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## Appendix A – Forecast of Operations

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

Detroit Airports District Office  
Metro Airport Center  
11677 South Wayne Road, Ste. 107  
Romulus, MI 48174

September 27, 2013

Mr. Jamal Husani, P.E.  
Chief Transportation and Traffic Engineer  
Cuyahoga County Department of Public Works  
2100 Superior Viaduct  
Cleveland, OH 44113

Cuyahoga County Airport (CGF)  
Richmond Heights, Ohio  
FAA Review of the Environmental Assessment Forecasts

Dear Mr. Husani:

The Federal Aviation Administration, Detroit Airports District Office have reviewed the *Forecasts of Operations Report, DRAFT August 2013*. These forecasts are generated for the current Environmental Assessment being prepared for the Runway 6/24 Safety Area Improvements. Based on our review we provide the following comments:

1. Per Table 3-31, FAA Template – Forecast Levels and Growth Rates presents base year and forecast data for aircraft operations (itinerant/local) and based aircraft. These forecasts are approved for use in the Environmental Assessment.
2. Based on timing and submittal of the Final EA, the Airport Sponsor may have to provide a written certification the forecasts are still representative of the actual activities at the Airport.

If you have any additional questions, please do not hesitate to contact me at (734) 229-2958.

Sincerely,

A handwritten signature in blue ink that reads "Katherine S. Delaney".

Katherine S. Delaney  
Community Planner

Cc: Stephanie Ward, Mead & Hunt, Lansing  
Mark Heckroth, CHA Companies, Cleveland

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# Forecasts of Operations Report

This Report contains aviation activity forecasts for the Cuyahoga County Airport (Airport) over a 20-year planning horizon. Aviation demand forecasts are an important step in the planning process. Ultimately, they form the basis for future demand-driven improvements at the Airport, provide data from which to estimate future off-airport impacts such as noise and traffic, and are incorporated by reference into other studies and policy decisions. This Report, which presents aviation activity forecasts through 2030, is organized as follows:

- 1.1 Forecasting Approach
- 1.2 Based Aircraft
- 1.3 Based Aircraft Fleet Mix
- 1.4 Historical Operations
- 1.5 Civil Operations
- 1.6 Military Operations
- 1.7 Instrument Operations
- 1.8 Peak Operations
- 1.9 Operations by Aircraft Type
- 1.10 Forecast Summary and TAF Comparison

The Federal Aviation Administration (FAA) projects future aviation activity through its Terminal Area Forecasts (TAF) which is utilized to compare projections that were prepared for this Report. Forecasts that are developed for airport planning documents and/or federal grants must be approved by the FAA. It is the FAA's policy, listed in Advisory Circular (AC) 150/5070-6B, Airport Master Plans, that FAA approval of forecasts should be consistent with the TAF. Forecasts for operations, based aircraft and enplanements are considered to be consistent with the TAF if they meet the following criteria:

- Forecasts differ by less than 10 percent in the five-year forecast and 15 percent in the 10- or 20-year period.

If the forecast is not consistent with the TAF, differences must be resolved if the forecast is to be used in FAA decision-making. This may involve revisions to the airport sponsor's submitted forecasts, adjustments to the TAF, or both. FAA decision-making includes key environmental issues (e.g. purpose and need, air quality, noise, land use), noise compatibility planning (14 CFR Part 150), approval of development on an airport layout plan and initial financial decisions.

This Report examines data that pertains to aviation activities and describes the projections of aviation demand. It should be noted that projections of aviation demand are based on data through the year 2012, as this was the most recent calendar year for which a full 12 months of historical data was available at the time these forecasts were developed in June, 2013.

## **1.1 Forecasting Approach**

A number of forecasting techniques may be used to project aviation activity that range from subjective judgment to sophisticated mathematical modeling. These forecasts incorporate local and national industry trends in assessing current and future demand. Socioeconomic factors such as local population, retail sales, and employment have also been analyzed for the effect they may have had historically and may have on future levels of activity. The comparison of the relationships among these various indicators provided the initial step in the development of forecasts for future aviation demand.

The following sections provide an assessment of historical trends of aviation activity data at the local and national level. Aviation activity statistics on such items as aircraft operations and based aircraft are collected, reviewed and analyzed. Since a large number of variables affect a facility plan, it is important that each one be considered in the context of its use in the plan. Methodologies used to develop forecasts described in this section include:

- Time-series methodologies
- Market share methodologies
- Socioeconomic methodologies

### **1.1.a Time-Series Methodologies**

Historical trend lines and linear extrapolation are widely used methods of forecasting. These techniques utilize time-series types of data and are most useful for a pattern of demand that demonstrates a historical relationship with time. Trend line analyses used in this Report are linearly extrapolated, establishing a trend line using the least squares method to known historical data. Growth rate analyses used in this Report examined the historical compounded annual growth rates (CAGR) and extrapolated future data values by assuming a similar CAGR for the future.

### **1.1.b Market Share Methodology**

Market share, ratio, or top-down methodologies compare local levels of activity with a larger entity. Such methodologies imply that the proportion of activity that can be assigned to the local level is a regular and predictable quantity. This method has been used extensively in the aviation industry to develop forecasts at the local level. Historical data is most commonly used to determine the share of total national traffic activity that will be captured by a particular region or airport. The FAA develops national forecasts annually in its FAA Aerospace Forecasts document; the latest edition of which is the FAA Aerospace Forecasts Fiscal Year (FY) 2013-2033.

### 1.1.c Socioeconomic Methodologies

Though trend line extrapolation and market share analyses may provide mathematical and formulaic justification for demand projections, there are many factors beyond historical levels of activity that may identify trends in aviation and its impact on local aviation demand. Socioeconomic or correlation analyses examine the direct relationship between two or more sets of historical data. Local market conditions examined in this analysis include population, total employment and total retail sales for Cuyahoga County. Historical and forecasted socio-economic statistics for this service area were obtained from the economic forecasting firm Woods & Poole Economics, Inc. Based upon the observed and projected correlation between historical aviation activity and the socioeconomic data sets, future aviation activity projections were developed. **Table 1-1** presents forecasts of socio-economic indicators that are utilized in various locations of this report.

**Table 1-1: Projected Socio-Economic Indicators – Cuyahoga County**

Year	Population (Thousands)	Employment (Thousands of jobs)	Total Retail Sales (mil, 2005\$)
<b>Historical:</b>			
2000	1,391,959	965,520	18,683.31
2001	1,382,520	946,978	18,641.03
2002	1,371,493	924,881	18,606.86
2003	1,359,929	917,199	18,721.66
2004	1,346,714	917,084	19,078.85
2005	1,330,612	913,538	19,271.28
2006	1,312,816	920,031	19,269.91
2007	1,301,540	922,863	19,054.69
2008	1,291,479	910,226	17,966.27
2009	1,285,082	873,947	16,397.56
2010	1,278,208	867,768	16,906.64
2011	1,274,183	872,412	17,638.10
2012	1,270,665	882,033	17,762.63
<b>Projected:</b>			
2017	1,255,045	916,222	18,423.98
2022	1,241,091	951,444	19,157.92
2027	1,227,052	987,544	19,949.78
2032	1,212,263	1,024,699	20,808.72
(CAGR 2012-2032)	-0.23%	0.75%	0.79%

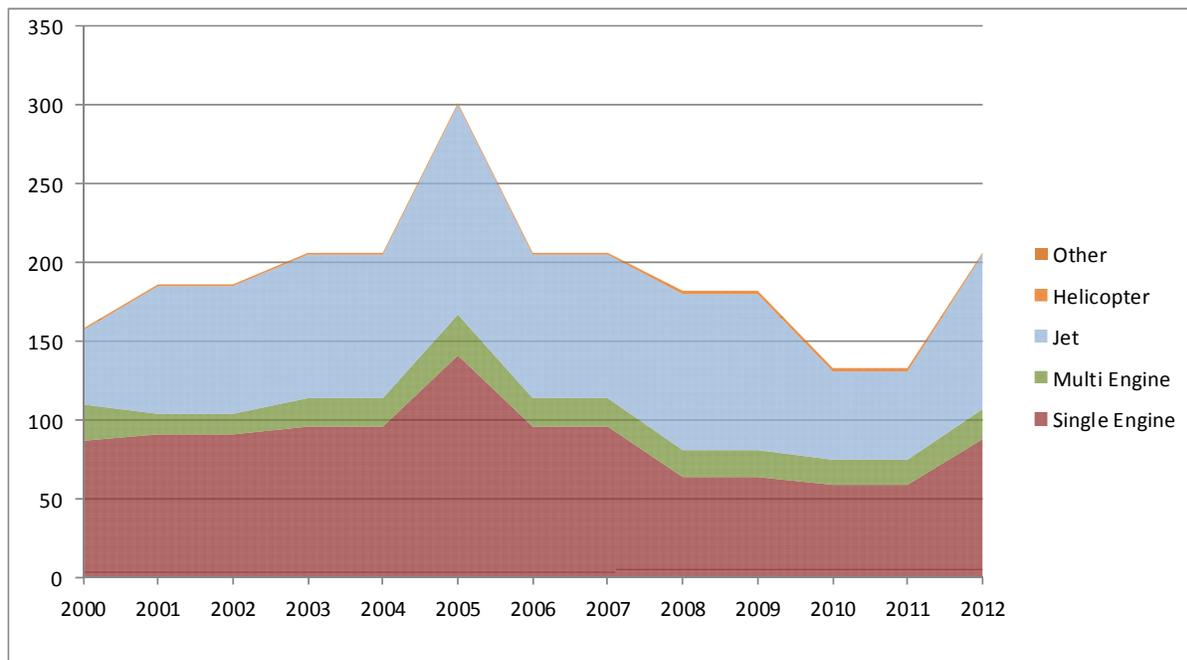
Sources: Woods & Poole Economics, Inc.

### 1.2 Based Aircraft

The FAA defines a based aircraft at an airport, as an aircraft that is “operational & air worthy” and which is typically based at the airport for a majority of the year. There are several factors that affect the number of based aircraft at an airport. Recently, increasing costs to own and operate aircraft has been a primary factor that has contributed to a slight decline in the overall US general aviation fleet since 2007. **Table 1-2** depicts the number of based aircraft at Cuyahoga County Airport from 2000 to 2012.

Table 1-2: Historical Based Aircraft

Year	Single Engine		Multi-Engine		Jet		Helicopter		Other		Total
	#	%	#	%	#	%	#	%	#	%	
<b>Historical:</b>											
2000	87	55%	23	15%	47	30%	1	1%	0	0%	158
2001	91	49%	13	7%	81	44%	1	1%	0	0%	186
2002	91	49%	13	7%	81	44%	1	1%	0	0%	186
2003	96	47%	18	9%	91	44%	1	0%	0	0%	206
2004	96	47%	18	9%	91	44%	1	0%	0	0%	206
2005	141	47%	26	9%	133	44%	1	0%	0	0%	301
2006	96	47%	18	9%	91	44%	1	0%	0	0%	206
2007	96	47%	18	9%	91	44%	1	0%	0	0%	206
2008	64	35%	17	9%	99	54%	2	1%	0	0%	182
2009	64	35%	17	9%	99	54%	2	1%	0	0%	182
2010	59	44%	16	12%	56	42%	2	2%	0	0%	133
2011	59	44%	16	12%	56	42%	2	2%	0	0%	133
2012	88	43%	19	9%	98	48%	1	0%	0	0%	206



Sources: 2000-2011 Historical Based Aircraft -FAA Terminal Area Forecast  
 2012 Historical Based Aircraft - Airport Records (Recent FAA 5010 Form Submittal)

The number of based aircraft reported in FAA databases for CGF has exhibited a decline since 2007; however conversations with Airport Management indicate that this is likely the result of not updating their database from 2008 to 2012. As based aircraft relocated to other airports during those years, they were reported by other airports and removed from the CGF inventory in the FAA database (one aircraft is not counted at two airports). However the aircraft relocating from other airports to CGF were not reported to the FAA database during this time. The airport recently completed an inventory of based aircraft in early 2013 and reported the following totals to the FAA for their FAA 5010 report: 88 Single-engine aircraft, 19 Multi-engine aircraft, 98 Jets and 1 Helicopter; for a total of 206 based aircraft. This early 2013 based

aircraft inventory compiled by Airport Management will be used as the most recent 2012 inventory of based aircraft.

Table 1-2 also shows a significant spike in based aircraft in 2005. In the early 2000's, a fractional ownership jet operator (Flight Options, called Corporate Wings at that time) merged with Raytheon Travel Air and moved many of their aircraft to CGF around 2005. Shortly thereafter CGF became a maintenance hub rather than the primary base for their operations and planes were relocated to other locations. This activity explains the 2005 spike in based aircraft. These two explanations combined suggest that the number of based aircraft at CGF has likely remained fairly constant since 2003 other than the impacts of one business operation.

The FAA Terminal Area Forecast for Cuyahoga County contains historical and projected levels of based aircraft; these totals are presented in **Table 1-3**, along with two methodologies that were evaluated to develop based aircraft projections. The FAA TAF and time series methodologies that include trend line analysis and growth rate analysis are presented in Table 1-3.

**Table 1-3: Based Aircraft Forecasts – TAF, Trend Line, & Growth Rate Methodologies**

Year	FAA TAF Summary	Trend Line	Growth Rate	
	Based Aircraft	Based Aircraft	Based Aircraft	Growth Rate
<b>Historical:</b>				
2000	158	158	158	
2001	186	186	186	17.72%
2002	186	186	186	0.00%
2003	206	206	206	10.75%
2004	206	206	206	0.00%
2005	301	301	301	46.12%
2006	206	206	206	-31.56%
2007	206	206	206	0.00%
2008	182	182	182	-11.65%
2009	182	182	182	0.00%
2010	133	133	133	-26.92%
2011	133	133	133	0.00%
2012	136	206	206	54.89%
			CAGR (2000-2012) 2.24%	
<b>Projected:</b>				
2017	147	167	230	2.24%
2022	159	156	257	2.24%
2027	169	145	287	2.24%
2032	179	134	321	2.24%
(CAGR 2012-2032)	1.38%	-2.13%	2.24%	

Sources: Historical Based Aircraft - 2000-2011 FAA Terminal Area Forecast; 2012 Airport Management  
 Projected Based Aircraft - Mead & Hunt, Inc., except FAA TAF Summary which are from the FAA TAF

The market share methodology compares local based aircraft at the Airport to the total number of general aviation aircraft in the US as reported by the FAA. The FAA Aerospace Forecast Fiscal Years 2013-2033 states the following regarding the projection for general aviation aircraft:

*After growing rapidly for most of the past decade, and then slowing over the past few years, the most recent shipment activity indicates a cautiously optimistic outlook that the hard impact of the recession on the business jet market is coming to an end. The forecast calls for robust growth in the long term outlook, driven by higher corporate profits and the growth of worldwide GDP, though at rates lower than those predicted last year. Additionally, continued concerns about safety, security, and flight delays keep business aviation attractive relative to commercial air travel. As the industry experts and prior year's survey results report a significant portion of piston aircraft hours are also used for business purposes, we predict business usage of general aviation aircraft will expand at a faster pace than that for personal and recreational use. Increased demand, especially for agricultural use turboprop aircraft also contributes to increased turbine fleet and hours.*

The majority of CGF's activity is business usage, which as noted above, is projected by the FAA to remain strong and expand at a faster pace than personal and recreational aviation use. As illustrated in **Table 1-4**, in 2012 the number of based aircraft at CGF represented 0.09335 percent of the total active general aviation aircraft in the United States. Maintaining this market share and applying a projected CAGR of 0.50 percent as forecasted for the growth of based aircraft in the US, the number of aircraft at the Airport is forecasted to grow from 206 in 2012 to 227 in 2032.

**Table 1-4: Based Aircraft Forecast – Market Share Methodology**

Year	Market Share Methodology		
	Based Aircraft	Total U.S. Active Aircraft	Market Share
<b>Historical:</b>			
2000	158	217,533	0.07263%
2001	186	211,446	0.08797%
2002	186	211,244	0.08805%
2003	206	209,606	0.09828%
2004	206	219,319	0.09393%
2005	301	224,257	0.13422%
2006	206	221,942	0.09282%
2007	206	231,606	0.08894%
2008	182	228,664	0.07959%
2009	182	223,876	0.08129%
2010	133	223,370	0.05954%
2011	133	220,770	0.06024%
2012	206	220,670	0.09335%
<b>Projected:</b>			
2017	208	223,315	0.09335%
2022	212	226,970	0.09335%
2027	218	233,355	0.09335%
2032	227	243,670	0.09335%
(CAGR 2012-2032)	0.50%	0.50%	

Sources: Historical Based Aircraft - 2000-2011 FAA Terminal Area Forecast; 2012 Airport Management  
 Total U.S. Active Aircraft (GA & Air Taxi) - FAA Aerospace Forecasts FY2013-2033  
 Projected Based Aircraft - Mead & Hunt, Inc.

Socioeconomic (or correlation) forecasting methodologies examine the direct relationship between two or more sets of historical data. Data examined in developing based aircraft forecasts using this methodology included both population and total retail sales. Total retail sales was used as an indicator of economic activity occurring within the community with the assumption being that changes in economic activity will impact the number of based aircraft. Historical and forecasted socio-economic statistics for Cuyahoga County were obtained from the economic forecasting firm Woods & Poole Economics, Inc. Based upon the observed and projected correlation between historical aviation activity and socioeconomic data, based aircraft forecasts were developed. The forecasts that were prepared utilizing these methodologies are presented in **Table 1-5**. As illustrated in the table, based aircraft at the Airport are projected to decrease from 206 aircraft in 2012 to 197 aircraft in 2032 using the population variable socioeconomic methodology, due a declining population base. Utilizing the same methodology, but using the number of based aircraft per 1 million dollars in retail sales, based aircraft at the Airport are projected to increase from 206 aircraft in 2012 to 241 aircraft in 2032, based upon increasing economic activity.

Table 1-5: Based Aircraft Forecasts – Socioeconomic Methodologies

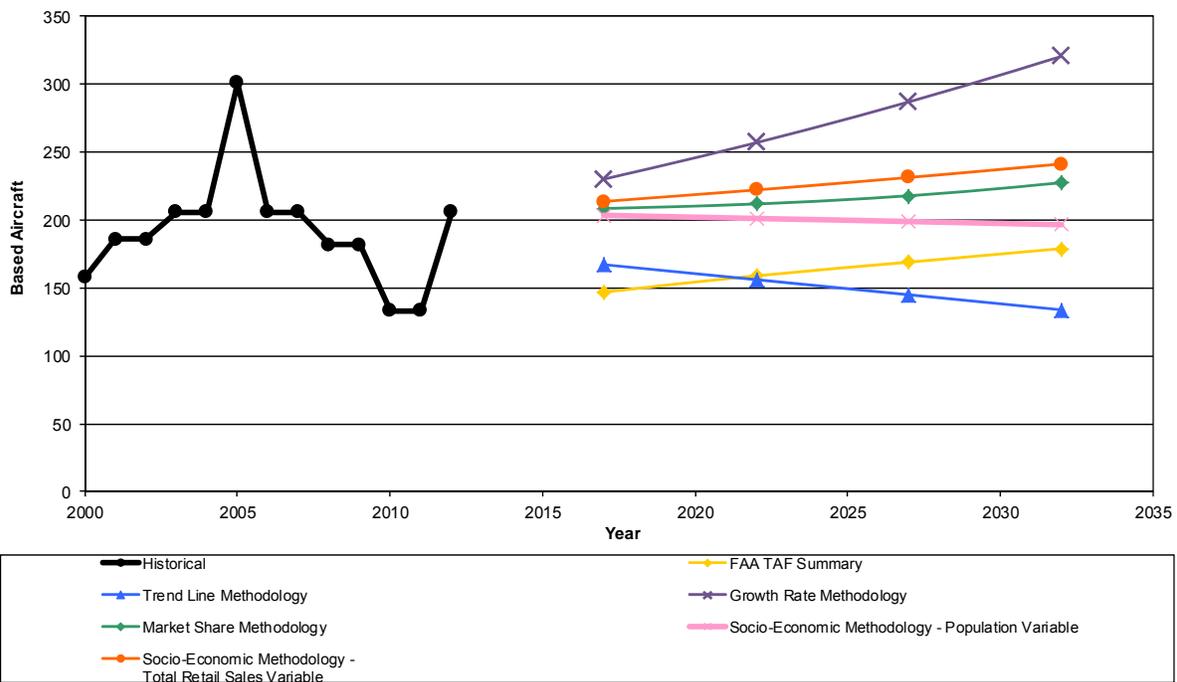
Year	Socio-Economic Methodology - Population Variable			Socio-Economic Methodology - Total Retail Sales Variable		
	Based Aircraft	Cuyahoga Co. Population	Based Aircraft Per Capita	Based Aircraft	Cuyahoga Co. Retail Sales (mil 2005\$)	Based Aircraft Per mil\$ Sales
<b>Historical:</b>						
2000	158	1,391,959	0.00011	158	18,683.3	0.00846
2001	186	1,382,520	0.00013	186	18,641.0	0.00998
2002	186	1,371,493	0.00014	186	18,606.9	0.01000
2003	206	1,359,929	0.00015	206	18,721.7	0.01100
2004	206	1,346,714	0.00015	206	19,078.9	0.01080
2005	301	1,330,612	0.00023	301	19,271.3	0.01562
2006	206	1,312,816	0.00016	206	19,269.9	0.01069
2007	206	1,301,540	0.00016	206	19,054.7	0.01081
2008	182	1,291,479	0.00014	182	17,966.3	0.01013
2009	182	1,285,082	0.00014	182	16,397.6	0.01110
2010	133	1,278,208	0.00010	133	16,906.6	0.00787
2011	133	1,274,183	0.00010	133	17,638.1	0.00754
2012	206	1,270,665	0.00016	206	17,762.6	0.01160
<b>Projected:</b>						
2017	203	1,255,045	0.00016	214	18,424.0	0.01160
2022	201	1,241,091	0.00016	222	19,157.9	0.01160
2027	199	1,227,052	0.00016	231	19,949.8	0.01160
2032	197	1,212,263	0.00016	241	20,808.7	0.01160
(CAGR 2012-2	-0.23%	-0.23%		0.79%	0.79%	

Sources: Historical Based Aircraft - 2000-2011 FAA Terminal Area Forecast; 2012 Airport Management  
Historical & Projected Population & Retail Sales - Woods & Poole Economics  
Projections - Mead & Hunt

A comparison of projected based aircraft at the Airport using the methodologies described in this section is presented in **Table 1-6**. The methodologies range from declining at -2.13% compound annual rate to the growth rate methodology projection with a compound annual growth rate of 2.24%. For the purposes of this study, the market share methodology based upon the correlation between based aircraft and total US active GA aircraft, lies near the middle of the various methodologies and serves as the preferred projection of based aircraft for the next 20 years. This methodology projects based aircraft to increase from 206 in 2012 to 227 in 2032, a compound annual growth rate of 0.50 percent.

Table 1-6: Based Aircraft Forecasts Summary

Year	Historical	FAA TAF Summary	Trend Line Methodology	Growth Rate Methodology	Preferred		
					Market Share Methodology	Socio-Economic Methodology - Population Variable	Socio-Economic Methodology - Total Retail Sales
<b>Historical:</b>							
2000	158						
2001	186						
2002	186						
2003	206						
2004	206						
2005	301						
2006	206						
2007	206						
2008	182						
2009	182						
2010	133						
2011	133						
2012	206						
CAGR (2000-2012)	2.24%						
<b>Projected:</b>							
2017		147	167	230	208	203	214
2022		159	156	257	212	201	222
2027		169	145	287	218	199	231
2032		179	134	321	227	197	241
CAGR (2012-2032)		-0.70%	-2.13%	2.24%	0.50%	-0.23%	0.79%



Sources: Historical Based Aircraft - 2000-2011 FAA Terminal Area Forecast; 2012 Airport Management  
 Projections - Mead & Hunt, Inc., except FAA TAF Summary which are from the FAA Terminal Area Forecast

### 1.3 Based Aircraft Fleet Mix

Historical based aircraft by type and projected fleet mix at the Cuyahoga County Airport is presented in **Table 1-7**. As was noted earlier, the 2012 total is based upon an early 2013 inventory of based aircraft prepared by Airport Management. This inventory found that 43 percent of the local fleet was comprised of single-engine aircraft, 9 percent multi-engine aircraft, 48 percent jet aircraft, and less than 1 percent

helicopters. The FAA Aerospace Forecast FY 2013-2033 projects that turboprop and jet aircraft will see a higher growth rate than other types of aircraft through 2032. This trend is also expected to occur locally as the number of multi-engine and jet aircraft based at the Airport are expected to increase at a higher growth rate than single-engine aircraft types.

**Table 1-7: Based Aircraft Fleet Mix Forecast**

Year	Single Engine		Multi-Engine		Jet		Helicopter		Other		Total
	#	%	#	%	#	%	#	%	#	%	
<b>Historical:</b>											
2000	87	55%	23	15%	47	30%	1	1%	0	0%	158
2001	91	49%	13	7%	81	44%	1	1%	0	0%	186
2002	91	49%	13	7%	81	44%	1	1%	0	0%	186
2003	96	47%	18	9%	91	44%	1	0%	0	0%	206
2004	96	47%	18	9%	91	44%	1	0%	0	0%	206
2005	141	47%	26	9%	133	44%	1	0%	0	0%	301
2006	96	47%	18	9%	91	44%	1	0%	0	0%	206
2007	96	47%	18	9%	91	44%	1	0%	0	0%	206
2008	64	35%	17	9%	99	54%	2	1%	0	0%	182
2009	64	35%	17	9%	99	54%	2	1%	0	0%	182
2010	59	44%	16	12%	56	42%	2	2%	0	0%	133
2011	59	44%	16	12%	56	42%	2	2%	0	0%	133
2012	88	43%	19	9%	98	48%	1	0%	0	0%	206
<b>Projected:</b>											
2017	88	42%	19	9%	100	48%	1	1%	0	0%	208
2022	89	42%	21	10%	102	48%	1	1%	0	0%	212
2027	89	41%	22	10%	105	48%	2	1%	0	0%	218
2032	91	40%	23	10%	111	49%	2	1%	0	0%	227
<b>CAGR (2012-2032)</b>		0.17%	0.90%		0.65%		0.00%		0.00%		0.50%

Notes: Numbers may not add due to rounding

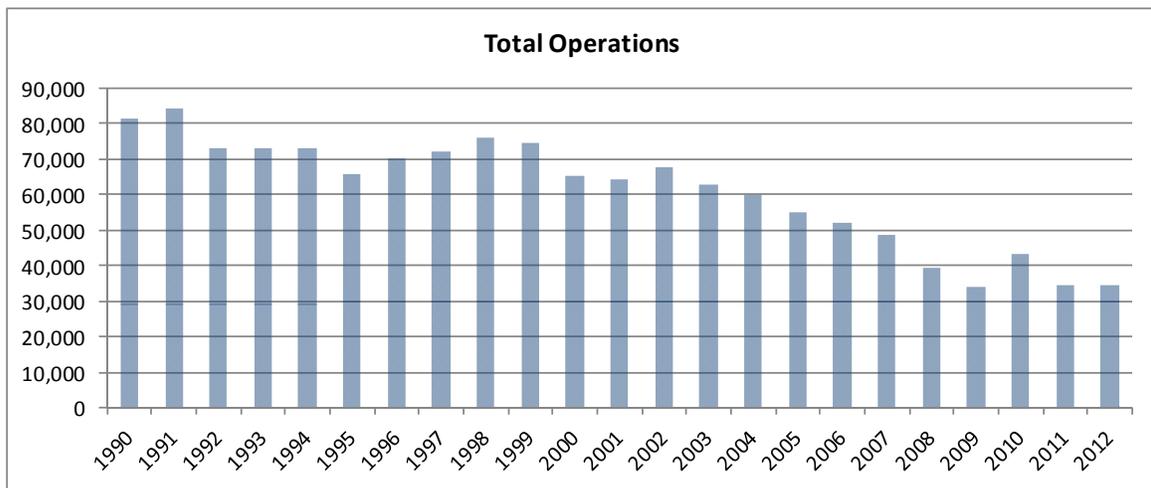
Sources: Historical Based Aircraft - 2000-2011, FAA Terminal Area Forecast; 2012 Airport Administration Projections - Mead & Hunt, Inc.

## 1.4 Historical Operations

General aviation activity can be affected by many variables including the costs to own and operate an aircraft, available hangar space for lease, and the status of local, state, national and world economies. Similar to what has been occurring nationally, there has been a decline in general aviation activity due in part to the downturn in the nation's economy and also to increasing costs to own and operate an aircraft. These economic conditions have resulted in declines in both corporate general aviation activity, and even more significantly in recreational flying by private pilots. In the 1980's and 1990's, the airport reports that 80% of their activity was private general aviation planes and 20% corporate and now those statistics have flipped and they are 80% corporate and 20% private general aviation. **Table 1-8** summarizes the total number of historical operations occurring at the airport from 1990 to 2012. Over the past four years, operational numbers have stopped declining and stayed fairly consistent.

Table 1-8: Historical Operations

Year	Itinerant					Local			Total Operations
	Air Carrier	Air Taxi	General Aviation	Military	Total	Civil	Military	Total	
<b>Historical:</b>									
1990	0	4,759	50,938	68	55,765	25,632	6	25,638	81,403
1991	0	1,621	55,123	54	56,798	27,522	10	27,532	84,330
1992	0	1,636	48,244	138	50,018	22,902	8	22,910	72,928
1993	0	1,698	48,841	128	50,667	22,286	20	22,306	72,973
1994	17	1,790	50,685	106	52,598	20,546	8	20,554	73,152
1995	0	1,899	47,618	153	49,670	16,050	14	16,064	65,734
1996	0	2,712	46,886	138	49,736	20,382	0	20,382	70,118
1997	0	2,659	48,463	75	51,197	20,977	0	20,977	72,174
1998	0	2,813	48,785	63	51,661	24,422	2	24,424	76,085
1999	0	4,763	47,887	42	52,692	21,806	0	21,806	74,498
2000	0	9,007	43,166	40	52,213	12,952	12	12,964	65,177
2001	0	11,325	37,224	49	48,598	15,433	52	15,485	64,083
2002	0	13,628	35,614	52	49,294	18,363	10	18,373	67,667
2003	0	11,903	31,277	61	43,241	19,696	6	19,702	62,943
2004	0	9,971	32,023	60	42,054	17,850	0	17,850	59,904
2005	0	7,870	29,546	51	37,467	17,608	0	17,608	55,075
2006	0	8,797	27,775	95	36,667	15,388	2	15,390	52,057
2007	0	9,115	24,774	83	33,972	14,750	12	14,762	48,734
2008	0	6,217	21,490	97	27,804	11,269	70	11,339	39,143
2009	0	4,021	20,230	31	24,282	9,902	4	9,906	34,188
2010	0	2,987	21,829	2	24,818	18,337	0	18,337	43,155
2011	0	2,980	18,351	8	21,339	13,297	6	13,303	34,642
2012	2	3,182	18,123	82	21,389	13,086	0	13,086	34,475



Sources: Historical Operations - FAA Air Traffic Activity Data System (ATADS)

## 1.5 Civil Operations

Civil operations are non-military operations and include both private and commercial operations. General aviation operations are those civil aircraft operations which are not categorized as commercial. CGF does not have scheduled commercial service so all non-military civil operations occurring at the airport operate as general aviation activity. General aviation activity is conducted on demand of their operator, rather than on a regularly scheduled route. Therefore all civil operations, which include itinerant and local operations conducted as air carrier, commuter and air taxi, and general aviation, will be forecast together as civil operations.

**Table 1-9** presents the civil operations forecasts from the FAA TAF and those that were prepared for this study using the Trend Line, Growth Rate and Operations per Based Aircraft (OPBA) Methodology.

**Table 1-9: Civil Operations Forecasts – TAF, Trend Line, Growth Rate and OPBA Methodologies**

Year	FAA TAF Summary	Trend Line	Growth Rate		Operations Per Based Aircraft Methodology		
	Civil Ops	Civil Ops	Civil Ops	Growth Rate	Based Acft	Ops per Based Acft	Total Civil Ops
<b>Historical:</b>							
2000	67,086	65,125	65,125		158	412	65,125
2001	65,234	63,982	63,982	-1.76%	186	344	63,982
2002	67,031	67,605	67,605	5.66%	186	363	67,605
2003	62,369	62,876	62,876	-7.00%	206	305	62,876
2004	62,108	59,844	59,844	-4.82%	206	291	59,844
2005	56,194	55,024	55,024	-8.05%	301	183	55,024
2006	52,116	51,960	51,960	-5.57%	206	252	51,960
2007	48,514	48,639	48,639	-6.39%	206	236	48,639
2008	41,730	38,976	38,976	-19.87%	182	214	38,976
2009	34,379	34,153	34,153	-12.37%	182	188	34,153
2010	41,327	43,153	43,153	26.35%	133	324	43,153
2011	35,660	34,628	34,628	-19.76%	133	260	34,628
2012	35,822	34,393	34,393	-0.68%	206	167	34,393
			<i>CAGR (2000-2012)</i>	<i>-5.18%</i>			
<b>Projected:</b>							
2017	34,951	16754	26,360	-5.18%	208	167	34,805
2022	36,072	1279	20,203	-5.18%	212	167	35,375
2027	37,251	0	15,484	-5.18%	218	167	36,370
2032	38,491	0	11,867	-5.18%	227	167	37,978
	<i>0.36%</i>	<i>-99.91%</i>	<i>-5.18%</i>		<i>0.50%</i>		<i>0.50%</i>

Notes: TAF data is based upon the federal fiscal year, while ATADS data is based upon the calendar year

Sources: Historical Operations - Air Traffic Activity Data System (ATADS)

Projections - Mead & Hunt, Inc., except FAA TAF Summary which are from the FAA Terminal Area Forecast

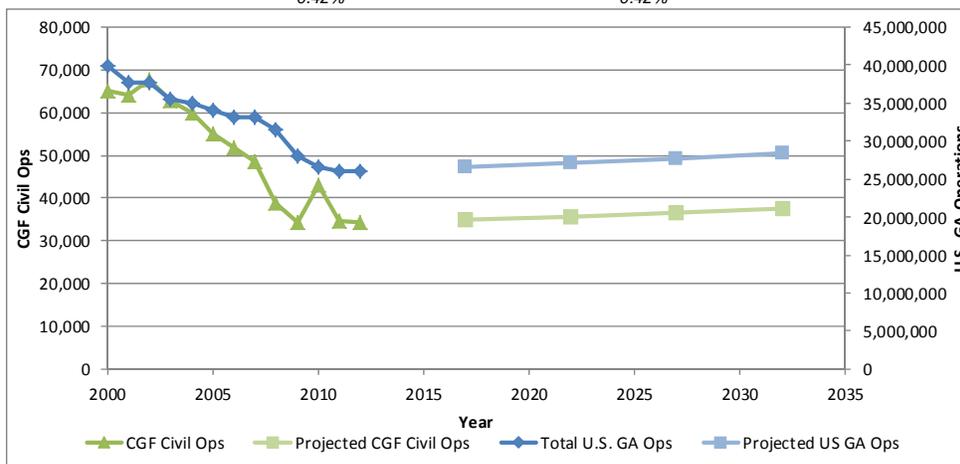
The Operations per Based Aircraft Methodology examines the number of civil operations that occurred in 2012 per based aircraft. In 2012, the number of civil operations per based aircraft was 167. Using the projected number of based aircraft for CGF and assuming this level of operations per based aircraft remains constant throughout the forecasting period, civil operations will increase from 34,393 in 2012 to 37,978 in 2032. The trend line and growth rate methodologies both project continuing declines in

operations based upon the declines experienced since the year 2000, however operations since 2009 have remained fairly consistent. The recent stabilization in operations, combined with the national economic recovery and other indicators, discount projections of continued decline.

The market share methodology compares local activity with a larger entity. In 2012 the Airport's 34,393 civil operations represented 0.1316 percent of the total US general aviation operations. As shown in the following table there is a high correlation between total US general aviation operations and civil operations at CGF, both exhibiting significant declines since 2000, however both recently showing signs that activity levels are beginning to stabilize. Using the FAA's forecasts of total US general aviation operations, and assuming the 2012 market share of 0.1316 percent remains constant throughout the forecasting period, the market share methodology projects civil operations will increase from 34,393 in 2012 to 37,394 in 2032.

Table 1-10: Civil Operations Forecast – Market Share Methodology

Year	Market Share Methodology		
	CGF Civil Ops	Total U.S. GA Ops	Market Share
<b>Historical:</b>			
2000	65,125	39,878,500	0.1633%
2001	63,982	37,626,472	0.1700%
2002	67,605	37,652,701	0.1795%
2003	62,876	35,524,020	0.1770%
2004	59,844	34,967,730	0.1711%
2005	55,024	34,146,800	0.1611%
2006	51,960	33,072,516	0.1571%
2007	48,639	33,131,959	0.1468%
2008	38,976	31,573,810	0.1234%
2009	34,153	28,019,023	0.1219%
2010	43,153	26,580,130	0.1624%
2011	34,628	25,964,931	0.1334%
2012	34,393	26,129,962	0.1316%
<b>Projected:</b>			
2017	34,934	26,540,848	0.1316%
2022	35,715	27,134,396	0.1316%
2027	36,534	27,756,756	0.1316%
2032	37,394	28,409,977	0.1316%
	0.42%	0.42%	

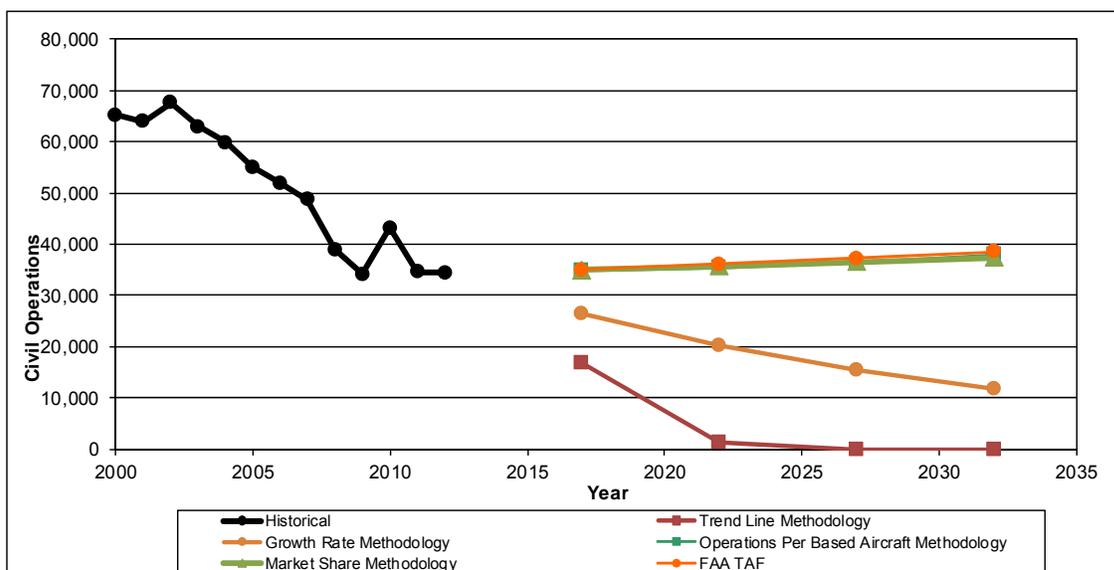


Sources: Historical Operations - Air Traffic Activity Data System (ATADS)  
 Total U.S. GA Operations - FAA Aerospace Forecasts FY 2013-2033  
 Projections - Mead & Hunt

A comparison of projected civil operations using the methodologies described in this section is presented in **Table 1-11**. It is anticipated that the Airport’s number of civil operations will increase proportionally with the number of general aviation operations projected to occur in the US by the FAA. As a result, the Market Share Methodology is the preferred projection, representing a compound annual growth rate of 0.42 percent. Also as shown in the following table, the outcome of this methodology is in extremely close proximity to the Operations per Based Aircraft Methodology and the FAA TAF summary.

Table 1-11: Civil Operations Forecasts Summary

Year	Historical	Trend Line Methodology	Growth Rate Methodology	Operations Per Based Aircraft Methodology	Preferred	
					Market Share Methodology	FAA TAF
<b>Historical:</b>						
2000	65,125					
2001	63,982					
2002	67,605					
2003	62,876					
2004	59,844					
2005	55,024					
2006	51,960					
2007	48,639					
2008	38,976					
2009	34,153					
2010	43,153					
2011	34,628					
2012	34,393					
<b>Projected:</b>						
2017		16,754	26,360	34,805	34,934	34,951
2022		1,279	20,203	35,375	35,715	36,072
2027		0	15,484	36,370	36,534	37,251
2032		0	11,867	37,978	37,394	38,491
CAGR (2012-2032)					0.42%	0.56%



CAGR = Compounded annual growth rate.

Sources: Historical Operations - Air Traffic Activity Data System (ATADS)  
 Projections - Mead & Hunt, Inc., except FAA Terminal Area Forecast Summary

As a part of the projections developed for civil operations, a breakdown of the operations that can be anticipated by local and itinerant aircraft movements, as well as by air carrier, air taxi, and general aviation was also prepared. As defined by the FAA Air Traffic Activity Data System, local operations are those operations performed by aircraft that remain in the local traffic pattern, execute simulated instrument approaches or low passes at an airport and the operations to or from an airport and a designated practice area within a 20-mile radius of the tower. Itinerant operations are operations performed by an aircraft, either IFR, SVFR (special VFR), or VFR that lands at an airport arriving from outside the airport area or departs an airport and leaves the airport area. Air carrier operations are those conducted by aircraft with a seating capacity of more than 60 seats or a payload capacity of more than

18,000 pounds that is operated for hire or compensation, there is generally no air carrier activity occurring at the airport. Air Taxi operations are those conducted for hire or compensation with a seating capacity of 60 seats or less or a maximum payload capacity of 18,000 pounds or less, the air taxi activity at Cuyahoga County is generally small business jets with 4 to 10 seats, and propeller aircraft with 4 to 6 seats. General Aviation operations are civil aircraft operations that are not classified as air carriers or air taxis.

From 2000 to 2012, itinerant general aviation operations averaged 69.1 percent of the total civil operations, while local operations averaged 30.9 percent. Air carrier operations averaged 0%, air taxi 14.6 percent, and itinerant general aviation operations 54.5 percent. It is anticipated that these splits in local/itinerant operations and in air carrier, air taxi, and general aviation operations will remain constant at their averages from throughout the forecasting period. A summary of the projected local and itinerant civil operations is presented in **Table 1-12**.

**Table 1-12: Civil Operations Forecast Summary**

Year	Air Taxi		Itinerant		Total Civil		Local		Total Civil Operations
	Ops	%	General Aviation		Total Civil		Total Civil		
			Ops	%	Ops	%	Ops	%	
<b>Historical:</b>									
2000	9,007	13.8%	43,166	66.3%	52,173	80.1%	12,952	19.9%	65,125
2001	11,325	17.7%	37,224	58.2%	48,549	75.9%	15,433	24.1%	63,982
2002	13,628	20.2%	35,614	52.7%	49,242	72.8%	18,363	27.2%	67,605
2003	11,903	18.9%	31,277	49.7%	43,180	68.7%	19,696	31.3%	62,876
2004	9,971	16.7%	32,023	53.5%	41,994	70.2%	17,850	29.8%	59,844
2005	7,870	14.3%	29,546	53.7%	37,416	68.0%	17,608	32.0%	55,024
2006	8,797	16.9%	27,775	53.5%	36,572	70.4%	15,388	29.6%	51,960
2007	9,115	18.7%	24,774	50.9%	33,889	69.7%	14,750	30.3%	48,639
2008	6,217	16.0%	21,490	55.1%	27,707	71.1%	11,269	28.9%	38,976
2009	4,021	11.8%	20,230	59.2%	24,251	71.0%	9,902	29.0%	34,153
2010	2,987	6.9%	21,829	50.6%	24,816	57.5%	18,337	42.5%	43,153
2011	2,980	8.6%	18,351	53.0%	21,331	61.6%	13,297	38.4%	34,628
2012	3,182	9.3%	18,123	52.7%	21,307	62.0%	13,086	38.0%	34,393
<i>Average (2000-2012)</i>		14.6%		54.5%		69.1%		30.9%	
<b>Projected:</b>									
2017	5,099	14.6%	19,056	54.5%	24,155	69.1%	10,779	30.9%	34,934
2022	5,213	14.6%	19,482	54.5%	24,695	69.1%	11,020	30.9%	35,715
2027	5,333	14.6%	19,929	54.5%	25,262	69.1%	11,273	30.9%	36,534
2032	5,458	14.6%	20,398	54.5%	25,856	69.1%	11,538	30.9%	37,394
<i>CAGR (2012-2032)</i>		2.73%		0.59%		0.97%		-0.63%	

Notes: CAGR = Compounded Annual Growth Rate.

Sources: Historical Operations - Air Traffic Activity Data System (ATADS)  
Projections - Mead & Hunt, Inc.

## 1.6 Military Operations

In 2012 the number of annual military operations conducted at Cuyahoga County Airport was 82. Military operations are driven more by national security policy decisions than by economic factors, therefore it is logical to project military operations will remain consistent with the number conducted in 2012. **Table 3-22** presents the military operations projections.

**Table 3-22: Military Operations Forecast**

Year	Itinerant		Local		Total
	Operations	%	Operations	%	
<b>Historical:</b>					
2000	40	77%	12	23%	52
2001	49	49%	52	51%	101
2002	52	84%	10	16%	62
2003	61	91%	6	9%	67
2004	60	100%	0	0%	60
2005	51	100%	0	0%	51
2006	95	98%	2	2%	97
2007	83	87%	12	13%	95
2008	97	58%	70	42%	167
2009	31	89%	4	11%	35
2010	2	100%	0	0%	2
2011	8	57%	6	43%	14
2012	82	100%	0	0%	82
	<i>Average (2000-2012)</i>	84%		16%	
<b>Projected:</b>					
2017	69	84%	13	16%	82
2022	69	84%	13	16%	82
2027	69	84%	13	16%	82
2032	69	84%	13	16%	82
			<i>CAGR 2012-2032</i>		0.00%

Sources: Historical Military Operations - FAA Air Traffic Activity Data System (ATADS)  
 Projections - Mead & Hunt, Inc.

## 1.7 Instrument Operations

Instrument operations are those conducted by properly equipped aircraft that can utilize radio and global positioning system (GPS) signals emitted by navigational equipment for a pilot to conduct a landing with limited visual cues. Most instrument operations are conducted by general aviation aircraft filing instrument flight plans, and essentially all aircraft operations conducted in IFR weather. From 2000 through 2012 instrument operations at Cuyahoga County Airport have averaged, 31% percent of all aircraft operations (**Table 3-23**). Assuming this percentage remains constant throughout the forecasting period, instrument operations are projected to increase from 10,482 in 2012 to 11,449 in 2032.

**Table 3-23: Instrument Operations Forecast**

Year	Total Operations	Instrument Operations		Visual Operations	
		Operations	Percent	Operations	Percent
<b>Historical:</b>					
2000	65,177	22,579	35%	42,598	65%
2001	64,083	22,290	35%	41,793	65%
2002	67,667	22,928	34%	44,739	66%
2003	62,943	20,753	33%	42,190	67%
2004	59,904	19,382	32%	40,522	68%
2005	55,075	15,616	28%	39,459	72%
2006	52,057	14,890	29%	37,167	71%
2007	48,734	13,385	27%	35,349	73%
2008	39,143	11,479	29%	27,664	71%
2009	34,188	9,972	29%	24,216	71%
2010	43,155	10,597	25%	32,558	75%
2011	34,642	10,610	31%	24,032	69%
2012	34,475	10,482	30%	23,993	70%
		<i>Average (2000-2012)</i>	31%		69%
<b>Projected:</b>					
2017	35,016	10,697	31%	24,319	69%
2022	35,797	10,936	31%	24,861	69%
2027	36,616	11,186	31%	25,430	69%
2032	37,476	11,449	31%	26,027	69%
<i>CAGR (2012-2030)</i>	0.42%		0.44%		0.41%

Notes: CAGR = Compounded Annual Growth Rate.

Sources: Historical Operations - FAA Air Traffic Activity Data System (ATADS) and Mead & Hunt  
Projections - Mead & Hunt, Inc.

## 1.8 Peak Operations

Airfield infrastructure planning is often based on peak periods of aircraft activity. In an effort to measure how well existing facilities can accommodate high levels of demand, this section presents the monthly, daily and hourly peak activity levels for aircraft operations anticipated at the Airport for the next 20 years.

To forecast peak month operations, the average percent of operations accounted for in the peak month is multiplied by the projected number of annual operations, and then divided by the number of days in the peak month. From 2009 to 2012 the peak month has averaged 11.81% of annual operations. Assuming this percentage remains constant throughout the forecasting period, the peak number of operations in a month is anticipated to increase from 3,895 in 2012 to 4,427 in 2032.

The number of aircraft operations in the peak hour for each day was estimated at 18.4 percent based on an average of the peak hour percentage from each day of the peak month. Assuming this percentage remains constant throughout the forecasting period, the number of peak hour operations in the peak month is anticipated to increase from 23 in 2012 to 26 in 2032 (**Table 3-25**).

**Table 3-25: Peak Month, Average Day, and Peak Hour Operations Projections**

		2009		2010		2011		2012	
		Ops	%	Ops	%	Ops	%	Ops	%
<b>Historical:</b>	Jan	1,750	5.1%	1,351	3.1%	1,246	3.6%	1,783	5.2%
	Feb	1,981	5.8%	1,550	3.6%	1,626	4.7%	2,155	6.3%
	Mar	2,954	8.6%	3,696	8.6%	2,591	7.5%	2,857	8.3%
	Apr	2,650	7.8%	4,208	9.8%	2,461	7.1%	2,962	8.6%
	May	3,587	10.5%	4,716	10.9%	3,313	9.6%	3,804	11.0%
	Jun	3,150	9.2%	4,912	11.4%	3,530	10.2%	3,566	10.3%
	Jul	3,257	9.5%	4,818	11.2%	4,716	13.6%	3,182	9.2%
	Aug	3,520	10.3%	4,397	10.2%	3,751	10.8%	3,895	11.3%
	Sep	3,747	11.0%	4,091	9.5%	3,024	8.7%	3,309	9.6%
	Oct	3,179	9.3%	4,275	9.9%	2,866	8.3%	2,570	7.5%
	Nov	2,771	8.1%	3,550	8.2%	3,248	9.4%	2,727	7.9%
	Dec	1,642	4.8%	1,591	3.7%	2,270	6.6%	1,665	4.8%
		<b>Total</b>	<b>34,188</b>		<b>43,155</b>		<b>34,642</b>		<b>34,475</b>
	<i>Peak Month</i>	<i>3,747</i>	<i>11.0%</i>	<i>4,912</i>	<i>11.4%</i>	<i>4,716</i>	<i>13.6%</i>	<i>3,895</i>	<i>11.3%</i>
	<i>Peak Month</i>	<i>Sept</i>		<i>June</i>		<i>July</i>		<i>Aug</i>	
						Average Percent of Annual in Peak Month		11.81%	
						2012 PMAD Operations		126	
						PMAD Peak Hour Operations <sup>1</sup>		23	
<b>Projected:</b>		<b>Annual Ops</b>	<b>Peak Mnth %</b>	<b>PM Ops</b>	<b>PMAD Ops</b>	<b>Peak Hr<sup>1</sup> %</b>	<b>PH Ops</b>		
	2017	35,016	11.81%	4,137	133	18.40%	25		
	2022	35,797	11.81%	4,229	136	18.40%	25		
	2027	36,616	11.81%	4,326	140	18.40%	26		
	2032	37,476	11.81%	4,427	143	18.40%	26		
	<i>CAGR (2012-2032)</i>	<i>0.42%</i>		<i>0.64%</i>		<i>0.64%</i>			

Notes: CAGR = Compounded Annual Growth Rate.  
 PM = Peak Month; PMAD = Peak Month Avg Day  
<sup>1</sup>Peak Hour percentage for each day in Aug 2012 averaged 18.4%

Sources: Historical Monthly Operations - FAA Air Traffic Activity Data System (ATADS)  
 Projections - Mead & Hunt, Inc.

### 1.9 Design Aircraft – Operations by Type

It is important to determine the most demanding aircraft operating at an airport, or “design aircraft”, as these aircraft have a direct influence on airfield geometric design standards and safety criteria. The design aircraft for an airport are identified by a Runway Reference Code (RRC) and Runway Design Code (RDC). The RRC signifies the current operational capabilities of a runway and its associated parallel taxiway, and the RDC signifies the standards to which the runway is to be built. The RRC and RDC for a particular aircraft consist of two components: Approach Category (based on approach speed) and Design Group (based on wingspan and tail height). FAA standard definitions for aircraft Approach Categories and Design Groups are listed in **Table 3-26**.

**Table 3-26: Aircraft Approach Category and Design Group Definitions**

Approach Category	Approach Speed (knots)	
A	Less than 91 knots	
B	91 or greater, but less than 121	
C	121 or greater, but less than 141	
D	141 or greater, but less than 166	
E	166 or greater	

Design Group	Wingspan (feet)	Tail Height (feet)
I	<49	<20
II	49 - <79	20 - <30
III	79 - <118	30 - <45
IV	118 - <171	45 - <60
V	171 - <214	60 - <66
VI	214 - <262	66 - <80

Source: FAA Advisory Circular 150/5300-13A, Airport Design

**Table 3-27** summarizes the number of IFR operations recorded in 2012; also noting the Approach Category and Design Group for each of the jet equipment types. The number of IFR Operations is also expressed as a percentage of the total IFR operations. IFR Operations numbers are used here in order to present the information associated with the Approach Category and Design Group which combine to express the RRC.

The most demanding aircraft at CGF for wingspan are ADG III. Aircraft operating at CGF in this category include the Gulfstream G500, and the Falcon 7X. Several jet aircraft in the ADG II operate at CGF with the most frequent being the Cessna Excel/XLS. The most frequent jet operations overall were made by the Raytheon/Beech Beechjet 400 which is ADG I. The most demanding aircraft for approach speed are Approach Category D which includes the Gulfstream G150, G400, G500, and a number of Learjet models. A combination of these two measures produces the RRC D-III as the most demanding category.

Table 3-27: Historical IFR Operations by Aircraft Type

Physical Class	Aircraft	Approach Category	Design Group	2012	
				IFR Operations	Percent By Type
Jet	BE40 - Raytheon/Beech Beechjet 400/T-1	C	I	1,469	14.0%
Jet	LJ45 - Bombardier Learjet 45	D	I	923	8.8%
Jet	C56X - Cessna Excel/XLS	C	II	594	5.7%
Jet	H25B - BAe HS 125/700-800/Hawker 800	C	II	507	4.8%
Jet	CL30 - Bombardier (Canadair) Challenger 300	C	II	499	4.8%
Jet	C750 - Cessna Citation X	C	II	350	3.3%
Jet	GLF4 - Gulfstream IV/G400	D	II	246	2.3%
Jet	C560 - Cessna Citation V/Ultra/Encore	B	II	211	2.0%
Jet	E55P - Embraer Phenom 300	B	II	187	1.8%
Jet	WW24 - IAI 1124 Westwind	C	I	177	1.7%
Jet	GLF5 - Gulfstream V/G500	D	III	150	1.4%
Jet	CL60 - Bombardier Challenger 600/601/604	C	II	139	1.3%
Jet	C680 - Cessna Citation Sovereign	B	II	137	1.3%
Jet	GALX - IAI 1126 Galaxy/Gulfstream G200	C	II	127	1.2%
Jet	E135 - Embraer ERJ 135/140/Legacy	C	II	115	1.1%
Jet	FA7X - Dassault Falcon F7X	B	III	114	1.1%
Jet	All others (Representative Types - Citation Jet, Falcon 2000, Global Express, Learjets)	various	various	1,069	10.2%
<b>Subtotal Jets</b>				<b>7,014</b>	<b>66.9%</b>
Turbine	PC12 - Pilatus PC-12			221	2.1%
Turbine	BE20 - Beech 200 Super King			160	1.5%
Turbine	P180 - Piaggio P-180 Avanti			140	1.3%
Turbine	TBM7 - Socata TBM-7			118	1.1%
Turbine	C441 - Cessna Conquest			114	1.1%
Turbine	BE9L - Beech King Air 90			94	0.9%
Turbine	All others (Representative Types - Piper Cheyenne, Malibu, King Air 350, TBM850)			350	3.3%
<b>Subtotal Turbines</b>				<b>1,197</b>	<b>11.4%</b>
Piston	BE36 - Beech Bonanza 36			264	2.5%
Piston	C172 - Cessna Skyhawk 172/Cutlass			173	1.6%
Piston	SR22 - Cirrus SR 22			165	1.6%
Piston	C310 - Cessna 310			151	1.4%
Piston	DA40 - Diamond Star DA40			149	1.4%
Piston	C182 - Cessna Skylane 182			133	1.3%
Piston	AA5 - American AA-5 Traveler			121	1.2%
Piston	BE58 - Beech 58			98	0.9%
Piston	All others (Representative Types - Piper Cherokee, Beech Baron, Cessna 340, Mooney, Piper Navajo)			1,016	9.7%
<b>Subtotal Pistons</b>				<b>2,270</b>	<b>21.6%</b>
Helicopters	All types (Sikorsky SH-60, S-76, Eurocopter 135)			10	0.1%
<b>Total IFR Operations</b>				<b>10,491</b>	<b>100.0%</b>

Source: 2012 IFR Operations - FAA Traffic Flow Management System Counts (TFMSC), and FAA Aviation System Performance Metrics (ASPM)  
Projected Percent by Type - Mead & Hunt, Inc.

**Table 3-28** summarizes the number of historical and projected operations by Approach Category and Design Group. Projections for operations by type were made from the Historic IFR operations by type presented in **Table 3-27** in this report, for projected itinerant operations and projected local operations by type were estimated based upon conversations with Airport Management and the Airport Traffic Control Tower personnel. As the fleet mix is not anticipated to change significantly through the planning period, these percentages by type are applied to projections of itinerant and local operations.

Table 3-28: Historical and Projected IFR Operations by Aircraft Type

Physical Class	Aircraft	Projected Percent by Type		2012 Estimated Ops by Type			2017 Projected Ops			2022 Projected Ops			2027 Projected Ops			2032 Projected Ops		
		Itinerant	Local	Itinerant	Local	Total	Itinerant	Local	Total	Itinerant	Local	Total	Itinerant	Local	Total	Itinerant	Local	Total
Jet	BE40 - Raytheon/Beech Beechjet 400/T-1	14.0%	1.0%	2,995	131	3,126	3,392	108	3,500	3,468	110	3,578	3,547	113	3,660	3,630	116	3,746
Jet	LJ45 - Bombardier Learjet 45	8.8%	0.5%	1,882	65	1,947	2,131	54	2,185	2,179	55	2,234	2,229	56	2,285	2,281	58	2,339
Jet	C56X - Cessna Excel/XLS	5.7%	0.5%	1,211	65	1,276	1,372	54	1,426	1,402	55	1,457	1,434	56	1,491	1,468	58	1,526
Jet	H25B - BAe HS 125/700-800/Hawker 800	4.8%	0.5%	1,034	65	1,099	1,171	54	1,225	1,197	55	1,252	1,224	56	1,281	1,253	58	1,311
Jet	CL30 - Bombardier (Canadair) Challenger 300	4.8%	0.5%	1,017	65	1,083	1,152	54	1,206	1,178	55	1,233	1,205	56	1,261	1,233	58	1,291
Jet	C750 - Cessna Citation X	3.3%	0.5%	714	65	779	808	54	862	826	55	881	845	56	902	865	58	923
Jet	GLF4 - Gulfstream IV/G400	2.3%	0.5%	502	65	567	568	54	622	581	55	636	594	56	650	608	58	666
Jet	C560 - Cessna Citation V/Ultra/Encore	2.0%	0.0%	430	0	430	487	0	487	498	0	498	509	0	509	521	0	521
Jet	E55P - Embraer Phenom 300	1.8%	0.0%	381	0	381	432	0	432	441	0	441	452	0	452	462	0	462
Jet	WW24 - IAI 1124 Westwind	1.7%	0.0%	361	0	361	409	0	409	418	0	418	427	0	427	437	0	437
Jet	GLF5 - Gulfstream V/G500	1.4%	0.0%	306	0	306	346	0	346	354	0	354	362	0	362	371	0	371
Jet	CL60 - Bombardier Challenger 600/601/604	1.3%	0.0%	283	0	283	321	0	321	328	0	328	336	0	336	343	0	343
Jet	C680 - Cessna Citation Sovereign	1.3%	0.0%	279	0	279	316	0	316	323	0	323	331	0	331	339	0	339
Jet	GALX - IAI 1126 Galaxy/Gulfstream G200	1.2%	0.0%	259	0	259	293	0	293	300	0	300	307	0	307	314	0	314
Jet	E135 - Embraer ERJ 135/140/Legacy	1.1%	0.0%	234	0	234	266	0	266	271	0	271	278	0	278	284	0	284
Jet	FA7X - Dassault Falcon F7X	1.1%	0.0%	232	0	232	263	0	263	269	0	269	275	0	275	282	0	282
Jet	All others (Representative Types - Citation Jet, Falcon 2000, Global Express, Learjets)	10.2%	1.0%	2,179	131	2,310	2,468	108	2,576	2,523	110	2,634	2,581	113	2,694	2,642	116	2,757
<b>Subtotal Jets</b>		<b>66.9%</b>	<b>5.0%</b>	<b>14,300</b>	<b>654</b>	<b>14,954</b>	<b>16,195</b>	<b>540</b>	<b>16,735</b>	<b>16,557</b>	<b>552</b>	<b>17,108</b>	<b>16,935</b>	<b>564</b>	<b>17,500</b>	<b>17,333</b>	<b>578</b>	<b>17,910</b>
Turbine	PC12 - Pilatus PC-12	2.1%	1.0%	451	131	581	510	108	618	522	110	632	534	113	646	546	116	662
Turbine	BE20 - Beech 200 Super King	1.5%	1.0%	326	131	457	369	108	477	378	110	488	386	113	499	395	116	511
Turbine	P180 - Piaggio P-180 Avanti	1.3%	1.0%	285	131	416	323	108	431	330	110	441	338	113	451	346	116	461
Turbine	TBM7 - Socata TBM-7	1.1%	1.0%	241	131	371	272	108	380	279	110	389	285	113	398	292	116	407
Turbine	C441 - Cessna Conquest	1.1%	0.0%	232	0	232	263	0	263	269	0	269	275	0	275	282	0	282
Turbine	BE9L - Beech King Air 90	0.9%	0.0%	192	0	192	217	0	217	222	0	222	227	0	227	232	0	232
Turbine	All others (Representative Types - Piper Cheyenne, Malibu, King Air 350, TBM850)	3.3%	1.0%	714	131	844	808	108	916	826	110	937	845	113	958	865	116	980
<b>Subtotal Turbines</b>		<b>11.4%</b>	<b>5.0%</b>	<b>2,440</b>	<b>654</b>	<b>3,095</b>	<b>2,764</b>	<b>540</b>	<b>3,303</b>	<b>2,826</b>	<b>552</b>	<b>3,377</b>	<b>2,890</b>	<b>564</b>	<b>3,454</b>	<b>2,958</b>	<b>578</b>	<b>3,536</b>
Piston	BE36 - Beech Bonanza 36	2.5%	10.0%	538	1,309	1,847	610	1,079	1,689	623	1,103	1,726	637	1,129	1,766	652	1,155	1,807
Piston	C172 - Cessna Skyhawk 172/Cutlass	1.6%	7.0%	353	916	1,269	399	755	1,155	408	772	1,181	418	790	1,208	428	809	1,236
Piston	SR22 - Cirrus SR 22	1.6%	7.0%	336	916	1,252	381	755	1,136	389	772	1,162	398	790	1,188	408	809	1,216
Piston	C310 - Cessna 310	1.4%	6.0%	308	785	1,093	349	648	996	356	662	1,018	365	677	1,042	373	693	1,066
Piston	DA40 - Diamond Star DA40	1.4%	6.0%	304	785	1,089	344	648	992	352	662	1,014	360	677	1,037	368	693	1,061
Piston	C182 - Cessna Skylane 182	1.3%	5.0%	271	654	925	307	540	847	314	552	866	321	564	885	329	578	906
Piston	AA5 - American AA-5 Traveler	1.2%	4.0%	247	523	770	279	432	711	286	441	727	292	451	744	299	462	761
Piston	BE58 - Beech 58	0.9%	3.0%	200	393	592	226	324	550	231	331	562	237	339	575	242	347	589
Piston	All others (Representative Types - Piper Cherokee, Beech Baron, Cessna 340, Mooney, Piper Navajo)	9.7%	40.0%	2,071	5,234	7,306	2,346	4,317	6,663	2,398	4,413	6,811	2,453	4,514	6,967	2,511	4,620	7,131
<b>Subtotal Pistons</b>		<b>21.6%</b>	<b>88.0%</b>	<b>4,628</b>	<b>11,516</b>	<b>16,144</b>	<b>5,241</b>	<b>9,497</b>	<b>14,738</b>	<b>5,358</b>	<b>9,709</b>	<b>15,067</b>	<b>5,481</b>	<b>9,932</b>	<b>15,412</b>	<b>5,610</b>	<b>10,165</b>	<b>15,775</b>
Helicopter	All types (Sikorsky SH-60, S-76, Eurocopter 135)	0.1%	2.0%	20	262	282	23	216	239	24	221	244	24	226	250	25	231	256
<b>Total Operations</b>		<b>100.0%</b>	<b>100.0%</b>	<b>21,389</b>	<b>13,086</b>	<b>34,475</b>	<b>24,224</b>	<b>10,792</b>	<b>35,016</b>	<b>24,764</b>	<b>11,033</b>	<b>35,797</b>	<b>25,330</b>	<b>11,286</b>	<b>36,616</b>	<b>25,925</b>	<b>11,551</b>	<b>37,476</b>

Source: FAA Traffic Flow Management System Counts (TFMSC), Aviation System Performance Metrics (ASPM)  
Projections - Mead & Hunt

FAA Advisory Circular (AC) 150/5300-13A, *Airport Design*, states the following regarding selection of a design aircraft:

*The design aircraft enables airport planners and engineers to design the airport in such a way as to satisfy the operational requirements of such aircraft and meet national standards for separation and geometric design (safety issues). The “design” aircraft may be a single aircraft or a composite of several different aircraft composed of the most demanding characteristics of each.*

This FAA guidance document also states the following regarding selection of a design aircraft for federally funded projects:

*The FAA administers a grant program (Order 5100.38) which provides financial assistance for developing public-use airports. Persons interested in the program can obtain information from the FAA Airports Regional Office or Airports District Office (ADO) that serves their geographic area. Consult these offices for assistance with selection of the design aircraft for federally funded projects, which depends on demand factors that are beyond the scope of this AC.*

FAA Order 5090.3C, Field Formulation of the National Plan of Integrated Airport Systems (NPIAS) defines “substantial use” as 500 or more annual itinerant operations, or scheduled commercial service, by the design or critical aircraft to be eligible for federal funding participation.

An examination of the RRC for each of the jet operations presented in Table 3-28 was performed to determine the number operations by Approach Category and Design Group. The operations by Approach Category and Design Group are summarized in **Table 3-29**. The current design aircraft is a D-III aircraft, and the future design aircraft is also recommended as a D-III aircraft as the fleet mix is not expected to change significantly over the planning period.

Table 3-29: Historical and Projected Jet Operations by Approach Category and Design Group

Approach Category	2012 Jet Operations		Projected Jet Operations			
	Jet Operations	Percent by Group	2017	2022	2027	2032
A	0	0.0%	0	0	0	0
B	2,649	17.7%	2,869	2,933	3,000	3,070
C	8,963	59.9%	9,707	9,923	10,150	10,388
D	3,342	22.4%	3,620	3,700	3,785	3,874
Total	14,954	100.0%	16,195	16,557	16,935	17,333
<b>Design Group</b>						
I	6,783	45.4%	7,346	7,510	7,681	7,862
II	7,421	49.6%	8,036	8,216	8,404	8,601
III	751	5.0%	813	831	850	870
IV	0	0.0%	0	0	0	0
Total	14,954	100.0%	16,195	16,557	16,935	17,333

Source: FAA Traffic Flow Management System Counts (TFMSC),  
 FAA Aviation System Performance Metrics (ASPM)  
 Projections - Mead & Hunt, Inc

Based on the design aircraft identified above, D-III is the current RDC for Runway 6/24, and this designation is recommended for planning purposes through 2032.

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## 1.10 Forecast Summary and FAA TAF Comparison

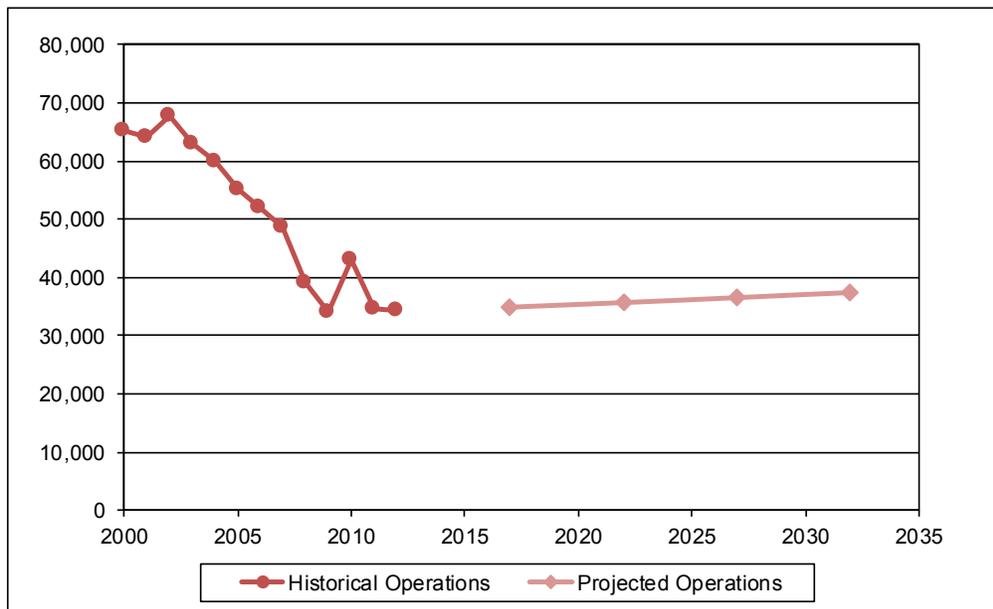
The number and type of operations activity at the Cuyahoga County Airport has fluctuated in recent history. This is not uncommon in comparison to many US airports as economic uncertainty and increased travel costs have impacted travel behavior. Despite increases in fuel cost, and an economic downturn that has seen a slow recovery, the forecasts developed here suggest based aircraft and total aircraft operations will grow modestly at the Airport over the next 20 years. The stabilization and expected increase in general aviation activity at CGF over the planning period mirrors the FAA's expectation that general aviation will experience modest growth at the national level. The FAA's national forecast is based on national economic and aviation trends including US Real Gross Domestic Product forecasts, the size of the national general aviation fleet, and the national general aviation hours flown. A summary of these projections is presented in **Table 3-30**. A summary of these forecasts is also presented in specific FAA required tabular formats in **Table 3-31** and **Table 3-32**.

As was noted earlier, forecasts that differ from the FAA TAF projections by more than 15% are considered inconsistent with the TAF and require FAA HQ review.

In this case, the preferred projection of Civil Operations based on the Market Share Methodology is almost identical to the TAF projections for operations. The numbers differ by a less than 1% in 2017 and by less than 3% in 2032. These ranges are certainly within the parameters of variation to be considered consistent with the TAF. The Operations per Based Aircraft numbers also resulted in projections that varied by less than 2% from the TAF and from the preferred methodology over the 20-year planning horizon. This consistency across methodologies offers support to the conclusion that operations will continue to increase at a modest rate through 2032.

Table 3-30: Projections Summary

Year	Operations				Based Aircraft
	Air Taxi	General Aviation	Military	Total	
<b>Historical</b>					
2000	9,007	56,118	52	65,177	158
2001	11,325	52,657	101	64,083	186
2002	13,628	53,977	62	67,667	186
2003	11,903	50,973	67	62,943	206
2004	9,971	49,873	60	59,904	206
2005	7,870	47,154	51	55,075	301
2006	8,797	43,163	97	52,057	206
2007	9,115	39,524	95	48,734	206
2008	6,217	32,759	167	39,143	182
2009	4,021	30,132	35	34,188	182
2010	2,987	40,166	2	43,155	133
2011	2,980	31,648	14	34,642	133
2012	3,182	31,209	82	34,475	206
<b>Projected</b>					
2017	5,099	29,834	82	35,016	208
2022	5,213	30,502	82	35,797	212
2027	5,333	31,201	82	36,616	218
2032	5,458	31,936	82	37,476	227
CAGR (2012-2032)	2.73%	0.12%	0.00%	0.42%	0.50%



Note: Air Taxi activity at Cuyahoga County is generally small business jets with 4 to 10 seats, and propeller aircraft with 4 to 6 seats.

Source: Historical Enplanements - FAA TAF  
 Historical Operations - Air Traffic Activity Data System (ATADS)  
 Historical Based Aircraft -FAA Terminal Area Forecast  
 Projections - Mead & Hunt, Inc.

Table 3-31: FAA Template – Forecast Levels and Growth Rates

	Specify base year: 2012					Average CAGR			
	2012	2017	2022	2027	2032	Base Yr. + 5yr.	Base Yr. + 10yrs.	Base Yr. + 15yrs.	Base Yr. + 20yrs.
	Base Yr. Level	Base Yr. + 5yr.	Base Yr. + 10yrs.	Base Yr. + 15yrs.	Base Yr. + 20yrs.				
<b>Operations</b>									
<u>Itinerant</u>									
Commuter/air taxi	3,182	5,099	5,213	5,333	5,458	9.9%	5.1%	3.5%	2.7%
Total Commercial Operations	3,184	5,099	5,213	5,333	5,459	9.9%	5.1%	3.5%	2.7%
General aviation	18,123	19,056	19,482	19,929	20,398	1.0%	0.7%	0.6%	0.6%
Military	82	69	69	69	69	-3.5%	-1.8%	-1.2%	-0.9%
<u>Local</u>									
General aviation	13,086	10,779	11,020	11,273	11,538	-3.8%	-1.7%	-1.0%	-0.6%
Military	0	13	13	13	13	NA	NA	NA	NA
TOTAL OPERATIONS	34,475	35,016	35,797	36,616	37,476	0.3%	0.4%	0.4%	0.4%
<b>Instrument Operations</b>	10,482	10,697	10,936	11,186	11,449	0.4%	0.4%	0.4%	0.4%
<b>Peak Hour Operations</b>	23	25	25	26	26	1.2%	0.8%	0.7%	0.6%
<b>Based Aircraft</b>									
Single Engine (Nonjet)	88	88	89	89	91	-0.1%	0.1%	0.1%	0.2%
Multi Engine (Nonjet)	19	19	21	22	23	-0.3%	1.1%	0.9%	0.9%
Jet Engine	98	100	102	105	111	0.4%	0.4%	0.4%	0.6%
Helicopter	1	1	1	2	2	7.9%	4.0%	5.3%	4.2%
Other	0	0	0	0	0	NA	NA	NA	NA
TOTAL	206	208	213	218	227	0.2%	0.4%	0.4%	0.5%
<b>B. Operational Factors</b>									
	Base Yr. Level	Base Yr. + 5yr.	Base Yr. + 10yrs.	Base Yr. + 15yrs.	Base Yr. + 20yrs.				
<b>Average aircraft size (seats)</b>									
Air carrier & Commuter	NA	NA	NA	NA	NA				
<b>Average enplaning load factor</b>									
Air carrier & Commuter	NA	NA	NA	NA	NA				
<b>GA operations per based aircraft</b>	152	144	143	143	140				

CAGR = Compound Annual Growth Rate

Table 3-32: FAA Template – Forecast Levels and Growth Rates

	<u>Year</u>	<u>Airport Forecast</u>	<u>TAF</u>	<u>AF/TAF (% Difference)</u>
<b>Air Taxi</b>				
Base Yr. Level	2012	3,184	4,465	-28.7%
Base Yr. + 5yr.	2017	5,099	3,444	48.1%
Base Yr. + 10yrs.	2022	5,213	3,831	36.1%
Base Yr. + 15yrs.	2027	5,333	4,255	25.3%
Base Yr. + 20yrs.	2032	5,459	4,719	15.7%
<b>Total Operations</b>				
Base Yr. Level	2012	34,475	34,455	0.1%
Base Yr. + 5yr.	2017	35,016	35,026	0.0%
Base Yr. + 10yrs.	2022	35,797	36,147	-1.0%
Base Yr. + 15yrs.	2027	36,616	37,326	-1.9%
Base Yr. + 20yrs.	2032	37,476	38,566	-2.8%

**NOTES:** TAF data is on a U.S. Government fiscal year basis (October through September).

Airport Forecast is on a calendar year basis.

Air Taxi activity at Cuyahoga County is generally small business jets with 4 to 10 seats, and propeller aircraft with 4 to 6 seats.