



Chapter Three – Forecast of Aviation Activity

AVIATION ACTIVITY FORECASTS

This chapter establishes the forecast levels of aviation activity that will be used as a basis for analysis in successive chapters of this study. Aviation activity forecasts provide the benchmark against which the adequacy of existing airport facilities are evaluated. These forecasts will replace the projections presented in the 1996 Master Plan Update. To adequately identify the future needs of the airport, a number of projections are necessary. In this chapter, the following elements are analyzed and subsequent projections prepared.

Based Aircraft

- Single-Engine
- Multi-Engine (piston and turboprop)
- Jet
- Rotorcraft

Aircraft Operations

- Annual Activity
- Local/Itinerant Split
- Fleet Mix

Peak Activity

- Peak Month
- Average Day Peak Month
- Peak Hour (of the Average Day Peak Month)

The standard planning period for an airport master plan is twenty years. Thus, the forecasts for TIX are presented for the years 2007, 2012, and 2022. The development of forecasts in this chapter also includes analyses of historical data from the Federal Aviation Administration (FAA), the Florida Department of Transportation (FDOT), and socioeconomic data from the State of Florida. This data has been supplemented by information obtained during interviews with airport management, air traffic control managers, tenants, and users.

The forecast for TIX will optimize two methods of forecasting: historic projections and trend analysis. Historic projections base future levels on growth rates previously attained. Trend or regression analysis is a widely used method of forecasting which optimizes the use of dependent and independent variables. The results of these methods will be compared to existing forecasts, with the most practicable being selected for use in this master plan.

Previous Aviation Activity Forecasts

In the recent past, three separate aviation activity forecasts have been prepared for the airport. These studies include the 1996 Master Plan Update, the FAA's Terminal Area Forecast, and the Florida Aviation System Plan. Although new forecasts are generated as part of this Master Plan Update, data contained in previous studies typically proves valuable for comparison purposes. This data was utilized as necessary to supplement the analysis of this study.



1996 Master Plan Update

The last planning document conducted specifically for the Airport was a Master Plan Update, which was completed in 1996. As with this update, the previous master plan included forecasts, which were projected out for a twenty-year planning period. The number of based aircraft and total annual operations projected are shown in **Table 3-1**. Although the forecast of this study will replace these figures, they have been included to compare the outlook for the airport in 1996 with that of today.

TABLE 3-1 1996 MASTER PLAN FORECASTS		
Year	Based Aircraft	Annual Operations
<i>Base Year</i>		
1992	150	129,532
<i>Forecast</i>		
1998	189	150,324
2003	201	162,990
2008	214	176,462
2013	227	189,740
<i>Extrapolated by LPA</i>		
2022	271	223,464

Source: 1996 Master Plan Update

Based on the forecasts reflected above, based aircraft for TIX were projected to increase at an average annual growth rate of 2.0 percent. Annual operations were projected to increase at an average annual rate of 1.8 percent. When compared to the 190 aircraft based at TIX in 2001, the forecasts from the previous Master Plan are less aggressive than historic growth. Similarly, annual aircraft operations were expected to reach 189,740 in 2013, when the levels recorded by the air traffic control tower (ATCT) for 2001 had already exceeded that projection, with 194,736 total operations.

FAA Terminal Area Forecasts

Terminal Area Forecasts (TAF) are prepared by the FAA to meet the planning needs of their offices concerned with future traffic levels at the nation’s airport facilities. Except for specific regional or state requests, the airports included in the FAA’s TAF report must meet at least one of the following criteria:

- Have an existing FAA tower.
- Have an existing FAA Contract tower.
- Candidate for a FAA tower.
- Currently receiving or expected to receive scheduled air carrier or regional/commuter service.
- Currently exceed 60,000 itinerant or 100,000 total aircraft operations.
- Reported 10 or more based aircraft on the latest available Airport Master Record (FAA 5010 Form).

Forecasts in the FAA TAF are calculated using a number of methods. Typically projections are calculated using regression analysis with various national economic indicators as the independent variables. **Table 3-2** depicts the figures contained in the 2001 TAF for TIX.



TABLE 3-2 2001 FAA TERMINAL AREA FORECAST		
Year	Based Aircraft	Annual Operations
<i>Base Year</i>		
2000	229	126,191
<i>Forecast</i>		
2005	245	132,250
2010	262	140,623
2015	281	148,996
<i>Extrapolated by LPA</i>		
2022	309	161,006

Source: 2001 FAA Terminal Area Forecast

The 2001 FAA TAF projected an average annual growth rate of 1.4 and 1.1 percent for based aircraft and annual operations, respectively. The 2000 level of based aircraft exceeds the airport’s 2001 count of 190 based aircraft. Conversely, the annual operations recorded for 2000 in the TAF does not appear to account for the start of Helicopter Adventures that year. Operation levels for 2001 at TIX were recorded by the ATCT as 194,736. This significant difference in operations is discussed in more detail in the section entitled, “Issues Pertaining to Historic Aircraft Operations.”

Florida Aviation System Plan

The Florida Aviation System Plan (FASP) is a broad blueprint that guides 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 activity forecasts for all of the public airports in the state.

The latest version of the FASP (2001-2021) was based on data collected up to and including 2000. Annual operations for the general aviation airports in the 2000 FASP were projected by creating a ratio of total annual operations to the total number of based aircraft. For based aircraft, the annual growth rate between 1989 and 2000 was averaged with the annual growth rate between 1995 and 2000. The overall average annual growth rate was then applied to the base year to develop the forecast of based aircraft. The projection of based aircraft and annual operations contained in the 2000 FASP for TIX are shown in **Table 3-3**.



TABLE 3-3 2000 FLORIDA AVIATION SYSTEM PLAN		
Year	Based Aircraft	Annual Operations
<i>Base Year</i>		
2000	229	149,110
<i>Forecast</i>		
2006	258	172,344
2011	285	194,655
2021	347	247,758
<i>Extrapolated by LPA</i>		
2022	354	253,822

Source: 2000 Florida Aviation System Plan

Overall, the 2000 FASP projects an average annual growth rate of 2.0 percent for based aircraft and 2.4 percent for annual operations. As with the TAF forecasts, the FASP figures exceed the current level of based aircraft and do not appear to account for Helicopter Adventures operations. The impact of Helicopter Adventures is described in the section entitled, “Historic Based Aircraft and Annual Operations.” It should be noted that at the time of this writing, the 2000 FASP numbers had not officially been adopted by FDOT.

FORECASTING APPROACH

Two of the primary considerations that can influence activity forecasts at an airport include historical trends and industry trends. By tracing historic trends, it is possible to determine the impact that economic fluctuations, as well as changes in the industry have had on activity at the airport. Likewise, applying recent or anticipated industry trends can allow educated assumptions to be made as to how TIX’s activity is affected in the future. These considerations play a key role in the forecast of based aircraft and annual operations.

In addition, assumptions were made with respect to how aviation activity may change in the future based on trends emerging in the aviation industry. Along these lines, many different factors were considered which may influence the course in which activity at an airport develops. This included evaluating TIX’s role in Florida’s aviation transportation network. Specifically, issues such as the airport’s proximity to the launch facilities of NASA and Canaveral Air Force Station; general aviation training activity (especially as it relates to Helicopter Adventures); and the industrial/business development on and surrounding TIX were taken into consideration. The primary goal of the analysis was to develop an approach that gives reasonable attention to these factors while at the same time providing a rational basis on which to base the forecast selection.

Another key element in the forecast process is the identification of local trends that enhance the potential for additional activity, as well as the potential for the airport to attract new tenants and users. In developing the forecasts for TIX, historic and projected demographics of the region were analyzed to identify potential factors that could impact the level or type of aviation activity. Area trends associated with these demographics were documented in the previous chapter. The demographic data was derived from the 2001 edition of the Florida Long-term Economic Forecasts, prepared by the University of Florida’s Bureau of Economic and Business Research. This data was used to develop the series of linear and multiple regression analyses.



Historic Based Aircraft and Annual Operations

TIX has served general aviation since 1947, when the federal government dedicated the prior auxiliary Naval Air Station to the cities of Titusville and Cocoa. According to the interviews and surveys conducted, the types of aircraft based at the airport have included both single and multi-engine (piston and turboprop); a varied mix of corporate/business jet aircraft (with the occasional charter or air cargo jet); and, more recently, a number of rotorcraft. While on occasion there have been other types of operations, such as military aircraft and warbird operations, which are limited. In the late 1960’s, Eastern Airlines provided regularly scheduled services, which only lasted for a short time. **Table 3-4** represents the historical level of based aircraft and annual operations recorded for the airport, through the year 2001.

TABLE 3-4 HISTORIC BASED AIRCRAFT AND AIRCRAFT OPERATIONS		
Year	Based Aircraft	Annual Operations
1992	152	129,532
1993	152	129,532
1994	163	108,252
1995	163	95,312
1996	180	114,626
1997	180	116,246
1998	180	111,545
1999	229	120,152
2000	229	132,790
2001	190	194,736

Source: FAA Airport Master Record, Terminal Area Forecast, and Air Traffic Control Tower records.

Over the past 10 years, based aircraft at TIX have increased at an average annual rate of 2.5 percent, while annual operations have increased at an average annual rate of 4.6 percent over the same period. Much of the increase in operations at TIX is attributed to the start up of Helicopter Adventures in 2000. As mentioned before, Helicopter Adventures is currently the largest civilian helicopter training school in the world. The impact of their current 21 helicopter fleet can be seen in the difference between the operations recorded by the control tower for 2001 versus 2000.

Industry Trends and Impacts of September 11th

Decreases in general aviation activity were experienced across the nation in the late 1980’s and early 1990’s due to significant increases in the cost of owning a general aviation aircraft. A large part of this cost 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 nearly every manufacturer of general aviation piston 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 optimism for the general aviation market, which led to a recovery in the industry.

After passage of the General Aviation Revitalization Act, two of the largest manufacturers of small aircraft resumed production in the general aviation market. The Cessna Aircraft Corporation re-entered the single-engine piston aircraft market for the first time since 1986. Also, the New Piper Aircraft Corporation emerged from Chapter 11 bankruptcy protection to restart and increase its production schedule. Other aircraft manufacturers and aviation suppliers also began hiring and expanding their production.

Overall, revitalization of the industry has had a positive effect on the number of active general aviation aircraft and the operations these aircraft conduct in the U.S. This was significantly facilitated by the strong economic cycle of the mid to late 1990s. However, rising fuel costs and a gradual slowdown of the economy resulted in decreases in the nation's general aviation activity between 2000 and 2001. As documented in the 2002 FAA Aerospace Forecasts, activity at U.S. airports with FAA and contract traffic control services had declined slightly even before the terrorist attacks of September 11th. As reflected in **Table 3-4**, the level of operations at TIX did not experience this national decline. Much of this had to do with the commencing of operations by Helicopter Adventures. Industry analysts predict general aviation activity for the nation to recover. This expectation is embodied in the FAA's forecasts for general aviation activity. The 2002 FAA Aerospace Forecasts state:

“The decline in general aviation activity, which started in late 2000 and continued through 2001, was exacerbated by the events following the terrorist attacks of September 11th. General aviation activity is expected to continue to experience slight declines in calendar year 2002; then it will return to more normal growth patterns beginning in 2003-04 as the U.S. economy reaches the peak of its recovery.”

As documented, TIX never experienced a decline in activity during this period. Therefore, a basic assumption of this forecast analysis is that the number of airplanes and the level of activity at TIX will not decline with the nation through 2002. Rather, it will be one of the leading general aviation facilities during the industry's recovery. Similarly, the 2002 FAA Aerospace Forecasts predicts that the number of active aircraft in the U.S. will decline through 2003 and then increase during the rest of the forecast period. While historic numbers show a decrease in the number of based aircraft at TIX from 2000 to 2001, this has nothing to do with the unfortunate events of September 11th.

FORECAST OF BASED AIRCRAFT

The forecast of based aircraft at a general aviation airport is necessary to properly plan the appropriate aircraft parking and hangar facilities required. Projections of based aircraft also provide a significant indication as to anticipated growth in activity that is expected to occur at the airport. For TIX, growth in the number of based aircraft is expected to occur during the planning period. Three new projections for the anticipated number of based aircraft were generated.

Projection of Based Aircraft using Historic Growth

The first projection extrapolated the 2001 level of based aircraft utilizing the historic growth rate for the Airport. **Table 3-4** showed that over the past ten years, the airport experienced an average annual growth of 2.5 percent. Applying the 2.5 percent average annual growth rate to the 2001 based aircraft level of 190 would result in a total of 320 based aircraft by the year 2022. These numbers are reflected in **Table 3-5** and illustrated in **Exhibit 3-1**.

Projection of Based Aircraft using National Forecasts

The second forecast of based aircraft for TIX applies the national forecast for the number of active general aviation aircraft anticipated in the U.S. This data was obtained from the 2002 FAA Aerospace Forecasts, which defines an active aircraft as any aircraft flying at least one hour during the year. In the FAA's forecasts, the number of active general aviation aircraft in the nation are expected to decrease through 2003 by approximately 3,600 aircraft. The forecasts then project the active fleet increasing through 2013 at an annual growth of 0.5



percent. This was applied to the 2001 number of based aircraft at TIX. This resulted in a total of 211 based aircraft expected at TIX by 2022. **Table 3-5** and **Exhibit 3-1** reflect this projection.

Projection of Based Aircraft using Regression Analysis

Initially, both linear and multiple regression models were generated to provide projections of based aircraft. Individual and combined groups of socioeconomic data for the region were compared to historic based aircraft levels in an effort to identify any possible relationships or correlations between such things as population, income, or employment growth. This approach is consistent with that employed in aviation planning studies around the nation. Basically, it is assumed that the tendency for people to utilize general aviation aircraft (business or pleasure) is related to variables such as a market area’s population, income, employment, and/or construction indicators, as they provide a gauge for growth. The corresponding assumptions follow:

- Population was included based on the assumption that the number of aircraft within a region are inherently related to the number of people introduced into the same area served by the airport.
- Income data was utilized because the use of general aviation has a median level of expense. In other words, it is believed that more people will use general aviation as their income levels increase.
- Employment data was included as it is considered to indicate the relative growth and/or stability of an airport region’s economy.
- As with employment data, various construction indicators (such as housing starts or business licenses) also provide an indication of an area’s economic vitality.

A variety of projections were made employing various combinations of the specific socioeconomic data sets presented in the Inventory – Chapter 2. Most of these models resulted in somewhat low statistical correlation values; however, a few did provide higher correlations. One of the more significant correlations indicated that a relationship existed between the level of based aircraft and the independent variables of per capita income and real taxable sales for Brevard County. As such, this multiple regression analysis was utilized to create the third projection of based aircraft for the planning period. This forecast is included in **Table 3-5** and shown graphically in **Exhibit 3-1**.

TABLE 3-5 PROJECTIONS OF BASED AIRCRAFT			
Year	Historic Growth	National Growth	Regression Analysis
2007	220	196	233
2012	250	201	264
2022	320	211	334
Average Annual Growth Rate	2.5%	0.5%	2.7%

Source: THE LPA GROUP INCORPORATED, 2003.

Selected Based Aircraft Forecast

In selecting the forecast of based aircraft for TIX, all three of the above projections were carefully considered. The historic growth provides a good estimate based on that which was experienced over the past ten years. Also, the calculation of the historic average annual growth eliminates the unverified peaks in based aircraft that were recorded for 1999 and 2000. Conversely, applying the anticipated national growth to the historic count provides a much more conservative projection for the planning period. As seen in **Table 3-5**, the historic average annual growth rate of 2.5 percent results in 320 based aircraft for 2022, whereas the application of the 0.5 percent



national rate only generates 211 based aircraft by 2022. While the national growth has some merit, the airport has traditionally exceeded those trends, and is fully expected to obtain more than 21 based aircraft during the planning period. Finally, the regression analysis incorporated variables representative of local trends into the forecast process, which resulted in a projection slightly higher than the historic growth model.

While the historic growth and regression analysis are considered valid, the fact that the national trend is so much lower needs to be considered. Although TIX has traditionally exceeded the national average and is anticipated to continue, it is believed that for based aircraft, this level will be slightly reduced in the future. Therefore an average of the three projections was calculated in an attempt to temper the local trends with those anticipated for the nation. These averages are included in **Table 3-6**. In addition to the average calculation, an adjustment was necessary based on changes that are currently in process at the airport. The first includes the construction of a new t-hangar building which will have 14 stalls. Based on the current t-hangar waiting list, approximately 65 of the 80 people listed do not currently keep their aircraft at TIX. Therefore it is safe to assume that this additional capacity on the airfield will generate 14 new based aircraft at the airport in the next couple of years. The second adjustment was made to incorporate the short term expansion plans for Helicopter Adventures. Interviews with their management indicated that they planned on having 9 or 10 additional based helicopters by the year 2007. Because none of the forecast methodologies could have considered these increases, the average of the three projections was increased by 24 based aircraft. This adjusted average is the selected based aircraft forecast for the planning period.

TABLE 3-6 SELECTED BASED AIRCRAFT FORECAST		
Year	Average of Projections	Adjusted and Selected Based Aircraft Forecast
2007	216	240
2012	238	262
2022	288	312

Source: THE LPA GROUP INCORPORATED, 2003.

The selected based aircraft forecast for TIX results in an average annual growth rate of 2.4 percent during the planning period. It should be noted that the number of based aircraft for each planning year, included in **Table 3-6**, is within 10 percent of the FAA’s TAF projections.



*****Insert Exhibit 3-1 (Projections of Based Aircraft)*****



Projected Based Aircraft Fleet Mix

Besides projecting the total number of based aircraft, it is important to project the fleet mix of those aircraft. A breakdown of the based aircraft fleet mix is necessary because different types of aircraft require different facilities. For example, jet aircraft normally need larger hangars, greater wing-tip clearances, and have different fuel requirements than single-engine aircraft. Typically, the future based aircraft fleet mix is determined by studying the historic fleet mix; however, projections for the future fleet mix of the nation were also examined.

Every year, the nation’s active general aviation fleet is published as part of the FAA’s forecasts. According to this data, nearly all of the aircraft types in the nation have continued to experience annual growth. According to the 2002 FAA Aerospace Forecasts, the current breakdown of nation’s active fleet includes: single-engine at 81.2 percent, multi-engine (piston and turboprop) at 12.3 percent, jet aircraft at 3.2 percent, and rotorcraft at 3.3 percent.

Up until the past few years, the based aircraft and operations at TIX have primarily been single and multi-engine aircraft. While jet aircraft have always used the airport on a regular basis, the most recent change in the type of based aircraft and activity revolves around Helicopter Adventures. Their activity and fleet size will continue to grow as interviews with Helicopter Adventures revealed plans for an additional 9 or 10 helicopters by 2007. This was applied to the current fleet mix to estimate the percentage of rotorcraft in 2007. Additional helicopter increases through the planning period were limited to only a few more as it was stated that a fleet of 30 helicopters for the school would approach saturation for this type of operation at the Airport. The projection of the nation’s forecast of active general aviation fleet mix was applied to project the mix between single-engine, multi-engine, and jet aircraft. Overall, it is projected that the future mix of based aircraft at TIX will remain primarily single and multi-engine aircraft with a significant increase in the number of based jets. These figures are presented in **Table 3-7**.

TABLE 3-7 PROJECTED BASED AIRCRAFT FLEET MIX									
Year	Single-Engine		Multi-Engine		Jet		Rotorcraft		Total Aircraft
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	
<i>Base Year</i>									
2001	133	70.1%	28	14.7%	5	2.6%	24	12.6%	190
<i>Forecast</i>									
2007	167	69.4%	34	14.2%	6	2.6%	33	13.8%	240
2012	181	69.1%	38	14.5%	9	3.4%	34	13.0%	262
2022	215	68.9%	47	15.1%	14	4.5%	36	11.5%	312

Source: THE LPA GROUP INCORPORATED, 2003.



FORECAST OF AIRCRAFT OPERATIONS

Many elements of aviation make up the broad definition of general aviation activity. General aviation includes all segments of the aviation industry except for those conducted by commercial air carriers. Its activities include the training of new pilots, sightseeing, aerial photography, law enforcement, and medical flights, as well as business, corporate, and personal travel. 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, that do not remain in the airport traffic pattern or within a 20 nautical mile radius.

At TIX, flight training activities make up the vast majority of the local operations at the airport. This would include student pilots who are getting started in aviation, pilots continuing training for additional ratings, and pilots conducting the recurrent training required of their rating. The FAA defines an operation as either a single aircraft landing or takeoff. Under this definition, an aircraft touch-and-go is considered two operations and are considered local operations. Itinerant general aviation operations are typically comprised of private flight activity, business and corporate activity, air taxi operations, and may also include operations by law enforcement and medical flights. Discussions on the anticipated local/itinerant split and operational fleet mix are included in the section entitled, "Types of Aircraft Operations." In addition, this section also provides additional detail to the jet aircraft activity and instrument operations conducted.

Issues Pertaining to Historic Aircraft Operations

There are two issues associated with the historic annual activity counts for TIX that need to be addressed before future projections can be made. The first is that the activity data recorded by the ATCT for 2001, see **Table 3-4**, is already well above the 2001 FAA TAF. When evaluating new forecasts of aviation activity, the FAA will generally use a range of 10 percent above or 10 percent below the TAF figures as the first assessment of their forecast review. Currently the 2001 numbers from the ATCT are already 55.1 percent above the TAF figure for the same year. In fact, the number of operations recorded at TIX in 2001 is already 20.9 percent greater than the TAF projection for 2022, the end of the planning period. The reason behind this is that the last historic year for the TAF (2000) was the same year that Helicopter Adventures started their operation at the Airport. As can be seen in the historic data, the airport experienced a significant increase in operations between 2000 and 2001. Much of this increase is attributed to the flight training conducted by Helicopter Adventures.

The second issue of concern is that the historic ATCT figures do not include any counts for night operations. Up to this point all of the discussions about the activity at the airport have been based on those operations recorded by the ATCT. However, this is a bit of a misnomer as a significant number of operations do occur after the ATCT closes, and some before the facility opens. Discussions with ATCT management, the operators of Helicopter Adventures, the managers for the various FBOs, and staff of the Aviation Authority confirmed that a significant number of operations occur when the ATCT is closed. The general consensus from those interviewed indicated that most of these operations occur immediately after the tower closes in the 9:00 p.m. to 10:00 p.m. hour, but also continue up to midnight. This is especially true in the summer months when pilots have to fly later in the evening to obtain their night training and currency requirements. For Helicopter Adventures, they focus a majority of their night operations each week on Tuesday and Thursday nights.

In addition, it was noted numerous times in the various interviews, that some of the State's largest fixed wing flight schools also utilize TIX at night for training. These include single and multi-engine aircraft from Embry Riddle Aeronautical University, out of Daytona Beach International Airport, The Delta Connection Academy out



of Orlando-Sanford International Airport, , and Florida Tech, out of Melbourne International Airport. Each of these flight schools are located within 40 nautical miles of TIX. There are numerous other flight schools found at surrounding airports that utilize TIX for training due to their control tower and instrument approaches. It is a safe assumption that these operations occur because the airspace over TIX is a lot less congested than the airports from which these aircraft originate. The airport and the FAA have been occasionally analyzing the traffic counts before and after the hours of operation for the control tower to see if the hours of operation at the facility should be expanded.

Estimation of Night Operations

An estimate for the number of night operations was calculated to determine the level of operations conducted at TIX when the ATCT is closed. This estimation was based on the following reasoning. The current hours of operation for the ATCT provide a total of 14 hours per day, seven days a week. This translates into 98 hours per week. In the past, these hours were slightly less on the weekends (10 hours per day). The hours were increased in 1999 due to increases in the operations conducted after hours on the weekends. Thus, prior to 1999 the tower was open 90 hours per week. These weekly hours of operation were applied to the respective years of historic activity counts received from ATCT (1996 to 2001). When calculated out, this resulted in an average of 27 operations per hour over the past 6 years.

From the interviews it was very evident that a significant number of operations have and will continue to occur each night between 9:00 p.m. and 10:00 p.m. From 10:00 p.m. to midnight, this activity continues, albeit at a considerably lower intensity. It has been assumed for the purposes of this study that the activity between 10:00 p.m. and midnight, as well as the activity prior to 7:00 a.m. is equivalent to the activity in the single 9:00 p.m. to 10:00 p.m. hour. Therefore, it is reasonable to assume that two average hours of activity occur after the ATCT is closed. By applying the average of 27 operations per hour, this generates 54 additional operations each day or 19,710 operations per year. Therefore, to account for the historic night operations at TIX, this amount was applied to the base ATCT counts from 1996 on. These totals are reflected in **Table 3-8**.

TABLE 3-8 ADJUSTED HISTORIC ANNUAL OPERATIONS	
Year	Annual Operations
1996	134,336
1997	135,956
1998	131,255
1999	139,862
2000	152,500
2001	214,446

Source: THE LPA GROUP INCORPORATED, 2003.

The figures shown in **Table 3-8** have been used in each of the following sections. A total of four methods were applied to generate projections for the future annual operations expected at TIX over the planning period.

Projection of Aircraft Operations using Historic Growth

As with the based aircraft forecasts, the first projection extrapolated the current level of aircraft operations employing the historic growth for the Airport. Before adjustments were made for night operations, **Table 3-4** shows that over the past ten years, the Airport experienced an average annual growth of 4.6 percent. Since the adjustment for night operations skews the average annual growth rates for the airport, the historic 4.6 percent was applied to the adjusted annual operations. The results are reflected in **Table 3-9** and shown in **Exhibit 3-2**.

Projection of Aircraft Operations using National Forecasts

The second forecast for TIX was generated by applying the rate of growth expected for the nation's general aviation activity. The 2002 FAA Aerospace Forecasts documents the annual general aviation operations at those airports with either an FAA or contract ATCT. From 1996 to 2001, the operations recorded at these facilities reflect an average annual growth rate of 1.3 percent. While the FAA initially shows a decline in general aviation operations for the nation between 2001 and 2003, the numbers ultimately increase through 2013. Ultimately, the FAA forecasts show an average annual growth of 1.6 percent from 2001 to 2013. This rate was applied to the adjusted night operations for TIX and is also reflected in **Table 3-9** and **Exhibit 3-2**.

Projection of Aircraft Operations using Regression Analysis

Both linear and multiple regression models were generated to provide projections of aircraft operations through the year 2022. For the individual and combined groups of socioeconomic data, the same assumptions as those utilized in the based aircraft models applied. Out of the various regression runs, a number of the models resulted in what initially appeared to be very significant correlations. One of the more significant was the simple linear regression between annual aircraft operations and population. However, when the regression models were used to forecast future activity, the resulting numbers were very unrealistic. In fact, some resulted in projections of one and a half million annual operations or more. It is believed that the significant increase in operations from 2000 to 2001 is what generated such high numbers in the various regression forecasts. Because none of the independent variables could possibly explain the increase from operations, primarily resulting from Helicopter Adventures, all of the forecasts generated by regression analysis were rejected from consideration.

Forecast using Operations per Based Aircraft

A fourth forecast for annual activity was generated using the historic operations per based aircraft. This methodology takes the historic level of annual operations which is then divided by the historic number of based aircraft for the same year. The resulting quotient allows an estimate of future operations to be calculated. Typically this is done by determining the average number of operations per based aircraft over the historic period analyzed. For TIX, an average of 759 operations per based aircraft have been conducted over the past ten years. During the same time period the airport has experienced a low of 585 operations per based aircraft and a high of 1,129. The high was based on the adjusted annual operations conducted in 2001 combined with the aircraft counted that year.

For the activity projection using based aircraft, the most recent level of 1,129 operations per based aircraft was selected. There were several reasons for selecting the most recent year. The primary reason is that the historic average is no longer representative of the current activity occurring at the Airport, including those conducted by Helicopter Adventures. In addition, the more recent level of operations per based aircraft was selected because of the reliability of the figures. It was stated earlier that there are concerns about past based aircraft counts, especially for the 229 recorded in both 1999 and 2000. Similarly, but to a lesser extent, the number recorded for 1993 is the same as that for 1992, the number for 1995 is the same as that for 1994, and the numbers for 1998 and



1997 are the same as that for 1996. This repetition brings up the question as to whether or not the information was actually updated each year. The results of applying 1,129 annual operations to number of based aircraft forecast for the planning period is reflected in **Table 3-9** and **Exhibit 3-2**.

Selected Annual Aircraft Operations Forecast

While all of the forecasts for annual operations are shown in **Exhibit 3-2**, **Table 3-9** shows how significantly the three projections of this study differ. The forecast based on historic growth was immediately rejected as it is unrealistic. While this projection was based on the historic counts recorded by the ATCT between 1992 and 2001, the average annual growth during that period is not expected to continue through the planning period. The 4.6 percent annual average growth includes the significant increase that resulted in the single year between 2000 to 2001. Much of this growth results from the start up of Helicopter Adventures operation. For such growth to continue, the airport would have to have another flight school of Helicopter Adventures’ magnitude begin operations every 10 years. Conversely, the 1.6 percent average annual growth rate projected for the nation’s activity is considered conservative. Given the existing level of operations, the activity generated by the Airport’s proximity to the nation’s leading aerospace launch facilities, and the potential of the industrial/business sector of the community, the national growth rate was considered low and unrealistic for TIX. As such, the forecast using the based aircraft methodology is considered the most reasonable forecast given the existing activities and possibilities at the airport.

TABLE 3-9 PROJECTIONS OF ANNUAL AIRCRAFT OPERATIONS			
Year	Historic Growth	National Growth	Based Aircraft Methodology
2007	281,426	235,874	270,960
2012	352,968	255,358	295,798
2022	555,238	299,286	352,248
Average Annual Growth Rate	4.6%	1.6%	2.4%

Source: THE LPA GROUP INCORPORATED, 2003.

An average of the historic growth and national growth rates would yield an annual growth rate of 3.1 percent. It is suggested that the slightly more conservative annual growth of 2.4 percent better reflects the level of operations TIX should expect and plan to be at by the end of the planning period. This growth rate eliminates the spike experienced when Helicopter Adventures began operations, while at the same time provides a reasonable amount of increase to reflect this operation and that of others on the airfield. Operations at the airport will continue to increase each year during the planning period due to a number of factors. The potential for both Kennedy Space Center and the Canaveral Air Force Station to restrict or even prevent private industry operations at their aircraft landing facilities bolsters the potential at TIX. The mere fact that today the Shuttle Landing Facility is closed to any operations when the Space Shuttle is air/spaceborne enhances TIX’s ability to attract activity related to military and civilian space payloads. In a similar manner, the airport’s proximity to existing and future industrial/business developments in this industry provides an ability to serve a niche market not known to any other airport facility in the nation.

Nonetheless, when all of this is considered, a balance must be struck that considers the theoretical limits of the airfield. All of these elements would appear to justify a significant increase in annual operations for the airport. However, as the flight training and industrial/business operations increase, some of the existing operations conducted at the airport will decrease, such as those from the other Central Florida flight schools. In other words, as TIX generates more and more operations from its tenants, the operations from the four surrounding flight



schools and other users will diminish to some extent. While that extent is difficult to estimate, it is believed that the overall effect will be a slightly lesser growth rate during the planning period. As such, the projection of annual operations generated using the based aircraft methodology is considered both reasonable and realistic.



*****Insert Exhibit 3-2 (Projections of Annual Aircraft Operations)*****



TYPES OF AIRCRAFT OPERATIONS

This section will take the forecasts of total annual operations and look at the different classifications of activity. These shall include a break out of the local versus itinerant operations and then analyze the operational aircraft fleet mix anticipated at the airport during the planning period.

Local versus Itinerant Split

The only consistent source for year-to-year data on the split between local and itinerant operations for TIX comes from the ATCT activity log. According to the historic ATCT counts, the split between local and itinerant traffic remained relatively equal between the years of 1996, 1997, and 1998. In 1999 a shift towards more local operations was recorded. This change continued through 2000 and then increased significantly in 2001 when the operations were documented as 69 percent local and 31 percent itinerant. It is believed that the operations by Helicopter Adventures had a lot to do with this change as a significant portion of their operations are conducted within a 20 nautical mile radius of the airfield. Because both local and itinerant operations are conducted at night after the ATCT closes, this ratio is assumed to be the same for the 2001 adjusted annual operations.

It is assumed that during the planning period, an increase in the number of itinerant operations will occur. In addition to the increases in operations by the industrial, corporate, and cargo related businesses, flight training will also contribute to this shift. The assumption is that while local operations will certainly increase with the heavy number of training operations such as the helicopter approaches or touch-and-goes, so too will the itinerant operations as they are also a significant part of training. Thus, a 65 percent local and 35 percent itinerant split was applied to the selected forecast of aircraft operations for the entire planning period. The effect of this split on the total annual operations is illustrated in **Table 3-10**.

TABLE 3-10 LOCAL VERSUS ITINERANT SPLIT			
Year	Local Operations	Itinerant Operations	Total Annual Aircraft Operations
<i>Base Year</i>			
2001	147,968	66,478	214,446
<i>Forecast</i>			
2007	176,124	94,836	270,960
2012	192,269	103,529	295,798
2022	228,961	123,287	352,248

Source: THE LPA GROUP INCORPORATED, 2003.

Operational Fleet Mix

Operational fleet mix is an important factor in determining the need for both airside and landside improvements at an airport. The breakout of operational fleet mix is also necessary to develop noise contours to assess the impact aircraft operations have on the local community. While TIX serves all types of aircraft, a majority of the current operations are conducted by single-engine aircraft or rotorcraft. Because there are no records kept on the actual operational mix at TIX, the level of single-engine, multi-engine, jet, and rotorcraft were estimated. The base year operational fleet mix was generated from ATCT records and the interviews with airport tenants. The mix of based aircraft was also considered in the estimate for current operations. The future operational mix was based on a number of assumptions. In general terms, all of the basic categories are expected to increase over the planning period.



For single-engine aircraft, the overall growth expected relates to the popularity of this type of aircraft at TIX. A majority of the future based aircraft operations as well as fixed wing training operations are expected to be conducted by single-engine aircraft. Growth in multi-engine operations is based on the expected increases in the piston aircraft, as well as the turbo-prop models, which are also in this category. Future jet operations are assumed to be conducted by everything from the smaller business/corporate aircraft, as well as larger and some heavier jet aircraft conducting cargo type operations. Jet activity has the highest growth projection for all general aviation activity in the FAA’s 2002 Aerospace Forecasts. Finally, the rotorcraft operations were increased significantly during the short term planning period, and then slowed for the remainder of the planning period. Helicopter operations were projected to increase 30 percent from 2001 to 2007. This rate reflects approximately the same growth projected for Helicopter Adventure’s fleet, assuming similar utilization rates. The final operational fleet mix figures as well as their percent over the forecasted annual operations is reflected in **Table 3-11**.

TABLE 3-11 PROJECTED OPERATIONAL FLEET MIX									
Year	Single-Engine		Multi-Engine		Jet		Rotorcraft		Total Aircraft
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	
<i>Base Year</i>									
2001	92,212	43%	25,734	12%	19,300	9%	77,201	36%	214,446
<i>Forecast</i>									
2007	113,803	42%	29,806	11%	27,096	10%	100,255	37%	270,960
2012	127,193	43%	32,538	11%	32,538	11%	103,529	35%	295,798
2022	154,989	44%	42,270	12%	45,792	13%	109,197	31%	352,248

Source: THE LPA GROUP INCORPORATED, 2003.

It should be noted that in the past, the ATCT has recorded some military operations at TIX. Since 1996, this number was never more than 1,000 operations per year. Conversations with ATCT staff have indicated that since 2001, these operations have nearly vanished. In fact, there were hardly any operations in the first five months of 2002.

Jet Aircraft Activity

While the level for all types of operations is expected to increase, probably the most significant with respect to airport design and facility planning is that of the jet activity. Operations conducted by these aircraft are expected to more than double during the planning period. The jet category includes a wide array of aircraft types, most of which have particular facility needs. In the past, some of the larger jet aircraft operating at TIX required additional runway length, which resulted in the extension of Runway 18-36 to 7,320 feet. However, as documented in the 1998 Runway Length Analysis conducted by the Titusville-Cocoa Airport Authority, this length still provides limitations to some aircraft that utilize TIX. During the planning period of this study, the number of aircraft affected by operational limitations will increase. This is due to the fact that additional large and even some occasional heavy jet aircraft are expected through the planning period. Larger aircraft being those over 12,500 pounds, but less than 300,000 pounds and the heavier aircraft representing those over 300,000 pounds. It is fully anticipated that the airport will play a larger role in supporting the operations of larger aircraft, particularly in the mid-size and large jet groups.

The U.S. government has invested a significant amount of money and resources towards the current space program. As long as space exploration remains a significant national priority, the role served by TIX in this industry will increase. Current and potential restrictions to the use of the Shuttle Landing Facility and the airfield at Canaveral Air Force Station will only increase the demand placed on TIX by large and possibly some heavy jet

aircraft. With respect to the space bound payloads, the larger airports in the surrounding area do not represent a practical alternative to TIX. Large airports such as Daytona International, Melbourne International, and even Orlando International do not provide viable alternatives to the large cargos typical of those companies supporting space operations, primarily due to ground transportation issues. These facts alone provide TIX with the potential to serve additional large and limited heavy jet operations. To a lesser extent, the ability of the airport to offer Foreign Trade Zone (FTZ) status also enhances the attractiveness to space related industries, as well as other large international corporations.

On the other hand, the jet activity potential at TIX is somewhat limited to the corporations supporting launch activities. For example, while Daytona, Melbourne, or Orlando International do not provide an alternative for the large and sensitive space bound payloads, they do provide a draw for the dedicated air cargo operations in the region. More specifically, Orlando International has captured the limited market related to dedicated freight and express cargo services. Companies like Airborne, DHL, Emery, Federal Express (FedEx), and the United Parcel Service (UPS) have made significant investments into their facilities at Orlando International. This coupled with Orlando International's proximity to Brevard County practically eliminates any possibility of these dedicated air cargo operators using TIX. Currently these companies utilize trucking operations for Brevard County for the daily flights into and out of Orlando International. Given the direct access provided by Florida Toll Road 528 (the Bee Line), it is highly unlikely that this operating standard will change during the twenty year planning period. The only cargo jet operations expected to utilize TIX over the course of the planning period would be the very limited flights into the airport with space bound payloads.

Similarly, only a very limited number of jet operations are expected to be conducted by the occasional air charter operations. After September 11th, the ability of TIX to support this type of operation on a regular basis has diminished. Because of heightened security measures, the costs of providing the proper passenger and baggage security screening capability for regularly scheduled charter operations has eliminated the economies of scale that were once possible at this airport for the cruise ship industry. Likewise, the state of the passenger airline industry currently precludes the ability for companies to initiate regular air charter service. Most likely, any ad hoc charter flights into TIX would be conducted by an established passenger air carrier on a very limited basis. The impact that the limited cargo and passenger jet aircraft will have on TIX and the facilities required to support them are addressed in subsequent analyses of this study. For the most part, the jet activity conducted at TIX will be by private corporate/business operators.

Instrument Operations

Although instrument operations are included within the total projection of annual aircraft operations, a separate count of the instrument operations conducted and expected is included in this section. This information is important to determine future facility requirements as they relate to operations under actual and simulated instrument meteorological conditions. Unfortunately, the historic ATCT records from 1996 to 2001 did not include individual counts for the number of instrument operations conducted at TIX. However, since this information is important to determine future facility requirements, an estimate was made based the weather data obtained from the National Climatic Data Center and interview with ATCT staff.

According to the January 1992 to December 2001 hourly observations collected at the Titusville Station of the National Climatic Data Center, 4.3 percent of the 39,294 observations were during actual instrument meteorological conditions. It can be inferred from this data that approximately 4.3 percent of the time, pilots operating to and from TIX must do so under instrument flight rules (IFR). However, it should be noted that this percent needs to also include the operations at TIX that were conducted under filed IFR flight plans, no matter what the weather. In other words, instrument operations do not just represent operations under actual instrument meteorological conditions. In fact, a majority of the instrument operations conducted at TIX are training flights



conducted in simulated instrument conditions, when the weather is actually better than that which would require actual IFR operations. Nonetheless, the requirements for actual and simulated IFR traffic is the same.

During an interview, ATCT staff were asked to estimate the level of instrument operations conducted in 2001 at TIX. The consensus was that 2,000 to 2,500 instrument operations were conducted each month at the airport. Because of the significant level of training and jet activity at TIX, the upper end of this estimate was considered reasonable. This results in 30,000 annual instrument operations for 2001, or nearly 14 percent of the total aircraft operations conducted each year. It is assumed that this percentage of instrument operations will remain relatively constant over the planning period. Thus, a projection of future instrument operations for TIX was generated by applying 14 percent to the selected annual operations forecast. These figures are reflected in **Table 3-12** below.

TABLE 3-12 PROJECTED ANNUAL INSTRUMENT OPERATIONS	
Year	Instrument Operations
<i>Base Year</i>	
2001	30,000
<i>Forecast</i>	
2007	37,934
2012	41,412
2022	49,315

Source: THE LPA GROUP INCORPORATED, 2003.

PEAK ACTIVITY

Peak operational activity such as peak month, average day of the peak month, and peak hour (of the average day in the peak month) forecasts are used in facility sizing and to determine the airport’s ability to accommodate projected demand. According to the ATCT activity reports since 1996, the airport usually experiences the highest traffic levels during the month of March. This is assumed to be associated to the annual Warbird Airshow conducted in March by the Valiant Air Command. However, the records for 1998 and 2001 reflect the highest activity occurring during the month of October. It is not certain why there was a change in the peak monthly activity during these years. Nonetheless, the historical peak months have represented a similar share of the annual operations, with an average of 10.3 percent. As such, 10.3 percent was applied to the forecasted annual operations through the year 2022 to estimate the peak month operations for each year.

The values for average day peak month and for the peak hour were calculated using the FAA’s methodology found in Advisory Circular 150/5360-7, “Planning and Design Considerations for Airport Terminal Building Development.” 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 TIX, the average of 31 days per month was used, to represent both March and August. Additionally, no historic data was available to determine the peak hour operations at the airport; however, the interviews conducted asked for an estimation of the peak hour. Unfortunately, very different responses were received. Therefore, it was estimated that 10 percent of the average day peak month would best represent the number of peak hour operations. The projections for future peak operations at the airport are shown in **Table 3-13**.



Table 3-13 FORECAST PEAK ACTIVITY				
Year	Total Annual Operations	Peak Month	Average Day Peak Month	Peak Hour*
<i>Base Year</i>				
2001	214,446	22,088	713	71
2007	270,960	27,909	900	90
2012	295,798	30,467	983	98
2022	352,248	36,282	1,170	117

Source: THE LPA GROUP INCORPORATED, 2003.

Note: *of the average day, peak month.

SUMMARY OF AVIATION ACTIVITY FORECASTS

Table 3-14 presents a summary of the forecasts developed in this Master Plan Update. Overall, the current activity at TIX is expected to show growth throughout the forecast period. As described in the previous sections, this activity will primarily include fixed wing and rotorcraft training flights, as well as corporate/business jet activity. Very little of the overall operations at TIX are expected to be related to air cargo or passenger charter operations. Due to the proximity of other larger airports, including Orlando International, it is projected that during the next 20 years, TIX will predominantly expand its service to those niche markets that it currently serves, including premiere corporate/business jet activity. In summary, the data and methods used to forecast aviation demand for the airport are consistent with those used by the FAA and other airports located in the State of Florida. Therefore, the forecasts presented in this study are considered to accurately reflect the activity anticipated at TIX through 2022.

The final tables of this chapter take the selected forecast of aircraft operations and presents them in a format similar to that which is used by the FAA in their TAF model. As described in the various sections of the forecast, while both air taxi and military operations do occur at TIX, their historical levels recorded by the ATCT since 1996 was considered to be very inconsistent and at such a low level, that individual analyses were not conducted. This coupled with the fact that there is no regularly scheduled flights of any kind at TIX, led to the categorization of all flights into either local or itinerant general aviation. **Table 3-15** presents the overall forecast numbers, while **Table 3-16** provides the corresponding growth rates associated with each column. Finally, **Table 3-17** reflects the FAA format to compare the forecasts of this chapter with the most recent version (2002) of the FAA TAF.



TABLE 3-14				
SUMMARY OF AVIATION ACTIVITY FORECASTS				
Forecast	2001	2007	2012	2022
Based Aircraft				
Total	190	240	262	312
Single-Engine	133	167	181	215
Multi-Engine	28	34	38	47
Jet	5	6	9	14
Rotor	24	33	34	36
Annual Operations				
Total	214,446	270,960	295,798	352,248
Local	147,968	176,124	192,269	228,961
Itinerant	66,478	94,836	103,529	123,287
Peak Activity				
Peak Month	22,088	27,909	30,467	36,282
Average Day Peak Month	713	900	983	1,170
Peak Hour	71	90	98	117

Source: THE LPA GROUP INCORPORATED, 2003.



Insert Table 3-15



Insert Table 3-16



TABLE 3-17				
COMPARISON OF MASTER PLAN FORECASTS TO 2002 TAF FORECASTS				
Total Operations	Year	Airport Forecast	2002 TAF	AF/TAF (% Difference)
Base Year	2001	214,446	177,930	20.5%
Base Year + 5 Years	2006	267,573	204,403	30.9%
Base Year + 10 Years	2011	291,282	218,582	33.3%
Base Year + 15 Years	2016	316,120	232,759	35.8%

Source: THE LPA GROUP INCORPORATED, 2003.