AIRPORT SETTING

The Crystal River Airport is located in Citrus County, a few miles south of the City of Crystal River. Established in 1887 from Hernando County, Citrus County is located on the west coast of Florida, which is known as the Nature Coast. Citrus County encompasses some 773 square miles and is bordered by Levy County to the north; Hernando County to the south; Marion and Sumter Counties to the east; and the Gulf of Mexico to the west. Within the County are the Cities of Crystal River and Inverness (County Seat), as well as a number of other communities including Floral City, Hernando, Homosassa, and Lecanto. Neighboring metropolitan areas include Tampa approximately 70 miles south, Orlando at 60 miles southeast, and Ocala at 35 miles to the northeast.

Location

The airport is located off US 19/98 (South Suncoast Boulevard) just south of the Crystal River city limits. Current airport property consists of approximately 193 acres of land with an airfield elevation of 9 feet above mean sea level. Public roadways that bound the property include West Godfrey Lane and North Lindbergh Drive to the north; North Golf Course Lane to the east; West Venable Street and West Flight Path Court to the south; and US 19/98 to the west. Access to the airport is via West Godfrey Lane and North Lindbergh Drive.

Administration

The airport is owned and operated by Citrus County. A seven member Aviation Advisory Board works with the County's Department of Public Works to make recommendations regarding the development, use, and operation of the airport. A senior staff member from the Department of Public Works serves as the airport manager, who ultimately reports to the Board of County Commissioners. Currently, a full time position has not been dedicated to the management of the Crystal River Airport or the Inverness Airport, which is also owned by the County.

Maintenance of the various airport facilities is conducted by Citrus County with some assistance from the primary tenant, the Crystal Aero Group fixed base operator (FBO). The Crystal Aero Group assists in the upkeep of the FBO facilities as well as some of the airfield lighting. Citrus County also has contracts to assist in the mowing operations and maintenance of the on airport weather station.

Role in National Air Transportation System

Crystal River Airport is designated by the Federal Aviation Administration (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, relievers (high capacity general aviation airports in metropolitan areas), and select general aviation airports.

The most recent NPIAS (2005-2009) classifies Crystal River 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 national airports system, providing air services to approximately one fifth of the United States population.

State System Plan

Crystal River Airport is also one of the 14 public-use airports in the North Central Florida Region of the Florida Aviation System Plan. The state system plan designates facilities as either commercial or community airports. Thirteen of the airports in this region, including Crystal River, are designated as community airports. The fourteenth, Gainesville Regional, is designated as a commercial airport since it supports regularly scheduled air carrier operations. Community airports serve a vital role in the state's air transportation network and economy. These facilities support over 85 percent of the aircraft operations conducted and a majority of the estimated 14,000 based aircraft in the state.

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. As such, information obtained regarding the Crystal River area's climate and wind characteristics is presented in the following sections.

Climate

Crystal River Airport has an elevation of 9 feet above mean sea level and is located only a few miles inland from the Gulf of Mexico. As with most of Florida's west coast, the surrounding land is relatively flat. Although the airport is located in the warmer southeastern portion of the nation, annual temperatures are considered moderate due to the influence of breezes from the gulf and many lakes in the area.

Summer temperatures rarely reach 100 degrees Fahrenheit, with an average high temperature of 92 degrees Fahrenheit in July. During the winter months, the average low temperature is around 44 degrees Fahrenheit. 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

Wind conditions were evaluated to determine the wind coverage at the airport. This element is important since aircraft takeoff and land into the wind. The FAA recommends that sufficient runways be provided to achieve 95 percent wind coverage. The 95 percent wind coverage 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 knot (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 of the critical aircraft, then a crosswind runway should be considered. The existing and future critical aircraft for the Crystal River Airport, as well as the ARC criteria is documented in the facility requirements chapter.

FAA Advisory Circular (AC) 150/5300-13, Change 11, "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 data is available from the National Oceanic and Atmosphere Administration's National Climatic Data Center, which officially records all aviation meteorological information. Wind coverage percentages should also take into account the different ceiling and visibility minimums associated with aircraft operations. Therefore data for all weather, visual flight rule (VFR), instrument flight rule (IFR), and below minimum conditions were analyzed.

Ten years of on-site wind data for the airport was not available. Therefore, it is recommended that data from the nearest airport or composite data from two airports be substituted. In selecting an alternate site, the surrounding airfields with ten years of data included the Leesburg Regional, Ocala International, and Tampa International Airports. Of the three, Ocala is the closest. While the previous wind analysis was conducted with data from Tampa International, this data was not used as the influence of Tampa Bay on winds is significantly different from the Crystal River area. However, Ocala is much further inland than Crystal River. Therefore, while the Ocala wind data was used, the six years of data available for the Hernando County Airport in Brooksville was also obtained. Located 25 nautical miles south, the Hernando County Airport has similar topography and proximity to the Gulf of Mexico as Crystal River.

Table 2-1
WIND COVERAGE ANALYSIS

	Crosswind Component	
	10.5 knots (12 mph)	**13 knots (15 mph)**
All Weather Conditions		
Runway 09-27	97.34%	98.57%
Runway 18-36	97.15%	98.58%
Combined	99.64%	99.91%
VFR Conditions (ceiling > 1,000 feet and visibility > 3 miles)		
Runway 09-27	97.30%	98.56%
Runway 18-36	96.99%	98.50%
Combined	99.63%	99.90%
IFR Conditions (ceiling 200 to 1,000 feet and visibility 0.5 to 3 miles)		
Runway 09-27	97.29%	98.43%
Runway 18-36	99.00%	99.53%
Combined	99.81%	99.95%

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

Calculations of wind coverage were made for the individual and combined runway orientations using the FAA's Airport Design software (version 4.2D). Only the 10.5 and 13 knot crosswind components were calculated, as aircraft in the higher wind groups are not expected to operate at the Crystal River Airport. Results showed that either runway alignment at Crystal River could

provide the required 95 percent crosswind coverage in either the 10.5 or 13 knot categories. As shown in **Table 2-1**, the combined coverage of the two runway system is even higher. The six years of data from Brooksville had nearly identical percentages for the individual Runway 09-27 and combined calculations, both of which varied by less than one half of a percent from the Ocala data used. The largest difference identified was on the individual Runway 18-36 calculations which in some cases varied by up to three percent; however, all were still above the recommended 95 percent.

HISTORIC DATA

A number of different sources were utilized to collect historic data related to activity at the airport. This included reviewing previous studies conducted for the airport, as well as FAA and state records for historic based aircraft and operations. **Appendix B** includes historic socioeconomic data for the Crystal River Airport area as well as future projected levels for several key economic indicators.

Previous Planning Documents

It is important to review previous planning documents completed for the airport to understand past planning efforts. Prior to this study an Airport Layout Plan (ALP) Update was conducted in 1999. Although this study primarily focused on revising the ALP drawing set, it also revisited some of the information contained in the last full Airport Master Plan, which was completed in 1990. These studies were utilized as informational documents during the preparation of this master plan. Each was reviewed for historic data and significant insight into past long-range planning efforts for the airport.

Historic Aircraft and Activity Counts

The historic number of based aircraft and operations at Crystal River Airport is essential to the development of forecasts for future aviation activity. This information, along with industry trends and socioeconomic factors, will be used to develop new activity forecasts.

Based Aircraft

A number of sources contain historic based aircraft information for the airport. These include the annual FAA Airport Master Record (Form 5010), FAA Terminal Area Forecast (TAF), and the Florida Aviation System Plan (FASP). For Crystal River, the FASP is the most complete and reliable source of data for based aircraft. The annual count is separated into the different types of aircraft based at the airport. These categories include single-engine, multi-engine, jet, rotorcraft, and glider. This aircraft fleet mix will help determine future airfield requirements for the airport. **Table 2-2** presents the total count of based aircraft over the past ten years that have been documented in the 2004 FASP. The figure for 2005 was obtained during the airfield inventory conducted for this study. Aircraft types are included in the aviation activity forecasts.

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 within sight of the airport. This generally covers an 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 Crystal River, the recorded operations are only estimates made by either FDOT during their annual inspection or by the management of the FBO. As with the based aircraft data, the estimates of operations documented in the FASP are considered the most reliable. The 2005 estimate was obtained during discussions with FBO management.

Table 2-2
HISTORIC BASED AIRCRAFT AND ACTIVITY COUNTS

	Based Aircraft	Annual Operations
1996	53	32,510
1997	57	28,238
1998	57	28,230
1999	55	28,638
2000	51	36,600
2001	51	36,600
2002	50	36,600
2003	48	36,000
2004	55	36,360
2005	47	37,720

Source: 2004 Florida Aviation System Plan.

AIRFIELD ENVIRONMENT

This section presents a description of the existing airside facilities at the airport. These will provide the basis for the airfield demand/capacity analysis and the determination of facility requirements to be presented in subsequent chapters. The airside 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.

Aircraft Movement Areas

The aircraft movement areas include those paved and 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 11, 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. Likewise, aircraft parking and storage facilities will be addressed in a subsequent section.

Runway 09-27

The primary runway, Runway 09-27, is 4,555 feet in length and 75 feet in width. The runway is of asphalt construction and while there are no declared weights published, the surface is considered to be in good condition after a visual inspection. In 2001, the original 4,296 foot length was overlaid with two inches of asphalt to ensure that the entire runway had a minimum surface course of four inches. During the project, the west or Runway 09 end was extended 132 feet and the east or Runway 27 end extended 127 feet. The pavement for the overlay and two extensions were all designed to accommodate aircraft up to 40,000 pounds, with a dual wheel landing gear configuration. For aircraft with a single wheel configuration, the weight limits would be less. However, until testing is conducted, the actual pavement strength is not known.

Runway 18-36

Runway 18-36 is a turf crosswind runway that has a published length of 2,665 feet and a width of 100 feet. The length and width is delineated using white markers placed every 200 feet along the sides of the landing area. Both ends of the turf runway have been displaced using green markers. At each end there are sets of three green markers centered on the white side markers. The Runway 18 threshold has been displaced 192 feet due to buildings while the Runway 36 threshold is displaced 820 feet due to trees. While the orientation of the two runways represents a capital letter T, the two do not intersect.

Taxiway A

Taxiway A is the full length parallel taxiway located on the north side of Runway 09-27. The taxiway is 30 feet wide and has two connector taxiways in addition to the two end connectors to Runway 09-27. As part of the Runway 09-27 improvements in 2001, a portion of Taxiway A was widened to provide a consistent width and the existing pavement was overlaid with two inches of asphalt. Like Runway 09-27, as-built drawings and the pavement design show the taxiway having the ability to support 40,000 pound aircraft (with a dual wheel landing configuration). A visual inspection of Taxiway A showed the pavement to be in good condition.

Taxiway B and Hangar Taxilanes

Taxiway B is the taxiway that links Taxiway A to the various aircraft hangar and parking areas of the airfield. The taxiway provides a minimum width of 30 feet. Its alignment is north/south between the west end of Taxiway A and the eastern edge of the paved aircraft parking aprons. There are four taxilanes of varying width running east off Taxiway B to link the hangars and FBO facilities to the airfield. The original strength of this pavement is not known, but was also designed to accommodate aircraft up to 40,000 pounds with a dual wheel configuration. Visual inspection shows the pavement

to be in good condition up to the first or southernmost taxilane. From this point the pavement is only considered to be in fair condition. The four taxilanes running off Taxiway B are also considered to be in fair to good condition.

Instrument Approaches

During times of inclement weather, instrument approaches allow pilots to safely land at an airport. 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 Crystal River

Currently, Crystal River Airport only has the most basic non-precision instrument approach. The VOR/DME or GPS-A circling non-precision approach published only provides horizontal guidance to the airfield. Such an approach offers very limited capability. A Very High Frequency Omnidirectional Radio Range (VOR) is a ground-based electronic navigation aid transmitting signals called radials. The VOR portion of Crystal River's approach is off a radial from the Ocala VOR, which is also equipped with

Distance Measuring Equipment (DME). DME allows pilots to determine their distances to or from the VOR as various radials are flown. The Ocala VOR is approximately 26 miles to the northeast of the Crystal River Airport.

The other portion of the non-precision instrument approach at Crystal River utilizes Global Positioning Satellites (GPS). GPS is a satellite-based navigation system that provides the position of any point on or above the Earth's surface. By analyzing the time delay of signals received from these satellites, air based receivers are able to determine latitude, longitude, and altitude. Unfortunately, the GPS portion of this approach is not a true stand alone GPS approach and requires a circling approach. This is actually one of the few remaining GPS overlay approaches in the U.S. that is not a stand alone approach. The GPS-A indicates that this approach does not qualify for a straight-in procedure which is primarily due to sub-standard airfield geometry. This will be addressed in the analysis of facility requirements for the airfield.

The current VOR/DME or GPS-A has a published minimum descent altitude of 711 feet above the touchdown zone elevation, which calculates to 720 feet above mean sea level. One statute mile visibility is required for Approach Category A aircraft, one and a quarter mile visibility for Approach Category B aircraft. 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 airfield lighting on the airfield enables Crystal River to accommodate aircraft operations at night. A majority of the airfield lighting is supported by equipment in the electric vault located just north of the Runway 09-27 midpoint.

Identification Lighting

An airport's rotating beacon universally indicates the location and presence of an airport at night or in adverse weather conditions. The rotating beacon tower at Crystal River is located next to the two above ground fuel tanks in the northwest corner of the airfield. 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 good condition, is continuously operated during nighttime hours and when the airfield is under instrument conditions.

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 09-27 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 122.725 MHz. The MIRL system consists of in pavement semi-flush mounted fixtures. Since there is no paved shoulder along the runway edge,

each fixture is installed on a concrete pad and located ten feet off the runway pavement edge. Each concrete pad measures seven feet wide by 13 feet long.

As part of the runway lighting system, the identification of the runway end (threshold), is of major importance to a pilot during landing and takeoff. Therefore, runway ends are equipped with special lighting to aid in the identification of the runway end. The ends of Runway 09-27 are identified with three standard inboard threshold lights on each side of the runway centerline. These threshold lights have a two-color (red/green) lens, placed across the edge of the runway pavement. When landing, the green half of the lens faces the approaching aircraft, indicating the beginning of the usable runway. The red half of the lens faces the aircraft on takeoff, indicating the end of the usable runway. As with the MIRL system, each semi-flush threshold light fixture has been installed on a concrete pad.

The runway lighting has been constructed using light cans with the cable placed in conduit and are considered to be in good to excellent condition. There are however other problems with the runway lighting systems that will be addressed in the facility requirements chapter of this study. A single 7.5 kilowatt regulator in the electrical vault powers the runway lighting circuit.

Taxiway Lighting

Taxiway A and a portion of Taxiway B are equipped with Medium Intensity Taxiway Lights (MITL). From the intersection with Taxiway A, there are only four sets of taxiway lights running north along Taxiway B to a point just south of the first hangar taxilane. As with the runway lights, the taxiway lighting systems have been installed using semi-flush fixtures constructed on concrete pads ten feet off the edge of the taxiway pavement. These concrete pads have the same dimensions as those used for the runway lighting. Each fixture includes a light can with the cable in conduit and all are considered to be in good to excellent condition. The taxiway lighting circuit is powered by a 10 kilowatt regulator located in the electrical vault.

Neither the apron edge nor any of the taxilanes to the hangar facilities have pavement edge lights.

Pavement Markings

Pavement markings delineate the various movement areas of the airfield. Runway 09-27 has designation numbers, centerline striping, and edge markings. Both ends of Runway 09-27 also have aiming point markers and threshold markings. 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.

All of the taxiways at Crystal River have visible centerline stripes with hold short lines located at the required locations. These markings ensure that taxing aircraft have the proper wingtip clearance and indicate the areas protected for runway operations. Taxiway A and its four connector taxiways also have taxiway edge markings to delineate the available taxiway width. For Taxiway B, edge markings only exist between the intersection with Taxiway A and a point

just south of the first hangar taxilane. The Taxiway B centerline stripe continues north to the last taxilane centerline stripe.

The four taxilanes that provide access to the aircraft hangars and parking aprons on the east side of Taxiway B only have centerline stripes. Markings on the main aircraft parking aprons, located just west of Taxiway B, are limited to those for the designated tiedown locations. All taxiway and taxilane markings are painted yellow, while the tiedown markings are painted white.

The runway and taxiway markings were last painted in 2001 as part of the overall airfield improvement project. Since that time, many of these markings have faded quite a bit and can be difficult to see in bright sunlight or wet conditions, both of which occur frequently. The same is true for a number of the tiedown markings, with the exception of the 2005 aircraft parking apron expansion. The four taxilane centerline stripes are in good condition and easier to see in all conditions.

Takeoff and Landing Aids

There are a number of different takeoff and landing aids at the Crystal River 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.

Wind Indicators

Perhaps the most basic takeoff and landing aid is the windsock, which indicates wind direction and speed. Currently, there are two internally illuminated windsocks, which are controlled by photocells. The main windsock is located just to the northwest of the intersection of the Runway 18-36 and extended Runway 09-27 centerline. This windsock is part of the airport's segmented circle. The segmented circle helps pilots identify the location of the windsock. The airport's segmented circle does not include landing strip or traffic pattern indicators as operations to all four runway ends are standard with left hand traffic. The second windsock is an illuminated supplemental windsock located left of the Runway 27 touchdown area.

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. The 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 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. A unidirectional REIL system is installed on the Runway 09 end. The Runway 27 end has an omnidirectional REIL system. This type of REIL system emits the white strobe light in 360 degrees around each of the two fixtures and is usually associated with a full Omnidirectional Approach Lighting System (ODALS). At Crystal River, the Runway 27 system is not considered a full ODALS as it does not include the five sequentially flashing approach lights that lead into the runway threshold.

Visual Glide Slope Indicators

There are a number of systems installed at airports to provide an indication of the aircrafts relationship to the visual glideslope. At Crystal River, Precision Approach Path Indicator (PAPI) systems have been installed on both ends of Runway 09-27. 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. Runway 09 has a 2-box PAPI system located on the left side while Runway 27 has a 2-box system installed on the right side of the runway.

Automated Weather Observing System

The airport has an Automated Weather Observing System (AWOS) located on the south side of the airfield. The AWOS reports the airfield altimeter setting, wind data, temperature, dew point, visibility, and cloud/ceiling data, as well as the time the data was collected. Pilots can receive this information on the assigned radio frequency (118.325 MHz) or through the dedicated telephone number (352) 563-6600. Currently the AWOS observations are not being collected by the National Weather Service due to equipment limitations.

Airfield Signage

As part of the airfield lighting system, the airport has four internally illuminated airfield signs. All are mandatory instruction signs which delineate to a pilot the limits of the Runway 09-27 environment. These signs are located on the left side of the four connector taxiways, adjacent to the runway holding position markers. The mandatory runway signs are all on the runway lighting circuit and considered to be in good condition.

There are also two metal signs along Taxiway B. The first indicates the AWOS frequency and is located on the right hand side of the taxiway as pilots approach the intersection with Taxiway A. The other is also on the right hand side of Taxiway B for aircraft taxing towards the aircraft parking and hangar areas. This sign, which is offset from the airfield, provides information for parking aircraft as well as airport security information.

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. Florida examples of airports with Class C airspace include the Orlando-Sanford International and Daytona 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).

Crystal River Airport Airspace

Regardless of the fact that Crystal River 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 frequency is used for communication between the aircraft operating to and from the airfield. Even the Class E controlled airspace designation does not have any specific operating rules, pilot requirements, or equipment requirements. The Class E airspace over the Crystal River Airport enables aircraft to transition between the airfield and the en route environment. In addition to the VOR/DME or GPS-A circling non-precision approach 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 en route navigation by linking VOR facilities.

The airport's approach profiles extend upward and outward starting 200 feet from the ends of Runway 09-27 and directly from the Runway 18-36 displaced thresholds. 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 (trees) or manmade (buildings), that should penetrate this sloping surface. The criteria for these approach profiles are dictated by guidelines set forth in the FAR Part 77. Requirements for the approach surfaces to each runway end at Crystal River will be addressed in the facility requirements chapter of this study.

Airspace Surrounding Crystal River Airport

The nearest public-use airports to Crystal River include the Dunnellon/Marion County and Park of Commerce Airport to the northeast, Inverness Airport to the east, and the Hernando County Airport to the south. All three are public use general aviation airports within 14 to 25 nautical miles. Thus, these airports are sufficiently distant from Crystal River so as not to affect aircraft operations. A privately owned, private-use airport, Post Oak Ranch Airport, located just under two nautical miles southeast of the Crystal River Airport, poses no operational conflict due to the relatively low level of aircraft activity at this facility.

There are a number of glider operations and aerobatic activity conducted in the airspace surrounding the Crystal River Airport. Two airspace boxes have been established in the surrounding airspace to support these operations. The first, intended for glider operations, is centered on the Runway 09-27 and Taxiway A centerlines, with a floor of 1,500 feet AMSL and a ceiling of 3,000 feet AMSL. The other is located approximately four nautical miles to the southwest and is intended for aerobatic activity. The aerobatic box is a three by two nautical mile area with a floor of 1,500 feet AMSL and a ceiling of 4,500 AMSL. As such, permanent Notices to Airman (NOTAMs) regarding these operations are included in various FAA publications, including the Jacksonville sectional aeronautical chart.

AIRPORT FACILITIES

A majority of the airport facilities at the Crystal River Airport are located on the northwest side of the airfield. This area generally includes the facilities located along the east side of Runway 18-36, between North Lindbergh Drive and Runway 09-27. All of the facilities in the northwest area are maintained and operated by the Crystal Aero Group, Inc., the only FBO on the airfield.

Hangar Facilities

Crystal Aero Group's main building is located just off North Lindbergh Drive. The 15,000 square foot facility serves as the main FBO hangar, as well as to provide office, classroom, and pilot/passenger terminal space. While the number may vary, typically two single-engine aircraft, one multi-engine aircraft, one rotorcraft, and one glider are regularly stored in the main FBO hangar. Currently there are 19 paved automobile parking spaces (18 regular and 1 handicap) in front of the main FBO hangar.

There are three additional hangar buildings just south of the FBO hangar. The two northernmost are shade hangars that are oriented in an east/west alignment with taxilanes on both sides. The first shade hangar is approximately 11,400 square feet and configured for taxi-thru parking. During the inventory, four large single-engine and two multi-engine aircraft were stored in the taxi-thru shade hangar. The second shade hangar provides approximately 12,800 square feet of covered space and provides a nested "t" parking configuration. Twelve single-engine aircraft are stored under this shade hangar.

A 7,800 square foot clearspan hangar is located just south of the two shade hangars. Currently this facility provides storage for two single-engine, one multi-engine, and one jet aircraft. All of the hangars described in this section are well maintained by the FBO and County and should serve the tenants for a number of years.

Aircraft Parking Aprons

Between the main FBO hangar and the northernmost shade hangar, there is approximately 45,000 square feet of paved apron area. Because this pavement is situated between the hangars and adjacent to the fuel tanks, it is not available for any long term storage of aircraft. In fact, a majority of the pavement in this area is considered a movement area. Visual inspection of this pavement shows it to be in fair to good condition. It is also the area where the fuel storage trucks are staged and includes a carport with space for five automobiles, adjacent to the main FBO hangar. These automobile spaces are used by the owners and management of the FBO.

Between Runway 18-36 and the various hangar buildings, there is a long, but narrow aircraft parking apron. The older portion of this apron has an average width of 124 feet, excluding the apron edge taxiway, Taxiway B, and extends north/south approximately 875 feet.

The northern end of the older aircraft parking apron is used primarily for the parking of Crystal Aero Group's training aircraft fleet. During the field inventory, all 12 of the parking spots located on this end of the ramp were occupied by single-engine aircraft. Cables running east/west are used to tie the aircraft down in three rows of four aircraft, with very limited space in between.

The north end also provides an area where aircraft reaching the end of Taxiway B can turn around. This end of the apron area also has pavement which ties it into the paved automobile parking lot of the main FBO building. Vehicular access to and from the aircraft parking is controlled by a swing arm gate.

The south portion of the older aircraft parking apron (now the middle) is utilized for both based and itinerant aircraft parking. This portion of the apron utilizes cables for the tiedown of aircraft. There are four sets of cables running north/south. The three cables in the middle can accommodate 25 single-engine aircraft in a nested configuration. The northern most 12 spaces are used for based aircraft, which included six single-engine and two multi-engine aircraft during the inventory. The remaining 13 spaces are used by transient aircraft. The fourth cable, located on the west side of the ramp, is no longer used for tiedowns due to its proximity to Runway 18-36.

In late 2005, this apron was extended to the south by approximately 385 feet. The north half of the new apron is also approximately 124 feet wide. This width increases to the south, following the slight southeast alignment of Taxiway B. The apron expansion also included an extension of the nested aircraft parking described above. However, instead of using a cable system, the new ramp provides tiedown anchors for up to 29 additional single-engine aircraft. It is envisioned that this area will primarily be used for transient and/or overflow aircraft parking.

In all, the current aircraft parking apron provides approximately 164,000 square feet of space. The northern portion of the older apron is in fair shape, but has some depressions. This is evident any time it rains as water will pond significantly. The middle portion of the apron is also in fair shape. While ponding also occurs in this area after significant rain, it does not pond as much as the north portion. The southernmost portion is in excellent condition as it was constructed in late 2005.

Aviation Fuel Storage

To the east of the terminal are two above ground aviation fuel storage tanks. Both tanks hold 12,500 gallons (one for 100LL Avgas and the other Jet A fuel) and have double wall construction. These tanks became operational in August 1993 and are owned by the Crystal Aero Group. To conduct aircraft fueling, the Crystal Aero Group also owns and operates two fuel trucks. One truck holds 1,200 gallons of Avgas and the other 2,000 gallons of Jet A. Both fuel storage tanks and both fuel trucks are in excellent condition.

Airfield Security Fencing

The active airfield at Crystal River is enclosed with security fencing. For the most part, this fencing follows the airport property boundary. One of the two exceptions include the area leased to the Florida Army National Guard on the southwest side of the field, which has its own system of security fencing, commensurate with the airfield fencing. The other area is the approximate 21 acre tract of land located east of North Golf Course Lane. This land, while owned by the airport, has no fencing, is vacant, and utilized to protect the approach to Runway 27.

As recommended by the FAA, FDOT, and Transportation Security Administration (TSA), the security fencing at Crystal River consists of six foot high chain link fence with three strands of barb wire on top. There are three electric gates: a 24 foot roll gate at the entrance to the FBO automobile parking lot, a swing arm gate at the entrance to the aircraft parking apron, and another 24 foot roll gate on the extension to North Lindbergh Drive by Bicentennial Park. Access through each electric gate is provided either through use of an access card or remote control. The swing arm gate has the option to call the FBO to open the gate. Each of these three gates are equipped with Siren Operated Sensors (SOS) systems which allow Citrus County Fire, Sheriff, and EMS Services to activate the gate opener by use of their vehicular sirens.

There are two pedestrian gates located on the north side of the airfield. Through a changeable combination lock, these provide access to and from the aircraft parking areas as well as the FBO building. The perimeter fencing also includes a number of other locked roll gates, which do not have an electric opening system. These gates are located all around the perimeter and provide access for maintenance or other uses. Most of these gates are not used very often.

All of the airfield security fencing and gates at Crystal River are considered to be in excellent condition. An FAA security grant in late 2005 was utilized by the County to repair, remove substandard fencing, install new fencing, install new gates, and to install new gate operating systems. The project also included clearing ten feet on each side of the entire perimeter fencing to provide the suggested clear area.

Aviation Services

As a full service FBO, the Crystal Aero Group offers Citrus County and the surrounding communities with several aviation services. The FBO provides long storage, short term parking, and dispenses both Avgas and Jet A aviation fuels. In addition, on-site mechanics can perform both airframe and power plant repairs on various aircraft, including an on-site aircraft inspector.

Flight training is another specialty of the Crystal Aero Group. They operate one of the few facilities in Florida that can offer flight training for all ratings from private pilot to airline transport pilot. These services include an on-site test center as well as two FAA Designated Pilot Examiners on staff. Flight training by the Crystal Aero Group also includes assistance with many special programs. They offer Veteran Affairs (VA) training for those veterans eligible as well as immigration services for those foreign students wishing to obtain a temporary VISA to pursue their flight training in the U.S.

Air taxi and air charter service is also offered throughout the southeast U.S. by the Crystal Aero Group. A high performance single-engine Beech Bonanza and multi-engine Cessna 310 are available for such flights. It is important to note a number of other services provided by the Crystal Aero Group. These include:

- Fire detection and surveillance flights for the Florida Division of Forestry.
- Manatee and eagle surveys for the U.S. Fish and Wildlife Service.
- Photo and sightseeing flights.
- Aerial advertising – banner towing.

- Private pilot training program awarded to one Citrus County high school student each year (John E. Kirk Aviation Scholarship).

Finally, because of the facilities managed by the Crystal Aero Group, the airport is able to support the following services for all of Citrus County and the surrounding communities.

- Base for local U.S. Coast Guard Auxiliary flights.
- Support for both U.S. Coast Guard and U.S. Air Force search and rescue flights.
- Air ambulance support (transfer of patients, organ transplants, and fueling).
- Angel Flights – free transportation for seriously ill individuals needing transportation to treatment facilities.
- Citrus County Sheriff's Aviation Unit.
- Citrus County Mosquito Control District.

Florida Army National Guard

On the southwest side of the airfield, the Florida Army National Guard has leased 18 acres of airport land from Citrus County. This facility includes a number of buildings and storage areas as well as their own automobile parking off West Venable Street. While on airport property, the airfield's security fencing separates the Florida Army National Guard's leasehold from the active airfield environment. At this time the Florida Army National Guard does not operate any aeronautical activities out of this area and therefore does not require airfield access.

AIRPORT INFRASTRUCTURE

A number of the proposed developments in this study will require extensions of the electric power, water, and wastewater utilities. The utility locations and sizes in this section were determined from past planning studies and from information provided by the utility providers. It should be noted that this information focuses on main utility lines rather than on every service line. Therefore, prior to any development at the airport, detailed utility drawings should be obtained. A review of this information showed that there are very limited utilities currently available on airport property.

Electric Power

All of the electric power for airport facilities comes off the main lines located along US 19/98. These overhead lines run along the west side of the highway, which provides additional vertical clearance for the approach to Runway 09. On the northwest portion of the airfield, the main FBO hangar, fuel tanks, rotating beacon, shade hangars, and clearspan hangar all have electric service via overhead lines off North Lindbergh Drive. Overhead service along the extension of North Lindbergh Drive also provides power to the security access gate just south of Bicentennial Park.

On the south side, power to the Florida Army National Guard facilities and the AWOS weather station is via underground service from the lines that run along West Venable Street. The electrical service along West Venable Street is underground from US 19/98 to a pole in front of the Florida Army National Guard. This provides vertical clearance for the approach to Runway

36. Progress Energy operates an electric substation on West Venable Street just across from the Florida Army National Guard facilities.

To the southeast of the airport, overhead power lines along West Venable Street provide service to the homes off West Seven Rivers Drive and North Golf Course Lane. These lines run north to also provide service to the homes surrounding the Seven Rivers Golf and County Club. However, these lines go underground and resurface on the north side of the airfield. This provides clearance to the Runway 27 approach surface on the east side of the airfield.

The airport has one electrical vault that distributes power to the two airfield lighting circuits described previously. The vault is a 12 foot by 12 foot enclosure located on the north side of the airfield, just northeast of the Runway 09-27 midpoint. As described previously, the vault houses a 7.5 kilowatt regulator for the runway circuit and a 10 kilowatt regulator for the taxiway circuit. Both regulators are considered to be in excellent condition. The enclosure also 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 control of the airfield lighting, including the antenna and photocell required for pilot control. Power to the electrical vault is via an underground drop from the overhead service in Bicentennial Park. Plans for the improvements made in 2001 show this service to be 120/240 volts, single phase.

This existing electric power infrastructure meets the current needs and it is reported to have the capacity to accommodate future developments; however, this should be verified during the design of any future developments. This electric service is provided by Progress Energy.

Water

Only the main FBO building and Florida Army National Guard facilities currently have water service. The other buildings, including the shade hangars, clearspan hangar, and electrical vault do not have water service. In the case of the clearspan hangar, this limits its use to a storage only facility. Water to the main FBO building is provided by a one-inch line that runs off the eight-inch water main along the east side of US 19/98. A two inch line comes off the 12 inch water main that runs along West Venable Street to supply the National Guard facilities. This 12 inch main runs along West Venable Street to West Seven Rivers Drive. There is also a six-inch main that runs along North Golf Course Lane ending at West Flight Path Court. The six-inch main also extends down West Flight Path Court.

Wastewater

As with water, only the main FBO building and Florida Army National Guard facilities have wastewater systems. Likewise, the lack of any wastewater system for the clearspan hangar limits its use to storage of aircraft only. A small pump station is located just outside of the Crystal Aero Group facilities. A three-inch line ties the main FBO building into the six-inch sanitary sewer force main that runs along the east side of US 19/98. Wastewater from the Florida National Guard Facilities is tied into the same force main along US 19/98. The size and location of this line was not determined.

CONCLUSION

The above descriptions do not provide an exhaustive account for every specific detail and facet of the Crystal River Airport. The purpose of this inventory was to provide general facility data for subsequent analyses. For example, the forecasting chapter will apply various methodologies to the historic data of this study, to project the based aircraft and operational activity.