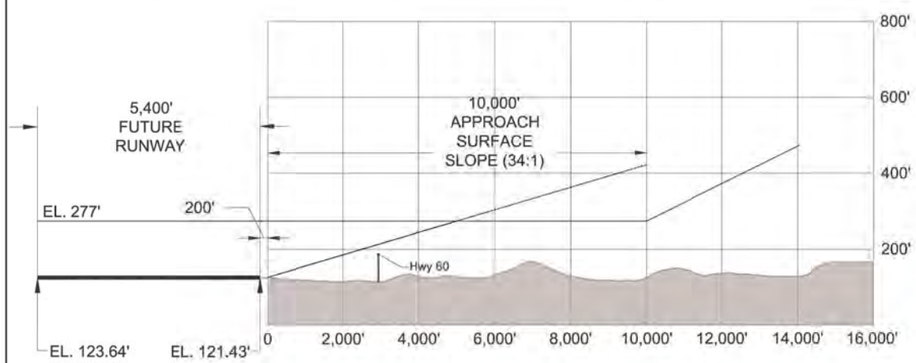
PART 77 AIRSPACE #2

DRAWING
10

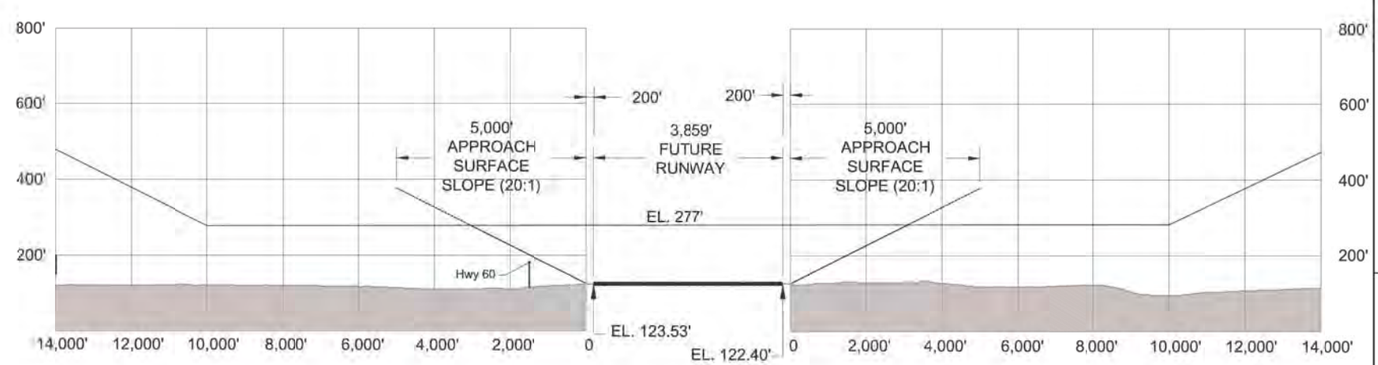
FUTURE PRECISION RUNWAY 06 PROFILE



FUTURE NON-PRECISION RUNWAY 24 PROFILE



EXISTING AND FUTURE VISUAL RUNWAY 17 AND 35 PROFILES



NOTES:
1. ALL ELEVATIONS SHOWN ARE IN FEET ABOVE MEAN SEA LEVEL (AMSL).
2. SEE INDIVIDUAL RUNWAY INNER APPROACH SURFACE PLANS FOR CLOSE-IN OBSTRUCTIONS.
3. RUNWAY LENGTHS NOT TO SCALE IN PROFILE VIEWS.

REV	DESCRIPTION	DR. BY	CHKD. BY	APPD. BY	DATE

PROJECT NO. 855714
FAA AIP# 3-12-0040-014-2011

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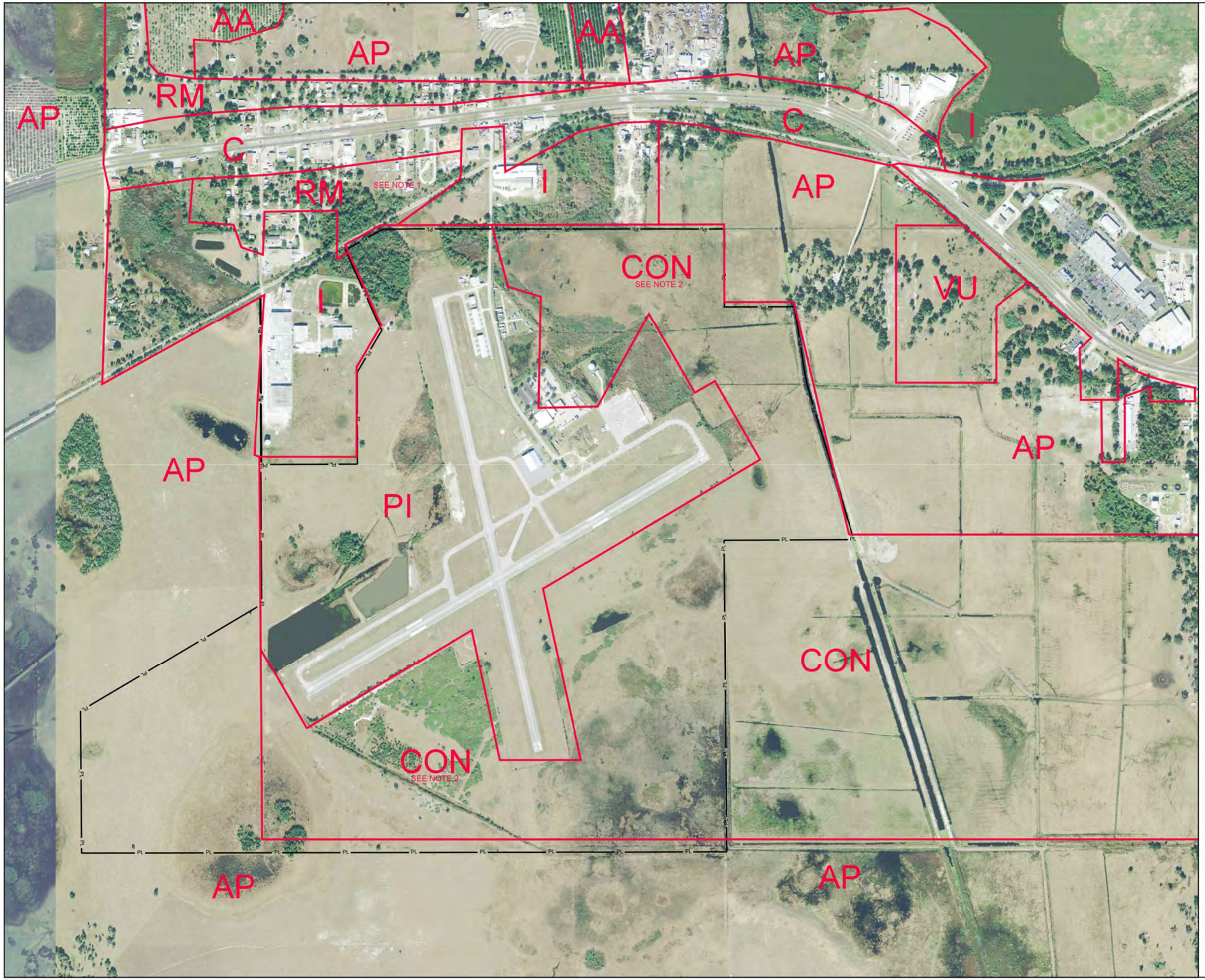
DR. BY ZEN
CHKD. BY WJM
DES. BY ZEN
DATE: MARCH 2013
SCALE: 1" = 1500'

LAKE WALES MUNICIPAL AIRPORT
LAKE WALES, FLORIDA

EXTENDED APPROACH PROFILES

DRAWING
11



LAND USE CODES

CITY OF LAKE WALES LAND USE CODES

PI	- PUBLIC AND INSTITUTIONAL
CON	- CONSERVATION

POLK COUNTY EXISTING LAND USE CODES

RM	- RESIDENTIAL MEDIUM
C	- COMMERCIAL
I	- INDUSTRIAL
AP	- AGRICULTURAL PASSIVE
VU	- VACANT UNDEVELOPED
AA	- AGRICULTURAL ACTIVE

NOTES:

1 - THE AREA OF RESIDENTIAL MEDIUM (RM) LAND USE FOUND TO THE NORTH AND NORTHWEST AND CONTIGUOUS TO THE AIRPORT PROPERTY DOES NOT COMPLY WITH FLORIDA STATUTE CHAPTER 333 "AIRPORT ZONING" SECTION 333.03 (2) (d). AVIGATION EASEMENTS HAVE BEEN RECOMMENDED FOR THIS AREA AS SHOWN ON SHEET 13.

2 - THE LAND USE CLASSIFICATION OF "CONSERVATION" COULD BE SEEN TO CONFLICT WITH THE AIRPORT SPONSOR'S GRANT ASSURANCE OBLIGATIONS TO THE FAA IN THAT SUCH A LAND USE CLASSIFICATION COULD POTENTIALLY LIMIT THE OVERALL UTILITY OF AIRPORT LANDS IN WHICH THE FAA HAS A FINANCIAL INTEREST. A RE-CLASSIFICATION OF THESE PROPERTIES TO "PUBLIC AND INSTITUTIONAL" IS RECOMMENDED.

N

5.41°

GRAPHIC SCALE

400' 0 400'

MAGNETIC DECLINATION 5.41° W
CHANGES 5' WEST / YR

REV	DESCRIPTION	DR BY	CHKD BY	APPD BY	DATE

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DATE: MARCH 2013
SCALE: 1" = 400'

LAKE WALES MUNICIPAL AIRPORT
LAKE WALES, FLORIDA

LAND USE MAP

DRAWING
12

SHEET 12 OF 13

LEGEND

EXISTING	PROPOSED	DESCRIPTION
	N/A	PARCEL BOUNDARY
	N/A	PROPERTY LINE
	N/A	LEASE BOUNDARY
		EASEMENT
N/A		FUTURE PROPERTY

I.D.	DATA OF ACQUISITION	FEDERAL AID NUMBER	TYPE	ACREAGE
A	December 30, 1930	N/A	Fee	± 120.00
B	October 18, 1941	N/A	Fee	± 274.95
C	October 27, 1941	N/A	Fee	± 87.33
D	June 13, 1955	N/A	Fee	± 2.27
E	2008/2009	N/A (OTTED FUNDED)	Fee	± 60.00
			TOTAL	± 544.55

N

GRAPHIC SCALE

400' 0 400'

MAGNETIC DECLINATION 5.41° W
CHANGES 5' WEST / YR

PROJECT NO. 855714

FAA AIP# 3-12-0040-014-2011

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SCALE: 1" = 400"
DATE: MARCH 2013
DES BY ZEN
DR. BY ZEN
CHKD BY WJM

LAKE WALES MUNICIPAL AIRPORT
LAKE WALES, FLORIDA

AIRPORT PROPERTY MAP

DRAWING
13

SHEET 13 OF 13

INTRODUCTION

The preceding chapters have identified the projects necessary for the Lake Wales Municipal Airport (X07) to accommodate the forecast levels of demand and provide for substantive economic development opportunities in the future. As discussed in Chapter 3, *Demand Capacity and Facility Requirements,* and Chapter 4, *Airport Development Plan*, specific improvements to both airside and landside elements of the Airport are recommended for implementation over the 20-year planning period. The projects included in the development plan form the basis of the Airport's capital improvement program (CIP).

It is the primary purpose of this chapter to: (1) itemize the individual development projects or development related projects required to fulfill the preferred development plan for the Lake Wales Municipal Airport as depicted in the Airport Layout Plan (ALP); (2) establish a phasing plan for the development projects which meets the forecasted needs; (3) review available funding sources and make assumptions as to the probable funding structure for each itemized project; (4) summarize recent and future potential cash flows for the airports; and (5) present a financially feasible CIP for each development phase.

The CIP includes projects that represent the facility's planned growth over the next 20+ years. Additionally, the proposed facilities reflect strategic development initiatives intended to maximize the safety and utilization of the Airport. As part of the development process, project phasing and cost estimates are developed and included in the CIP in order to manage and plan for the implementation requirements associated with these development projects.

DEVELOPMENT PHASING

This section of the Airport's master plan report seeks to establish a tentative schedule for the various projects required to fulfill the future development goals of the Lake Wales Municipal Airport. Essentially the schedule represents a prioritized Airport development plan to meet regulatory issues, forecast increases in aeronautical activity, and/or economic development initiatives of the municipality. Naturally, projects appearing in the first phase are of the greatest importance to the Airport and have the least tolerance for delay. Additionally, some projects included in an early phase may be a prerequisite for other planned improvements in a later phase. The development phasing for X07 has been divided into four distinct phases as follows:

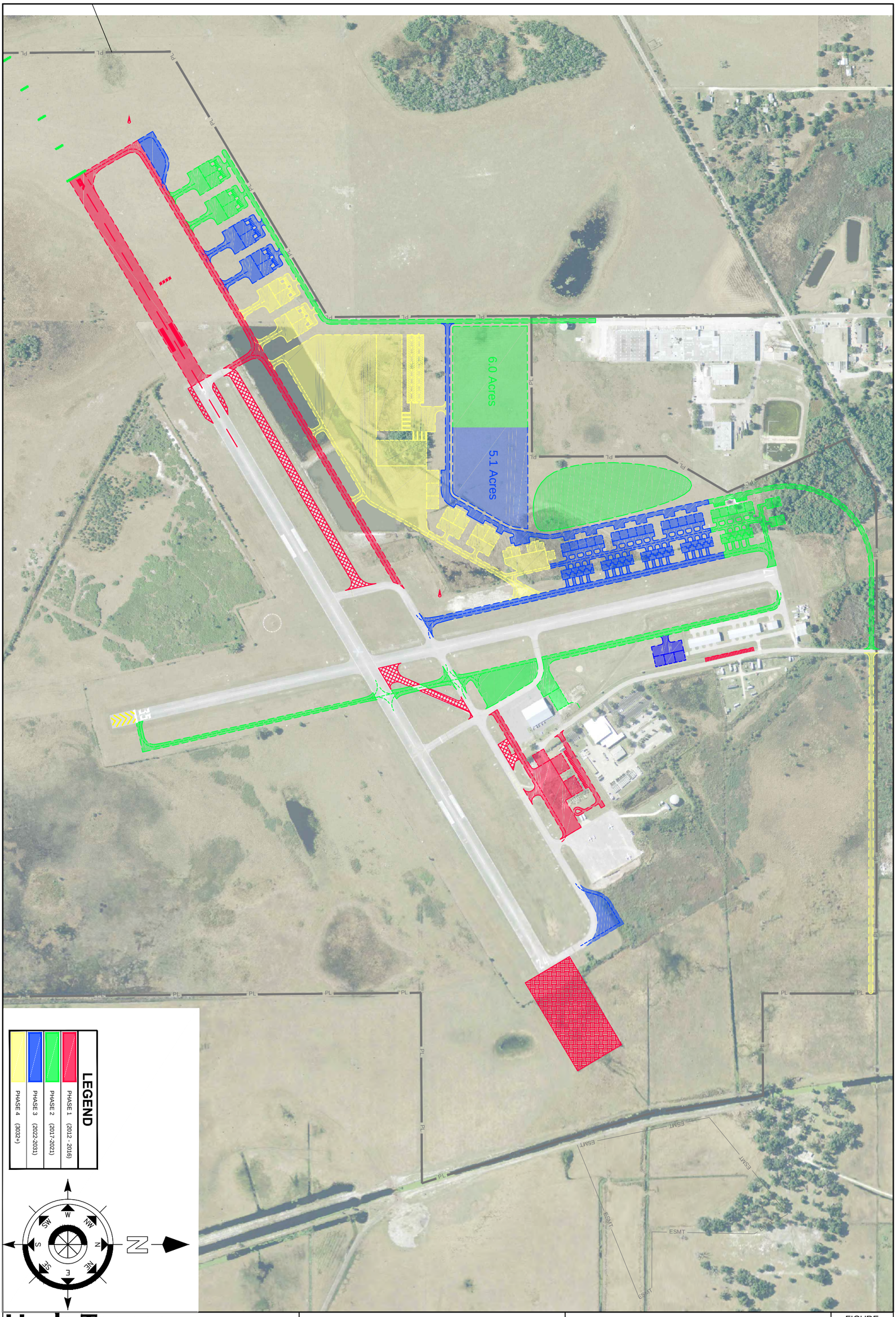
- Phase I: (0 to 5 years), 2012-2016
- Phase II: (6 to 10 years), 2017-2021
- Phase III: (11 to 20 years), 2022-2031
- Phase IV (Beyond 20 years), 2032+

It should be pointed out here, however, that the phasing of individual projects should undergo periodic review to determine the need for changes based upon variations in forecast demand, available funding, economic conditions, and/or other factors that may reasonably influence airport development. Additionally, other projects not foreseen in this report may be identified in the future and would, therefore, likely necessitate changes in the phasing of projects and the overall CIP. Further, the projects and overall development identified in the CIP, though tied to a time table, will only occur once the triggering demand and/or need is realized. Phasing for the projects included in the development plan is shown in **Table 6-1** and depicted in **Figure 6-1**.

Table 6-1. Capital Improvement Plan Phasing

Proposed Development Action:	Phase I (2012-2016)	Phase II (2017-2021)	Phase III (2022-2031)	Phase IV (2032+)
AIRSIDE				
RSA Mitigation Runway 24 End - Standard RSA 600' beyond edge of pavement	1			
Extend Taxiway A to Existing Runway 6 End				
Demolish Taxiway Delta and Taxiway Charlie	1			
Extend Taxiway Lighting (MITLs)	1			
Extend Runway 6-24 to the Southwest				
Runway Pavement Extension (1,401')	1			
Rehabilitation of Existing Runway 6-24 Pavement	1			
Runway Lighting Extensions/Relocations (LED MIRLs)	1			
Runway 6-24 Remarking (Including Displaced 24 Threshold)	1			
Add Distance Remaining Signs on Runway 6-24	1			
Extend Taxiway A to Relocated Runway 6 End	1			
Taxiway Bravo Relocation and Extension (Full Parallel to RW 17-35)		2		
Eastern Aircraft Apron Expansion and Taxilane Construction		2		
Precision Approach To Relocated Runway 6 End				
Environmental Assessment		2		
Vertically Guided Airport Airspace Analysis Survey		2		
Install MALSR Approach Lighting System for Runway 6			3	
Construct Taxiway Charlie (Partial Parallel to RW 17-35)			3	
Construct Aircraft Run-up Area			3	
LANDSIDE				
Parking near Runway 17 end Hangar Facilities	1			
Landside Access and Parking to East Aircraft Apron	1			
East Apron Hangar Development		2		
Landside Access and Parking to New West Side Development Areas (Phase 1)		2		
West Side Hangar Development (Phase 1)		2		
Western Airport Access			3	
Corporate Aviation Hangar Development (Phase 1)			3	
West Side Roadway Improvements			3	
West Side Hangar Development (Phase 2)				4
Corporate Aviation Hangar Development (Phase 2)				4
West Side Hangar Development (Phase 3)				4
Corporate Aviation Hangar Development (Phase 3)				4

Source: Hoyle, Tanner & Associates, Inc., 2012.



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LAKE WALES MUNICIPAL AIRPORT
LAKE WALES, FLORIDA

PHASE 2 (2017-2021)
DEVELOPMENT PLAN

FIGURE
6-1

Table 6-2. Summary of Cost Estimates

Development Period		Total	Federal (FAA)	State	Local	Other
Phase I	(2013-2017)	$4,309,000	$5,756,400	$2,779,800	$1,115,750	$0
Phase III	(2018-2022)	$5,789,000	$2,546,100	$4,512,250	$1,292,650	$1,404,000
Phase III	(2023-2032)	$8,673,000	$2,693,700	$1,924,050	$939,450	$3,115,800
Phase IV	(2032 +)	$17,021,000	$4,038,800	$504,850	$1,197,250	$11,280,100

Note: The funding amounts and project eligibility presented are based on current FAA and State guidelines but do not constitute approval, acceptance, or a commitment of funding by the FAA or other sources, and should only be used for planning and budgeting purposes.

Source: Hoyle, Tanner & Associates, Inc., 2012.

CAPITAL IMPROVEMENT PROGRAM

The objective of the section is to outline the CIP for Lake Wales Municipal Airport for the next 20 years and beyond, while providing a brief description of the projects included. Special attention has been placed on the first five years of the CIP. These projects slated for immediate implementation have been identified as critical to the Airport in terms of both providing adequate facilities to meet the needs of its users, as well as supporting the strategic economic development initiatives of the Airport and its sponsoring community.

Near-Term Capital Improvement Program (2013-2017)

In the first five years of the CIP a number of projects are identified. These primarily include a runway extension and strengthening, taxiway improvements, and landside access and parking improvements. **Table 6-3** identifies Phase I projects, their rough-order cost estimates, and the funding participation from Federal, local, and other agencies. **Figure 6-2** graphically depicts the CIP Phase I improvements.

Mid-Term Capital Improvement Program (2018-2022)

In the second five years of the CIP the projects primarily include taxiway improvements, apron area improvements, and hangar development. **Table 6-4** identifies Phase II projects, their rough-order cost estimates, and the funding participation from Federal, local, and other agencies. **Figure 6-3** graphically depicts the CIP Phase II improvements.

Long-Term Capital Improvement Program (2023-2032)

In the second decade of the CIP a number of projects are identified. These primarily include hangar development, taxiway/lane improvements, and airport visual/approach aids. **Table 6-5** identifies Phase III projects, their rough-order cost estimates, and the funding participation from Federal, local, and other agencies. **Figure 6-4** graphically depicts the CIP Phase III improvements.

Ultimate Future Capital Improvement Program (2032+)

Beyond 2032, a number of projects are identified, which are largely focused on hangar development initiatives. **Table 6-6** identifies Phase IV projects, their rough-order cost estimates, and the funding participation from Federal, local, and other agencies. **Figure 6-5** graphically depicts the CIP Phase IV improvements.

Table 6-3. Capital Improvement Program – Phase I (2013-2017)

Year	Project Title and Description	Estimated Total Cost	Funding Sources	
2013	**RSA Mitigation Runway 24** This project includes developing a full size RSA area prior to the Runway 24 end to support the potential landing short or overrunning of aircraft from the runway. The RSA area prior to the runway will be 600 feet long and 300 feet wide and meet all grading standards prescribed by the FAA.	**$496,000**	Federal (FAA)	$446,400.00 or 90%
			State	$24,800.00 or 5%
			Local	$24,800.00 or 5%
			Other	$0.00 or 0%
2014	**Extend Taxiway A to the Existing Runway 6 End** In an effort to enhance safety on the airfield and comply with FAA regulations relative to runway and taxiway separations, this project seeks to extend Taxiway A to the existing Runway 6 end maintaining a centerline to centerline offset of 400 feet. Additionally, this project would include the demolition and removal of Taxiways Delta and Charlie to minimize potential confusion to pilots and decrease the likelihood of an runway incursion accidents or incidents.	**$1,283,000**	Federal (FAA)	$1,154,700.00 90%
			State	$64,150.00 5%
			Local	$64,150.00 5%
			Other	$0.00 0%
2014	**Parking Improvements Near Runway 17 End Hangar Facilities** During the process of developing the Master Plan for Lake Wales Municipal Airport, concerns were raised about the lack of parking facilities near the conventional and T-hangar facilities just east of the Runway 17 end. As such, a parking area should be developed to support these facilities in the near future.	**$144,000.00**	Federal (FAA)	$0.00 or 0%
			State	$115,200.00 or 80%
			Local	$28,800.00 or 20%
			Other	$0.00 or

				0%
2015	**Extend Runway 6-24 & Taxiway A to the Southwest by 1,401'** As a means to better support operations by the growing number of large and complex aircraft being experienced at X07, a runway extension of at least 1,401 feet is highly recommended in the short-term development period. Furthermore, strengthening of the runway should also occur to bring its operational strength index to near 50,000 SWL. Additionally, this project would include an in-kind extension of Taxiway A, the extension of LED MIRLs, the remarking of Runway 6-24 to include a displaced threshold at the Runway 24 end, and distance remaining signs along the runway shoulders.	**$3,619,000**	Federal (FAA)	$3,257,100.00 or 90%
			State	$180,950.00 or 5%
			Local	$180,950.00 or 5%
			Other	$0.00 or 0%
2016	**Landside Access and Parking to East Aircraft Apron** Currently, no access to or parking for the expansive East Aircraft Apron. As such, its overall utility is affected. Development of access roadway and parking facilities will add value to this apron and encourage its use.	**$546,000**	Federal (FAA)	$0.00 or 0%
			State	$436,800.00 or 80%
			Local	$109,200.00 or 20%
			Other	$0.00 or 0%
2016	**Eastern Aircraft Apron Expansion and Taxilane Construction** The Eastern Aircraft Apron represents a significant resource to the airport and itinerant traffic. In the future, once landside access and parking is provided to this facility, its adjacent land will be poised for development. By expanding the apron and constructing a taxiway, the existing East Aircraft apron and FBO apron can be connected, thereby increasing the overall utility of each.	**$998,000**	Federal (FAA)	$898,200.00 or 90%
			State	$49,900.00 or 5%
			Local	$49,900.00 or 5%
			Other	$0.00 or 0%

2017	**East Apron Hangar Development** After landside access and parking is made available to the east aircraft apron, and the apron is expanded and connected with the FBO apron, significant value will be created for the land abutting the expanded apron. This area will be well suited for a large business or corporate tenant seeking to establish a large hangar or hangar complex near the highly visible main entrance road of the Airport.	**$2,385,000**	Federal (FAA)	$0.00 or 0%
			State	$1,908,000.00 or 80%
			Local	$477,000.00 or 20%
			Other	$0.00 or 0%

Subtotals:	
Federal (FAA)	$5,756,400.00
State	$2,779,800.00
Local	$1,115,750.00
Other	$0.00
TOTAL	$9,471,000

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LAKE WALES MUNICIPAL AIRPORT
LAKE WALES, FLORIDA

PHASE 1 (2012-2016)
DEVELOPMENT PLAN

FIGURE
6-2

Table 6-4. Capital Improvement Program – Phase II (2018-2022)

Year	Project Title and Description	Estimated Total Cost	Funding Sources	
2018	**Precision Approach To Relocated Runway 6 End** A precision approach to Runway 6 is recommended to be developed within the mid-term of the planning period. Such and improvement would better support operations by aircraft in inclement weather as well as make the airfield more attractive to GA and business aircraft alike. By utilizing GPS technologies to develop approach procedures and ground based lighting aids to heighten visual recognition of the airfield, low weather minimums are an achievable goal.	**$143,000**	Federal (FAA)	$128,700.00 or 90%
			State	$7,150.00 or 5%
			Local	$7,150.00 or 5%
			Other	$0.00 or 0%
2019	**FBO Apron Expansion** To better facilitate aircraft movements and provide appropriate non-movement apron areas for the storage of aircraft, the FBO apron is recommended to be expanded to adjoin the newly constructed Taxiway Bravo as well as the future apron and taxilane extension associated with the East Aircraft Apron such that contiguous movement from both apron areas is provided for.	**$440,000**	Federal (FAA)	$396,000.00 or 90%
			State	$22,000.00 or 5%
			Local	$22,000.00 or 5%
			Other	$0.00 or 0%
2020	**Taxiway Bravo Relocation and Extension (Full Parallel to RW 17-35)** At present, Taxiway Bravo does not have the appropriate clearance from the T-Hangars found just east of the Runway 17 end to allow for the uncompromised passage of Group II aircraft. This project calls for the relocation of the existing taxiway stub serving these hangars and the Runway 17 end to be relocated 24 feet to the East and then extended southward to the Runway 17 end.	**$2,255,000**	Federal (FAA)	$0.00 or 0%
			State	$1,804,000.00 or 80%
			Local	$451,000.00 or 20%

			Other	$0.00 or 0%
2021	**Landside Access and Parking to New West Development Area (Phase 1)** To enable the development of properties west of Runway 17-35 and north of Runway 6-24, roadway access and parking facilities will be required to be develop don this side of the field. Phase one of this landside access improvement will bring a stub road from South Airport Road around the Runway 17 Runway Safety Area to the properties just west of the Runway 17 end. This roadway system will be capable of being extended in the future to allow for additional west side development.	**$726,000**	Federal (FAA)	$0.00 or 0%
			State	$580,800.00 or 80%
			Local	$145,200.00 or 20%
			Other	$0.00 or 0%
2022	**West Side Hangar Development (Phase 1)** This project includes the development of a taxiway entrance to Runway 17 and a stub taxiway and taxilane to provide access to T-hangar facilities, as well as the construction of those T-hangar facilities.	**$2,808,000**	Federal (FAA)	$1,123,200.00 or 40%
			State	$140,400.00 or 5%
			Local	$140,400.00 or 5%
			Other	$1,404,000.00 or 50%

Subtotals:	
Federal	$1,647,900.00
State	$2,554,350,00
Local	$765,750.00
Other	$1,404,000.00
TOTAL	$6,372,000.00

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LAKE WALES MUNICIPAL AIRPORT
LAKE WALES, FLORIDA

PHASE 2 (2017-2021)
DEVELOPMENT PLAN

FIGURE
6-3

Table 6-4. Capital Improvement Program – Phase III (2023-2032)

Year	Project Title and Description	Estimated Total Cost	Funding Sources	
2023	**Install MALSR on Runway 6** In order to further support operation by aircraft flying under Instrument Flight Rules (IFR) and facilitate the lowest minimums possible for the precision approach to Runway 6 , a MALSR lighting system is recommended for installation. This lighting system will provide pilots better visual recognition of the airfield and their approach alignment during operations during inclement weather or at night.	**$985,000**	Federal (FAA)	$886,500.00 or 90%
			State	$49,250.00 or 5%
			Local	$49,250.00 or 5%
			Other	$0.00 or 0%
2024	**Construct Taxiway Charlie (Partial Parallel to Runway 17-35)** The beginnings of Taxiway Charlie were initiated during the first phase of the Westside Hangar Development, however this project calls for its extension to Taxiway A. Such an improvement will provide for better and safer aircraft movements about the airfield and support additional west side hangar development as demand is realized.	**$971,000**	Federal (FAA)	$0.00 or 0%
			State	$776,800.00 or 80%
			Local	$194,200.00 or 20%
			Other	$0.00 or 0%

2026	**Construct Aircraft Run-up Areas** The construction of aircraft run-up areas will essentially allow for an aircraft bypass at the runway end. Such features provide space for holding airplanes, for whatever reason, to delay their entrance to the runway, while allowing other aircraft to pass. Such an improvement will contribute to airfield safety, efficiency, and capacity.	**$649,000**	Federal (FAA)	$584,100.00 or 90%
			State	$32,450.00 or 5%
			Local	$32,450.00 or 5%
			Other	$0.00 or 0%
2028	**Western Airport Access Improvement** As a means to provide access to the airport's western properties and encourage large corporate hangar development near the Runway 6 end, a secondary access road to the Airport is recommended. The southerly extension of S. Acuff Road will provide such access. This project only calls for the extension of S. Acuff Road. A future project will seek to connect this roadway extension with the previously established road along the West Hangar Development Area.	**1,247,000**	Federal (FAA)	$0.00 or 0%
			State	$997,600.00 or 80%
			Local	$249,400.00 or 20%
			Other	$0.00 or 0%

2030	**Corporate Aviation Hangar Development (Phase 1)** Phase 1 of the Corporate Aviation Hangar Development is anticipated to include two large corporate hangars with private access and hangar space. These initial facilities are anticipated to be adjacent to the Runway 6 end and be accessible via the S. Acuff Road extension discussed above.	**$3,462,000**	Federal (FAA)	$0.00 or 0%
			State	$0.00 or 0%
			Local	$346,200.00 or 10%
			Other	$3,115,800.00 or 90%
2032	**West Side Roadway Improvements** The Westside Roadway Improvement Project will connect the S. Acuff Road extension with the new road developed to support and encourage GA hangar development west of Runway 17-35. This roadway project will be developed such that a large development parcel, outside of the RVZ, is framed and developable properties along and adjacent to the newly constructed Taxiway Charlie are conveniently accessible.	**$1,359,000**	Federal (FAA)	$1,223,100.00 or 90%
			State	$67,950.00 or 5%
			Local	$67,950.00 or 5%
			Other	$0.00 or 0%

Subtotals:	
Federal	$2,693,700.00
State	$1,924,050.00
Local	$939,450.00
Other	$3,115,800.00
TOTAL	$8,673,000

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LAKE WALES MUNICIPAL AIRPORT
LAKE WALES, FLORIDA

PHASE 3 (2022-2032)
DEVELOPMENT PLAN

FIGURE
6-4

Table 6-4. Capital Improvement Program – Phase IV (2032+)

Year	Project Title and Description	Estimated Total Cost	Funding Sources	
2032+	**West Side Hangar Development (Phase 2)** Phase 2 of the West Side Hangar Development is largely a continuation of the action initiated in Phase 1. Moving south along the new Taxiway Charlie, both T-hangar and conventional hangar units will be develop as needed to meet demand. Also included in this project is the necessary extension of the hangar Taxilane found parallel to and west of the new Taxiway Charlie which provides access to the hangar facilities.	**$5,935,000**	Federal (FAA)	$2,374,000.00 or 40%
			State	$296,750.00 or 5%
			Local	$296,750.00 or 5%
			Other	$2,967,500.00 or 50%
2032+	**Corporate Aviation Hangar Development (Phase 2)** Phase 2 of the Corporate Aviation Hangar Development is largely a continuation of the action initiated in Phase 1. Moving north east along the extended Taxiway A, additional corporate hangar facilities, private aprons, and taxiway accesses will be developed.	**$3,462,000**	Federal (FAA)	$0.00 or 0%
			State	$0.00 or 0%
			Local	$346,200.00 or 10%
			Other	$3,115,800.00 or 90%

2032+	**West Side Hangar Development (Phase 3)**	**$4,162,000**	Federal (FAA)	$1,664,800.00 or 40%
	Continuing the development action from Phase 2 of the West Side Hangar Development, additional hangar facilities and taxilane will be developed.		State	$208,100.00 or 5%
			Local	$208,100.00 or 5%
			Other	$2,081,000.00 or 50%
2032+	**Corporate Aviation Hangar Development (Phase 3)**	**$3,462,000**	Federal (FAA)	$0.00 or 0%
	Continuing the Development action from Phase 3 of the Corporate Aviation Hangar Development, additional corporate hangar facilities will be developed as demand requires.		State	$0.00 or 0%
			Local	$346,200.00 or 10%
			Other	$3,115,800.00 or 90%

Subtotals:	
Federal	$4,038,800.00
State	$504,850.00
Local	$1,197,250.00
Other	$11,280,100.00
TOTAL	$17,021,000

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LAKE WALES MUNICIPAL AIRPORT
LAKE WALES, FLORIDA

PHASE 4 (2032+)
DEVELOPMENT PLAN

FIGURE
6-5

IMPLEMENTATION

The purpose of this section is to analyze Lake Wales Municipal Airport's historical and projected revenue and expenditures and determine whether it is financially viable to implement the airport Master Plan's capital improvement program (CIP). The objective of this financial analysis is twofold:

- Estimate the capital and operating costs for the various components that comprise the CIP.
- Determine if it is feasible for the Airport to generate sufficient revenues to cover capital and operating costs.

Historical Airport Financial Data

Revenue Sources

Fiscal year revenues were collected over a historical five-year period. As presented in **Table 6-7**, airport operating revenues have been steadily increasing over this historical period reviewed. These revenues are primarily derived from T-hangar rental, campground rental, and fuel flowage fees. Overall growth in revenues has occurred at an average annual growth rate of 51.92 percent since 2007.

Expenses

As presented in Table 6-7, expenses cover contractual services, repairs and maintenance, materials and supplies, general and administrative expenses, and depreciation. Over the five year period reviewed expenses have increased at an average annual rate of 21.71 percent.

Historical Revenues vs. Expenses

During the period cited, expenditures exceeded revenue. Table 6-7 summarizes the historical revenues, expenses, and losses. Further, the operating loss and loss before outside contributions have both been on the rise over this period with 17.04 and 45.96 percent average annual growth, respectively.

Table 6-7. Historical Financial Records

	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Operating Revenues					
Charges for Services	$ 16,918	$ 40,584	$ 62,798	$ 86,632	$ 90,111
Operating Expenses					
Contractual Services	$ 11,171	$ 9,826	$ 32,562	$ 27,365	$ 36,427
Repairs and Maintenance	$ 16,272	$ 5,591	$ 12,565	$ 4,406	$ 2,844
Materials and Supplies	$ 734	$ 250	$ 631	$ 237	$ 178
General and Administrative	$ 61,483	$ 49,053	$ 68,395	$ 63,025	$ 68,753
Depreciation	$ 94,227	$ 134,149	$ 227,673	$ 230,867	$ 295,245
Total Operating Expenses	$ (183,887)	$ (198,869)	$ (341,826)	$ (325,900)	$ (403,447)
Operating (Loss)	$ (166,969)	$ (166,969)	$ (279,028)	$ (239,268)	$ (313,336)
Non-operating Revenues					
Interest Income	$ 97,935	$ 97,935	$ 245	$ -	$ -
(Loss) Before Contributions	$ (69,034)	$ (69,034)	$ (278,783)	$ (239,268)	$ (313,336)

Source: City of Lake Wales, 2012; Hoyle, Tanner & Associates, Inc. 2012.

Projected Revenue and Expenses

Revenues that Lake Wales Municipal Airport generates in the future will largely be derived from the same sources from which it generates revenues today, including: fuel flowage fees, building leases, land leases, and revenues from FBO operations. Based on existing aviation lease agreements, current activities and interests, and assuming no hangar vacancies perpetuate, annual fiscal year revenues were estimated during the planning period and are presented in **Table 6-8**.

The historical revenue growth rate of 51.92 percent over the preceding five years was not used as the basis of forecasting future airport revenues. This growth rate is considered to be much too high as it includes a rebound in operational activity following the 2004 hurricanes and its impact to Lake Wales Airport facilities. Future revenue projections were instead based on a conservative average annual growth rate of eight percent. Additionally, future revenue streams from aeronautical and non-aeronautical land leases were included to future revenue projections. Based on the forecast of demand and the CIP previously developed, the following future revenue streams were included with X07's revenue projections:

- 1 acre of aeronautical development per year, beginning in 2015, at a rate of $0.18 per square foot.
- 6 acres of non-aeronautical development in 2020 and 5 acres of non-aeronautical development in 2025 at a rate of $0.14 per square foot.

Similar to revenues, historical growth of airport expenses is considered to be inflated as a result of the redevelopment efforts which occurred at the Airport after the 2004 hurricanes. For the purpose of this analysis, future operating expenses at the airport were grown using the following metrics:

- Contractual Services 7% AAGR
- Repairs and Materials 6% AAGR
- Materials and Supplies 10% AAGR
- General and Administrative 3% AAGR
- Depreciation 3% AAGR

As can be seen in Table 6-8, projected revenues will not exceed expenditures as activity continues to increase at the airport without a more aggressive utilization of the land and facilities available. Additional revenue generation at the airport is plausible and would most likely revolve around commercial/industrial developments in the northeast quadrant of the Airport's property. Additionally, expenses could be reduced as airport power requirements are supplemented, or entirely provided by, solar power initiatives at the Airport. These savings were not quantified or included in the financial analysis, but could represent a significant savings.

Table 6-8. Financial Projections

	FY2013	FY 2015	FY 2020	FY 2025	FY 2030
Operating Revenues					
Charges for Services	$ 147,846	$ 172,447	$ 253,382	$ 372,301	$ 547,032
New Revenue Sources					
Aeronautical Land Leases	$ -	$ 7,841	$ 47,045	$ 86,249	$ 145,434
Non-Aeronautical Land Leases	$ -	$ -	$ 36,590	$ 67,082.40	$ 77,766.89
Total Revenues	**$ 147,846**	**$ 180,288**	**$ 337,017**	**$ 525,632**	**$ 770,233**
Operating Expenses					
Contractual Services	$ 38,977	$ 44,625	$ 62,588	$ 87,783	$ 123,121
Repairs and Maintenance	$ 8,836	$ 9,928	$ 13,286	$ 17,779	$ 23,793
Materials and Supplies	$ 196	$ 237	$ 382	$ 615	$ 990
General and Administrative	$ 74,356	$ 78,885	$ 91,449	$ 106,014	$ 122,900
Depreciation	$ 304,102	$ 322,622	$ 374,008	$ 433,577	$ 502,635
Total Operating Expenses	**$ (426,467)**	**$ (456,296)**	**$ (541,712)**	**$ (645,769)**	**$ (773,438)**
Operating (Loss)	**$ (278,621)**	**$ (276,008)**	**$ (204,695)**	**$ (120,137)**	**$ (3,205)**

Source: Hoyle, Tanner & Associates, Inc. 2012.

AIRPORT DEVELOPMENT FUNDING

The following development program has been evaluated from a variety of funding perspectives, and is not exclusively dependent upon the City of Lake Wales for funding. In fact, with proper and timely decision making on the part of responsible officials, it is quite possible for the City of Lake Wales to capitalize on several sources of development funds made available by Federal and State organizations. For the most part, the development program presented in the subsequent sections of this chapter is dependent upon funding found outside of the City's coffers. However, this is not to mean that the City will not have to provide its share of the costs, as the majority of outside development funding made available is in the form of matching grants or percentage based participatory funding.

The primary sources of development funding, other than local shares, included in this CIP include both State and Federal funding.

State Funding

Aviation activity is recognized to be a vital economic catalyst in the State of Florida. To preserve and encourage growth, sustainability, and economic vitality of the State's public use airports, the State of Florida has developed one of the nation's largest and most proactive state aviation programs. Each year the Florida Department of Transportation (FDOT) Aviation Office manages an aviation work program of state grants to airports for capital construction and planning projects. FDOT will generally provide up to 80 percent of the funding for most airport development projects; however, only 50 percent is provided if the project is directly related to economic development initiatives.

Federal Funding

On the Federal level, the FAA manages the Airport Improvement Program (AIP). Funds from this program are derived from the collection of various aviation related fees imposed on users of the national airspace system.

Local Funding

The local share of airport capital funding is generally obtained through a variety of sources. Most commonly however, is for the municipal entity sponsoring the airport, in this case the City of Lake Wales, to draw upon general funds either directly or indirectly through the issuance of general obligation bonds. For smaller amounts, the sponsoring municipal government may elect to contribute directly, but for larger funding levels bonds are often the preferred option. Issuance of general obligation bonds for airport development can be a useful municipal tool to contribute the local share of project funding for large projects of significant community importance. Ideally however, an airport will be able to contribute its local matching share for capital development projects from its retained earnings, or earnings in excess of operating costs accumulated over multiple years in reserve or capital accounts.

Airports may also use second or third-party funding techniques to accumulate the required local share for a particular development project. A second-party development is when an airport tenant funds the development of their own facility on lands leased from the airport. This approach has the advantage of ensuring no public funds are used for development, while still increasing the overall value of the airport. Third-party development is similar to second-party development in that land is leased from the airport and developed at the expense of someone else. In a third-party development scheme however, the entity incurring the cost to develop facilities on land lease from the airport recoups their initial investment by leasing out their facilities for profit. Both of these approaches to developing the required local source of funding for a development project have the obvious benefit of reducing the cost to the municipality for developing the airport while increasing the overall value of the airport. However, these techniques also preclude the airport from capitalizing on the full market value of the developed asset as the airport only collects on ground lease revenues and not facility revenues. These types of development funding techniques are most often utilized to construct hangar facilities.

SUMMARY

Revenues the airport generates now and in the future will come primarily from hangar and building rentals as well as land leases for both aeronautical and non-aeronautical purposes. Construction of new hangars to meet the existing demand represents significant opportunities to generate additional revenue. However, non-aeronautical developments on airport properties will be vital to airport financial solvency in the future and generate substantial revenues.

The revenues and expenses associated with the different funding sources available vary significantly and thus, further analysis of the financial feasibility of each project will be necessary prior to the time of grant application and overall project implementation.

Appendix A
Detailed Cost Estimates

Lake Wales Airport Master Plan Update: Capital Improvement Plan Cost Estimates

Project	Total Cost
1-A: Extend Runway 6-24*	$ 3,619,000.00
1-B: Taxiway Alpha Realignment	$ 1,283,000.00
A: Parking Improvements Near RW 17 End Hangar Facilities	$ 144,000.00
B: Landside Access and Parking to East Aircraft Apron	$ 546,000.00
C: Taxiway Bravo Relocation and Extension (Full Parallel to RW 17-35)	$ 2,255,000.00
D: FBO Apron Expansion	$ 440,000.00
E: Eastern Aircraft Apron Expansion and Taxilane Construction	$ 998,000.00
F: Precision Approach to Relocate Runway 6 End	$ 143,000.00
G: East Apron Hangar Development	$ 2,385,000.00
H: Landside Access Parking Lot to New West Development Area (Phase 1)	$ 726,000.00
I: West Side Hangar Development (Phase 1)	$ 2,808,000.00
J: Install MALSR on Runway 6	$ 985,000.00
K: Construct Taxiway Charlie (Partial Parallel to Runway 17-35)	$ 971,000.00
L: Construct Aircraft Run-up Areas	$ 649,000.00
M: Western Airport Access Improvement	$ 1,247,000.00
N: Corporate Aviation Hangar Development (Phase 1)	$ 3,462,000.00
O: Westside Roadway Improvements	$ 1,359,000.00
P: West Side Hanagar Development (Phase 2)	$ 5,935,000.00
Q: Corporate Aviation Hangar Development (Phase 2)	$ 3,462,000.00
R: West Side Hanagar Development (Phase 3)	$ 4,162,000.00
S: Corporate Aviation Hangar Development (Phase 3)	$ 3,462,000.00
T:Runway 24 Safety Area Improvements	$ 496,000.00
Total	**$ 41,041,000.00**

Lake Wales Airport Master Plan Update: Capital Improvement Plan Cost Estimates

1-A: Extend Runway 6-24*

Item	Quantity	Unit	Unit Price	Amount
Pipe for Storm Drains and Culverts: Twin 24" RCP	333	LF	$75.00	$ 24,975.00
Pipe for Storm Drains and Culverts: Twin 30" RCP	415	LF	$100.00	$ 41,500.00
Pipe for Storm Drains and Culverts: Twin 24" x 38" RECP	333	LF	$200.00	$ 66,600.00
Pipe for Storm Drains and Culverts: Twin 29" x 45" RECP	1,004	LF	$90.00	$ 90,360.00
Double 24" RCP Mitered End Section	1	EA	$1,000.00	$ 1,000.00
Double 30" RCP Mitered End Section	1	EA	$2,000.00	$ 2,000.00
29" x 45" RECP Mitered End Section	1	EA	$3,000.00	$ 3,000.00
6" DIA Side Drain (HDPE or PVC) Complete Including Liner and Cleanouts	410	LF	$40.00	$ 16,400.00
8" DIA Side Drain (HDPE of PVC) Complete Including Liner and Cleanouts	964	LF	$40.00	$ 38,560.00
Type D Inlet with Cast Iron Grate	1	EA	$1,800.00	$ 1,800.00
Type H Inlet with 3 Cast Iron Grates	2	EA	$7,000.00	$ 14,000.00
Type H Inlet with 4 Cast Iron Grates	2	EA	$8,000.00	$ 16,000.00
6' Chainlink Galvanized Fencing with 3-Strand Barbed Wire	5,401	LF	$10.00	$ 54,010.00
Runway Grooving	60,000	SY	$0.65	$ 39,000.00
No. 8, 5000V,. L-824 Type 'C' Conductor in Conduit or Duct	22,865	LF	$1.00	$ 22,865.00
#6 Bare Copper Counterpoise Wire in Trench	9,527	LF	$0.90	$ 8,574.30
Cable Trench in Unpaved Area, 8" Deep, for Counterpoise Wire	6,157	LF	$0.85	$ 5,233.45
10 FT, 3/4"DIA Copper Ground Rod with Connector	29	EA	$125.00	$ 3,625.00
Trench in Unpaved Area, 24" Deep, for Conduit	10,427	LF	$0.85	$ 8,862.95
Trench in Existing Asphalt Pavement with Pavement Repair (Concrete)	10	LF	$20.00	$ 200.00
2" PVC Sch. 40 Conduit, In Trench	11,295	LF	$1.35	$ 15,248.25
Two - 2" HDPE Conduits Installed by Directional Boring	206	LF	$15.00	$ 3,090.00
1 Way 2" Concrete Encased Duct	25	LF	$10.00	$ 250.00
2 Way 2" Concrete Encased Duct	31	LF	$12.00	$ 372.00
2 Way 3" Concrete Encased Duct	41	LF	$14.00	$ 574.00
L-867 Junction Box Installed at End of Existing 3" or 4" Duct	6	EA	$386.00	$ 2,316.00
L-867 Junction Box Serving Only 2" Conduits	11	EA	$400.00	$ 4,400.00
Connect Proposed Conduit to Existing Junction Box or Handhole	1	EA	$300.00	$ 300.00
Base-Mounted Elevated Taxiway Edge Light (LED) in Unpaved Area	39	EA	$700.00	$ 27,300.00
Medium Intensity Base-Mounted Elevated Runway Edge or Threshold Light	20	EA	$600.00	$ 12,000.00
Semiflush In-Pavement Runway Edge Light (L-852D fixture)	1	EA	$1,200.00	$ 1,200.00
L-858 Lighted Sign - Size 1, 1 Module	1	EA	$2,300.00	$ 2,300.00
L-858 Lighted Sign - Size 2, 2 Module	2	EA	$3,000.00	$ 6,000.00
Relocate Existing 2-Module Lighted Sign to New Concrete Pad	2	EA	$1,200.00	$ 2,400.00
Relocate Existing 3-Module Lighted Sign to New Concrete Pad	1	EA	$1,400.00	$ 1,400.00
Relocate Existing 4-Module Lighted Sign to New Concrete Pad	1	EA	$1,900.00	$ 1,900.00
L-880 PAPI-4 System	2	EA	$17,000.00	$ 34,000.00
L-849C REILS System, Low Intensity (LED)	2	EA	$13,000.00	$ 26,000.00
Remove Existing Base-Mounted Runway Edge or Threshold Light	7	EA	$112.00	$ 784.00
Remove Existing Lighted Sign Including Concrete Pad	2	EA	$225.00	$ 450.00
Change Glass Globe to Clear - Existing Medium Intensity Runway Edge Light	14	EA	$65.00	$ 910.00
Work in Airfield Lighting Vault for PAPI Circuits	1	LF	$5,000.00	$ 5,000.00
Unclassified Excavation	1	LS	$1,025,750.00	$ 1,025,750.00
Clearing and Grubbing (Trees and shrubs)	2	AC	$5,000.00	$ 10,000.00
Muck Excavation	11,116	CY	$5.00	$ 55,580.00
Stripping and Stockpiling:	3,782	CY	$2.00	$ 7,564.00
Temporary Silt Fence	1	LS	$16,250.00	$ 16,250.00
6" Limerock Base Course	3,782	CY	$45.00	$ 170,190.00
4" Bituminous Asphalt Concrete Surface:	5,219	TON	$90.00	$ 469,710.00
Bituminous Prime Coat	8,508	GAL	$0.01	$ 85.08
Runway Painting -White	20,789	SF	$0.45	$ 9,355.05
Taxiway Painting -Yellow	4,519	SF	$0.45	$ 2,033.55
Runway and Taxiway Painting -Black	12,542	SF	$0.35	$ 4,389.70
Hydroseed	294	KSF	$42.00	$ 12,348.00
Solid Sodding:	114,052	SY	$1.35	$ 153,970.20
Mobilization	1	LS	$136,518.00	$ 136,518.00
Rehabilitate Runway 6-24	1	LS	$29,258.00	$ 29,258.00
Rejuvenate Taxiway Alpha	1	LS	$183,000.00	$ 183,000.00
TOTAL CONSTRUCTION COSTS				**$ 2,892,761.53**

Engineering	$ 397,000.00
Contingencies @ 10% (Construction + Engineering)	$ 328,976.15
TOTAL PROJECT COST	**$ 3,619,000.00**

*Based on Bids

1-B: Taxiway Alpha Realignment*

Item	Quantity	Unit	Unit Price	Amount
Pipe for Storm Drains and Culverts: 24" RCP	427	LF	$40.00	$ 17,080.00
24" RCP Mitered End Section	2	EA	$1,000.00	$ 2,000.00
Type C Inlet with Cast Iron Grate	2	EA	$1,500.00	$ 3,000.00
6' Chainlink Galvanized Fencing with 3-Strand Barbed Wire	2,909	LF	$10.00	$ 29,090.00
Site Dewatering	1	LS	$150,000.00	$ 150,000.00
24" Concrete Collar	2	LS	$500.00	$ 1,000.00
No. 8, 5000V,. L-824 Type 'C' Conductor in Conduit or Duct	4,695	LF	$1.00	$ 4,695.00
#6 Bare Copper Counterpoise Wire in Trench	4,713	LF	$0.90	$ 4,241.70
Cable Trench in Unpaved Area, 8" Deep, for Counterpoise Wire	4,713	LF	$0.85	$ 4,006.05
10 FT, 3/4"DIA Copper Ground Rod with Connector	9	EA	$125.00	$ 1,125.00
Trench in Unpaved Area, 24" Deep, for Conduit	4,713	LF	$0.85	$ 4,006.05
2" PVC Sch. 40 Conduit, In Trench	4,695	LF	$1.35	$ 6,338.25
2 Way 2" Concrete Encased Duct	75	LF	$12.00	$ 900.00
L-867 Junction Box Installed at End of Existing 3" or 4" Duct	3	EA	$386.00	$ 1,158.00
Connect Proposed Conduit to Existing Junction Box or Handhole	3	EA	$300.00	$ 900.00
Base-Mounted Elevated Taxiway Edge Light (LED) in Unpaved Area	47	EA	$700.00	$ 32,900.00
L-858 Lighted Sign - Size 1, 1 Module	1	EA	$2,300.00	$ 2,300.00
L-858 Lighted Sign - Size 2, 2 Module	1	EA	$3,000.00	$ 3,000.00
L-858 Lighted Sign - Size 2, 3 Module	3	EA	$3,900.00	$ 11,700.00
Relocate Existing 2-Module Lighted Sign to New Concrete Pad	1	EA	$1,200.00	$ 1,200.00
Remove Existing Stake Mounted Taxiway Edge Light	57	EA	$40.00	$ 2,280.00
Remove Existing Lighted Sign Including Concrete Pad	1	EA	$225.00	$ 225.00
Unclassified Excavation	1	LS	$349,250.00	$ 349,250.00
Stripping and Stockpiling:	1,287	CY	$2.00	$ 2,574.00
Unclassified Excavation (Pavement)	11,631	SY	$1.00	$ 11,631.00
Temporary Silt Fence	1	LS	$8,750.00	$ 8,750.00
6" Limerock Base Course	1,287	CY	$45.00	$ 57,915.00
4" Bituminous Asphalt Concrete Surface:	1,776	TON	$90.00	$ 159,840.00
Bituminous Prime Coat	2,897	GAL	$0.01	$ 28.97
Taxiway Painting -Yellow	5,137	SF	$0.45	$ 2,311.65
Runway and Taxiway Painting -Black	8,282	SF	$0.35	$ 2,898.70
Hydroseed	159	KSF	$42.00	$ 6,678.00
Solid Sodding:	77,567	SY	$1.35	$ 104,715.45
Mobilization	1	LS	$46,482.00	$ 46,482.00
TOTAL CONSTRUCTION COSTS				**$ 1,036,219.82**

Engineering	$ 130,000.00
Contingencies @ 10% (Construction + Engineering)	$ 116,621.98
TOTAL PROJECT COST	**$ 1,283,000.00**

*Based on Bids

A: Parking Improvements Near RW 17 End Hangar Facilities

Item	Quantity	Unit	Unit Price	Amount
6" Stripping and Stockpiling	117	CY	$8.50	$ 997.66
6" Limerock Base Course	117	CY	$55.00	$ 6,455.47
2" - Plant Mix Bituminous Surface Course	81	TONS	$125.00	$ 10,123.35
Unclassified Excavation	1	LS	$50,000.00	$ 50,000.00
Bituminous Prime Coat	264	GAL	$2.50	$ 660.22
Marking	220	SF	$1.00	$ 220.00
Solid Sodding	369	SY	$4.00	$ 1,475.56
Temporary Silt Fence	332	LF	$3.50	$ 1,162.00
Drainage @ 30% of apron cost				$ 21,328.28
Mobilization @ 20% of construction costs	1	LS		$ 18,484.51
TOTAL CONSTRUCTION COSTS				**$ 110,907.05**

Engineering	$ 20,000.00
Contingencies @ 10% (Construction + Engineering)	$ 13,090.71
TOTAL PROJECT COST	**$ 144,000.00**

B: Landside Access and Parking to East Aircraft Apron

Item	Quantity	Unit	Unit Price	Amount
6" Stripping and Stockpiling	385	CY	$8.50	$ 3,272.81
6" Limerock Base Course	385	CY	$55.00	$ 21,177.04
2" - Plant Mix Bituminous Surface Course	266	TONS	$125.00	$ 33,209.44
Unclassified Excavation	1	LS	$75,000.00	$ 75,000.00
Bituminous Prime Coat	2311	GAL	$2.50	$ 5,776.49
Marking	11101	SF	$1.00	$ 11,100.50
Solid Sodding	23826	SY	$4.00	$ 95,302.22
Temporary Silt Fence	21443	LF	$3.50	$ 75,050.50
Drainage @ 30% of apron cost				$ 95,966.70
Mobilization @ 20% of construction costs	1	LS		$ 83,171.14
TOTAL CONSTRUCTION COSTS				**$ 415,855.72**

Engineering	$ 80,000.00
Contingencies @ 10% (Construction + Engineering)	$ 49,585.57
TOTAL PROJECT COST	**$ 546,000.00**

C: Taxiway Bravo Relocation and Extension (Full Parallel to RW 17-35)

Item	Quantity	Unit	Unit Price	Amount
6" Stripping and Stockpiling	2491	CY	$8.50	$ 21,173.37
6" Limerock Base Course	2491	CY	$55.00	$ 137,004.15
Unclassified Excavation	1	LS	$100,000.00	$ 100,000.00
2.0" - Plant Mix Bituminous Surface Course	3438	TONS	$125.00	$ 429,694.85
Bituminous Prime Coat	5605	GAL	$2.50	$ 14,011.79
Runway & Taxiway Painting	29995	SF	$1.00	$ 29,995.00
L-858 Airfield Sign	14	EA	$4,500.00	$ 63,000.00
2 Way 2"Concrete Encased Duct	700	LF	$35.00	$ 24,500.00
1/c #8, 5 kV L-824 Type C Cable in Duct	9620	LF	$1.50	$ 14,430.00
#6 Bare Conterpoise Wire	19240	LF	$1.25	$ 24,050.00
Vault Work	1	LS	$10,000.00	$ 10,000.00
Taxiway Lights (LED)	64	EA	$1,000.00	$ 64,071.47
2" PVC Conduit in Trench	9620	LF	$3.50	$ 33,670.00
10 FT, 3/4" DIA Copper Ground Rods	19	EA	$75.00	$ 1,441.61
Solid Sodding	37375	SY	$4.00	$ 149,500.09
Temporary Silt Fence	10572	LF	$3.50	$ 37,001.27
Drainage @ 30% of taxiway cost				$ 346,063.08
Mobilization @ 20% of construction costs	1	LS		$ 299,921.34
TOTAL CONSTRUCTION COSTS				**$ 1,799,528.01**

Engineering	$ 250,000.00

Contingencies @ 10% (Construction + Engineering)	$ 204,952.80

TOTAL PROJECT COST	**$ 2,255,000.00**

D: FBO Apron Expansion

Item	Quantity	Unit	Unit Price	Amount
6" Stripping and Stockpiling	745	CY	$8.50	$6,332.63
6" Limerock Base Course	745	CY	$55.00	$40,975.83
Unclassified Excavation	1	LS	$30,000.00	$30,000.00
4.0" - Plant Mix Bituminous Surface Course	1028	TONS	$125.00	$128,500.00
Bituminous Prime Coat	1676	GAL	$2.50	$4,190.71
Runway & Taxiway Painting	918	SF	$1.00	$918.00
Temporary Silt Fence	934.88	LF	$3.50	$3,272.07
Drainage @ 30% of apron cost				$64,256.77
Mobilization @ 20% of construction costs	1	LS		$55,689.20
TOTAL CONSTRUCTION COSTS				$334,135.21

Engineering	$ 65,000.00
Contingencies @ 10% (Construction + Engineering)	$ 39,913.52
TOTAL PROJECT COST	**$ 440,000.00**

E: Eastern Aircraft Apron Expansion and Taxilane Construction

Item	Quantity	Unit	Unit Price	Amount
6" Stripping and Stockpiling	1416	CY	$ 8.50	$ 12,035.39
Unclassified Excavation	1	LS	$ 75,000.00	$ 75,000.00
6" Limerock Base Course	1416	CY	$ 55.00	$ 77,876.08
4.0" - Plant Mix Bituminous Surface Course	1954	TONS	$ 125.00	$ 244,250.00
Bituminous Prime Coat	3186	GAL	$ 2.50	$ 7,964.60
Runway & Taxiway Painting	6485	SF	$ 1.00	$ 6,485.00
L-858 Airfield Sign	3	EA	$ 4,500.00	$ 13,500.00
2 Way 2"Concrete Encased Duct	45	LF	$ 35.00	$ 1,575.00
1/c #8, 5 kV L-824 Type C Cable in Duct	2270	LF	$ 1.50	$ 3,404.25
#6 Bare Conterpoise Wire	1513	LF	$ 1.25	$ 1,891.25
Vault Work	1	LS	$ 7,500.00	$ 7,500.00
Taxiway Lights (LED)	10	EA	$ 1,000.00	$ 10,086.67
2" PVC Conduit in Trench	1513	LF	$ 3.50	$ 5,295.50
10 FT, 3/4" DIA Copper Ground Rods	3	EA	$ 75.00	$ 226.95
Solid Sodding	2545	SY	$ 4.00	$ 10,178.93
Temporary Silt Fence	2290	LF	$ 3.50	$ 8,015.91
Drainage @ 30% of taxiway cost				$ 145,585.66
Mobilization @ 20% of construction costs	1	LS		$ 126,174.24
TOTAL CONSTRUCTION COSTS				**$ 757,045.43**

Engineering	$ 150,000.00

Contingencies @ 10% (Construction + Engineering)	$ 90,704.54

TOTAL PROJECT COST	**$ 998,000.00**

F: Precision Approach to Relocate Runway 6 End

Item	Quantity	Unit	Unit Price	Amount
Planning Including FAA Coordination	1	LS	$ 30,000.00	$ 30,000.00
FAA 18B Survey	1	LS	$ 100,000.00	$ 100,000.00
TOTAL PROJECT COSTS				**$ 130,000.00**

Contingencies @ 10% Project Costs	$ 13,000.00
TOTAL PROJECT COST	**$ 143,000.00**

G: East Apron Hangar Development

Item	Quantity	Unit	Unit Price	Amount
Three Corporate Hangars with concrete slab	20625	SF	$50.00	$ 1,031,250.00
Site Work @ 25% of hangar cost				$ 257,812.50
Drainage @ 30% of hangar cost				$ 309,375.00
Mobilization @ 20% of construction costs	1	LS		$ 319,687.50
TOTAL CONSTRUCTION COSTS				**$ 1,918,125.00**

Engineering	$ 250,000.00

Contingencies @ 10% (Construction + Engineering)	$ 216,812.50

TOTAL PROJECT COST	**$ 2,385,000.00**

H: Landside Access Parking Lot to New West Development Area (Phase 1)

Item	Quantity	Unit	Unit Price	Amount
6" Stripping and Stockpiling	868	CY	$8.50	$ 7,381.29
6" Limerock Base Course	868	CY	$55.00	$ 47,761.29
2" - Plant Mix Bituminous Surface Course	599	TONS	$125.00	$ 74,898.38
Unclassified Excavation	1	LS	$75,000.00	$ 75,000.00
Bituminous Prime Coat	1954	GAL	$2.50	$ 4,884.68
Painting	2839	SF	$1.00	$ 2,839.00
Solid Sodding	4113	SY	$4.00	$ 16,451.37
Temporary Silt Fence	3702	LF	$3.50	$ 12,955.46
Water Main (8" PVC)	1000	LF	$100.00	$ 100,000.00
Fire Hydrant	3	EA	$5,000.00	$ 15,000.00
Power (Underground) 2 Way 4"	100	LF	$12.50	$ 1,250.00
Drainage @ 30% of parking lot cost				$ 107,526.44
Mobilization @ 20% of construction costs	1	LS		$ 93,189.58
TOTAL CONSTRUCTION COSTS				**$ 559,137.49**

Engineering	$ 100,000.00

Contingencies @ 10% (Construction + Engineering)	$ 65,913.75

TOTAL PROJECT COST	**$ 726,000.00**

I: West Side Hangar Development (Phase 1)

Clear Span Hangars

Item	Quantity	Unit	Unit Price	Amount
Two Corporate Hangars with concrete slab	5400	SF	$ 50.00	$ 270,000.00
Site Work @ 25% of hangar cost				$ -
Drainage @ 30% of hangar cost				$ -
Mobilization @ 20% of construction costs	1	LS		$ -
				$ 270,000.00

T-Hangar

Item	Quantity	Unit	Unit Price	Amount
12,500 Corporate Hangar (Five, 50' x 50' partions)	1	EA	$ 500,000.00	$ 500,000.00
8 unit T-Hangar	1	EA	$ 400,000.00	$ 400,000.00
Site Work including drainage @ 15% of hangar costs	1	LS	$ 75,000.00	$ 75,000.00
Power @ 5% of hangar costs	1	LS	$ 25,000.00	$ 25,000.00
Mobilization @ 20% of construction costs	1	LS		$ 200,000.00
				$ 1,200,000.00

Taxilane

Item	Quantity	Unit	Unit Price	Amount
6" Stripping and Stockpiling	2751	CY	$ 8.50	$ 23,382.70
Unclassified Excavation	1	LS	$ 75,000.00	$ 75,000.00
6" Limerock Base Course	2751	CY	$ 55.00	$ 151,299.84
4.0" - Plant Mix Bituminous Surface Course	1266	TONS	$ 125.00	$ 158,250.00
Bituminous Prime Coat	2063	GAL	$ 2.50	$ 5,157.95
Runway & Taxiway Painting	8814	SF	$ 1.00	$ 8,814.00
L-858 Airfield Sign	2	EA	$ 4,500.00	$ 9,000.00
2 Way 2"Concrete Encased Duct	45	LF	$ 35.00	$ 1,575.00
1/c #8, 5 kV L-824 Type C Cable in Duct	720	LF	$ 1.50	$ 1,080.00
#6 Bare Conterpoise Wire	480	LF	$ 1.25	$ 600.00
Vault Work	1	LS	$ 5,000.00	$ 5,000.00
Taxiway Lights (LED)	4	EA	$ 1,000.00	$ 4,000.00
2" PVC Conduit in Trench	480	LF	$ 3.50	$ 1,680.00
10 FT, 3/4" DIA Copper Ground Rods	1	EA	$ 75.00	$ 75.00
Solid Sodding	3267	SY	$ 4.00	$ 13,067.28
Temporary Silt Fence	3340	LF	$ 3.50	$ 11,690.00
Drainage @ 30% of taxiway cost				$ 140,901.53
Mobilization @ 20% of construction costs	1	LS		$ 122,114.66
				$ 732,687.95
TOTAL CONSTRUCTION COSTS				**$ 2,202,687.95**

Engineering	$ 350,000.00
Contingencies @ 10% (Construction + Engineering)	$ 255,268.80
TOTAL PROJECT COST	**$ 2,808,000.00**

J: Install MALSR on Runway 6

Item	Quantity	Unit	Unit Price	Amount
Cost Benefit Analysis for MALSR on RW 6	1	LS	$ 25,000.00	$ 25,000.00
Short Form EA for MALSR on RW 6	1	LS	$ 20,000.00	$ 20,000.00
Install MALSR System Complete on Runway 6	1	LS	$ 850,000.00	$ 850,000.00
TOTAL CONSTRUCTION COSTS				**$ 895,000.00**

Contingencies @ 10% Project Costs	$ 89,500.00

TOTAL PROJECT COST	**$ 985,000.00**

K: Construct Taxiway Charlie (Partial Parallel to Runway 17-35)

Item	Quantity	Unit	Unit Price	Amount
6" Stripping and Stockpiling	1202	CY	$ 8.50	$ 10,216.29
6" Limerock Base Course	1202	CY	$ 55.00	$ 66,105.41
Unclassified Excavation	1	LS	$ 100,000.00	$ 100,000.00
4.0" - Plant Mix Bituminous Surface Course	1658	TONS	$ 125.00	$ 207,250.00
Bituminous Prime Coat	2704	GAL	$ 2.50	$ 6,760.78
Runway & Taxiway Painting	12136	SF	$ 1.00	$ 12,136.00
L-858 Airfield Sign	2	EA	$ 4,500.00	$ 9,000.00
2 Way 2"Concrete Encased Duct	285	LF	$ 35.00	$ 9,975.00
1/c #8, 5 kV L-824 Type C Cable in Duct	5483	LF	$ 1.50	$ 8,223.75
#6 Bare Conterpoise Wire	3655	LF	$ 1.25	$ 4,568.75
Vault Work	1	LS	$ 10,000.00	$ 10,000.00
Taxiway Lights (LED)	24	EA	$ 1,000.00	$ 24,366.67
2" PVC Conduit in Trench	3655	LF	$ 3.50	$ 12,792.50
10 FT, 3/4" DIA Copper Ground Rods	7	EA	$ 75.00	$ 548.25
Solid Sodding	4061	SY	$ 4.00	$ 16,244.44
Temporary Silt Fence	3655	LF	$ 3.50	$ 12,792.50
Drainage @ 30% of apron cost				$ 153,294.10
Mobilization @ 20% of construction costs	1	LS		$ 132,854.89
TOTAL CONSTRUCTION COSTS				**$ 797,129.33**

Engineering	$ 85,000.00

Contingencies @ 10% (Construction + Engineering)	$ 88,212.93

TOTAL PROJECT COST	**$ 971,000.00**

L: Construct Aircraft Run-up Areas

Item	Quantity	Unit	Unit Price	Amount
L-1: Construct Aircraft Run-up Area Runway 24 End				
6" Stripping and Stockpiling	598	CY	$8.50	$ 5,081.69
6" Limerock Base Course	598	CY	$55.00	$ 32,881.50
Unclassified Excavation	1	LS	$75,000.00	$ 75,000.00
2.0" - Plant Mix Bituminous Surface Course	413	TONS	$125.00	$ 51,564.18
Bituminous Prime Coat	1345	GAL	$2.50	$ 3,362.88
Runway & Taxiway Painting	3470	SF	$1.00	$ 3,470.00
Solid Sodding	678	SY	$4.00	$ 2,711.11
Temporary Silt Fence	61	LF	$3.50	$ 213.50
Drainage @ 30% of apron cost				$ 52,285.46
Mobilization @ 20% of construction costs	1	LS		$ 45,314.06
L-1: Construct Aircraft Run-up Area Runway 6 End				
6" Stripping and Stockpiling	470	CY	$8.50	$ 3,996.80
6" Limerock Base Course	470	CY	$55.00	$ 25,861.67
Unclassified Excavation	1	LS	$ 75,000.00	$ 75,000.00
2.0" - Plant Mix Bituminous Surface Course	324	TONS	$ 125.00	$ 40,555.80
Bituminous Prime Coat	1058	GAL	$ 2.50	$ 2,644.94
Runway & Taxiway Painting	2633	SF	$ 1.00	$ 2,633.00
Solid Sodding	441	SY	$ 4.00	$ 1,764.44
Temporary Silt Fence	40	LF	$ 3.50	$ 138.95
Drainage @ 30% of apron cost				$ 45,778.68
Mobilization @ 20% of construction costs	1	LS		$ 39,674.86
TOTAL CONSTRUCTION COSTS				**$ 509,933.53**

Engineering	$ 80,000.00
Contingencies @ 10% (Construction + Engineering)	$ 58,993.35
TOTAL PROJECT COST	**$ 649,000.00**

M: Western Airport Access Improvement

Item	Quantity	Unit	Unit Price	Amount
6" Stripping and Stockpiling	1283	CY	$8.50	$ 10,905.46
6" Limerock Base Course	1283	CY	$55.00	$ 70,564.74
2" - Plant Mix Bituminous Surface Course	885	TONS	$125.00	$ 110,658.35
Unclassified Excavation	1	LS	$75,000.00	$ 75,000.00
Bituminous Prime Coat	2887	GAL	$2.50	$ 7,216.85
Painting	4155	SF	$1.00	$ 4,155.00
Solid Sodding	6153	SY	$4.00	$ 24,612.50
Temporary Silt Fence	554	LF	$3.50	$ 1,938.23
Water Main (8" PVC)	2769	LF	$100.00	$ 276,890.58
Fire Hydrant	3	EA	$5,000.00	$ 13,844.53
Power (Underground) 2 Way 4"	2769	LF	$12.50	$ 34,611.32
Drainage @ 30% of parking lot cost				$ 189,119.27
Mobilization @ 20% of construction costs	1	LS		$ 163,903.37
TOTAL CONSTRUCTION COSTS				**$ 983,420.19**

Engineering	$ 150,000.00

Contingencies @ 10% (Construction + Engineering)	$ 113,342.02

TOTAL PROJECT COST	**$ 1,247,000.00**

N: Corporate Aviation Hangar Development (Phase 1)

Parking Lot

Item	Quantity	Unit	Unit Price	Amount
6" Stripping and Stockpiling	81	CY	$ 8.50	$ 692.59
Unclassified Excavation	1	LS	$ 50,000.00	$ 50,000.00
6" Limerock Base Course	81	CY	$ 55.00	$ 4,481.48
1.25" - Plant Mix Bituminous Surface Course	35	TONS	$ 125.00	$ 4,392.36
Bituminous Prime Coat	183	GAL	$ 2.50	$ 458.33
Painting	1538	SF	$ 1.00	$ 1,538.00
Solid Sodding	1531	SY	$ 4.00	$ 6,124.44
Temporary Silt Fence	1378	LF	$ 3.50	$ 4,823.00
Drainage @ 30% of parking lot cost				$ 21,753.06
Mobilization @ 20% of construction costs	1	LS		$ 18,852.66
				$ 113,115.93

Corporate Hangars

Item	Quantity	Unit	Unit Price	Amount
Three Hangars with concrete slab	23800	SF	$50.00	$ 1,190,000.00
Site Work @ 25% of hangar cost	1	LS		$ 297,500.00
Drainage @ 30% of hangar cost	1	LS		$ 446,250.00
Mobilization @ 20% of construction costs	1	LS		$ 386,750.00
				$ 2,320,500.00

Taxilane

Item	Quantity	Unit	Unit Price	Amount
6" Stripping and Stockpiling	636	CY	$ 8.50	$ 5,410.09
Unclassified Excavation	1	LS	$ 50,000.00	$ 50,000.00
6" Limerock Base Course	636	CY	$ 55.00	$ 35,006.48
4.0" - Plant Mix Bituminous Surface Course	878	TONS	$ 125.00	$ 109,750.00
Bituminous Prime Coat	1432	GAL	$ 2.50	$ 3,580.21
Runway & Taxiway Painting	302	SF	$ 1.00	$ 302.00
Solid Sodding	1809	SY	$ 4.00	$ 7,235.56
Temporary Silt Fence	1628	LF	$ 3.50	$ 5,698.00
Drainage @ 30% of taxiway cost				$ 65,094.70
Mobilization @ 20% of construction costs	1	LS		$ 56,415.41
				$ 338,492.45
TOTAL CONSTRUCTION COSTS				**$ 2,772,108.38**

Engineering	$ 375,000.00
Contingencies @ 10% (Construction + Engineering)	$ 314,710.84
TOTAL PROJECT COST	**$ 3,462,000.00**

O: Westside Roadway Improvements

Item	Quantity	Unit	Unit Price	Amount
6" Stripping and Stockpiling	1665	CY	$8.50	$ 14,156.25
6" Limerock Base Course	1665	CY	$55.00	$ 91,599.29
2" - Plant Mix Bituminous Surface Course	1149	TONS	$125.00	$ 143,644.35
Unclassified Excavation	1	LS	$75,000.00	$ 75,000.00
Bituminous Prime Coat	3747	GAL	$2.50	$ 9,368.11
Painting	5250	SF	$1.00	$ 5,250.00
Solid Sodding	6527	SY	$4.00	$ 26,107.12
Temporary Silt Fence	5874	LF	$3.50	$ 20,559.35
Water Main (8" PVC)	2937	LF	$100.00	$ 293,705.06
Fire Hydrant	3	EA	$5,000.00	$ 14,685.25
Power (Underground) 2 Way 4"	100	LF	$12.50	$ 1,250.00
Drainage @ 30% of parking lot cost				$ 208,597.44
Mobilization @ 20% of construction costs	1	LS		$ 180,784.45
TOTAL CONSTRUCTION COSTS				**$ 1,084,706.67**

Engineering	$ 150,000.00

Contingencies @ 10% (Construction + Engineering)	$ 123,470.67

TOTAL PROJECT COST	**$ 1,359,000.00**

P: West Side Hanagar Development (Phase 2)

T-Hangars

Item	Quantity	Unit	Unit Price	Amount
Two, 8 unit T-Hangar	2	LS	$ 400,000.00	$ 800,000.00
				$ 800,000.00

Corporate Hangars

Item	Quantity	Unit	Unit Price	Amount
12,500 Corporate Hangar (Five, 50' x 50' partions)	1	LS	$500,000.00	$ 500,000.00
				$ 500,000.00

Taxilane and Aprons

Item	Quantity	Unit	Unit Price	Amount
6" Stripping and Stockpiling	9398	CY	$ 8.50	$ 79,883.00
Unclassified Excavation	1	LS	$ 100,000.00	$ 100,000.00
6" Limerock Base Course	9398	CY	$ 55.00	$ 516,890.00
4.0" - Plant Mix Bituminous Surface Course	12970	TONS	$ 125.00	$ 1,621,250.00
Bituminous Prime Coat	21144	GAL	$ 2.50	$ 52,860.00
Runway & Taxiway Painting	19664	SF	$ 1.00	$ 19,664.00
L-858 Airfield Sign	8	EA	$ 4,500.00	$ 36,000.00
2 Way 2"Concrete Encased Duct	270	LF	$ 35.00	$ 9,450.00
1/c #8, 5 kV L-824 Type C Cable in Duct	5064	LF	$ 1.50	$ 7,596.00
#6 Bare Conterpoise Wire	2374	LF	$ 1.25	$ 2,967.50
Vault Work	1	LS	$ 10,000.00	$ 10,000.00
Taxiway Lights (LED)	19	EA	$ 1,000.00	$ 19,000.00
2" PVC Conduit in Trench	2374	LF	$ 3.50	$ 8,309.00
10 FT, 3/4" DIA Copper Ground Rods	4	EA	$ 75.00	$ 300.00
Solid Sodding	6094	SY	$ 4.00	$ 24,376.00
Temporary Silt Fence	5485	LF	$ 3.50	$ 19,197.50
Drainage @ 30% of taxiway cost				$ 758,322.90
Mobilization @ 10% of construction costs	1	LS		$ 458,606.59
				$ 3,744,672.49
TOTAL CONSTRUCTION COSTS				**$ 5,044,672.49**

Engineering	$ 350,000.00
Contingencies @ 10% (Construction + Engineering)	$ 539,467.25
TOTAL PROJECT COST	**$ 5,935,000.00**

Q: Corporate Aviation Hangar Development (Phase 2)

Parking Lot

Item	Quantity	Unit	Unit Price	Amount
6" Stripping and Stockpiling	81	CY	$ 8.50	$ 692.59
Unclassified Excavation	1	LS	$ 50,000.00	$ 50,000.00
6" Limerock Base Course	81	CY	$ 55.00	$ 4,481.48
1.25" - Plant Mix Bituminous Surface Course	35	TONS	$ 125.00	$ 4,392.36
Bituminous Prime Coat	183	GAL	$ 2.50	$ 458.33
Painting	1538	SF	$ 1.00	$ 1,538.00
Solid Sodding	1531	SY	$ 4.00	$ 6,124.44
Temporary Silt Fence	1378	LF	$ 3.50	$ 4,823.00
Drainage @ 30% of parking lot cost				$ 21,753.06
Mobilization @ 20% of construction costs	1	LS		$ 18,852.66
				$ 113,115.93

Corporate Hangars

Item	Quantity	Unit	Unit Price	Amount
Three Hangars with concrete slab	23800	SF	$50.00	$ 1,190,000.00
Site Work @ 25% of hangar cost	1	LS		$ 297,500.00
Drainage @ 30% of hangar cost	1	LS		$ 446,250.00
Mobilization @ 20% of construction costs	1	LS		$ 386,750.00
				$ 2,320,500.00

Taxilane

Item	Quantity	Unit	Unit Price	Amount
6" Stripping and Stockpiling	636	CY	$ 8.50	$ 5,410.09
Unclassified Excavation	1	LS	$ 50,000.00	$ 50,000.00
6" Limerock Base Course	636	CY	$ 55.00	$ 35,006.48
4.0" - Plant Mix Bituminous Surface Course	878	TONS	$ 125.00	$ 109,750.00
Bituminous Prime Coat	1432	GAL	$ 2.50	$ 3,580.21
Runway & Taxiway Painting	302	SF	$ 1.00	$ 302.00
Solid Sodding	1809	SY	$ 4.00	$ 7,235.56
Temporary Silt Fence	1628	LF	$ 3.50	$ 5,698.00
Drainage @ 30% of taxiway cost				$ 65,094.70
Mobilization @ 20% of construction costs	1	LS		$ 56,415.41
				$ 338,492.45
TOTAL CONSTRUCTION COSTS				**$ 2,772,108.38**

Engineering	$ 375,000.00
Contingencies @ 10% (Construction + Engineering)	$ 314,710.84
TOTAL PROJECT COST	**$ 3,462,000.00**

R: West Side Hanagar Development (Phase 3)

T-Hangars

Item	Quantity	Unit	Unit Price	Amount
Two, 8 unit T-Hangar	2	LS	$ 400,000.00	$ 800,000.00
Site Work including drainage @ 15% of hangar costs	1	LS	$ 120,000.00	$ 120,000.00
Drainage @ 30% of hangar cost	1	LS		$ 276,000.00
Power @ 5% of hangar costs	1	LS	$ 40,000.00	$ 40,000.00
Mobilization @ 20% of construction costs	1	LS		$ 247,200.00
				$ 1,483,200.00

Corporate Hangars

Item	Quantity	Unit	Unit Price	Amount
Two,12,500 Corporate Hangar (Five, 50' x 50' partions	1	LS	$1,000,000.00	$ 1,000,000.00
Site Work @ 25% of hangar cost	1	LS		$ 250,000.00
Drainage @ 30% of hangar cost	1	LS		$ 375,000.00
Mobilization @ 20% of construction costs	1	LS		$ 325,000.00
				$ 1,950,000.00

Taxilane and Aprons

TOTAL CONSTRUCTION COSTS		**$ 3,433,200.00**

Engineering	$ 350,000.00

Contingencies @ 10% (Construction + Engineering)	$ 378,320.00

TOTAL PROJECT COST	**$ 4,162,000.00**

S: Corporate Aviation Hangar Development (Phase 3)

Parking Lot

Item	Quantity	Unit	Unit Price	Amount
6" Stripping and Stockpiling	81	CY	$ 8.50	$ 692.59
Unclassified Excavation	1	LS	$ 50,000.00	$ 50,000.00
6" Limerock Base Course	81	CY	$ 55.00	$ 4,481.48
1.25" - Plant Mix Bituminous Surface Course	35	TONS	$ 125.00	$ 4,392.36
Bituminous Prime Coat	183	GAL	$ 2.50	$ 458.33
Painting	1538	SF	$ 1.00	$ 1,538.00
Solid Sodding	1531	SY	$ 4.00	$ 6,124.44
Temporary Silt Fence	1378	LF	$ 3.50	$ 4,823.00
Drainage @ 30% of parking lot cost				$ 21,753.06
Mobilization @ 20% of construction costs	1	LS		$ 18,852.66
				$ 113,115.93

Corporate Hangars

Item	Quantity	Unit	Unit Price	Amount
Three Hangars with concrete slab	23800	SF	$50.00	$ 1,190,000.00
Site Work @ 25% of hangar cost	1	LS		$ 297,500.00
Drainage @ 30% of hangar cost	1	LS		$ 446,250.00
Mobilization @ 20% of construction costs	1	LS		$ 386,750.00
				$ 2,320,500.00

Taxilane

Item	Quantity	Unit	Unit Price	Amount
6" Stripping and Stockpiling	636	CY	$ 8.50	$ 5,410.09
Unclassified Excavation	1	LS	$ 50,000.00	$ 50,000.00
6" Limerock Base Course	636	CY	$ 55.00	$ 35,006.48
4.0" - Plant Mix Bituminous Surface Course	878	TONS	$ 125.00	$ 109,750.00
Bituminous Prime Coat	1432	GAL	$ 2.50	$ 3,580.21
Runway & Taxiway Painting	302	SF	$ 1.00	$ 302.00
Solid Sodding	1809	SY	$ 4.00	$ 7,235.56
Temporary Silt Fence	1628	LF	$ 3.50	$ 5,698.00
Drainage @ 30% of taxiway cost				$ 65,094.70
Mobilization @ 20% of construction costs	1	LS		$ 56,415.41
				$ 338,492.45
TOTAL CONSTRUCTION COSTS				**$ 2,772,108.38**

Engineering	$ 375,000.00
Contingencies @ 10% (Construction + Engineering)	$ 314,710.84
TOTAL PROJECT COST	**$ 3,462,000.00**

Appendix B
Common Aviation Acronyms

COMMON AVIATION ACRONYMS

AC	Advisory Circular
ADA	Americans with Disabilities Act
ADAP	Airport Development Aid Program
ADF	Automatic Direction Finder
ADG	Airplane Design Group
ADO	Airport District Office
AFD	Airport/Facility Directory
AFSS	Automated Flight Service Station
AGL	Above Ground Level
AIP	Airport Improvement Program
ALP	Airport Layout Plan
ALS	Approach Light System
AMSL	Above Mean Sea Level
AOA	Airport Operations Area
ARC	Airport Reference Code
ARFF	Aircraft Rescue and Fire Fighting Facilities
ARP	Airport Reference Point
ARPT	Airport
ARTCC	Air Route Traffic Control Center
ARTS	Automated Radar Terminal System
ASL	Above Sea Level
ASOS	Automated Surface Observation System
ASR	Airport Surveillance Radar
AST	Above Ground Storage Tank
ASTM	American Society for Testing and Materials
ASV	Annual Service Volume
ATC	Air Traffic Control
ATCT	Air Traffic Control Tower
ATIS	Automatic Terminal Information Service
AVGAS	Aviation Gasoline
AWOS	Automated Weather Observing System
BRL	Building Restriction Line
CAD	Computer Aided Design
CAT I-III	Category I, II, III ILS Approach
CIP	Capital Improvements Program
CTAF	Common Traffic Advisory Frequency
DA	Decision Altitude
DH	Decision Height
DME	Distance Measuring Equipment
DNL	Day-Night Sound Level
DOT	Department of Transportation
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ERG	Effective Runway Gradient
FAA	Federal Aviation Administration
FAAP	Federal Aid Airport Program
FAR	Federal Aviation Regulation
FBO	Fixed Base Operator
FCT	Federal Contract Tower
FEMA	Federal Emergency Management Agency
FOD	Foreign Object Debris
FONSI	Finding of No Significant Impact
FSS	Flight Service Station
FTZ	Foreign Trade Zone
GA	General Aviation
GAMA	General Aviation Manufacturers Association
GAO	General Accounting Office
GPS	Global Positioning Satellites
GS	Glide Slope
HIRL	High Intensity Runway Lights
HITL	High Intensity Taxiway Lights
HIWAS	Hazardous In-flight Weather Advisory Service
IAP	Instrument Approach Procedure
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
ILS	Instrument Landing System

IM	Inner Marker
IMC	Instrument Meteorological Conditions
INM	Integrated Noise Model
LAAS	Local Area Augmentation System
LAHSO	Land and Hold Short Operations
LLWAS	Low-Level Wind Shear Alert System
LNAV	Lateral Navigation
LOA	Letter of Agreement
LOC	Localizer
LP	Localizer Performance
MALS	Medium Intensity Approach Lighting System
MALSF	Medium Intensity Approach Light System
MALSR	Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights
MB	Marker Beacon
MDA	Minimum Descent Altitude
MGW	Maximum Gross Weight
MIRL	Medium Intensity Runway Lights
MITL	Medium Intensity Taxiway Lights
MM	Middle Marker
MOA	Military Operating Area
MSA	Metropolitan Statistical Area
MSL	Mean Sea Level
NAS	National Airspace System
NAVAIDS	Navigational Aids
NCP	Noise Compatibility Program
NDB	Non-Directional Beacon
NEM	Noise Exposure Map
NOAA	National Oceanic and Atmospheric Administration
NOTAM	Notice to Airmen
NPI	Non-precision Instrument
NPIAS	National Plan of Integrated Airport Systems
NPL	National Priority List
ODALS	Omnidirectional Approach Light Systems
OFA	Object Free Area
OFZ	Object Free Zone
OM	Outer Marker
PA	Precision Approach
PAPI	Precision Approach Path Indicator
PAX	Passengers
PIR	Precision Instrument Runway
PMPP	Pavement Maintenance Management Program
PVC	Poor Visibility and Ceiling Conditions
RAIL	Runway Alignment Indicator Light
RCO	Remote Communications Outlet
REIL	Runway End Identification Lights
RNAV	Area Navigation
ROFA	Runway Object Free Area
RPZ	Runway Protection Zone
RSA	Runway Safety Area
RVR	Runway Visual Range
RVZ	Runway Visibility Zone
RW	Runway
SEL	Sound Exposure Level
SSALF	Simplified Short Approach Lighting System with Sequenced Flashers
SSALS	Simplified Short Approach Lighting System
SSALSR	Simplified Short Approach Lighting System with Runway Alignment Indicator Lights
TAC	Technical Advisory Committee
TACAN	Tactical Air Navigation
TAF	Terminal Area Forecasts
TAP	Terminal Area Plan
TDZ	Touchdown Zone
TDZE	Touchdown Zone Elevation
TERPS	Terminal Instrument Procedures
TOFA	Taxiway Object Free Area
TRACON	Terminal Radar Approach Control Facility
TRSA	Terminal Radar Service Area
TSA	Transportation Security Administration
TW	Taxiway

USGS	United States Geological Survey
VASI	Visual Approach Slope Indicator
VFR	Visual Flight Rules
VHF	Very High Frequency
VMC	Visual Meteorological Conditions
VOR	VHF Omni-Directional Radar Beacon
VORDME	VHF Omni-Directional Radar Beacon with Distance Measuring Equipment
VORTAC	VHF Omni-directional Range Beacon with Tactical Aircraft Approach and Navigation
WAAS	Wide Area Augmentation System

Appendix C
Meetings and Workshops

MEETINGS AND WORKSHOPS

The following table provides a summary of the key public meetings, workshops, and other outreach efforts held as part of the development of the Lake Wales Airport Master Plan.

Thursday, October 20, 2011	Conducted on-site facility inventory and interviews with FBO management and Airport tenants.
Monday, June 04, 2012	Airport Authority Briefing - Aeronautical Forecast Overview.
Monday, July 30, 2012	Master Plan Strategy Meeting with City Staff.
Monday, October 01, 2012	Planning Charrette with City Staff.
Thursday, October 18, 2012	Airport Authority Briefing - Demand/Capacity & Facility Requirements Overview.
Tuesday, November 06, 2012	Board of County Commissioners Workshop - Development Alternatives.
Tuesday, November 06, 2012	Public Outreach Workshop - Development Alternatives.

END OF FINAL DRAFT - BACK COVER