CHAPTER 5 - FACILITY REQUIREMENTS

This chapter identifies the requirements for airfield and landside facilities to accommodate the forecast demand level. Facility requirements have been developed for the various airport functional areas shown below:

- Airfield Facilities
  - Runways
  - Taxiways
  - Instrumentation and Lighting

- Landside Facilities
  - Commercial Service Requirements
  - General Aviation Requirements
  - Fuel Storage
  - Aircraft Rescue and Firefighting Facilities (ARFF)
  - Auto Parking and Ground Access.

5.01 Airfield Facilities

Airfield facilities, as described in this report, include the runways, taxiways, minimum land envelope, and airfield instrumentation and lighting. From the demand/capacity analysis, it was concluded that the airport's present runway system will be more than adequate to accommodate demand throughout the planning period. The requirements for runways and taxiways may be described in a number of terms. In this study, the following descriptors are used:

- Airfield Capacity Analysis
- Runway Orientation
- Runway Length and Width
- Pavement Strength
- Taxiway System
- Airfield Instrumentation and Lighting

5.01-1 Airfield Capacity Analysis

In this section, the existing airfield capacity at Erie International Airport (ERI) is compared with the forecast levels of aviation activity. From this analysis, facility requirements for the planning period will be developed by converting any identified capacity deficiencies into detailed needs for new airport facilities. The background of airfield capacity is based on four areas. They are:

- Definition of airfield capacity
- Methodology used
- Hourly capacity
- Annual service volume.

DEFINITION OF AIRFIELD CAPACITY

Airfield capacity, as it applies to ERI Airport, is a measure of terminal area airspace and airfield saturation. It is defined as the maximum rate at which aircraft can arrive and depart an airfield with an acceptable level of delay. Measures of capacity include the following:

- Hourly Capacity of Runways: The maximum number of aircraft operations that can take place on the runway system in one hour.

- Annual Service Volume: The annual capacity or a maximum level of annual aircraft operations, that can be accommodated on the runway system with an acceptable level of delay.

METHODOLOGY USED

A variety of techniques have been developed for the analysis of airfield capacity. The current technique accepted by the FAA is described in the FAA Advisory Circular 150/5060-5, *Airport Capacity and Delay*. The Airport Capacity and Delay Model (ACDM) uses the following inputs to derive an estimated airport capacity:

- Airfield layout and runway use
- Meteorological conditions
- Navigational aids
- Aircraft operational fleet mix
- Touch-and-Go operations.

Each input used in a calculation of airfield capacity is described in the following sections.

AIRFIELD LAYOUT AND RUNWAY USE

The airport layout refers to the location and orientation of runways, taxiways, and other facilities. Currently, ERI has two runways with a system of parallel and partial parallel taxiways which access the four runway ends. A series of stub/access taxiways provide access to the landside facilities.

METEOROLOGICAL CONDITIONS

Wind conditions are of prime importance in determining runway use and orientation. The prevailing wind and visibility conditions determine the direction in which takeoffs and landings may be conducted and the frequency of use for each available runway.

For the purpose of this study, the terms visual flight rules (VFR) and instrument flight rules (IFR) are used as measures of ceiling and visibility. VFR conditions occur when the ceiling is at least 1,000 feet and visibility is three miles or greater. During these conditions, pilots fly on a see-and-be-seen basis. IFR conditions occur when the ceiling is less than 1,000 feet or visibility drops below three miles. In IFR weather, the FAA air traffic control system assumes responsibility for safe separation between aircraft.

NAVIGATIONAL AIDS

FAA's ACDM uses information concerning IFR capability in the capacity calculation. Airports with instrument capabilities are able to operate during IFR conditions and thus are open a greater percentage of the year than similar VFR-only airports.

The navigational aids available at ERI have been described in Section 2.07-3. They include:

• High Intensity Runway Lighting (HIRL)	Runway 6-24
• Medium Intensity Runway Lighting (MIRL)	Runway 2-20
• Precision Runway Marking	Runway 6-24
• Non-Precision Runway Marking	Runway 2-20
• Medium Intensity Taxiway Lighting (MITL)	All taxiways and ramps
• Medium Intensity Approach Light System with Runway Alignment Indicator Lights (MALSR)	Runways 6 and 24
• Air Traffic Control Tower (ATCT)	Terminal Building
• Instrument Landing System (ILS)	Runways 6 and 24
• Global positioning satellite (GPS) approach	Runways 6 and 24
• Very High Frequency Omni-Directional Range (VOR)	Runways 6 and 24
• VOR supplemented with Distance Measuring Equipment(VOR/DME),	Runway 24
• Visual Approach Slope Indicator (VASI)	Runway 20
• Wind Cone/Supplemental Wind Cone	North side of Runway 24,1000' west AER
• Automated Terminal Information Service (ATIS)	Terminal
• Non-Directional Radio Beacon (NDB)	On top of the ATCT

AIRCRAFT OPERATIONAL FLEET MIX

The FAA's Airport Capacity Model also requires that total annual operations be converted to operations by specific aircraft classification category. The capacity model identifies an airport's aircraft fleet mix in terms of four classifications ranging from A (small, single engine with gross weight 12,500 lbs. or less) to D (large aircraft with gross weights over 300,000 lbs.). These classifications and examples of each are identified in Table 5-1. The classifications that apply to ERI fleet mix are Classes A, B, and C.

TABLE 5-1
ACDM AIRCRAFT CLASSIFICATION SYSTEM

Class A: Small single-engine, gross weight 12,500 lbs. or less		
Examples:	Cessna 172/182	Mooney 201
	Beech Bonanza	Piper Cherokee/Warrior
Class B: Twin-engine, gross weight 12,500 lbs. or less		
Examples:	Beech Baron	Mitsubishi Mu-2
	Cessna Citation 1	Piper Navajo
Class C: Large aircraft, gross weight 12,500 lbs. to 300,000 lbs.		
Examples:	Boeing 727/37/57	Douglas DC-9
	Gulfstream III	Lear 35/55
Class D: Large aircraft, gross weight more than 300,000 lbs.		
Examples:	Boeing 747	Airbus A-300/310
	Lockheed	Douglas DC-8-60/70

Source: C&S Engineers, Inc.

TOUCH AND GO OPERATIONS

A touch and go operation occurs when an aircraft lands and then makes an immediate takeoff without coming to a full stop. The primary purpose of touch and go operations is for the training of student pilots. Typically, touch and go operations occur in greater numbers at smaller airports or airports with large flight schools.

HOURLY CAPACITY

The FAA's Airport Capacity Model combines information concerning runway configuration, runway usage, meteorology, operational fleet mix, and touch and go operations to produce an hourly capacity of the airfield. A weighted hourly capacity combines the input data to determine a base for each VFR and IFR operational runway use configuration at the airport. Each hourly capacity base is assigned a proportionate weight (based on the time each is used) in order to determine the weighted hourly capacity of the entire airfield.

The forecast design hour operations, including both commercial and general aviation, range from 34 in 2005 to 41 in 2020, resulting in a maximum capacity utilization (in 2020) of 44.7% VFR and 69.5% IFR. Thus the airfield will have sufficient hourly capacity to meet design hour and peak period demands for the 20-year forecast period.

ANNUAL SERVICE VOLUME

An airport's Annual Service Volume (ASV) has been defined by the FAA as "a reasonable estimate of an airport's annual capacity. It accounts for differences in runway use, aircraft mix, weather conditions, etc., that would be encountered over a year's time." Therefore, ASV is a function of the hourly capacity of the airfield and the annual, daily, and hourly demands placed upon it. ASV is estimated by multiplying the daily and hourly operation ratios by a weighted hourly capacity.

At Erie International Airport the FAA's Airport Capacity Model provided an ASV of 225,000 for present conditions. Compared to the projection of 78,826 operations by the year 2020, it is evident that airfield capacity is not a constraining factor to growth of the Airport. Table 5-2 summarizes the ASV relationships developed in this chapter.

TABLE 5-2
ANNUAL SERVICE VOLUME SUMMARY

Year	Annual Operations	Annual Service Volume[1]	Annual Capacity Ratio
2005	63,704	225,000	28.3%
2010	68,152	225,000	30.3%
2020	78,826	225,000	35.0%

[1] FAA Airport Capacity Model

Source: C&S Engineers, Inc.

5.01-2 Runway Orientation

The orientation of runways for takeoff and landing operations is primarily a function of wind velocity and direction, together with the ability of aircraft to operate under adverse conditions. As a general rule, the primary runway at an airport is oriented as closely as practicable in the direction of the prevailing winds. The most desirable runway configuration will provide the largest wind coverage for a given maximum crosswind component. The crosswind component is the vector of wind velocity and direction which acts at a right angle to the runway. Further, runway wind coverage is that percent of time in which operations can safely occur because of acceptable crosswind components. The desirable wind coverage criterion for a runway system has been set by the FAA at 95 percent with a 16 knot crosswind component for an airport category C-III airport. A combination of the two runways at Erie International Airport exceeds the FAA criteria, providing 99% wind coverage at 10.5, 13, and 16 knots.

5.01-3 Runway Length and Width Analysis

Runway length requirements are dependent upon the flight characteristics of the aircraft that the runway is intended to serve. The weight of the aircraft, the thrust developed by its engines, field elevation, temperature, non-stop flight distance, and the amount of fuel needed for the flight interrelate to determine the length of runway required for takeoff and landing with a desired payload (passengers plus cargo). Appendix E provides a runway length analysis for Erie International Airport.

Runway width is a dimensional standard that is based upon the physical characteristics of aircraft using the airport. The physical characteristic of importance is wingspan. Currently, FAA Airplane Design Group III (wingspans up to but not including 118 feet) is used for defining airport dimensional standards for the primary runway (Runway 6-24), and Design Group II aircraft (wingspans up to but not including 79 feet) are used for defining airport dimensional standards for Runway 2-20. FAA AC 150/5300-13 specifies a runway width of 100 feet for an Airplane Design Group III runway and a width of 75 feet for ADG II. Both runways at Erie International Airport exceed these requirements.

5.01-4 Pavement Strength

The existing pavement strength of Runway 6-24, the primary runway at Erie International Airport, is 180,000 pounds for dual tandem wheel landing gear and 98,000 pounds for dual wheel landing gear. The primary runway pavement strength is sufficient to meet the needs of a C-III aircraft, such as the DC-9-30, which has dual wheel landing gear and a maximum take off weight of 108,000 pounds. Because the B727-200 is expected to operate out of ERI carrying cargo, future pavement design should be based on this aircraft.

Runway 2-20 has an existing pavement strength of 150,000 pounds for dual tandem wheel landing gear and 60,000 pounds for dual wheel landing gear. This pavement strength is adequate for regular use by aircraft such as the Falcon 10 (maximum takeoff weight of 18,740 pounds). See Section 6.06-2 for a discussion of recommended future use of Runway 2-20 by A-I/B-I aircraft only.

5.01-5 Taxiway System

The taxiway system for Erie International Airport should complement the runway system by providing safe access to and from runway and landside areas. At present, the primary runway (6-24) has a full parallel taxiway access (Taxiways A and G). Runway 2-20 has taxiway access to Runway 20 via partial parallel Taxiway B. There is no direct taxiway access to Runway 2. Taxiways C, D, E, and F are taxiways providing access to the runways from the terminal apron.

In terms of taxiway design, based on FAA Advisory Circular 150/5300-13 standards, the taxiway system should be designed to a minimum width of 50 feet at a separation of 400 feet from runway centerline and should have the same strength as the runway

system. Currently, all taxiways except one meet these requirements. A modification of standards was granted for the runway to taxiway centerline separating distance for Runway 6-24 and Taxiway A.

5.01-6 Airfield Instrumentation And Lighting

Instrumentation and lighting at an airport is a prime concern of all pilots and residents. Determining the suitable instrumentation and lighting standards has a prominent influence on airside and landside development.

As a primary commercial service airport, ERI will need an all weather operating capability to accommodate air carrier service. Table 5-3 lists instrumentation and lighting systems recommended for the Airport based upon forecasts, the projected role of the Airport, and the standards depicted in FAA Order 7031.2C, *Airway Planning Standard Number One - Terminal Air Navigation Facilities and Air Traffic Control Services*.

TABLE 5-3
AIRFIELD INSTRUMENTATION AND LIGHTING

Item	Existing	Phase 1 (2000-2005)	Phase 2 (2006-2010)	Phase 3 (2011-2020)
Lighting				
Runway 6-24	HIRL, MITL	HIRL, MITL	HIRL, MITL	HIRL, MITL
Runway 2-20	MIRL, MITL	MIRL, MITL	MIRL,MITL	MIRL, MITL
Visual Aids	VASI (R/W 20)	PAPI (R/W 6, 24, 2, 20)	REILs (R/W 6, 24, 2, 20) PAPI (R/W 6, 24, 2, 20)	REILs (R/W 6, 24, 2, 20) PAPI (R/W 6, 24, 2, 20)
Instrumentation	ILS (R/W 6, 24) MALSR (R/W 6, 24) NDB, VOR/DME (R/W 24) VOR (R/W 6)	ILS (R/W 6, 24) MALSR (R/W 6. 24) NDB, VOR/DME (R/W 6,24)	ILS (R/W 6, 24) MALSR (R/W 6, 24) NDB, VOR/DME (R/W 6, 24, 2, 20)	ILS (R/W 6, 24) MALSR (R/W 6, 24) NDB, VOR/DME (R/W 6, 24, 2, 20)

Legend:		
	HIRL	High Intensity Runway Lights
	MIRL	Medium Intensity Runway Lights
	MITL	Medium Intensity Taxiway Lights
	PAPI	Precision Approach Path Indicator
	REILs	Runway End Identification Lights
	NDB	Non-directional Beacon
	ILS	Instrument Landing System (with localizer, glideslope, outer marker and middle marker)
	MALSR	Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights
	VASI	Visual Approach Slope Indicator
	VOR/DME	Very High Frequency Omni-Directional Range supplemented with Distance Measuring Equipment

Source: C&S Engineers, Inc.

5.02 Landside Facilities

The planning of landside facilities should be based upon a balance of airside and landside capacity. The determination for terminal and support area facilities has been accomplished for the three future planning periods. The principal operating elements covered under these analyses for airline/commuter and general aviation requirements include:

- Terminal Building
- Aircraft Parking Apron
- Hangars
- Automobile Parking.

5.02-1 Airline/Commuter Service Requirements

The first component in assessing future requirements of the airport lies on the commercial side; the commercial activities are centered around the terminal. The terminal complex functions as an area of interchange between ground and air transportation modes.

PASSENGER TERMINAL BUILDING

The passenger terminal building serves as the primary point of transition from surface to air transportation. As such, its purpose is to provide safe, efficient, comfortable, and convenient transfer of passengers and their baggage. Each airport has its own unique characteristics that are essential in determining what facilities are necessary to adequately serve this purpose.

Erie International Airport, as a primary commercial service airport, will need a terminal building with highly specialized areas common to small, medium and large hub airports. However, due to space constraints the ideal terminal building will combine space and function, often sharing some areas for multiple passenger uses. The end result is an efficient terminal building that accommodates peak passenger demand comfortably within a minimum envelope.

According to the 1995 Terminal Area Master Plan the total enclosed area of the terminal building is 40,497 square feet. The Terminal Area Master Plan does not include the recent construction of the baggage claim area which consists of 7,600 square feet. The Terminal Area Master Plan indicated need for a total of 68,870 square feet in the forecast year 2014, based on 328,000 forecasted enplanements.

Appendix F provides an extract from the 1995 Terminal Area Master Plan with detailed terminal area space requirements.

AIRCRAFT PARKING APRON

According to FAA AC 150/5360-9, the number of aircraft parking positions required to accommodate peak hour passengers ranging from 59 in 2005 to 81 in 2020 is three. The Advisory Circular notes that additional aircraft parking positions may be provided to accommodate delayed or off-schedule flights, air taxi or charter activity, and to allow for scheduling of simultaneous flights.

Area for the parking spaces was calculated based on dimensional requirements for taxi-in, taxi-out parking positions recommended in the AC. The depth of apron was based on the size of the Beechcraft 1900 aircraft and the DC-9-30. Table 5-4 summarizes the requirements for aircraft parking apron through the planning period. Current apron area is sufficient to meet these needs.

TABLE 5-4
AIRCRAFT PARKING APRON - 2020

Aircraft Type	Aircraft Size	Center Apron	Number of Positions	Apron Area
Commuter	19 seats	1,400 SY	2	2,800 SY
Air Carrier	115 seats	4,920 SY	2	9,840 SY

Source: C&S Engineers, Inc.

COMMERCIAL SERVICE RELATED AUTOMOBILE PARKING FACILITIES

The terminal area master plan addresses requirements for automobile parking facilities. Requirements for the year 2014 total 1132 spaces. There are currently 923 spaces available, including short and long-term employee, car rental and other miscellaneous spaces. The terminal area master plan did not identify a need to increase parking spaces until after 2009.

5.02-2 General Aviation Requirements

This section describes the guidelines and methodologies used to develop facility requirements for the general aviation areas of Erie International Airport. For this study, general aviation area facility requirements were calculated by forecasting demand and comparing it to the existing capacity of the facility.

The following categories were examined in this analysis:

- Hangars,
- Aircraft apron area,
- FBO area,
- GA terminal building, and
- Auto parking and ground access.

HANGAR AREA

Hangar requirements for a general aviation facility are a function of the number of based aircraft, the type of aircraft to be accommodated, owner preferences, and area climate.

Prefabricated conventional, plane-port, and T-hangar units are available from a variety of manufacturers throughout the nation. Storage space for based aircraft was determined using guidelines suggested in manufacturers' literature. Typical aircraft sizes were also reviewed in light of the evolution of business aircraft size. Conventional hangar space was based upon a standard of 1,200 square feet for a single-engine aircraft, 1,400 square feet for a multi-engine piston aircraft, and 1,800 square feet for a turboprop or turbojet aircraft. A standard of 1,400 square feet per T-hangar or plane-port unit was used in calculating area requirements. These hangar areas were then applied to the based aircraft forecasts to determine the actual hangar area requirements for each hangar type. Tie-down space was allocated as part of the itinerant airport apron area and is addressed later in this chapter. The following assumptions were made regarding the type of hangar needed for each type of aircraft:

Percent of Aircraft Type	Type of Storage
100% of Turbojet Aircraft	Conventional Hangar
55% of Multi-Engine Piston	Conventional Hangar
35% of Multi-Engine Piston	T-Hangar
10% of Multi-Engine Piston	Parking Apron
20% of Single-Engine Piston	Conventional Hangar
60% of Single-Engine Piston	T-Hangar
20% of Single-Engine Piston	Parking Apron.

Using the above assumptions combined with the forecast of fleet mix (shown previously in Table 4-14), Table 5-5 sets forth the demand requirements for hangar space at Erie International Airport. It should be noted that these recommendations are not rigid. For example, the shifting of space requirements between conventional and T-hangars is left to local preference.

TABLE 5-5
HANGAR AREA DEMAND (SQUARE FEET)

Item	Year 2005	2010	2020
Conventional			
Turboprop/jet	9,000	10,800	14,400
Single-engine piston	8,400	8,400	10,800
Multi-engine piston	7,000	8,400	8,400
SUBTOTAL	**24,400 sf**	**27,600 sf**	**33,600 sf**
T-Hangar			
Single-engine (units @ 1,200 SF)	30,800 (22)	30,800 (22)	36,400 (26)
Multi-engine (units @ 1,400 SF)	4,200 (3)	5,600 (4)	5,600 (4)
SUBTOTAL	**35,000 sf (25)**	**36,400 sf (26)**	**42,000 sf (30)**
GRAND TOTAL	**59,400 sf**	**64,000 sf**	**75,600 sf**

Source: C&S Engineers, Inc.

AIRCRAFT APRON AREA

The aircraft apron area consists of the hangar/FBO apron, based aircraft apron, and itinerant aircraft parking apron. Estimations of the needed apron areas are presented in the following sections. Apron area, currently adequate, will be inadequate to meet the future aircraft parking demand.

HANGAR APRON AREA

Hangar apron demands were established using an aviation industry planning guideline which indicates a need to develop a hangar apron equal to the hangar area itself. T-hangars do not require aprons but can be adequately accessed using hangar taxiways. The dimensions of these taxiways will be dependent on the number of T-hangars and their configuration at the airport. Hangar apron demand for conventional hangars has been calculated to be 24,400 square feet (2,711 square yards) for Phase 1; 27,600 square feet (3,067 square yards) for Phase 2; and 33,600 square feet 3,733 square yards) for Phase 3.

BASED AIRCRAFT APRON

The based aircraft parking area is planned to ensure adequate tie-down space for those based aircraft that do not require hangar storage. Currently, the airport has approximately 19,000 square yards of paved tie-down area. The paved tie-down area requirements were calculated using a standard of 300 square yards per aircraft. Aircraft identified as desiring tie-down space include 20% of single-engine piston aircraft and 10% of multi-engine piston aircraft and 100% of rotorcraft. Applying these standards, a total of 2,700 square yards of apron is required for Phase 1; 2,700 square yards for Phase 2; and 3,300 square yards for Phase 3.

ITINERANT AIRCRAFT PARKING APRON

Areas designated for the parking of transient (visiting) aircraft are called "itinerant aprons." The itinerant apron areas are also used by based aircraft for loading, fuel, and other activities. The size of such an apron required to meet itinerant demand was estimated using the following methodology:

- Assume that a busy day at Erie International Airport is 10 percent busier than the average day.
- Based on historical information the local/itinerant operations ratio is 32/68.
- Assume that 50 percent of the itinerant aircraft will be on the apron at any one time during the day. Since 50 percent of the itinerant operations are departures, only 50 percent of the daily itinerant operations will represent aircraft on the ground in need of parking area.
- Itinerant ramp requirements for general aviation aircraft (Airplane Design Group II) likely to use Erie International Airport indicate that 400 square yards per itinerant aircraft is a reasonable allotment of space.

Applying this approach to the general aviation itinerant operations forecast yields the demand for apron area shown in Table 5-6.

TABLE 5-6
ITINERANT AIRCRAFT APRON REQUIREMENTS

Year	Busy Day Operations	Average Busy Day Itinerant Aircraft	Required Apron
2005	154	52	20,800 SY
2010	164	56	22,400 SY
2020	188	64	25,600 SY

Source: C&S Engineers, Inc.

FIXED BASE OPERATOR MAINTENANCE AREA

Practices concerning fixed base operator (FBO) and maintenance facilities vary. As such, FBO and maintenance area requirements will differ according to the services provided. A frequently used criterion, however, is to compute FBO and maintenance areas at ten percent of the total aircraft hangar area or 5,000 square feet, whichever is greater. An equal amount of apron area is required for an FBO maintenance ramp. Thus, for ERI, a 6,200 square-foot maintenance hangar with 6,200 square feet (689 SY) of adjacent apron space would be the minimum recommendation for Phase 3 of the study period.

GENERAL AVIATION TERMINAL BUILDING

A general aviation terminal is needed to provide space for management offices, lounge areas, restrooms, food services, and other areas for the needs of pilots and passengers.

The FAA has devised an approach for calculating general aviation terminal requirements that uses operational peaking characteristics to determine size of terminal areas. The method relates general aviation peak-hour pilots and passengers to the functional areas within the terminal to produce overall building size. Table 5-5 shows the standard square footage requirement per passenger. Erie Airways currently operates out of office space attached to its hangar with an area of approximately 2,000 square feet. The 3,250 square footage requirement through the 20-year planning period exceeds the currently available space by 1,250 feet. It may be practical to consider a multiple use terminal at Erie International Airport that could accommodate commercial service passenger needs (as outlined in Section 5.02-1) with services needed for general aviation pilots and passengers.

TABLE 5-7
GENERAL AVIATION BUILDING AREA REQUIREMENTS

Functional Area	Area Per Peak Hour Pilot/Passenger
Waiting Lounge	15.0 SF
FBO Operations	3.0 SF
Public Conveniences	2.0 SF
Concession Area	5.0 SF
Circulation, Storage, HVAC	25.0 SF
TOTAL	**50.0 SF**

Source: Federal Aviation Administration, **Aviation Demand and Airport Facility Requirement Forecast for Medium Air Transportation Hubs** (Washington, D.C., 1969).

Using the standards in Table 5-7, the recommended general aviation terminal function size for each design year is presented in Table 5-8. Numbers of peak hour passengers shown in the table were derived by assuming 2.5 passengers and pilots per general aviation design hour operation.

TABLE 5-8
GENERAL AVIATION TERMINAL BUILDING REQUIREMENTS

Year	Design Hour Operations	Peak Hour Pilots & Passengers	Terminal Function Size
2005	21	53	2,650 sf
2010	22	55	2,750 sf
2020	26	65	3,250 sf

Source: C&S Engineers, Inc.

GENERAL AVIATION RELATED AUTOMOBILE PARKING

The number of auto spaces required at an airport is also dependent upon the level of general aviation aircraft activity at the facility. The methodology for determining parking needs relates peak hour pilots, passengers, and airport employees to the number of parking spaces required. Numbers of peak hour pilots and passengers were previously derived for the general aviation terminal building requirements. The number of employees relating to the general aviation function of an airport such as Erie International Airport is estimated at 1 employee for every 7.2 based aircraft. The number of auto parking spaces equaled the sum of the peak hour pilots/passengers and employees at the airport. This number was converted into paved area by using a planning standard of 40 square yards per vehicle space (refer to Table 5-9).

TABLE 5-9
AUTO PARKING AREA REQUIREMENTS

Year	Peak Hour Pilots & Passengers	Airport Employees[1]	Total Parking Spaces	Area
2005	53	7	60	2,400 SY
2010	55	7	62	2,480 SY
2020	65	8	73	2,920 SY

[1] Federal Aviation Administration, **Measuring The Regional Economic Significance of Airports**, (U.S. Department of Transportation, Washington, D.C., October 1986) p. 23.

Source: C&S Engineers, Inc.

5.02-3 Fuel Storage Requirements

The projected fuel storage requirements at Erie International Airport were calculated according to the methodology outlined below:

- Calculate the average daily operations for both turbine and piston powered aircraft for each design year.
- Based on historical utilization characteristics at other airports, assume approximately 10 gallons of fuel per turbine operation and 4.2 gallons of fuel per piston operation throughout the planning period.
- Multiply daily results by 14 to obtain *a two-week consumption.*
- Increase fuel requirements by 10 percent to allow for peaking characteristics in fuel usage.

Tables 5-10 and 5-11 show the results of this methodology calculating fuel storage requirements for both commercial and general aviation activity.

TABLE 5-10
COMMERCIAL FUEL STORAGE REQUIREMENTS (TWO-WEEK)

Year	Average Daily Operations - Turbine	Average Jet A Demand (Gallons)	Peak Demand (+10%)
2005	43	6,020	6,622
2010	48	6,720	7,392
2020	57	7,980	8,778

Source: C&S Engineers, Inc.

TABLE 5-11
GENERAL AVIATION FUEL STORAGE REQUIREMENTS (TWO-WEEK)

	Average Daily Operations		Average Demand (gals.)		Peak Demand (+10%)	
Year	Piston	Turbine	Avgas	Jet A	Avgas	Jet A
2005	126	19	7,409	2,660	8,150	2,926
2010	133	21	7,820	2,940	8,602	3,234
2020	153	23	8,996	3,220	9,896	3,542

Source: C&S Engineers, Inc.

5.02-4 Aircraft Rescue And Firefighting Facilities (ARFF)

The Federal Aviation Regulation Part 139.315 establishes a system of indexing airports that are regularly served by scheduled commercial aircraft. The airport index is determined by the length of the aircraft with five or more daily departures.

The Airport currently operates as an index B facility. Index B airports are served by aircraft more than 90 feet and up to 126 feet in length. The minimum rescue and firefighting equipment and agents required for this index are as follows:

One vehicle carrying at least:

- One vehicle carrying at least 500 lbs. of sodium based dry chemical or halon 1211 and 1,500 gallons of water and the commensurate quantity of Aqueous Film Forming Foam (AFFF) for foam production, or

- Two vehicles, one to carry the above mentioned extinguishing agents, and one vehicle to carry water and commensurate amount of AFFF so that total quantity of water for foam production carried by both vehicles is at least 1,500 gallons.

The ARFF vehicles currently at the Airport meet FAR Part 139 certification requirements according to airport personnel. The current fire protection rating of Index B is judged to be appropriate for the current operations at the Airport. If large airplanes begin to operate at Erie regularly, this fire protection rating should be reevaluated.

The Airport's ARFF equipment occupies 4,500 square feet at the southern end of the maintenance building. In order to ensure the proper storage of ARFF equipment and supplies, a separate building for ARFF storage and training may be appropriate.

5.03 Airside and Landside Facility Requirements Summary

The preceding sections have identified the commercial, commuter, and general aviation facility requirements for Erie International Airport. Tables 5-12 and 5-13 summarize the requirements by planning phase and area of need by comparing existing facilities to total airport demand for each period. A runway length of 8,000 to 9,000 feet is included for long-term planning, and is evaluated in Chapter 6. The extended runway length (8,000 to 9,000 feet) will be evaluated only to accommodate larger aircraft that may use the Airport in the future.

TABLE 5-12
AIRSIDE FACILITIES SUMMARY

Item	Existing (2000)	Phase 1 (2000-2005)	Phase 2 (2006-2010)	Phase 3 (2011-2020)
Runways:				
6-24	6,505' x 150'	7,500' x 150'	7,500' x 150'	9000' x 150'
2-20	3,530' x 150'	3,530' x 150'	3,530' x 150'	3,530' x 150'
Taxiways:				
6-24	Partial Parallel	Partial Parallel	Partial Parallel	Partial Parallel
2-20	Partial Parallel	Partial Parallel	Partial Parallel	Partial Parallel
Lighting:				
6-24	HIRL, MITL	HIRL, MITL	HIRL, MITL	HIRL, HITL
2-20	MIRL, MITL	MIRL, MITL	MIRL, MITL	MIRL, MITL
Navigation Aids:	VASI (R/W 20), NDB, ILS (R/W 6, 24), MALSR (R/W 6, 24), ATCT, VOR (R/W 6), VOR/DME (R/W 24), Wind Cone, ATIS	PAPI (R/W 6, 24, 2, 20), NDB, ILS (R/W 6, 24), MALSR (R/W 6, 24), ATCT, VOR/DME (R/W 6, 24), Wind Cone, ATIS	PAPI (R/W 6, 24, 2, 20), REILs (R/W 6, 24, 2, 20), NDB, ILS (R/W 6, 24), MALSR (R/W 6, 24), ATCT, VOR/DME (R/W 6, 24, 2, 20), Wind Cone, ATIS	PAPI (R/W 6, 24, 2, 20), REILs (R/W 6, 24, 2, 20), NDB, ILS (R/W 6, 24), MALSR (R/W 6, 24), ATCT, VOR/DME (R/W 6, 24, 2, 20), Wind Cone, ATIS

Legend:		
	HIRL	High Intensity Runway Lights
	MIRL	Medium Intensity Runway Lights
	MITL	Medium Intensity Taxiway Lights
	VASI	Visual Approach Slope Indicator
	PAPI	Precision Approach Path Indicator
	REIL	Runway End Identifier Lights
	NDB	Non-directional Beacon
	ILS	Instrument Landing System (with localizer, glideslope, outer marker and middle marker)
	MALSR	Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights
	ATCT	Air Traffic Control Tower
	VOR/DME	Very High Frequency Omni-Directional Range supplemented with Distance Measuring Equipment
	ATIS	Automated Terminal/Informational Service

Source: C&S Engineers, Inc.

TABLE 5-13
LANDSIDE FACILITIES SUMMARY

Item	Existing (2000)	Phase 1 (2000-2005)	Phase 2 (2006-2010)	Phase 3 (2011-2020)
Terminal:				
Commercial Service	48,097 SF	54,325 SF	62,680 SF	68,870 SF
GA		2,650 SF	2,750 SF	3,250 SF
TOTAL	48,097 SF	56,975 SF	65,430 SF	72,120 SF
Hangars:				
Conventional	29,950 SF	24,400 SF	27,600 SF	33,600 SF
T-Hangar	33,600 SF	35,000 SF	36,400 SF	42,000 SF
FBO	38,000 SF	6,220 SF	6,220 SF	6,220 SF
TOTAL	101,550 SF	65,620 SF	70,220 SF	81,820 SF
Apron:				
Commercial Service	22,000 SY	12,640 SY	12,640 SY	12,640 SY
General Aviation	19,000 SY			
Itinerant		20,800 SY	22,400 SY	25,600 SY
Based		2,700 SY	2,700 SY	3,300 SY
Hangar Related FBO	20,000 SY	689 SY	689 SY	689 SY
TOTAL	61,000 SY	36,829 SY	38,429 SY	42,229 SY
Auto Parking:				
Commercial Spaces	923	776	914	1132
GA Spaces		60	62	73
Area		33,440 SY	39,040 SY	48,200 SY
Fuel Demand: (Two week period)	54,000 Gal.	17,698 Gal.	19,228 Gal.	22,216 Gal.

Source: C&S Engineers, Inc.