CHAPTER 2

AVIATION FORECASTS

When Mr. Henry Addison Beckley used his influence to bring about the selection of Springfield for the defense project landing field site for World War II, he did so because he envisioned what the airport could become. Mr. Beckley's vision of the airport's full potential enabled him to respond to circumstances when opportunities surfaced.

One of the purposes of master planning is to identify and preserve adequate space for facility expansion so that when opportunities for better utilization or maximizing of resources occur, an appropriate response can be made. An airport's full potential rests in the phrase "unconstrained demand," describing the optimal environment in which the airport's resources can be maximized. Facility planning begins with defining the reasonable level of unconstrained demand, or activity level, that can be expected to occur over a long-term planning period. This involves developing forecasts of aviation activity in order to identify and preserve adequate room for facility expansion.

Forecasting is both an art and a science. Data collected during the inventory process is used to define the forecast levels of aviation activity during the planning period. Year-to-year variation, however, is difficult to predict with any level of certainty over a 20-year planning period. Many factors affect aviation activity at the local, regional and national levels. Forecasts serve as guidelines; planning must remain flexible enough to respond to unforeseen facility needs. While actual development of investments is made based upon realized demand, the planning that precedes it should be made in an optimal environment that looks at full potential.

CHAPTER OVERVIEW

The first step to updating aviation forecasts at Springfield-Beckley Municipal Airport is to define the standard indicators of aviation activity and identify what data is available for these indicators. The next step is to review past studies for the airport to identify forecasting processes that have previously been used. The findings of these studies will be compared to the actual activity to help identify what forecasting methodologies appear to be the most applicable to the airport. As a part of updating the forecasts, local socioeconomic indicators are reviewed to determine the applicability of national trends to the activity at the Springfield-Beckley Municipal Airport. The various forecasting resources are then used as the basis for preparing updated forecasts of based aircraft, aircraft operations, peak operations, and instrument approaches.

EXISTING AVIATION ACTIVITY INDICATORS

At general aviation airports, there are two primary measures of aviation activity; based aircraft and annual operations. Based aircraft are those aircraft that are kept at the airport either in hangars or tied-down when not in use. Annual operations are the total of all types of operations that occur at the airport in a year. Within each of these measures there are subcategories that are used to further identify the specific type activity. The existing and historic level of based aircraft and annual operations at Springfield-Beckley Municipal Airport are the basis upon which the forecasts are developed.

Based Aircraft

There are 80 based aircraft at the Springfield-Beckley Municipal Airport. These aircraft can be divided into two categories: general aviation aircraft that encompass all of the civilian operations at the airport, and military aircraft.

General Aviation Aircraft

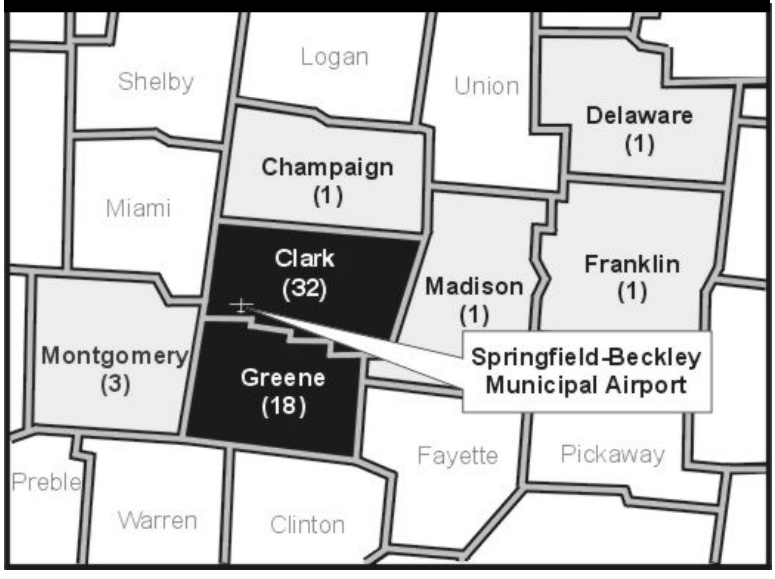
Many factors go into an aircraft owner's decision regarding where to base the airplane. Location relative to the owner's home or business is usually a strong consideration. Other factors include availability of hangar and/or tie-down space, rental rates for such space, and amenities available at the airport both in terms of airfield facilities and fixed base operator (FBO) services. The Springfield-Beckley Municipal Airport, with good runways, navigational aids, and a full-service FBO, is located in Clark County, ½ mile from the Greene County border. However, due to limited hangar development, the number of based aircraft at the airport has been constrained. The City of Springfield maintains a list of the based civilian general aviation aircraft at the airport, and this has been used to identify the current market area served by the Springfield-Beckley Municipal Airport as shown on **Exhibit 2A.**

The primary counties in the Springfield-Beckley Municipal Airport service area are Clark (55% of the based aircraft) and Greene counties (30% of the based aircraft). This is a change from the 1992 Master Plan, which included Clark, Greene and Champaign counties in the airport service area. Grimes Field (Urbana) in Champaign County underwent an extensive airport improvement program in the late 1990s. Champaign County aircraft no longer have a strong presence at Springfield-Beckley Municipal Airport.

Military Aircraft

Springfield-Beckley Municipal Airport is home to the Ohio Air National Guard (OANG) 178th Fighter Wing. The 178th Fighter Wing is currently operating F-16 C and D models. The Wing maintains 18 primary aircraft and on average 2 backup aircraft for a total of 20 aircraft.

Exhibit 2A
Counties Associated with Based Aircraft



3 based aircraft with out-of-state owners
60 total based aircraft

Fleet Mix

The existing aircraft based at the Springfield-Beckley Municipal Airport were also used to define the fleet mix as shown on **Exhibit 2B**. There are also two ultralights based at the airport.

EXHIBIT 2B
EXISTING BASED AIRCRAFT FLEET MIX

Type of Aircraft	Number of Aircraft
Single-engine piston	48
Twin-engine piston	5
Turboprop	6
Jet	1
Subtotal general aviation aircraft	60
F-16	20
Total Aircraft	80

Source: City of Springfield records, October 2002; Ohio Air National Guard, October 2002.

In addition to the based aircraft, Springfield-Beckley Municipal Airport accommodates a range of civilian transient aircraft ranging from single-engine piston aircraft to corporate jets. Corporate aircraft that use the airport on a regular basis include Hawker 800, Gulfstream III/IV/V, Falcon 200/900, Sabre 60/70, Challenger and Citation Bravo.

The OANG also experiences transient operations by military aircraft in support of its mission. The military transient aircraft include C130, K135 and C141.

Annual Operations

The two primary types of operations occurring at the Springfield-Beckley Municipal Airport are civilian general aviation and military operations.

The only actual operations data available for the Springfield-Beckley Municipal Airport is from the Airport Traffic Control Tower (ATCT), which keeps operations records during their hours of operations (Tuesday-Friday, 8:00 a.m. to 4:30 p.m.; extended hours by Notice to Airmen). From 1999 to 2001 the Springfield OANG aircraft relocated to Wright Patterson Air Force Base for portions of the year during construction on the primary runway at the Springfield-Beckley Municipal Airport. **Exhibit 2C** summarizes the annual tower records from 1996 to 2001 and monthly tower records for fiscal year 2002.

EXHIBIT 2C
ATCT OPERATION RECORDS

Year	Military	Civilian	Total	OANG Absence
Annual				
1996	9,366	9,653	19,019	
1997	10,191	10,662	20,853	
1998	8,592	9,488	18,080	
1999	7,584	9,437	17,021	Oct-Dec
2000	10,765	9,680	20,445	Jan-Apr
2001	7,075	8,037	15,112	May-Dec
Monthly				
Oct 2001	168	672	854	Absent
Nov 2001	223	599	833	Absent
Dec 2001	106	397	509	Absent
Jan 2002	162	436	667	Absent
Feb 2002	132	612	744	Absent
Mar 2002	135	778	922	Absent
Apr 2002	1,359	513	1,876	
May 2002**	1,746	651	2,404	
Jun 2002	1,297	452	1,752	
Jul 2002	1,070	728	1,800	
Aug 2002	1,220	841	2,078	
Sep 2002	1,214	668	1,885	

*** Annually May will be the high traffic operation month due to the "B" course "transition phase"*
Source: Springfield-Beckley OANG Annual ATCT Records, February 2002; Springfield-Beckley Municipal Airport ATCT Fiscal Year 2002 Monthly Records, November 2002.

This exhibit also identifies the periods of time the OANG was absent from the airport. ATCT personnel indicate that when the OANG is at Springfield fulltime, they anticipate the ATCT operations counts to be 20,000 to 23,000, potentially as high as 25,000, with about 60% military activity and 40% civilian. In addition to the local growing flight school, aircraft from other area airports use Springfield-Beckley Municipal Airport to practice instrument approaches and operations in a towered environment.

General Aviation Operations

While all military operations occur when the ATCT is open, the airport does not maintain records that identify the percentage of civilian general aviation operations occurring while the ATCT is open, compared to when the ATCT is closed. In fact, the ATCT is closed during many of the typical peak periods for general aviation activity: early mornings, evenings, and weekends. Therefore, other sources of data are needed to estimate the total existing general aviation operations levels.

The *FAA 5010 Form, Airport Master Record*, is a potential resource for annual operations data. However, the airport identified that the annual operations information included on the *FAA 5010 Form* is based on the forecasts in the 1992 Master Plan, which may be somewhat optimistic. Thus, there is no available data for total annual civilian general aviation operations at the Springfield-Beckley Municipal Airport. A baseline estimate will be prepared using several resources, as will be discussed in the following sections. The baseline estimate prepared includes an estimate of the percentage of local operations, operations remaining within 20 miles of the airport, and itinerant operations, those traveling farther than 20 miles, typically to other airports.

Military Operations

Averaging the 2002 full military activity months, all "good weather" months, of April through September (excluding May, the OANG's peak operations month) yields 1,200 average monthly military operations. The monthly average in winter months is likely to be closer to the lower activity level of July or about 1,050 due to weather cancellations. Depending on the level of operations during winter flying months, it is reasonable to anticipate that 13,000 to 15,000 annual operations are conducted by the military during a full year at the Springfield-Beckley Municipal Airport. The majority of these operations are by F-16s. Operations by other military aircraft are estimated to total less than 20 operations per month.

PRIOR FORECAST METHODOLOGY/FINDINGS

With limited existing data for annual operations, other resources are needed to identify the activity levels. Additional sources of information regarding aviation activity at the Springfield-Beckley Municipal Airport include the *1992 Master Plan Update*, *1994 Federal Aviation Regulations (FAR) Part 150 Noise Compatibility Study*, *Federal Aviation Administration (FAA) Terminal Area Forecasts and 1989 Ohio Aviation System Plan*.

Prior Local Forecasts

1992 Master Plan Update

The *1992 Master Plan Update* included forecasts of aviation activity at the Springfield-Beckley Municipal Airport for based aircraft, aircraft operations and fleet mix. Two methods were examined for the forecasts of based aircraft. The first method examined the historical relationship between the number of based aircraft at the Springfield-Beckley Municipal Airport and the number of aircraft registered in the air trade area identified as Champaign, Clark and Greene counties.

The second method used was regression analysis using socioeconomic and demographic data. These projections took into consideration that at the time of the study the aircraft storage space at the airport had been fully saturated for several years. Simple linear and multiple regression analysis revealed no strong correlation between socioeconomic growth in the air trade area and the based aircraft. Thus, the market share analysis was used as the preferred forecast for based aircraft. The FAA national projections were then used to project the fleet mix of the based aircraft at the airport. Using historic data, the ratio of general aviation operations per based aircraft was calculated. This ratio was used to project the operations from the based aircraft forecasts. **Exhibit 2D** summarizes the 1992 Master Plan forecasts.

EXHIBIT 2D
HISTORIC AND FORECAST AVIATION ACTIVITY
1992 SPRINGFIELD-BECKLEY MUNICIPAL AIRPORT MASTER PLAN UPDATE

	1986	1987	1988	1989	1990	1995*	2000*
Single-engine	65	72	77	76	78	81	84
Multi-engine	13	15	17	14	13	14	15
Turboprop	0	0	0	3	3	3	4
Jet	0	0	1	1	1	2	2
Total	78	87	95	94	95	100	105
Air Taxi	1,000	1,000	1,000	2,500	2,500	3,030	3,630
GA Itinerant	18,250	18,500	18,500	18,500	18,750	20,500	22,600
GA Local	26,750	27,000	27,000	27,000	27,500	30,000	33,200
Military	9,000	10,000	10,000	10,000	10,000	10,500	11,000
Total	55,000	56,500	56,500	58,000	58,750	64,030	70,430
OPBA	577	523	479	484	487	505	530

OPBA – Operations per based aircraft
**forecasts*
Source: Springfield-Beckley Municipal Airport Master Plan Update, Aviation Planning Associates et al, April 1992

1994 Part 150 Noise Compatibility Study

The Springfield-Beckley Municipal Airport completed an FAR Part 150 Noise Compatibility Study in 1994. The noise study used data from the ATCT to confirm the 1993 military operations count at the airport, since all these operations occur while the ATCT is open. The *FAA Form 5010* (March 1992) was used for the air taxi and general aviation existing operations. Future activity information was obtained from the master plan. The five-year forecast activity represented a 15% increase from the existing conditions in the noise study, a rather significant increase. This increase was justified based on the anticipated growth outlined in the master plan, increasing amount of non-military training activity attracted by the instrument landing system, and the opening of AirparkOhio. **Exhibit 2E** summarizes the aviation activity included in the FAR Part 150 noise study.

EXHIBIT 2E
PART 150 AVIATION ACTIVITY MEASURES

Type of Operation	1993 (Existing)	1998 (Forecast)
Air carrier/air taxi	2,506	3,390
Local general aviation	27,000	32,000
Itinerant general aviation	18,500	21,760
Military	11,500	11,500
Total	59,506	68,650

Source: FAR Part 150 Noise Compatibility Study, Springfield-Beckley Municipal Airport, Aviation Planning Associates, Inc., LSR Consultants, June 1994.

Federal and State Forecasts

Federal Aviation Administration Forecasts

One resource commonly reviewed for aviation forecasting purposes is the *FAA Aerospace Forecasts*. The FAA uses the economic performance of the United States as an indictor of future aviation industry growth for these forecasts. The latest edition, released in March 2002, was used in the preparation of this document. This edition forecasts aviation activity for fiscal years 2002-2013.

Clear national trends in general aviation are difficult to predict at this time. The demand for general aviation products and services had slowed, due to the downturn in the U.S. economic activity, even before the events of September 11, 2001. Although shipments of jet aircraft declined during 2001, the events of September 11 appear to have spurred a renewed interest in fractional and corporate aircraft ownership and have created new growth opportunities for the on-demand charter industry. General aviation aircraft shipments are expected to decline in 2002. The strongest part of the general aviation market is anticipated to be in the business/corporate segment of the industry. The current forecast assumes that business use of general aviation aircraft will expand more rapidly than personal/sport use.

The *FAA Aerospace Forecasts* anticipate a decrease in general aviation growth through 2003 and then an increase through 2013. For the general aviation fleet, this results in an average annual increase of 0.3% for the forecast period. The greatest levels of growth are anticipated in the turboprop and jet segments of general aviation. The best growth measure in the *FAA Aviation Forecasts* to represent annual operations is the annual hours flown. It is forecast that the general aviation hours flown will experience an average annual increase of 0.5% through the forecast period.

To address anticipated local levels of aviation activity, the FAA prepares and publishes the *Terminal Area Forecasts* (TAF) for their use in budgeting and facility planning. The TAF provides information that is commonly used as reference in the aviation industry for other planning purposes.

From 1989 to 1993 the TAF matches the 1989 data from the 1992 Master Plan. Then from 1994 to 2000 the TAF matches the 1995 forecast from the 1992 Master Plan. From 2000 to 2001 there is a 2% decrease in the itinerant and general aviation forecasts. The forecast from 2001 to 2015 is a flat line and shows no growth in either the number of based aircraft or annual operations, as shown in **Exhibit 2F**. This is a common TAF forecast for many general aviation airports where no verifiable records are available. However, based upon national and local trends, including a potential suppressed demand due to very limited hangar development, anticipating no change in based aircraft or operations is unrealistic for Springfield-Beckley Municipal Airport. Thus, the TAF provides no new information compared to the 1992 Master Plan and is not considered a valid indicator of future activity levels at the airport.

1989 Ohio Aviation System Plan

The Ohio Aviation System Plan, completed in December 1989, reviewed the aviation activity in Ohio as a whole. Forecasts in the system plan are based on analysis of factors affecting aviation activity at the national and state level; those relationships are then applied at the zonal level. The system plan divided the state into zones to develop forecasts for the individual airports. In rural areas such as Clark County, each county represents a zone. The urban areas, including portions of Greene County, were divided into several zones corresponding to urban transportation planning zones. The system plan forecasts were completed for the entire state as a unit and then distributed to individual airports.

EXHIBIT 2F
FAA 2002 TERMINAL AREA FORECAST (TAF)

SPRINGFIELD-BECKLEY MUNICIPAL	1992	1997	2002*	2007*	2012*	2016*
Based Aircraft						
Single-engine	73	62	59	59	59	59
Multi-engine	13	10	10	10	10	10
Other	22	23	23	23	23	23
Total	108	95	92	92	92	92
Itinerant						
Air Taxi	2,506	3,030	3,030	3,030	3,030	3,030
General Aviation	18,500	20,500	20,090	20,090	20,090	20,090
Military	10,000	10,500	10,500	10,500	10,500	10,500
Itinerant Subtotal	31,000	34,030	33,620	33,620	33,620	33,620
Local						
General Aviation	27,000	30,000	29,400	29,400	29,400	29,400
Military	0	0	0	0	0	0
Local Subtotal	27,000	30,000	29,400	29,400	29,400	29,400
Total Operations	58,006	64,030	63,020	63,020	63,020	63,020

** forecasts*
Source: FAA Terminal Area Forecasts, October 2002.

The primary measure for general aviation activity in the system plan was based aircraft. Three separate methods were examined for generating the based aircraft forecast: use of Ohio Data Users Center population projections; use of state share of U.S. market with growth rates projected in the FAA terminal area forecasts for Ohio air carrier airports; and use of regression analysis based on 1985 Department of Commerce forecasts of population, employment and personal income for Ohio. The regression forecasts were selected as the preferred method due to concerns about the population forecast being too conservative (negative growth) and the high growth rate of the market share forecast. The historical based aircraft data for the system plan forecasts were obtained from *FAA 5010 Form* as updated by the Ohio Department of Transportation and compared to the system plan inventory information to check their reasonableness. Assigning the statewide forecasts to zones and individual airports was accomplished using factors such as runway length, instrument landing system and distance between airports in the zone. The operations at each airport were forecast by using the historical average operations per based aircraft from the *FAA 5010 Forms* for airports without a full-time tower. The results of the system plan forecasts are shown in **Exhibit 2G**.

EXHIBIT 2G
OHIO AVIATION SYSTEM PLAN FORECASTS (DECEMBER 1989)

Springfield-Beckley Municipal	1980	1990	1995*	2005*
Civil Based Aircraft				
Single-engine	65	74	79	86
Multi-engine	13	14	15	17
Total	78	89	94	103
Civil Operations	37,213	42,294	45,007	49,150

*forecasts

Source: Ohio Aviation System Plan Technical Appendices of the Ohio Department of Transportation, Bureau of Aviation, December 1989, prepared by G.R. Brandy & Associates.

Socioeconomic Indicators

In addition to reviewing existing forecasts for the Springfield-Beckley Municipal Airport, the socioeconomic indicators were reviewed to determine whether state and/or national trends in aviation would be applicable to the local airport service area.

The airport service area of Clark and Greene counties are both within the Dayton-Springfield Metropolitan Statistical Area (MSA). Clark County is more autonomous from the Dayton metro area than Greene County, as the western portion of Greene County contains Dayton suburbs. **Exhibits 2H**, **2I** and **2J** summarize the key socioeconomic indicators for Clark and Greene counties, with comparisons to the State of Ohio and the United States. The population of Clark County has been decreasing somewhat in recent years, while the population of Greene County has been increasing, resulting in a relatively steady population base in the airport service area. The per capita income for Clark County has tracked somewhat below the state and national average, while the per capita income for Greene County has tracked between the state and national average. The unemployment rate for Clark County has tracked slightly above the state and national averages, while the Greene County unemployment rate has tracked well below both the state and national averages. While the

EXHIBIT 2H
POPULATION

Area	1980	1990	2000	2005	2010	2015
Clark County	150,236	147,548	144,472	149,300	150,900	151,800
Greene County	129,769	136,731	147,886	150,200	155,300	158,400
State of Ohio	10,797,630	10,847,115	11,353,140	11,518,970	11,738,930	12,060,620
United States	226,542,199	281,421,906	281,421,906	287,716,000	299,867,000	312,268,000

Source: Ohio County Profiles, Ohio Department of Development, Office of Strategic Research, 2000; Population Projections, Ohio Department of Development, Office of Strategic Research (based on 1990 census data), U.S. Census Data and Projections based on 1990 census data.

EXHIBIT 2I
PER CAPITA INCOME (DOLLARS)

Area	1995	1996	1997	1998	1999	2000
Clark County	$21,135	$21,525	$22,868	$24,065	$24,738	$25,802
Greene County	23,123	24,014	25,423	26,749	26,973	27,988
State of Ohio	22,790	23,496	24,772	25,921	26,753	27,977
United States	23,255	24,270	25,412	26,893	27,843	29,469

Source: Bureau of Economic Analysis (Washington D.C.), Regional Economic Information System, 2002.

EXHIBIT 2J
UNEMPLOYMENT RATE (PERCENT)

Area	1996	1997	1998	1999	2000	2001
Clark County	5.6	4.7	4.3	4.4	4.6	5.3
Greene County	3.9	3.5	3.2	3.3	3.4	3.4
State of Ohio	4.9	4.6	4.3	4.3	4.1	4.3
United States	5.4	4.9	4.5	4.2	4.0	4.8

Source: Ohio Bureau of Employment Services, prepared by Ohio Office of Strategic Research, 2002.

two counties that make up the primary airport service area have tracked somewhat differently from the state and national averages, both have followed the trends. Combined, they are fairly reflective of the state and national averages.

FORECAST UPDATE

Using existing data and prior forecasts as the baseline for current activity at the airport the next step is to prepare the forecast as aviation activity over the 20-year planning period. The first step in the forecasting process is to update the based aircraft forecast. Regression analysis with socioeconomic variables will not be valid without a clear, representative historical trend. Therefore, national trends will be used to forecast based aircraft. National trends should be applicable to the Springfield-Beckley Municipal Airport; socioeconomic variables for its air service area have followed trends similar to the national trends. After forecasting the total based aircraft, the forecast fleet mix is identified by projecting forward trends in types of aircraft based at the Springfield-Beckley Municipal Airport.

The based aircraft forecast is prepared first as one method to forecast annual operations by estimating the number of operations occurring per based aircraft and projecting the trend into the future. With the existing constraints on the number of based aircraft, it was found that the operations per based aircraft method is not applicable. Therefore, national trends will also be used to forecast annual aircraft operations. After preparing the annual operations forecast, the forecast of peak operations levels will be prepared. Peak operations forecasts are used for identifying facility needs at the airport. Finally, with an instrument landing system (ILS) at the airport, the level of instrument approaches at the airport will be forecast.

BASED AIRCRAFT FORECAST

As described earlier in this chapter, there are two types of based aircraft at Springfield-Beckley Municipal Airport. The general aviation aircraft are all the civilian-owned aircraft, either personal or business, based at the airport. The other component of the based aircraft is the military aircraft for the OANG 178th Fighter Wing.

General Aviation Aircraft

In northern climates such as found in Ohio, aircraft owners typically prefer hangars to protect their investment from the elements. This is true at the Springfield-Beckley Municipal Airport; only three of the 60 based aircraft use outdoor tie-down storage. Based aircraft at the airport have decreased since the 1992 Master Plan. This is representative of the suppressed demand due to the hangar constraints, and the fact that other airports in the area have made hangar improvements. Since one of the goals of this master plan update is to identify a clear vision for the general aviation terminal area in order to accommodate the full demand at the airport, the based aircraft forecasts will assume unconstrained growth. The peak level of historic general aviation based aircraft is 95, as identified for 1988 and 1990 in the 1992 Master Plan.

Springfield-Beckley Municipal Airport's market share of total U.S. active general aviation aircraft for both 1990, the last historical year from the 1992 Master Plan, and the current level have been calculated to identify historical high and low market shares. In addition, an unconstrained 2002 market

share has been estimated as a reasonable baseline market share level. This estimate includes the potential number of aircraft if all the existing t-hangars (61) were leased for aircraft storage, plus the based aircraft in conventional hangars and on tiedowns (12) for a total of 73. These market shares are shown on **Exhibit 2K**.

The *FAA Aerospace Forecasts 2002-2013* forecast total U.S. active general aviation and based aircraft through 2013. These forecasts have been extrapolated to 2022 by assuming continued growth at the same rate as the last 10 years (0.5%). The low-, mid-, and high-level market shares have been used to forecast low, mid and high based aircraft levels at Springfield-Beckley Municipal Airport, as shown in **Exhibit 2L**.

It is recognized that the existing based aircraft levels at the Springfield-Beckley Municipal Airport are in a constrained condition. Therefore, it is reasonable to expect that if the constraints are removed, based aircraft growth higher than the low forecast may be achieved. The mid-level forecasts, representing an unconstrained condition, would be reasonable to expect over the 20-year planning period. While the high level of based aircraft occurred more than 10 years ago, it is reasonable to use the high-level forecasts for planning purposes to identify the area to be reserved for accommodating general aviation based aircraft demand. Actual development should occur as demand is experienced.

EXHIBIT 2K
GENERAL AVIATION AIRCRAFT HISTORIC NATIONAL MARKET SHARE

Year	Springfield	U.S. total	Springfield Market Share
1990	95	212,900	0.045%
2002 existing	60	214,350	0.028%
2002 unconstrained	73	214,350	0.034%

Source: 1992 Master Plan Update, 1992; City of Springfield Records, 2002; FAA Aerospace Forecasts, various years.

EXHIBIT 2L
GENERAL AVIATION MARKET SHARE BASED AIRCRAFT FORECASTS

	Market Share	2002	2007	2012	2017	2022
Total U.S. GA Aircraft	100%	214,350	218,250	224,310	230,000	235,800
Low	0.029%	60	61	63	64	66
Mid	0.034%	73	74	76	78	80
High	0.045%	96	98	101	104	106

Source: FAA Aerospace Forecasts 2002-2013 extrapolated to 2022, Aerofinity, Inc., 2002.

Military Aircraft

Coordination with the 178th Fighter Wing has identified that the number of F-16s based in Springfield is anticipated to remain consistent for the foreseeable future. Therefore, a constant level of 20 F-16s is forecast at the airport for the planning period.

Fleet Mix

The next step in forecasting based aircraft is to identify the forecast fleet mix. Since the type and number of military aircraft is forecast to remain constant, the military and general aviation aircraft fleet mix have been forecast separately and then combined for an overall fleet mix at the airport. **Exhibit 2M** summarizes the existing and previously forecast general aviation fleet mix.

Single-engine aircraft at Springfield-Beckley Municipal Airport have comprised 80-85% of the fleet, with the balance being the various types of multi-engine aircraft. The greatest growth in general aviation aircraft is occurring in the turboprop and jet portion of the fleet, while single-engine aircraft are experiencing some of the lowest growth rates due to the retirement of older aircraft. Thus, for the purpose of forecasting future fleet mix, it has been assumed that the single-engine aircraft will comprise about 80% of the fleet at Springfield-Beckley Municipal Airport.

Multi-engine aircraft in the 1992 Master Plan and existing fleet mix are further divided into types of aircraft. While the total multi-engine aircraft percentage is similar in 1992 Master Plan and the 2002 fleet mix, a greater percentage of those aircraft are now turboprops, the fastest growing segment of general aviation. With good runway facilities for accommodating turboprop and jet aircraft at the Springfield-Beckley Municipal Airport, it is assumed that the future multi-engine fleet mix will be similar to the existing fleet mix, with slight growth in the jet aircraft. Thus, for forecasting the future fleet mix: 8% are assumed to be multi-engine

EXHIBIT 2M
EXISTING AND FORECAST GENERAL AVIATION FLEET MIX

Type of Aircraft	2002	2002 Unconstrained	1992 Master Plan	2002 FAA TAF	1989 Ohio Aviation System Plan
Single-engine	80%	84%	81%	85%	84%
All Multi-engine	20%	16%	19%	15%	16%
Multi-engine breakout					
Multi-engine Piston	8%	7%	14%	NA	NA
Turboprops	10%	8%	3%	NA	NA
Jets	2%	1%	2%	NA	NA

Source: City of Springfield records, October 2002; 1992 Master Plan Update; FAA TAF, 2002; Ohio Aviation System Plan 1989; Aerofinity, 2002.

piston aircraft, 9% are assumed to be turboprop aircraft, and 3% are assumed to be jet aircraft. **Exhibit 2N** summarizes the forecast fleet mix for Springfield-Beckley Municipal Airport.

AIRCRAFT OPERATIONS FORECAST

Similar to the based aircraft, the annual operations forecast can be divided into civilian general aviation and military operations. Forecasts for the two types of operations have been prepared separately and then combined to provide an overall operations forecast for the Springfield-Beckley Municipal Airport.

General Aviation Operations

The best historical data is the 1992 Master Plan used as the basis for the noise study and TAF. However, discussions with the airport have identified that the 1992 Master Plan forecasts may be somewhat optimistic compared to the existing level of activity at the airport. The Ohio Aviation System Plan is more than 10 years old, but does provide information independent from the 1992 Master Plan for determining relative operations levels.

Reviewing the historical aircraft operations data sources, a range of 48,000 (Ohio Aviation System

EXHIBIT 2N
FORECAST FLEET MIX

	Single-engine	Multi-engine Piston	Turboprop	Jet	Military	Total
Existing	48	5	6	1	20	80
			2007			
Low	48	5	6	2	20	81
Mid	59	6	7	2	20	94
High	78	8	9	3	20	118
			2012			
Low	50	5	6	2	20	83
Mid	61	6	7	2	20	96
High	81	8	9	3	20	121
			2017			
Low	51	5	6	2	20	84
Mid	63	6	7	2	20	98
High	83	8	9	3	20	124
			2022			
Low	53	5	6	2	20	86
Mid	64	7	7	2	20	100
High	85	8	10	3	20	126

Source: Aerofinity, Inc., 2002.

Plan) to 54,000 (1992 Master Plan) average annual general aviation operations occurred at Springfield-Beckley Municipal Airport. Coordination with the City has identified that this is a reasonable range for current general aviation operations.

Without detailed historical operations data, a common strategy is to use a ratio of operations per based aircraft to forecast future general aviations operations levels. The 1992 Master Plan identified historical operations per based aircraft ratio of 479 to 577, and used a ratio of 505 to 530 for projecting future operations. FAA planning guidance in *FAA Advisory Circular 150/5300-13, Airport Design, Appendix 5* recommends a ratio of 637 operations per based aircraft for general aviation airports. The existing general aviation operations level and the constrained based aircraft levels yield a ratio of 800 to 900, unrealistic levels for forecasts of future unconstrained demand.

Another strategy is to take existing aircraft operations levels and forecast future levels of activity based on national growth rates. Aircraft operations are anticipated to grow at the Springfield-Beckley Municipal Airport in the future. A flight school has located at the airport and is growing. In addition, the flight school is training future pilots who may acquire and base an aircraft at the airport. Also, one of the goals of this master plan process is to identify a vision for the general aviation terminal area, providing development options to accommodated additional aircraft at the airport.

The FAA forecast growth in annual average hours flown of 0.5% is the most representative measure for annual operations. In addition to a baseline forecast using this FAA forecast growth rate and an average of the available current general operations levels, a low and high forecast have been projected to represent the variability of aviation activity due to outside influences. The low forecast was prepared with a slightly lower growth rate of 0.4% and the high forecast was prepared with a slightly higher growth rate of 0.6%. **Exhibit 2O** shows the projected general aviation operations at Springfield-Beckley Municipal Airport.

Military Operations

Reviewing the most recent tower records reveals 13,000 to 15,000 average annual military operations should occur when the OANG is at the airport a full year. Coordination with the OANG has identified that it is reasonable to expect 13,000 to 15,000 annual operations by the military over the planning period. The majority of these operations are conducted by the F-16s based at Springfield-Beckley Municipal Airport. However, operations by

EXHIBIT 2O
FORECAST GENERAL AVIATION OPERATIONS

	2002	2007	2012	2017	2022
Low	48,000	49,000	50,000	51,000	52,000
Average	51,000	52,300	53,600	55,000	56,300
High	54,000	55,600	57,300	59,100	60,900

Source: FAA Aerospace Forecasts 2002-2013; Aerofinity, Inc., 2002.

larger military aircraft such as the C130, K135 and C141 aircraft also support the local base's mission.

Local and Itinerant Operations

The 1992 Master Plan and FAA TAF indicate that about 56% of the general aviation operations are local, remaining within 20 miles of the airport. The balance of the operations is itinerant operations conducted by both Springfield-based and transient aircraft. A portion of the itinerant operations is air taxi operations, such as charter operations, comprising 5% to 6% of the total operations. The recent growth in operations at Springfield-Beckley Municipal Airport has been related to a growing flight school, which conducts many local training operations and some itinerant operations. Also, the airport has seen increasing use of the airfield for instrument approach training by aircraft based in Springfield and at surrounding airports. The addition of two corporate hangars and their associated based aircraft has contributed to itinerant operations at the airport. However, the FBO has seen a decrease in its charter activity from regularly scheduled charter flights to on-demand charter flights, causing a decrease in the air taxi itinerant operations. Given that the growth in operations at the Springfield-Beckley Municipal Airport is found in both local and itinerant operations, it is anticipated that the historical levels of local and itinerant operations will remain similar for the foreseeable future. Air taxi operations have been forecast at the lower end of the historical range in recognition of the decrease in local charter activity, but tempered by the fact that transient aircraft from other airports conduct some of the air taxi operations. **Exhibit 2P** summarizes the forecast annual operations, by the type of operations.

EXHIBIT 2P
FORECAST ANNUAL OPERATIONS BY TYPE

	Itinerant				Local	
	Air Taxi	GA	Military	Total	GA	Total
Low						
2007	2,450	19,110	13,000	34,560	27,440	62,000
2012	2,500	19,500	13,000	35,000	28,000	63,000
2017	2,550	19,890	13,000	35,440	28,560	64,000
2022	2,600	20,280	13,000	35,880	29,120	65,000
Average						
2007	2,615	20,397	14,000	37,012	29,288	66,300
2012	2,680	20,904	14,000	37,548	30,016	67,600
2017	2,750	21,450	14,000	38,200	30,800	69,000
2022	2,815	21,957	14,000	38,772	31,528	70,300
High						
2007	2,780	21,684	15,000	39,464	31,136	70,600
2012	2,865	22,347	15,000	40,212	32,088	72,300
2017	2,955	23,049	15,000	41,004	33,096	74,100
2022	3,045	23,751	15,000	41,796	34,104	75,900

Source: Aerofinity, Inc., 2002.

PEAK OPERATIONS

Purpose

Airports are similar to other facilities with fixed capacities, such as highways or parking facilities. An airport may be able to accommodate the overall annual operations demand, but may not be able to handle the peak hour traffic. The periods that will be used in developing facility requirements for this master plan include peak month, average day of the peak month (design day), busy day, and design hour operations. These terms are described as follows:

Peak Month - the calendar month when peak aircraft operations occur.

Design Day - the average day within the peak month. Dividing the peak month operations by the number of days in the month calculates this indicator.

Busy Day - the busy day of a typical week in the peak month. This indicator is used primarily for planning general aviation ramp space.

Design Hour - the peak hour within the busy day. This indicator is used in airfield demand/capacity analysis and terminal building and access road requirements.

Findings

The ATCT records are the only monthly data available for the Springfield-Beckley Municipal Airport. Reviewing the civilian general aviation operations that occurred during periods when the tower was open revealed that the peak months were March, July and August. Peak general aviation activity typically occurs during "good weather" months, normally during the summer months. According to tower records, the peak months of general aviation operations represent approximately 11% of the annual general aviation operations. The peak month for the military operations is May, based on their mission. The design day was calculated by dividing the peak month operations by 30 (days). The busy day was assumed to be 10% more than the average day in the peak month. It was assumed that the peak hour is 10% of the busy day. **Exhibit 2Q** summarizes general aviation peak operations for the planning period.

FAA Advisory Circular 150/5070-6A, Airport Master Plans, provides typical peaking characteristics against which the forecast should be compared. These typical peaking characteristics are:

- The ratio of peak hour operations to average daily operations (for the busiest month) may range from 7% to 11%
- The ratio of average daily operations to annual operations may range from 0.29% to 0.34%

These ratios are directly related to the size and demand level of the airport, with the lower percentages common to the busiest commercial service airports and the highest percentages common to the lower activity airports. These ratios should not go below 6.25% (16 hour day) and 0.27% respectively, which represent a steady, no-peak demand pattern. Comparing the forecast general aviation activity at the Springfield-Beckley Municipal Airport to the planning ratio, the peak

EXHIBIT 2Q
FORECAST PEAK GENERLAL AVIATION OPERATIONS LEVEL

Year	Low	Mid	High
	2007		
Annual Operations	49,000	52,300	55,600
Peak Month	5,390	5,753	6,116
Average Day	180	192	204
Busy Day	198	211	224
Peak Hour	20	21	22
	2012		
Annual Operations	50,000	53,600	57,300
Peak Month	5,500	5,896	6,303
Average Day	183	197	210
Busy Day	202	216	231
Peak Hour	20	22	23
	2017		
Annual Operations	51,000	55,000	59,100
Peak Month	5,610	6,050	6,501
Average Day	187	202	217
Busy Day	206	222	238
Peak Hour	21	22	24
	2022		
Annual Operations	52,000	56,300	60,900
Peak Month	5,720	6,193	6,699
Average Day	191	206	223
Busy Day	210	227	246
Peak Hour	21	23	25

Source: Aerofinity, Inc., 2002.

hour operations are 11% of the average daily operations. The average daily operations are 0.37% of the annual operations. These measures are at the high end or slightly above the range in the FAA Advisory Circular representing the fact that there are distinct periods of low and high aviation activity at the airport, a common occurrence at general aviation airports.

INSTRUMENT APPROACHES

Purpose

Instrument operations are a series of predetermined maneuvers for the orderly transfer of an aircraft under instrument flight conditions from the beginning of the initial approach to a landing, or to a point from which a landing may be made visually. The availability of several instrument

approach procedures, including the ILS with minimums of ½-mile visibility and 200-foot ceiling, greatly enhance the utility of the Springfield-Beckley Municipal Airport. Forecast of instrument approaches are used to document the need for and maintenance of the procedures at the airport.

Findings

The only source for instrument activity at Springfield-Beckley Municipal Airport is the FAA TAF. **Exhibit 2R** summarizes the TAF historic and forecast instrument activity levels.

TAF future levels are based on the last year of actual data (2000), for which the military was absent from the Springfield-Beckley Municipal Airport for a portion of the year, continuing at a constant level. The last year that the OANG was operating normally from the Springfield-Beckley Municipal Airport for a full year is 1998, during which 323 instrument operations were recorded. The *FAA Aerospace Forecasts* indicate that general aviation instrument operations are anticipated to grow 1.2% annually and that military instrument operations are anticipated to remain constant. ATCT personnel have indicated an increasing use of Springfield-Beckley Municipal Airport for instrument operations training.

Using 320 annual instrument operations as a reasonable baseline level for full activity at Springfield-Beckley Municipal Airport, the future levels are forecast using 1.2% annual growth for the high forecast. The mid-level forecast was prepared using 0.8% annual growth to represent the average of 0% growth for the military

EXHIBIT 2R
TAF HISTORIC AND FORECAST INSTRUMENT ACTIVITY LEVELS

	Air Taxi	General Aviation	Military	Total
1992	14	27	754	795
1993	0	77	850	927
1994	1	240	137	378
1996	0	206	129	335
1997	3	151	92	246
1998	11	93	219	323
1999	3	94	161	258
2000	1	169	59	229
2002*	1	169	59	229
2007*	1	169	59	229
2012*	1	169	59	229
2016*	1	169	59	229

Note: No data available for 1995
**forecast*
Source: FAA Terminal Area Forecast, 2002.

operations or about 1/3 of the total instrument operations, and 1.2% growth by the remaining 2/3 of the instrument operations conducted by general aviation aircraft. The low forecast was prepared using 0.6% annual growth rate, a slight reduction from the mid-level rate to represent slower growth by general aviation. The instrument operations forecasts are summarized in **Exhibit 2S**.

SUMMARY

Part of the master planning process is concerned with reserving space for future aviation and airport development; thus, the forecasts, while tempered with the current industry atmosphere, are developed as a reasonable prediction of future activity levels ranging from the status quo to the optimistic. **Exhibit 2T** provides a summary of the low, mid and high forecasts developed for the next 20 years at the Springfield-Beckley Municipal Airport. These forecasts were be submitted to the FAA for their concurrence. The FAA concurrence letter is included in **Appendix I**.

In addition, the master plan forecasts provide indicators of the approximate timing for developing additional airport facilities due to demand. A development made either too early or too late may lead to premature capital expenditures or lost revenues, so it is important to examine the actual demand at the time a new or expanded facility is being considered.

EXHIBIT 2S
INSTRUMENT OPERATIONS FORECASTS

	2007	2012	2017	2022
Low	330	340	350	360
Mid	333	347	361	375
High	340	361	383	406

Source: Aerofinity, Inc., 2002.

EXHIBIT 2T
FORECAST SUMMARY

	2007			2012			2017			2022		
	Low	**Mid**	**High**	**Low**	**Mid**	**High**	**Low**	**Mid**	**High**	**Low**	**Mid**	**High**
Based General Aviation Aircraft												
Single-engine	50	59	78	52	61	81	54	63	83	54	64	85
Multi-engine	5	6	8	5	6	8	5	6	8	6	7	8
Turbo Prop	6	7	9	6	7	9	6	7	9	6	7	10
Jet	2	2	3	2	2	3	2	2	3	2	2	3
Military	20	20	20	20	20	20	20	20	20	20	20	20
Total	83	94	118	85	96	121	87	98	124	88	100	126
Annual Aircraft Operations												
Air Taxi (Itinerant)	2,450	2,615	2,780	2,500	2,680	2,865	2,550	2,750	2,955	2,600	2,815	3,045
General Aviation (Itinerant)	19,110	20,397	21,684	19,500	20,904	22,347	19,890	21,450	23,049	20,280	21,957	23,751
Military (Itinerant)	13,000	14,000	15,000	13,000	14,000	15,000	13,000	14,000	15,000	13,000	14,000	15,000
General Aviation (Local)	27,440	29,288	31,136	28,000	30,016	32,088	28,560	30,800	33,096	29,120	31,528	34,104
Total Airport Operations	62,000	66,300	70,600	63,000	67,600	72,300	64,000	69,000	74,100	65,000	70,300	75,900
General Aviation Peaking Characteristics												
Peak Month	5,390	5,753	6,116	5,500	5,896	6,303	5,610	6,050	6,501	5,720	6,193	6,699
Average Day	180	192	204	183	197	210	187	202	217	191	206	223
Busy Day	198	211	224	202	216	231	206	222	238	210	227	246
Peak Hour	20	21	22	20	22	23	21	22	24	21	23	25
Instrument Operations	330	333	340	340	347	361	350	361	383	360	375	406

Source: Aerofinity, Inc., 2002.