MARION COUNTY AIRPORT MASTER PLAN

JANUARY 2010

U.S. Department
of Transportation
**Federal Aviation
Administration**

Orlando Airports District Office
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RECEIVED
JUN 09 2008
Hoyle, Tanner & Assoc., Inc.
ORLANDO

June 5, 2008

Mr. Roy Sieger
Marion County Airport Supervisor
601 SE 25th Ave
Ocala, FL 34471

Dear Mr. Sieger:

RE: Marion County Airport (X35), Dunnellon, FL
Airport Master Plan Update
Forecasts of Aviation Demand

This letter is in response to your consultant's May 21, 2008 submittal of the Inventory and Forecasts of Aviation Demand to be included in the on-going Airport Master Plan Update for the Marion County Airport (X35).

As you know, X35 is not obligated to seek Federal Aviation Administration (FAA) approval for the Forecasts of Aviation Demand, as the airport is not currently obligated through the terms and conditions of accepting airport improvement program grants (grant assurances). However, we understand Marion County, the sponsor of X35, may apply for federal grants in the future, so it would be appropriate to seek FAA approval at this time.

In reviewing the documentation submitted by your consultant, we find the forecasts are not consistent with the FAA's Terminal Area Forecasts. Projections for both based aircraft and operations vary significantly from previous FAA projections. However, the methods used to create these forecasts and the underlying assumptions appear rational, and to be developed in accordance with FAA guidance. Further, the resulting forecasts of operations and based aircraft appear reasonable. Therefore, we concur with the use of these forecasts for the development of the on-going Airport Master Plan and Airport Layout Plan.

The documentation provided by your consultant indicates the Airport Master Record (Form 5010) incorrectly states the current number of based aircraft, as well as operations. The FAA

requests you update this information annually, either through your annual airport inspection, or when the FAA contacts you by U.S. Mail to update the 5010.

Sincerely,

Original Signed By

Rebecca R. Henry
Program Manager
Planning and Compliance

cc: Doug DiCarlo, Hoyle, Tanner & Assoc., Orlando

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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 Marion County Airport was completed in 1993. Since that time, there have been changes in the environment surrounding the airport and aviation industry, as well as the current leadership's vision for the airport.

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 Marion County. 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 Marion County. 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, Change 15, "Airport Design," and the FDOT "Guidebook for Airport Master Planning."

AIRPORT SETTING

The airport is located in Marion County, Florida, between the City of Dunnellon and City of Ocala. Marion County is positioned in the southern half of North Central Florida and comprises some 1,663 square miles of land. Bordering counties include Alachua County to the north; Putnam County to the northeast; Volusia County to the east; Lake County to the southeast; Sumter County to the south; Citrus County to the southwest; and Levy County to the west.

Location

The airport is on the west side of the County just north of SW Highway 484 (which is also called County Road 484 or Ned Folks Highway). Current airport property consists of 792 acres of land with an airfield elevation of 66 feet above mean sea level. Public access to the airport is via SW 147th Court which comes off SW Highway 484. Vehicle access to the various airfield facilities is provided via SW 111th Street, SW 110th Street, or SW 147th Circle, all of which come directly off SW 147th Court.

History

The initial development of the airfield began in 1941 with an agreement between Marion County and the federal government to construct a training base for the Army Air Corps on County property. In 1942 it was named the Dunnellon Army Airfield and consisted of three runways with facilities to support the Army Air Forces School of Applied Tactics. Pilots and crewmen were trained on the Waco CG-4A glider or to become C-47 Skytrain pilots. The airfield became a civilian airport after the federal government returned the property back to the county in 1945.

Administration

The airport is owned and operated by Marion County. Responsibility of the airport facilities fall under the County's Public Works Bureau. A full time Airport Manager works under the Public Works Bureau Chief who ultimately reports to the Board of County Commissioners. The Airport Manager's office is located on the east side of the airfield in the general aviation terminal.

Role in National Air Transportation System

Marion County 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 (2007-2011) classifies the Marion County Airport 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.

State System Plan

Marion County Airport is also one of the 14 public-use airports in the North 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. Thirteen of the airports in this region, including Marion County, are designated as community airports. The 14th, Gainesville Regional, is designated as a commercial airport since it supports regularly scheduled air carrier operations.

The most recent system plan (FASP 2025) lists Marion County as an airport providing only the general aviation roles of flight training and recreational/sport. As detailed in the aviation activity forecasts chapter, the airport's services and users have evolved to also include business and corporate aircraft activity. Ultimately the system plan will need to be updated to reflect the changes in the general aviation roles that the Marion County Airport serves.

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

Marion County Airport has an elevation of 66 feet above mean sea level and is located approximately 24 nautical miles inland from the Gulf of Mexico. As with most of Florida's west coast, the surrounding land is relatively flat with a gradual slope towards the Gulf of Mexico. The average high temperature is 92 degrees Fahrenheit in July, while the average low is around

44 degrees Fahrenheit in January. Rainfall in this area occurs during all seasons; however, it is more abundant during the summer when daily showers are common. Historic data shows an average 52 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 the Marion County Airport, as well as the associated ARC criteria, is addressed in the facility requirements chapter.

Table 1-1
WIND COVERAGE ANALYSIS

	Crosswind Component	
	10.5 knots (12 mph)	**13 knots (15 mph)**
All Weather Conditions		
Runway 05-23	98.42%	99.34%
Runway 09-27	97.04%	98.39%
Combined (05-23 & 09-27)	99.00%	99.68%
Deactivated Runway 14-32	95.69%	97.64%
VFR Conditions (ceiling > 1,000 feet and visibility > 3 miles)		
Runway 05-23	98.38%	99.33%
Runway 09-27	96.99%	98.37%
Combined (05-23 & 09-27)	98.99%	99.69%
Deactivated Runway 14-32	95.48%	97.53%
IFR Conditions (ceiling 200 to 1,000 feet and visibility 0.5 to 3 miles)		
Runway 05-23	98.51%	99.32%
Runway 09-27	97.02%	98.25%
Combined (05-23 & 09-27)	98.86%	99.58%
Deactivated Runway 14-32	97.93%	99.00%

Source: National Climatic Data Center: Ocala International Airport – January 1998 to December 2007.

FAA AC 150/5300-13, Change 15, “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 is not available from the airport, the data from Ocala International Airport was utilized. Only the

10.5 and 13 knot crosswind components were calculated using the FAA's Airport Design software (version 4.2D). While aircraft in higher wind groups are expected to operate at the airfield, the individual runway calculations exceed 99 percent coverage in all conditions.

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 1993 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 1993 Master Plan, a count of 35 aircraft was made in 1991. This figure is considered accurate given that in 1991 three of the current t-hangar buildings, as well as a number of the other hangar facilities had not been constructed.

County airport records and a count made for this study confirmed 86 based aircraft at the Marion County Airport in 2008. While only the based aircraft counts for 1991 and 2008 are shown in **Table 1-2**, the other historic based aircraft counts are described in the aviation activity forecasts chapter.

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.

Because there is no air traffic control tower at Marion County, 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 simply carried over. This has been the case at the Marion County Airport and has resulted in historic operations that are not reliable. Most sources show the 1991 figure from the 1993 Airport Master Plan as the last true estimate made. For activity in 2008, a new estimate was based on discussions with airport management, review of fuel sales, and information gathered from the surveys and interviews conducted with airport tenants. The result is an estimate of 29,600 annual operations as shown in **Table 1-2**.

Table 1-2
BASED AIRCRAFT AND ACTIVITY COUNTS

	Based Aircraft	Annual Operations
1991	35	12,000
2008	86	29,600

Source: 1993 Airport Master Plan, airfield counts, interviews, and fuel sales.

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. A number of these facilities are illustrated in **Exhibit 1-1**.

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 environment, there are other safety-related criteria. These criteria are defined not only in FAA AC 150/5300-13, Change 15, but also by Federal Aviation Regulations (FAR) Part 77, "Objects Affecting Navigable Airspace." While there are various imaginary surfaces associated with each runway and taxiway, the criteria for each will be discussed in other chapters.

Runway 05-23

The primary runway, Runway 05-23, is 4,941 feet in length and 100 feet in width. Originally constructed of asphaltic concrete in 1942, the pavement surface had an asphalt overlay in 1989 for the center 4,300 feet of the runway. Just over 300 feet on the south end of the runway was also overlaid with asphalt in 1993 as part of the work on Runway 09-27. On the north end of the runway, the first 300 feet is still the original 1942 Portland cement concrete.

In 2008, FDOT published a pavement report for the Marion County Airport based on surveys and field work conducted in 2006. The Pavement Condition Index (PCI) assigned to the different portions of Runway 05-23 result in a fair rating. During the visual inspection conducted for this study in 2008 it was noted that portions of the runway surface is raveling and there are bad pavement joints along the entire length.

Currently there are no weight bearing capacities published for the runway. Since no recent testing of the pavement has been conducted, the actual strength is not known. The runway also has 25 foot paved shoulders on each side of the full strength pavement width. These shoulders exist from the original runway width of 150 feet which has not been maintained for some time. The shoulder pavement consists of significant block cracking, vegetative growth, some crumbling pavement, and patched trenches for the lighting cables.

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

PROJECT NO. **857501**

CADD NO. **857501e11**

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SCALE: **NONE** | DATE: **JAN. 2010**

MARION COUNTY AIRPORT
MARION COUNTY, FLORIDA

EXISTING AIRPORT FACILITIES
(2004 AERIAL IMAGE)

EXHIBIT

1-1

Runway 09-27

Runway 09-27 is the crosswind runway that has a published length of 4,702 feet and a width of 60 feet. The entire length of this runway was overlaid with asphalt in 1993. The FDOT pavement study assigned PCI ratings that show the asphalt surface to be in satisfactory condition. As with the primary runway, there are no weight bearing capacities published.

Deactivated Runway 14-32 Alignment

The airfield also has a third runway alignment, Runway 14-32, which was temporarily closed due to the deteriorating condition of the pavement. Before the runway was deactivated, it was published as having a length of 4,875 feet and a width of 150 feet. No PCI rating was given in the 2008 FDOT pavement report.

North-South Taxiway

The only active taxiway at the airport runs in a north-south direction, connecting the approach ends of Runway 23 and Runway 27. At 50 feet wide there is no information available about the strength of the asphalt pavement. The FDOT pavement report shows three distinctly different conditions for this taxiway.

On the south end, approximately 230 feet of the taxiway is considered to be in good condition as it was overlaid in 1993 during the Runway 09-27 project. At the north end, there is a small section that is rated as very poor. This is the portion that ties into the Runway 05-23 pavement, both of which are of the original 1942 construction. The majority or middle portion of the North-South Taxiway was overlaid with asphalt in 1989 and is rated in fair condition. A visual inspection conducted in 2008 showed some block cracking and locations along the taxiway where the aggregate is beginning to come out of the surface.

A number of old military hardstands off both sides of the North-South Taxiway still exist. In some instances new taxilanes or hangar aprons have been constructed on top of some of the old hardstand pavements. There are also a few that are used in their current deteriorated condition and some that just remain abandoned. Each is 50 feet wide with lengths varying between 150 to 260 feet off the North-South Taxiway.

T-hangar Taxilanes

There are three taxilanes off the west side of the North-South Taxiway that provide access to two t-hangar buildings. All three have a width of 20 feet, are of asphalt construction, and rated in the FDOT pavement report as in good condition. There are three additional taxilanes serving the two t-hangar buildings located on the east side of the North-South Taxiway. These newer taxilanes are also 20 feet wide but are of concrete and considered to be in excellent condition.

Deactivated East-West Taxiway Alignment

A taxiway which connects the approach ends of Runway 23 and Runway 14 is not currently open to aircraft movements due to the condition of the pavement. Much like the North-South Taxiway, this pavement is 50 feet wide and has a number of old military hardstands off both sides of the east-west alignment. The taxiway, which is still the original 1942 pavement, is rated as very poor in the FDOT pavement report. This is true for the various hardstands which are also 50 feet wide with lengths varying between 150 to 260 feet off the taxiway alignment.

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 far 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 Marion County

Currently, Marion County Airport has two published straight-in, non-precision instrument approaches to Runway 23. The first is through the use of Global Positioning Satellites (GPS) and the second is via the Ocala Very High Frequency Omnidirectional Radio Range (VOR).

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.
The VOR is a ground-based electronic navigation aid transmitting signals called radials. The VOR approach off the Ocala VOR also utilizes the Distance Measuring Equipment (DME) of that facility which allows pilots to determine their distances to or from the VOR. The Ocala VOR is approximately 10.5 nautical miles to the northeast of the airport.

Both approaches provide the same instrument landing minimums. For the straight-in and circle-to-land maneuver, the approaches provide an MDA of 474 feet above the Runway 23 touchdown zone elevation (540 feet above mean sea level) and one mile visibility. Slightly higher minimums apply to larger and higher performance aircraft.

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 located to the east of the North-South Taxiway, between SW 110th and SW 111th Streets.

Identification Lighting

Rotating beacons universally indicate the location and presence of an airport at night or in adverse weather conditions. The rotating beacon at the Marion County Airport is located just east of the North-South Taxiway, north of the airfield electrical vault. The 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 excellent 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 05-23 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 05-23 consist of base mounted light fixtures on cans placed 15 feet from the edge of the full strength runway width in the paved runway shoulder area. The cables run outside the paved shoulders via trenches that have been cut out to the edge and then patched with asphalt. The cables are then directly buried between each fixture, running along the outside of the runway shoulder pavement.

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 05-23 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 the aircraft on takeoff, indicating the end of usable runway.

On the Runway 05 end, each threshold light fixture is flush mounted on a can since this threshold overlaps a portion of Runway 09-27. Trenches with asphalt patches were dug to direct bury the cables between each can. The threshold lights on the Runway 23 end are stake mounted in the ground and have direct buried cable.

While the runway edge lighting is considered to be in good condition, the Runway 05 threshold lights are not. These flush mounted fixtures are constantly failing and require maintenance on a regular basis. A 7.5 kilowatt regulator in the airfield electrical vault powers the Runway 05-23 lighting circuit.

Runway 09-27 also has MIRLs and inboard threshold lights (three on each side) at each end. All of the Runway 09-27 lights consist of stake-mounted fixtures with direct buried cables and are considered to be in good condition. The edge lights are installed 10 feet off of the runway pavement edge. A 4.0 kilowatt regulator in the airfield electrical vault powers the Runway 09-27 lighting circuit.

Taxiway Lighting

The only taxiway lights on the airfield are sets of two fixtures located on each side of the approach end of Runway 23. On the west side these two fixtures identify the intersection with the North-South Taxiway while those on the east side previously indicated the intersection with the currently deactivated East-West Taxiway and the approach end of Runway 23. There are blue, reflective raised pavement markers along the entire centerline of the North-South Taxiway.

Pavement Markings

Pavement markings delineate the various movement areas of the airfield. Runway 05-23 has designation numbers, centerline striping, side stripes, and shoulder markings. Both ends of Runway 05-23 also have threshold bars, threshold markings, and aiming point markers. The designation markings identify the runways by their magnetic azimuth, while the threshold markings identify the beginning of the available landing area. All runway markings are painted

white and are outlined in black. The only exception is the shoulder markings which are yellow. Currently the markings for Runway 05-23 are faded and difficult to see under certain conditions.

Runway 09-27 only has designation numbers and centerline striping. These markings, which are also white with a black outline, are in excellent condition. The North-South Taxiway and all of the 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 and considered to be in good condition.

A number of painted X symbols of varying size have been placed along the alignments of the temporarily closed Runway 14-23 and East-West Taxiway alignments. These Xs indicate that the pavement in these areas is not currently open for the operation of aircraft.

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 Marion County, Precision Approach Path Indicator (PAPI) systems have been installed on both ends of Runway 05-23. 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 05-23 have a 2-light PAPI system located on the left side of the runway when viewed from an approaching aircraft. These units are controlled by a separate 4.0 kilowatt regulator located in the airfield electrical vault.

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 southeast of the Runway 05-23 midpoint and north of Runway 09-27. This windsock is part of the airport's segmented circle. The segmented circle helps pilots identify the location of the windsock.

Also to the southeast of Runway 05-23 and just north of the Runway 09-27 midpoint is a wind tee. This type of wind indicator consists of "T" shape that resembles an aircraft

which is mounted on a post to allow the nose to always point into the wind. The wind tee at the airport rotates freely, but is not very visible due to rust and inoperative lights.

Airfield Signage

At both ends of the North-South Taxiway, there are metal "STOP" signs visible to the pilots as they approach the runway holding position markers. At the end by the Runway 23 approach, there is also a sign for vehicles to yield to aircraft. On the end by Runway 27 there is a sign which provides aircraft parking and fueling information. Other information signs are placed around the aviation fuel facilities and general aviation terminal building.

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 Orlando Sanford 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).

Regardless of the fact that Marion County 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.

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 the Marion County Airport enables aircraft to transition between the airfield and the enroute environment. In addition to the GPS and VOR/DME non-precision approaches described previously, this environment is also influenced by a number of low altitude Federal Airways, which are designated corridors of Class E airspace used for enroute navigation by linking VOR facilities.

The airport's approach profiles extend upward and outward starting 200 feet from the ends of Runway 05-23, Runway 09-27, and Runway 14-32 (even though it is currently closed). The size and slope of the approach angle 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

All of the facilities at the Marion County Airport are located on the east side of the airfield. This area includes the facilities located east of Runway 05-23 and north of Runway 09-27. The aircraft noted in and around each facility are based on field observations conducted in 2008 and confirmed by airport records. The airport facilities are illustrated in **Exhibit 1-1**.

Hangar Facilities

To the west of the North-South Taxiway there are four hangar buildings. The northern most is the 12 unit t-hangar operated by the County. Currently there are 12 single-engine aircraft stored in this hangar. Just south is a 16 unit t-hangar also operated by the County and storing 16 single-engine aircraft. To the south of the t-hangars there is a 3,500 square foot clearspan hangar. While this facility is used for the assembly of light sport aircraft, it currently does not provide storage for any active aircraft. The southern most hangar on this side of the taxiway is a 2,500 square foot Quonset hangar. This Quonset hangar is located off of one of the old military hardstands, which while in poor condition, provides access to the one private single-engine aircraft stored in the building.

To the east of the North-South Taxiway, there are a number of clearspan hangars. The northern most is a 10,600 square foot clearspan hangar housing two single-engine and two multi-engine aircraft. Next is a 2,400 square foot hangar which only accommodates powered parachute rigs. South of that is a 6,000 foot clearspan hangar with three single-engine inside and one single-engine outside. The next hangar provides approximately 10,000 square feet of space with four single-engine aircraft stored inside and one single-engine outside. This hangar is operated by Whiskey Bravo Air, which provides flight instruction services in addition to private aircraft operations.

To the south of Whiskey Bravo Air is a 9,300 square foot hangar that provides storage for seven single-engine and one multi-engine aircraft inside and five single-engine aircraft outside. This facility is operated by the fixed base operator (FBO) Pratt Aviation. Pratt Aviation also operates two t-hangar buildings to the south of the 7,500 square foot hangar. Each t-hangar provides six units which currently provide storage for 11 single-engine and one multi-engine aircraft.

South of SW 111th Street, there is another 2,500 square foot Quonset hangar which stores one private single-engine aircraft. The last hangar on the east side of the taxiway is 5,100 square foot clearspan hangar that does not currently store any active aircraft.

Aircraft Parking Apron

The only paved area dedicated to aircraft parking is to the west of the North-South Taxiway, just south of the 3,500 square foot hangar. This asphalt apron, which provides approximately 124,000 square feet of space, is considered to be in fair to good condition. While there are aircraft parked in other outside areas, these are primarily private and some are unpaved.

Three apron taxilanes connect the three rows of aircraft parking with the North-South Taxiway. Two of the taxilanes have 80 feet of space between parked aircraft while the third is only offset 40 feet, since it is along the apron edge and only serves aircraft parking on one side. The ramp

currently accommodates 15 single-engine and two multi-engine aircraft through a system of permanent tiedown anchors.

There is also one multi-engine aircraft stored on one of the old military hardstands located on the west side of the North-South Taxiway.

General Aviation Terminal

The current general aviation terminal is a 700 square foot portable structure. This facility provides public restrooms and a small seating area with vending machines. The building also provides a small office for the on-site Airport Manager and some storage space.

Aviation Fuel Storage

Between the 16 unit t-hangar and North-South Taxiway are two above ground aviation fuel storage tanks. These above ground tanks each hold 12,000 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 under a little shelter next to the tanks. Both tanks are considered to be in excellent condition.

Airfield Security Fencing

Currently the active airfield at Marion County is enclosed by a combination of security fencing and vegetative 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 is one electric gate located at the end of SW 111th Street by the general aviation terminal. Access through the electric gate is provided through the use of proximity access cards. There is no keypad and only the Airport Manager has a remote control.

There is also a pedestrian gate located just south of the general aviation terminal building next to the small grass parking lot also at the end of SW 111th Street. The perimeter fencing also includes a number of other locked roll or swing gates, which do not have an electric opening system. These gates are in various locations around the perimeter and provide access for maintenance or other uses. Most of these gates are not used very often.

Other Aviation Facilities

The airport has an airfield electrical vault that distributes power to the airfield lighting circuits. The active vault, which measures 11 feet by 17 feet, is located to the east of the North-South Taxiway and south of the rotating beacon tower. As described previously, the vault houses one 7.5 kilowatt and two 4.0 kilowatt regulators, each of which is 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 an L-841 lighting control panel and L-854 radio control panel to facilitate pilot control of the airfield lighting. Power to the electrical vault is via an underground drop from the overhead service that runs along SW 110th Street.

To the north of the rotating beacon is an older, abandoned electrical vault dating back to the original construction of the airfield in 1942. South of the airfield electrical vault is an antennae tower that is owned and maintained by the FAA. This tower facilitates radio communications for the Jacksonville Air Route Traffic Control Center which is responsible for enroute air traffic control for most of the northern Florida. The FAA antennae tower has its own electrical vault which is also powered by an underground drop from the overhead service that runs along SW 110th Street.

Non-Aviation Facilities

A number of non-aviation parcels are located on the east side of the airport. These commercial and industrial sites are primarily located between SW 110th and SW 111th Streets between the airfield and SW 147th Court. Currently there are four buildings in this area with different tenants. There is a block of industrial commercial land (8.6 acres) owned by the airport inside the southern half of the SW 147th Circle and another (4.2 acres) at the east end of SW 110th Street. A third outparcel owned by the airport is located on the corner of SW 147th Court and SW Highway 484. This parcel consists of 26.9 acres of which approximately half is leased by Flowmatic.

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 principal lines located along SW Highway 484. These overhead lines run along the south side of the highway and feed a trunk line that runs up SW 147th Court. This overhead service goes underground along the portion that traverses the approach to Runway 27. To the north of the approach, the service continues overhead, providing lines down both SW 110th and SW 111th Streets. Overhead service also extends up the western half of the SW 147th Circle, via lines off SW 110th Street. All of the electrical power going to the various airfield facilities is provided via underground extensions from the overhead lines along the various streets. All electric service to the airfield is provided by Progress Energy.

Water and Wastewater

Currently water service is provided to all but one of the buildings on airport property. There is no water service to the single Quonset hangar on the west side of the North-South Taxiway. For the various t-hangar buildings, the water service is limited to outdoor hose spigots since none of the t-hangars have restrooms or sinks. All of the other buildings with indoor water service utilize septic tank systems as there are no sanitary sewer lines currently serving the airport. The water service is provided by Marion County Utilities.

Much of the east side of the airfield, both aviation and non-aviation parcels have access to fire hydrants. The system is served by a 10 inch mainline which is rated at 1,500 gallons per minute for two hours.

CONCLUSION

The above descriptions do not provide an exhaustive account for every specific detail and facet of the Marion County 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 Marion County 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 2008, forecasts are presented for 2013, 2018, and 2028 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 for 2008. 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 the Marion County Airport.

PREVIOUS AIRCRAFT AND ACTIVITY PROJECTIONS

The current number of based aircraft and annual operations documented in the inventory chapter is significantly greater than the figures previously recorded for the airport. County airport records and a count made during this study confirmed 86 based aircraft at the Marion County Airport in 2008. Likewise, an estimate of the activity at the airport was re-established at 29,600 annual operations through discussions with airport management, review of aircraft fuel sales, and the information gathered from surveys and interviews with the operators on the airfield. This included noting the significant number of flight training activity, specifically touch and go operations, which are conducted nearly every day at the airport. In addition to the two flight training facilities at the airport, regular training flights also originate from other airports including Ocala International, Crystal River, and even the Delta Connection Academy at Orlando-Sanford International.

Three previous forecasts of aviation activity for Marion County currently exist. These include the 1993 Airport Master Plan, the Florida Aviation System Plan 2025 (FASP), and the 2008 FAA Terminal Area Forecasts (TAF). Each of these previous studies 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 this chapter.

1993 Airport Master Plan

The last planning document conducted specifically for the Marion County Airport was the 1993 Airport Master Plan. The number of based aircraft and total annual operations from that study are shown in **Table 2-1**.

Table 2-1
1993 Airport Master Plan

	Based Aircraft	Annual Operations
Base Year		
1991	35	12,000
Forecast		
1996	54	17,500
2001	64	21,300
2011	89	31,100

Source: 1993 Airport Master Plan.

In 1993 both based aircraft and annual operations were projected to increase at an overall average annual rate of 4.8 and 4.9 percent, respectively. It is interesting to note that while these seem like aggressive growth rates, the based aircraft projection is still lower than the actual number documented for 2008. The annual operations projected are even more conservative when compared to the level occurring at the airport today.

Florida Aviation System Plan

The Florida Aviation System Plan (FASP) helps guide FDOT with 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 FASP 2025 is the latest version with forecasts through the year 2026. The FASP projects based aircraft using a top-down linear growth approach. It divides the state into planning regions, establishes an average growth rate for each, and then the based aircraft for each region is calculated. The aircraft are then allocated to the individual airports based upon its market share. Annual operations for the general aviation airports are projected by creating ratios between the total annual operations and total number of based aircraft. Overall, the current FASP projects an average annual growth rate of 1.6 percent for based aircraft and 1.9 percent for annual operations. Data from FASP 2025 is listed in **Table 2-2**.

Table 2-2
FLORIDA AVIATION SYSTEM PLAN 2025

	Based Aircraft	Annual Operations
Base Year		
2006	47	15,000
Forecast		
2013	52	17,088
2018	57	18,756
2026	65	21,770

Source: Florida Aviation System Plan 2025.

The discouraging part of the FASP figures is that most of the historic aircraft and activity counts recorded since 1991 suggest that for many of the years the number was simply not updated.

This is evident given for most of the early years there are 35 based aircraft shown each year while the later years reflect 47. This includes the most recent year, 2006, where the figure of 47 was nearly half of the number actually at the airport. For operations, a majority of the historic years are flat-lined at 15,000 annual operations.

FAA Terminal Area Forecasts

Terminal Area Forecasts (TAF) are the projections of aviation activity prepared by the FAA for the nation's airport facilities. These forecasts help the FAA 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 2008 TAF for Marion County.

Table 2-3
2008 FAA TERMINAL AREA FORECASTS

	Based Aircraft	Annual Operations
Base Year		
2006	52	15,000
Forecast		
2013	52	15,000
2018	52	15,000
2025	52	15,000

Source: 2008 FAA Terminal Area Forecasts.

It is interesting to note that the level of based aircraft and the number of annual operations for Marion County are expected to remain the same through the year 2025. No explanation is given for the zero growth projections. Also, as with the FASP figures, the count of based aircraft for 2006 is inaccurate. Not only is this well below the actual level, but it is also the same number that was recorded for the prior seven years.

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, spraying services, advertising, and various forms of recreation, not to mention business, corporate, and personal travel. Since the 1993 Airport Master Plan, there have been a number of changes in the general aviation industry.

Decreases in general aviation activity were experienced across the nation in the late 1980's and early 1990's. A large part of this was directly attributable to increasing product liability costs, as well as increasing operating costs. Unfortunately, this period, which was also affected by a national recession, ultimately forced the closure of many manufacturers of general aviation

aircraft. Legislators responded to the severe downturn with the passage of the General Aviation Revitalization Act of 1994. The signing of this act provided a renewed era of growth for the general aviation market, which helped the industry recover.

However, between 2001 and 2003 the general aviation industry declined, due primarily to an economic downturn and impacts from the tragic events of September 11th. Results of these downturns materialized in the first months of 2001 with 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.

Each year the FAA prepares projections in their Aerospace Forecasts for a number of the leading aviation and aerospace indices. While there have been some recent fluctuations in the industry, overall the 2008 FAA Aerospace Forecasts project positive growth to continue, especially as more manufacturers enter the market. Most of these new entrants include companies building aircraft in the very light jet and light sport aircraft markets. According to the 2008 FAA Aerospace Forecasts, the overall number of active general aviation aircraft is expected to increase 1.4 percent annually through 2025. Similarly, the number of hours flown by general aviation aircraft is projected to increase 3.0 percent annually through 2025. The FAA industry forecasts assume that much of the growth will be attributed to the continued growth in business and corporate traffic, but also assumes that utilization rates for all aircraft will increase and that the regulatory environment will not significantly change.

As described in later sections, a number of approaches were applied to forecast aviation activity. Today, general aviation growth 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 Board of County Commissioners, County staff, airport management, fixed base operators (FBOs), and other tenants will actively support all aviation activity and initiate the appropriate measures to proactively maintain the airport.

PROJECTIONS OF BASED AIRCRAFT

The number of aircraft owners projected to use Marion County 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 the Marion County Airport, 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. As described, the number of based aircraft has increased from the count of 35 in 1991 to the current level of 86 in 2008. This growth results in an average annual increase of 5.4 percent over the past 17 years. When this rate is applied to

the 2008 aircraft count, the result is 248 based aircraft by the end of the planning period as shown in **Table 2-4**.

Previous Growth Projections

The based aircraft forecast from the 1993 Airport Master Plan resulted in a projection that closely matches the actual count of aircraft for 2008. The forecast utilized significantly different growth rates for the initial five year planning period than those for the intermediate and long term horizons. In fact, the short term growth was nearly triple that of the latter planning periods.

In all, an average of three different projections, which were then increased 15 percent, was utilized in the 1993 Airport Master Plan based aircraft forecast. Of the three, only the regional forecast evaluated at that time projected more growth in the short term planning period. The reasons for which are not documented in the previous master plan. Regardless, when average annual growth (4.8 percent) from the 1993 Airport Master Plan is applied to the 2008 figure, the result is a projection of 220 aircraft by 2028.

The regional study referred to above was a part of the 1992–2010 FASP. While this older state study showed significant growth for the Marion County Airport, the newer FASP 2025 does not. As described, the FASP 2025 projects an overall growth of 1.6 percent annually. If that rate is applied to the based aircraft count for 2008, the result would be 118 aircraft by the end of the planning period. This estimate, along with the projection using the 1993 Airport Master Plan growth, is reflected in **Table 2-4**.

National Active Fleet Forecasts

The next forecast of based aircraft for Marion County applies the growth expected in the nation's number of active general aviation aircraft. This data was obtained from the 2008 FAA Aerospace Forecasts, which shows the number of active general aviation aircraft (in the nation) increasing at an average of 1.4 percent through 2025. This growth rate was applied to the 2008 count for the airport resulted in 114 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					
2008	86	86	86	86	86
Forecast					
2013	112	109	93	92	116
2018	146	137	101	99	133
2028	248	220	118	114	176

Source: Hoyle, Tanner & Associates, Inc., 2008.

Selected Based Aircraft Forecast

When reviewing the previous forecasts of based aircraft, one fact remains clear which is that the Marion County Airport has outpaced the growth anticipated in both the regional and national studies. However, given the very cyclical nature of the general aviation industry and current economic conditions, it is not believed that an annual growth around 5.0 percent will be sustained throughout the 20-year planning period.

A more realistic approach would be to average the historic growth with the regional and national projections described above. In effect, this tempers the significant growth experienced locally over the past 17 years with more recent regional and national industry trends. The resultant growth rate, 2.8 percent annually, is considered plausible for the intermediate and long term planning periods; however, additional considerations should be made for the short term. Obviously, in any forecasting effort, the near term is the easiest to predict as there are less unknowns. Also, what is known is that the County currently has plans to construct two additional t-hangar buildings. In fact, FDOT has programmed funding in fiscal years 2009 and 2010 for these hangars, the County has their local match, and there are individuals ready to rent.

For a number of years the Marion County Airport has maintained a hangar waiting list. This hangar waiting lists shows that there is a strong demand for facilities at the airport, which would result in additional based aircraft. There are currently 84 people on the waiting list which is only a few years old. In order to develop a forecast of based aircraft which is truly unconstrained the hangar waiting list must be considered; however, it is not uncommon for up to 50 percent of the individuals on an airport's hangar waiting list to withdraw, once facilities become available. This 50 percent reduction also accounts for the few people on the list that currently base their aircraft on the airport's parking apron (i.e. would not be a new based aircraft). Therefore, it is more realistic to assume there are only 42 new aircraft ready to be based at Marion County.

At this point it could be argued that a number of the individuals on the waiting list are also on the lists for other airports in the region. While this is certainly true, the fact remains that unlike a lot of similarly sized airports; Marion County is ready to construct these hangars and has the financial wherewithal to see the project through completion. Also, Marion County's self serving fuel is regularly the most reasonable in the region. So much so that there are a number of aircraft which are based at neighboring airports which come to Marion County to fill their tanks before returning to their home field.

These conditions combined with the competitive lease rates, comparable services, and airfield environment make the Marion County airport a true competitor for the business of the area's general aviation aircraft population. Therefore, it is not unrealistic to expect an additional 30 aircraft to be based at the airport over the next five years. This accounts for the 20 to 24 new t-hangars that will be constructed in the next two years as well as additional private hangar development and those new tenants only desiring apron space for their aircraft. It should also be noted that of the 84 aircraft on the waiting list, 31 have been posted since January 2007.

An adjustment of 30 new based aircraft was made for the short term planning period and then the average rate of the historic, regional, and national growth applied for the remaining planning horizon. The resulting "Adjusted Forecast" is shown in **Table 2-4**.

PROJECTED BASED AIRCRAFT FLEET MIX

Projecting the mix of the based aircraft fleet is necessary since different aircraft require different facilities. 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 the Marion County Airport.

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 2007 there were 225,007 active general aviation aircraft. By 2025, the FAA predicts this figure to increase to 286,500 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 (LSA) 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 (VLJs) to the heaviest business jets.

Table 2-5
FORECAST OF NATION'S ACTIVE FLEET

	2007 Fleet Mix	2025 Fleet Mix	Average Annual Growth Rate
Single-Engine	76.1 %	72.4 %	0.8 %
Multi-Engine (piston & turboprop)	11.9 %	9.2 %	None
Jet	4.9 %	10.3 %	4.4 %
Rotorcraft	4.3 %	5.9 %	2.4 %
Other (gliders, balloons, etc.)	2.8 %	2.2 %	None

Source: 2008 FAA Aerospace Forecasts.

These projections suggest a noticeable growth in the jet category. Several reasons exist to support this anticipated growth. The use of business aircraft by smaller companies has escalated as various charter, lease, time-share, partnership, and fractional ownership agreements have emerged. Businesses continue to use 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 one's final destination. This is one of the main objectives behind NASA's Small Aircraft Transportation System (SATS). In addition the VLJs, which began flying in 2007, have already stimulated the market. In the FAA's projections, the VLJs as well as other jet aircraft models 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 no growth. In fact, the FAA predicts a decline in the multi-engine piston fleet which is offset by the expected increase in multi-engine turboprop aircraft.

Finally, while growth in the single-engine category seems small, there is a significant increase in the number of LSA expected across the nation. By 2025, the FAA predicts that the 2,700 of these aircraft registered in 2007 will increase to 14,700. The popularity of these aircraft is important to consider given current fuel prices and the desirable flying conditions in Florida for such aircraft.

Marion County Airport Based Aircraft Fleet Mix

The existing based aircraft fleet mix at the Marion County Airport is 91.9 percent single-engine and 8.1 percent multi-engine. 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 a number of the new and popular light sport aircraft will base at Marion County.

Perhaps the more significant growth with respect to planning consideration are the future jet aircraft that will eventually be based at the airport. While a number are shown during the 20-year planning period, this figure is considered somewhat conservative for the intermediate and long term planning periods. As predicted by the FAA, turbojet technology is at the point where it is truly feasible for jet aircraft to be considered as replacements 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

	2008	2013	2018	2028
Single-Engine	79	104	117	151
Multi-Engine (piston & turboprop)	7	8	8	9
Jet	0	2	5	11
Rotorcraft	0	2	3	5
Other (gliders, balloons, etc.)	0	0	0	0
Total	86	116	133	176

Source: Hoyle, Tanner & Associates, Inc., 2008.

As with most airports, the single and multi-engine categories are predominantly comprised of Beech, Cessna, Mooney, and Piper models. Likewise, most turboprops and multi-engine aircraft tend to include the Beech King Air series; Cessna models, such as the 337 Skymaster and 414 Chancellor; or the Piper Seminole and Seneca aircraft. 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 operations (one arrival and one departure) and are local operations. 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.

Historic Growth

As with the based aircraft forecasts, the first projection considered extrapolating the future levels of aircraft operations employing the historic growth. As stated previously, the historic level of annual operations are estimates given there is no air traffic control tower at the airfield. Because of this, the historic annual operations are based on the estimate made for 1991 as part of the last master plan and the more recent estimate of activity for this study. The average annual growth between these two estimates is 5.5 percent. If this rate were used to project future operations, the activity would reach 85,625 by 2028 as shown in **Table 2-7**.

Previous Growth Projections

Much like the projection of based aircraft, operations in the 1993 Airport Master Plan were projected to have a higher growth rate for the initial planning period versus the intermediate and long term horizons. While the short term growth was double that of the latter planning periods, the overall average annual growth was 4.9 percent in the study. Applying this rate to the revised 2008 figure results is an estimate of 77,055 annual operations by 2028, shown in **Table 2-7**.

While the historic data contained in the FASP 2025 is questionable, the projected growth of this airport within the North Central Florida region of the state is worth considering. Between 2006 and 2026 activity is expected to have an average annual growth of 1.9 percent. When this is applied to the estimate of operations for 2008, the result is 43,130 operations by 2028.

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 2008 FAA Aerospace Forecasts. Between 2000 and 2006, general aviation operations at these facilities declined, much of which was attributed to the impacts that September 11th, then rising insurance, and most recently increases in fuel costs had on the industry. However, starting with figures for 2007, the FAA sees an end to this decline and projects growth in general aviation operations at an average annual rate of 1.3

percent through 2025. When applied to the base year operations for Marion County, the national growth results in 38,325 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 54,782 annual operations for 2008. Based on the recent estimate of activity, this does not appear realistic.

Conversely, if the new activity estimate for 2008 is divided by the current based aircraft count (86) the result is 344 operations per based aircraft. This is significantly lower than operations per based aircraft suggested by the FAA for the category that the airport is designated as in the NPIAS. The other NPIAS category for general aviation is reliever which includes airports that support a significant amount of activity in areas near a congested hub airport in a major metropolitan area. To be eligible for this designation, the airport must have 100 or more based aircraft or support 25,000 annual itinerant operations.

While it is not suggested that the airport be designated as a reliever in the NPIAS, it is considered to have the characteristics of such a facility. This is evident as the level of based aircraft and even activity to a lesser extent approach the thresholds defined by the FAA for a reliever airport. Applying this reasoning, the FAA recommends using 492 operations per based aircraft to estimate activity at non-towered reliever airports. Interesting enough, the average between the historic (344) and FAA suggested (637) operations per based aircraft for Marion County is 491. Therefore, 491 was applied to the based aircraft forecast to project the future activity. The results, shown in **Table 2-7**, are supported by the fact that not only is the number of based aircraft increasing at the airport, but also the types of operations and utilization of aircraft.

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					
2008	29,600	29,600	29,600	29,600	29,600
Forecast					
2013	38,603	37,598	32,521	31,575	56,898
2018	50,344	47,758	35,730	33,681	65,237
2028	85,625	77,055	43,130	38,325	86,328

Source: Hoyle, Tanner & Associates, Inc., 2008.

Selected Forecast of Aircraft Operations

There is a significant difference between the projections of annual operations described previously. While each is based on accepted methodologies, the reliability depends on the data that was used to generate the projection. This is always 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 expected growth in the nation's general aviation activity from the 2008 FAA Aerospace Forecasts. As shown in **Table 2-7**, the expected growth for the industry would only increase the overall activity by 8,725 annual operations over the next 20 years. For the Marion County Airport, as well as a number of other general aviation facilities in Florida, this not realistic, especially given the significant demand for additional hangars, two active flight training operations, and the activity generated by the reasonable fuel costs. For these reasons the projection based on the national growth was excluded from further consideration.

The Florida statewide system plan shows a little more growth than that of the nation. While a number of the airports in Florida are significant contributors to the general aviation industry as a whole, the FASP 2025 regional perspectives provide outlooks at the local level. For the North Central Florida Region, it states that most growth will occur in Alachua County and Marion County. This is due to the influence of the University of Florida, the Interstate 75 corridor, and the over 700 horse farms, some internationally known. The area also enjoys the lowest unemployment in Florida and is home to expanding computer hardware, software, biotech, healthcare, and research industries.

While much of this growth is centered on the University of Florida, the growth on the west side of Marion County cannot be ignored. Regardless, the FASP 2025 does not recognize the growth that has occurred at the Marion County Airport over the past several years. Even though the growth of 1.9 percent annually is among the highest for the North Central Florida Region of the study, the growth is based on the inaccurate and nearly flat historic operations data. While non-towered airport activity data can always be argued, the figures for based aircraft in the FASP 2025 are nearly half of those documented at the airport for the same years. Overall, the projected growth from the statewide system plan is not reasonable as it has obvious constraints by not correctly recognizing the airport's success and growth.

As indicated previously, the projection based on the 1993 Airport Master Plan resulted in a level of operations that is slightly lower than the more recent estimate for 2008. Given that the projection was based on information from 1991, the previous master plan projection is still considered practical. However, when the more recent information related to the significant growth in based aircraft, types of aircraft operators, and current activity, the previous master plan growth somewhat constrains the activity that is likely to occur at the airport. Therefore, this projection was not selected.

While the remaining projections (historic and operations per based aircraft) result in very similar levels of activity by the end of the planning period, they arrive at these figures in completely different manners. Both projections provide factors that consider the activity expected by new tenants as well as that of existing users and itinerant operations. The biggest difference

between the two is that while the overall growth is the same, there is a short term spike in activity under the operations per based aircraft methodology. This is simply the product of the earlier assumption that there will be 30 new based aircraft by 2013.

While activity is expected to increase through 2013, it is not at the level that results from the operations per based aircraft methodology. Rather the growth is expected to be more linear over the entire planning period. As discussed in the following section, itinerant operations are expected to increase throughout the planning period, especially as additional business and corporate operators use or even base at the airfield. Likewise, the short term potential for a new aircraft maintenance operator on the airfield will certainly generate additional itinerant operations by 2013, but not at the levels under the operations per based aircraft model.

While the selected forecast of operations exceeds those of the national and statewide projections, neither of these other studies recognized the significant growth that was occurring at the Marion County Airport. As described in previous sections, this growth is expected to continue given the demand for facilities at the airport, varied aircraft operators on the field, fuel prices, training activity, and available developable space on the airfield. In short, the selected projection of activity is considered the most realistic with respect to the current demand and unmet potential of the airfield. Likewise, the state system plan needs to be revised to reflect the fact that the airport currently serves and will continue to serve business and corporate aircraft operations in addition to flight training and recreational activity.

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 1993 Airport Master Plan estimated an initial split of 75 percent local and 25 percent itinerant operations for 1991. In the previous master plan study it was anticipated that local operations would continue to exceed itinerant ending in a split of 60 percent local and 40 percent itinerant by 2011. Similarly, while the 2008 FAA TAF has a fixed level of operations projected for the airport, the split was 75/25 between 1990 and 1994 but then shows 80/20 from 1995 on through the future.

For 2008 it has been estimated that the share of itinerant operations has grown. This is based on the discussions with airport management and the surveys/interviews conducted with the tenants. Overall, there was a general consensus that while flight training and local recreational flights generate a majority of the annual operations, itinerant flights have increased. This increase is also supported by the number of fuel sales to aircraft not based at Marion County as well as the growth in the number of based aircraft, which include some used for business and other non-recreational uses.

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 is expected to be the predominant generator of activity, the hangar waiting list provides an indication that the resident population of the airport will also grow. Such based aircraft growth does not typically increase the level of local operations as flight training does.

Additionally, a number of other factors indicate that itinerant operations will grow. The industry expected increases in business aviation and other forms of general aviation for point-to-point transportation (such as the 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. Throughout the planning period, it is anticipated that there will be a continued shift towards more itinerant operations, as reflected below.

Table 2-8
FORECAST OF LOCAL VERSUS ITINERANT OPERATIONS

	Local Operations		Itinerant Operations		Total
Base Year					
2008	19,240	65%	10,360	35%	29,600
Forecast					
2013	23,162	60%	15,441	40%	38,603
2018	30,206	60%	20,138	40%	50,344
2028	47,093	55%	38,532	45%	85,625

Source: Hoyle, Tanner & Associates, Inc., 2008.

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 Ocala International 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, this is still an industry benchmark for most approaches.

For Ocala, IFR conditions have been observed 5.0 percent of the time. The results of applying this figure to the current and future annual operations are shown in **Table 2-12**. Most likely the number of instrument operations shown for 2008 did not occur. However, the purpose of 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 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, the FBOs, and other airport users.

Information from the 2008 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 multi-engine aircraft category, 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 and rotorcraft categories.

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.

Table 2-9
PROJECTED OPERATIONAL FLEET MIX

	2008	2013	2018	2028
Single-Engine	23,088	29,724	37,254	62,506
Multi-Engine (piston & turboprop)	5,328	5,790	6,042	6,850
Jet	740	1,930	3,776	9,419
Rotorcraft	444	1,159	3,272	6,850
Other (includes gliders)	0	0	0	0
Total	29,600	38,603	50,344	85,625

Source: Hoyle, Tanner & Associates, Inc., 2008.

Essentially, single-engine aircraft will continue to conduct a majority of the activity. Following the industry, national, and local trends, a considerable growth in jet aircraft activity and to a lesser extent rotorcraft operations will occur over the planning period.

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 and Raytheon Hawker type jet aircraft that currently operate into the Marion County Airport. In addition, the jet activity will also see an increase in the activity by the newer VLJs (under 10,000 pounds) and the occasional larger business jet over 60,000 pounds.

While there are no rotorcraft currently based at the Marion County Airport, helicopter operations do occur. This includes occasional training by the U.S. Coast Guard HH-60 Jayhawk helicopters on the north side of the airfield as well as some private training from other local area flight schools with rotorcraft. This activity is expected to continue as well as the operations by rotorcraft expected to be based at the airfield in the future. Such based rotorcraft may include law enforcement and/or emergency medical operators.

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 historic fuel sales, the Marion County Airport typically experiences the highest traffic levels during the month of April. Much of this is due to the activity generated by the Experimental Aircraft Association's (EAA) annual Sun 'n Fun Fly-In held at the Lakeland Linder Regional Airport. This event, which is second only to the EAA's AirVenture Convention held in Oshkosh, Wisconsin, attracted some 160,000 people and 4,000 aircraft during the week long events in 2007. Marion County is one of many surrounding airports in Florida that help facilitate aircraft activity during this busy event.

It has been estimated that activity during the peak month is approximately 40 percent greater than the other months. Therefore, operations during the peak month can account for up to 12 percent of the overall annual operations. It is expected 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. For April, 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				
2008	29,600	3,552	118	18
Forecast				
2013	38,603	4,632	154	23
2018	50,344	6,041	201	30
2028	85,625	10,275	342	51

Source: Hoyle, Tanner & Associates, Inc., 2008.

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 Marion County, a comparison of the selected forecasts to those in the 2008 FAA TAF is included in **Table 2-11**.

Table 2-11
COMPARISON OF FORECASTS

	Selected Forecasts	2008 FAA TAF	Difference
Based Aircraft			
Base Year (2008)	86	52	65%
5 Year (2013)	116	52	123%
10 Year (2018)	133	52	156%
Annual Operations			
Base Year (2008)	29,600	15,000	97%
5 Year (2013)	38,603	15,000	157%
10 Year (2018)	50,344	15,000	236%

Source: Hoyle, Tanner & Associates, Inc., 2008.

The forecast of based aircraft exceeds the limits stated by the FAA. However, there are two key concerns. Since 1999 the TAF has shown only 52 based aircraft at the Marion County Airport. While this may have been true in 1999, the current count for 2008 (86 aircraft) has exceeded that level. Second, even if the base year figure was correct, the TAF shows the number of based aircraft remaining at 52 each year, through 2025, but gives no reason for why not 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 the Marion County Airport, the operations are set at 15,000 throughout the entire TAF planning period, which is also not realistic and below those currently conducted.

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 the Marion County Airport through 2028 given the information analyzed and available during this study.

Table 2-12
SUMMARY OF ACTIVITY FORECASTS

	2008	2013	2018	2028
Based Aircraft				
Single-Engine	79	104	117	151
Multi-Engine (piston & turboprop)	7	8	8	9
Jet	0	2	5	11
Rotorcraft	0	2	3	5
Other (gliders, balloons, etc.)	0	0	0	0
Total	86	116	133	176
Operations				
Local	19,240	23,162	30,206	47,093
Itinerant	10,360	15,441	20,138	38,532
Total	29,600	38,603	50,344	85,625
Instrument Operations	1,480	1,930	2,517	4,281
Peak Activity				
Peak Month Operations	3,552	4,632	6,041	10,275
Average Day Operations	118	154	201	342
Peak Hour Operations	18	23	30	51

Source: Hoyle, Tanner & Associates, Inc., 2008.

Demand/Capacity and Facility Requirements

INTRODUCTION

To ensure that the Marion County 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. Increasingly, the nation's general aviation airports are facing serious deficiencies in their ability to provide the requisite facilities necessary to meet the public's demand for aviation services.

DEMAND/CAPACITY ANALYSIS

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 the Marion County airport intersect, creating what is typically referred to as a "closed V" configuration. As documented, the orientation of these runways provides the required wind coverage.

Neither runway has a parallel taxiway. In fact, only the northeast end of Runway 05-23 and the east end of Runway 09-27 are served by a taxiway. Access to and from the western ends of both runways requires aircraft to back taxi along the runways. This lack of taxiways significantly decreases the runway 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 then used in calculating the airfield capacity elements. At Marion County, 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 3 to 11.

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. The FAA defines three general weather categories, based upon the height of the clouds above ground level and visibility:

- 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 Marion County Airport area experiences VFR conditions 92.6 percent of the time, IFR conditions 5.0 percent of the time, and PVC conditions 2.4 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 Marion County are relatively constant.

During VFR conditions the airport is estimated to be capable of supporting up to 99 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 Marion County, the ASV ranges from the current high of 157,167 to a low of 152,833 operations at the end of the planning period. This reduction in ASV is the result of the increase in jet activity expected and the current airfield limitations.

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 the Marion County Airport are shown in **Table 3-1**.

Table 3-1
AIRFIELD CAPACITY LEVELS

Year	Annual Operations	Annual Service Volume	Capacity Level
Base Year			
2008	29,600	157,167	19%
Forecast			
2013	38,603	155,667	25%
2018	50,344	154,167	33%
2028	85,625	152,833	56%

Source: Hoyle, Tanner & Associates, Inc., 2008.

While the airport does not quite 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 Marion County's, the ASV could be as high as 230,000 annual operations. The specific calculations for Marion County Airport are much lower than this level due to the fact that neither runway has a full length parallel taxiway. Essentially, the runway occupancy times for non-touch and go operations is increased due to the lack entrance and exit points along each runway. While not quantifiable in the FAA method, the overlap of the Runway 05 threshold with Runway 09-27 also impacts overall airfield capacity.

Conclusion

The FAA's methodology shows that the Marion County Airport should not experience any runway related capacity problems during the planning period. It should be noted that this is only with respect to runway occupancy times and 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 15, "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 15.

Table 3-3
AIRCRAFT DESIGN GROUPS

Design Group	Wingspan (feet)	Tail Height (feet)
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 15.

Currently, Runway 05-23 provides the proper design criteria to accommodate B-II aircraft, which includes many of the light to medium sized business jets. Examples of these jet aircraft include a number of the Cessna Citation and Raytheon Hawker models, as well as the Dassault Falcon series of business jets. 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.

Table 3-4
MARION COUNTY AIRPORT REFERENCE CODES

	Existing	Future
Runway 05-23	B-II Dassault Falcon 900	C-II Grumman Gulfstream III
Runway 09-27	B-I Twin Turbo Commander 690A	

Source: Hoyle, Tanner & Associates, Inc., 2008.

In the future, it is expected that the number and size of the business jet aircraft operating in and out of the Marion County Airport will increase. Towards the end of the planning period it is likely that the number of larger and heavier business jet aircraft will conduct enough operations to change the ARC for Runway 05-23. The larger aircraft expected include the Grumman Gulfstream and Bombardier Challenger series of business jets as well as some of the larger Cessna Citation models including the Citation VI, VII, and X aircraft. These aircraft primarily fall in the Approach Category C and Design Group II categories. However, it should be noted that while no single C-II aircraft is expected to generate 500 annual itinerant operations at Marion County, collectively it is expected this group of aircraft would. Therefore, Approach Category C and Design Group II standards need to be considered for the ultimate airfield development plan. For planning purposes, the representative C-II aircraft would be the Grumman Gulfstream III as it is one of the largest and heaviest aircraft to consider in this grouping of aircraft. The Gulfstream III has a maximum allowable takeoff weight of 69,700 pounds and a dual wheel landing gear configuration.

Currently, Runway 09-27 only provides the proper design criteria to accommodate B-I aircraft. 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. This is not expected to change throughout the course of this planning period. As such, the Twin Turbo Commander 690A is considered the representative existing and future critical aircraft for Runway 09-27. This aircraft, which has a maximum allowable takeoff weight of 10,250 pounds and a single wheel landing gear configuration, was selected since one is currently based at the airport. Similar B-I aircraft for this runway include the Beechcraft King Air 90 and 100 models, both of which have a size, weight, and configuration comparable to the Twin Turbo Commander.

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 15. These and other design standards are based on the critical aircraft's Approach Category, Design Group, and the airport'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 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 other accepted techniques were utilized to calculate the runway length required for the aircraft expected to operate on Runway 05-23 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 (such as the future critical aircraft for Runway 05-23) length is determined by utilizing the individual aircraft performance charts. Since aircraft within the future ARC designation of C-II can weigh less than or more than 60,000 pounds, both methodologies have been conducted.

Each approach requires 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. 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. Historic weather data for Marion County show July as the hottest month of the year with a mean high temperature of 92°F. The airfield elevation is 66 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 Marion County Airport can fly greater distances than that; therefore, both the 60 and 90 percent useful loads were calculated.

Calculations for Jet Aircraft Weighing 12,500 to 60,000 Pounds

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 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 already conducted operations into the airport and are fully expected to increase activity over the course of the 20-year planning horizon.

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 6,900 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 7,000 feet for the 90 percent useful load. For 100 percent of the fleet the curves show a runway length requirement of 5,530 feet for a 60 percent useful load and 8,630 feet for the 90 percent useful load 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'	7,000'
90 Percent	5,530'	8,630'

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

Runway Length for Grumman Gulfstream III

The Grumman Gulfstream III was selected as the representative critical aircraft for the airport's future ARC of C-II on Runway 05-23. While not all of the C-II aircraft weigh more than 60,000 pounds, the maximum allowable takeoff weight of the Gulfstream III is 69,700 pounds. Therefore, takeoff performance charts for this specific aircraft were evaluated for runway length requirements.

As with any aircraft performance charts a number of factors must be considered for the conditions expected and unlike the general FAA performance curves, a number of

aircraft configurations with respect to takeoff weight are given. In addition to the maximum allowable takeoff weight, performance of the Gulfstream III at 64,000 pounds was also considered. This weight, which represents approximately a 75 percent useful load, was based on the maximum zero fuel weight (44,000 pounds), maximum passenger and cargo payload (6,000 pounds), and half a load of fuel (14,000 pounds). With a maximum range around 3,500 nautical miles, the half fuel load would represents a configuration that would either allow the aircraft to fly non-stop to any point in the U.S. or to do a round trip to a number of destinations on the eastern half of the nation. Specific fuel reserves and other operating limitations would certainly need to be taken into consideration for specific missions.

Given the above, both the 10 and 20 degree takeoff flap setting charts were evaluated. Likewise the charts specifically for wet runways (contamination less than 0.1 inch) were selected as the local average annual rainfall is 52 inches, most of which occurs during the hottest conditions in the summer when daily showers are common. The resulting runway length calculations, shown in **Table 3-6**, range from 5,850 to 7,510 feet.

Table 3-6
GRUMMAN GULFSTREAM III LENGTH REQUIREMENTS

Takeoff Weight	20° Takeoff Flap Setting	10° Takeoff Flap Setting
64,000 Pounds	5,850’	6,400’
69,700 Pounds	6,860’	7,510’

Source: Gulfstream III Operational Information Supplement (GIII-OIS-10), “Operations on Contaminated Runways.”

Runway Length Analysis Using Balanced Field Length

Performance data from the aircraft manufacturers was 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 58 of the most popular business jet aircraft today, each of which have an ARC that is within the future designation of C-II for the Marion County Airport. These aircraft are listed alphabetically in **Table 3-7** along with their runway length requirements.

Table 3-7
SPECIFIC RUNWAY LENGTHS FOR JETS WEIGHING 12,500 TO 60,000 POUNDS

Aircraft Type	Airport Reference Code (ARC)	Maximum Takeoff Weight (pounds)	Balanced Field Length (feet)	Required Length at Marion County (feet)
Astra1125 SP	C-II	23,500	5,300	6,239
Beechjet 400A	B-I	16,100	4,290	5,056
Challenger 300	C-II	38,500	4,720	5,560
Challenger 600	C-II	41,250	5,700	6,708
Challenger 601	C-II	43,250	5,400	6,356
Challenger 604	C-II	48,200	5,840	6,872
Challenger 800	C-II	53,000	6,295	7,405

Aircraft Type	Airport Reference Code (ARC)	Maximum Takeoff Weight (pounds)	Balanced Field Length (feet)	Required Length at Marion County (feet)
Citation Bravo	B-II	14,800	3,600	4,248
Citation CJ2	B-II	12,500	3,420	4,037
Citation CJ3	B-II	13,870	3,450	4,072
Citation Encore	B-II	16,630	3,490	4,119
Citation Excel	B-II	18,700	3,415	4,031
Citation II	B-II	14,100	3,450	4,072
Citation III	B-II	22,200	5,150	6,064
Citation Sovereign	B-II	30,000	3,694	4,358
Citation Ultra	B-II	16,300	3,180	3,756
Citation V	B-II	15,900	3,160	3,732
Citation VI	C-II	22,000	5,150	6,064
Citation VII	C-II	22,450	4,690	5,525
Citation X	C-II	36,100	5,140	6,052
Citation XLS	B-II	20,200	3,590	4,236
Falcon 10	B-I	18,740	4,500	5,302
Falcon 200	B-II	32,000	5,200	6,122
Falcon 2000	B-II	35,000	5,815	6,843
Falcon 2000EX	B-II	41,300	5,634	6,631
Falcon 20-5	B-II	29,100	5,820	6,849
Falcon 20F	B-II	28,600	4,900	5,771
Falcon 50	B-II	40,780	5,200	6,122
Falcon 50EX	B-II	39,700	4,890	5,759
Falcon 900	B-II	45,500	5,300	6,239
Falcon 900B	B-II	45,500	4,930	5,806
Falcon 900C	B-II	45,500	4,935	5,812
Falcon 900DX	B-II	46,700	4,890	5,759
Falcon 900EX	B-II	48,300	5,215	6,140
Gulfstream G100	C-II	24,650	5,395	6,351
Gulfstream G200	C-II	34,850	5,500	6,474
Hawker 125-1000	B-II	36,000	5,250	6,181
Hawker 125-800	B-II	28,000	5,380	6,333
Hawker 125-800XP	B-II	28,000	5,030	5,923
Learjet 23	C-I	12,500	4,000	4,716
Learjet 24	C-I	13,000	3,200	3,779
Learjet 25	C-I	15,000	4,000	4,716
Learjet 28/29	B-I	15,000	3,050	3,603
Learjet 31A	C-I	16,500	3,490	4,119
Learjet 40	C-I	20,350	4,326	5,098
Learjet 45	C-I	20,500	4,350	5,126
Learjet 45XR	C-I	21,500	5,060	5,958
Learjet 55C	C-I	21,500	5,598	6,588
Learjet 60	C-I	23,500	5,450	6,415
MU-300 Diamond	B-I	14,360	4,300	5,068
Premier Jet	B-I	12,500	3,792	4,473
Sabreliner 40	B-I	18,650	4,900	5,771

Aircraft Type	Airport Reference Code (ARC)	Maximum Takeoff Weight (pounds)	Balanced Field Length (feet)	Required Length at Marion County (feet)
Sabreliner 60	C-I	20,000	5,100	6,005
Sabreliner 65	C-II	24,000	5,450	6,415
Sabreliner 75	C-I	23,300	5,500	6,474
Sabreliner 75A	C-I	23,300	4,460	5,255
Sabreliner 80	C-II	24,500	4,380	5,161
Westwind 1124A	C-I	23,500	5,250	6,181

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

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 Marion County is only 66 feet AMSL, these values can be considered, but only as a best case scenario, as temperatures are rarely around 59°F. In fact, while Marion County 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 Marion County which is based on the specific airport elevation, temperature, and gradient of Runway 05-23. 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 Marion County without weight restrictions. These 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

Over the course of the planning period additional runway length will be required at the Marion County Airport. The average of the FAA recommendations for 75 and 100 percent of the aircraft between 12,500 and 60,000 pounds, at a 60 percent useful load, is 6,200 feet. Similarly, the average for the different flap settings of the Grumman Gulfstream III, at a takeoff weight of 64,000 pounds, resulted in an average of 6,125 feet. Finally, the average length required at the Marion County Airport for aircraft with an ARC of C-II in **Table 3-7** is 6,245 feet. Therefore, an overall length of 6,200 feet for Runway 05-23 should be planned to accommodate the jet aircraft activity expected in the future.

While a runway length of 6,200 feet may not be required until the latter part of the 20-year planning period, a length greater than the current 4,941 feet may be needed in the short to intermediate planning period. Specifically, the aircraft with an ARC of B-II will require additional runway length as the number of their operations and/or trip distances increase. The average length required at the Marion County Airport for aircraft with an ARC of B-II in **Table 3-7** is 5,347 feet. Using the FAA methodology for aircraft between 12,500 and 60,000 pounds, a length of 5,405 feet under the 60 percent useful load category is required. Therefore, consideration

should be given to initially extending Runway 05-23 to at least 5,400 feet within the next 10 years and then extending to 6,200 feet by the end of the planning period.

The existing length of Runway 09-27 is considered adequate for the entire planning period. At 4,702 feet, this runway length is capable of accommodating nearly every aircraft within the runway's ARC designation of B-I. This includes the Twin Turbo Commander 690A which is the representative B-I aircraft based at the airport. The Twin Turbo Commander as well as other B-I aircraft such as the Beechcraft King Air 90s, King Air 100s, Cessna 310s, and Cessna 414/425 type models all can operate at their maximum allowable takeoff weight in the hottest conditions on 4,702 feet.

It should be mentioned at this point that an entirely new generation of business jet aircraft are emerging. In 2006, the Eclipse 500 and Cessna Citation Mustang were certified as the first "very light jet" aircraft. These aircraft use new processes such as composite construction to create light airframes with small jet engine technology. The industry goal is to make personal aviation more efficient and affordable. New aircraft such as the Eclipse 500, Cessna Citation Mustang, Hondajet, Embraer Phenom 100, and other derivatives will provide an option to the commercial air passenger market by allowing access to the nation's extensive system of small airports. It is purely speculative at best when such aircraft may operate at Marion County 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.

With any major runway extension, the FAA will likely require that an Environmental Assessment be undertaken. It is ultimately up to the FAA to determine whether an extension to Runway 05-23 constitutes a major runway extension. Given today's environmental laws, some of the surrounding features of the Marion County Airport, and past requirements for environmental studies, an Environmental Assessment for the extension(s) of Runway 05-23 should be programmed within the Capital Improvement Program (CIP). This study will require close coordination with the FAA Orlando Airport District Office (ADO) environmental representative.

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 ultimate proposed extension is greater than 25 percent of the current length, the Marion County Airport does not have any regularly scheduled flights nor is it expected to in the future. Therefore, the DRI process is not required but this will need to be confirmed at the time the runway environmental processing begins.

Runway Width Requirements

Criteria contained in FAA AC 150/5300-13 Change 15, states that runways with an ARC of B-II are required to have a width of 75 feet for visual and not lower than ¾ mile instrument approach visibility minimums. Therefore, at 100 feet, the current width of Runway 05-23 is more than

adequate. However, when the ARC changes to C-II, the width requirement will be 100 feet. This width would also accommodate improved instrument approach minimums on Runway 05-23. Therefore, the current width of Runway 05-23 needs to be preserved throughout the planning period. This includes providing paved runway shoulders as part of any extension to match the existing paved runway shoulders.

Ultimately it should be planned for Runway 09-27 to have a straight-in non-precision instrument approaches. The possibility for better instrument approaches is discussed in a later section. Regardless, runways with an ARC of B-I with visual and not lower than ¾ mile instrument approach visibility minimums are required to have a width of 60 feet. Therefore, the current width of Runway 09-27 meets the requirements today and for any instrument approaches that may be established with minimums up to but not lower than ¾ mile.

Runway Pavement Strength

Currently there are no weight bearing capacities published for Runway 05-23. As shown in **Table 3-7**, some of the larger B-II jet aircraft have a maximum allowable takeoff weight approaching 50,000 pounds. This includes the Falcon 900 series aircraft, which is the current critical aircraft for the airfield with a dual wheel landing gear configuration. Given that the runway pavement still includes the original 1942 asphaltic concrete below the current surface course, the runway is expected to have a relatively strong pavement structure. However, this cannot be confirmed without testing.

Regardless of the pavement strength, the current surface has areas of raveling and some bad pavement joints along the alignment. The 2008 FDOT pavement report documented that microsurfacing of the asphalt runway surface and restoration for the 300 feet of original Portland cement concrete (northeast end only) is required to improve the fair pavement rating for Runway 05-23. It is recommended that testing and consideration of the future critical aircraft be included in the decision on the best method for rehabilitating the existing runway surface.

For the first proposed runway extension of approximately 459 feet (overall length of 5,400 feet) the new pavement needs to support aircraft up to 50,000 pounds with a dual wheel landing gear configuration. For the ultimate runway, the future runway pavement would need to support aircraft up to 70,000 pounds with a dual wheel landing gear configuration. Depending on available funding and the fact that new pavement should last for a number of years, the ability to provide the ultimate runway strength should be considered for both the existing runway surface rehabilitation and the initial runway extension.

As with the primary runway, there are no pavement strengths currently published for Runway 09-27. Regardless, the existing and future group of critical aircraft for Runway 09-27 all weigh less than 12,500 pounds with a single wheel landing gear configuration. Likewise, the pavement surface is considered to be in satisfactory condition according to the 2008 FDOT pavement report. Therefore, the pavement strength is sufficient for the planning period. However a rehabilitation of the Runway 09-27 surface will most likely be required towards the end of the 20-year planning horizon. 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 B-II, with visual and not lower than ¾ statute mile approach visibility minimums, Runway 05-23 requires a 150 foot wide RSA (75 feet either side of the runway centerline) that extends 300 feet beyond each runway end. The required RSA dimensions are currently provided and protected for Runway 05-23.

The current ROFA for Runway 05-23 needs to be 500 feet wide (250 feet either side of the runway centerline) and also extend 300 feet beyond each runway end. 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. The OFZ needs to be 400 feet wide and extend 200 feet beyond each runway end. As with the RSA, Runway 05-23 currently meets the FAA width and length requirements for the ROFA and OFZ as well as the criteria required for the RPZs.

Once the ARC for Runway 05-23 changes to C-II and better instrument approaches are established, Runway 05-23 will require a 500 foot wide RSA and 800 foot wide ROFA, both extending 1,000 feet beyond each runway end. In addition, each runway end receiving improved instrument approach capabilities will need a larger RPZ. For C-II runways with visual and not lower than one mile visibility minimums the inner width remains 500 feet but the outer width increases to 1,010 feet and the overall length increases to 1,700 feet. For C-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 05-23 will be evaluated as part of the airport alternatives analysis in the next chapter.

Table 3-8
EXISTING AND FUTURE RUNWAY SAFETY CRITERIA

	Runway Safety Area	Runway Object Free Area	Runway Protection Zone	Runway Obstacle Free Zone
Runway 05-23 (existing)	150’ wide 300’ beyond	500’ wide 300’ beyond	500’ x 700’ x 1,000’ (both ends)	400’ wide 200’ beyond
Runway 05-23 (future)	500’ wide 1,000’ beyond	800’ wide 1,000’ beyond	500’ x 1,010’ x 1,700’ (and) 1,000’ x 1,750’ x 2,500’	400’ wide 200’ beyond
Runway 09-27 (existing & future)	120’ wide 240’ beyond	400’ wide 240’ beyond	500’ x 700’ x 1,000’ (both ends)	400’ wide 200’ beyond

Source: Hoyle, Tanner & Associates, Inc., 2008.

The base OFZ dimensions for Runway 05-23 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.

For Runway 09-27, the safety criteria required for the current and future ARC of B-II will not change even given the plan to establish straight-in, non-precision approaches to both runway ends. Now and in the future, Runway 09-27 requires a 120 foot wide RSA and 400 foot wide ROFA, both extending 240 feet beyond each runway end. The OFZ needs to be 400 feet wide and extend 200 feet beyond the runway end. In addition, both runway ends require a RPZ that starts 200 feet beyond the end of the area usable for takeoff or landing. Both RPZs need to have an inner width of 500 feet, an outer width of 700 feet, and an overall length of 1,000 feet. Currently all of the required imaginary runway safety surfaces for Runway 09-27, for both existing and future conditions, are provided on property owned and controlled by the airport.

Runway Intersection

The threshold for Runway 05 lies along the Runway 09-27 pavement alignment. This overlap coupled with the current lack of a parallel taxiway system creates a situation where any aircraft positioning on or waiting to depart Runway 05 is also occupying Runway 09-27. While both runways have the proper safety criteria required, options to modify the current intersection between the two runways should be explored. The ability to eliminate the overlap of the Runway 05 threshold with Runway 09-27 would significantly enhance the safety of operations for both runways, especially given that the airfield is a non-towered airport.

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 Marion County. Taxiway systems include parallel taxiways, entrance/exit taxiways, by-pass taxiways, taxiway run-up areas, apron taxiways, and taxilanes.

Currently most of the airport is required to have taxiways and taxilanes that meet the criteria for Design Group II aircraft. The exceptions being Runway 09-27 and any aircraft movement areas (such as between t-hangars) which are only 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 05-23 requires a 240 foot separation for Design Group II with not lower than ¾ mile visibility minimums. In the future, the Runway 05-23 separation needs to increase to 400 feet to support Design Group II aircraft and the potential for lower than ¾ mile visibility minimums. A centerline separation of 225 feet is required for any parallel taxiway serving Runway 09-27 now or in the future, regardless of whether visual or not lower than ¾ mile visibility minimums are available. For both runways at Marion County, FAA criteria recommends the optimal connector or exit taxiways be 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.

North-South Taxiway

As the only active taxiway at the Marion County Airport, the North-South Taxiway provides the proper width and safety related setbacks required for Design Group II aircraft. However, as documented in the 2008 FDOT pavement report, a significant majority of the taxiway pavement is only considered to be in fair condition. As such, the pavement report documented that most of the North-South taxiway surface will require reconstruction. This included restoration of the small portion on the north end by Runway 05-23 which consists of the original 1942 surface. The reconstruction would correct areas where both block cracking and loose aggregate were noted during the visual inspection conducted as part of this study.

Deactivated East-West Taxiway

It is not certain what, if any portions of the current east-west taxiway alignment need to be re-activated. As documented in the 2008 FDOT pavement report this original 1942 pavement is in very poor condition. Perhaps more significant is that most of the east-west taxiway runs parallel to and just a little more than 100 feet south of the north airport property line. While this offset would provide the required TOFA, the existing alignment would prevent the potential to develop the airport area north of the taxiway between Runway 05-23 and the deactivated Runway 14-32 alignment. The ability to utilize portions of the deactivated East-West Taxiway alignment will be explored as part of the airport alternatives analyses in the next chapter.

Taxilanes

The existing taxilanes serving the t-hangars are constructed to Design Group I standards while those taxilanes that serve the private hangars and the aircraft parking apron have the proper width and spacing for Design Group II aircraft.

Ratings in the 2008 FDOT pavement report documented the three t-hangar taxilanes to the west of the North-South Taxiway as in good condition. While no immediate improvements are required, these taxilanes will require some form of rehabilitation towards the end of the long term planning period. The other t-hangar taxilanes as well as the various private hangar taxilanes were not evaluated as they are privately maintained areas.
The three taxilanes that are a part of the aircraft parking apron were documented as satisfactory in the 2008 FDOT pavement report. The report suggests that microsurfacing of the asphalt parking apron and related taxilane surfaces be conducted at the end of the short term planning period.

New Taxiways and Taxilanes

Typically, airports with the level and type of operations similar to those at Marion County are sufficiently served by one parallel taxiway for each active runway. Unfortunately, neither runway currently has a full length or even partial parallel taxiway. As described previously, this significantly affects the occupancy time for both runways 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 and recommended for those runways with non-precision instrument approach procedures.

At least one full length parallel taxiway needs to be provided to each runway. Ultimately parallel taxiways on both sides may be needed 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. Consideration should be given to applying Design Group II criteria to any future parallel taxiway systems for Runway 09-27. Doing so would provide the proper spacing, including a 240 foot centerline separation to enable unrestricted ground movements of Design Group II aircraft around the airfield.

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.

NEW INSTRUMENT APPROACH PROCEDURES

Marion County currently has two published straight-in, non-precision instrument approaches to Runway 23. The first is through the use of Global Positioning Satellites (GPS) and the second is via the Ocala Very High Frequency Omnidirectional Radio Range (VOR). For both, the landing minimums for the straight-in and circle-to-land maneuver provide a minimum descent altitude (MDA) of 474 feet above the Runway 23 touchdown zone elevation (540 feet above mean sea level) and one mile approach visibility minimums.

While the duality of these approaches is good, they are still somewhat limited with respect to the ability of aircraft to get into the airfield during certain conditions. In fact, the current approaches have higher minimums for the larger and higher performance aircraft which are expected to increase operations over the course of the planning period. The ability of the airport to accommodate this traffic is greatly enhanced if the airfield has multiple instrument approaches established. As documented by the meteorological data collected for this study, the Marion County Airport area experiences less than visual conditions 7.4 percent of the time.
These issues combined with the different instrument approaches available due to GPS technology warrant the need to plan for better instrument approach procedures for all four runway ends at Marion County. 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 desired approach minimums, including 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 05-23, should be planned for the Marion County Airport.

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 150/5300-18A, "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 will forward the data 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.

Establishment of Straight-In Non-Precision Instrument Approaches

Straight-in non-precision approaches to the runway ends that currently have no approach capability need to be planned. From an airspace and GPS technology perspective, there is no obvious reason why new, straight-in GPS approaches could not be developed for Runway 05 or either end of Runway 09-27. Establishing a new non-precision approach procedure into any of the runway ends will also require survey data and some airfield facilities.

Runway and obstruction survey data must be collected that meets the Non-Vertically Guided Airport Airspace Analysis Survey criteria of FAA AC 150/5300-18A. Because straight-in non-precision approaches are desired on Runway 05 and both ends of Runway 09-27, the required surveys would have to be conducted to include all three runway ends. The requirements for non-precision instrument approaches with not lower than 1 statute mile visibility minimums also has minimum runway lighting, pavement marking, and other approach aid recommendations. As mentioned previously, non-precision approaches will increase the various runway safety criteria and a full length parallel taxiway is recommended.

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 05-23 the current width is 500 feet and would increase to 1,000 feet when a

precision instrument approach procedure is established. For Runway 09-27 the current and future Primary Surface width is 500 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 05-23 already require a Horizontal Surface with a radius of 10,000 feet due to the existing instrument approach procedures. For Runway 09-27 the current Horizontal Surface radius is 5,000 feet and would increase to 10,000 feet with the establishment of an instrument approach to either runway end.

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 runway. 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 also governed by the runway category and instrument approach procedure available.

For Runway 23, the current approach slope extends out 10,000 feet at a slope of 34:1 to an outer width of 3,500 feet. For the 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 Runway 05 and both ends of Runway 09-27, the current approach slopes extend out 5,000 feet at a 20:1 ratio to an outer width of 1,250 feet. When non-precision instrument approaches are established, the ends receiving such an approach will require a surface that extends out 10,000 feet at a slope of 34:1 to an outer width of 3,500 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 05-23 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 05-23 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. If this is the Runway 23 end, the stake mounted fixtures currently installed would need to be replaced. The flush mounted threshold light fixtures on the Runway 05 end will need to be replaced to eliminate the problems with the current fixtures even if the runway is not extended on this end.

The single 7.5 kilowatt regulator which currently powers the runway lighting circuit will likely need to be upgraded when the additional fixtures for the runway extension are added to the circuit. The ultimate size will depend on the final electrical design of the runway circuit once the runway lighting improvements are made.

For Runway 09-27, the current stake-mounted MIRL fixtures are all that is required for any of the planned non-precision approach improvements. However, 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. Therefore, it is likely that before the end of the 20-year planning period, the existing system, which is currently in good condition, will need to be replaced with a can and conduit type of installation. At that time it may also be necessary to replace the single 4.0 kilowatt regulator which currently powers the runway lighting circuit.

Taxiway Lighting

Currently there are no edge lights installed along the North-South Taxiway, which is the only active taxiway at the airport. Medium Intensity Taxiway Lights (MITLs) will need to be included as part of the construction of the future parallel taxiway systems to each runway. Depending on how the future parallel taxiway alignments tie into the North-South Taxiway, it may be advantageous to extend the future MITL circuits along a portion of the existing taxiway. This would facilitate the transition of lighting from the airfield environment to the different hangar and aircraft parking areas, many of which may have floodlighting. Similarly, any connector taxiways that come off of the future parallel taxiway systems will need to include MITLs to transition into the airfield facilities they are providing access to and from. 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. Taxiways generally have a centerline and pavement edge stripes, plus holding position markings at the entrance to 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 05-23

Runway 05-23 currently 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.

Runway 09-27

While the markings for Runway 09-27 are currently in good condition, additional markings will need to be added once any non-precision approach is established. At a minimum, threshold markings would need to be added; however, it is also recommended that aiming point markings also be considered for Runway 09-27.

Taxiways and Taxilanes

FAA guidelines state that all taxiways should have centerline markings and runway holding position markings whenever they intersect with a runway. For any existing or future taxiway serving Runway 05-23 under the current non-precision instrument and ARC designation of B-II, the holding position markings need to be offset 200 feet, perpendicular to the runway centerline. Once the runway increases to an ARC of C-II, the holding position markings will move out to a 250 foot perpendicular offset for visual,

non-precision, or precision approaches. For Runway 09-27, the ARC designation of B-I with visual or non-precision instrument approaches will require the holding position markings to be offset 200 feet.

Since the markings associated with the North-South Taxiway and other taxilanes are considered to be in good condition, they should not require re-painting until the intermediate planning period. Any new taxiways, taxilanes, and aprons should, at a minimum, have the appropriate centerline and holding position markings required by the FAA.

Takeoff and Landing Aids

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

Precision Approach Lighting Systems

As part of the establishment of a precision approach to Runway 05-23, 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 7.4 percent of the time, it is assumed that during the planning period a MALSR system will be required.

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 the Marion County Airport. 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. There are also omnidirectional REIL systems which are one of the recommended approach lighting systems in FAA AC 150/5300-13 Change 15 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 05-23 that does not receive the precision instrument approach, as well as both ends of Runway 09-27. Any runway end with ODALS will also need to preserve the requirement of the inner-approach OFZ described previously.

Visual Glide Slope Indicators

Visual descent information is provided to pilots using Runway 05-23 via the current 2-light Precision Approach Path Indicator (PAPI) systems installed for each end. In the future both should be upgraded to a 4-light PAPI system. Likewise, 4-light PAPIs will need to be provided to both ends of Runway 09-27. The 4-light PAPI provides more precise glideslope information over the 2-light systems and are recommended by the FAA for runways with electronic guidance (including straight-in non-precision approaches) and/or jet aircraft operations. While the need for these systems will coincide with the establishment of better instrument approaches, the systems could be installed earlier as part of an airfield lighting improvement project. Depending on the final electrical design, the 4.0 kilowatt regulator that controls the current 2-light PAPI systems will most likely need to be replaced. At that time it may be more efficient to install a regulator large enough to handle all four proposed 4-light PAPI systems.

Automated Weather Observing System

An Automated Weather Observing System (AWOS) provides continuous real-time weather reports, 24 hours a day, without human involvement. Using a computer-synthesized voice, AWOS can generate new weather reports every minute in a standard format familiar to pilots. The information may be broadcasted through common navigational aids or its own discrete VHF frequency.

There are three basic types of AWOS configurations. AWOS I includes sensors to measure and report temperature, dew-point, wind speed, wind direction, altimeter setting, and density altitude. AWOS II includes all measurements from AWOS I, plus visibility and precipitation sensors. AWOS III includes all measurements from AWOS II, plus cloud height and cloud cover information. Most AWOS systems also have the option to include additional sensors for precipitation detection; including time of occurrence, rate of accumulation and total accumulation; freezing rain detection and time of occurrence; and thunderstorm detection and time of occurrence.

The addition of an AWOS would provide actual airfield weather information and a 24 hour local altimeter setting for pilots using the Marion County Airport. An AWOS at the airport would also enhance the existing and future instrument approach procedures. The landing minimums for the current published instrument procedures to Runway 23 are based on using the Ocala International Airport altimeter setting. Once a local altimeter setting becomes available, the current and any future instrument approach procedures will likely have better landing minimums.

There are a number of critical areas and setbacks associated with the different instruments of an AWOS. Each, including the cleared area required for the wind indicator will be considered as part of the development of the ALP drawing set.

Wind Indicators

Depending on how the current internally illuminated windsock is maintained and/or facilities are developed, a project to rehabilitate or relocate this takeoff and landing aid will be required. This would include the panels which make up the segmented circle. In addition, supplemental windsocks should be considered for each of the individual runway ends. The airport's wind tee also needs to be re-painted and the lights rehabilitated so that this landing aid is visible to pilots from the air.

Airfield Signage

Currently there are no illuminated signs installed at the Marion County Airport. 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 the Marion County Airport. 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 Marion County is a non-towered airport.

Runway distance remaining signs should be considered as part of the project that extends Runway 05-23 to its ultimate length of 6,200 feet. These signs, which are located along the side(s) 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 05-23 that receives the precision instrument approach.

Ground Communications

There is a need for the ability to enhance communications between aircraft on the ground at Marion County with air traffic control facilities. Currently pilots conducting instrument arrivals into Marion County 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 Marion County 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 Marion County, 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 Marion County, 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. For such a facility, the FAA might require a benefit-cost analysis to be conducted for financial purposes.

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 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 $10,000 towards the end of 2008. 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 hangar facilities, aircraft parking areas, general aviation terminal space, aviation fuel storage, airfield security fencing, and other support facilities.

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 71 percent or 61 of the 86 based aircraft are stored in hangars at Marion County. If additional facilities are constructed, it is expected that anywhere from 75 to 80 percent of the based aircraft will be stored in hangars by the end of the planning period. This is supported by the fact that most of the aircraft waiting for hangar space are not currently based at the airport. In addition, the County continually receives calls inquiring about the availability of hangar space. Florida's environment (sun and rain) also contributes to the desire for hangar facilities by aircraft owners. Therefore, a minimum of 71 new hangar spaces (132 total), more than double that which is available today, will be required by the end of the planning period.

Of the 61 based aircraft stored in hangars, 40 are stored in the t-hangars and 21 in clearspan hangars. Anticipating similar trends, it is expected that of the 71 new hangar spaces required, approximately 50 would desire t-hangar space. This is simply due to the fact that many of these aircraft are private owners of single-engine or light multi-engine aircraft.

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 21 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 County 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 29 percent or 25 of the 86 based aircraft are parked outside. Of these three are light multi-engine aircraft and the rest single-engine with a majority parked on the only apron area dedicated to aircraft parking, which is west of the North-South Taxiway.

For planning purposes, based and itinerant aircraft 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 15. 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. This methodology requires 8,250 SY of apron space for the 25 small 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 75 percent 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 176 based aircraft projected by 2028, only 25 percent or 44 total aircraft will need apron space.

As stated previously, if adequate and affordable hangar space can be provided, it is possible some of the aircraft currently stored outside to move into hangars over the planning period. Regardless, there will always be a number of based aircraft stored outside. It is also assumed that those based aircraft stored outside will primarily consist of the smaller aircraft. Therefore, 14,520 SY of apron space will be required by the end of the planning period for the 44 based aircraft expected to remain outside.

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 Marion County, 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 6,600 SY of itinerant apron space required in 2008 and 22,680 SY by 2028.

Using the FAA criteria, it is estimated that a total of 14,850 SY or 133,650 square feet (SF) of aircraft parking apron is needed now and 37,200 SY or 334,800 SF in the future. The inventory documented that there is approximately 124,000 SF of dedicated paved apron space to the west of the North-South Taxiway. This amount was reduced from the calculated needs in order to estimate the additional aircraft parking apron requirements for the planning period.

There are a few key points with respect to the current aircraft parking deficiency shown in **Table 3-9**. First, the apron area shown available in 2008 does not account for the various outdoor parking associated with a number of the private hangar facilities. In fact, of the 25 aircraft currently stored outside, the inventory documented that eight were parked in these private areas. Also, it is important to note that the calculations above for itinerant aircraft requirements

are based on the peak day. The result is that while there may be space available on the dedicated apron on a regular basis, this is not the case on those days when the airport is experiencing peak activity.

Table 3-9
SUMMARY OF AIRCRAFT PARKING APRON REQUIREMENTS

		2008	2028
Based Aircraft			
	Number of Small Aircraft on Apron	25	44
	Area Required for Based Aircraft	8,250 SY	14,520 SY
Itinerant Aircraft			
	Small Aircraft on Peak Day	10	38
	Area Required for Small Aircraft	3,600 SY	13,680 SY
	Large Aircraft on Peak Day	3	9
	Area Required for Large Aircraft	3,000 SY	9,000 SY
Total Apron Area Required		14,850 SY (133,650 SF)	37,200 SY (334,800 SF)
Apron Area Available in 2008		124,000 SF	124,000 SF
Surplus (+) / Deficit (-)		-9,650 SF	-210,800 SF

Source: Hoyle, Tanner & Associates, Inc., 2008.

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.

The 2008 FDOT pavement report recommended that microsurfacing of the current paved parking apron and related taxilane surfaces be conducted towards the end of the short term planning period. The inclusion of floodlighting to any existing aircraft parking apron improvement and all future apron projects is recommended as it provides additional safety for night operations and security for parking.

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. A limited number of services are currently provided via the 700 square foot portable structure, located east of the North-South Taxiway.

While the current facility supports most of the operations, additional space and a permanent structure is required. This space must also be tied into the future airfield improvements as visibility and access to the services described above are essential. Future runway and taxiway improvements will have the most significant influence with respect to the future general aviation terminal location, while activity levels will dictate the need for space. Finally, the ability to provide paved aircraft parking space, primarily for itinerant users, next to the general aviation terminal is required.

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 criteria was applied with the results shown in **Table 3-10**.

- 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 3-10
GENERAL AVIATION TERMINAL SPACE

	Peak Hour Operations	Adjusted Operations	Number of People	Total Terminal Space (SF)
Base Year				
2008	18	13.5	27.0	2,700
Forecast				
2013	23	17.3	34.5	3,450
2018	30	22.5	45.0	4,500
2028	51	38.3	76.5	7,650

Source: Hoyle, Tanner & Associates, Inc., 2008.

Since the current general aviation terminal is a portable structure, any new facility will not benefit from the existing space. Towards the end of the planning horizon, it is likely that an expansion of the facilities in combination with a second facility (perhaps operated by an FBO) needs to be included in the development plans to accommodate the space required. Options to provide a single general aviation terminal as well as other FBO facilities will be explored. Likewise, the ability to expand any future facilities should be preserved, especially as it relates to providing additional space for aviation related services, flight training, and aircraft maintenance.

Aviation Fuel Storage Requirements

The current self serve 12,000 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 area bounded by Runway 05-23 to the northwest, the deactivated Runway 14-32 alignment to the southwest, and the North-South Taxiway to the east. Currently there is no direct automobile access to the hangars on the west side of the North-South Taxiway. As additional development is proposed in this area, a dedicated road will be necessary. At some point, this landside access will bisect the North-South Taxiway and with it, access to the existing fuel tanks for a number of airport tenants.

Because of this situation as well as the fact that many future facilities may be quite a distance away from the current fuel storage site; a second fuel tank site needs to be planned. At the appropriate time, the County may decide to relocate the existing tanks in addition to installing additional tanks in the future. Another option would be to utilize mobile refuelers to dispense fuel around the different airport locations. However this option would require the County 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 County 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 County 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 Marion County 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 Marion County Fire Rescue Department provides the fire and rescue services for the airport. The Friendship Fire Station #21 located on SW Highway 200 is the closest station at approximately nine driving miles from the airport. There is also the Rainbow Springs Fire Station #22 to the northwest of the airport on SW 86th Street near Dunnellon. This station, which is approximately ten driving miles away, is also able to respond to any emergencies at 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

Direct public access to the facilities on the east side of the airfield is provided either via SW 111th Street, SW 110th Street, or SW 147th Circle, all of which come directly off SW 147th Court. There is no dedicated automobile or pedestrian access to the hangars and aircraft parking areas west of the North-South Taxiway. As such, landside access, which does not conflict with aircraft movements on the North-South Taxiway is needed for the public facilities west of the taxiway. This direct access is also needed 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 maintain the ability to provide access into the north half of the airfield. In addition to the east side of the airfield, the north portion of the airport property provides the most potential for future aviation related development.

Automobile Parking

At many general aviation airports, a number of automobiles are parked in the various 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.

With the exception of the 12 t-hangars, all of the hangar facilities to the east of the North-South Taxiway and north of SW 110th Street have adequate automobile parking spaces. For all of the airport's t-hangars, the two private hangars south of SW 111th Street, and the hangars west of the North-South Taxiway, there is no dedicated automobile parking. This results in a number of automobiles that must utilize a portion of the North-South Taxiway and other taxilanes to access their facilities. As with dedicated landside access, there is an immediate need to provide automobile parking facilities that will 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, water, and wastewater) to future facilities is an important consideration since the associated costs can be a significant portion of the overall development. Extending the existing electric power and water utilities into future development areas should be considered as part of the projects providing access into the new areas. While the ability to handle wastewater can be provided through the continued use of septic tank systems, this is not recommended. The ultimate build out and development of the airfield will eventually require 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 sewer lines to the airport.

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. This limits the use and therefore the types of tenants that may lease the facilities from the County. Nearly every company and many private entities require adequate utilities to conduct various activities in their facilities. Without, the buildings would be limited to only the storage of aircraft. It should be noted that aircraft storage may be the only activity allowed by the County in certain facilities given lease or insurance requirements.

POLLUTION PREVENTION PLANS

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 County 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.

SUMMARY OF FACILITY REQUIREMENTS

Table 3-11 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 3-11
SUMMARY OF FACILITY REQUIREMENTS

Category	Required Improvements
Runways	Environmental Assessment for the Extension of Runway 05-23
	Extend Runway 05-23 to 6,200 feet including MIRLs
	Replace Flush Mounted Runway 05 Threshold Light Fixtures
	Rehabilitate Existing Runway 05-23 Pavement Surface
	Rehabilitate Runway 09-27 Pavement Surface
	Periodic Runway Pavement Maintenance
	Improve Intersection of Runways
Taxiways	Reconstruct North-South Taxiway
	Rehabilitate T-hangar Taxilanes
	Rehabilitate Aircraft Parking Apron Taxilanes
	Construct Parallel Taxiway to Runway 05-23 including MITLs
	Construct Parallel Taxiway to Runway 09-27 including MITLs
	Provide Taxiway/Taxilane Access to New Facilities
	Construct Aircraft Run-up Areas
	Periodic Taxiway Pavement Maintenance
Airfield Environment	Conduct Vertically Guided Airport Airspace Analysis Survey
	Conduct Non-Vertically Guided Airport Airspace Analysis Survey
	Periodic Clearing of Runway Obstructions
	Periodic Remarking of All Airfield Pavements
	MALSR for Precision Approach to Runway 05-23
	ODALS for Runways with Non-Precision Approaches (3 ends)
	PAPI 4-light Systems on All Runway Ends
	Install AWOS III Equipment
	Rehabilitate Airport Windsock, Segmented Circle, and Wind Tee
	Install Supplemental Windsocks for All Runway Ends
	Provide Illuminated Airfield Signage (as required)
	Install Distance Remaining Signs on Runway 05-23
	Install Ground Communications Outlet Equipment
Airport Facilities	Construct 50 T-hangar Units
	Construct Clearspan Hangar Space for 21 Aircraft
	Provide Additional Aircraft Parking Apron Space (210,800 SF)

Table 3-11
SUMMARY OF FACILITY REQUIREMENTS

Category	Required Improvements
Airport Facilities (cont.)	Rehabilitate Existing Aircraft Parking Apron Construct General Aviation Terminal Space (7,650 SF) Provide Second Aviation Fuel Storage Area (100LL Avgas and Jet A) Improve Airfield Security Fencing (as required)
Other Facilities	Provide Access and Parking to Hangars West of North-South Taxiway Provide Access and Parking to New Development Areas Extend Utilities to New Development Areas Develop Stormwater Pollution Prevention Plan (SWPPP) Develop Spill Prevention, Control, and Countermeasure Plan (SPCC)

Source: Hoyle, Tanner & Associates, Inc., 2008.

Airport Alternatives Analysis

INTRODUCTION

The following sections evaluate alternatives for meeting the needs identified in the previous chapter and ultimately provide a planning framework on which to base future airport development decisions. 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. Marion County Airport should be developed so that the facilities accommodate the demand identified and minimize any operational constraints.

Potential development schemes have been created for the future improvements identified in the facility requirements. Only those concepts considered in depth are presented in this chapter. The alternative concepts that required such analysis include:

- Alternatives to Extend Runway 05-23
- Evaluation of Deactivated Runway 14-32 Alignment
- Future Development Areas and Landside Access Considerations
- Recommended Plan for Future Runway/Taxiway Configuration
- Development of Airport Facilities
- Sites for Dedicated Rotorcraft Operations

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.

ALTERNATIVES TO EXTEND RUNWAY 05-23

Three options to extend Runway 05-23 were evaluated. As recommended in the facility requirements, each reflects the long term option for a runway length of 6,200 feet while also addressing the ability to provide an intermediate 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.

As described in later sections, each of the Runway 05-23 alternatives include a future precision approach to Runway 23, a straight-in non-precision approach to Runway 05, and a full length parallel taxiway on the southeast side of the runway. Each alternative also shows how the proposed improvements would tie into Runway 09-27 including the potential for a full length parallel taxiway to the north of the crosswind runway.

Extend Runway 05-23 to the Northeast

In this alternative both the initial and ultimate runway extensions are made to the northeast. While the ultimate runway length is shown in **Exhibit 4-1**, the connector taxiway between the existing and future Runway 23 ends denotes where the threshold would be for the initial 5,400 foot length. With this configuration, the future precision RPZ would overlap a portion of a single family residential parcel located off SW 101st Lane to the northeast of the airport. On the southwest side, a portion of the future visual and non-precision RPZ goes off airport property and overlaps three parcels off Highway 484. The westernmost parcel has a single family residence and the other two have condemned structures. While the overlap of the RPZs will need to be addressed, neither currently encompasses the residential dwellings.

Extend Runway 05-23 to the Southwest

This alternative is similar to the first in that both the initial and ultimate runway extensions are made in one direction. In this case the runway extensions are to the southwest as illustrated in **Exhibit 4-2**. The connector taxiway between the existing and future Runway 05 thresholds delineates the limits for a 5,400 foot runway. Extending the runway southwest keeps the future precision RPZ to Runway 23 on airport property. On the southwest side, the required RSA and ROFA go off airport property and onto three parcels off Highway 484. The future visual and non-precision RPZ also overlaps these parcels, one of which (westernmost) has a single family residence. While the overlap of the required runway surfaces will need to be addressed, none of them encompass the residential dwelling.

Extend Runway 05-23 to the Northeast and Southwest

The third alternative splits the future improvements by extending a portion of Runway 05-23 to the northeast and a portion to the southwest. In **Exhibit 4-3** this alternative reflects the initial extension of approximately 459 feet to the southwest for a total length of 5,400 feet. The follow-on extension to the northeast of 800 feet would provide the ultimate length of 6,200 feet. Under this configuration, the future precision RPZ to Runway 23 remains on airport property. On the southwest side, the required RSA and ROFA go off airport property and overlap two parcels off Highway 484. The future visual and non-precision RPZ overlap three parcels off Highway 484, one of which (westernmost) has a single family residence. While the overlap of the required runway surfaces will need to be addressed, none of them encompass the residential dwelling.

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

PROJECT NO. 857501

CADD NO. 857501e41

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DJD	DJD	DNN

DATE: JAN. 2010

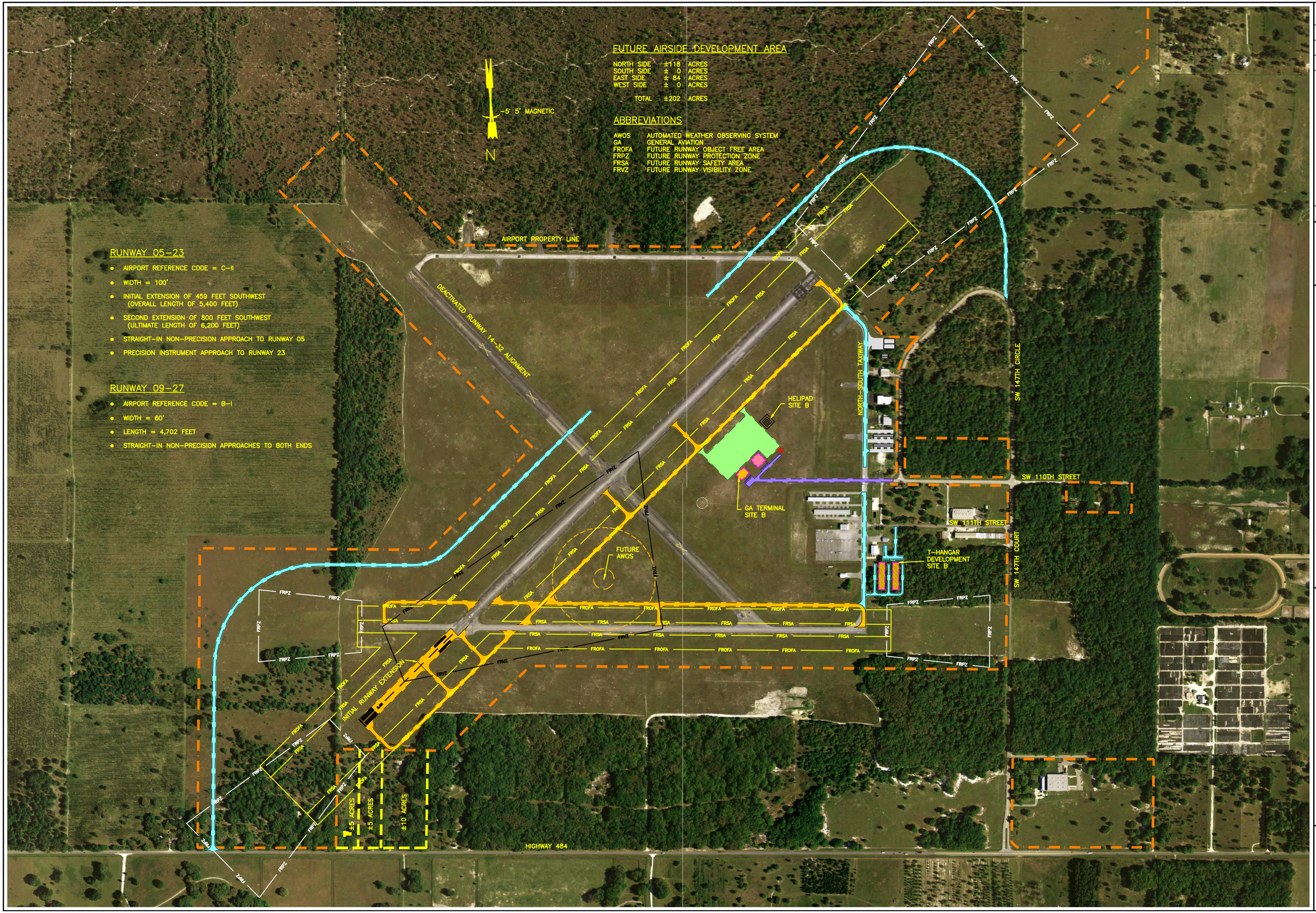
SCALE: NONE

MARION COUNTY AIRPORT
MARION COUNTY, FLORIDA

EXTEND RUNWAY 05-23 TO NE
AND OPTION A FOR OTHER FACILITIES

EXHIBIT

4-1



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

PROJECT NO. **857501**

CADD NO. **857501e42**

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DES. BY **DD** | DR. BY **DD** | CHKD. BY **DNN**

SCALE: **NONE** | DATE: **JAN. 2010**

MARION COUNTY AIRPORT
MARION COUNTY, FLORIDA

EXTEND RUNWAY 05-23 TO SW AND OPTION B FOR OTHER FACILITES

EXHIBIT

4-2

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

PROJECT NO. 857501

CADD NO. 857501e43

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DATE: JAN. 2010

SCALE: NONE

MARION COUNTY AIRPORT
MARION COUNTY, FLORIDA

EXTEND RUNWAY 05-23 TO NE AND SW AND OPTION C FOR OTHER FACILITES

EXHIBIT

4-3

Comparison of Runway 05-23 Alternatives

When comparing the runway extension alternatives, it was assumed that the base construction costs would not vary significantly between the three options. However, other factors were considered, some of which would increase the overall costs. Each is described in the following sections.

Improved Runway Intersection

An immediate benefit to any runway extension to the southwest would be the ability to eliminate the overlap of the Runway 05 threshold with Runway 09-27. Such an improvement would significantly enhance the safety of operations for both runways. Under the current configuration any aircraft positioning on or waiting to depart Runway 05 is also occupying a portion of the west end of Runway 09-27. This situation increases the potential for a runway incursion, especially since the airport is a non-towered facility.

Both southwest extensions shown in **Exhibits 4-2** and **4-3** move the Runway 05 threshold away from Runway 09-27. In addition, the distances shown would allow aircraft holding on the future parallel taxiway to Runway 05 as well as aircraft at the very end of Runway 05, to remain clear of the ultimate RSA and ROFA surfaces required for Runway 09-27. The alternative which only extends Runway 05-23 to the northeast does not change the orientation of the existing runway to runway intersection.

Ability to Establish Future Instrument Approaches

Currently the only published instrument procedures at the airport are the two straight-in, non-precision approaches to Runway 23. As the primary runway expected to serve an increasing number of jet aircraft, instrument approaches to both ends of Runway 05-23 should be established. This includes the ability to provide a precision instrument approach to one end. Using the wind and weather data collected, **Table 4-1** illustrates that Runways 05 and 09 are favored slightly more for both all weather and instrument flight rule (IFR) conditions.

Given the above, the initial thought would be to establish a precision approach to the 05 end of the primary runway. However, there are other issues that must be considered. The first is the overhead power transmission lines that run along the south side of Highway 484. These transmission lines are supported by 75 foot poles that were installed 10 to 13 feet deep. The elevations along the poles varies from 61 to 64 feet above mean sea level (AMSL), therefore it is assumed that the average height is 126 feet AMSL. Progress Energy did not have any exact survey data on file for these poles which they attributed to the fact that they were installed using general specifications in the field during the aftermath of the 2004 hurricane season. There is also a 100 foot United States Forest Service (USFS) lookout tower located north of Highway 484 to the northwest of the extended runway centerline. Using the most recent topographic maps, the overall elevation of this tower is approximately 164 feet AMSL. These structures will create limitations to any approaches established to the existing Runway 05 threshold, which would be limited even further with any proposed extension to the south. In the

simplest terms, a precision instrument approach to Runway 05 would require these power lines to be placed underground and the lookout tower removed. Such an expense impacts the feasibility of establishing such an approach.

Table 4-1
RUNWAY END USE DURING VARIOUS CONDITIONS

All Weather Conditions	
Runway 05	26%
Runway 23	24%
Runway 09	27%
Runway 27	23%
IFR Conditions (ceiling 200 to 1,000 feet and visibility 0.5 to 3 miles)	
Runway 05	30%
Runway 23	21%
Runway 09	28%
Runway 27	21%

Source: National Climatic Data Center: Ocala International Airport – January 1995 to December 2004.

The second consideration is the geographic location of the airfield. The proximity and alignment of Runway 05-23 with the Ocala Very High Frequency Omnidirectional Radio Range (VOR) facilitates the establishment of approaches from the north side of the airport. The north side is also where most flights originate from or depart to given the Florida peninsula in relation to the rest of the nation. Finally, the Medium-intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR) recommended for the future precision approach consists of a light lane that begins 2,400 feet prior to the landing threshold. The MALSR also requires an inner approach Obstacle Free Zone (OFZ) which is 400 feet wide and would continue to a point 200 feet beyond the furthest fixture of the approach lighting system. The length and configuration of this lighting system as well as the inner approach OFZ would require additional land to be acquired for any alternative that considers a precision approach to Runway 05.

Taking the above into consideration, Runway 23 is the only reasonable end to consider for the establishment of a future precision approach. It should also be noted that the power lines and lookout tower described above may also impact the ability to establish certain departure surface criteria for aircraft departing the airport to the southeast. For Runway 05 a future straight-in, non-precision approach is planned and considered essential given the calculations shown in **Table 4-1**. However, as indicated previously, the published minimum descent altitude for any non-precision approach to Runway 05 will likely be impacted by the power lines and lookout tower. In the absence of specific survey data, it appears the lookout tower would penetrate the approach surface by just under eight feet if a non-precision approach were established to the existing Runway 05 threshold. For both of the alternatives (**Exhibits 4-2** and **4-3**) which extend the existing Runway 05 threshold to the southwest, the power lines would also create penetrations to the required surfaces. This is not to say that a non-precision approach cannot be established, it would just have certain penalties related to the actual penetrations.

Requirements for Land Acquisition

With very few exceptions, both the RSA and ROFA must be on airport property in order to provide the proper safety to aircraft operations. While the airport currently owns the property required for the RSA and ROFA, this would change under two of the three options. Both alternatives which extend a portion of Runway 05-23 to the southwest would require the acquisition of additional land in order to maintain control of the future RSA and ROFA. The option shown in **Exhibit 4-2** would require the acquisition of up to three parcels located between the current airport property boundary and Highway 484. These include two five acre and one 10 acre parcel. For the option in **Exhibit 4-3**, it would only be necessary to acquire one of the five acre parcels with the 10 acre parcel. For both, there is the potential that an arrangement could be made to purchase only the affected portion of the parcels, thus significantly reducing the land acquisition required.

As described in the facility requirements, it is not required for the airport to own the land that lies within the RPZ of a runway. However, the land may need to be acquired if a change in the runway configuration would result in the new RPZ overlapping an incompatible land use as defined by the FAA. For the alternative shown in **Exhibit 4-1**, the future precision approach RPZ to the northeast would encompass a portion of the parcel with a single family residence located off SW 101st Lane. While the future RPZ shown does not actually overlap the residential structure, this alternative would likely require the acquisition of this five acre parcel if adjustments were not made to shift the RPZ in and away from the private property. As such, a reduction in the ultimate runway length would need to be made to avoid impacting this private residence.

For all three of the Runway 05-23 alternatives, a portion of the visual and non-precision RPZ for Runway 05 goes off airport property. For the alternatives in **Exhibits 4-1** and **4-3**, the future RPZ would only overlap portions of the parcels between airport property and Highway 484. For the alternative in **Exhibit 4-2**, the future RPZ would also overlap some land to the south of Highway 484 which is currently classified as agriculture land for grazing. What is critical to point out here is that even if the runway is not extended to the southwest (**Exhibit 4-1**) and a non-precision instrument approach is not established to Runway 05, the future RPZ would still overlap three of the parcels between the airport and Highway 484 (one of which has a single family residence). This is simply due to the fact that the RPZ size will increase on the Runway 05 end once the critical aircraft at the Marion County airport changes the current Airport Reference Code (ARC) designation from B-II to C-II. Essentially, once enough larger aircraft operate at the airport to require changing the ARC designation, a portion of these parcels will be within the RPZ required, even if the current Runway 05 threshold remains where it is today. As documented in the facility requirements, this change in ARC is expected to occur towards the end of the 20-year planning period.

In order to accommodate the expected change in ARC, the County has a few options to consider. As described previously, while portions of the future Runway 05 RPZ overlaps parcels with residential structures, no part of the future RPZ would actually encompass the residential dwelling. This combined with the fact that the parcel is approximately five acres in size creates the potential for just a portion of the land to be acquired or an easement obtained to accommodate the future RPZ requirements. It should be noted

that any options to the outright acquisition of the entire parcel would require coordination between the County and land owner, as well as any funding agencies involved in developing the airfield.

EVALUATION OF DEACTIVATED RUNWAY 14-32 ALIGNMENT

An element of the overall runway alternatives analysis is to address the deactivated Runway 14-32 alignment. This 4,875 foot by 150 foot runway was closed due to significant deterioration of the pavement structure. Since, a number of the airport users have expressed a desire to re-activate Runway 14-32. The following sections identify key issues that must be addressed to evaluate the potential.

Crosswind Requirement

Per FAA guidance, an airport's runway system needs to provide 95 percent wind coverage, which is computed based on crosswind components for different groups of aircraft. Previously **Table 1-1** showed that individually, both Runway 05-23 and Runway 09-27 provide the coverage required for the critical 10.5 and 13 knot crosswind component categories. In fact, when combined, the two runways provide an even greater crosswind coverage which in most conditions exceeds 99 percent. Regardless, additional calculations were generated using the FAA methodology. This evaluation replaced the Runway 09-27 orientation with that of Runway 14-32 to calculate the combined coverage if the runways were to change roles. The results, compared to the existing combined coverage, are documented in **Table 4-2**.

Table 4-2
ADDITIONAL WIND COVERAGE ANALYSIS (RUNWAY 05-23 AS PRIMARY)

	Crosswind Component	
	10.5 knots (12 mph)	**13 knots (15 mph)**
All Weather Conditions		
Combined with Crosswind Runway 09-27	99.00%	99.68%
Combined with Crosswind Runway 14-32	99.73%	99.96%
VFR Conditions (ceiling > 1,000 feet and visibility > 3 miles)		
Combined with Crosswind Runway 09-27	98.99%	99.69%
Combined with Crosswind Runway 14-32	99.73%	99.96%
IFR Conditions (ceiling 200 to 1,000 feet and visibility 0.5 to 3 miles)		
Combined with Crosswind Runway 09-27	98.86%	99.58%
Combined with Crosswind Runway 14-32	99.79%	99.98%

Source: National Climatic Data Center: Ocala International Airport – January 1998 to December 2007.

Individually Runway 14-32 provides slightly less crosswind coverage than Runway 09-27 during most conditions (see **Table 1-1**). However, when combined with Runway 05-23, the combined coverage using Runway 14-32 as the crosswind runway is slightly better in all of the conditions

analyzed. Regardless, both the FAA and FDOT will only fund a secondary runway when the crosswind coverage is less than 95 percent for all applicable crosswind categories. Therefore, if Runway 14-32 were to be reactivated, the cost to do so would not be eligible for FAA or FDOT grants. The exception to this statement is if the Runway 09-27 pavement reaches the end of its useful life. At that point the funding agencies might consider putting money into Runway 14-32 rather than Runway 09-27. With regard to the latter, the 2008 FDOT pavement study does not show any rehabilitation of the Runway 09-27 pavement within their 10 year plan, which goes through the year 2017.

Initial Costs to Reactivate Runway 14-32

Even though the FAA and FDOT are not likely to participate in the funding of a third runway, it is still important to address the initial costs associated with reactivating Runway 14-32. This information is vital to making any decisions on the future of the Runway 14-32 alignment. This includes the options of reactivating Runway 14-32 as a third runway or keeping it deactivated until the pavement for Runway 09-27 requires similar repairs.

In either case, both would require the existing runway pavement to be reconstructed. For ease of comparison, an initial cost estimate was created to essentially replicate what is currently available on Runway 09-27. In other words, to convert the Runway 14-32 alignment into a useable 4,702 foot long by 60 foot wide runway with lights, the initial costs (in 2008 dollars) would be around $1.5 million. This estimate does not include any taxiway work nor does it consider any other costs that may be associated with the need to acquire land or establish an avigation easement on the southeast side for the RPZ to Runway 32. It should be noted that if Runway 14-32 were to be reactivated, it would probably be more realistic to consider providing a runway width of 75 feet. Along those lines, the initial cost does not include any costs that may be required to remove the remaining 90 feet of original runway pavement width.

Ability to Enhance Airfield Configuration

As described previously a goal for the future airfield configuration should be to try and eliminate the overlap of the Runway 05 threshold with Runway 09-27. Obviously if Runway 14-32 was reactivated and Runway 09-27 closed, the current configuration would change. **Exhibit 4-4** illustrates the option of reactivating Runway 14-32 with the alternative to extend Runway 05-23 to both the northeast and southwest. In addition to enhancing the safety of airfield operations, the configuration shown in **Exhibit 4-4** would provide slightly more developable space for aviation related facilities.

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

PROJECT NO. **857501**

CADD NO. **857501e44**

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DATE: JAN. 2010

SCALE: NONE

MARION COUNTY AIRPORT
MARION COUNTY, FLORIDA

REACTIVATING RUNWAY 14-32
AND OPTION D FOR OTHER FACILITIES

EXHIBIT

4-4

FUTURE DEVELOPMENT AREAS AND LANDSIDE ACCESS CONSIDERATIONS

While there are a number of areas that can be developed at the airport, those with the potential for aviation related development will depend on the ultimate airfield configuration with respect to the airport property, as well as potential to provide landside access. The four general areas or quadrants of the airport are described in the following sections.

North Side of Airport

The north side primarily includes the land to the north of the current Runway 05-23 and deactivated Runway 14-32 alignments. Even after all of the various imaginary surfaces related to the aircraft movement areas are taken into consideration, this portion of the airport provides the most space for future development under most of the runway configuration options. For those showing Runway 09-27 remaining the crosswind runway, approximately 118 acres is available on the north side of the airport. If Runway 14-32 were reactivated, this area would decrease to approximately 50 acres due to the space required for Runway 14-32 and its associated setbacks, including a parallel taxiway and the approach to Runway 14 (reference **Exhibit 4-4**).

Under any airfield configuration, perhaps the most significant cost associated with developing the north side of the airfield will result from the required landside access. As shown in **Exhibits 4-1** to **4-4**, the current property line and setbacks associated with Runway 05-23 require a significantly long access road to this area. Essentially there are two options. One is to provide access directly off Highway 484 while the other would utilize an existing right-of-way north of SW 147th Circle. Access off Highway 484 is not possible if Runway 14-32 is re-activated and the ability to get a road beneath the ultimate approach to Runway 23 is not possible if Runway 05-23 is extended its full length to the northeast as illustrated in **Exhibit 4-1**.

In all, access to the north area directly from Highway 484 would require additional roadway length than the option to access this area off SW 147th Circle.

South Side of Airport

The south side of the airport includes the land south of the current Runway 05-23 and deactivated Runway 14-32 alignments. Due to the proximity of the airport property line to the imaginary surfaces related to Runway 09-27, there is no realistic space available for development as long as this runway remains active. The only potential development shown is this area for the alternatives that keep Runway 09-27 open is for a future takeoff and landing aids since they are some of the few elements that can be placed within the required Runway Visibility Zone (RVZ). This is illustrated in **Exhibits 4-1** to **4-3**.

If Runway 14-32 was reactivated and Runway 09-27 closed, the south side of the airport could provide approximately 28 acres of developable space (illustrated in **Exhibit 4-4**). While developable space to the south of the runway intersection would be possible under this scenario, it would require the acquisition of land between the airport and Highway 484 for access. This is simply due to the fact that access off of SW 147th Court could not be provided due to approach surface required to Runway 32. To do so would require the threshold for Runway 32 to be displaced more than 300 feet.

East Side of Airport

The east side primarily includes all of the land to the east of the Runway 05-23 and deactivated Runway 14-32 alignments. Depending on the future RVZ, which moves based on the ultimate runway endpoints, the options where Runway 09-27 remains active varies between 81 and 84 developable acres on the east side. If Runway 14-32 were to re-open and Runway 09-27 close (**Exhibit 4-4**) the developable space increases to approximately 93 acres. This results from the land west of SW 147th Court that would no longer be required for the approach to Runway 27.

For any of the airfield configuration alternatives, future landside access into the east side would most likely be provided by extending SW 110th Street. While SW 111th Street currently provides the primary automobile access to the airport, the extension of this road into the undeveloped, infield portion on the east side would require the removal of at least one existing aircraft hangar and some paved aircraft apron areas, including a majority of the space in front of the self serve aviation fuel tanks.

Another critical issue for the east side of the airport is the need to eliminate the mix of aircraft and automobile traffic on the same pavement. Therefore, any landside access option will essentially divide the airfield in half. Not only will this significantly increase taxi times to get from one side of the airport, it would also segregate the existing self serve aviation fuel tanks to one half of the airfield. Eventually, the addition of new taxiways and fuel tanks (or the relocation of the existing tanks) will eliminate the mix of aircraft and automobile traffic on the east side. The phasing of the various projects will need to take this into considerations as additional facilities and improvements are made on the airfield for the east side.

West Side of Airport

Due to the proximity of the airport property line to the intersection of the current Runway 05-23 and deactivated Runway 14-32 alignments, the west side primarily includes land in the southwest corner of the airfield. As such, there is no realistic space available for aviation related development as long as Runway 09-27 remains active. Should Runway 14-32 be reactivated and Runway 09-27 closed (as shown in **Exhibit 4-4**), approximately 60 acres on the west side could be developed. Landside access to this area would come directly off Highway 484.

Non-Aviation Related Development

In the discussions above about the north, south, east, and west development options, the areas described are to serve aviation related uses first. While **Exhibits 4-1** to **4-4** show some 200 acres available, these are only the general areas outside all of the various imaginary surfaces and setbacks required for the future runway options. As the necessary taxiways, taxilanes, landside access, water management features, right-of-ways, setbacks, etc. are considered, the available space will be consumed quickly, especially if facilities are not developed in an efficient manner.

Regardless, non-aviation development represents a significant revenue source and much needed diversification for the development of the airport property. Currently the airport has some space available for non-aviation related leaseholds. All of these areas are outside of what

would be considered developable for aviation related facilities, primarily because they do not have the potential for providing ties into to the aircraft movement areas of the airfield.

Within the primary airport property boundary, there are a few parcels that lie between SW 110th Street and SW 111th Street. This area is bounded on the west by aviation facilities along the east side of the North-South Taxiway and by SW 147th Court to the east. Depending on whether or not the current flightline is expanded east, this area currently has approximately 7.5 acres of vacant space that could be used for non-aviation development.

There are three airport parcels that are not contiguous with the rest of the property and therefore should be dedicated to non-aviation development. One is located just north of SW 110th Street, within the boundary of SW 147th Circle. This outparcel is currently vacant and provides 8.5 acres. At the eastern end of SW 110th Street, there is a 4.2 acre parcel owned by the airport. While there are some structures on this site, they were County facilities that have been abandoned. The final outparcel is a 26.9 acre tract north of Highway 484 and east of SW 147th Court at the entrance to the airport. Approximately half of this property is currently leased and the remaining portion undeveloped.

In each of the potential airfield configurations shown in **Exhibits 4-1** to **4-4**, a parcel of land could be developed in the southwest corner of the airport, directly off of Highway 484. The actual size and use of the parcel will depend on the ultimate configuration of Runway 05-23. In all cases the parcel would have frontage along Highway 484, but could only accommodate compatible non-aviation uses that would also be subject to certain restrictions, including height limitations.

RECOMMENDED PLAN FOR FUTURE RUNWAY/TAXIWAY CONFIGURATION

The following sections summarize the different considerations addressed previously with regard to the options for airfield development. The resulting runway and taxiway configuration recommended will be carried forward in the analyses of other airport alternatives and will serve as the foundation for the new Airport Layout Plan (ALP) drawings.

Runway 05-23

With the exception of the potential acquisition of private parcels, none of the runway alternatives considered has a significant impact to the surrounding environment. Much of this has to do with the fact that the airport property is void of most environmentally sensitive features such as wetlands, threatened species, endangered flora/fauna, etc. However, as described previously, all of the options will eventually result in the future RPZ for Runway 05 overlapping three of the parcels between the airport and Highway 484. And while one of these parcels has a single family residence, no portion of the future RPZs would actually encompass the residential dwelling.

It is important to point out again that the situation described above will occur at some point in the future regardless of whether Runway 05-23 is extended or a non-precision instrument approach established to Runway 05. The future increase in RPZ size is based on the forecasted change in the size of aircraft utilizing the airport towards the latter part of the 20-year planning period. Therefore, it is necessary to plan to accommodate that projected change for

the airport and while acquisition of the three parcels is the best alternative, it is not the only alternative given the size and limited residential development currently associated with each. It is recommended that the County try and acquire these parcels should they become available. However, a likely scenario is that one or all three of the parcels will still need to be addressed at the time the runway design standards need to be changed. At that time the remaining parcels may be acquired, only the affected portions acquired, or some other form of use agreement/easement established with the land owner.

While the overlap of the future RPZ creates the potential for options to the acquisition of land, any overlap by the future RSA and ROFA would not. This coupled with the desire to improve the runway to runway intersection resulted in a refined alternative for Runway 05-23. The first phase would be to construct 224 feet to the southwest to improve runway to runway intersection. While the resulting runway length of 5,165 feet is less than the 5,400 feet identified in the facility requirements, it would keep the required RSA and ROFA on existing airport property. As indicated previously, the initial extension of Runway 05-23 is expected to occur within the first half of the 20-year planning period. The actual project timeframe will depend on the documented demand, availability of funding, and the need to complete any required environmental review. A second phase in the long term planning period would extend the runway an additional 1,035 feet to the northeast. This extension would result in an overall runway length of 6,200 feet while also keeping the RPZ required for a future precision approach to Runway 23 from impacting any property to the northeast. This revised option is illustrated in **Exhibit 4-5** at the end of this chapter.

In addition to a shorter intermediate runway length, the truncated extension of the Runway 05 threshold to the southwest only provides the ability to hold aircraft on the future parallel taxiway to this runway end. Under the original split extension option (**Exhibit 4-3**) aircraft would have been able to position and hold for departure on Runway 05, as well as the parallel taxiway, without impacting the critical surfaces associated with operations along Runway 09-27. Regardless, this option represents a slight compromise of intermediate runway length in order to keep future RSA and future ROFA on airport property, as well as to improve the runway intersection.

Since the 224 foot extension to the southwest might occur before a change in the critical aircraft for Runway 05-23, the initial RPZ to Runway 05 would stay the same size as it is today. However, the proposed extension would push a corner of the smaller existing RPZ over one of the private parcels located between airport property and Highway 484. As mentioned above, options to mitigate this overlap include outright acquisition of the entire parcel, partial acquisition, or some form of use agreement/easement with the private land owner. It should be noted that only the future (larger) RPZ off Runway 05 is shown on **Exhibit 4-5**.

Previously it was stated that the ability to establish a straight-in, non-precision approach to Runway 05 will depend on the very detailed information that would result from the required Non-Vertically Guided Airport Airspace Analysis Survey described in the facility requirements chapter. Such a survey would clearly delineate any penetrations to the required instrument approach surfaces, including the power lines and USFS lookout tower. Based on the information available, the power lines would only create a penetration of a foot or two while the lookout tower would be approximately 14 feet. Depending on the actual penetrations, a future

non-precision approach to Runway 05 could be established with some minor penalties in the minimum descent altitude or the obstructions could be removed.

Crosswind Runway

Runway 09-27 will continue to serve as the crosswind runway at the Marion County Airport. The 1993 ALP drawing set originally included all three runways. However, after Runway 14-32 was deactivated, a note was added to the ALP set of record on file with the FAA Orlando Airport District Office (ADO). No note was made on the actual drawing depicting the various imaginary surfaces of Federal Aviation Regulation (FAR) Part 77. Therefore it is possible that the approach surfaces off each end of Runway 14-32 may still be considered during FAA airspace reviews. However, the entire 1993 ALP drawing set will be updated and superseded by this study. When asked, the FAA Orlando ADO stated that they could not protect a third runway unless there was a documented need for the runway. As indicated in the sections above, the only potential to reactivate Runway 14-32 would be if Runway 09-27 were to close. Closing Runway 09-27 and reactivating Runway 14-32 are not considered viable in any part of this study. As such, the various imaginary surfaces and design criteria associated with Runway 14-32 cannot be included on the new ALP drawing set submitted for FAA approval.

For both ends of Runway 09-27, future straight-in, non-precision approaches are planned. In the absence of specific survey data, there are no obvious reasons why such GPS approaches could not be developed for either end of Runway 09-27. Given the calculations shown in **Table 4-1** the priority would be to establish an approach to the Runway 09 end first. In either case a number of trees will likely be obstructions to the future instrument approach surfaces and would need to be removed. Also, if an Omnidirectional Approach Lighting System (ODALS) is considered for the Runway 27 end, it will require either an easement for or the acquisition of approximately 2.6 acres of land just east of SW 147th Court. This would be to accommodate the last fixture of the ODALS as well as to protect the required inner-approach obstacle free zone.

Parallel Taxiway Systems

A number of sections have addressed the need to ultimately construct parallel taxiways to both runways. 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 development of any portion must be prioritized.

Previously a number of reasons illustrated why the east side of the airport provides the most immediate development space for aviation related uses. In addition, the east side also provides adequate space to accommodate all of the demand anticipated to occur at the Marion County Airport over the 20-year planning horizon. In other words, development on the north or west sides of the airport is not necessary to meet the aviation demand identified for the 20-year planning horizon. Therefore, the first taxiway improvements need to include the ability to ultimately provide a full length parallel taxiway on the southeast side of Runway 05-23. Due to the incremental runway extensions as well as available funding, a full length parallel taxiway will likely require two or more phases to complete.

Afterwards, a full length parallel taxiway on the north side of Runway 09-27 should be constructed. It is recommended that the future parallel taxiway to Runway 09-27 be 35 feet

wide and at a runway centerline to taxiway centerline separation of 240 feet. This would provide the taxiway standards associated with aircraft having an ARC of B-II versus the crosswind runway's minimum requirement for an ARC of B-I. While doing so would increase the taxiway pavement 10 feet and the centerline separation by 15 feet, the result is that Design Group II aircraft would be able to utilize this taxiway to and from Runway 05-23. It would also allow the movements of Design Group II aircraft along the taxiway without impacting operations on Runway 09-27. The full length parallel taxiway to Runway 09-27 may also require more than one project to complete. Both of the recommended full length parallel taxiways are shown as part of **Exhibit 4-5**.

Exhibit 4-5 also illustrates the best connector or exit taxiway locations for the parallel taxiway systems. For both runways the applicable FAA criteria recommends the optimal connector/exit taxiway location be within 2,000 to 4,000 feet from the landing runway threshold and separated by at least 750 feet. For Runway 05-23 a connector is shown along the alignment of the deactivated Runway 14-32 pavement. Not only does this location provide the ability to use the old pavement structure for construction, it is also within the proper exit range from the existing and future Runway 05-23 thresholds. Likewise, the new connector shown off Runway 05-23 to the future general aviation facilities would be within the optimal range for both the existing and future thresholds on both ends of Runway 05-23. Combined, these connectors provide multiple exits for aircraft using Runway 05-23, as they are also separated from each other by a distance greater than 750 feet. For Runway 09-27 a single connector/exit taxiway is shown at the midpoint of the runway since there is such a narrow margin for which a single connector could provide an exit within the optimal range for landings on either runway end.

While beyond the 20-year planning period, development of the north side of the airport will eventually require parallel taxiway access. While it is possible to have facilities with no paved taxiway access, this is normally not accepted by FAA or FDOT. Generally, when using state or federal funds for development, the agencies require there to be adequate airfield access in place. Thus, until a full or partial parallel taxiway is built on the northwest side of Runway 05-23, no aviation related development should occur on the north side. The primary reason for this is directly related to the safety of operations. Since Marion County is a non-towered airport, the lack of any parallel taxiway serving the north side would result in an increase in the number of aircraft crossing or taxiing along Runway 05-23, if facilities were constructed on the north side.

DEVELOPMENT OF AIRPORT FACILITIES

The following sections address the criteria and options that were considered in order to determine the best airport facilities for future development. While the airport facility alternatives shown in **Exhibits 4-1** to **4-4** were based primarily on the needs identified in the facility requirements, some may vary in size based on the developable space available for a given area. For any facility, no development should be pursued until the actual demand materializes.

Critical Airfield Design Standards

In addition to remaining clear of the RSA, ROFA, and RPZ associated with the future runway configuration, there are additional setbacks that are critical to the layout of future facilities at the Marion County Airport.

Building Restriction Line

The overall height of most on-airport structures is limited by the object's location with respect to the various airspace surfaces required under FAR Part 77. For general aviation airports, a Building Restriction Line (BRL) that delineates the location for which structures of up to 20 feet can be located is useful in facility planning. Typically, the Transitional Surface coming off the sides of a runway determine the location of the BRL, but it can also be influenced by Taxiway Object Free Areas (TOFA), taxilane object free areas, RPZs, critical areas for navigational aids, and other surfaces.

Taxiway Centerline Spacing

Previous sections addressed the minimum runway centerline to parallel taxiway centerline separation standard. However, for some configurations there will be a need to consider an apron edge taxiway or hangar taxilane that is parallel to another taxiway. For Design Group II aircraft, the parallel taxiway centerline to parallel taxiway/taxilane centerline must be 105 feet. The secondary taxiway/taxilane is also subject to the same object free areas as the primary taxiway system.

Building Separation

Guidance on the proper construction and protection of aircraft hangar facilities is provided by the National Fire Protection Association (NFP) in their document NFPA 409, "Standard on Aircraft Hangars." This document includes the separation required between hangar buildings. However, depending on the type and use of hangar buildings, as well as building materials, the requirements may vary and final interpretations are typically made at the local level. Some hangar separations may be up to 75 feet between single hangars or a cluster of small hangars (like t-hangars) that provide up to 12,000 square feet of space. Because various building sizes are shown on the different exhibits, a minimum and conservative separation of 75 feet was considered between all structures.

Water Management Considerations

Currently there is no master drainage plan or conceptual permit available for the development of facilities at the airport. Likewise, no evaluations or calculations for the different options shown have been made. However, in an effort to plan facilities that can properly accommodate the runoff and treatment of stormwater, each option attempts to preserve an equal amount of open area for the impervious area of the development proposed. The intent of this general consideration is to make each alternative more realistic with respect to the water management criteria required during design.

T-hangar Development Site Alternatives

As documented in the forecast chapter, over 80 aircraft in 2008 are waiting for hangar space at the Marion County Airport. Nearly every one of the individuals on this list desires a t-hangar facility. To address this need and the fact that the airport does not have any areas currently planned for additional t-hangars, a number of different sites were identified. All but one of the

layouts shown reflects 10 unit nested t-hangar buildings which can accommodate most single-engine and multi-engine piston aircraft.

In the facility requirements, the minimum taxiway width and TOFA were described for both Design Group I and II aircraft. Since t-hangars typically house only small single and light multi-engine aircraft, the taxilanes serving them only require Design Group I standards. As described in the facility requirements, this would include a taxiway/taxilane width of 25 feet and a TOFA width of 79 feet. However, Appendix 5 of FAA AC 150/5300-13, Change 15, "Airport Design," allows a slight reduction in the Design Group I requirements when designing t-hangar layouts. Using Appendix 5, only 20 feet is required for the taxilane width and 75 feet between each t-hangar separated by a taxilane. While there is only a small difference in the TOFA spacing, it may make a difference in some of the potential t-hangar layouts. Additionally the 20 foot pavement requirement will result in lower construction cost while the 75 foot separation meets the building setbacks described previously.

T-hangar Development Site A

The first site considered for the expansion of t-hangar facilities is shown west of the North-South Taxiway on **Exhibit 4-1**. This is the only option that utilizes different t-hangar building sizes since the layout expands the existing t-hangar configuration. As such, Site A uses standard t-hangars (rather than nested buildings) with 75 feet in-between. The north t-hangar is a 10 unit structure while the south t-hangar is an 8 unit structure. The layout reflects the ability to provide up to 22 automobile spaces on the north and 24 spaces on the south to accommodate both existing and future tenant parking. The automobile parking on the south could also be expanded to provide landside access and automobile parking for the existing clearspan hangar and aircraft parking apron, south of the current t-hangars and self serve aviation fuel tanks.

T-hangar Development Site B

One of the two potential t-hangar sites east of the North-South Taxiway is shown on **Exhibit 4-2**. This site is south of SW 111th Street with airside access to the two 10 unit t-hangar buildings via taxilanes off the North-South Taxiway. The westernmost t-hangar taxilane is offset 105 feet from the centerline of the North-South Taxiway to provide the proper Design Group II taxiway to taxilane separation. Units of the westernmost t-hangar do not have direct access off North-South Taxiway as this taxiway an active movement area serving a number of other facilities including the self serve aviation fuel tanks. The layout reflects the ability to provide up to 20 automobile spaces which could also be expanded to provide landside access and automobile parking for the two existing hangars east of North-South Taxiway and south of SW 111th Street.

T-hangar Development Site C

Another t-hangar site option west of the North-South Taxiway but north of the existing t-hangar facilities was considered. As depicted on **Exhibit 4-3**, this site would be located just north of the future extension of SW 110th Street. Airside access to the two 10 unit t-hangar buildings would be via new taxilanes and the existing taxiway. Units along the east side of the easternmost t-hangar would have direct access off the North-South

Taxiway. This is considered viable since the North-South Taxiway would dead end at this location. The configuration shown offsets the easternmost t-hangar 65.5 feet from the North-South Taxiway centerline to preserve a Design Group II TOFA. Depending on how the area south of the 12 t-hangars east of the taxiway is developed, this dimension could be reduced to Design Group I standards. The new taxilane north of the proposed t-hangar buildings should allow Design Group II standards in order to provide access to other future facilities in this area. Landside considerations include placing the t-hangar buildings such that the 80 foot right-of-way associated with SW 110th Street is maintained west of the North-South Taxiway. The layout also provides the ability to construct up to 20 automobile spaces off the future extension of SW 110th Street.

T-hangar Development Site D

The final t-hangar site considered is east of the North-South Taxiway, between SW 110th and SW 111th Streets. As shown on **Exhibit 4-4**, airside access to the two 10 unit t-hangars would be via a taxilane which utilizes a portion of SW 111th Street. This would require the relocation of the existing airfield fencing and electric gate to SW 110th Street. Likewise, the westernmost taxilane to the t-hangar buildings is offset from road connecting SW 110th Street and SW 111th Street to provide proper Design Group I taxilane object free area. This is necessary in order to maintain public access to the existing general aviation terminal building. The site also shows up to 20 automobile parking spaces off of SW 111th Street.

Preferred T-hangar Development Site

Due to the continuing requests for t-hangar space, the identification of a preferred development site was addressed early in the alternatives process. This included workshops with both the airport tenants and the Board of County Commissioners. During each, the four sites were discussed with attention given to the fact that one of the biggest differences was that two of the options would required bisecting the North-South Taxiway.

Safe automobile and pedestrian access to the existing facilities west of the North-South Taxiway is needed. Until such dedicated landside access is provided, the funding agencies are not eager to participate in additional facilities that would increase the potential number of automobiles or pedestrians using active aircraft movement areas. Therefore, the North-South Taxiway would have to be bisected before new facilities could be constructed west of the existing taxiway alignment. While extending SW 110th Street into the airfield is relatively straightforward, the result is that doing so splits the airport facilities in half. Aircraft to the north would not have access to the self serve aviation fuel tanks unless they taxied all the way around the airfield, which would include using both active runways. The extension of SW 110th Street would also limit the ground maneuvering options available to all aircraft since the North-South Taxiway is the only dedicated taxiway available to the two runways.

The result is that for either Site A or Site D, significant improvements to the airport's airfield and landside infrastructure would have to occur first. While such improvements will ultimately occur, the direction given at the public workshop with the County

Commissioners was to immediately pursue developing t-hangars at Site B. Essentially, Site B was selected over Site D as it did not require using a portion of SW 111th Street for taxilane access and Site B had the ability to accommodate the additional t-hangar development identified in the facility requirements chapter.

Exhibit 4-5 reflects the modification of Site B to show the development of at least 50 t-hangar units to fulfill the need identified. The buildings shown are based on Erect-A-Tube's N54-42 nested t-hangar building which measures 54 feet wide by 231 feet long for 10 units. These particular buildings can easily accommodate multi-engine pistons models such as the Cessna 310 or Piper Aztec. The first t-hangar has also been set further back from the North-South Taxiway to allow another large clearspan hangar to be constructed south of the existing clearspan hangar south of SW 111th Street.

General Aviation Terminal Sites

Additional general aviation terminal space will be required during the planning period. However, since the current terminal building is a portable structure, the space cannot be expanded. Therefore, three different sites for the development of general aviation terminal facilities are shown on **Exhibits 4-1** to **4-3**. For comparison, each layout includes a general aviation terminal building, an aircraft parking apron with airside access, a large clearspan hangar, aviation fuel storage tanks, and landside access. Because these facilities are primarily intended for itinerant users and any based aircraft would be on the ramp or in the surrounding hangars, these sites do not have to coincide with the t-hangar development sites.

General Aviation Terminal Site A

Site A is situated just north of Runway 09-27. An initial consideration for this area was to tie some or all of the future facilities into the existing aircraft parking apron. While there are a number of layouts that could be shown in this open area, the one illustrated balances the need for both airside and landside access. Site A provides enough space to accommodate all of the future general aviation terminal and aircraft parking apron space identified for the 20-year planning period. Depending on the final layout, Site A would also enable a number of larger clearspan hangars to ultimately be constructed around the aircraft apron. **Exhibit 4-1** illustrates a 7,500 square foot (SF) terminal, a 10,000 SF clearspan hangar, aviation fuel storage tanks, and approximately 210,000 SF of aircraft parking apron.

General Aviation Terminal Site B

The general aviation facilities shown on **Exhibit 4-2** provide a site that is centrally located on the primary runway. Because of the lack of developed facilities, Site B provides adequate space to accommodate the general aviation terminal and aircraft parking apron space projected for the 20-year planning period. This also includes the ability to ultimately configure a number of larger clearspan hangars around the aircraft apron. Site B reflects a 7,500 square foot (SF) terminal, a 10,000 SF clearspan hangar, aviation fuel storage tanks, and approximately 210,000 SF of aircraft parking apron

General Aviation Terminal Site C

The layout shown on **Exhibit 4-3** explores the ability to develop new general aviation terminal facilities near the existing site east of the North-South Taxiway. This area is somewhat limited since most of the area north of the approach to Runway 27 and SW 111th Street is being reserved for the development of t-hangars. However, there is enough space to accommodate the terminal space and aircraft parking apron space needed over the next 10 years. For the aircraft parking apron, Site C represents approximately half (100,000 SF) of what is calculated as required by the end of the 20-year planning period. The layout also includes a 4,500 SF terminal, 10,000 SF clearspan hangar, and aviation fuel storage tanks.

Recommended Development of General Aviation Terminal Facilities

Both Sites A and B have virtually unlimited capability and flexibility due to the amount of undevelopable space between the two active runways and the North-South Taxiway. However, of the two, Site B provides a centralized location on the primary runway with the best opportunity for direct landside access and airside visibility. Regardless, both Sites A and B require significant infrastructure improvements before any general aviation terminal facilities can be constructed. This includes the requirement for at least a portion of the future parallel taxiway systems, extension of SW 110th Street, and related utilities to be constructed first. In addition, development of either Site A or Site B would effectively split the current airfield facilities in half, as described for the t-hangar sites west of the North-South Taxiway.

Therefore, Site C is recommended as the area where development of general aviation terminal facilities should occur first. As with the preferred t-hangar alternative, Site C enables the County to develop airport facilities without having to incur the cost and time required to expand the supporting infrastructure beforehand. Even though Site C can be developed immediately, it will not have enough space to accommodate all of the demand identified through 2028. For that reason, Site B should be reserved for the development of general aviation terminal facilities towards the second half of the planning period. Doing so allows the necessary airside and landside infrastructure for Site B to be constructed after the intermediate needs have been met by developing Site C.

The initial development of Site B could also be phased such that it provides the necessary airside access and aviation fuel that would be necessary for those facilities that exist north of the point where the extension of SW 110th Street would bisect the airfield. The phased development of airside and landside access for Site B would also support the construction of airport facilities west of the North-South Taxiway and north of the extension of SW 110th Street.

Additional considerations for Site C include the option for the County to relocate the existing aviation fuel storage tanks instead of purchasing and installing new tanks. They could also be put in a location such that landside access to the tanks would be possible without introducing unauthorized vehicles on airport property. Such an arrangement has the potential to make fuel sales to other users such as airboat operators or race car owners. Due to the limited space, the initial layout shown would require a portion of the

open space currently fenced as a part of the Jacksonville Air Route Traffic Control Center tower facility as well as the temporary Quonset hangar to be recaptured by the airport.

Other Airport Facility Issues

Other considerations for the development of airport facilities are listed below. While the initial goal is to meet the facility requirements identified for the planning period, the items below should help provide flexibility in future development options. For any area, some thought must be given to ensure that the airport's long term potential is not prohibited by the development of facilities to meet short term goals.

Types of Hangars

Space should be reserved for all types of hangars, as the actual need may not be known until the design is considered. Therefore, in addition to t-hangars, different sizes of large and small clearspan hangars should be planned. A key consideration is that the larger hangars will have a corresponding taller height, and therefore, will need to be planned on sites further away from the critical airfield setbacks such as the BRL. Different sizes are also necessary as some facilities may be used for individual private storage, multiple aircraft storage, or for commercial operations such as aircraft maintenance, avionics repair, etc.

Flexibility

As much flexibility needs to be incorporated into any development plan due to the limited and sometimes odd shaped property on an airfield. Similarly, it may be discovered during the initial design of a facility that the site would better accommodate the needed facilities in a different orientation. Therefore, when possible, enough space should be provided to allow the potential to rearrange facilities within a given site to take advantage of specific site conditions and/or to reduce development costs.

Common Infrastructure

Many of the sites on airport property will require water and wastewater service. Without either, the user of a structure cannot obtain an occupancy certificate. The inability to obtain such a certificate limits the use of a hangar to only aircraft storage. Therefore, consideration should be given to developing facilities with water and wastewater service. For example, some t-hangars and clearspan hangars may benefit from providing a common restroom area located conveniently to the facilities served. Conversely, other facilities such as a corporate hangar with offices or an aircraft maintenance operation will most certainly need dedicated water and wastewater service.

SITES FOR DEDICATED ROTORCRAFT OPERATIONS

Since rotorcraft activity is expected to increase throughout the planning period, a future public helipad to safely accommodate the arrival and departure of rotorcraft operations should be considered.

Minimum setbacks associated with a dedicated helipad are based on the criteria contained in FAA AC 150/5390-2B, "Heliport Design." For planning purposes, the Eurocopter AS350B was utilized as the critical rotorcraft. In the absence of a single model that conducts at least 500 annual operations, the Eurocopter AS350B was selected as it has similar characteristic to other popular rotorcraft. This includes the McDonnell Douglas MD500 and Bell 206 JetRangers; however the AS350B is slightly more demanding with respect to rotor diameter and overall length. Planning a helipad to the requirements of this midsize group of rotorcraft will provide more than adequate space for a number of the smaller, piston rotorcraft which are very popular in Florida for training. These include the Schweitzer 300s and Robinson rotorcraft (R22 and R44 models). The Eurocopter AS350B requires the following square areas to provide the proper safety criteria:

> **Touchdown and Lift-off Area (TLOF)** = 36 feet (1 times the rotor diameter of the critical rotorcraft). The AS350B has a rotor diameter of 35.07 feet.
>
> **Final Approach and Takeoff Area (FATO)** = 64 feet (1.5 times the overall length of the critical rotorcraft). In this case the AS350B has an overall length of 42.45 feet.
>
> **Safety Area** = 20 feet beyond the FATO.

Using the required setbacks and facility footprints, three potential public helipad sites have been shown on **Exhibits 4-1** through **4-3**.

Helipad Site A

Exhibit 4-1 illustrates one general area where a public helipad could be developed adjacent to the general aviation facilities off Runway 09-27. In this particular layout, the helipad has been configured on the west side of the proposed aircraft parking apron to provide adequate clearance with the airfield for the rotorcraft arrival and departure corridors. Depending on how facilities, including taxiways, are developed off the future parallel taxiway to Runway 09-27, the helipad could also be moved further west. This would allow the helipad shown at Site A to take advantage of the existing pavement of the deactivated Runway 14-32 alignment. While the pavement would need reconstruction, it could potentially result in a cost savings for the construction of the helipad. Ultimately, the helipad should tie into future facilities such that there is direct paved access to aircraft parking areas and/or hangar facilities. This would allow the movement of rotorcraft, via dollies, to and from the different facilities proposed.

Helipad Site B

The second area for the development of a public helipad is similar to Site A in that it places the facility adjacent to the proposed general aviation terminal facilities off Runway 05-23. As shown on **Exhibit 4-2**, Site B would allow rotorcraft operations to primarily arrive and depart the airfield

using flight tracts along the Runway 05-23 alignment. As described above, any helipad in the Site B location should tie into future facilities to provide paved access to aircraft parking areas and/or hangar facilities.

Helipad Site C

The public helipad shown on **Exhibit 4-3** reflects one potential option to support rotorcraft operations adjacent to the existing aircraft parking apron. Site C shows the helipad configured on the south side of the apron to better facilitate the arrival and departure corridors with the alignment of Runway 09-27. Doing so preserves the ability to develop facilities west of the existing aircraft parking apron and helps avoid rotorcraft overflights of aircraft parking areas. The final layout of a helipad in this area should tie into the existing aircraft parking apron to provide paved access to other airport facilities.

Recommended Helipad Sites

Of the three helipad sites shown, all would require some sort of landside access to be provided. Otherwise the facility would increase the number of instances where automobile and/or pedestrian traffic would cross the North-South Taxiway. This is unavoidable as no real option to construct a helipad east of the North-South Taxiway exists. However, given the expected level of rotorcraft operations, this should not create too much concern, as a dedicated public helipad is not expected to be required until the second half of the 20-year planning period. For this reason, the ability to construct a helipad as part of the future development off the parallel taxiway to Runway 05-23 should be preserved (Site B).

Even though Site B is the preferred site, the need to develop a dedicated rotorcraft facility could materialize much sooner than the activity forecasts suggest. For example, if a rotorcraft training operation were to move to the airport, an entirely new site might be considered. Given the open space available, the ability to establish another dedicated site in the future will exist for some time. In fact, a dedicated helipad could be included as part of the plans to develop facilities immediately west of the North-South Taxiway. The preservation of space on the northern end of this taxiway as well as the area around Site C would provide flexibility in the County's options to safely accommodate different rotorcraft operations.

SUMMARY OF AIRPORT ALTERNATIVES

The preceding sections have identified and analyzed a number of planning alternatives for the future development of the Marion County Airport. The alternatives presented focused on meeting facility needs at the airport while maintaining operational efficiency and safety standards. The preferred alternatives reflected on **Exhibit 4-5** will be utilized as the basis for the development of the new ALP drawing set for the airport.

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

PROJECT NO. **857501**

CADD NO. **857501e45**

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DES. BY	DR. BY	CHKD. BY
DJD	**DJD**	**DNN**

DATE: **JAN. 2010**

SCALE: **NONE**

MARION COUNTY AIRPORT
MARION COUNTY, FLORIDA

RECOMMENDED PLAN FOR FUTURE AIRFIELD CONFIGURATION AND FACILITIES

EXHIBIT

4-5

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 support. The plans will also serve as a reference for the County to evaluate existing and/or future obstruction disposition in conjunction with the 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.

DRAWING SET

The ALP set consists of eight separate drawings, which have been prepared on a computer-assisted drafting system to graphically depict the recommended airfield improvements, imaginary safety surfaces, and layout of future facilities. The sheets of the ALP set meet the criteria established by the FAA in Advisory Circular (AC) 150/5070-6B, Change 1, "Airport Master Plans" and AC 150/5300-13, Change 15, "Airport Design." This drawing set includes:

- Cover Sheet
- Airport Layout Plan
- Terminal Area Plan
- Runway 05-23 Inner Portion of the Approach Surface Plan
- Runway 09-27 Inner Portion of the Approach Surface Plan
- Future FAR Part 77 Airspace Surfaces – A
- Future FAR Part 77 Airspace Surfaces - B
- Airport Property Map

The recommended development addresses the needs first identified in the assessment of the facility requirements, which were then analyzed further to arrive at a flexible plan meeting long-term airport goals. A full size version of the ALP set is on file at the Airport Manager's office at the airport as well as with both the FAA and Florida Department of Transportation (FDOT).

Airport Layout Plan

The ALP graphically presents the existing and ultimate airfield layout, key design standards, runway data, and buildings, as well as the orientation of roads, structures, and other features in the immediate vicinity of the airport. This information is presented on **Drawing 2**. The ALP becomes the official guidance for Marion County, once approved by the FAA and the FDOT, to make decisions on the funding of airfield improvements or other requests for development on or adjacent to airport property.

Marion County should update this drawing as needed to ensure that FAA and FDOT always have an ALP reflective of current conditions. However, it should be noted that only the airport property boundary and runway endpoints were surveyed. Since no budget was available to conduct any other surveys or aerial photogrammetry, the airfield was digitized by tying the boundary and endpoint survey data with files from Marion County's Geographical Information System (GIS) aerial imagery.

Most of the information presented on the ALP has been analyzed in proceeding chapters, justifying the need for recommended development. This includes the need to provide the proper design criteria for larger business jet aircraft, which ultimately would include additional runway length. Therefore, the ALP shows an overall length of 6,200 feet for Runway 05-23 and a full length parallel taxiway at the proper centerline separation. A precision instrument approach is planned for the future Runway 23 end and straight-in non-precision instrument approaches are shown to each of the other three runway ends of the airport with the appropriate imaginary surfaces. Additional features include the recommended navigational aids, airfield facilities, hangar buildings, general aviation terminal facilities, aircraft parking areas, landside access, and automobile parking facilities. In addition, some features beyond the 20-year planning horizon have been included to insure their viability in the future. This primarily includes the build out of additional hangar facilities and aircraft parking apron space.

As indicated above, the build out shown reflects more facilities than what is required over the 20-year planning period. Additional structures were shown to reflect the potential development as well as to offer flexibility in the County's expansion of facilities. It will also decrease the need for the County to update the ALP for individual projects. Regardless, none of the airport improvements shown will be constructed without approval from the Board of County Commissioners nor will any be allowed to create any offsite impacts with respect to drainage or water quality. Before construction, each project will also require an individual airspace analysis to protect the operational capability of the airfield. This will ensure that none of the future structures and aircraft parking areas will impact the imaginary surfaces required for the ultimate runway or taxiway system.

Terminal Area Plan

The Terminal Area Plan (**Drawing 3**) depicts the same development configuration shown on the ALP drawing, but provides a larger scale version so that certain additional features and greater detail of the general aviation facilities can be discerned. The plan reflects the potential for the development of t-hangars, various sized clearspan hangars, aircraft parking areas, taxiway access, and landside access.

In the future, the primary landside access into the airport will be via the extension of SW 110th Street. The extension of this road will provide the necessary access into the infield portion of the airport's east side development area. As shown, the initial hangar, aircraft parking, and automobile parking facilities are located just south of SW 110th Street with security fencing separating these facilities from public access. These have been depicted to provide a general layout of how future general aviation facilities could be developed east of the North-South Taxiway.

Nearly all of the taxiways shown have been designed to accommodate Design Group II aircraft (35 feet wide). The exceptions include the smaller taxilanes that will provide access into the t-hangars, which are shown at the accepted design standard (minimum 20 feet wide) for between t-hangars serving Design Group I aircraft.

The relation of airport facilities to the critical setbacks associated with the airfield is also shown on the Terminal Area Plan. Of most significance is the proximity of some facilities to the 20 foot Future Building Restriction Line (FBRL). The FBRL is based on the design criteria required for

the airfield, including protecting the ability to improve the instrument approach capability to both runways.

Inner Portion of the Approach Surface Plans

The Inner Portion of the Approach Surface Plans illustrate in detail the approach area immediately beyond the ends of each runway. These drawings reflect the Runway Safety Areas, Future Runway Protection Zones, Primary Surfaces, Approach Surfaces, and Transitional Surfaces associated with both runways. Descriptions of the Primary, Approach, and Transitional Surfaces are included in the following section. Essentially, all of the areas within these imaginary surfaces should be kept free of obstacles that could constitute a hazard to aircraft approaching or departing the airport. Each of these sheets depict the location of any roadways, structures, ground elevations, and other man-made or natural features within the limits of the various imaginary surfaces.

Details on each drawing are provided for objects that penetrate the appropriate criteria related to these surfaces. Obstructions are listed numerically in a table with data describing the obstruction, obstruction elevation, impact (penetration) to the surfaces, and proposed mitigation. It should be noted that no budget was provided to conduct an obstruction survey. Therefore, obstacle locations were digitized using County GIS aerial imagery, while their respective elevations were estimated during field visits. All elevations are representative of average situations only.

All of the imaginary surfaces related to the ultimate configuration for Runway 05-23 are shown on **Drawing 4** while **Drawing 5** reflects the same surfaces for Runway 09-27. On both sheets the future Approach Surfaces extend out to a height of 100 feet above the runway threshold, as per FAA guidance for this type of drawing.

Future FAR Part 77 Airspace Surfaces

The airspace surfaces shown on **Drawing 6** and **Drawing 7** were developed utilizing the criteria found in Federal Aviation Regulations (FAR) Part 77, “Objects Affecting Navigable Airspace.” In order to protect the airspace and approaches to each runway from hazards that could affect the safe and efficient operation of the airport, the ultimate runway lengths and instrument approaches are utilized in this drawing. This Federal criterion has been established for use by local planning and land use jurisdictions to control the height of objects in the vicinity of the airport. The specific imaginary surfaces, which shall 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 threshold, when the runway is paved. Width of the Primary Surface is based on the most sophisticated approach procedure a runway has, while the elevation follows, and is the same as that of the runway centerline, along all points. For Runway 05-23 this width is 1,000 feet and for Runway 09-27 the width is 500 feet.

Horizontal Surface

An 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. Both Runway 05-23 and Runway 09-27 will require a 10,000 foot Horizontal Surface radius at an elevation of 216 feet above mean sea level (AMSL).

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. For the Marion County Airport the Conical Surface protects airspace up to 416 feet AMSL.

Approach Surfaces

These surfaces begin at the end of the Primary Surface and slope upward at a ratio determined by the runway category and type of instrument approach available to the individual runway ends. 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 also governed by the runway category and instrument approach procedure available.

For the ultimate precision instrument approach planned to Runway 23 a surface that extends out 10,000 feet at a slope of 50:1 and then out another 40,000 feet at a slope of 40:1 with an outer width of 16,000 feet. For Runway 05 and both ends of Runway 09-27, the ultimate non-precision instrument approaches require a surface that extends out 10,000 feet at a slope of 34:1 to an outer width of 3,500 feet.

Transitional Surface

A sloping area beginning at the edges of the Primary and Approach Surfaces that extend upward and outward at a 7:1 ratio.

The Future FAR Part 77 Airspace Surfaces must be used in conjunction with local ordinances in order for County staff to readily determine if the construction of a proposed structure will penetrate any of the protective surfaces. Current height restrictions and compatible land use zoning for the area surrounding the airport are included in the 2008 Marion County Comprehensive Plan, Section Two – Transportation Element. Objective 13.0 of the Transportation Element outlines the County's policies and regulations related to tall structures, airport overlay zoning ordinance, and adjacent land uses. Therefore, the FAR Part 77 Surfaces in this ALP set should be incorporated into the County's Comprehensive Plan and any other related zoning ordinance that determines whether or not a proposed structure would constitute hazard to air navigation.

Although no survey was budgeted for these sheets, a search for area obstruction data was conducted. Structures documented in the FAA and FDOT databases are shown on the drawing and included in the obstruction data table.

Airport Property Map

The Airport Property Map, **Drawing 8**, is intended to accurately show all of the details associated with the current airport property line based on the boundary survey conducted as part of the study. Details contained on the sheet describe the known features of the airport property, as well as the documentation of source data and any limitations. This sheet also depicts the land identified as desirable for acquisition as part of the ultimate runway expansion plans.

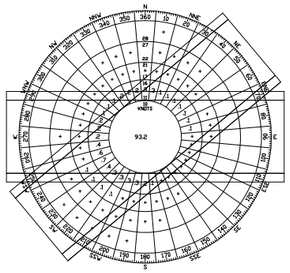
SUMMARY

The preceding chapters have identified the anticipated level of activity for the Marion County Airport, converted that demand into facility needs, and investigated the alternatives available to address the demand. From the alternatives analysis a set of development actions were selected for use in preparing the ALP drawing set. The final step in the process is to identify the development schedule for implementing the proposed improvements and the cost associated with those actions.

MARION COUNTY AIRPORT
MARION COUNTY, FLORIDA

AIRPORT LAYOUT PLAN
DRAWING SET

ALL WEATHER WIND ROSE

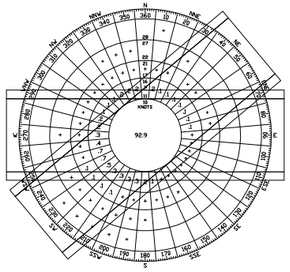


ALL WIND DATA SUMMARY

Crosswind Component Knots(MPH)	Runway 05-23	Runway 09-27	Combined Coverage
10.5(12)	95.00%	93.00%	95.00%
13(15)	98.00%	97.00%	98.00%

Station: Ocala, Florida (FAA)
Source: National Climatic Data Center (NCDC)
Period of Observations: 1995-2007

VFR WEATHER WIND ROSE

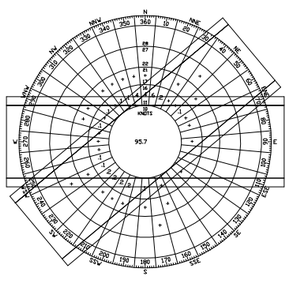


VFR WIND DATA SUMMARY

Crosswind Component Knots(MPH)	Runway 05-23	Runway 09-27	Combined Coverage
10.5(12)	95.00%	93.00%	95.00%
13(15)	98.00%	97.00%	98.00%

Station: Ocala, Florida (FAA)
Source: National Climatic Data Center (NCDC)
Period of Observations: 1995-2007

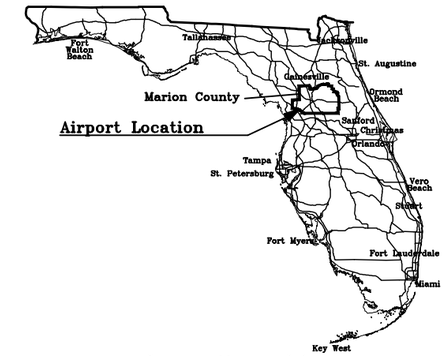
IFR WEATHER WIND ROSE



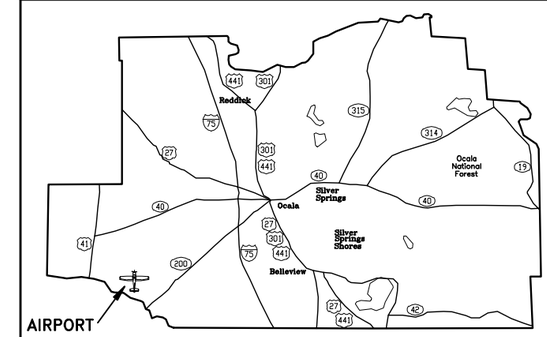
IFR WIND DATA SUMMARY

Crosswind Component Knots(MPH)	Runway 05-23	Runway 09-27	Combined Coverage
10.5(12)	95.00%	93.00%	95.00%
13(15)	98.00%	97.00%	98.00%

Station: Ocala, Florida (FAA)
Source: National Climatic Data Center (NCDC)
Period of Observations: 1995-2007



Location Map



Vicinity Map

BOARD OF COUNTY COMMISSIONERS

Barbara Fitos – Chair, District 4

Stan McClain – Vice Chairman, District 3

Mike Amsden – District 1

Jim Payton – District 2

Charlie Stone – District 5

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3 TERMINAL AREA PLAN

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5 RUNWAY 09–27 INNER PORTION OF THE APPROACH SURFACE PLAN

6 FUTURE FAR PART 77 AIRSPACE SURFACES – A

7 FUTURE FAR PART 77 AIRSPACE SURFACES – B

8 AIRPORT PROPERTY MAP

JANUARY 2010

PLANS PREPARED BY:

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NO PORTION OF THESE DOCUMENTS MAY BE REPRODUCED WITHOUT THE WRITTEN CONSENT OF HOYLE, TANNER & ASSOCIATES, INC.

LEGEND

ITEM	EXISTING	FUTURE
AIRPORT PROPERTY LINE		
BUILDINGS		
AIRPORT SECURITY FENCING		
AIRPORT REFERENCE POINT		
BUILDING RESTRICTION LINE (20')	BRL	FBRL
EDGE OF PAVEMENT		
NEW AIRFIELD PAVEMENT	N/A	
GROUND CONTOURS	50	N/A
RUNWAY SAFETY AREA (RSA)	RSA	FRSA
RUNWAY OBJECT FREE AREA (ROFA)	ROFA	FROFA
RUNWAY PROTECTION ZONE (RPZ)	RPZ RPZ	FRPZ FRPZ
RUNWAY OBSTACLE FREE ZONE (ROFZ)	ROFZ	FROFZ

MODIFICATIONS TO FAA DESIGN STANDARDS

DESCRIPTION	CRITERIA	STANDARD	REQUESTED	EXISTING	FAA APPROVAL DATES

RUNWAY DATA

DESCRIPTION	EXISTING RUNWAY 05–23	FUTURE RUNWAY 05–23	EXISTING/FUTURE RUNWAY 09–27
AIRPORT REFERENCE CODE	B–II	C–II	B–I
CRITICAL DESIGN AIRCRAFT	DASSAULT FALCON 900	GRUMMAN GULFSTREAM III	TWIN TURBO COMMANDER
EFFECTIVE GRADIENT	0.061%	0.048%	0.041%
WIND COVERAGE: 10.5 KTS/12 MPH	98.42%	SAME	97.04%
13 KTS/15 MPH	99.34%	SAME	98.39%
MAXIMUM ELEVATION (NAVD 88)	65.5'	SAME	64.1'
LENGTH	4,941'	6,200'	4,702'
WIDTH	100'	SAME	60'
DISPLACED THRESHOLDS	NONE	NONE	NONE
SURFACE	ASPHALT	SAME	ASPHALT
PAVEMENT STRENGTH	45,500 DWL (ESTIMATED)	MINIMUM 69,700 DWL	MINIMUM 12,500 SWL
PART 77 APPROACH CATEGORY	VISUAL (05) / NON–PREC. (23)	NON–PREC. (05) / PREC. (23)	VISUAL / NON–PREC.
INSTRUMENT APPROACH	NONE (05) / GPS (23)	GPS	NONE / GPS
APPROACH SLOPE	20:1 (05) / 34:1 (23)	34:1 (05) / 50:1 (23)	20:1 / 34:1
LIGHTING	MIRL	SAME	MIRL
MARKING	NON–PRECISION	PRECISION	BASIC / NON–PRECISION
VISUAL AIDS	PAPI 2L / PAPI 2L	PAPI 4L / MALSR / ODALS	NONE / PAPI 4L & ODALS
RUNWAY SAFETY AREA	150' WIDE 300' BEYOND RW END & PRIOR TO LANDING THRESHOLD	500' WIDE 1,000' BEYOND RW END & 600' PRIOR TO LANDING THRESHOLD	120' WIDE 240' BEYOND RW END & PRIOR TO LANDING THRESHOLD
RUNWAY OBJECT FREE AREA	500' WIDE 300' BEYOND RW END	800' WIDE 1,000' BEYOND RW END	400' WIDE 240' BEYOND RW END
RUNWAY PROTECTION ZONE	500' X 700' X 1,000' BOTH ENDS	500' X 1,010' X 1,700' (05) 1,000' X 1,750' X 2,500' (23)	500' X 700' X 1,000' BOTH ENDS
RUNWAY OBSTACLE FREE ZONE	400' WIDE 200' BEYOND RW END	SAME	400' WIDE 200' BEYOND RW END

AIRPORT DATA

DESCRIPTION		EXISTING	FUTURE
AIRPORT ELEVATION (NAVD 88)		65.5' MSL	SAME
AIRPORT REFERENCE POINT (NAD 83)	LAT.	29°03'42.419" N	29°03'44.974" N
	LONG.	82°22'35.710" W	82°22'33.797" W
NAVIGATIONAL AIDS		BEACON/GPS	SAME
MEAN MAXIMUM TEMPERATURE (HOTTEST MONTH)		92°F	SAME
LAND OWNED IN FEE		792 ACRES	±812 ACRES
TAXIWAY WIDTH		50'	35'
TAXIWAY TO RUNWAY CENTERLINE SEPARATION		N/A	400' & 240'
TAXIWAY SAFETY AREA WIDTH		79'	SAME
TAXIWAY OBJECT FREE AREA WIDTH		131'	SAME
TAXIWAY LIGHTING		NONE	MITL
TAXIWAY MARKING		CENTERLINE	SAME

ABBREVIATIONS

AGL	ABOVE GROUND LEVEL
AWOS	AUTOMATED WEATHER OBSERVING SYSTEM
DWL	DUAL WHEEL LOADING
EL	ELEVATION
FUT	FUTURE
GA	GENERAL AVIATION
GPS	GLOBAL POSITIONING SATELLITE
MALSR	MEDIUM INTENSITY APPROACH LIGHTING SYSTEM WITH RUNWAY ALIGNMENT INDICATOR LIGHTS
MIRL	MEDIUM INTENSITY RUNWAY LIGHTS
MITL	MEDIUM INTENSITY TAXIWAY LIGHTS
ODALS	OMNIDIRECTIONAL APPROACH LIGHTING SYSTEM
PAPI	PRECISION APPROACH PATH INDICATOR
PREC	PRECISION
PT	POINT
RW	RUNWAY
SF	SQUARE FEET
SUP	SUPPLEMENTAL
SWL	SINGLE WHEEL LOADING
TBD	TO BE DETERMINED
TDZE	TOUCHDOWN ZONE ELEVATION

RUNWAY ENDPOINT DATA

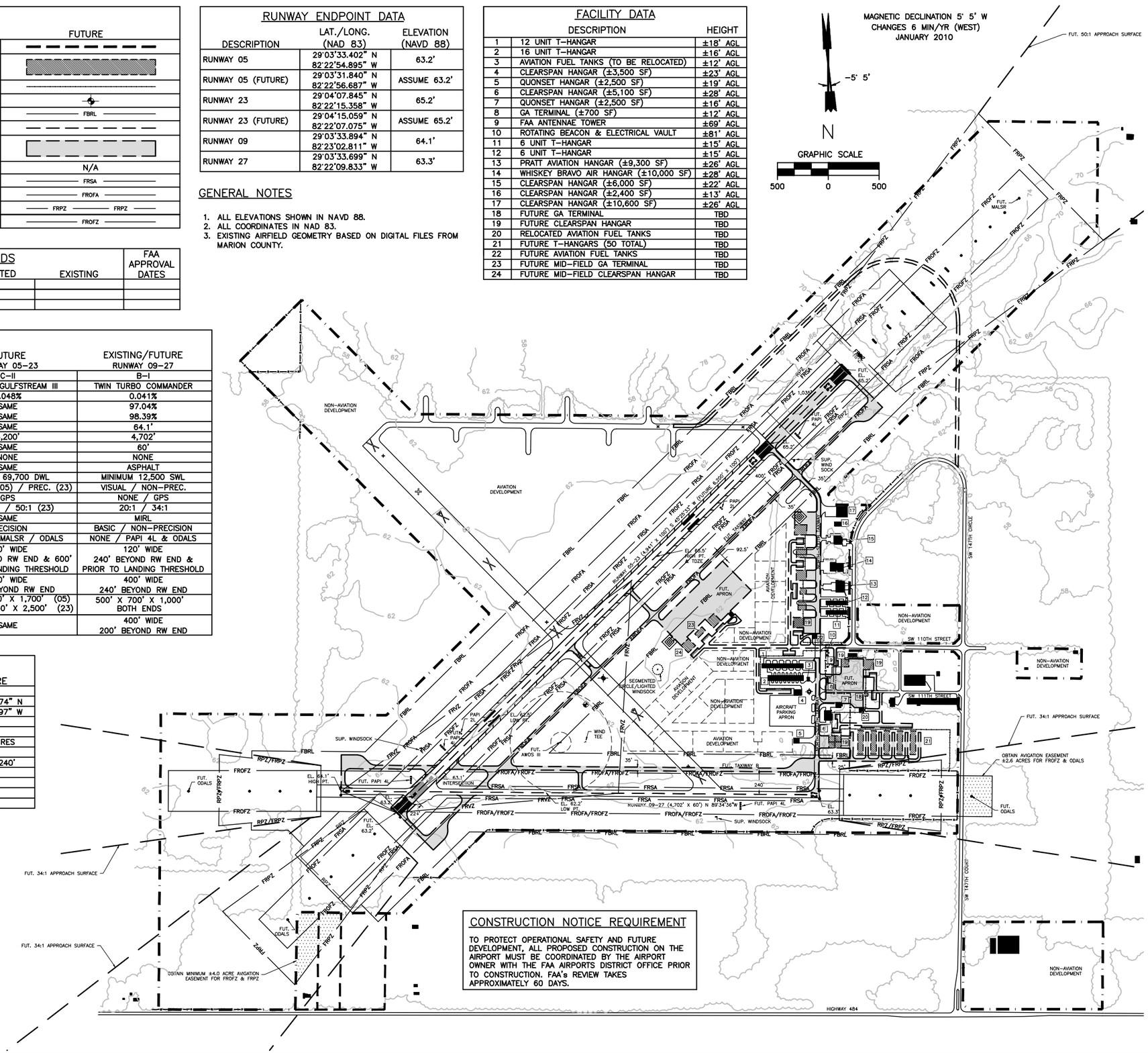
DESCRIPTION	LAT./LONG. (NAD 83)	ELEVATION (NAVD 88)
RUNWAY 05	29°03'33.402" N 82°22'54.895" W	63.2'
RUNWAY 05 (FUTURE)	29°03'31.840" N 82°22'56.687" W	ASSUME 63.2'
RUNWAY 23	29°04'07.845" N 82°22'15.358" W	65.2'
RUNWAY 23 (FUTURE)	29°04'15.059" N 82°22'07.075" W	ASSUME 65.2'
RUNWAY 09	29°03'33.894" N 82°23'02.811" W	64.1'
RUNWAY 27	29°03'33.699" N 82°22'09.833" W	63.3'

GENERAL NOTES

1. ALL ELEVATIONS SHOWN IN NAVD 88.
2. ALL COORDINATES IN NAD 83.
3. EXISTING AIRFIELD GEOMETRY BASED ON DIGITAL FILES FROM MARION COUNTY.

FACILITY DATA

	DESCRIPTION	HEIGHT
1	12 UNIT T–HANGAR	±18' AGL
2	16 UNIT T–HANGAR	±16' AGL
3	AVIATION FUEL TANKS (TO BE RELOCATED)	±12' AGL
4	CLEARSPAN HANGAR (±3,500 SF)	±23' AGL
5	QUONSET HANGAR (±2,500 SF)	±19' AGL
6	CLEARSPAN HANGAR (±5,100 SF)	±28' AGL
7	QUONSET HANGAR (±2,500 SF)	±16' AGL
8	GA TERMINAL (±700 SF)	±12' AGL
9	FAA ANTENNAE TOWER	±69' AGL
10	ROTATING BEACON & ELECTRICAL VAULT	±81' AGL
11	6 UNIT T–HANGAR	±15' AGL
12	6 UNIT T–HANGAR	±15' AGL
13	PRATT AVIATION HANGAR (±9,300 SF)	±26' AGL
14	WHISKEY BRAVO AIR HANGAR (±10,000 SF)	±28' AGL
15	CLEARSPAN HANGAR (±6,000 SF)	±22' AGL
16	CLEARSPAN HANGAR (±2,400 SF)	±13' AGL
17	CLEARSPAN HANGAR (±10,600 SF)	±26' AGL
18	FUTURE GA TERMINAL	TBD
19	FUTURE CLEARSPAN HANGAR	TBD
20	RELOCATED AVIATION FUEL TANKS	TBD
21	FUTURE T–HANGARS (50 TOTAL)	TBD
22	FUTURE AVIATION FUEL TANKS	TBD
23	FUTURE MID–FIELD GA TERMINAL	TBD
24	FUTURE MID–FIELD CLEARSPAN HANGAR	TBD



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	BY	CHKD. BY	APPD. BY	DATE

PROJECT NO. 857501
CADD NO. 857501002

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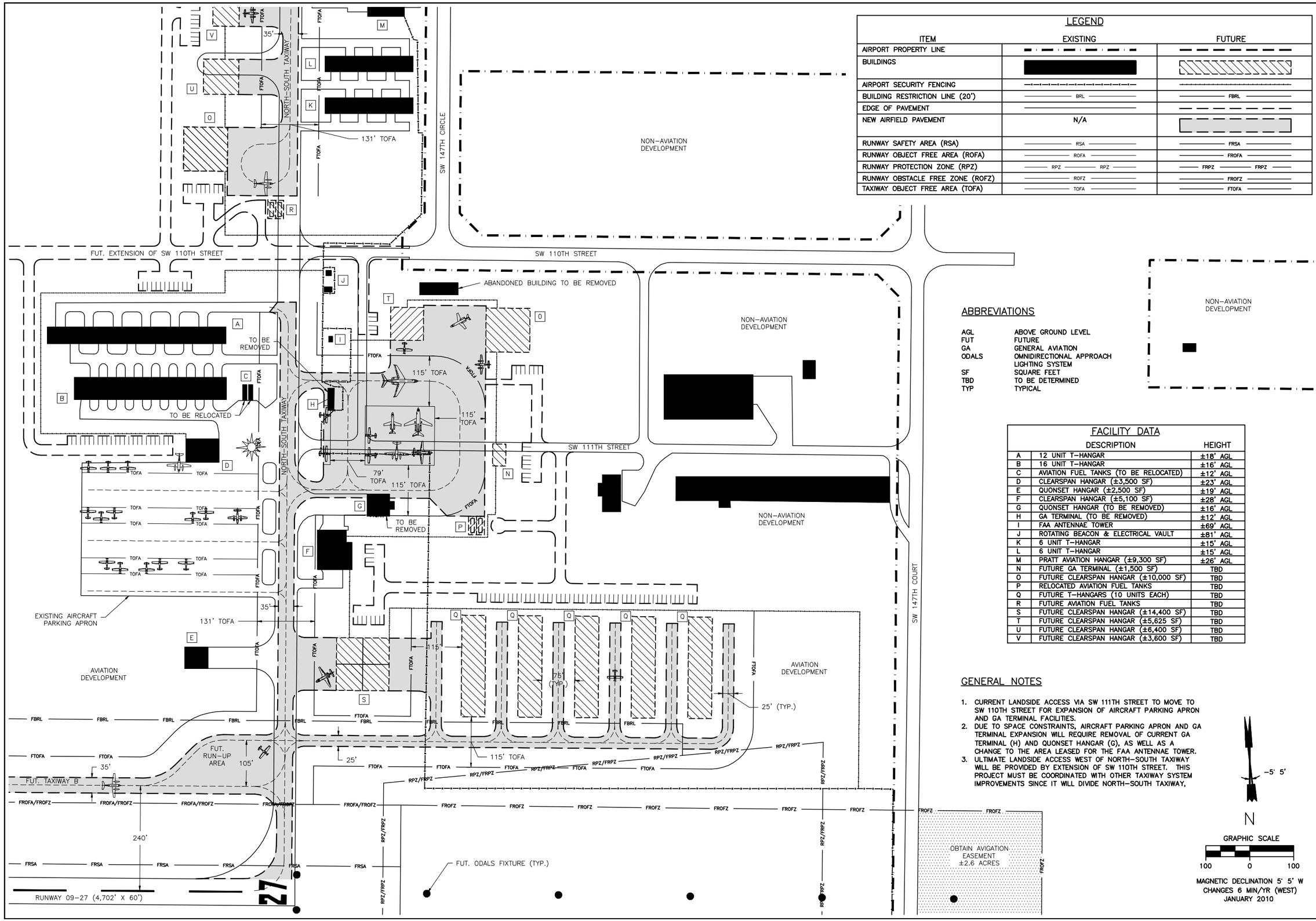
DES. BY DD | DR. BY DD | CHKD. BY DNN
SCALE: GRAPHIC | DATE: JAN. 2010

MARION COUNTY AIRPORT
MARION COUNTY, FLORIDA

AIRPORT LAYOUT PLAN

DRAWING 2



LEGEND

ITEM	EXISTING	FUTURE
AIRPORT PROPERTY LINE		
BUILDINGS		
AIRPORT SECURITY FENCING		
BUILDING RESTRICTION LINE (20')	BRL	FBRL
EDGE OF PAVEMENT		
NEW AIRFIELD PAVEMENT	N/A	
RUNWAY SAFETY AREA (RSA)	RSA	FRSA
RUNWAY OBJECT FREE AREA (ROFA)	ROFA	FROFA
RUNWAY PROTECTION ZONE (RPZ)	RPZ RPZ	FRPZ FRPZ
RUNWAY OBSTACLE FREE ZONE (ROFZ)	ROFZ	FROFZ
TAXIWAY OBJECT FREE AREA (TOFA)	TOFA	FTOFA

ABBREVIATIONS

AGL	ABOVE GROUND LEVEL
FUT	FUTURE
GA	GENERAL AVIATION
ODALS	OMNIDIRECTIONAL APPROACH LIGHTING SYSTEM
SF	SQUARE FEET
TBD	TO BE DETERMINED
TYP	TYPICAL

FACILITY DATA

	DESCRIPTION	HEIGHT
A	12 UNIT T–HANGAR	±18' AGL
B	16 UNIT T–HANGAR	±16' AGL
C	AVIATION FUEL TANKS (TO BE RELOCATED)	±12' AGL
D	CLEARSPAN HANGAR (±3,500 SF)	±23' AGL
E	QUONSET HANGAR (±2,500 SF)	±19' AGL
F	CLEARSPAN HANGAR (±5,100 SF)	±28' AGL
G	QUONSET HANGAR (TO BE REMOVED)	±16' AGL
H	GA TERMINAL (TO BE REMOVED)	±12' AGL
I	FAA ANTENNAE TOWER	±69' AGL
J	ROTATING BEACON & ELECTRICAL VAULT	±81' AGL
K	6 UNIT T–HANGAR	±15' AGL
L	6 UNIT T–HANGAR	±15' AGL
M	PRATT AVIATION HANGAR (±9,300 SF)	±26' AGL
N	FUTURE GA TERMINAL (±1,500 SF)	TBD
O	FUTURE CLEARSPAN HANGAR (±10,000 SF)	TBD
P	RELOCATED AVIATION FUEL TANKS	TBD
Q	FUTURE T–HANGARS (10 UNITS EACH)	TBD
R	FUTURE AVIATION FUEL TANKS	TBD
S	FUTURE CLEARSPAN HANGAR (±14,400 SF)	TBD
T	FUTURE CLEARSPAN HANGAR (±5,625 SF)	TBD
U	FUTURE CLEARSPAN HANGAR (±6,400 SF)	TBD
V	FUTURE CLEARSPAN HANGAR (±3,600 SF)	TBD

GENERAL NOTES

1. CURRENT LANDSIDE ACCESS VIA SW 111TH STREET TO MOVE TO SW 110TH STREET FOR EXPANSION OF AIRCRAFT PARKING APRON AND GA TERMINAL FACILITIES.
2. DUE TO SPACE CONSTRAINTS, AIRCRAFT PARKING APRON AND GA TERMINAL EXPANSION WILL REQUIRE REMOVAL OF CURRENT GA TERMINAL (H) AND QUONSET HANGAR (G), AS WELL AS A CHANGE TO THE AREA LEASED FOR THE FAA ANTENNAE TOWER.
3. ULTIMATE LANDSIDE ACCESS WEST OF NORTH–SOUTH TAXIWAY WILL BE PROVIDED BY EXTENSION OF SW 110TH STREET. THIS PROJECT MUST BE COORDINATED WITH OTHER TAXIWAY SYSTEM IMPROVEMENTS SINCE IT WILL DIVIDE NORTH–SOUTH TAXIWAY,

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

PROJECT NO. 857501

CADD NO. 857501003

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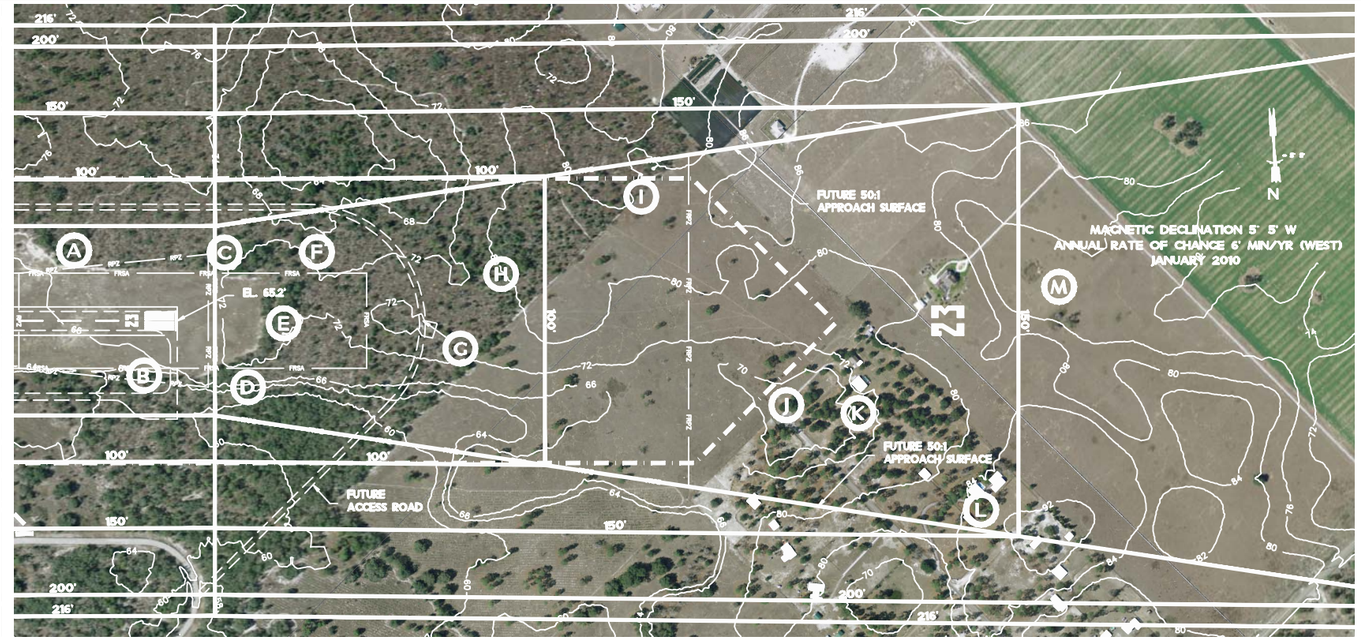
DES. BY DD | DR. BY DD | CHKD. BY DNN

SCALE: GRAPHIC | DATE: JAN. 2010

MARION COUNTY AIRPORT
MARION COUNTY, FLORIDA

TERMINAL AREA PLAN

DRAWING 3



FUTURE RUNWAY 05 NPI (34:1) APPROACH SURFACE EVALUATION

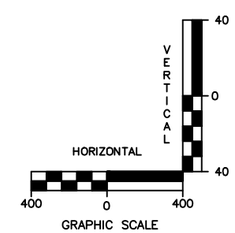
	DESCRIPTION	ELEVATION	PENETRATION	MITIGATION
A	GROUP OF TREES	±106'	±34'	CLEAR AS REQUIRED
B	GROUP OF TREES	±108'	±25'	CLEAR AS REQUIRED
C	GROUP OF TREES	±110'	±21'	CLEAR AS REQUIRED
D	GROUP OF TREES	±103'	±6'	CLEAR AS REQUIRED
E	GROUP OF TREES	±111'	NONE	NONE REQUIRED
F	POLES	±126'	NONE	NONE REQUIRED
G	HIGHWAY 484	±62'	NONE	NONE REQUIRED
H	TOWER	±164'	±14'	OFF PROPERTY, SURVEY FOR NPI

NOTES:

1. ALL ELEVATIONS SHOWN IN HEIGHT ABOVE MEAN SEA LEVEL (NAVD 88) EXCEPT PENETRATION HEIGHTS WHICH ARE ABOVE APPROACH SLOPE OR TRANSITIONAL SURFACES.
2. NO SURVEY WAS CONDUCTED AS PART OF THE UPDATE OF THIS DRAWING.
3. OBSTACLE LOCATIONS AND THEIR RESPECTIVE ELEVATIONS WERE OBTAINED BY FIELD OBSERVATIONS. ALL LOCATIONS AND ELEVATIONS ARE "PLUS OR MINUS" AND ARE REPRESENTATIVE OF AVERAGE SITUATIONS ONLY.
4. NUMEROUS SPECIES OF TREES EXIST WITHIN THE IMAGINARY SURFACES OF THE FUTURE RUNWAY ALIGNMENT. THOSE TREES SHOWN HEREON REPRESENT THE AVERAGE OF A GROUP OF TREES. NOT ALL TREES WERE LOCATED THAT MIGHT IMPACT THE IMAGINARY SURFACES, RATHER THE HEIGHTS OF DIFFERENT GROUPS WERE IDENTIFIED. ALL ON-AIRPORT VEGETATIVE PENETRATIONS SHOULD BE CLEARED AS REQUIRED.
5. FUTURE RUNWAY SAFETY AREA (FRSA) = 500' WIDE AND 1,000' BEYOND RUNWAY ENDS.
6. FUTURE RUNWAY PROTECTION ZONES (FRPZ) = 500' X 1,010' X 1,700' WITH VISUAL AND NOT LOWER THAN 1 MILE (RUNWAY 05 END) AND 1,000' X 1,750' X 2,500' WITH LOWER THAN 3/4 MILE (RUNWAY 23 END).
7. NPI = NON-PRECISION INSTRUMENT AND PI = PRECISION INSTRUMENT.

LEGEND

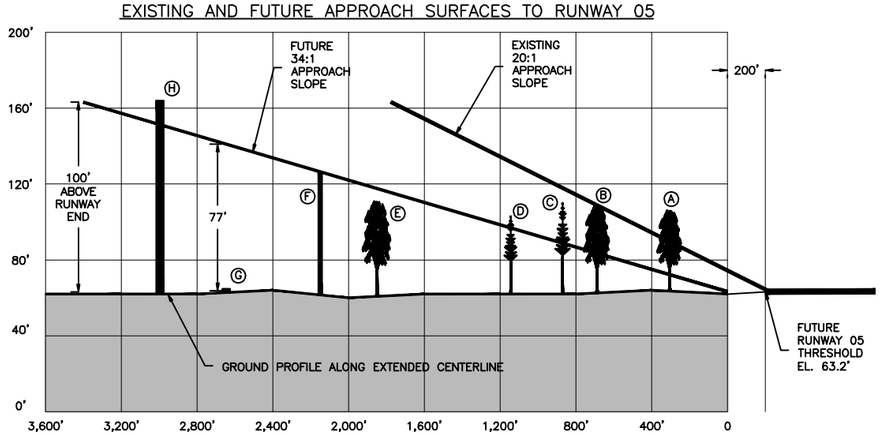
ITEM	EXISTING	FUTURE
AIRPORT PROPERTY LINE		
BUILDINGS	N/A	
EDGE OF PAVEMENT	N/A	
GROUND CONTOURS	50	N/A
POTENTIAL OBSTRUCTION	E	N/A



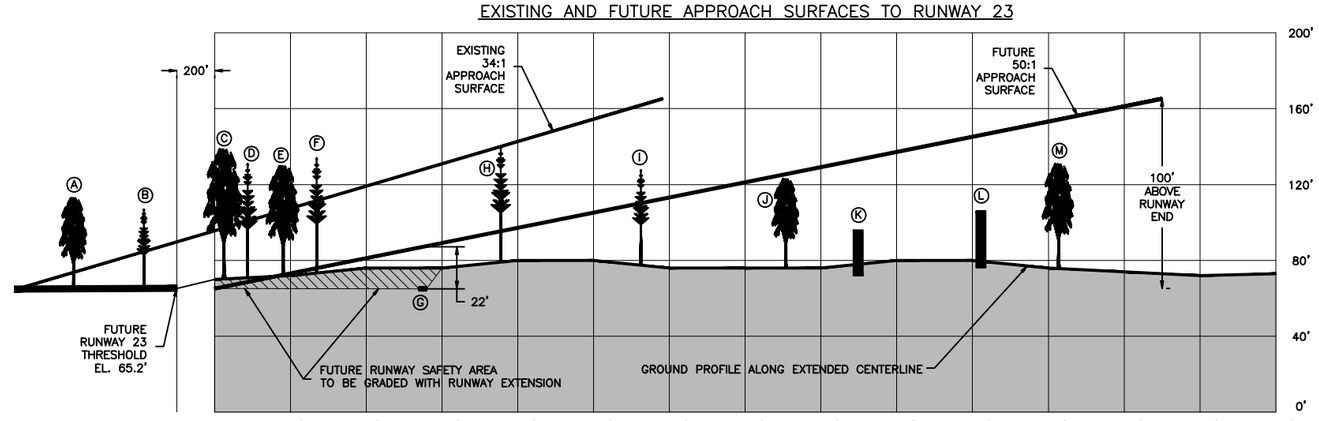
FUTURE RUNWAY 23 PI (50:1) APPROACH SURFACE EVALUATION

	DESCRIPTION	ELEVATION	PENETRATION	MITIGATION
A	GROUP OF TREES	±113'	±48'	CLEAR AS REQUIRED
B	GROUP OF TREES	±107'	±42	CLEAR AS REQUIRED
C	GROUP OF TREES	±139'	±72'	CLEAR AS REQUIRED
D	GROUP OF TREES	±131'	±61'	CLEAR AS REQUIRED
E	GROUP OF TREES	±130'	±58'	CLEAR AS REQUIRED
F	GROUP OF TREES	±134'	±59'	CLEAR AS REQUIRED
G	FUTURE ACCESS ROAD	±65'	NONE	NONE REQUIRED
H	GROUP OF TREES	±140'	±45'	CLEAR AS REQUIRED
I	GROUP OF TREES	±128'	±18'	CLEAR AS REQUIRED
J	GROUP OF TREES	±123'	NONE	NONE REQUIRED
K	PRIVATE RESIDENCE	±96'	NONE	NONE REQUIRED
L	PRIVATE RESIDENCE	±106'	NONE	NONE REQUIRED
M	GROUP OF TREES	±130'	NONE	NONE REQUIRED

EXISTING AND FUTURE APPROACH SURFACES TO RUNWAY 05



EXISTING AND FUTURE APPROACH SURFACES TO RUNWAY 23



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

PROJECT NO. 857501

CADD NO. 857501004

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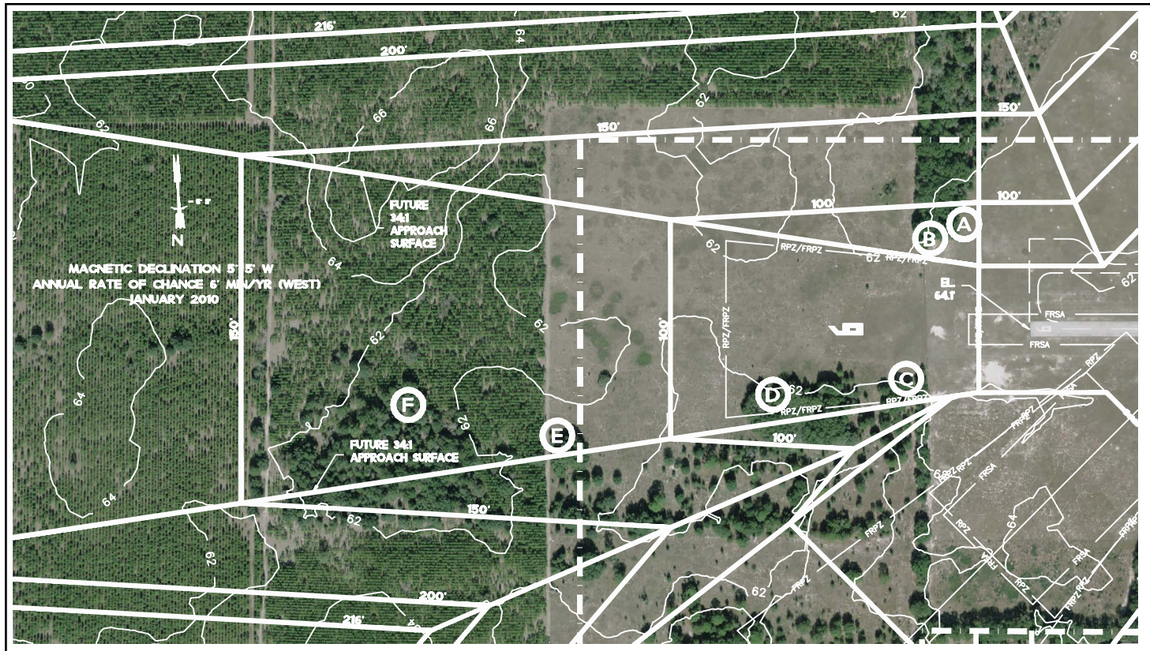
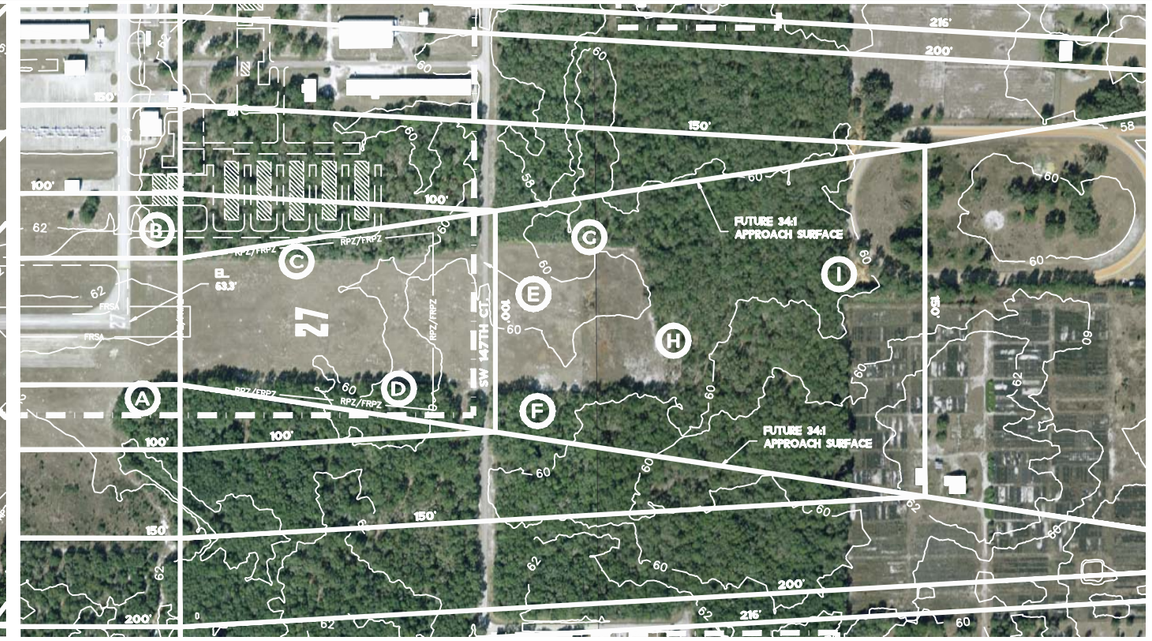
MARION COUNTY AIRPORT
MARION COUNTY, FLORIDA

RUNWAY 05-23 INNER PORTION
OF THE APPROACH SURFACE PLAN

DRAWING 4





FUTURE RUNWAY 09 NPI (34:1) APPROACH SURFACE EVALUATION

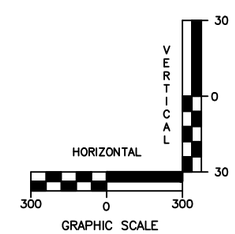
	DESCRIPTION	ELEVATION	PENETRATION	MITIGATION
A	GROUP OF TREES	±120'	±32'	CLEAR AS REQUIRED
B	GROUP OF TREES	±98'	±17'	CLEAR AS REQUIRED
C	GROUP OF TREES	±108'	±35'	CLEAR AS REQUIRED
D	GROUP OF TREES	±113'	±26'	CLEAR AS REQUIRED
E	GROUP OF TREES	±115'	±3'	OFF PROPERTY, SURVEY FOR NPI
F	GROUP OF TREES	±113'	NONE	NONE REQUIRED

NOTES:

1. ALL ELEVATIONS SHOWN IN HEIGHT ABOVE MEAN SEA LEVEL (NAVD 88) EXCEPT PENETRATION HEIGHTS WHICH ARE ABOVE APPROACH SLOPE OR TRANSITIONAL SURFACES.
2. NO SURVEY WAS CONDUCTED AS PART OF THE UPDATE OF THIS DRAWING.
3. OBSTACLE LOCATIONS AND THEIR RESPECTIVE ELEVATIONS WERE OBTAINED BY FIELD OBSERVATIONS. ALL LOCATIONS AND ELEVATIONS ARE "PLUS OR MINUS" AND ARE REPRESENTATIVE OF AVERAGE SITUATIONS ONLY.
4. NUMEROUS SPECIES OF TREES EXIST WITHIN THE IMAGINARY SURFACES OF THE FUTURE RUNWAY ALIGNMENT. THOSE TREES SHOWN HEREON REPRESENT THE AVERAGE OF A GROUP OF TREES. NOT ALL TREES WERE LOCATED THAT MIGHT IMPACT THE IMAGINARY SURFACES, RATHER THE HEIGHTS OF DIFFERENT GROUPS WERE IDENTIFIED. ALL ON-AIRPORT VEGETATIVE PENETRATIONS SHOULD BE CLEARED AS REQUIRED.
5. FUTURE RUNWAY SAFETY AREA (FRSA) = 120' WIDE AND 240' BEYOND RUNWAY ENDS.
6. FUTURE RUNWAY PROTECTION ZONES (FRPZ) = 500' X 700' X 1,000' WITH VISUAL AND NOT LOWER THAN 1 MILE (BOTH ENDS).
7. NPI = NON-PRECISION INSTRUMENT.

LEGEND

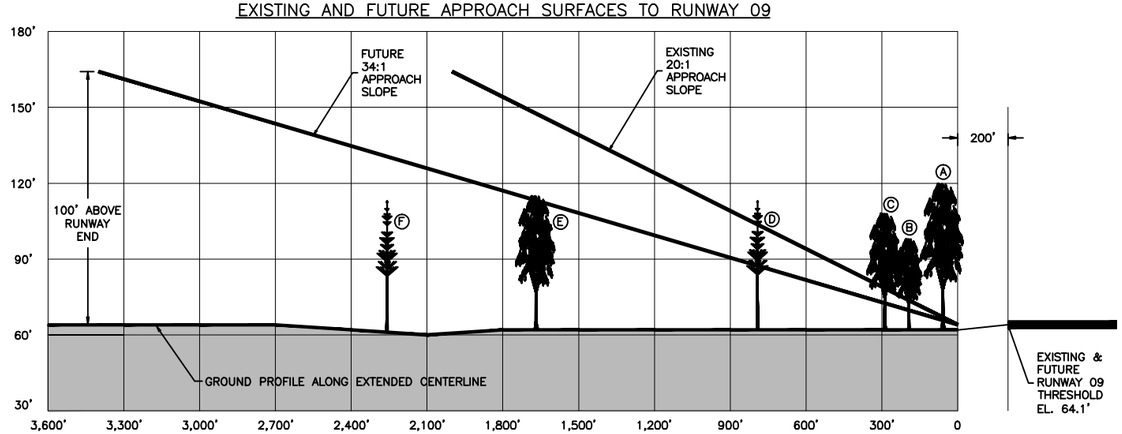
ITEM	EXISTING	FUTURE
AIRPORT PROPERTY LINE		
BUILDINGS	N/A	
EDGE OF PAVEMENT	N/A	
GROUND CONTOURS	50	N/A
POTENTIAL OBSTRUCTION	E	N/A



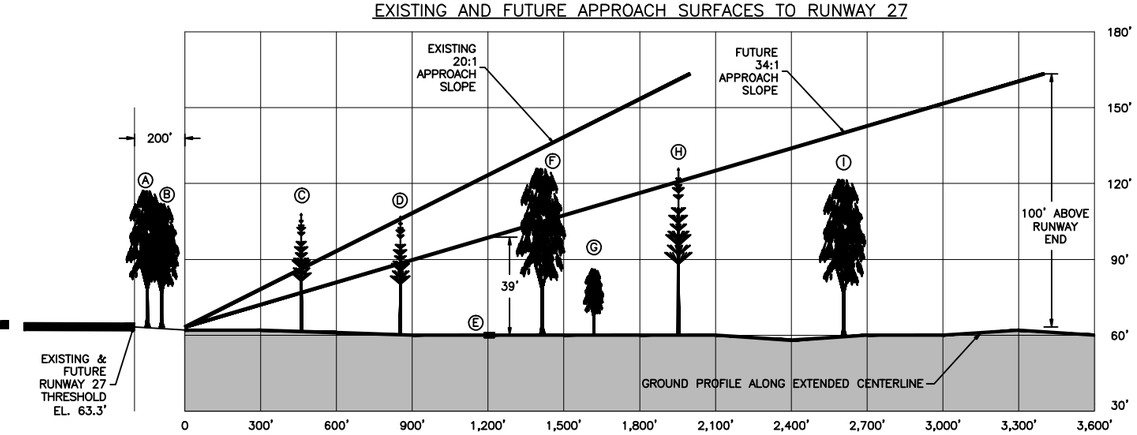
FUTURE RUNWAY 27 NPI (34:1) APPROACH SURFACE EVALUATION

	DESCRIPTION	ELEVATION	PENETRATION	MITIGATION
A	GROUP OF TREES	±118'	±46'	CLEAR AS REQUIRED
B	GROUP OF TREES	±113'	±45'	TO BE CLEARED WITH TAXILANE
C	GROUP OF TREES	±108'	±31'	TO BE CLEARED WITH TAXILANE
D	GROUP OF TREES	±107'	±19'	CLEAR AS REQUIRED
E	SW 147TH CT.	±60'	NONE	NONE REQUIRED
F	GROUP OF TREES	±126'	±21'	OFF PROPERTY, SURVEY FOR NPI
G	GROUP OF TREES	±86'	NONE	NONE REQUIRED
H	GROUP OF TREES	±126'	±5'	OFF PROPERTY, SURVEY FOR NPI
I	GROUP OF TREES	±122'	NONE	NONE REQUIRED

EXISTING AND FUTURE APPROACH SURFACES TO RUNWAY 09



EXISTING AND FUTURE APPROACH SURFACES TO RUNWAY 27



REV	DESCRIPTION	BY	CHKD. BY	APPD. BY	DATE

PROJECT NO. 857501

CADD NO. 857501005

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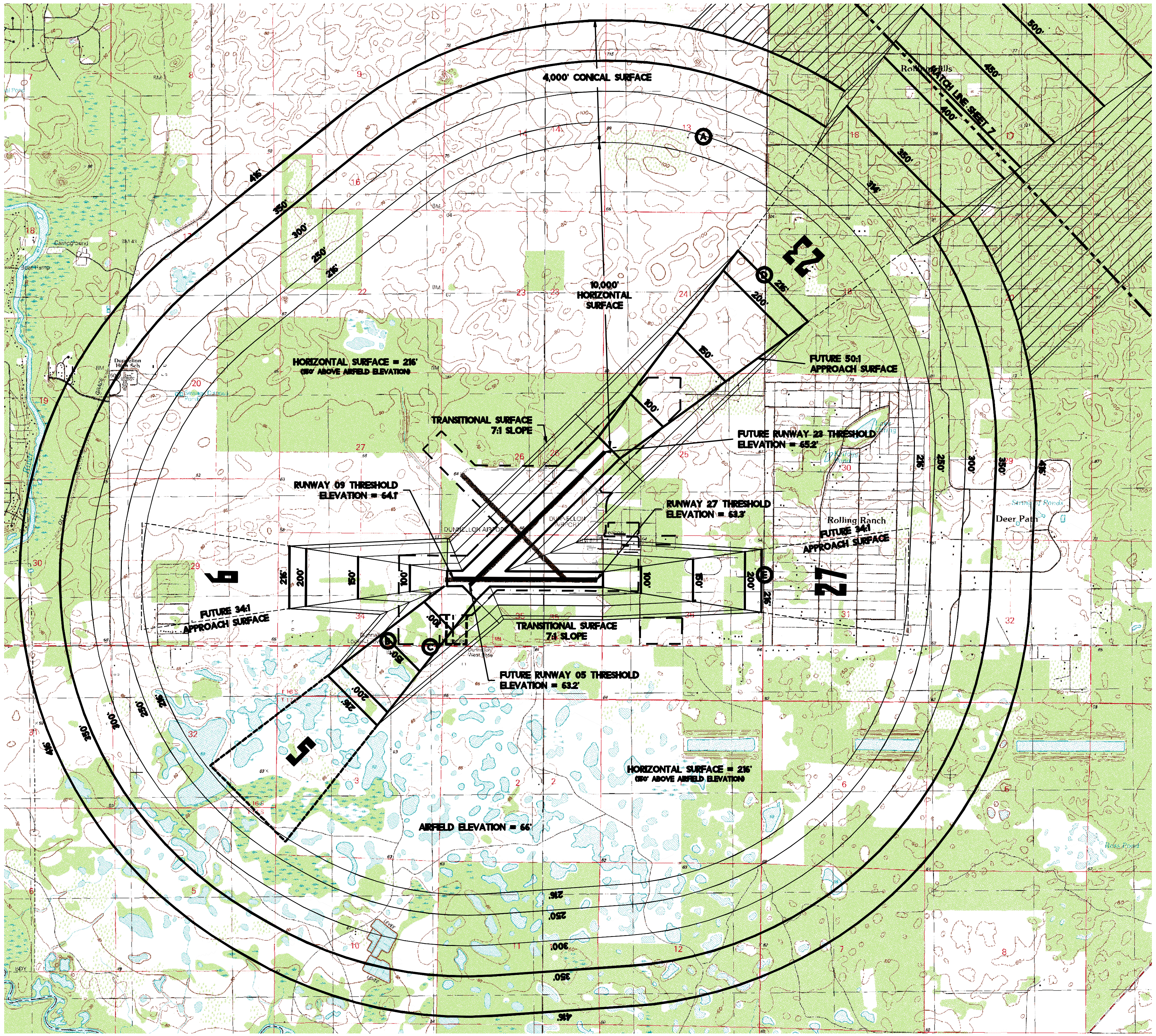
DES. BY DD | DR. BY DD | CHKD. BY DNN

SCALE: GRAPHIC | DATE: JAN. 2010

MARION COUNTY AIRPORT
MARION COUNTY, FLORIDA

RUNWAY 09-27 INNER PORTION
OF THE APPROACH SURFACE PLAN

DRAWING 5



OBSTRUCTION DATA TABLE

	STUDY NUMBER	TYPE	ELEVATION	LATITUDE	LONGITUDE	PENETRATION	SURFACE
A	2008–ASO–350–OE	TOWER	243'	29° 05' 57.43" N	82° 21' 30.99" W	N	N/A
B	NONE FOUND	TOWER	164'	29° 03' 13.61" N	82° 23' 26.83" W	Y	APPROACH
C	NONE FOUND	POLES	126'	29° 03' 11.66" N	82° 23' 11.21" W	N	N/A
D	2006–ASO–7091–OE	POLES	157'	29° 05' 12.67" N	82° 21' 08.33" W	N	N/A
E	2006–ASO–7067–OE	POLES	145'	29° 03' 35.40" N	82° 21' 07.94" W	N	N/A

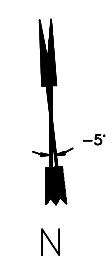
NOTES:

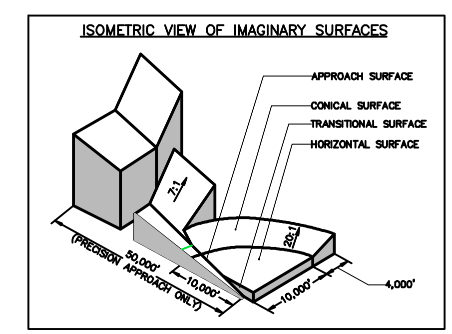
1. ALL ELEVATIONS SHOWN IN HEIGHT ABOVE MEAN SEA LEVEL (NAVD 88). REFER TO THE RUNWAY 05–23 AND RUNWAY 09–27 INNER PORTION OF THE APPROACH SURFACE PLANS FOR CLOSE–IN OBSTRUCTION DETAILS.
2. NO SURVEY WAS CONDUCTED AS PART OF THE UPDATE OF THIS DRAWING. OBSTRUCTION DATA BASED ON EXISTING FILES.
3. THE ENTIRE AIRPORT PROPERTY HAS A LAND USE DESIGNATION OF LIGHT INDUSTRIAL (M–1).
4. FOR HEIGHT RESTRICTIONS AND COMPATIBLE LAND USE ZONING AROUND THE AIRPORT, REFERENCE THE 2008 MARION COUNTY COMPREHENSIVE PLAN, SECTION TWO – TRANSPORTATION ELEMENT. OBJECTIVE 13.0 OF THE TRANSPORTATION ELEMENT OUTLINES THE COUNTY'S POLICIES AND REGULATIONS RELATED TO TALL STRUCTURES, AIRPORT OVERLAY ZONING ORDINANCE, AND ADJACENT LAND USES.

LEGEND

ITEM	EXISTING	FUTURE
AIRPORT PROPERTY LINE	— · — · — · —	- - - - - - - -
GROUND CONTOURS	—— 50 ——	N/A
POTENTIAL OBSTRUCTION	(E)	N/A

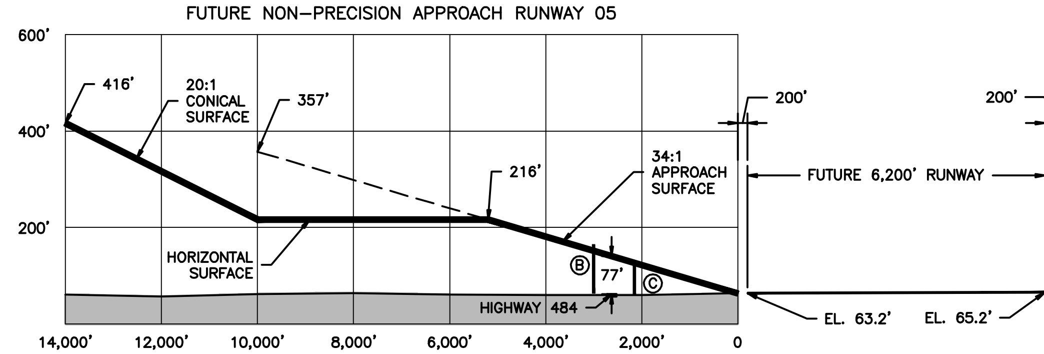
MAGNETIC DECLINATION 5° 5' W
CHANGES 6 MIN/YR (WEST)
JANUARY 2010



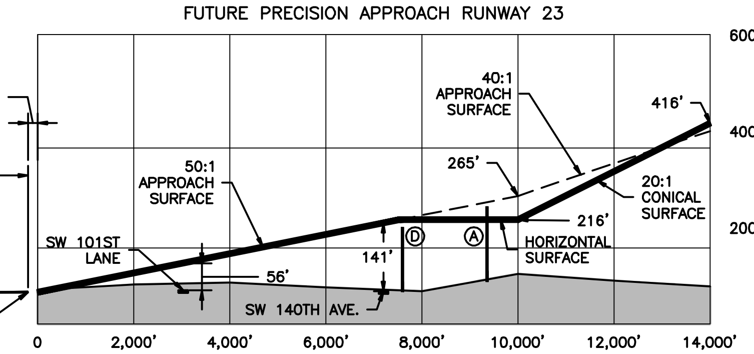


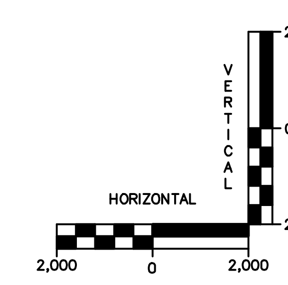
RUNWAY 05–23 PROFILE

FUTURE NON–PRECISION APPROACH RUNWAY 05



FUTURE PRECISION APPROACH RUNWAY 23





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

PROJECT NO. **857501**
CADD NO. **857501006**

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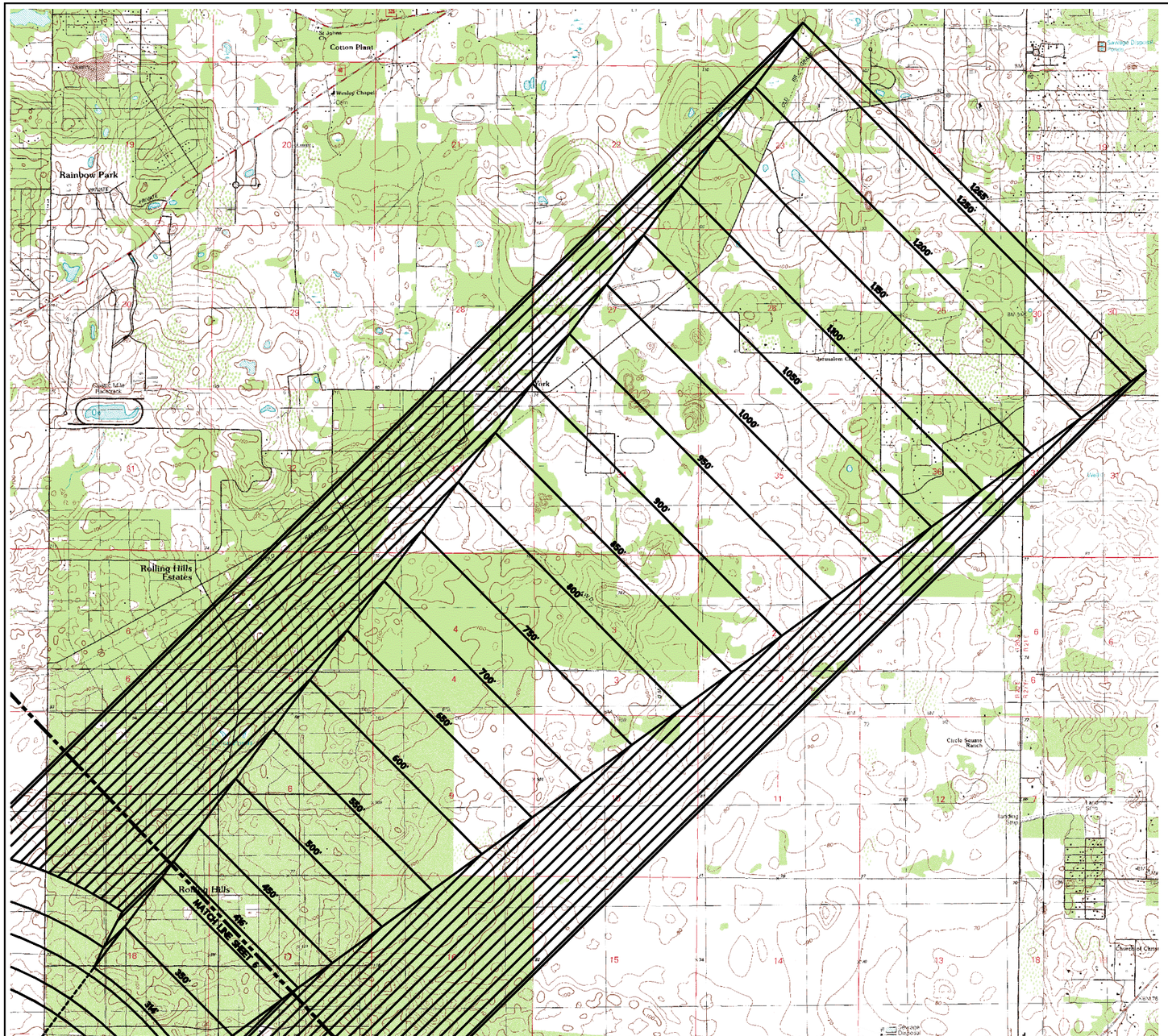
CHKD. BY **DNN**
DR. BY **DJD**
DES. BY **DJD**
DATE: **JAN. 2010**
SCALE: **GRAPHIC**

MARION COUNTY AIRPORT
MARION COUNTY, FLORIDA

FUTURE FAR PART 77
AIRSPACE SURFACES – A

DRAWING
6

SHEET 6 OF 8



OBSTRUCTION DATA TABLE

	STUDY NUMBER	TYPE	ELEVATION	LATITUDE	LONGITUDE	PENETRATION	SURFACE
A	2008-ASO-350-OE	TOWER	243'	29° 05' 57.43" N	82° 21' 30.99" W	N	N/A
B	NONE FOUND	TOWER	164'	29° 03' 13.61" N	82° 23' 26.83" W	Y	APPROACH
C	NONE FOUND	POLES	126'	29° 03' 11.66" N	82° 23' 11.21" W	N	N/A
D	2006-ASO-7091-OE	POLES	157'	29° 05' 12.67" N	82° 21' 08.33" W	N	N/A
E	2006-ASO-7067-OE	POLES	145'	29° 03' 35.40" N	82° 21' 07.94" W	N	N/A

NOTES:

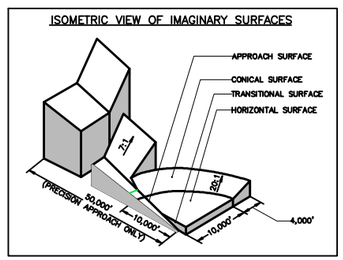
1. ALL ELEVATIONS SHOWN IN HEIGHT ABOVE MEAN SEA LEVEL (NAVD 88). REFER TO THE RUNWAY 05–23 AND RUNWAY 09–27 INNER PORTION OF THE APPROACH SURFACE PLANS FOR CLOSE–IN OBSTRUCTION DETAILS.
2. NO SURVEY WAS CONDUCTED AS PART OF THE UPDATE OF THIS DRAWING. OBSTRUCTION DATA BASED ON EXISTING FILES.
3. THE ENTIRE AIRPORT PROPERTY HAS A LAND USE DESIGNATION OF LIGHT INDUSTRIAL (M–1).
4. FOR HEIGHT RESTRICTIONS AND COMPATIBLE LAND USE ZONING AROUND THE AIRPORT, REFERENCE THE 2008 MARION COUNTY COMPREHENSIVE PLAN, SECTION TWO – TRANSPORTATION ELEMENT. OBJECTIVE 13.0 OF THE TRANSPORTATION ELEMENT OUTLINES THE COUNTY'S POLICIES AND REGULATIONS RELATED TO TALL STRUCTURES, AIRPORT OVERLAY ZONING ORDINANCE, AND ADJACENT LAND USES.

LEGEND

ITEM	EXISTING	FUTURE
AIRPORT PROPERTY LINE		
GROUND CONTOURS	50	N/A
POTENTIAL OBSTRUCTION	E	N/A

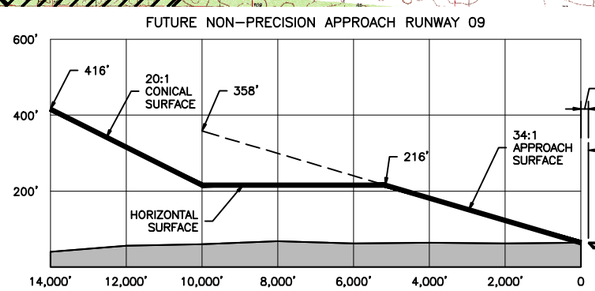
MAGNETIC DECLINATION 5° 5' W
CHANGES 6 MIN/YR (WEST)
JANUARY 2010

ISOMETRIC VIEW OF IMAGINARY SURFACES

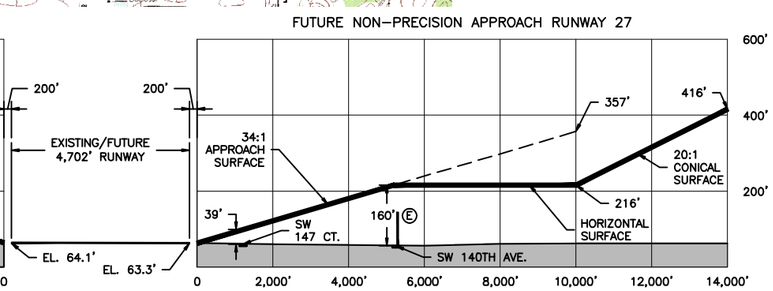


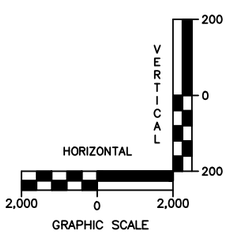
RUNWAY 09–27 PROFILE

FUTURE NON–PRECISION APPROACH RUNWAY 09



FUTURE NON–PRECISION APPROACH RUNWAY 27





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

PROJECT NO. 857501
CADD NO. 857501007

Hoyle, Tanner & Associates, Inc.
Consulting Engineers
95 E. MITCHELL HAMMOCK ROAD
SUITE 200
OVIEDO, FL 32765
tel: (407) 380–1919 fax: (407) 380–1830
web: www.hoyletanner.com

SCALE:	DATE:	DES. BY	DR. BY	CHKD. BY
GRAPHIC	JAN. 2010	DD	DD	DNN

MARION COUNTY AIRPORT
MARION COUNTY, FLORIDA

FUTURE FAR PART 77
AIRSPACE SURFACES – B

DRAWING
7

LEGEND

ITEM	EXISTING	FUTURE
AIRPORT PROPERTY LINE		
BUILDINGS		
EDGE OF PAVEMENT		
RUNWAY SAFETY AREA (RSA)	RSA RSA	FRSA FRSA
RUNWAY PROTECTION ZONE (RPZ)	RPZ RPZ	FRPZ FRPZ
4" X 4" CONC. MONUMENT FOUND		N/A
NAIL & DISK SET – P.S.M. 5469		N/A

PARCEL DATA

PARCEL ID	ACQ. DATE	FED. AID NO.	TYPE	AREA (AC)
A	1941, 1942, 1948 & 1990	N/A	QUITCLAIM DEED	752.260
B	1942	N/A	QUITCLAIM DEED	8.562
C	1948	N/A	QUITCLAIM DEED	4.228
D	1948	N/A	QUITCLAIM DEED	26.931
F1	–	–	FUTURE	±5.0
F2	–	–	FUTURE	±5.0
F3	–	–	FUTURE	±10.0
			EXISTING TOTAL	791.981
			FUTURE TOTAL	±811.981

LINE DATA

SEGMENT	LENGTH	BEARING
L1	87.33'	S44°42'14"E
L2	42.25'	S00°25'13"W
L3	360.80'	S89°30'08"E
L4	50.01'	N45°52'26"E
L5	70.60'	S45°31'00"W
L6	80.00'	S00°36'17"W
L7	1082.20'	S89°23'43"E
L8	70.71'	S44°23'44"E
L9	1003.20'	S89°31'30"E
L10	325.59'	S00°34'53"W
L11	70.70'	N45°35'39"E
L12	902.20'	N89°23'43"W
L13	70.83'	S44°29'00"E
L14	323.32'	N00°25'44"E
L15	635.00'	S89°23'52"E
L16	290.00'	N00°36'08"E
L17	635.00'	S89°23'52"E
L18	290.00'	S00°36'08"W
L19	219.46'	N00°45'32"E
L20	138.21'	N00°41'19"E
L21	70.32'	N44°37'51"W

CURVE DATA

CURVE	RADIUS	ARC	TANGENT	CENTRAL ANGLE	CHORD	CHORD BEARING
C1	560.87'	444.86'	234.88'	45°26'42"	433.29'	S23°09'05"W

ABBREVIATIONS

AC	ACREAGE
ACQ	ACQUISITION
CONC	CONCRETE
FED	FEDERAL
FROFZ	FUTURE RUNWAY OBSTACLE FREE ZONE
FUT	FUTURE
NO	NUMBER
ODALS	OMNIDIRECTIONAL APPROACH LIGHTING SYSTEM
PSM	PROFESSIONAL SURVEYOR & MAPPER

MAGNETIC DECLINATION 5° 5' W
CHANGES 6 MIN/YR (WEST)
JANUARY 2010

-5° 5'

N

GRAPHIC SCALE
500 0 500

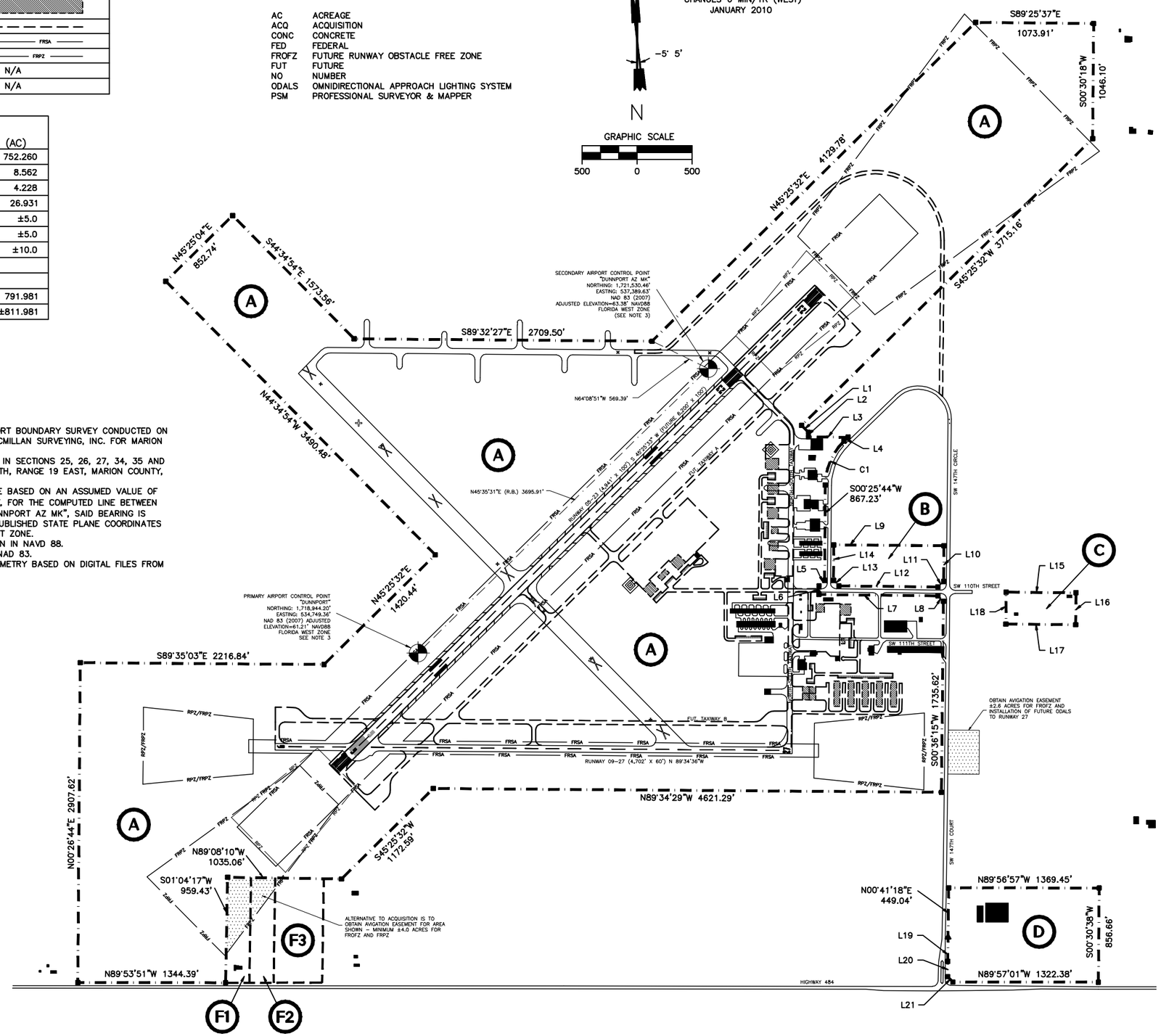
GENERAL NOTES

1. BASED ON FULL AIRPORT BOUNDARY SURVEY CONDUCTED ON APRIL 30, 2008 BY MCMILLAN SURVEYING, INC. FOR MARION COUNTY.
2. AIRPORT PROPERTY IS IN SECTIONS 25, 26, 27, 34, 35 AND 36, TOWNSHIP 16 SOUTH, RANGE 19 EAST, MARION COUNTY, FLORIDA.
3. BEARINGS HEREON ARE BASED ON AN ASSUMED VALUE OF NORTH 45°35'31" EAST, FOR THE COMPUTED LINE BETWEEN "DUNNPORT" AND "DUNNPORT AZ MK", SAID BEARING IS IDENTICAL WITH THE PUBLISHED STATE PLANE COORDINATES FOR THE FLORIDA WEST ZONE.
4. ALL ELEVATIONS SHOWN IN NAVD 88.
5. ALL COORDINATES IN NAD 83.
6. EXISTING AIRFIELD GEOMETRY BASED ON DIGITAL FILES FROM MARION COUNTY.

PROPERTY DESCRIPTION

THE NORTH ½ OF SECTION 26 AND THE WEST ¾ OF THE SOUTH ½ OF SECTION 26 AND THE EAST ¼ OF THE SOUTH ½ OF SECTION 26 AND THE WEST ½ OF THE NORTHWEST ¼ OF SECTION 25 AND THE EAST ½ OF THE NORTHWEST ¼ AND THE WETS ½ OF THE SOUTHWEST ¼ OF SECTION 25 AND THE NORTHEAST ¼ OF THE SOUTHWEST ¼ OF SECTION 25 AND THE SOUTHEAST ¼ OF THE SOUTHWEST ¼ OF SECTION 25 AND THE WEST ½ OF SECTION 36, (NORTH OF COUNTY ROAD NO. 484 (PREVIOUSLY KNOWN AS FLORIDA STATE HIGHWAY 81)) AND THE NORTH ½ OF SECTION 35, ALL LYING AND BEING IN TOWNSHIP 16 SOUTH, RANGE 19 EAST, MARION COUNTY, FLORIDA; PORTIONS OF THE AFOREMENTIONED BEING PART OF LANDS DESCRIBED IN DEED BOOK 283, PAGE 230 AND DEED BOOK 244, PAGE 114 AND DEED BOOK 244, PAGE 118 AND DEED BOOK 245, PAGE 511 AND DEED BOOK 245, PAGE 494 AND O.R.B. 1707, PAGE 93, ALL OF THE PUBLIC RECORDS OF MARION COUNTY, FLORIDA; TOGETHER WITH LANDS DESCRIBED IN O.R.B. 1791, PAGE 994, SAID PUBLIC RECORDS. ALL THE AFOREMENTIONED LAND BEING LESS AND EXCEPT TRACTS AND RIGHT-OF-WAYS WITHIN DUNNELLON AIRPORT SUBDIVISION, ACCORDING TO THE PLAT THEREOF, AS RECORDED IN PLAT BOOK 7, PAGES 107 THRU 113, SAID PUBLIC RECORDS.
CONTAINING 791.981 ACRES, MORE OR LESS.

(BY SURVEYOR VIA DEEDS SUPPLIED BY MARION COUNTY)



REV	DESCRIPTION	DR. BY	CHKD. BY	DATE

PROJECT NO. 857501
CADD NO. 857501008

Hoyle, Tanner & Associates, Inc.
Consulting Engineers
95 E. MITCHELL HAMMOCK ROAD
SUITE 200
OVIEDO, FL 32765
tel: (407) 380-1919 fax: (407) 380-1830
web: www.hoyletanner.com

SCALE: GRAPHIC | DATE: JAN. 2010 | DES. BY DD | DR. BY DD | CHKD. BY DNN

MARION COUNTY AIRPORT
MARION COUNTY, FLORIDA

AIRPORT PROPERTY MAP

DRAWING
8

SHEET 8 OF 8

Capital Improvement Program

INTRODUCTION

The schedule of proposed capital improvements resulting from the recommendations of this master plan and the cost estimates for their development are included in this chapter. The intent is to assist Marion County in achieving their goals to maximize revenues and minimize operating expenses, while at the same time providing safe facilities for the public. Consequently, the timing of the improvement projects proposed for the Marion County Airport has been structured to support these goals.

The analyses conducted in the previous chapters have evaluated airport development needs based upon current and forecast aviation activity, as well as the opportunities that will exist once the airfield is reconfigured. However, a key component of the master planning process is the application of basic economic, financial, and management rationale to each development item so that a responsible and efficient implementation process can be assured. In short, these factors are critical to make the plan realistic and successful. Therefore, this section of the study is often the primary reference for decision makers. Proper understanding of the effects on a decision either for or against a recommendation will be essential in maintaining a realistic program that provides the maximum benefit to the community.

AIRPORT DEVELOPMENT FUNDING

The following development program has been evaluated from a variety of perspectives. It is not dependent exclusively upon the County for funding. In fact, with proper and timely decision making on the part of responsible officials, it is quite possible for the County to capitalize several sources of development funds. For the most part, the development program is dependent upon sources other than those from the County. However, this does not mean that the County will not have to provide its share of the costs.

The process of collecting and distributing aviation user funds is quite variable but follows essentially the same guidelines. Services are provided for a fee, and part of that fee is used to fund additional development. The primary source of aviation user funds that have been identified in this plan will come from the state level. This reason alone is why it is essential for the next version of the state system plan to reflect the current role of the airport in serving business and corporate aircraft operations in addition to the flight training and recreational activity. 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 studies. FDOT will 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. These funds are also used to leverage funds from the Federal Aviation Administration (FAA).

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. These funds are distributed under appropriations set by Congress to all airports in the U.S. that have certified eligibility. For general aviation airports AIP grants typically include an annual entitlement grant and discretionary funding. There are also instances where grants may be offered for special projects such as security improvements. While Marion County is an eligible airport it has not yet

accepted any FAA grants, including the annual general aviation entitlement of $150,000. The entitlement grants can be carried over for up to three years in order to fund larger projects.

Even though the airport has not accepted any federal discretionary monies for airfield improvements, it must be recognized and properly considered that these limited funds are distributed on a priority basis. FAA project priorities are established by each FAA Regional Office based upon the number and dollar amount of applications received. Marion County will be competing with other communities in Florida and the FAA Southern Region (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, Puerto Rico, South Carolina, Tennessee, and the U.S. Virgin Islands) as well as the entire country, for these discretionary grants. Regardless, since the AIP discretionary and entitlement grants provide up to 95 percent of the funding for eligible projects, it will be very beneficial to the airport development program for Marion County.

Consequently, close coordination of the County's priorities with the FAA and FDOT will help enhance both agencies' participation in projects at the airport. It is extremely important to maintain this coordination and to act expeditiously in securing the local share for either federal or state grants. Local shares of airport development projects can vary from approximately 2 ½ percent to 50 percent. Likewise, there exist some economic development grants from the state that may also be utilized for the funding of eligible projects.

Another source of development funding that is frequently overlooked and does not receive adequate credit for its investment is the private sector. At general aviation airports there are several instances where private development sources can contribute needed improvements to the airport. The simple fact is that maintenance and expansion of basic airport facilities will always compete with limited dollars, resulting in a tendency to delay or possibly eliminate the development of some facilities.

This is not to say that the County should relinquish its ability to control the development of the airport. In fact, it would provide an opportunity to expand the available services while also increasing the revenue. Simple development codes and minimum standards can be employed to control future airport facilities. Establishment of such requirements would allow the County to better focus on maintaining an airport that provides safe transportation services and serve the economic well being of the community. Since the principal benefactors of a public airport are local business and industry and because of the importance of the facility to the community as a whole, the private and public sector must work together, as they have in the past at the airport, to ensure that adequate funds are available.

CAPITAL IMPROVEMENT PROGRAM

The initial step in establishing an airport development program is to determine the cost of each proposed improvement. Cost data used in this study was collected from a variety of sources, including actual project estimates, published engineering indices, government agencies, and similar airport construction projects in the area. In addition to the actual construction costs, financial consideration must be given to the engineering and design work, plus minor construction items and contingencies, which have not been specifically enumerated. For planning purposes, the base construction cost has been increased to reflect the anticipated engineering, testing, survey, and inspection costs, as well as for unknown contingencies.

Estimates for each planning period are based on 2008 dollars. In future years, as the plan is implemented, these cost presentations can continue to serve as management aids by adjusting the 2008 based figures for subsequent inflation. This may be accomplished by converting the interim change in the National Consumer Price Index (CPI) into a multiplier ratio through the following formula:

CPI Multiplier Ratio = X / CPI

where: X = CPI in any given future year
CPI = National CPI in 2008

Multiplying the change ratio times any 2008 based cost or income figure presented in this study will yield the adjusted dollar amounts appropriate in any future year re-evaluation. However, only National CPI data should be used, as local or regional measures may vary. This information is available from the economic research departments of most banks.

The recommended developments of the Capital Improvement Program (CIP) are divided into three planning periods, which include a short term (2010 - 2014), intermediate term (2015 - 2019), and long term (2020 - 2031). These periods vary from those presented in the aviation activity forecasts for a number of reasons, one of which is the fact that the forecasts are based on data through the year 2008. Also, because of the time required to complete the various portions of this study, nearly a year has passed and new projects have started using grants from the 2009 budget.

Each of the CIP periods is presented individually to provide detail of the project priorities and financial requirements. As shown in **Table 6-1**, the total cost for the planned development of Marion County Airport will be approximately $32.2 million through the year 2027.

Table 6-1
SUMMARY OF DEVELOPMENT COSTS

Planning Period	Program Costs (2008 dollars)	Estimated Local Share
Short Term (2010 – 2014)	$4,446,000	$413,550
Intermediate Term (2015 – 2019)	$6,030,500	$964,338
Long Term (2020 – 2031)	$21,748,000	$3,463,400
TOTALS	**$32,224,500**	**$4,841,288**

Source: Hoyle, Tanner & Associates, Inc., 2009.

Descriptions of the improvements for each CIP period are included in the following sections. The associated tables represent the culmination of comparative analysis of basic budget factors, need or demand, and priority assignments. Costs for the development items have typically been broken down based on the previous funding experiences for similar projects. The allocation of funds from any agency does not imply that the funds are guaranteed from that particular source. They are simply potential sources used as part of the financial feasibility and phasing of the various projects.

The information contained in the following tables is meant to help guide the County as they work with the various agencies to obtain project grants. This data will be used directly to update the Joint Automated Capital Improvement Program (JACIP) used by the FAA and FDOT to coordinate funding efforts. The JACIP is a secure, internet-based program, which allows the agencies and airport management to interact on a real time basis as the airport needs and funding issues evolve. It should be noted that when the JACIP is updated, annual increases should be included with the individual 2008 cost estimates in order to ensure that a realistic budget is set for each project over the 20-year planning period.

Short Term Capital Improvement Program

Airport improvements for the short term CIP begin in 2010 following the completion of the 20 t-hangar units and related taxilanes designed and constructed in 2009. The first two projects for 2010 include rejuvenating the Runway 05-23 pavement and repainting the markings on Runway 09-27. These two projects will preserver the condition and visibility of both runways throughout the short term planning period. The third project is one of three programmed in the CIP which enables the airfield security fencing to be modified to accommodate the expansion of future facilities. The initial airfield security improvements would change the fencing and electric roll gate to allow SW 111th Street to be abandoned in preparation for the first phases of development just east of the North-South Taxiway. Improvements would include providing a new roll gate at SW 110th Street to provide the access necessary for authorized airfield users.

The projects in 2011 provide new and improvement navigational and communication services to the users of the airport. The first is the installation of an Automated Weather Observing System (AWOS) which would provide continuous real-time weather reports, including on-site altimeter settings for pilots on instrument approaches. The Ground Communication Outlet (GCO) equipment will improve the ability to communicate with air traffic control facilities that are not located on airport property. The final projects will upgrade and improve existing takeoff and landing aids as well as provide the County with the ability to conduct a formal Stormwater Pollution Prevention Plan (SWPPP) to include a Spill Prevention, Control, and Countermeasure (SPCC) element.

The first project in 2012 will preserve both the pavement surfaces of the North-South Taxiway as well as the existing aircraft parking apron. Improvements to floodlight the existing aircraft parking apron should also be included. The second project includes the first phase of additional aircraft parking apron space to the east of the North-South Taxiway. This expansion along with the relocation of the existing aviation fuel storage tanks (first project in 2013) are necessary not only to provide additional aircraft parking space, but also to alleviate the congestion that regularly occurs in front of the existing fuel storage tank site. The activity that occurs in this area frequently causes aircraft blocking the t-hangar taxilane, operator of the adjacent clearspan hangar, and at times, the North-South Taxiway. Both projects to construct additional aircraft parking apron space and to relocate the aviation fuel storage tanks should include floodlighting to enhance the safety of nighttime operations.

As described above, the first project in 2013 would be to relocate the existing aviation fuel storage tanks. This project includes the necessary landside access to the new site as well as the provision for secondary containment which current regulations require, despite the fact that the existing tanks are of double wall construction. Two design projects in 2013 will prepare the

next development for construction the following year. These include the initial general aviation terminal building and parallel taxiway system to Runway 05-23. During this time, coordination with the FAA is necessary in order to begin negotiations to recapture a portion of the fenced area around the Jacksonville Air Route Traffic Control Center tower site. As described previously, a portion of this leased area will be necessary to construct the second phase of the aircraft parking apron. The final project will provide the detailed survey needed by the FAA to begin the process of establishing non-precision instrument approaches to both ends of Runway 09-27.

Table 6-2
SHORT TERM CAPITAL IMPROVEMENT PROGRAM

		Estimates (in 2008 dollars)			
Year	**Project**	**Total**	**FAA**	**FDOT**	**Local**
2010	Rejuvenate Runway 05-23 Pavement Surface	$311,000	$295,450	$7,775	$7,775
2010	Remark Runway 09-27	$60,000	$0	$48,000	$12,000
2010	Improve Airfield Security - Phase I	$42,000	$0	$33,600	$8,400
	Subtotal for 2010	**$413,000**	**$295,450**	**$89,375**	**$28,175**
2011	Install AWOS III Equipment	$150,000	$142,500	$3,750	$3,750
2011	Install Ground Communications Outlet Equipment	$12,000	$11,400	$300	$300
2011	Rehab. Windsock, Segmented Circle, & Wind Tee	$30,000	$0	$24,000	$6,000
2011	Develop SWPPP and SPCC	$18,000	$0	$14,400	$3,600
	Subtotal for 2011	**$210,000**	**$153,900**	**$42,450**	**$13,650**
2012	Rejuvenate North-South Taxiway & Aircraft Apron	$125,000	$118,750	$3,125	$3,125
2012	Construct Aircraft Parking Apron - Phase I	$448,000	$0	$358,400	$89,600
	Subtotal for 2012	**$573,000**	**$118,750**	**$361,525**	**$92,725**
2013	Relocate Existing Fuel Storage Tanks	$209,000	$0	$167,200	$41,800
2013	Design General Aviation Terminal (± 1,500 SF)	$210,000	$0	$168,000	$42,000
2013	Design Parallel Taxiway to Runway 05-23	$170,000	$161,500	$4,250	$4,250
2013	Runway 09-27 Airspace Analysis Survey	$85,000	$0	$68,000	$17,000
	Subtotal for 2013	**$674,000**	**$161,500**	**$407,450**	**$105,050**
2014	Construct General Aviation Terminal (± 1,500 SF)	$564,000	$0	$451,200	$112,800
2014	Improve Airfield Security - Phase II	$42,000	$0	$33,600	$8,400
2014	Construct Parallel Taxiway to Runway 05-23	$1,950,000	$1,852,500	$48,750	$48,750
2014	Clearing of Runway 09-27 Obstructions (± 5 acres)	$20,000	$0	$16,000	$4,000
	Subtotal for 2014	**$2,576,000**	**$1,852,500**	**$549,550**	**$173,950**
	SHORT TERM TOTAL	**$4,446,000**	**$2,582,100**	**$1,450,350**	**$413,550**

Source: Hoyle, Tanner & Associates, Inc., 2009.

In 2014, four projects are programmed to continue the improvements set in the prior year. The first two would be to construct the general aviation terminal building and then to adjust the airfield security fencing and gates to accommodate the expansion of facilities. The third project would be the first to request FAA discretionary monies in order to construct the parallel taxiway design for Runway 05-23 in the prior year. The taxiway construction would include Medium

Intensity Taxiway Lights (MITLs) and illuminated airfield signage along the new taxiway alignment. Finally, monies are also programmed to provide the clearing that would likely be necessary to remove any on-airport vegetation identified as obstructions to the future non-precision approaches planned for both ends of Runway 09-27.

Intermediate Term Capital Improvement Program

As detailed in **Table 6-3**, projects in the first half of the intermediate term CIP primarily focus on continuing to expand and provide both aircraft parking and storage space to the east of the North-South Taxiway. This includes the second phase of the aircraft parking apron (with floodlighting), next 10-unit t-hangar, and a larger clearspan hangar. There is also a project to rehabilitate the existing taxilane pavements serving the County t-hangars west of the North-South Taxiway. The first half ends with two planning studies. The first is a master plan update which is programmed to occur approximately six years after this study. The other is the environmental analysis required before the needed improvements to the runway intersection can begin. At this point in time it is expected that both the new master plan update and environmental assessment will help determine whether future improvements to the existing Runway 05-23 pavement would need to be moved up from their current placement within the long term CIP.

Table 6-3
INTERMEDIATE TERM CAPITAL IMPROVEMENT PROGRAM

		Estimates (in 2008 dollars)			
Year	**Project**	**Total**	**FAA**	**FDOT**	**Local**
2015	Construct Aircraft Parking Apron - Phase II	$537,000	$0	$429,600	$107,400
2015	Rehabilitate T-hangar Taxilanes	$299,000	$0	$239,200	$59,800
2016	Airport Master Plan Update	$130,000	$123,500	$3,250	$3,250
2016	Construct Clearspan Hangar (10,000 SF)	$1,344,000	$0	$1,075,200	$268,800
2017	Construct 10 Unit T-hangar with Taxilane	$1,090,000	$0	$872,000	$218,000
2017	Environmental Assessment - Runway Intersection	$85,000	$80,750	$2,125	$2,125
2018	Construct Runway Intersection Improvement	$836,000	$794,200	$20,900	$20,900
2018	Install Lighted Supplemental Windsocks (3)	$45,000	$42,750	$1,125	$1,125
2018	ODALS (both ends Runway 09-27)	$130,000	$123,500	$3,250	$3,250
2018	Construct Fuel Storage Area (Avgas & Jet A)	$582,000	$0	$465,600	$116,400
2019	Runway 05 Airspace Analysis Survey	$42,500	$40,375	$1,063	$1,063
2019	Clearing of Runway 05 Obstructions (± 12 acres)	$48,000	$45,600	$1,200	$1,200
2019	ODALS (Runway 05 end)	$65,000	$61,750	$1,625	$1,625
2019	Construct Clearspan Hangar (5,625 SF)	$797,000	$0	$637,600	$159,400
	INTERMEDIATE TERM TOTAL	**$6,030,500**	**$1,312,425**	**$3,753,738**	**$964,338**

Source: Hoyle, Tanner & Associates, Inc., 2009.

With the exception of another clearspan hangar project, the second half of the intermediate term CIP focuses on improving runway and airfield facilities. This includes the improvement of the runway intersection which would also extend the parallel taxiway to Runway 05-23 to the southwest. The runway and taxiway improvements would include Medium Intensity Runway

Lights (MIRLs), a 4-light Precision Approach Path Indicator (PAPI) for Runway 05, MITLs, illuminated airfield signage (including runway distance remaining signs), and an aircraft run-up area. Additional airfield improvements include the installation of supplemental windsocks, construction of a second aviation fuel storage area (with floodlighting), and the survey required for the FAA to begin the process of establishing a non-precision instrument approach to Runway 05. Line items are also included for the clearing of obstructions to the proposed Runway 05 non-precision approach and for the installation of Omnidirectional Approach Lighting Systems (ODALS) to Runway 05 as well as both ends of Runway 09-27. It should be noted that for Runway 05 and Runway 27, the installation of the ODALS will depend on the ability to obtain the necessary clearing and/or property rights reflected on the Airport Layout Plan (ALP) drawing. At this time it is not certain whether the need for these proposed non-precision approaches would justify the property rights that would likely be required.

Long Term Capital Improvement Program

Projects in the long term planning period are essentially split between improving the runway and taxiway system with those required to begin development of facilities to the west of the North-South Taxiway. The primary runway and taxiway improvements involve those projects necessary to extend and strengthen Runway 05-23 to support the expected increase in activity by larger and heavier business jet aircraft. These projects include the environmental analysis required for the runway extension and the construction projects to extend the runway, extend the parallel taxiway, and strengthen the existing runway length. The construction estimates include costs to provide the required MIRLs, MITLs, a 4-light PAPI for Runway 23, illuminated airfield signage, and an aircraft run-up area.

Projects for the survey, clearing, and approach lighting system required to potentially establish a precision instrument approach to Runway 23 are included towards the middle of the long term CIP. While a Medium-intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR) is planned, the actual system installed will depend on the type of precision approach established as well as the number of approaches expected to be conducted under actual instrument conditions. The approach lighting system will likely require some level of environmental review.

An upgrade to the MIRLs for Runway 09-27 is programmed to replace the existing stake mounted lights base mounted light fixtures on cans with conduit. The project also includes installing 4-light PAPIs for both ends of Runway 09-27. Projects during this period would also provide two phases to construct a full length parallel taxiway on the north side of Runway 09-27. This project would include MITLs, illuminated airfield signage, and aircraft run-up areas at both ends of the parallel taxiway alignment.

Expansion of the facilities west of the North-South Taxiway initially includes a number of phases that would extend SW 110th Street, automobile parking, utilities, and the required security fencing and gates. Future facilities include the development of the mid-field terminal area to include the first phases of the aircraft parking apron, the first clearspan hangar, a public helipad, and the mid-field general aviation terminal building.

The long term planning period also includes projects to remark, rejuvenate, or rehabilitate different airport pavement areas. Projects to reconstruct what would then be the two halves of

the North-South Taxiway are also programmed, to include the addition of MITLs and illuminated airfield signage along these taxiway alignments. There are a few more hangar projects programmed that would provide the final 20 t-hangar units and an additional clearspan hangar to the east of the North-South Taxiway. Finally, there are two addition airport master plan updates programmed to occur over the course of the long term period.

Table 6-4
LONG TERM CAPITAL IMPROVEMENT PROGRAM

		Estimates (in 2008 dollars)			
Year	**Project**	**Total**	**FAA**	**FDOT**	**Local**
2020	Landside Access and Parking - Phase I	$392,000	$0	$313,600	$78,400
2020	Improve Airfield Security - Phase III	$83,000	$78,850	$2,075	$2,075
2020	Rehabilitate Runway 09-27 Lighting	$344,000	$0	$275,200	$68,800
2021	Airport Master Plan Update	$130,000	$123,500	$3,250	$3,250
2021	Landside Access and Parking - Phase II	$213,000	$0	$170,400	$42,600
2021	Remark Runway 05-23	$125,000	$118,750	$3,125	$3,125
2021	Remark Taxiway/Taxilane Pavements	$60,000	$57,000	$1,500	$1,500
2021	Rejuvenate Runway 09-27 Pavement Surface	$225,000	$0	$180,000	$45,000
2021	Parallel Taxiway to Runway 09-27 - Phase I	$702,000	$0	$561,600	$140,400
2022	Construct Clearspan Hangar (10,000 SF)	$1,327,000	$0	$1,061,600	$265,400
2022	Environmental Assessment – Extend Runway 23	$120,000	$114,000	$3,000	$3,000
2023	Construct 10 Unit T-hangar with Taxilane	$1,090,000	$0	$872,000	$218,000
2023	Landside Access and Parking - Phase III	$308,000	$0	$246,400	$61,600
2024	Extend Runway 05-23 to 6,200 feet	$1,728,000	$1,641,600	$43,200	$43,200
2024	Strengthen Existing Runway 05-23 Pavement	$2,368,000	$2,249,600	$59,200	$59,200
2024	Mid-Field Aircraft Parking Apron - Phase I	$867,000	$0	$693,600	$173,400
2025	Reconstruct North-South Taxiway - Phase I	$632,000	$0	$505,600	$126,400
2025	Reconstruct North-South Taxiway - Phase II	$432,000	$0	$345,600	$86,400
2025	Rehabilitate Existing Aircraft Parking Apron	$536,000	$0	$428,800	$107,200
2026	Mid-Field General Aviation Terminal (± 5,000 SF)	$1,784,000	$0	$1,427,200	$356,800
2027	Construct Clearspan Hangar (14,400 SF)	$1,848,000	$0	$1,478,400	$369,600
2028	Parallel Taxiway to Runway 09-27 - Phase II	$1,429,000	$0	$1,143,200	$285,800
2028	Airport Master Plan Update	$130,000	$123,500	$3,250	$3,250
2029	Runway 23 Airspace Analysis Survey	$75,000	$71,250	$1,875	$1,875
2029	Clearing of Runway 23 Obstructions (± 30 acres)	$120,000	$114,000	$3,000	$3,000
2029	Construct 10 Unit T-hangar with Taxilane	$1,090,000	$0	$872,000	$218,000
2030	MALSR to Runway 23	$125,000	$118,750	$3,125	$3,125
2030	Construct Lighted Public Helipad	$280,000	$0	$224,000	$56,000
2030	Construct Clearspan Hangar (10,000 SF)	$1,296,000	$0	$1,036,800	$259,200
2031	Mid-Field Aircraft Parking Apron - Phase II	$743,000	$0	$594,400	$148,600
2031	Rehabilitate Runway 09-27 Pavement Surface	$1,146,000	$0	$916,800	$229,200
	LONG TERM TOTAL	**$21,748,000**	**$4,810,800**	**$13,473,800**	**$3,463,400**

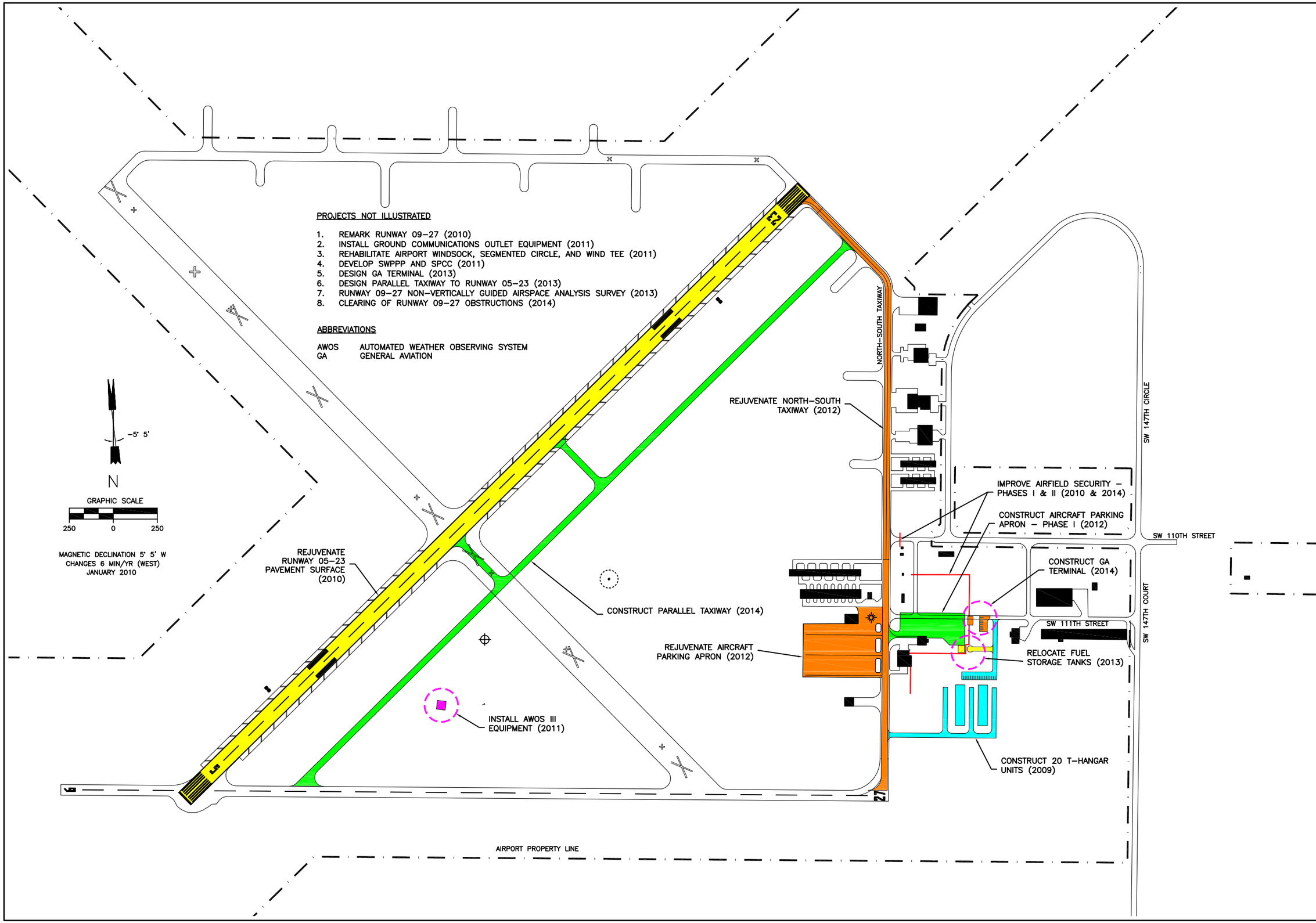
Source: Hoyle, Tanner & Associates, Inc., 2008.

Program Summary

The planning and improvements conducted over the past couple of years have put the Marion County Airport into a position that will enable it to become an even more significant economic engine for the County. For this to continue, the County needs to continue and support the development and improvement of airport facilities. Of most importance is the development that directly impacts the income potential for the airport. However, such capital improvements to the airfield will require additional support from the County as well as the other identified funding sources, including private investment when appropriate.

The goals and objectives of this study centered on the fact that Marion County Airport is a significant economic catalyst for not only the County, but also for the surrounding communities. The County's future financial support of Marion County Airport is actually an investment in the area's continued economic growth. With the proper investment, the Marion County Airport will be one of the largest economic engines for the area, as well as one of the largest creators of jobs for the surrounding community.

While the development program proposed over the course of the 20-year planning period is aggressive, all of the projects proposed are considered necessary for the successful growth of the airport. Having said this, it should be noted that the build out shown on the Airport Layout Plan (ALP) reflects more facilities than those included in the 20-year CIP. These extra facilities were included on the ALP to offer flexibility in the County's expansion of facilities. It will also decrease the need for the County to conduct an ALP update for individual facilities.



REV	DESCRIPTION	DR. BY	CHKD. BY	APPR. BY	DATE

PROJECT NO. 857501

CADD NO. 857501e61

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DES. BY	DR. BY	CHKD. BY
DJD	DJD	DNN

DATE: JAN. 2010

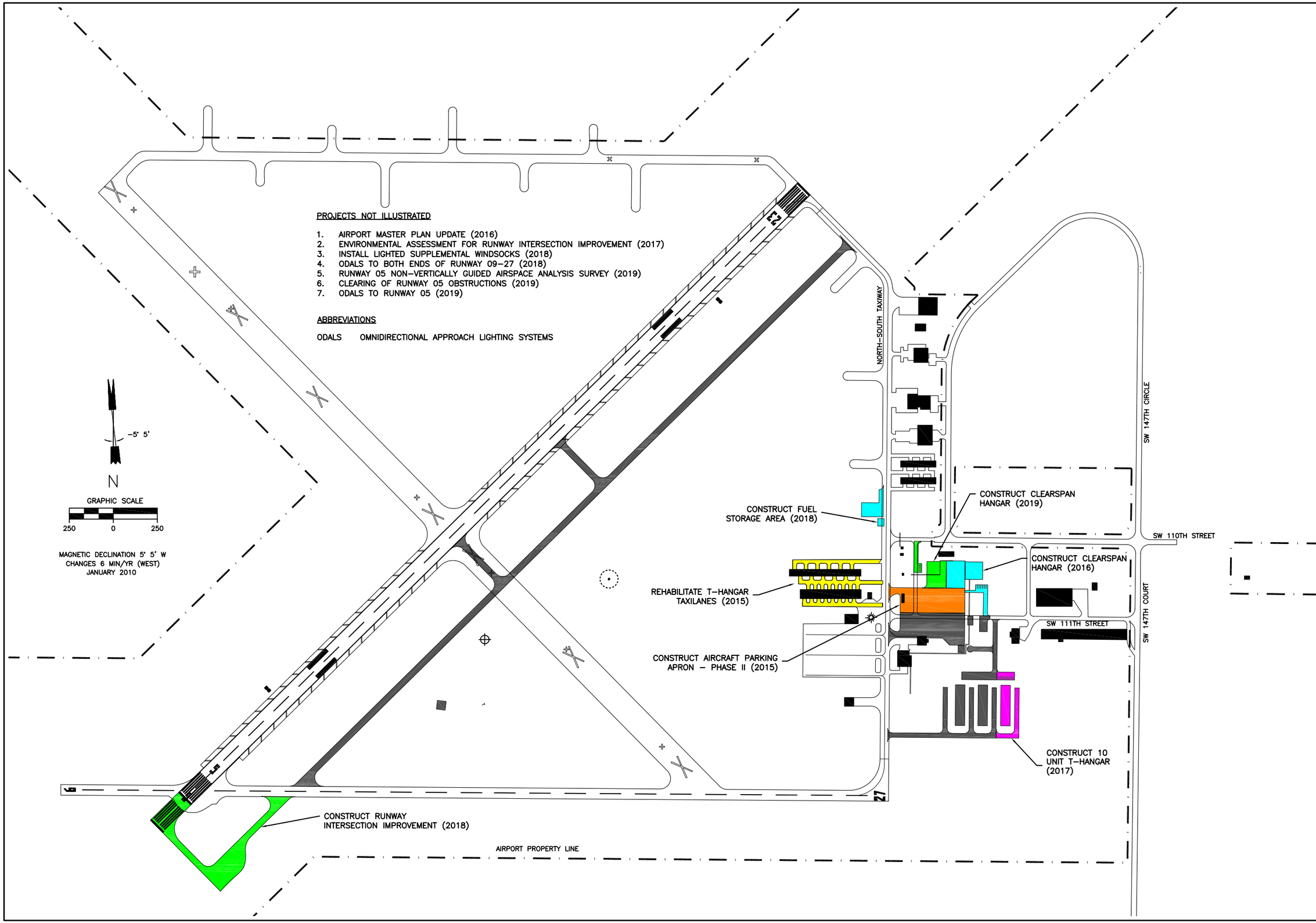
SCALE: NONE

MARION COUNTY AIRPORT
MARION COUNTY, FLORIDA

SHORT TERM (2010 – 2014)
CAPITAL IMPROVEMENT PROJECTS

EXHIBIT

6–1



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PROJECT NO. 857501

CADD NO. 857501e62

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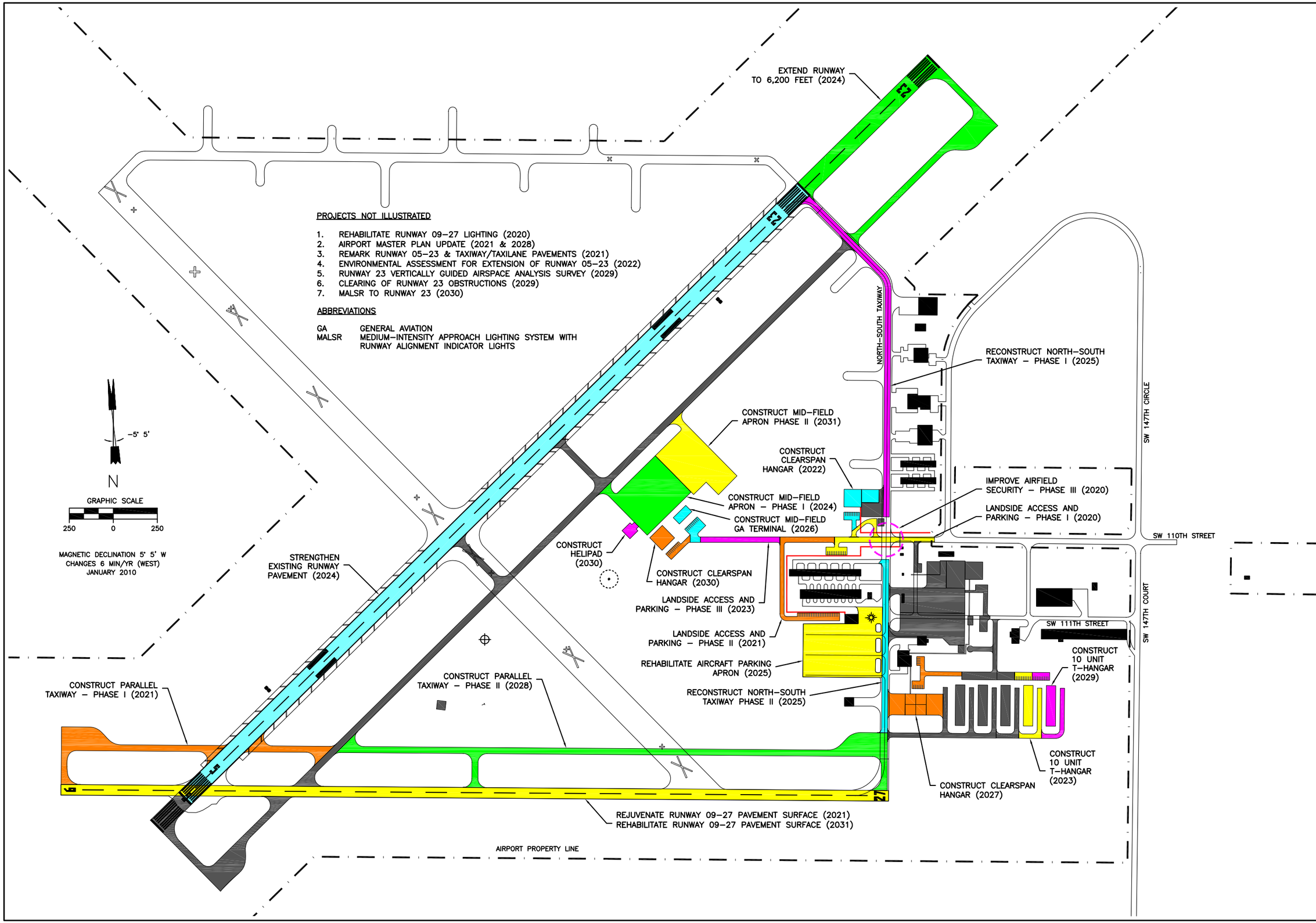
DR. BY DJD | CHKD. BY DNN

DES. BY DJD | DATE: JAN. 2010 | SCALE: NONE

MARION COUNTY AIRPORT
MARION COUNTY, FLORIDA

INTERMEDIATE TERM (2015 - 2019)
CAPITAL IMPROVEMENT PROJECTS

EXHIBIT
6-2



REV	DESCRIPTION	DR. BY	CHKD. BY	APPV. BY	DATE

PROJECT NO. 857501

CADD NO. 857501e63

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DES. BY DJD | DR. BY DJD | CHKD. BY DNN

DATE: JAN. 2010

SCALE: NONE

MARION COUNTY AIRPORT
MARION COUNTY, FLORIDA

LONG TERM (2020 – 2029)
CAPITAL IMPROVEMENT PROJECTS

EXHIBIT

6–3

Appendix A
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
LOA	Letter of Agreement
LOC	Localizer
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 B
Meetings and Workshops

MEETINGS AND WORKSHOPS

The following provides a summary of the key public meetings and workshops held as part of the development of the Marion County Airport Master Plan.

December 19, 2007	Meeting with County and Florida Department of Transportation (FDOT) staff to determine Master Plan Scope of Services.
January 22, 2008	Board of County Commissioners Meeting - Contract for Master Plan project accepted (pending acceptance of FDOT grant).
February 19, 2008	Board of County Commissioners Meeting - Acceptance of Florida Department of Transportation (FDOT) grant for Master Plan study.
March 13, 2008	Project Kick-off Meeting with County staff.
March 25, 2008	Airport Tenant Interviews and Surveys
April 21, 2008	FDOT Airport Inspection – Meeting with County and FDOT staff afterwards to discuss airport Facility Requirements.
May 7, 2008	Meeting at FDOT District 5 with County staff to discuss issues related to future T-hangar development.
June 3, 2008	Board of County Commissioners Meeting - Briefing on Existing Conditions and Aviation Activity Forecasts.
July 24, 2008	Meeting with County staff - Runway and T-hangar Alternatives
August 18, 2008	Public Workshop at Airport - Runway and T-hangar Alternatives
September 23, 2008	Board of County Commissioners Workshop 1 – Runway and T-hangar Alternatives
October 8, 2008	Meeting with County staff – Facility Requirements and Alternatives Analysis
October 16, 2008	Meeting with County staff – Facility Requirements and Alternatives Analysis
November 7, 2008	Meeting with County staff – Facility Requirements and Alternatives Analysis
December 11, 2008	Board of County Commissioners Workshop 2 – Final Demand/Capacity, Facility Requirements, and Airport Alternatives Analysis
January 21, 2009	Board of County Commissioners Workshop 3 – Draft Airport Layout Plan drawing set and Capital Improvement Program.
January 28, 2009	Meeting with County staff – Update Joint Automated Capital Improvement Program for airport projects.
March 2, 2010	Board of County Commissioners Meeting – Approval and acceptance of Final Airport Master Plan Report (January 2010) and Airport Layout Plan drawing set.

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