

CHAPTER 4-AVIATION DEMAND FORECASTS

4.01 Background

This chapter presents forecasts of aviation demand for Erie International Airport through the year 2020. The forecasts will serve as the basis for establishing requirements for Airport facilities and for performing the environmental, financial, and other analyses necessary in Airport master planning. Major subjects discussed are (1) the historical and forecast population and economy of the region, (2) historical airline passenger traffic, (3) general aviation, (4) aircraft operations, and (5) aviation demand forecasts.

Aviation demand at an airport, such as Erie International Airport, is a function of the economic and demographic characteristics of the area served by the airport. Such an area is commonly referred to as the "airport service region." An understanding of the present and likely future economy and population of the region is essential to the development of aviation demand forecasts.

4.01-1 Airport Service Region

Erie International Airport is located in Erie County in northwestern Pennsylvania, near two major interstate routes—the east-west I-90 and the north-south I-79. Cleveland Hopkins International Airport is approximately 110 miles to the west, Buffalo International Airport is approximately 105 miles to the east, and Pittsburgh International Airport is approximately 125 miles to the south.

The Airport serves the northwestern Pennsylvania, western New York, and eastern Ohio Regions, which is made up of nine counties: Crawford, Erie, Forest, Mercer, Venango, and Warren counties Pennsylvania; Ashtabula and Trumbull counties Ohio; and Chautauqua county, New York.

The primary airport service region encompasses most of Erie County, which has almost 30% of the population in the region. A primary airport service region usually generates well over two-thirds of the airline passenger and cargo traffic at an air carrier airport.

The airport service region was selected based upon a 30-mile drive from Erie International Airport. Its limits are defined by the range and character of airline service provided by other air carrier airports outside the airport service region.

4.01-2 Population Trends

Historical and forecast population for the airport service region and the United States from 1970 through 2011 are presented in Table 4-1. The airport service region has experienced a total population growth of about 0.15% per year, or about 1.5% over the last 10 years. Between 1990 and 2000, the national average was about 1.0% per year, or about 10.0% over the same period.

It is expected that the population of the primary service area will grow at a rate well below the rate predicted for the national population growth rate. The Erie County population is expected to increase to 286,283 in 2005, 288,541 in 2010, and 292,252 in 2020.

**TABLE 4-1
HISTORICAL AND FORECAST POPULATION
ERIE INTERNATIONAL AIRPORT**

Year	Erie County ^(a)		Airport service region ^(b)		United States	
	Population	Average annual increase	Population	Average annual increase	Population	Average annual increase
Historical						
1970	263,604	--			203,801,000	--
1980	279,780	0.7			227,257,000	1.1%
1990	275,572	-0.17	919,611		250,395,000	1.0
2000 ^(c)	283,851	0.30	933,390	0.15%	275,306,000	0.9
Forecast						
2005 ^(d)	286,283	0.17%	940,280	0.15	287,716,000	
2010	288,541	0.16	945,942	0.12	299,862,000	0.08
2020	292,252	0.13	955,742	0.10	324,927,000	0.08

a) Erie County

b) Regional population (Crawford, Erie, Forest, Mercer, Venango, Warren, counties Pennsylvania; Ashtabula, Trumbull counties, Ohio)

c) Estimated, U.S. Census

d) Data for year 2005 was estimated by C&S Engineers, Inc. from population forecasts for the years 2000 and 2010. The years 2005, 2010, and 2020 represent the 5-, 10-, and 20- year airport master planning time frame from 2000.

Source: Pennsylvania State Data Center, U.S. Census, Ohio Department of Development

4.01-3 Industry and Employment

In contrast to the modest growth in the region's population base during the last 10 years, Erie County experienced a 4.7% increase in nonagricultural employment between 1980 and 1990 (Table 4-2).

Significant increases in jobs in the managerial, sales, and service sectors have more than offset the employment decrease trend in labor, the second ranked industry in 1980.

The region is experiencing growth in privately held, small sized companies. Today, the economy in the area is more diversified than in previous decades, with no single major industry. This trend in economic diversification and growth is expected to continue and, as shown in Table 4-2, nonagricultural employment is expected to increase to 126,137 in 2020.

In addition, Erie is an attractive location for business because it (1) is relatively close to Cleveland, Pittsburgh, and Buffalo, (2) is at the intersection of two main interstate highways, (3) has good air and rail service, (4) has relatively low cost of operations, and (5) has access to nearby marine transportation facilities at the Port of Erie and the Great Lakes System.

A new convention center is now under consideration for Erie that is expected to attract additional businesses to the Erie region.

**TABLE 4-2
HISTORICAL AND FORECAST NONAGRICULTURAL EMPLOYMENT
ERIE INTERNATIONAL AIRPORT
CALENDAR YEARS 1980 – 1990**

Industry	1980		1990		% change 1980-1990
	# employed	% of total	# employed	% of total	
Historical Employment					
Managerial	23,340	20.2%	28,819	23.9%	3.6%
Sales and Support	33,310	28.9%	36,055	29.9%	1.0%
Service	15,130	13.1%	17,414	14.4%	1.3%
Craft and Repair	16,420	14.2%	15,207	12.6%	-1.6%
Labor	<u>27,094</u>	<u>23.5%</u>	<u>23,178</u>	<u>19.2%</u>	<u>-4.3%</u>
Total	115,294	100.0%	120,673	100.0%	4.7%
United States	90,406,000		110,657,000		22.4%
Employment Forecast					
	Projected Employment in Erie County				
	2005		124,298		
	2010		124,536		
	2010		126,137		

Source: C&S Engineers, Inc.

4.01-4 Summary

Population in the overall airport service region is projected to increase at a modest rate through 2020. Employment in the region, however, is expected to continue the trend of more rapid growth, especially in the service sector.

Employment increases are expected to result from continued diversification and growth in medium-size companies. Similarly, personal income is expected to increase in the future.

4.02 Historical Airport Activity

Erie International Airport is classified as a commercial service airport by the Federal Aviation Administration (FAA), in terms of certificated airline traffic activity, as measured by enplaned passengers. A commercial service airport is defined by the FAA as a community that enplanes from 10,001 passengers to 0.1% of the total enplaned revenue passengers in all services and all operations of U.S. certificated route air carriers within the **50** states, the District of Columbia, and other U.S. areas designated by the FAA.

4.02-1 Airlines Serving Erie

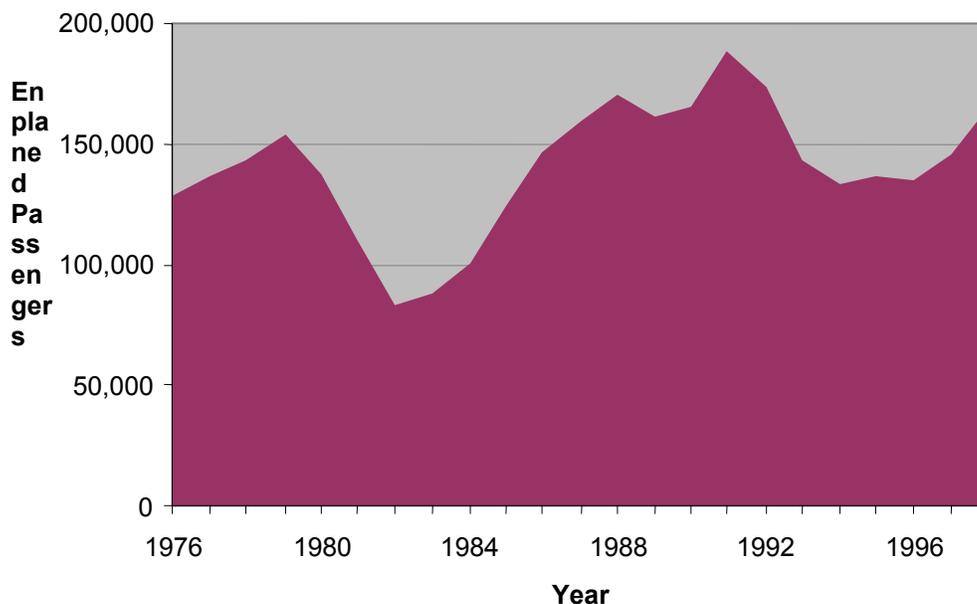
In 1999, one major national airline and three commuter/regional airlines served the Airport. US Airways is the national airline, and the three commuter regional airlines were: US Airways Express, Continental Express, and Northwest Airlin

US Airways, continues to account for the majority of the market, with approximately 60% of all enplaned passengers. The recent announcement of a merger between US Airways and United Airlines may have an effect on service at Erie International Airport; however it is premature to determine what impacts may occur.

4.02-2 Enplaned Passengers

Historical commercial passenger enplanements at the Airport from 1976 through 1998 are shown in Chart 4-1. Historical commercial passenger service at the Airport from 1981 through 1998 is presented in Table 4-3. Commercial passenger service is defined as air carrier, commuter, and air taxi service. The number of annual enplaned passengers has increased by 49% over this period, from 110,235 to 164,323 enplanements. During the national recession, enplanements declined from 188,396 in 1991 to 134,444 in 1996. Since 1997, enplaned passenger volumes have begun to steadily increase to 164,323 enplanements in 1998.

**CHART 4-1
HISTORICAL PASSENGER ENPLANEMENTS
ERIE INTERNATIONAL AIRPORT**



It is expected that the recent trend in air passenger volumes will continue based on the introduction of regional jet service by the air carriers that will likely result in service enhancements with direct access to cities beyond the hubs at Pittsburgh (US Airways),

Cleveland (Continental Express), and Detroit (Northwest AirlinK). Additionally, the regional jet has been tremendously popular with passengers that historically have utilized Buffalo, Cleveland and Pittsburgh in order to avoid turboprop commuter flights.

4.02-3 Aircraft Departures

As shown in Table 4-3, the average number of daily commercial passenger aircraft departures grew by 58% from 1981 to 1998, from about 11 to 18. But the number of passengers enplaned per departure has stayed relatively steady with an average of 23 over the period. This phenomenon is primarily due to an increase in commuter airlines using relatively smaller aircraft.

**TABLE 4-3
HISTORICAL COMMERCIAL PASSENGER SERVICE
ERIE INTERNATIONAL AIRPORT**

Year	Enplaned Passengers	Commercial Passenger Service Departures^(a)	Average Daily Commercial Passenger Service Departures	Passengers Enplaned per Departure
1981	110,235	4,099	11	27
1982	83,345	4,505	12	19
1983	88,047	5,097	14	17
1984	100,182	7,775	21	13
1985	124,323	9,696	27	13
1986	146,745	8,670	24	17
1987	159,024	8,029	22	20
1988	169,790	9,440	26	18
1989	161,103	9,932	27	16
1990	165,099	8,717	24	19
1991	188,396	8,353	23	23
1992	173,320	7,191	20	24
1993	142,248	5,597	15	25
1994	132,651	6,252	17	21
1995	135,868	6,380	17	21
1996	134,444	5,467	15	25
1997	145,178	6,555	18	22
1998	164,323	6,492	18	25

Source: FAA Terminal Area Forecast

(a) Commercial service passenger service is defined as air carrier, commuter, and air taxi service.

As shown in Table 4-4, the number of commuter aircraft departures has increased from 4,070 in 1993 to 5,024 in 1998, while air carrier aircraft departures have decreased slightly from 1,527 to 1,468 over the same period. Due primarily to the increase in commuter aircraft departures, the total number of commercial passenger service aircraft departures peaked in 1997 at 6,555, a 17% increase from 1993. There was an incremental decrease in departures in 1998 by 127 departures.

**TABLE 4-4
HISTORICAL COMMERCIAL PASSENGER AIRCRAFT DEPARTURES
ERIE INTERNATIONAL AIRPORT**

Year	Air Carrier	Commuter / Air Taxi	Total
1993	1,527	4,070	5,597
1994	1,479	4,773	6,252
1995	1,429	4,952	6,380
1996	1,444	4,024	5,467
1997	1,454	5,101	6,555
1998	1,468	5,024	6,492

Source: FAA Terminal Area Forecast

4.02-4 Airline Service

As of June 2000, the airlines and commuters serving Erie International Airport provided nonstop service to and from 3 U.S. cities with connections to the national and international network of three major carriers. The 3 cities receiving non-stop service out of Erie are Detroit (260 miles west), Cleveland (110 miles west), and Pittsburgh (125 miles south).

The types of airline and commercial aircraft serving Erie as of June 2000 are shown in Table 4-5. All aircraft routinely accommodated at the Airport are narrowbody or small aircraft, suited to the short- and medium-range service pattern. Air carrier aircraft accounted for 4 of the 18 scheduled daily departures, or 22% of total departures. Commuter operations accounted for 14 departures or 78% of the total departures.

**TABLE 4-5
SCHEDULED AIRLINE AIRCRAFT SERVING ERIE INTERNATIONAL AIRPORT
JUNE 2000**

Aircraft Type	Seats	Daily Scheduled Aircraft Departures			Total
		Continental Express	Northwest Airlink	US Airways	
Air Carrier					
DC-9-30	108	0	0	3	3
F-100	103	0	0	1	1
Total Air Carrier		0	0	4	4
Commuter					
Dehavilland Dash 8	30	0	0	3	3
Embraer 120	30	2	0	0	2
Saab SF-340	30	0	6	0	6
Beechcraft 1900	19	3	0	0	3
Total Commuter		5	6	3	14
TOTAL		5	6	7	18

Source: Official Airline Guides, Inc., *Official Airline Guide*, June 2000.

4.02-5 Air Carrier Operations

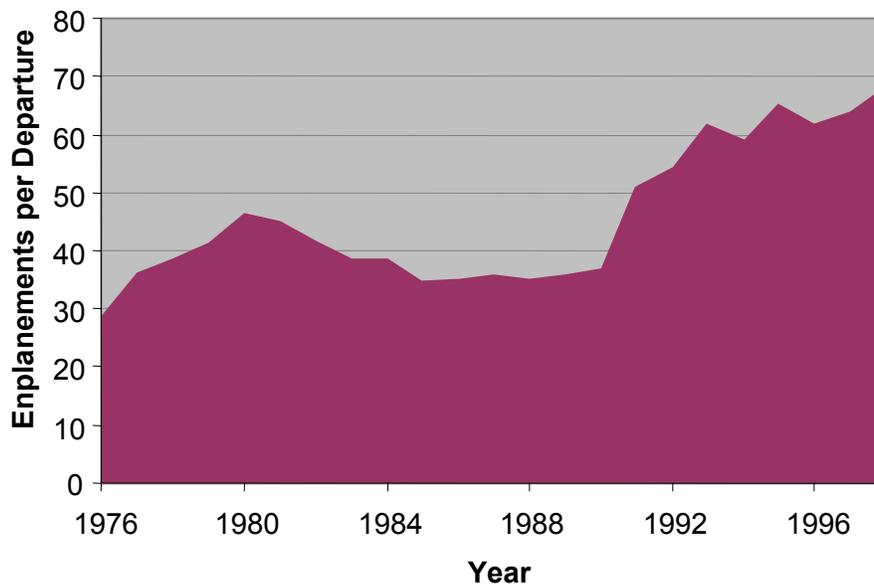
Air carrier aircraft operations are those used in revenue service by the major scheduled airlines operating aircraft with more than 60 passenger seats. Included are scheduled flights, charter flights, diverted flights, and ferry operations. In 1998, 2,935 air carrier operations were performed at Erie International Airport.

The number of air carrier aircraft operations at the Airport has generally decreased over the years, but at varying rates since 1976 due to a combination of factors, including changes in levels of airline service, aircraft seating capacity, airline fares, and aviation fuel costs, and due to economic trends, airline strikes, and airline mergers.

The most frequently operated aircraft has been the DC-9-30 utilized by US Airways. There are 3 daily departures by this 108-seat aircraft. Combined with the 103 seats on the daily departure by the Fokker F-100, there are 427 available air carrier seats per day at ERI.

There were an average of 275 daily air carrier enplanements in 1998. This represents an average load factor of 64% on the air carrier aircraft, and an average of 68 enplaned passengers per departure. The average number of enplaned passengers per departing air carrier aircraft has risen steadily since 1991 (see Chart 4-2).

**CHART 4-2
HISTORICAL AIR CARRIER ENPLANEMENTS PER DEPARTURE
ERIE INTERNATIONAL AIRPORT**



The FAA’s Terminal Area Forecast predicts that by 2015, there will be 125,930 annual air carrier enplanements on 1,524 annual air carrier departures, or 83 enplaned passengers per departure. Based upon information provided by representatives of US Airways, the DC-9-30 or similar equipment is expected to be utilized at ERI for the foreseeable future. The DC-9-30 will be the critical aircraft for airfield evaluations.

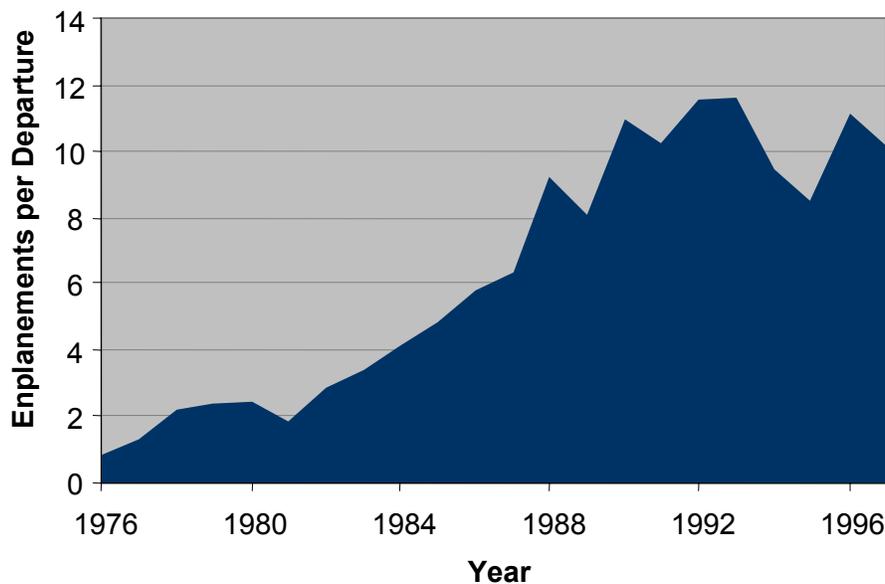
4.02-6 Air Taxi and Commuter Operations

Air taxi aircraft operations consist of the unscheduled operations of "for-hire" air taxis. Air taxi service involves the chartering (or hiring) of an aircraft to transport passengers or cargo, usually on a onetime basis. For example, a small group of businessmen may hire an air taxi to fly them from Erie to Philadelphia to conduct business and then fly them back. Air taxi service is usually provided by fixed base operators or independent air taxi operators. Commuter operations consist of the scheduled operations of commuter airlines and of regional airlines operating aircraft with 60 or fewer passenger seats.

Air taxi and commuter operations have increased rapidly, from approximately 1% of the total aircraft operations in 1976 to approximately 16% in 1998. This change corresponds to an increase in commuter passenger enplanements, from less than 1% of total passengers in 1976 to 39% in 1998. This increase is partially due to the large passenger demand at nearby markets, such as Cleveland and Pittsburgh that are in the range of commuter aircraft. The commuter operators have also taken advantage of the air carrier hubbing activity and provide feeder service into the mainline carrier's hub.

There were 10,048 air taxi and commuter operations at the Airport in 1998. There are 387 available seats on the 14 daily commuter departures each day. A daily average of 175 enplanements occurred at ERI in 1998, for an average of 13 enplanements per departure and an average load factor of 45%. Similar to the air carrier enplanements per departure, the air taxi and commuter enplanements per departure have also risen since 1982.

**CHART 4-3
HISTORICAL AIR TAXI AND COMMUTER ENPLANEMENTS PER DEPARTURE
ERIE INTERNATIONAL AIRPORT**



The FAA's Terminal Area Forecast data indicates that the average enplanements per air taxi and commuter departure will increase to 18 by 2015.

4.03 Commercial Aviation Demand Forecasts

Forecasts of commercial aviation demand at Erie International Airport through 2020 are presented in Table 4-6. Data for activity in 1998 are also shown.

**TABLE 4-6
COMMERCIAL AVIATION DEMAND FORECASTS
ERIE INTERNATIONAL AIRPORT**

	Actual 1998	Forecast		
		2005	2010	2020
Enplaned Passengers	164,323	193,998	218,423	276,884
Commercial Aircraft Departures				
Air Carrier Aircraft Departures	1,468	1,552	1,615	1,720
Air Taxi/Commuter Departures	<u>5,024</u>	<u>5,386</u>	<u>5,661</u>	<u>6,253</u>
Total Commercial Aircraft Departures	6,492	6,938	7,276	7,973
Passengers per Departure				
Air Carrier Aircraft	68	76	82	92
Air Taxi/Commuter Aircraft	13	14	15	17
Average Enplaned Passengers / Aircraft Departure	25	28	30	33

Sources: Actual: FAA Terminal Area Forecast
Forecast: C&S Engineers, Inc.

4.03-1 General Assumptions

The aviation demand forecasts are based on the following general assumptions:

1. The national economy will experience moderate but sustained economic growth during the forecast period, although the rate of growth may vary from year to year.
2. The introduction of regional jet aircraft will begin to replace commuter turboprop aircraft operating at the Airport over the forecast period.
3. The potential merger of United Airlines and US Airways will not have a significant effect on the service at the airport (should US Airways service be reduced or eliminated, it is assumed that another airline will absorb the forecast activity with similar equipment and route structures).
4. Over the long term, airfares will tend to increase in constant dollars at the same rate as overall price level changes (although significant short term fluctuations in average fare levels can be expected).

5. The airline industry will provide sufficient airline service at the Airport to accommodate the demand for airline passenger traffic.

4.03-2 Enplaned Passengers

The volume of enplaned passengers at the Airport is forecast to increase from 164,323 in 1998 to 193,998 in 2005, then to 218,423 in 2010, and to 276,884 in 2020. These increases in passenger enplanements are based on historical passenger enplanement trends and socioeconomic conditions and forecasts for the region.

To forecast enplaned passenger activity, attempts were made to establish relationships between historical passenger enplanements at Erie International Airport and several independent variables. The independent variables tested were total population and employment in the Erie MSA and surrounding region. It was discovered that over the period of 1976 through 1998, the average annual growth rate of enplanements at the Airport was approximately 5% (accounting for both increases and decreases). However, it is not expected that this growth rate will be sustained over the forecast period and an annual growth rate of 2.4% was used based on an examination of predicted population growth in the region and employment growth.

In the short term, aviation activity at airports is subject to fluctuations that are usually caused by overall economic conditions, aviation fuel prices, air fares, and global issues, such as wars and terrorism. In the long term—and Erie is not expected to be an exception—the general trend is upwards. Therefore, for purposes of this Master Plan, the forecasts presented herein provide a reasonable basis for the long-term planning of Airport facilities, and are reasonably consistent with the FAA’s Terminal Area Forecast.

4.03-2 Airline Aircraft Departures

The number of departures by airline aircraft, defined as air carrier and commuter aircraft, is forecast to increase from 6,492 in 1998 to 7,973 in 2020. Commuter aircraft, such as the Embraer 120 or Beechcraft 1900, are expected to be replaced over the forecast period with regional jet aircraft, based upon information presented by manufacturers and airlines. The number of passengers enplaned per aircraft departure is expected to rise over the forecast period from 25 to 33. Air carrier aircraft operation forecasts were based on the assumption that the average number of passengers per enplaned aircraft would grow from 68 to 92. This is a result of an expectation that similar equipment will continue to be operated in this market.

4.03-4 Air Cargo Forecast

The domestic air cargo industry has experienced strong and steady growth in the last decade. This growth has been attributed to the lengthy U.S. economic expansion, growing demand for just-in-time delivery of products and components, and recently, the development of the electronic commerce industry. It is predicted that the growth in domestic enplaned air cargo will continue at a sustained rate of 10% annually.

Erie International Airport has historically enplaned primarily belly cargo on the scheduled air carriers. (It is important to note that five integrated all-cargo carriers control more than 62

percent of the domestic freight market: Federal Express, UPS, Airborne Express, Emery and Burlington.) A significant volume of cargo is processed by Cleveland Hopkins International and Buffalo Niagara International airports as shown in Table 4-7.

**TABLE 4-7
TOTAL CARGO (TONS)
CLEVELAND HOPKINS INTERNATIONAL AND
BUFFALO NIAGARA INTERNATIONAL AIRPORTS**

Airport	1994	1995	1996	1997	1998
CLE	237,000	265,000	295,000	295,000	282,000
BUF	<u>195,000</u>	<u>193,000</u>	<u>190,000</u>	<u>170,000</u>	<u>167,000</u>
TOTAL	432,000	459,000	485,000	465,000	449,000

Source: FAA DOT/TSC CY1998 ACAIS Database

As shown by this data, the combined cargo volume at Cleveland and Buffalo has remained relatively flat over the period from 1994 to 1998. For the purposes of this analysis, a conservative assumption of future enplaned cargo was based upon a modest 3% annual growth at Cleveland and no growth at Buffalo. This potential growth is shown in Table 4-8.

**TABLE 4-8
TOTAL CARGO FORECAST (TONS)
CLEVELAND HOPKINS INTERNATIONAL AND
BUFFALO INTERNATIONAL AIRPORTS**

Airport	2000	2005	2010	2015	2020
CLE	304,000	367,000	443,000	535,000	646,000
BUF	<u>167,000</u>	<u>167,000</u>	<u>167,000</u>	<u>167,000</u>	<u>167,000</u>
TOTAL	471,000	534,000	610,000	702,000	812,000

Source: C&S Engineers, Inc.

ERIE INTERNATIONAL AIRPORT

Much of the originating and destination cargo in the Erie region is processed through Cleveland and Buffalo, then trucked to or from the Erie area (see discussion of the Erie-Western Pennsylvania Port Authority in Section 2.04-2). The scheduled acquisition of the former Fenestra building and Penn Brass building (located along the southeast border of the existing airport property) presents the Erie Municipal Airport Authority with a unique opportunity. These facilities, coupled with their location adjacent to a rail siding (currently abandoned but with the potential for recovery), provides the Authority with the opportunity to develop a cargo facility that complements the goals and objectives of the Airport.

The existence of dedicated, cost-effective cargo facilities with direct access to a rail siding, improved ground access (as part of the Powell Avenue relocation project) and airport infrastructure that can support typical integrated cargo carrier aircraft, is expected to create a potential air cargo market opportunity at Erie International. In order to establish a baseline of potential cargo activity at Erie International, some assumptions regarding how existing cargo is moved to and from the region were made.

As a starting point, the consultant developed a forecast for potential cargo enplaned at ERI as a percentage of the air cargo enplaned at Cleveland Hopkins International and Buffalo International airports. It is expected that local manufacturers or suppliers would ship (and/or receive) certain unique or highly time-sensitive cargo via air directly from Erie if appropriate cost-effective service were available.

Three potential percentages of total cargo forecast for Buffalo and Cleveland were developed for this analysis, as shown in Table 4-9.

**TABLE 4-9
POTENTIAL CARGO CAPTURE (TONS)
ERIE INTERNATIONAL AIRPORT**

	2000	2005	2010	2015	2020
3%	14,130	16,020	18,300	21,060	24,360
5%	23,550	26,700	30,500	35,100	40,600
10%	47,100	53,400	61,000	70,200	81,200

Source: C&S Engineers, Inc.

Based on a comparison of cargo activity at similar facilities with similar demographics, these estimates seem reasonable. The remainder of this forecast discussion will utilize a range of potential cargo activity at Erie International based upon these estimates. The consultant recommends that cargo development considerations be based on the range of 3 to 5% of activity at Cleveland and Buffalo, and that an aggressive marketing strategy be developed to support this potential.

EQUIPMENT DEMANDS

The next step in the cargo forecast process is to determine the typical equipment that would be utilized by air cargo carriers to transport the forecast cargo tonnage. A number of different aircraft types are in use today by all-cargo carriers, ranging from the Cessna Caravan (a twin turbo-prop aircraft) to the Boeing 747-400. Based upon a survey of cargo carrier activities of similar airports in the FAA's Eastern Region, typical cargo aircraft include:

- Boeing 757
- Boeing 727
- Airbus A-300
- Cessna Caravan

The most likely aircraft expected to provide regular service to Erie International would be the Boeing 727 and the Cessna Caravan. The B-727 has become the workhorse of the medium volume, short haul cargo operation (500 to 1,000 miles in range). This aircraft continues to be utilized by Federal Express, UPS, and other cargo carriers.

The Cessna Caravan is typically utilized to transport cargo from a spoke point on a cargo carrier's hub and spoke network to more remote airport locations. It is also a highly functional piece of equipment for short haul (500 miles or less) immediate delivery of critical items.

The nominal maximum payload capacity of the Boeing 727-200 in freighter configuration is 60,000 pounds. Assuming that cargo activities would be consistent with typical cargo activity at other airports, cargo operations would occur on a 5-day-per-week schedule. This results in approximately 260 cargo activity days per year. Assuming that that inbound and outbound cargo would be approximately equal, the following daily cargo activity would result.

TABLE 4-10
DAILY ENPLANED CARGO (X 1,000 POUNDS)
ERIE INTERNATIONAL AIRPORT

	2000	2005	2010	2015	2020
3%	27	31	35	41	47
5%	45	51	59	68	78

Source: C&S Engineers, Inc.

Since the B-727-200 can accommodate up to 60,000 pounds of payload, it is expected that 1 to 2 aircraft per day (2 to 4 operations per day) would accommodate the immediate term cargo demands. At the end of the forecast period, 2 to 3 aircraft per day would be necessary to accommodate the forecast activity, as shown in Table 4-11.

TABLE 4-11
B-727-200 AIRCRAFT NECESSARY PER DAY TO ACCOMMODATE FORECAST CARGO
ERIE INTERNATIONAL AIRPORT

	2000	2005	2010	2015	2020
3%	1	1	1	1	2
5%	2	2	2	2	3

Source: C&S Engineers, Inc.

It is expected that as a result of the potential unique nature of forecast cargo activities, that the B-727-200 aircraft would be supplemented with Cessna Caravan aircraft to properly serve connections from Erie International to smaller remote facilities. Initially, 2 to 3 Cessna Caravans would be necessary to properly serve the Year 2001 forecast. At the end of the forecast period, it is expected that 4 to 6 aircraft (8 to 12 daily operations) by Cessna Caravan aircraft would be warranted. This translates into approximately 520 B-727 operations and 1,008 Caravan operations per year at a 3% cargo capture in 2001, and up to 1,560 annual B-727 (or equivalent aircraft) and 3,120 Caravan operations in 2020.

The continuing growth of the air cargo market in general, the increasing demand for rapid response by customers for delivery of mission-critical materials, and the incorporation of specialized facilities into the Erie International Airport infrastructure has tremendous potential to lead to a successful cargo operation. This analysis indicates that the development of the Fenestra and Penn Brass facilities has the potential for creating a unique air cargo opportunity.

4.04 General Aviation Forecasts

General Aviation (GA) is defined as that portion of civil aviation that encompasses all facets of aviation except military and commercial operations. To determine the types and sizes of facilities that should be planned to accommodate general aviation activity, certain elements of this activity must be forecast. Indicators of general aviation activity include:

- Based Aircraft
- Fleet Mix
- Operations
- Peak Period Activity

Forecast data presented in the general aviation forecast is provided by the Federal Aviation Administration Terminal Area Forecasts (FAATAF), Aviation Forecasts for Fiscal Years 1999-2010, and Form 5010 dated 12/31/1999. The master plan for Erie International, completed in 1990 by Coffman Associates, is also used as a source of data. Typically, State Aviation System Plans (SASP) are used as another source of forecasts; however, Pennsylvania's SASP is more than 20 years old and is currently being rewritten. According to dialogue with the FAA, there are no Regional Aviation System Plans (RASP) that include Erie International Airport. The information in these reports will serve as a comparative basis of forecasting aviation demand at the Airport to the year 2020. Specific portions of these statewide and federal planning studies will be referenced, compared, and adjusted to more accurately reflect the present and expected future conditions at the Airport.

4.04-1 Based Aircraft

The number of based aircraft is the most basic indicator of general aviation demand. A based aircraft is a general aviation aircraft that is stationed at an airport as its "home base." Forecasts of based aircraft have been presented in the FAA TAF and the 1990 Master Plan, and shall be compared, updated, and applied to the present and expected future conditions at the airport (i.e., the preferred forecast). The number of currently based aircraft was obtained through communication with airport officials. Historical and forecasted figures for based aircraft from these various sources are shown in Table 4-12.

The preferred forecast for based aircraft is displayed in Chart 4-4. The number of based aircraft at Erie International Airport has declined from 62 in 1985 to 35 in 1995, followed by growth to 48 based aircraft in 1999. The decline can be attributed to a decreasing number of private pilots, along with an increase in costs associated with owning and flying a plane, but general positive economic trends in recent years are contributing to a resurgence in general aviation.

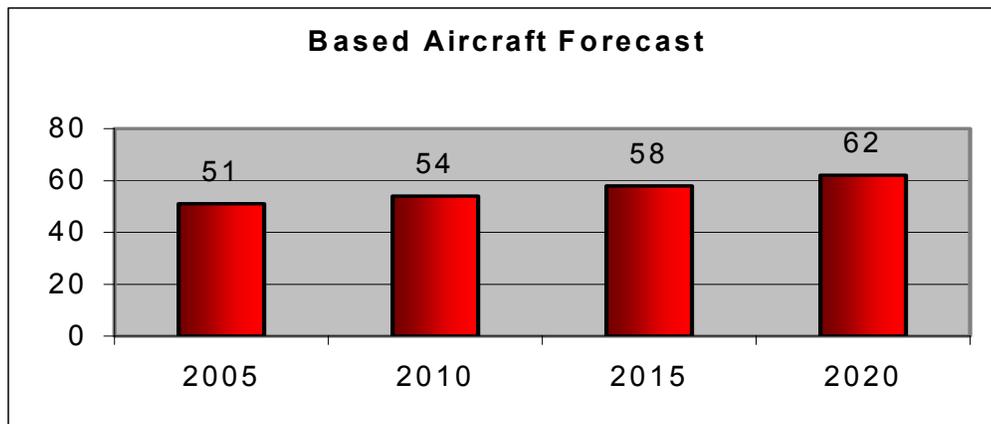
**TABLE 4-12
BASED AIRCRAFT HISTORY AND FORECAST
ERIE INTERNATIONAL AIRPORT**

Year	TAF FAA ¹	NPIAS ²	MP ³	Preferred ⁴
Historical				
1985	62			
1989			50	
1990	50			
1995	35			
1997	34	55		
1998	34	55		
1999	48			
Forecast				
1990			52	
1995			55	
1999				
2000	48		59	
2005	51		62*	51
2010	54		68	54
2015	58		70*	58
2020	62*		74*	62

1 Federal Aviation Administration, Terminal Area Forecasts (2000-2015)
 2 National Plan of Integrated Airport Systems (NPIAS) 93-97, 94-98, 98-03
 3 Source: Erie International Airport Master Plan (1990)
 4 Source: C&S preferred forecasts.
 * Interpolated and extrapolated for forecast years.
 Source: C&S Engineers, Inc.

To develop the preferred forecast of based aircraft, the most recent (2000-2015) TAF forecast was adopted. The TAF forecasts have been adjusted relative to recent growth in the number of based aircraft at the Airport, reflecting a national trend of increasing general aviation activity. The preferred forecast shown in Chart 4-4 increases at the same rate (approximately 1.5%) as the TAF for the duration of the forecast period.

**CHART 4-4
PREFERRED BASED AIRCRAFT FORECAST
ERIE INTERNATIONAL AIRPORT**



Source: C&S Engineers, Inc.

BASED AIRCRAFT FLEET MIX

The forecast of the based aircraft fleet mix (type of aircraft) is based upon expected national trends adjusted to local conditions. These forecasts give an indication of the growth and direction of the fleet, and of potential future based aircraft at the Airport. Table 4-13 presents the forecast fleet mix percentages, while Table 4-14 presents the based aircraft fleet mix resulting from these percentages.

The preferred fleet mix estimate, presented in Table 4-14, was derived from a comparison of the FAA Aviation Forecasts, forecasts prepared for the 1990 Master Plan, and the existing fleet mix. The current fleet mix at Erie consists of 72% single engine aircraft, 20% multi-engine and 8% jet. The comparison of existing and forecasted fleets indicates that the majority of aircraft operated in the region are single engine aircraft, and would therefore continue to dominate the fleet mix.

**TABLE 4-13
BASED AIRCRAFT FLEET MIX PERCENTAGE FORECAST
ERIE INTERNATIONAL AIRPORT**

mp¹	aircraft type	2005	2010	2015	2020
	single engine	53%	51%	51%	51%
	multi-engine	16%	16%	16%	15%
	jet	13%	15%	15%	16%
	turboprop	13%	12%	12%	12%
	rotor	5%	6%	6%	6%
FAA² Aviation Forecast	aircraft type	2005	2010	2015	2020
	single engine	70%	69%	69%	69%
	multi-engine	19%	18%	18%	18%
	jet	6%	8%	8%	8%
	turboprop	2%	2%	2%	2%
	rotor	2%	2%	2%	2%
Preferred³ Forecast	aircraft type	2005	2010	2015	2020
	single engine	70%	69%	69%	69%
	multi-engine	18%	18%	17%	16%
	jet	8%	10%	11%	12%
	turboprop	2%	2%	2%	2%
	rotor	2%	1%	1%	1%

1 1990 Master Plan with extrapolation to the year 2020 by C&S Engineers

2 FAA Aviation Forecast 1996-2007 with extrapolation to the year 2020 by C&S Engineers

3 C&S preferred estimate for Erie International Airport

Source: C&S Engineers, Inc.

TABLE 4-14
BASED AIRCRAFT FLEET MIX FORECAST
ERIE INTERNATIONAL AIRPORT

Preferred Forecast	aircraft type	2005	2010	2015	2020
	single engine	36	37	40	43
	multi-engine	9	10	10	10
	jet	4	5	6	7
	turboprop	1	1	1	1
	rotor	1	1	1	1

Source: C&S Engineers, Inc.

4.04-2 Operations Forecasts

An aircraft operation is a measure of activity that is defined as either a takeoff or a landing. A takeoff and a landing are two operations. The annual general aviation operations forecast was derived for both local and itinerant operations through the use of an Operations-Per-Based-Aircraft (OPBA) ratio. Typically, the OPBA ratios are calculated as an average of historical information.

For this study, information concerning historical OPBA levels was taken from Erie International Airport records, FAA Form 5010 dated 12/31/1999, and FAA Terminal Area Forecast (FAA TAF) which estimate:

- FAA TAF (1990-2000) OPBA ranged from 741-1498
- Erie International (1999) OPBA-1312

An OPBA of 900 and a local/itinerant operational split of 32 percent local and 68 percent itinerant, in conjunction with based aircraft forecasts, were used to determine the operations forecasts shown in Table 4-15. This operational split is based on the current percentages reported in the FAA Form 5010.

TABLE 4-15
ANNUAL GENERAL AVIATION OPERATIONS HISTORY AND FORECAST
ERIE INTERNATIONAL AIRPORT

Year	Based Aircraft	OPBA	Local Operations	Itinerant Operations	Total
Historical					
1990 ¹	50	1007	16,768	33,557	50,325
1995 ¹	35	1289	19,735	25,373	45,108
1998 ¹	34	1401	19,288	28,343	47,631
1999	46 ²	1312	19,319 ³	41,052 ³	60,371 ³
2000 ¹	48	803	13,620	24,941	38,561
Forecast					
2005	51	900	14,688	31,212	45,900
2010	54	900	15,552	33,048	48,600
2015	58	900	16,704	35,496	52,200
2020	62	900	17,856	37,944	55,800

¹ FAATAF

² Erie International Airport

³ FAA Airport Master Record Form 5010 (12/31/99)

Source: C&S Engineers, Inc.

Based on FAA Form 5010 (12/31/1999), the number of military operations totaled 2,429 in 1999. Consultation with the Airport Tower at Erie indicates that military activities, primarily touch-and-goes by C-130's, will yield approximately the same number of annual operations for the forecast period.

Table 4-16 presents the C&S preferred forecast for annual general aviation operations and compares these with other sources of GA operations forecasts. The preferred forecast adjusts for the current (2001) based aircraft number of 48. The preferred forecast of operations increases at approximately 1.1% annually, consistent with the FAATAF operations forecast rate of increases.

**TABLE 4-16
GENERAL AVIATION OPERATIONS FORECAST
ERIE INTERNATIONAL AIRPORT**

Year	FAA 5010 (12/99)	FAA TAF (2000)	Master Plan (1990)	Preferred Forecast
Historical				
1990		50,325	52,000	
1995		45,108		
1998		47,631		
1999	60,371			
2000		38,561		
Forecast				
1995			56,100	
2000			61,400	
2005		40,393	66,470*	45,900
2010		42,947	73,400	48,600
2015		45,502	77,899*	52,200
2020		46,278*	84,332*	55,800

Source: C&S Engineers, Inc.

*Interpolated and extrapolated by C&S Engineers.

4.04-3 Peak Period Activity Forecasts

Since many of the airport's facility needs are related to the levels of activity during peak periods, forecasts were developed for peak month and peak hour operations.

The peak period general aviation operations for 1999, at Erie International Airport, were calculated using the following methodology:

Peak Month Operations: This level of activity is defined as the calendar month when peak aircraft operations occur. Peak month percentages at Erie are typically 10 percent busier than an average month of the year.

$$\text{Peak Month Operations} = (\text{Annual Operations}/12) \times 1.10$$

Design Day Operations: This level of operations is defined as the average day within the peak month.

$$\text{Design Day Operations} = \text{Peak Month Operations}/30$$

Design Hour Operations: This level of activity is defined as the peak hour within the design day. Typically these operations will range between 10 and 15 percent of the design day operations. The lower the annual number of operations, the higher the design hour percentage of the design day.

Considering our operational forecasts, a figure of 15 percent was used to estimate design hour operations.

$$\text{Design Hour Operations} = \text{Design Day Operations} \times 0.15$$

Table 4-17 presents the forecast of peaking characteristics for general aviation operations at Erie International.

**TABLE 4-17
GENERAL AVIATION OPERATIONAL PEAKING FORECAST
ERIE INTERNATIONAL AIRPORT**

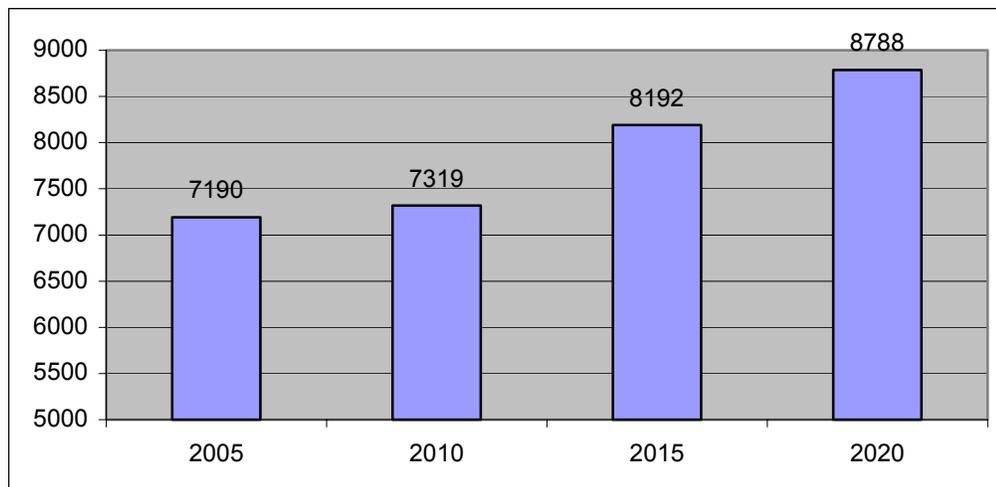
Year	Annual Operations	Peak Month Operations	Design Day Operations	Design Hour Operations
2005	45,900	4,208	140	21
2010	48,600	4,455	149	22
2015	52,200	4,785	160	24
2020	55,800	5,115	171	26

Source: C&S Engineers, Inc.

4.05 Forecasts of Annual Instrument Approaches

A necessary task in assessing the need for new or improved landing aids is a forecast of the levels of instrument approaches at the airport. An instrument approach can be defined as a series of predetermined maneuvers for the orderly transfer of an aircraft under instrument flight conditions (i.e., poor weather) from the beginning of the initial approach to a landing or to a point from which a landing may be made visually. A review of historic data provided by the Erie Air Traffic Control Tower indicated that the number of annual instrument approaches at Erie International has been increasing since 1996 and is expected to continue to increase. See Table 4-18 for a forecast of instrument approaches.

**TABLE 4-18
INSTRUMENT APPROACH FORECAST
ERIE INTERNATIONAL AIRPORT**



Source: C&S Engineers, Inc.

4.06 Demand Forecast Summary

The major demand forecast elements for this study are summarized in Table 4-19.

**TABLE 4-19
FORECAST SUMMARY TABLE
ERIE INTERNATIONAL AIRPORT**

	Forecast			
	Actual 1998	2005	2010	2020
Enplaned Passengers	164,323	193,998	218,423	276,884
Based Aircraft	46	51	54	62
Aircraft Operations				
Air Carrier	2,935	3,104	3,230	3,440
Air Taxi/Commuter	10,048	10,772	11,322	12,506
Air Cargo	0	1,528	2,600	4,680
Aircraft General	47,631	45,900	48,600	55,800
Aviation Military	<u>2,642</u>	<u>2,400</u>	<u>2,400</u>	<u>2,400</u>
Total Aircraft Operations	63,256	63,704	68,152	78,826

Source: C&S Engineers, Inc.

In the following chapter, the Airport's facility requirements will be developed, based on the aviation demand forecasts and the design aircraft, the DC-9-30. The facility requirements analysis will identify development necessary to accommodate forecasted growth throughout the planning period, and will address needs for both airside and landside development.

Appendices D and E include a design aircraft analysis and a runway length analysis in anticipation of the development of facility requirements for Erie International Airport.