2.0 FORECASTS

This chapter presents the forecasts of aviation demand for the Waterbury-Oxford Airport (OXC). The forecasts were derived based on a review of historical trends, market analysis, and other techniques, including the application of professional judgment. Forecasts are shown for:

- Based Aircraft
- Aircraft Operations (takeoffs and landings)
- Annual Aircraft Instrument Operations & Approaches
- Peak Hour Operations

Consistent with airport planning practice, forecasts are presented for 5-year intervals (i.e., short-, intermediate-, and long-term), beginning with year 2003.

2.1 Socioeconomic Setting

2.1.1 Airport Service Area

In the beginning months of 2004, the Waterbury-Oxford Airport served as a base for 236 aircraft. The location of aircraft owners helps to define the air service area for the facility. Aircraft basing reflects consideration of such factors as convenience in terms of access, facilities and services available, and operating costs versus those associated with other airports. The Airport draws nearly 55 percent of all based aircraft from owners located in the 13 municipalities comprising the Central Naugatuck Valley Region. Adjacent communities within a driving range of less than 45 minutes from the Airport increase the air service area share of based aircraft owners to nearly 74 percent.

Ownership of the aircraft based at the Airport is comprised of private individuals and businesses. The latter group accounts for several owners located outside the Central Naugatuck Valley Region. These owners primarily operate some of the business jet aircraft based at the Airport and managed by one of the service providers. Therefore, the Airport may be considered to have two service areas. The first related to the traditional general aviation market that includes small piston- and turboprop aircraft used primarily for pleasure and business purposes. The second service area has a greater geographical reach to include aircraft owners opting to base their business jets at the Airport because of the availability of terminal area facilities and the services provided by aircraft management companies located at the Airport.

Based on these factors, the air service area for most general aviation aircraft may be best identified as the Central Naugatuck Valley Region. The state-designated metropolitan planning organization responsible for coordinating transportation planning of local governments within this region is the Council of Governments of the Central Naugatuck Valley (COGCNV). Socioeconomic data for COGCNV were used to represent the characteristics of this traditional general aviation Airport air service area. Economic conditions for the greater Metropolitan area suggest the potential demand for basing business jet aircraft at the Airport.

Principal indicators of the socioeconomic setting of the traditional general aviation airport service area, State of Connecticut and the United States are presented in Table 2-1. Because Waterbury is the primary municipality within the COGCNV, socioeconomic data has been segregated to the extent possible so that the contribution from the relatively more rural and suburban areas in the region can be considered. These areas are growing faster than Waterbury and tend to generate higher demand for air transportation services. Key features of Table 2-1 are:

1. Population growth rate in the traditional general aviation airport service area (with and without data for Waterbury) has been greater than that occurring in Connecticut but less than that in the United States. Expectations are for lower rates of growth for the traditional general aviation airport service area, Waterbury and nationally, and a slightly higher rate of growth in the state population when compared to those experienced between 1990 and 2000. The traditional general aviation airport service area population is projected to increase at a rate less than those expected in the state and United States. When the population projections for Waterbury are excluded from the airport service area, the rate of growth is second to that of the country.[1]

2. The economic base of the traditional general aviation airport service area is generally comparable to that in Connecticut and the United States with a higher proportion of jobs in the manufacturing sector.[2] Other data suggests that there has been a gradual shift away from this sector following a similar pattern in the rest of the state and the country.[3]

3. The median household effective buying income, a measure of disposable income, in the traditional general aviation airport service area is less than that of Connecticut and higher than that in the United States. The percentage of households with effective buying income levels in excess of $50,000, a level that should provide sufficient funds for discretionary purposes such as air transportation, illustrates a similar pattern.[4]

[1] Source: COGCNV; Connecticut Department of Transportation; U.S. Census Bureau.
[2] Source: COGCNV; Connecticut Department of Labor, Office of Research; U.S. Bureau of Labor Statistics.
[3] Source: COGCNV, "A Profile of the CNVR: 2003."
[4] Source: Sales & Marketing Management, "Survey of Buying Power".

TABLE 2-1 – GENERAL AVIATION AIR SERVICE AREA SOCIOECONOMIC CHARACTERISTICS					
	Traditional General Aviation Air Service Area				
	COGCNV	**Waterbury**	**COGCNV less Waterbury**	**Connecticut**	**United States**
POPULATION					
1990	261,081	108,961	152,120	3,287,116	249,623,000
2000	272,594	107,271	165,323	3,407,565	282,125,000
2005	278,240	107,320	170,920	3,475,970	287,716,000
2010	283,870	107,370	176,500	3,544,380	299,862,000
2015*	287,370	107,370	180,000	3,619,670	312,268,000
2020	290,920	107,370	183,550	3,696,560	324,927,000
2025	294,460	107,370	187,090	3,775,995	337,815,000
* Interpolated, except United States					
Average Annual Growth Rate					
1990 - 2000	0.43%	-0.16%	0.84%	0.36%	1.23%
2000 - 2025	0.31%	0.00%	0.50%	0.41%	0.72%
EMPLOYMENT					
Industry Sector - 2001	**Percent Distribution**				
Agriculture	n.a	n.a.	n.a.	n.a.	2.3
Mining	n.a.	n.a.	n.a.	0.1	0.4
Construction	4.5	3.1	5.5	3.9	7.1
Manufacturing	19.5	14.9	22.9	15.1	14.1
Transportation and Utilities	5.4	4.4	6.1	4.7	7.2
Wholesale Trade	5.5	4.0	6.5	4.7	7.2
Retail Trade	17.3	17.6	17.1	16.6	16.7
Finance, Insurance and Real Estate	4.5	5.1	4.1	8.4	6.5
Services	32.0	38.4	27.4	32.0	37.4
Government	11.3	12.5	10.4	14.5	4.5
Total	100.0	100.0	100.0	100.0	100.0
INCOME	**Effective Buying Income (EBI) - 2003**				
	New Haven - Waterbury - Meriden				
Median Household EBI	$42,795			$46,986	$38,035
Households by EBI Group	**Percent Distribution**				
< $20,000	20.5			17.2	22.3
$20,000 - $34,999	19.6			18.3	23.2
$34,999 - $50,000	18.3			17.8	19.5
> $50,000	41.6			46.7	35.0
Total	100.0			100.0	100.0

2.1.2 Regional Economic Considerations

The Waterbury-Oxford Airport is an active general aviation airport that serves two primary operating roles. First, it accommodates the general aviation travel demands generated by aircraft owners located within its traditional general aviation service area. These users typically operate piston and turboprop aircraft. Second, it serves as a base for corporate business jets that transition primarily to either the Westchester County or Teterboro airports for passenger transport to and from their ultimate destinations. This second role is a unique characteristic of the Airport and is nearly entirely dependent on the availability of appropriate hangar storage for these aircraft, which represent sizable capital investments made by aircraft management companies that have selected the Waterbury-Oxford Airport for this purpose.

Economic conditions in a region greater than that of the Airport's traditional general aviation service area can also influence aviation activity levels at the facility. Those airports to which the corporate business jet aircraft transition are located in major economic centers within the New York metropolitan area, one of the strongest markets for nearly every type of business and general consumer in the United States. Although not immune to the effects of economic downturns, this region of the country is one of the leading economies in the nation. General aviation use of corporate business jets has always been high in this region for reasons of convenience, prestige, image and more recently security. Improving economic conditions should continue to fuel the use of corporate business jets for executive travel, including those employed in fractional or other forms of shared ownership and use.

In recent years, the unavailability of adequate hangar storage for these aircraft at their intended or preferred origination airport has generated the rapid growth of the corporate business jet fleet at the Waterbury-Oxford Airport. Operators using the Airport for transition purposes have also realized economic benefits in this type of operation. These are lower hangar rent, flight crew, maintenance, and fuel costs. Thus, even if the Westchester County or Teterboro airports were able to provide additional hangar storage, an event that appears unlikely in significant volume, those business jet aircraft operators using the Waterbury-Oxford Airport as a base are not likely to relocate. This opinion was reflected in response to a based aircraft owner survey, the details of which are presented in Appendix A. Further, the fact that Key Air has completed design and has broken ground on a second 62,500 square-foot hangar to accommodate some 25 additional based jet aircraft by 2006 is an indication of the continued strength of the market.

2.2 Aviation Demand Forecasts

Factors that influence the demand for aviation activity at an airport include the socioeconomic characteristics of the air service area(s), the level of service and facilities provided at the airport versus other airports in the region, and its location with respect to demand generators for originating or transient users.

First-class hangar facilities, combined with one of the longest runway lengths available in the region and major maintenance services attract corporate aircraft to use the Airport as an operations base. The Airport also attracts local aircraft owners to use the facility as a base. These factors, combined with previous capital improvements at the Airport and the socioeconomic characteristics of the air service areas, suggest that the demand for aviation services at the Waterbury-Oxford Airport is being sustained and has the potential for growth.

The population growth of the air service area and the continued diversification of the economy and disposable income levels, support the continued reliance on the Waterbury-Oxford Airport to provide air transportation services. This is especially relevant when the economic centers are distant from one another or involve excessive travel times to enable same-day ground transportation trips. General aviation air travel supports this user demand. Longer passenger processing times associated with scheduled airline travel have contributed to the increased awareness and utility of general aviation aircraft and the airports they utilize. The attractiveness of fractional ownership of business aircraft, both in jet and turboprop families, further supports this trend. Availability of land for the construction of hangar facilities at the Airport is a primary factor contributing to the continued attraction of aircraft to the facility. Barring an economic scenario that suggests poor performance in the dominant area businesses, both in the traditional general aviation air service area and the New York metropolitan area, use of the Waterbury-Oxford Airport is likely to continue and experience increasing frequency.

From a facilities perspective, the Waterbury-Oxford Airport is well maintained and offers certain advantages over other area airports, as highlighted in Table 2-2. Waterbury-Oxford Airport draws pilots and aircraft owners primarily from areas to its north, west and south based on the addresses of aircraft owners. Potential users in areas east of the Airport tend to operate from airports in the Hartford area for reasons of accessibility and available facilities.

TABLE 2-2 – COMPARISON WITH OTHER AREA AIRPORTS

Airport	Number of Paved Runways and Longest Length	Instrument Approach Capability	Aviation Fuel Availability	Fixed Base Operator Services
Waterbury-Oxford	1 – 5,800’	Precision	100 LL, Jet-A	Major, Hangar, Tiedown
Danbury Municipal	2 – 4,422’	Nonprecision	100 LL, Jet-A	Major, Hangar, Tiedown
Meriden-Markham Municipal	1 – 3,100’	Nonprecision	100 LL	Major, Hangar, Tiedown
Robertson Field	1 – 3,612’	None	100 LL, Jet-A	Major, Hangar, Tiedown
Sikorsky Memorial	2 – 4,761’	Precision	100 LL, Jet-A	Major, Hangar, Tiedown
Tweed-New Haven Regional	2 – 5,600’	Precision	100 LL, Jet-A	Minor, Hangar, Tiedown
Westchester County	2 – 6,548’	Precision	100LL, Jet-A	Major, Hangar, Tiedown
Hartford-Brainard	2 – 4,418’	Nonprecision	100LL, Jet-A	Major, Hangar, Tiedown

Of the other airports, only the Meriden-Markham Municipal Airport is actively working toward providing a new 10-unit T-hangar. However, this facility will be owned by pilots currently basing small piston and turboprop aircraft at the Airport and will not result in an increase in the based aircraft total other than those that might assume the vacated tiedown spaces. Overall, the prospect for future aviation activity at the Waterbury-Oxford Airport is considered positive and should advance at rates comparable to those expected nationally.

Bradley International, Westchester County, Tweed-New Haven Regional and Stewart International airports all have scheduled airline or commuter service. The proximity of these airports, each within a 90-minute drive time from the Waterbury-Oxford area, restricts the introduction of scheduled airline or commuter service at OXC.

Post September 11, 2001 combined with a weakening economy has led to reductions in aviation travel. However, the "hassle factor" associated with scheduled airline travel, especially for frequent flyers, has stimulated additional interest in the general aviation industry. Corporate travelers have realized the convenience and improved affordability of using chartered general aviation aircraft or have joined fractional aircraft ownership programs. Fractional aircraft ownership involves the purchase of a predetermined share of an aircraft, which is then maintained and operated by a management company. These programs, initially involving business jet aircraft, now offer participation in turboprop aircraft such as the Beechcraft King Air. The ability of these aircraft to operate at airports located closer to the passengers' homes and suburban office locations have contributed to the success of these programs. As the economy improves, these positive forces are expected to return and stimulate the demand for this type of general aviation activity. This expectation is mirrored in the national forecasts of general aviation activity presented by the FAA in its "Aerospace Forecasts Fiscal Years 2004 – 2015" (prepared March 25, 2004).

Contributing to this prospect for growth will be the introduction of lightweight, low noise, new technology personal and corporate jet aircraft. An example is the Eclipse 500 twin-engine jet. This aircraft has a maximum gross takeoff weight of 4,700 pounds and can transport 4 passengers and a crew of 2 some 1,600 nautical miles nonstop. The aircraft sells for about $1 million and should be operational by early 2006. The twinjet aircraft is specifically designed to operate from general aviation airports with runway lengths of at least 2,600 feet, thus making it attractive for use at most general aviation airports.

2.2.1 Summary of Forecast Methodology

The forecasts were derived from an assessment of survey activities of based aircraft and aircraft operations (Appendix A), on-going and planned terminal area improvements, anticipated trends in the general aviation market, and physical constraints of existing developable land resources at the Airport. These findings are coupled with consideration of causal relationships as reflected in supply (competition) and demand (population, employment and income) factors. This forecast approach allows for differing projections of demand that could be anticipated at the Airport. Initially, the forecasts address two key projections – based aircraft and aircraft operations – from which a series of derivative forecasts can be generated. The specific methodology for each is documented in the sections below.

2.2.2 Based Aircraft

National projections of the active general aviation aircraft fleet prepared by the Federal Aviation Administration (FAA) indicate average annual growth rates during the next 11 years, as presented in Table 2-3.

TABLE 2-3 – NATIONAL GENERAL AVIATION AIRCRAFT FLEET PROJECTIONS						
	Average Annual Growth Rate (percent)					
Period	**Single-Engine Piston**	**Multi-Engine Piston**	**Multi-Engine Turboprop**	**Turbojet**	**Rotorcraft**	**All**
2004 – 2015	0.32	-0.50	1.49	5.45	0.70	1.07
Source: FAA, "Aerospace Forecasts Fiscal Years 2004 – 2015", March 25, 2004						

These forecast growth rates reflect a trend toward larger aircraft in the general aviation fleet, notably those powered by turboprop and turbojet engines. In absolute numbers of aircraft nationally, however, the smaller piston-powered active aircraft greatly exceed these larger aircraft by a ratio of more than 10:1 today. Over time, this ratio may decrease to nearly 7:1.

These same trends and characteristics can be expected at the Waterbury-Oxford Airport inasmuch as the socioeconomic characteristics of the traditional general aviation service area and the New York metropolitan area support such growth. The resultant projection of based aircraft reflecting national growth rates is presented in Table 2-4.

TABLE 2- 4 – BASED AIRCRAFT FORECASTS – NATIONAL GROWTH RATES					
Year	**Single-Engine/ Multi-Engine Piston**	**Single-Engine/ Multi-Engine Turboprop**	**Business Jets**	**Rotorcraft**	**Total**
2003	188	10	37	1	236
2008	191	11	48	1	251
2013	194	12	63	1	270
2018	197	13	82	1	293
2023	200	14	107	1	322

The use of the Airport by large, corporate business jets has reflected a market demand situation that is unlike that observed at most general aviation airports in the country. As presented in the inventory chapter, the historical count of business jets based at the Airport exhibited little growth until significant private development was made in hangar facilities to fill an unserved market demand at New York metropolitan area airports.

This action is about to be repeated in the near-term when a planned 62,500 s.f. hangar becomes available. The $10 million private investment in "Hangar G" is being heavily promoted and may be expected to be filled with some 25 business jets by 2006. The impact of this event is likely to result in an acceleration of the number of based business jets in the earlier years of the forecast period, but culminating in the same total demand by the end of the forecast horizon, as presented in Table 2-5.

TABLE 2-5 – BASED AIRCRAFT FORECASTS – ADJUSTED FOR AN ADDITIONAL BUSINESS JET HANGAR FACILITY					
Year	**Single-Engine/ Multi-Engine Piston**	**Single-Engine/ Multi-Engine Turboprop**	**Business Jets**	**Rotorcraft**	**Total**
2003	188	10	37	1	236
2008	191	11	65	1	268
2013	194	12	80	1	287
2018	197	13	87	1	298
2023	200	14	107	1	322

At this juncture, the introduction of physical constraints associated with the limited amount of developable land area at the Airport should be introduced. A review of the existing land resources for the suitable location and construction of hangar facilities suggests a build-out capacity to accommodate as many as 72 business jet aircraft (approximately double the 2003 level). The growth in piston and turboprop aircraft is expected to be satisfied primarily by the facilities currently available. This aircraft basing limitation could well mean that the potential demand for 107 business jets at the Airport cannot be realized. Vacant land areas at the Airport are primarily characterized as wetlands or would require extensive fill in order to achieve suitable building sites. The resultant site improvement costs may result in hangar rental rates that are not economically viable.

Consequently, the excess business jet demand would be accommodated at other airports in the region. This potential outcome has occurred at Waterbury-Oxford Airport in the past, and illustrates the natural tendency for the demand to be accommodated at other airports located more distant from the demand generator. Airports such as Stewart International in Newburgh, New York and R.J. Miller Airport in Toms River, New Jersey are just two potential candidates with available land area to absorb this unsatisfied demand should the airport owners or the private sector opt to provide the required facilities to service these aircraft.

Alternatively, forecast methodology utilizing trend analysis of historical counts of based aircraft was considered. The total number of aircraft based at the Airport has exhibited a steadily increasing trend since 1985. At that time, there were 161 aircraft based at the Airport, none of which were business jets. A trend analysis can be interpreted to reflect the host of economic, operational and qualitative factors that influence the demand for aircraft ownership. Linear regression of the total number of based aircraft and business jets at the Airport generate year 2023 demand levels of 269 and 51, respectively. However, statistical measures of the reliability of the relationship between the data points and their use for projections were relatively low (correlation coefficient on the order of 0.60 for total based aircraft and 0.71 for business jets). The closer such measures are to 1.00 the higher the reliability and level of confidence that can be assigned to their use. Thus, the reliance that can be placed on these trend forecasts is similarly low.

The economics of operating a business jet for corporate travel is complex. Thus, it is useful to consider the market dynamics and financial factors that have contributed to the attractiveness of these aircraft to OXC since the construction of first-class hangar facilities and the provision of aircraft management services. Average hangar rents for a large business jet aircraft are nearly $20,000 per month at Westchester County Airport and about $15,000 monthly at Teterboro Airport, due in large part to the high land values in these built-up urban locations close to major population and business centers. The average monthly rental for the same type of aircraft at the Waterbury-Oxford Airport is about $6,000. The savings in rental fees is offset by the higher operating cost to transition the aircraft from OXC to the facility that is closest to the origination point of the passengers. Further, operating conditions at OXC are comparatively more favorable in terms of uncongested airspace (i.e., reduced potential for departure and arrival delays), less aircraft apron congestion and the availability of at least one new hangar facility.

These same economic and operational factors would become evident at other outlying airports having equal or better runway facilities and instrument approach capabilities to serve the operational needs of business jets. Thus, there is a the real potential for that portion of the demand for business jets at OXC to shift to other airports when space is no longer available and economics support the transfer.

As such, the forecast of based aircraft for OXC recommended for planning purposes reflects the case where the demand for based business jets is constrained by the availability of suitable hangar facilities. This forecast is presented in Table 2-6.

TABLE 2-6 – BASED AIRCRAFT FORECASTS – CONSTRAINED DEMAND

Year	Single-Engine/ Multi-Engine Piston	Single-Engine/ Multi-Engine Turboprop	Business Jets	Rotorcraft	Total
2003	188	10	37	1	236
2008	191	11	65	1	268
2013	194	12	67	1	274
2018	197	13	69	1	280
2023	200	14	72	1	287

The projections in Table 2-6 for business jets were segregated by maximum gross takeoff weight (MGTW), and are presented in Table 2-7. These commonly-used informal designations are later utilized for space planning purposes, but do not represent any regulatory or design standard category. As used in this report, small business jets are defined as having a MGTW of 25,000 pounds or less. Medium business jets have a MGTW of between 25,001 pounds and 60,000 pounds. Large business jets are those with MGTW equal to or more than 60,001 pounds.

- Small jets, often called light jets, includes the Cessna Citations and Lear Jets
- Medium jets, often called mid-size business jets, includes most Hawkers and Falcons

- Large jets, often called full-size jets, includes the Gulfstream series and the Global Express

TABLE 2-7 – BASED BUSINESS JET FORECAST – CONSTRAINED DEMAND				
	Business Jets			
Year	**Small ≤ 25,000 lbs.**	**Medium 25,001 lbs. - 60,000 lbs.**	**Large > 60,000 lbs.**	**Total**
2003	1	15	21	37
2008	2	27	36	65
2013	2	27	38	67
2018	2	28	39	69
2023	2	28	42	72

2.2.3 Aircraft Operations

Aircraft operations were developed based on traffic counts provided by the FAA contract air traffic control tower, which operates between the hours of 6:00 a.m. and 9:00 p.m. daily. The tower presents this information by type of operation (local or itinerant). Year 2003 was the first year of complete recording of aircraft operations and the total was 55,172 movements (takeoffs and landings). Of these recorded operations, 23,754 were local and 31,418 were itinerant. This level of activity, although accurate for the recording period, does not include or make allowance for aircraft operations that occur when the tower is closed. Further, the activity records reflect a constrained airport operation between the months of June and November when the runway was closed intermittently for Runway Safety Area (RSA) construction activities. Consequently, it was appropriate to make an upward adjustment to the recorded tower activity data to account for these two conditions.

The adjustment to the tower counts of activity considered historical fuel deliveries as reported in the total numbers of gallons delivered in the two years prior to the runway construction period and the volumes during the months of June through November. These records confirmed that total fuel deliveries had been increasing during those years at an annual rate of nearly 8.7 percent. Additionally, fuel deliveries during the months of the RSA construction were down nearly 22 percent from the same period in the previous year. Based on this data and allowing for the growth rate in fuel deliveries, it was concluded that the aircraft movements during the months of June through November 2003 were understated by nearly 26 percent, or 7,519 operations.

Additionally, an allowance was made for aircraft operations occurring when the air traffic control tower is closed. Given the aircraft transitioning activity that is a unique characteristic of operations at the Waterbury-Oxford Airport, it was conservatively estimated that such operations were itinerant in nature and represented 10 percent of the total activity, adjusted for the understatement due to the RSA construction period, or 3,258 operations. Accordingly, the adjusted annual total aircraft operations are 65,949 in the year 2003. Of these, 30,110 are local and 35,839 are itinerant. By comparison, a review of FAA-generated data from filed flight plans (Extended Traffic Management System Counts - ETMSC) that cover a 24-hour period of each day in 2003 indicates that 8.3 percent of all aircraft operations occur when the air traffic control tower is closed between 9:00 p.m. and 6:00 a.m. Because not all aircraft file flight plans, use of a 10 percent factor is a reasonable estimate for planning purposes.

Future aircraft operations were projected on the basis of slightly increased aircraft utilization rates expressed in terms of operations per based aircraft as projected for the constrained demand scenario in Table 2-6. These utilization rates considered FAA projections of hours flown by category of aircraft and were adjusted to account for slightly increasing stage lengths for all categories of aircraft except business jets. Because the primary flight mission of the corporate business jets based at the Airport is to transition to another airport, it is expected that their flight frequencies would increase from an annual average of 100 operations per based business jet, to 115 operations during the course of the forecast horizon (as determined from a review of flight operations data for 15 of the current based jets). All business jet aircraft operations total 3,700 movements, a value that compares favorably with the FAA from flight plans data for OXC. The ETMSC flight plan data identified a total of 3,713 business jet aircraft operations at OXC during 2003, including night operations. The ETMSC data also provided an indication of the mix of business jet operations. These values were used in the forecasting methodology, which provides for a slightly increasing share of the business jet activity to be conducted by large aircraft. The resulting forecast of aircraft operations is presented in Table 2-8.

TABLE 2-8 – AIRCRAFT OPERATIONS FORECAST

			Business Jets					
Year	**Single-Engine/ Multi-Engine Piston**	**Single-Engine/ Multi-Engine Turboprop**	**Small ≤ 25,000 lbs.**	**Medium 25,001 lbs. - 60,000 lbs.**	**Large > 60,000 lbs.**	**Total Jet**	**Rotorcraft**	**Total**
2003	58,656	3,120	970	1,380	1,350	3,700	473	65,949
2008	61,884	3,564	1,741	2,444	2,511	6,695	497	72,640
2013	65,378	4,044	1,828	2,581	2,760	7,169	522	77,113
2018	68,950	4,550	1,915	2,719	3,025	7,659	548	81,707
2023	72,600	5,082	2,029	2,898	3,353	8,280	576	86,538

2.2.4 Local & Itinerant Operations

Local operations are performed by aircraft that:

- Operate in the local traffic pattern or within sight of an airport,
- Are departing for or arriving from flight in a local practice area located within a 20-mile radius of the airport, or
- Are conducting simulated instrument approaches or low pass at an airport.

Itinerant operations are all other operations. The local and itinerant split at OXC in 2003 is estimated at 46 percent local and 54 percent itinerant operations. Table 2-9 depicts the local/itinerant split expected to occur at OXC through the planning period. The itinerant percentages are anticipated to increase slightly over time as more business activity occurs.

TABLE 2-9 – LOCAL & ITINERANT OPERATIONS				
Year	**Local**	**Itinerant**	**Total**	**Percent**
2003	30,110	35,839	65,949	46/54
2008	31,540	41,100	72,640	43/57
2013	32,863	44,250	77,113	43/57
2018	34,207	47,500	81,707	42/58
2023	35,338	51,200	86,538	41/59

2.2.5 Instrument Operations & Approaches

Instrument operations and approaches include flights and procedures that are activity directed by air traffic control personnel in order to provide appropriate aircraft separation during reduced visibility conditions. An instrument operation is any aircraft operation conducted in accordance with an instrument flight rule (IFR) flight plan or an operation where IFR separation is provided by a terminal control facility or air route traffic control center (ARTCC). Instrument operations also include overflights through terminal airspace, including flights that transit through the Class D airspace of OXC. Instrument operations are reported on the basis of the controlling facility that separates the counts as primary, secondary or overflights. Primary instrument operations are those that take place at the reporting airport, while secondary instrument operations are those performed at other airports (towered or nontowered) that are controlled by the primary facility. Therefore, all instrument operations at OXC are reported as primary.

In contrast to an instrument operation, an instrument approach is an approach made to an airport by an aircraft on an IFR flight plan, when the visibility is less than three miles or the ceiling is at or below the minimum control approach altitude. This definition has three elements – (1) an instrument approach is specifically limited to those approaches when the aircraft is on an IFR flight plan; (2) weather conditions play an important part in determining if the IFR arrival qualifies as an instrument approach; and (3) instrument approaches are credited to the airport of destination with a published instrument approach procedure. With regard to establishing the need for additional instrument approach procedures, the number of existing instrument approaches is the key element of consideration.

The instrument operations forecast for OXC are based on a percentage of the itinerant operations. Historical data presented in the latest FAA Terminal Area Forecast indicates that the instrument operation activity level is about 17 percent of total itinerant activity and remains constant through the forecast period. Forecasts of instrument approaches were derived from the number of instrument operations utilizing a ratio reflecting activity characteristics and the occurrence of IFR conditions for the Boston and New York ARTCCs. This ratio indicates that slightly more than 24 percent of all instrument operations are instrument approaches. Application of this forecast methodology results in the projections of instrument operations and approaches presented in Table 2-10.

TABLE 2-10 – ANNUAL AIRCRAFT INSTRUMENT OPERATIONS & APPROACHES		
Year	**Instrument Operations**	**Instrument Approaches**
2003	6,123	1,491
2008	6,989	1,702
2013	7,524	1,832
2018	8,084	1,968
2023	8,708	2,120

2.2.6 Peak-Hour Aircraft Operations

Hourly activity data recorded by the air traffic control tower was used to identify the existing level of peak-hour air traffic at the Airport. Data for visual flight rule (VFR) conditions during the months of January 2004 through May 2004 was available for evaluation. The peak-hour was defined as the highest average of two consecutive hourly periods. This data supported that peak hourly traffic generally occurred during the weekends when pilots were primarily conducting touch-and-go operations. The VFR peak-hour activity level was determined to be 60 aircraft operations. The hourly demand for IFR activity was estimated as three times the average hourly traffic based on a 250 business-day year and 16-hour day. This generates a current IFR hourly demand of five operations.

The forecast of peak-hour traffic levels takes into account the condition that as annual activity levels increase, the percentage of activity that occurs during the peak-hour decreases, due to peak operating periods spreading out during the day. This trend is more evident when the peak-hour traffic begins to approach airfield capacity. Table 2-11 presents the resulting forecasts of VFR and IFR peak-hour aircraft operations. During VFR peak-hour conditions, the aircraft mix will be dominated by single-engine piston aircraft. IFR peak-hour aircraft operations will feature the larger aircraft types operating at the Airport, especially in the early morning and evening hours when the business jets are transitioning to and from other area airports.

TABLE 2-11 – VFR & IFR PEAK-HOUR AIRCRAFT OPERATIONS		
Year	**Peak-Hour Aircraft Operations**	
	VFR	**IFR**
2003	60	5
2008	65	5
2013	69	6
2018	72	6
2023	75	7

2.3 Comparison with Other Forecasts

The projections of based aircraft and aircraft total operations derived in the preceding sections were compared to those generated by the FAA in its Terminal Area Forecast (TAF), and the values are summarized in Table 2-12 and Table 2-13, respectively.

TABLE 2-12 – BASED AIRCRAFT FORECAST COMPARISON

Year	Master Plan Recommendation					FAA Terminal Area Forecast			
	Piston	Business Jet	Other	Total		Piston	Business Jet	Other	Total
2003	188*	37*	11*	236*		181**	31**	30**	242**
2008	191	65	12	268		193	33	32	258
2013	194	67	13	274		207	35	34	276
2018	197	69	14	280		221	38	36	295
2023	200	72	15	287		236***	40***	39***	315***

* Existing aircraft in year 2003.
** FAA Terminal Area Forecast based on year 2002 and earlier data.
*** Extrapolated value.

The forecasts of total based aircraft differ by only nine percent in 2023. However, there are some differences in the two projections that are worth noting. The master plan forecasts of total based aircraft demonstrate an overall average annual growth rate of 0.98 percent and reflect a demand level that is constrained by developable airport property. The TAF of total based aircraft equates to an average annual growth rate of 1.33 percent, which is higher than that anticipated nationally (1.07 percent) for the active general aviation fleet. The mix of based aircraft in each forecast differs primarily in the numbers of single-engine piston and business jet aircraft. The TAF utilizes an average annual growth rate for single-engine piston aircraft of 1.34 percent, a rate that is more than four times that used in the national forecast and for this Master Plan. The number of business jets in the TAF increases from 31 to 40 (extrapolated) representing an average annual growth rate of 1.28 percent, or about four times less than that expected nationally. Further, the year 2023 TAF projection is predicated on a level of 31 business jets versus the 37 that were based at the Airport in 2003. The variance in the resultant numbers for each category of aircraft tends to offset one another and yield a total number of based aircraft that is generally consistent with that proposed herein.

Aircraft operations forecasts differ in absolute numbers because the TAF is based on the records obtained from the part-time Air Traffic Control Tower. However, the two forecasts may be compared on the basis of average annual growth rates and in the average number of operations per based aircraft. The master plan forecasts indicate an average annual growth rate of 1.37 percent compared to the TAF rate of 0.97 percent. The lower rate of growth in the TAF activity is reflected in the calculation of the number of operations per based aircraft. The master plan data suggests that this ratio will increase from 279 to 302 over the 20-year period. The TAF values generate a decreasing trend in this ratio of aircraft operations per based aircraft from 231 to 215. The decrease implies that the average aircraft will be used less frequently over time, a characteristic that is contrary to that reflected by the FAA's national forecasts.

TABLE 2-13 – AIRCRAFT OPERATIONS FORECAST COMPARISON		
Year	**Master Plan Recommendation**	**FAA Terminal Area Forecast***
2003	65,949	55,814
2008	72,640	58,759
2013	77,113	61,705
2018	81,707	64,652
2023	86,538	67,648**
* Excludes traffic occurring when the air traffic control tower is closed (9:00 p.m. to 6:00 a.m.) ** Extrapolated value.		

It is recommended that the Master Plan forecasts be utilized in the planning process because the base year (2003) takes into account activity occurring when the Air Traffic Control Tower is closed as well as those flights not operated during the construction program in that year. Additionally, these forecasts utilize 2003 actual based aircraft by type data and reflect a slight increase in aircraft utilization. Finally, the airport master planning process has the benefit of using surveys of airport users and interviews with airport management, key tenants, and air traffic control personnel. For these reasons, the Master Plan data reflects a more current snapshot of the Airport and its use, than the input utilized as part of the FAA TAF process.

2.4 Future Design Aircraft

Frequency of use is the key factor in defining the "critical" or "design" aircraft for an airport. As discussed in Chapter 1, accepted industry practice is to select the Airport Reference Code (ARC) based on the most demanding aircraft that generates, or is expected to generate, at least 500 annual itinerant aircraft operations. Occasional use by aircraft larger in size or faster in approach speed does not overly influence the design of an airport.

In the previous Waterbury-Oxford Airport Master Plan (1995), the design aircraft was listed as a Gulfstream III, which falls within ARC C-II (see Table 1-7). Thus, the ARC for OXC in 1995 was C-II. The 1995 study forecast that the "new" Gulfstream IV (G450) aircraft would become a regular airport user in the future. The Gulfstream IV (G450) has a higher approach speed than the Gulfstream III and an ARC of D-II. Therefore, the 1995 Master Plan forecast that the ARC for OXC would change from C-II to D-II.

Since 1995, the Gulfstream IV (G450) aircraft has become a regular user of OXC. In 2003, the FAA recorded 570 itinerant operations of the G450, which is sufficient activity to change the designated ARC. Thus, the current ARC for OXC is now ARC D-II.

The business jet fleet at OXC is continually being upgraded, with additional changes anticipated through the year 2023. It is forecast that more Gulfstream V (G550) and Global Express aircraft (shown below) operations will occur at OXC, as these aircraft are now based at the Airport. The new G550 and Global Express aircraft have slightly larger wingspans than the G450, which place them in ARC D-III. In 2003, the FAA recorded 260 itinerant operations at OXC by these two aircraft types, and over 600 annual itinerant operations are forecast by 2023. Thus, for planning purposes, ARC D-III is used as the future ARC for Waterbury-Oxford Airport.

Gulfstream V	**Global Express**
	

2.5 Forecast Summary

Table 2-14 presents a summary of the forecasts for Waterbury-Oxford Airport over the planning period. The forecasts as presented in this chapter will be used throughout the remainder of this report.

TABLE 2-14 – FORECAST SUMMARY					
	2003	**2008**	**2013**	**2018**	**2023**
Based Aircraft					
Single-Engine/Multi-Engine Piston	188	191	194	197	200
Single-Engine/Multi-Engine Turboprop	10	11	12	13	14
Business Jet	37	65	67	69	72
Rotorcraft	1	1	1	1	1
Total	236	268	274	280	287
Operations by Fleet Mix					
Single-Engine/Multi-Engine Piston	58,656	61,884	65,378	68,950	72,600
Single-Engine/Multi-Engine Turboprop	3,120	3,564	4,044	4,550	5,082
Business Jet	3,700	6,695	7,169	7,659	8,280
Rotorcraft	473	497	522	548	576
Total	65,949	72,640	77,113	81,707	86,538
Local and Itinerant Operations					
Local	30,110	31,540	32,863	34,207	35,338
Itinerant	35,839	41,100	44,250	47,500	51,200
Annual Aircraft Instrument Operations & Approaches					
Instrument Operations	6,123	6,989	7,524	8,084	8,708
Instrument Approaches	1,491	1,702	1,832	1,968	2,120
Peak Period Hour Operations					
VFR	60	65	69	72	75
IFR	5	5	6	6	7