CHAPTER THREE

AVIATION DEMAND PROJECTIONS

3-1 INTRODUCTION

Projecting aviation demand is a critical element in the overall master planning process. This process defines an airport's ability to accommodate aircraft and operations, thus determining the type, size, and timing of future airside and landside facility development. Projections of aviation demand through 2023 were prepared for based aircraft, the based aircraft fleet mix, and aircraft operations for Harry Clever Airfield.

This forecast analysis includes methodologies that consider historical aviation trends at the Airport and throughout the nation. Local historical data were collected from FAA 5010 forms, FAA Terminal Area Forecast (TAF) records, and airport records. In addition, demographic data for Tuscarawas County were used to track local trends and conditions that can impact general aviation demand levels. The base year for these forecasts is 2003. Projections of aviation activity for the Airport were prepared for the near-term (2008), mid-term (2013), and long-term (2018 and 2023) timeframes.

This chapter discusses the findings and methodologies used to project based aircraft and operations for Harry Clever Field. Although these forecasts provide a meaningful guide to the future development of the Airport, it must be recognized that there are often short-term fluctuations in an airport's activity due to a variety of factors. The projections of aviation demand are documented in the following sections:

- General Aviation Trends
- Based Aircraft Projections
- Aircraft Operations Projections
- Critical Aircraft
- Summary

3-2 GENERAL AVIATION TRENDS

To provide insight into understanding the factors that affect aviation-related activities at Harry Clever Airfield, a brief discussion of general aviation trends is helpful. Several key indicators measured annually by the FAA provide valuable information for understanding the national trends that may be affecting any particular airport throughout the national system of general aviation airports. These key indicators include active general aviation aircraft, general aviation hours flown, and active pilots. Recent trends and growth forecasts for these indicators are shown in **Table 3-1**.

Table 3-1
FAA AEROSPACE FORECASTS
Active Aircraft, Hours Flown, Active Pilots

Year	Total Active Aircraft	Percent Growth	Total Hours Flown (000's)	Percent Growth	Total Active Pilots	Percent Growth
2000	217,533	-0.9%	30,973	-2.5%	631,629	-0.9%
2001	211,447	-2.8%	29,133	-5.9%	657,490	4.1%
2002E	211,040	-0.2%	29,455	1.1%	661,358	0.6%
2003	211,370	0.2%	29,795	1.2%	664,800	0.5%
2004	213,120	0.8%	30,200	1.4%	670,880	0.9%
2005	215,490	1.1%	30,710	1.7%	680,095	1.4%
2006	217,055	0.7%	31,195	1.6%	690,775	1.6%
2007	218,820	0.8%	31,695	1.6%	702,060	1.6%
2008	220,595	0.8%	32,220	1.7%	713,970	1.7%
2009	222,150	0.7%	32,700	1.5%	725,415	1.6%
2010	223,720	0.7%	33,205	1.5%	736,195	1.5%
2011	225,170	0.6%	33,718	1.5%	746,715	1.4%
2012	226,610	0.6%	34,215	1.5%	757,070	1.4%
2013	228,060	0.6%	34,750	1.6%	767,380	1.4%
2014	229,490	0.6%	35,290	1.6%	777,730	1.3%
CAGR 2000-2002E		-1.5%		-2.5%		2.3%
CAGR 2002E-2014		0.7%		1.5%		1.4%

Source: FAA Aerospace Forecasts, Fiscal Years 2003-2014
E = Estimate

The FAA annually tracks the number of active general aviation aircraft in the U.S. Active aircraft are those aircraft that are currently registered and fly at least one hour during the year. By tracking this information, the FAA is able to identify trends in the total number of active aircraft, as well as the types of aircraft operating in the active fleet. Any changes in the number of active aircraft in the national fleet are generally anticipated to be reflected in similar changes to based aircraft in local fleets throughout the country. As shown in **Table 3-1**, the total active aircraft fleet is forecast to experience an average annual growth rate of 0.7 percent between 2002 and 2014. There was a decline during 2000 and 2002. It should be noted that one of the most significant trends identified by the FAA in these forecasts is the relatively strong growth anticipated in active general aviation jet aircraft. This trend illustrates a movement in the general aviation community towards higher-performing, more demanding aircraft. Growth in general aviation jet aircraft is expected to outpace growth in all other segments of the general aviation aircraft fleet, with an annual growth rate of 4.0 percent through 2014.

The FAA also records the total hours flown by type of aircraft in the active general aviation fleet. As shown in **Table 3-1**, the total hours flown declined in 2000 and 2001. This decrease occurred primarily in the segments of single and multi-engine aircraft. Increases in jet hours flown, while steady, could not offset the significant decreases in single engine hours flown. A sign of an expected economic turnaround, the total hours flown are forecast by the FAA to experience an average annual growth rate of 1.5 percent between 2002 and 2014.

Of particular interest is the increase in active pilots between 2000 and 2001, when the active pilot population grew by over 25,800 pilots. The majority of this increase occurred in the private and commercial certificate segments, where the combined increases accounted for more than 26,100 pilots. During this period, segments such as student, rotorcraft and glider pilots experienced declines. The most significant decline occurred in the student pilot segment, where a decline of nearly 4,700 pilots was recorded. The previously published FAA forecast did not predict this event.

The nature of general aviation activity is illustrated in the data presented in this overview, and can be characterized as undergoing significant change. Historically, general aviation activity and active aircraft experienced steady growth in all areas, however, the terrorist attacks of 2001 and the economic downturn dampened activity over the last several years. These events happened to coincide with shifts in the active general aviation fleet that are showing signs of increased jet aircraft use. A rebound in active pilots in 2001 presents a positive signal of growth for the future. These two factors are reflected in FAA projections that show varied growth over the next several years, and most components of general aviation activity are projected to soon surpass previous activity levels.

3-3 BASED AIRCRAFT PROJECTIONS

This section discusses the methodology and conclusions resulting from developing projections of based aircraft under several scenarios. These scenarios reflect varying growth rates for demographic data in Tuscarawas County, along with activity growth rates used in the development of aerospace forecasts by the FAA. The projections are documented in the following sections.

- Demographic Trends
- National Trends
- Unrestricted Growth
- Summary
- Preferred Based Aircraft Projections
- Based Aircraft Fleet Mix Projections

3-3-1 Demographic Trends

There are a number of demographic factors that impact, to varying degrees, the demand for general aviation in any particular region. In addition to population trends, regional economic trends also can significantly impact aviation demand. Regional economic trends are summarized in this analysis through an examination of employment and earnings data.

Several reliable data sources were used. Historic and projected population data was obtained from the U.S. Census and the Ohio State University Extension Data Center. Employment and per capita income data were obtained from the U.S. Department of Commerce and Woods & Poole.

Tuscarawas County is located in east central Ohio. The City of New Philadelphia is the county seat and most populous area in the county. The county experienced modest growth in the 1990s, increasing from a population of 84,090 in 1990 to 90,914 in 2000, as shown in **Table 3-2**. This

represents a compound annual growth rate (CAGR) of 0.8 percent, slightly above the state average CAGR of 0.5 percent for the same period.

Table 3-2
HISTORIC POPULATION GROWTH

	Tuscarawas County	Ohio
1990	84,090	10,847,115
2000	90,914	11,353,140
CAGR	0.8%	0.5%

Source: Ohio State University Extension Data Center

Future population growth, as forecast by the Ohio State University Extension Data Center, is expected to slow to the same rate as the rest of the state, as shown in **Table 3-3**. Both the state and Tuscarawas County population are projected to grow at a rate of 0.3 percent.

Table 3-3
PROJECTED POPULATION

	Year	Tuscarawas County Population	Ohio Population
Historic	2003	91,199	11,447,254
Projected	2008	92,454	11,604,111
	2013	93,660	11,768,518
	2018	95,244	11,937,957
	2023	96,398	12,099,297
CAGR (2003-2023)		0.3%	0.3%

Source: Ohio State University Extension Data Center and Wilbur Smith Associates

Employment and per capita income for the county are expected to outpace the growth in population. Both employment and per capita income can be indicators of the potential demand for aviation services.

Since 1999, the county has had a CAGR in employment of 1.7 percent, as shown in **Table 3-4**. This outperformed the state of Ohio, which experienced a decline of 0.2 percent in employment from 1998 to 2002. Future growth in employment in the county is expected to slow to a rate of 0.8 percent, which is still three times the rate of population growth.

In 2000, the manufacturing sector provided the largest number of jobs, with more than 9,400 employees, or 26 percent, among the businesses tracked by the data. By 2001, the manufacturing sector was only employing approximately 9,000 workers, or about 25 percent of the tracked work force. The health care and social assistance sector showed the most growth, employing more than 3,800 workers in 2000, and nearly 4,000 in 2001. Among the major manufacturing employers in Tuscarawas County are Allied Machine & Engineering, JLG Industries/Gradall

Company, Lauren International, Smerfit-Stone Container Corporation, and Zimmer Holdings. Union Hospital Association is also a major employer in the region.

Table 3-4
HISTORIC AND PROJECTED EMPLOYMENT GROWTH

	Year	Tuscarawas County Employment
Historic	1999	48,109
	2000	49,069
	2001	49,923
	2002	50,688
	2003	51,399
CAGR (1999-2003)		1.7%
Projected	2008	54,351
	2013	56,695
	2018	58,792
	2023	60,711
CAGR (2003-2023)		0.8%

Source: Historic data: U.S. Department of Commerce; projected data: Woods & Poole

Statistical analysis typically indicates that regional per capita income is one of the most important demographic factors impacting aviation demand, illustrating an underlying assumption that as per capita income, and consequently, discretionary income grows, regional residents have more to spend on all goods and services, including aviation-related activities.

Per capita income in Tuscarawas County has been increasing at a CAGR of 1.9 percent since 1999, as shown in **Table 3-5**. This lagged behind the state of Ohio, which experienced a growth rate of 3.2 percent from 1998 to 2002. Future years are expected to see a slightly slower growth in the county's per capita income, with a CAGR of 1.1 percent during the forecast period.

Tuscarawas County has shown a trend of modest but steady growth. Historically, it has shown better growth than the state overall. Its future prospects indicate that growth is expected to slow somewhat, but continue at a steady pace.

Three forecasts of based aircraft were developed using projections of demographic data. This resulted in the forecasts shown in **Table 3-6**. The forecast based on population growth resulted in the lowest projection of based aircraft, increasing from 51 to 54 aircraft.

The forecast based on per capita income growth resulted in the highest projection, increasing from 51 to 62 based aircraft.

Table 3-5
HISTORIC AND PROJECTED PER CAPITA INCOME

	Year	Tuscarawas County per Capita Income /1
Historic	1999	$20,385
	2000	$20,780
	2001	$21,208
	2002	$21,603
	2003	$21,975
CAGR (1999-2003)		1.9%
Projected	2008	$23,604
	2013	$24,961
	2018	$26,190
	2023	$27,330
CAGR (2003-2023)		1.1%

/1 Adjusted for inflation.
Source: Historic data: U.S. Department of Commerce;
Projected data: Woods & Poole

Table 3-6
BASED AIRCRAFT FORECAST USING DEMOGRAPHIC PROJECTIONS

	Population Growth	Employment Growth	Per Capita Income Growth
CAGR	0.3%	0.8%	1.1%
Historical			
2003	51	51	51
Forecast			
2008	52	53	54
2013	52	55	56
2018	53	57	59
2023	54	59	62

Source: Wilbur Smith Associates

3-3-2 National Trends

On an annual basis, the FAA publishes its Aerospace Forecasts that summarize anticipated trends in all components of aviation activity. Each published forecast revisits previous aerospace forecasts and updates them after examining the previous year's trends in aviation and economic activity. Many factors are considered in the FAA's development of its Aerospace Forecasts, some of the most important of which are U.S. and international economic forecasts and anticipated trends in fuel costs. FAA Aerospace Forecasts generally provide one of the most detailed analyses of historic and forecasted aviation trends and provide the general framework for examining future levels of aviation activity for the nation as well as in specific states and regions.

As discussed previously, the FAA tracks the number of active general aviation aircraft in the U.S. fleet annually. **Table 3-7** summarizes FAA projections of future active aircraft.

Table 3-7
FAA AEROSPACE PROJECTIONS – ACTIVE AIRCRAFT

Year	Total Active Aircraft
2002E	211,040
2014	229,490
CAGR (2002-2014)	0.7%

Source: FAA Aerospace Forecasts, Fiscal Years 2003-2014
E=estimated

The FAA projects continued growth in total active aircraft in the U.S. fleet from 2002 through 2014. There are some fluctuations in annual growth rates during this period, and the CAGR for the 12-year window is 0.7 percent. These fluctuations consider national trends in aircraft manufacturing, along with expectations for economic growth relevant to aviation-related activity nationwide. These growth rates reflect only input from national trends, and do not consider any specific data or aviation activity in the State of Ohio in Tuscarawas County.

One scenario under which projections for based aircraft at Harry Clever Airfield can be made is the assumption that these national trends in active aircraft are replicated at the Airport. **Table 3-8** summarizes projections for based aircraft at Harry Clever Field when applying the overall CAGR from the FAA Aerospace Forecasts to the number of aircraft currently based at the Airport. Projecting based aircraft using this growth rate through the horizon year of 2023 yields another scenario for forecasting the level of future based aircraft at Harry Clever Airfield.

Table 3-8
BASED AIRCRAFT PROJECTIONS – FAA ACTIVE AIRCRAFT

Year	Harry Clever Field Based Aircraft	CAGR
2003	51	-
2008	53	0.7%
2013	55	0.7%
2018	56	0.7%
2023	58	0.7%

Source: Wilbur Smith Associates

3-3-3 Unrestricted Growth

To further refine the estimates of based aircraft, a phone survey of existing airport users was conducted. Based on these discussions with several tenants, the historic growth of based aircraft appears to have been restricted by the lack of hangars and insufficient runway length. An aircraft dealer began operating on the field in December 2003, purchasing and selling single engine and light twin-engine aircraft. He stated that he typically hangars four aircraft at nearby airports

because there is inadequate hangar space at Harry Clever Field. Additionally, the fluctuations in his business can result in him having as many as a dozen aircraft that require hangar space during certain times of the year.

Kent State University has considered using Harry Clever Field for flight training. A spokesman for the dean of the Tuscarawas campus of Kent State University said it has been decided that budget constraints prevent the establishment of an additional flight training program at Harry Clever Field within the next three to five years. However, the issue will probably be revisited beyond this time frame and could represent a substantial growth opportunity in the long term, if the airport facilities are available to support such an activity.

Lauren Manufacturing, a full-service extruder and molder of organic, silicone, and specialty polymer products headquartered in New Philadelphia, bases a Piper Cheyenne III at the Airport. A representative for Lauren Manufacturing, stated that the current facilities often limit the aircraft's operations. He said the aircraft typically operates with only a three-quarter fuel load because of runway length limits. The aircraft often will fly to Akron-Canton to top off the fuel tanks before continuing on its trip. The runway orientation is also a constraint because crosswinds can exceed the aircraft's operating limits. The spokesman indicated a better runway orientation would be even more beneficial than an instrument landing system. The company would like to buy a second aircraft, possibly a jet, but will not do so unless a 5,000-foot runway is available.

Lauren Manufacturing is not the only company that is restricted by the lack of runway length at the airfield. Schwab Floor & Wall Covering of Dover, Ohio, bases a Learjet 31 at the Airport. The jet diverts to Akron anytime there is snow on the runway because of the short field length.

Given these latent demands that cannot be met due to current facility constraints, an unrestricted growth forecast was developed. Under this scenario, it was assumed that growth would exceed that of the national level with a growth rate approximately twice that of the growth rate forecast by the FAA for active aircraft, or about 1.5 percent per year. The results are shown in **Table 3-9**.

Table 3-9
BASED AIRCRAFT PROJECTIONS – UNRESTRICTED GROWTH

Year	Harry Clever Field Based Aircraft
2003	51
2008	55
2013	58
2018	65
2023	69

Source: Wilbur Smith Associates

3-3-4 Summary

The forecasts described in this section offer a range of possible scenarios for growth of based aircraft dependant upon several variables.

Table 3-10
BASED AIRCRAFT PROJECTIONS COMPARISON

Year	Tuscarawas County Population	Tuscarawas County Employment	Tuscarawas County per Capita Income	FAA Aerospace Forecast	Unrestricted Growth
2003	51	51	51	51	51
2008	52	53	54	53	55
2013	52	55	56	55	58
2018	53	57	59	56	65
2023	54	59	62	58	69
CAGR (2003-2023)	0.3%	0.8%	1.1%	0.7%	1.5%

Source: Wilbur Smith Associates

The projections based upon the demographic data demonstrate that population and economic trends favor at least modest growth. This is also supported by the projection based upon the FAA's forecast. The projection for unrestricted growth, while not overly aggressive, is contingent upon the Airport improving its existing facilities.

3-3-5 Preferred Based Aircraft Projections

Based on the analysis and projection methods used in this effort, and the comparison of these projections contained above, the preferred based aircraft projections for Harry Clever Airfield Master Plan Update are those based on unrestricted growth. This scenario was selected because it represents the most demanding forecast for purposes of determining future facility requirements. Discussions with current Airport users indicated that the limited facilities of the Airport have inhibited the growth of activity at the Airport. This preferred forecast presumes that these facility constraints can be addressed and permit the Airport to serve this pent up demand.

The preferred projected based aircraft figures are as shown in **Table 3-11**.

Table 3-11
PREFERRED BASED AIRCRAFT FORECAST

Year	Based Aircraft
2008	55
2013	58
2018	65
2023	69
CAGR	1.5%

Source: Wilbur Smith Associates

3-3-6 Based Aircraft Fleet Mix Projections

An airport's based aircraft fleet mix is one indication of its operational role. The future based aircraft fleet mix for Harry Clever Airfield was projected using the current based aircraft fleet

mix. Approximately 90 percent (46 aircraft) of the total aircraft fleet based at the Airport in 2003 are single engine aircraft. Approximately 4 percent (two aircraft) of this based fleet are made up of multi-engine and turboprop aircraft. In the late 1990's, a Lear 31 joined the based aircraft. There are also two based helicopters. Based on discussions with a representative of Lauren Manufacturing, they may also purchase a jet and base it at the Airport in the near term, resulting in two jets based at the Airport. By the end of the planning period, the growth anticipated by the FAA in the U.S. jet fleet makes it likely that the Airport could attract at least one additional jet.

The future based aircraft fleet mix for the Airport is presented in **Table 3-12**. It is based upon maintaining the current fleet mix percentages but also reflects the potential of an additional based jet aircraft if a 5,000-foot runway were available.

Table 3-12
BASED AIRCRAFT FLEET MIX PROJECTIONS

Year	Single Engine	Multi-engine	Jet	Helicopter	Total
2003	46	2	1	2	51
2008	49	2	2	2	55
2013	52	2	2	2	58
2018	57	3	2	3	65
2023	60	3	3	3	69

Source: Wilbur Smith Associates

As shown in Table 3-12, it is projected that 60 single-engine aircraft will be based at Harry Clever Airfield by the end of the planning period. The number of multi-engine is projected to increase by one. Consistent with national trends, jet aircraft are expected to increase by two and helicopters by one.

3-4 AIRCRAFT OPERATIONS PROJECTIONS

Data on historical and projected aircraft operations for Harry Clever Airfield were obtained from FAA Terminal Area Forecast records since the Airport does not have an air traffic control tower to provide accurate operational counts. In order to project future operations for the Airport, methodologies that examined the historic airport activity levels and national general aviation trends were utilized. Two accepted methodologies were analyzed in the development of the general aviation operations forecast. These consist of an operation per based aircraft (OPBA) methodology and another utilizing the FAA's anticipated trend in national operational activity. From these scenarios, a preferred operations projection was selected. The preferred operations projection was then used to develop projections for local and itinerant operations through the planning horizon year of 2023.

3-4-1 OPBA Projection

Future operational activity for the Airport was projected using OPBA, a commonly accepted planning statistic. OPBAs are calculated by dividing the total number of annual operations at an airport by the number of based aircraft. This methodology analyzes historical OPBA ratios and projects future operations based on the historical average. The OPBA ratio does not indicate

which based aircraft will actually conduct any certain number of operations, however, the OPBA is a methodology recognized by the FAA to relate total general aviation activity to a known variable, in this case, based aircraft. Historical operations and OPBA are shown in **Table 3-13**.

Table 3-13
HISTORICAL OPBA – FAA TAF

Year	Total Operations	Based Aircraft	OPBA
1999	54,880	46	1,200
2000	54,880	46	1,200
2001	54,880	46	1,200
2002	54,880	46	1,200
2003	20,000	51	400

Sources: FAA TAF, and Airport manager estimate for 2003.

The number of operations at Harry Clever Airfield has reportedly remained steady from 1999 to 2002. This results in an OPBA of 1,200. This is an extremely high OPBA and would only be expected at airports that have a great deal of flight training activity, which can generate a high number of operations through touch-and-goes. Since Harry Clever Field does not have extensive flight training operations, it appears that the FAA TAF has overestimated the number of operations in recent years. The airport manager estimated there were 20,000 operations in 2003. This is a significant drop from previous years but is much more in line with expectations. This operations estimate yields an OPBA of 400 in 2003, which is a much more realistic figure. This value for OPBA is typical for airports with the kind of facilities, tenants, and aircraft found at Harry Clever Airfield. This OPBA of 400 was assumed to remain constant throughout the planning period. It was multiplied by the number of projected based aircraft and resulted in the forecast shown in **Table 3-14**.

Table 3-14
OPERATIONS PROJECTIONS – POPULATION GROWTH

Year	Based Aircraft	OPBA	Harry Clever Field Operations
2003	51	400	20,000
2008	55	400	22,000
2013	59	400	23,600
2018	64	400	25,600
2023	69	400	27,600

Source: Wilbur Smith Associates.

3-4-2 National Trend

The FAA prepares an aviation forecast that includes projections of the number of hours flown annually by general aviation aircraft. Historically, the number of hours flown has been shown to be a broad indication of general aviation activity, where growth in national hours flown can be anticipated to cause similar growth at the local level. In 2003, the FAA estimated that all types of

general aviation aircraft flew nearly 29.8 million hours. By 2014, the number of hours flown by general aviation aircraft is expected to exceed 35.2 million, representing a 1.5 percent compound annual growth rate. **Table 3-15** presents the projected national hours flown and the projected future compound annual growth rate as published in the FAA Aerospace Forecasts projections.

Table 3-15
FAA AEROSPACE PROJECTIONS – HOURS FLOWN

Year	National Hours Flown
2003	29,795,000
2014	35,290,000
CAGR (2002-2014)	1.5%

Source: FAA Aerospace Forecasts, Fiscal Years 2003-2014

Table 3-16 presents a projection of operations for Harry Clever Airfield using the national rate of growth projected for hours flown by active general aviation aircraft. Using this method, approximately 26,900 operations are projected for 2023 using 2003 as the base year.

Table 3-16
OPERATIONS PROJECTIONS – HOURS FLOWN

Year	Harry Clever Field Operations	CAGR
2003	20,000	-
2008	21,500	1.5%
2013	23,200	1.5%
2018	25,000	1.5%
2023	26,900	1.5%

Source: Wilbur Smith Associates

3-4-3 Demographic Projection

The two previous forecasts anticipate fairly aggressive growth relative to the historic trend in operations. This third projection was developed to reflect a more moderate growth in operations. This operations projection assumed that operations growth would correlate to the slowest growing demographic trend. Population growth in the county was projected to increase at a CAGR of 0.3 percent. When this growth rate is applied to the base year operations, operations are projected to increase to 21,200 by the end of the planning period, as shown in **Table 3-17**.

Table 3-17
OPERATIONS PROJECTIONS – POPULATION GROWTH

Year	Harry Clever Field Operations	CAGR
2003	20,000	-
2008	20,300	0.3%
2013	20,600	0.3%
2018	20,900	0.3%
2023	21,200	0.3%

Source: Wilbur Smith Associates

3-4-4 Summary

The forecasts described in this section offer a range of possible scenarios for growth of annual operations at Harry Clever Airfield dependent upon several variables. **Table 3-18** compares these forecast scenarios.

The projections based on the 2003 OPBA and the FAA hours flown forecast represent the high end of the operations forecast.

Table 3-18
OPERATIONS PROJECTIONS COMPARISON

Year	OPBA	FAA Hours Flown Forecast	Population
2003	20,000	20,000	20,000
2008	22,000	21,500	20,300
2013	23,600	23,200	20,600
2018	25,600	25,000	20,900
2023	27,600	26,900	21,200
CAGR (2003-2023)	1.5%	1.5%	0.3%

Source: Wilbur Smith Associates

The projection based upon the growth in the county's population presents a more conservative forecast. However, even the most aggressive estimate, based on OPBA, presents a scenario where only a fraction of the Airport's capacity is utilized.

3-4-5 Preferred Projection of Operations

Of the various scenarios presented in this section, the projection methodology that uses OPBA is the preferred operations forecast. **Table 3-19** summarizes the projection.

Table 3-19
PREFERRED OPERATIONS FORECAST

Year	Operations
2008	22,000
2013	23,600
2018	25,600
2023	27,600

Source: Wilbur Smith Associates

This projection results in an estimated 27,600 operations in 2023, the highest of the three projections. By using the highest operations projection, future facility requirements can be anticipated under the most demanding conditions expected. It is important to note that this operational level is approximately half of what has been reported in the TAF for the last decade. Again, the TAF estimate is apparently overstated based on airport management estimates.

3-4-6 Local and Itinerant Operations

Historical annual operations data contained in the TAF for Harry Clever Airfield indicate that annual operations in 2002 were comprised of approximately 23 percent itinerant and 77 percent local aircraft operations. This ratio has been constant since 1992, according to the FAA TAF, and it is assumed that it will not significantly change in the future. Therefore, it was applied to the airport manager's estimate of 20,000 operations in 2003 as well as future projections of operations.

Table 3-20 illustrates the preferred operations forecast split into itinerant and local operations as per historical trends.

Table 3-20
OPERATIONS PROJECTIONS – LOCAL AND ITINERANT

Year	Total Operations	Itinerant Operations	Itinerant Percentage	Local Operations	Local Percentage
2003	20,000	4,600	23%	15,400	77%
2008	22,000	5,100	23%	16,900	77%
2013	23,600	5,400	23%	18,200	77%
2018	25,600	5,900	23%	19,700	77%
2023	27,600	6,300	23%	21,300	77%

Sources: Wilbur Smith Associates

Based on this operations projection, the number of operations for each category of aircraft was estimated. The total number of operations were allocated to the aircraft categories by assuming the operations were proportional to the number of projected based aircraft in that category. It was assumed that multi-engine aircraft and jets would generate 300 operations per based aircraft. Helicopters were assumed to generate 400 operations per based aircraft. The remainder of the operations were allocated to the single-engine category of aircraft. The estimate is shown in **Table 3-21**.

Table 3-21
FLEET MIX OPERATIONS PROJECTIONS

Year	Single Engine	Multi-Engine	Jets	Helicopters	Total Operations
2003	18,300	600	300	800	20,000
2008	20,000	600	600	800	22,000
2013	21,600	600	600	800	23,600
2018	22,900	900	600	1,200	25,600
2023	24,600	900	900	1,200	27,600

Sources: Wilbur Smith Associates

3-4-7 Peak Operational Demand

To develop a portrait of peak operational demands, a peaking factor was applied to the preferred operational forecasts. Generally, peak month operations have been found to represent approximately 10-15 percent of annual operations. Since there are no air traffic control tower counts for Harry Clever Airfield, peak month operations were assumed to lie in the middle of this range at 13 percent. For projection purposes, it was also assumed that this monthly peaking factor would remain constant throughout the planning period. From this point, average daily operations were estimated by dividing the peak month figure by 30 - the average number of days in any month throughout the year. To estimate peak hour operations, another peaking factor, the estimated percentage of daily activity occurring in the peak hour (12 percent), was applied to the number of average daily operations.

Peak hour projections are depicted in **Table 3-22.**

Table 3-22
PEAK HOUR OPERATIONS

Year	Annual Operations	Peak Month	Peak Month Average Day	Peak Month Peak Hour
2003	20,000	2,600	80	10
2008	22,000	2,860	90	11
2013	23,600	3,070	100	12
2018	25,600	3,330	110	13
2023	27,600	3,590	120	14

Note: The peak month operations are estimated to represent approximately 13 percent of total annual operations. Average daily operations are estimated by dividing the peak month operations by 30 days. The peak hour operations are estimated to represent approximately 12 percent of average daily operations.
Source: Wilbur Smith Associates

As shown, peak month operations are expected to increase from approximately 2,600 in 2003 to approximately 3,590 in 2023. Average day operations are projected to increase from 80 to 120 over this same time period. Peak hour activity is anticipated to remain almost unchanged, increasing from 10 to 14 by the end of the planning period. It should be noted that these projections represent averages that are based on generally accepted peak operational factors, and

may not represent absolute peak operational demand. In fact, the hourly and daily peaks may be exceeded during exceptionally active periods at the Airport.

3-5 CRITICAL AIRCRAFT

The development of airport facilities is impacted by both the demand for those facilities, typically represented by total based aircraft and operations at an airport, as well as the type of aircraft that will make use of those facilities. In general, airport infrastructure components are designed to accommodate the largest and/or most demanding type of aircraft, referred to as the critical aircraft that will utilize the infrastructure on a regular basis, defined as 500 annual operations at an airport. Several different critical aircraft might be present at an airport based on gross weight, approach speed, and wingspan. These aircraft are used to characterize the design standards and specifications the airport will need to meet so that it can safely and effectively serve those aircraft.

The FAA groups aircraft into Aircraft Categories and Airplane Design Groups based on their approach speed and wingspan, respectively. The criteria for these categories are presented in **Table 3-23** and **Table 3-24**.

Table 3-23
AIRCRAFT CATEGORIES

Aircraft Category	Approach Speed
A	< 91 knots
B	91 to < 121 knots
C	121 to < 141 knots
D	141 to < 166 knots
E	166 knots or more

Table 3-24
AIRPLANE DESIGN GROUPS

Airplane Design Group	Wingspan
I	< 49 feet
II	49 to < 79 feet
III	79 to < 118 feet
IV	118 to < 171 feet
V	171 to < 197 feet
VI	197 to < 262 feet

After identifying an airport's critical aircraft it is then possible to determine the facility's Airport Reference Code (ARC). The ARC is a coding system that relates airport design criteria to the operational and physical characteristics of the airplanes that are intended to operate at an airport.

An airport's ARC is a composite designation based on the Aircraft Category and Airplane Design Group of that airport's critical aircraft.

Currently, airport facilities (runway length, approaches, etc.) seriously constrain the operation by demanding aircraft. As discussed, the most demanding aircraft based at the Airport is a Learjet 31. The Learjet 31 has a wingspan of 43.8 feet and a typical approach speed of approximately 122 knots. While this aircraft meets C-I design standards, it performs slightly less than 500 annual operations. Twin-engine aircraft under 12,500 pounds meeting B-I ARC standards, such as the Piper Cheyenne operated by Lauren Manufacturing, are currently the most demanding aircraft performing 500 annual operations. The current airfield is constrained, however, as was discussed in a previous section, such that Category C design standards are unlikely to be obtained without significant improvements. The current airfield conditions prevent C aircraft from operating with a greater frequency. For planning purposes, however, an ultimate ARC encompassing C-I/II aircraft is warranted due to the fact that a Lear 31 is currently based at the Airport. In an unconstrained environment, it seems reasonable to assume that similar business jets would base or perform transient operations if suitable facilities were available. Lauren Manufacturing will consider purchasing a Citation Jet 2 (CJ2) or Bravo jet aircraft in 2005 to fulfill additional missions. Such B-II business jets are being considered because they can operate, though not at maximum efficiency, on a 4,000-foot runway. In order to accommodate typical aircraft with slightly larger wingspans than a Lear 31 (such as Citations, KingAir, etc.) the future ARC for Harry Clever Field should be set at C-II. Again, Lauren Manufacturing has indicated that they are considering replacing their Cheyenne with a B-II business jet in the near future.

In following components of the master plan, existing facilities at Harry Clever Field will be compared to design standards for those facilities based on the future airport's ARC of C-II to determine any facility improvements that may be required.

3-6 SUMMARY

The aviation demand projections for Harry Clever Airfield are summarized in **Table 3-25** and can be characterized as follows:

- All forecasts developed as part of this study are based on historical airport activity, area demographic trends, and FAA projections. These trends were tempered with specific knowledge of local conditions where appropriate.
- All forecasts are considered unconstrained by current conditions.
- Based aircraft are expected to increase from 46 to 69 during the planning period.
- Using operations per based aircraft (OPBA) and the projected number of based aircraft, the number of annual operations is expected to increase to approximately 27,600 by the end of the planning period.
- The operating fleet mix is projected to see an increase in the percentage of jet aircraft using the Airport. Single-engine aircraft will continue to comprise the majority of the Airport's operating fleet throughout the planning period.
- The average number of peak hour operations is estimated to increase from 10 in 2003 to 14 by the end of the planning period, a modest rise in peak activity.
- The future ARC for the Airport is C-II.

Table 3-25
SUMMARY OF FORECASTS

	Annual Operations			Based Aircraft				
Year	Itinerant	Local	Total	Single	Multi	Jet	Hel	Total
2003	4,600	15,400	20,000	46	2	1	2	51
2008	5,100	16,900	22,000	49	2	2	2	55
2013	5,400	18,200	23,600	52	2	2	2	58
2018	5,900	19,700	25,600	57	3	2	3	65
2023	6,300	21,300	27,600	60	3	3	3	69

Source: Wilbur Smith Associates