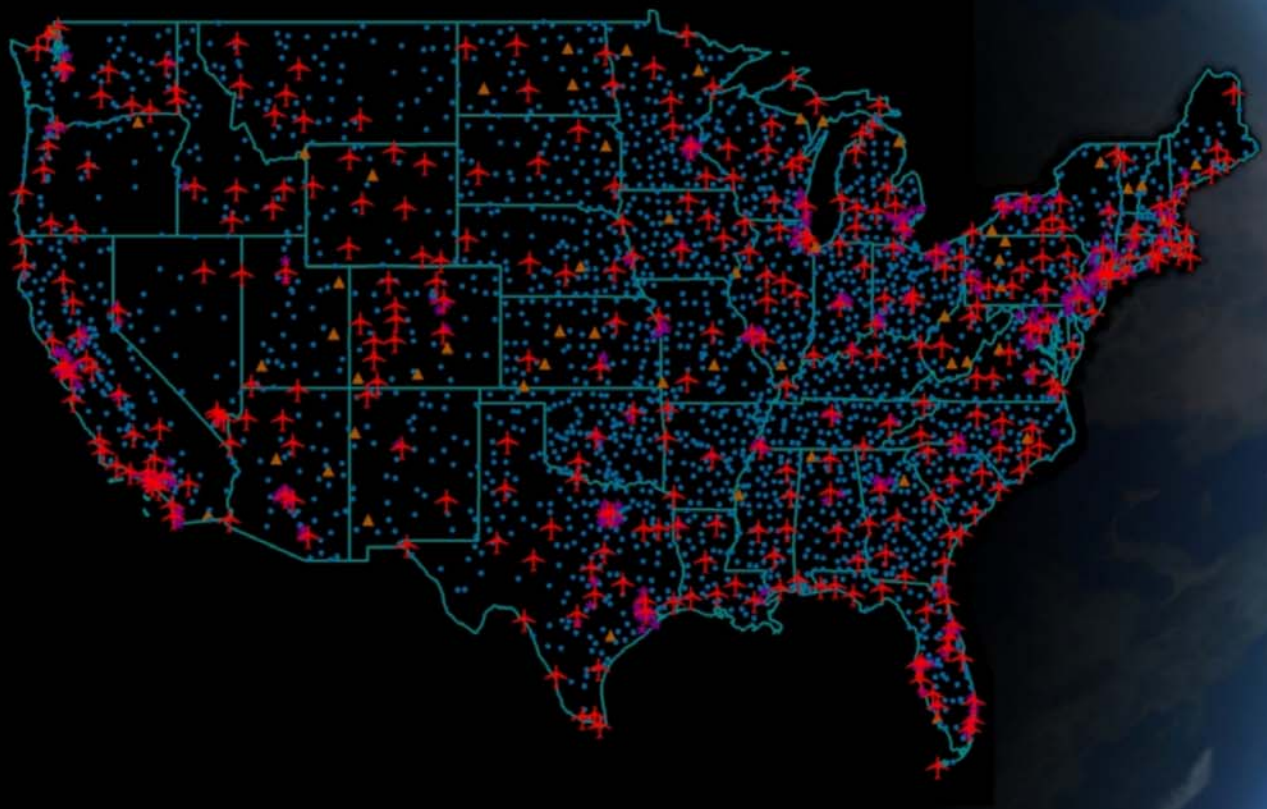
Federal Aviation Administration

Report to Congress



National Plan of Integrated Airport Systems (NPIAS)

2011-2015

Federal Aviation Administration
U.S. Department of Transportation

National Plan of Integrated Airport Systems (NPIAS) (2011-2015)

Report of the Secretary of Transportation to the United States Congress
Pursuant to Section 47103 of Title 49, United States Code

The NPIAS 2011-2015 report is available online at
http://www.faa.gov/airports/planning_capacity/npias/reports

THE SECRETARY OF TRANSPORTATION
WASHINGTON, D.C. 20590

September 27, 2010

The Honorable Joseph Biden
President of the Senate
Washington, DC 20510

Dear Mr. President:

I am pleased to transmit to you the National Plan of Integrated Airport Systems (NPIAS) 2011–2015.

The NPIAS report estimates the costs associated with establishing a system of airports that adequately meets the needs of civil aviation and supports the U.S. Department of Defense and the U.S. Postal Service. It draws selectively from local, regional, and State planning studies.

An identical letter has been sent to the Speaker of the House of Representatives.

Sincerely yours,

Ray LaHood

Enclosure

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September 27, 2010

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Speaker of the House of Representatives
Washington, DC 20515

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Table of Contents

List of Figures and Tables

FIGURES

TABLES

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Executive Summary

The National Plan of Integrated Airport Systems (NPIAS) for Fiscal Years (FY) 2011 to 2015 is submitted to Congress in accordance with Section 47103 of Title 49 of the United States Code. A national airport plan has been prepared at regular intervals since the mid-1940s.

The plan identifies 3,380 public-use airports[1] (3,332 existing and 48 proposed) that are significant to national air transportation and, therefore, eligible to receive grants under the Federal Aviation Administration (FAA) Airport Improvement Program (AIP).

The development data contained in this report were largely compiled in 2009. The report estimates that over the next 5 years, there will be $52.2 billion of AIP eligible infrastructure development for all segments of civil aviation. This is an increase of 5 percent ($2.5 billion) over the last report issued 2 years ago. This report reflects an increase in development estimates for all categories of airports, except large hubs and new airports which are predicting slight decreases in AIP eligible development over the next 5 years. Airport capital development needs are driven by traffic growth resulting in the need to expand facilities, rehabilitation or reconstruction of infrastructure due to use and age of facilities, and changing aircraft technology requiring airports to update or replace equipment and infrastructure.

The NPIAS is used by FAA in administering the AIP. It supports the goals identified in the FAA Flight Plan for safety and capacity by identifying airports and airport improvements that will help achieve those goals. Fifty-seven percent of the development is intended to rehabilitate existing infrastructure and keep airports up to standards for the aircraft that use them. Forty-three percent of the development in the report is intended to accommodate growth in travel, including more passengers, cargo and activity, and larger aircraft.

This report includes a section on the condition and performance of the national airport system, highlighting six topics: safety, capacity, pavement condition, financial performance, surface accessibility, and environment. The findings are favorable indicating that the system is safe, convenient, well maintained, and largely supported by nonfederal revenue (rents, fees, and taxes paid by users).

DEVELOPMENT ESTIMATES

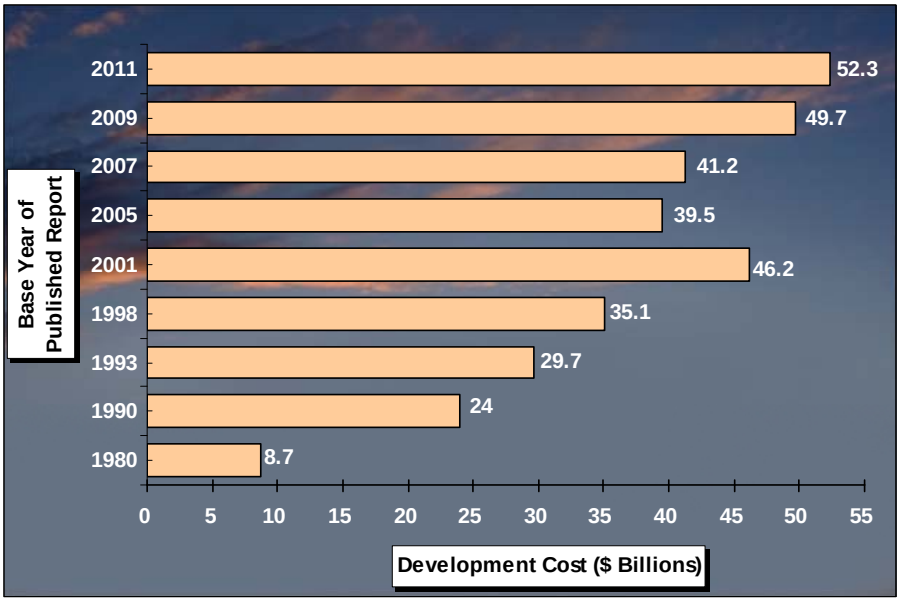
As shown in Figure 1, all but one edition since 1980 reflected an increase in development estimates. Overall, this trend reflects the continued long-term growth in capital costs, offset in certain areas by fluctuating capital needs of certain categories of airports. The cost estimates of future airport development included in this report are 5 percent higher than those found in the 2009 edition.[2]

[1] The word "airport," as identified in this report, includes landing areas developed for conventional fixed-wing aircraft, helicopters, and seaplanes.

[2] Estimates reflect the dollars at the time the report was prepared (2011 report reflects 2009 dollars; 2009 report reflects 2007 dollars).

According to the Army Corps of Engineers, general construction costs increased approximately 4.5 percent from FY 2007 to FY 2009.[3]

Figure 1: 5-Year Development Estimates from Published NPIAS Reports to Congress [4]

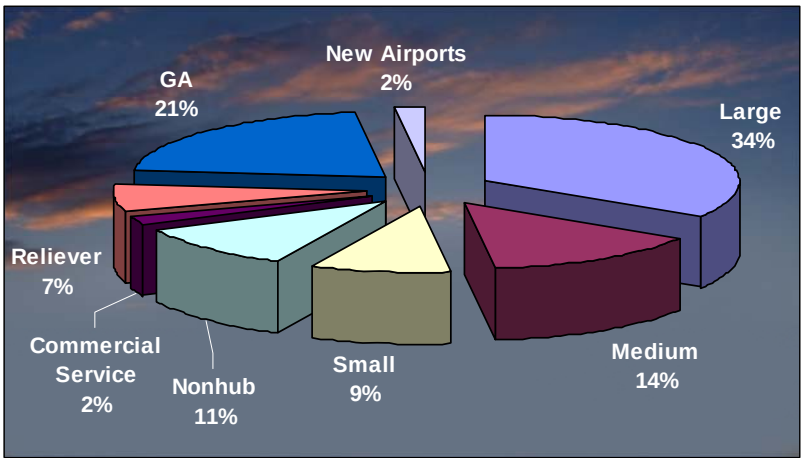


Estimates by Airport Type

Figure 2 shows the distribution of development costs for each category of airports. The 503 airports that accommodate scheduled air carrier service (29 large, 37 medium, 72 small, and 244 nonhubs and 121 nonprimary commercial service airports) account for 70 percent of the total development in this report. Of the commercial service airports, the 29 large hubs have the greatest development estimates, accounting for 34 percent ($18 billion) of the $52.2 billion identified. The 2,560 general aviation and 269 reliever[5] airports that provide their communities with access to the national transportation system make up 84 percent of the airports, accounting for 28 percent of the total development contained in the report. The 2,560 general aviation airports account for the second largest percentage of development (21 percent).

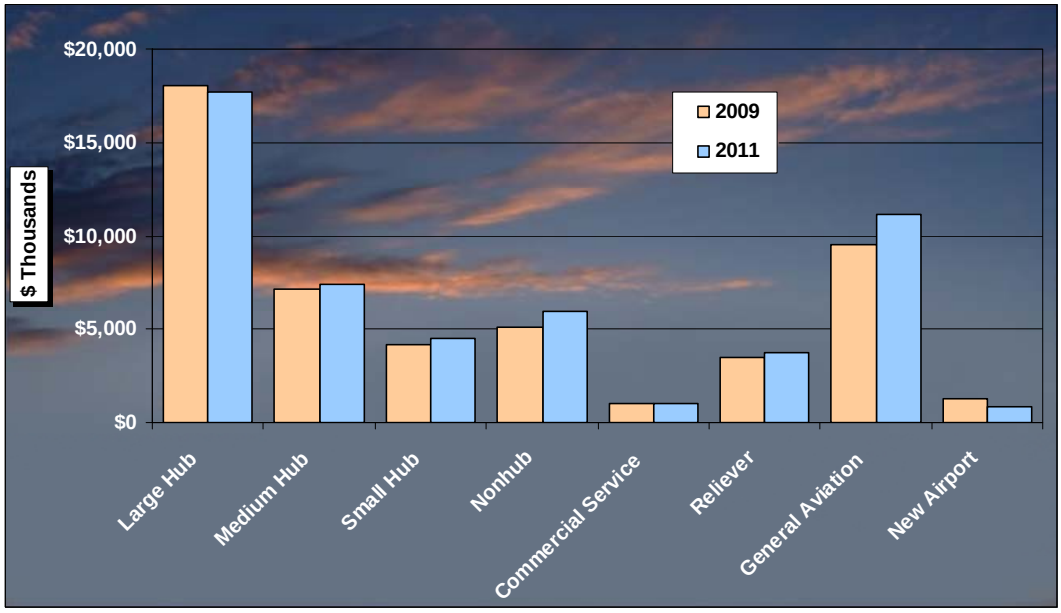
[3] Source: Civil Works Construction Cost Index System calculated by the U.S. Army Corps of Engineers, March 31, 2010. Comparing construction costs for FY 2009 to 2007.
[4] FAA was in the process of coordinating the 2001 NPIAS report when 9/11 occurred and the report was put on hold. It was transmitted to Congress in August 2002 and covered FY 2001-2005. The 2005 report was transmitted to Congress in September 2004 and covered FY 2005-2009 (the first year covered in the report became a projection rather than a year past).
[5] A reliever airport is a high-capacity general aviation airport in a metropolitan area.

Figure 2: NPIAS Cost by Airport Type



Development estimates for five of the seven airport categories (see Figure 3) increased since the last report. Development estimates decreased 2 percent for large hubs ($341 million) and 33 percent for new airports ($436 million). Costs for large hubs reflect increases in capacity and access development and decreases in terminal development. The decrease in terminal development reflects the funding of a few terminal projects through the passenger facility charges (PFCs) and a few that were deferred beyond 2015. When the FAA approves collection of PFCs for airport development, the project is considered funded and, therefore, is no longer included in the NPIAS. Since the preceding report, the FAA has approved PFC collections for significant projects at Houston Intercontinental, Orlando, Atlanta, and Las Vegas airports. Capacity remains the largest development category for the large hubs with an increase of $1.1 billion since the last report. This includes major development programs at Chicago O'Hare International, Fort Lauderdale/Hollywood International, Philadelphia International, Los Angeles International, and Denver International Airports.

Figure 3: Change in Development Costs from 2009-2013 NPIAS Report by Airport Type

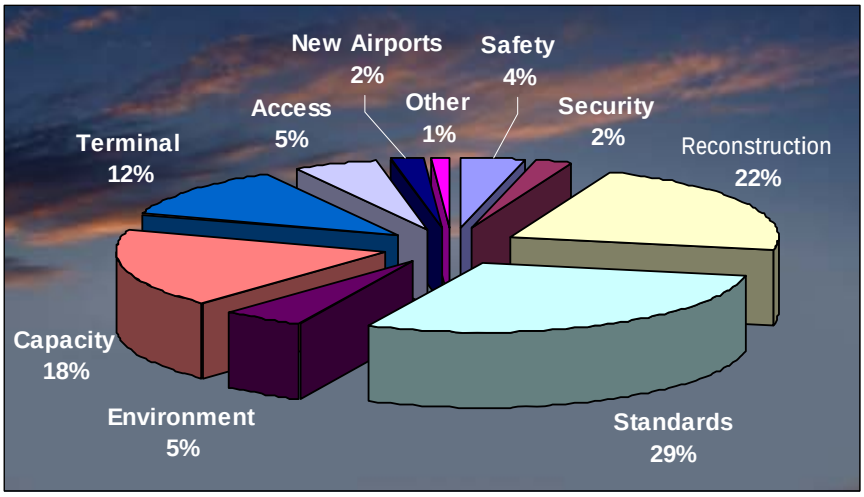


Development estimates at general aviation airports increased 17 percent ($1.6 billion). This increase reflects a continuing focus on bringing these airports up to the recommended design standard (60 percent of development) and rehabilitating airfield pavement (25 percent of development). It is also due in part to the expanded eligibility for AIP funding at these facilities for hangars, fuel facilities, and other items contained in Vision 100-Century of Aviation Reauthorization Act. The availability of nonprimary entitlement funds has also led to the identification and inclusion of lower-priority items that were previously unlikely to be funded, such as access road improvements and general aviation terminal buildings.

Estimates by Type of Development

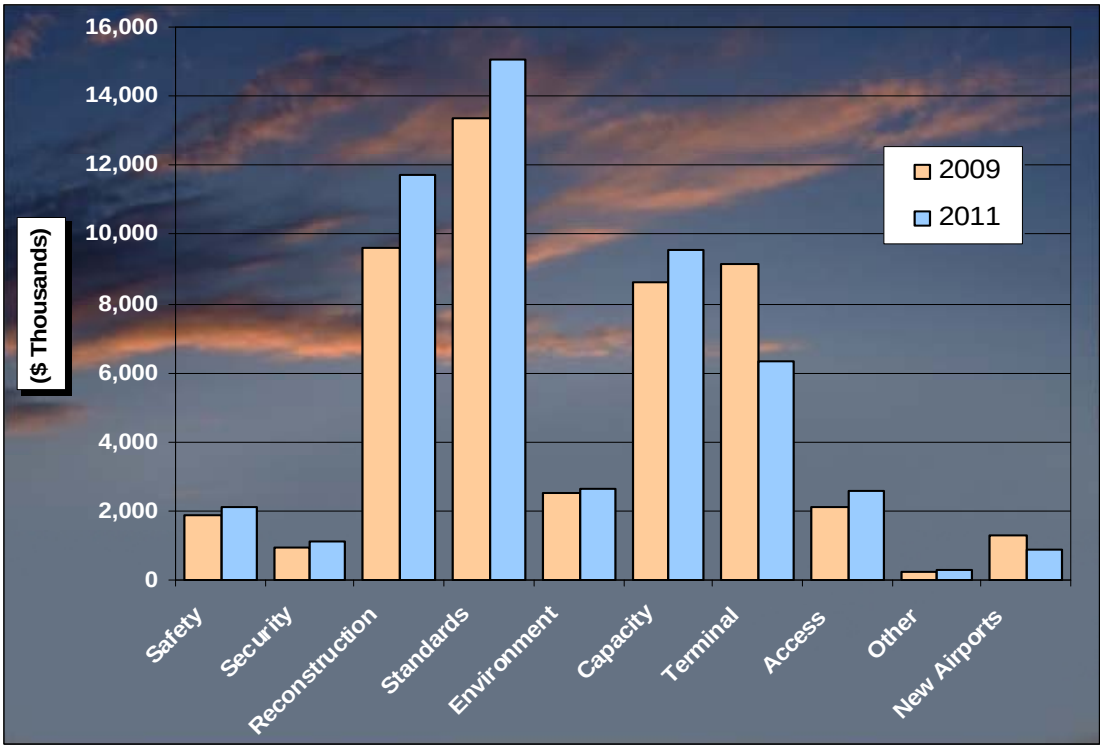
Figure 4 identifies the NPIAS costs by type of development. The purpose of planned development contained in this report is primarily to bring existing airports up to current design standards (29 percent) and to replace or rehabilitate airport facilities, mostly pavement and lighting systems (22 percent). A significant amount is to increase airfield capacity (18 percent) and to modify, replace, and construct passenger terminal buildings to accommodate more passengers, larger aircraft, new security requirements, and increased competition among airlines (12 percent).

Figure 4: NPIAS Cost by Type of Development



As airports respond to a changing aviation environment, their development needs also change. While overall development needs have increased, several types of development saw significant increases and decreases (see Figure 5). Costs to replace or rehabilitate airport pavement and associated equipment rose 22 percent from 2009 to 2011. Development to bring existing airports up to design standards increased 13 percent, and development to increase airfield capacity increased 11 percent from the last report. However, development to modify, replace, and construct passenger terminal buildings decreased 31 percent ($2.8 billion) at large, medium, and small hubs. The large hubs account for 85 percent of the decrease, which is due to projects being deferred or funded through the PFC program.

Figure 5: Change in Development Costs from 2009-2013 by Category



Cost estimates in the NPIAS are obtained primarily from airport master and State system plans that were prepared by planning and engineering firms for airport sponsors, including local and State agencies. These plans are usually funded in part by FAA, are consistent with FAA forecasts of aeronautical activity, follow FAA guidelines, and have been reviewed and accepted by FAA planners who are familiar with local conditions. Efforts have been made to obtain realistic estimates of development needs that coincide with local and State capital improvement plans. The estimates only include development to be undertaken by airport sponsors. The development reflected in the NPIAS is based on planning documents available through 2009. As a planning document, the NPIAS should not be used in evaluating investment priorities. Generally, development estimates do not include contingency costs (increases in cost based on change in design or construction uncertainty) or normal price escalation due to inflation (annual increase in costs). The NPIAS includes only planned development that is eligible to receive Federal grants under the AIP.

For airports across the country, the infrastructure requirements needed to implement a lateral precision approach with vertical guidance (LPV), using FAA's wide area augmentation system (WAAS), have not been independently assessed and, therefore, may not be fully captured in this report. Aerial surveys are underway nationwide to help assess the physical obstacles that may impact improved approach minimums at a particular runway.

Funds for airport development are derived from a variety of sources including Federal/State/local grants, bond proceeds, PFCs, airport-generated funds (landing and terminal fees, parking, and concessions revenues), and tenant and third-party financing. The availability of funding sources and their adequacy to meet needs varies with type of airport and level of activity.

STATUS OF THE INDUSTRY

In the last decade, U.S. airlines have dealt with the impacts of 9/11, four network carriers reorganized under Chapter 11 bankruptcy protection[6], record high fuel prices, the most serious economic downturn since the Great Depression, and concerns about the threat of a pandemic. While there has been a recent slowdown in travel, the number of passengers traveling is forecast to grow over the long term with one billion passengers to be flown in 2023.

Profitability for U.S. network carriers may hinge on the return of demand for corporate air travel, the ability to pass along fare increases to leisure travelers, a stable environment for fuel prices, and additional efforts to lower costs in general. To navigate the volatile operating environment, mainline carriers will continue to drive down their costs by better matching flight frequencies and aircraft size with demand, delaying deliveries of newer aircraft and/or grounding older aircraft, and reducing regional affiliate fees for contract flying. There remains considerable interest in consolidation within the airline industry. Some carriers believe that consolidation may be necessary for long-term stability and profitability; others view consolidation as creating less competition resulting in higher fares.

The downturn in the economy has dampened the near-term prospects for the general aviation industry, but the long-term outlook remains favorable. Growth in business aviation demand over the long term will be driven by the return of a growing United States and world economy. As the fleet grows, the number of general aviation hours flown is projected to increase an average of 2.5 percent a year through 2030.

In 2009,[7] the 19 carriers reporting on-time performance recorded an overall on-time arrival rate of 79.2 percent, an improvement over 2008's rate of 70.9 percent and the best annual record since the 81.3 percent on-time rate of 2002. The majority of airports in our national system have adequate airport capacity and few or no delays. However, there are airports that continue to experience delays. In 2004, 11 airports experienced 5 minutes of delay or more per operation. In 2009, three airports experienced 5 minutes of delay or more per operation (Philadelphia, Newark, and Atlanta).

Commercial service airports have several sources to fund airport projects, including Federal/ State/local grants, bond proceeds backed by general airport revenues, PFCs, airport generated funds, and tenant and third-party financing. The majority of the development projects at major U.S. airports are funded through the capital markets, most commonly through airport revenue bonds. The overall creditworthiness of U.S. airports remains strong. Overall, the finances of the air carrier airports are stable; however, airports are carefully managing operating, financing, and capital expenses.

[6] Network carriers that went into Chapter 11 are US Airways (2002 and 2004), United (2002), Delta (2005), and Northwest (2005).

[7] For further information on carrier on-time performance see: http://www.bts.gov/programs/airline_information/airline_ontime_tables/2010_03/index.html.

Chapter 1: System Composition

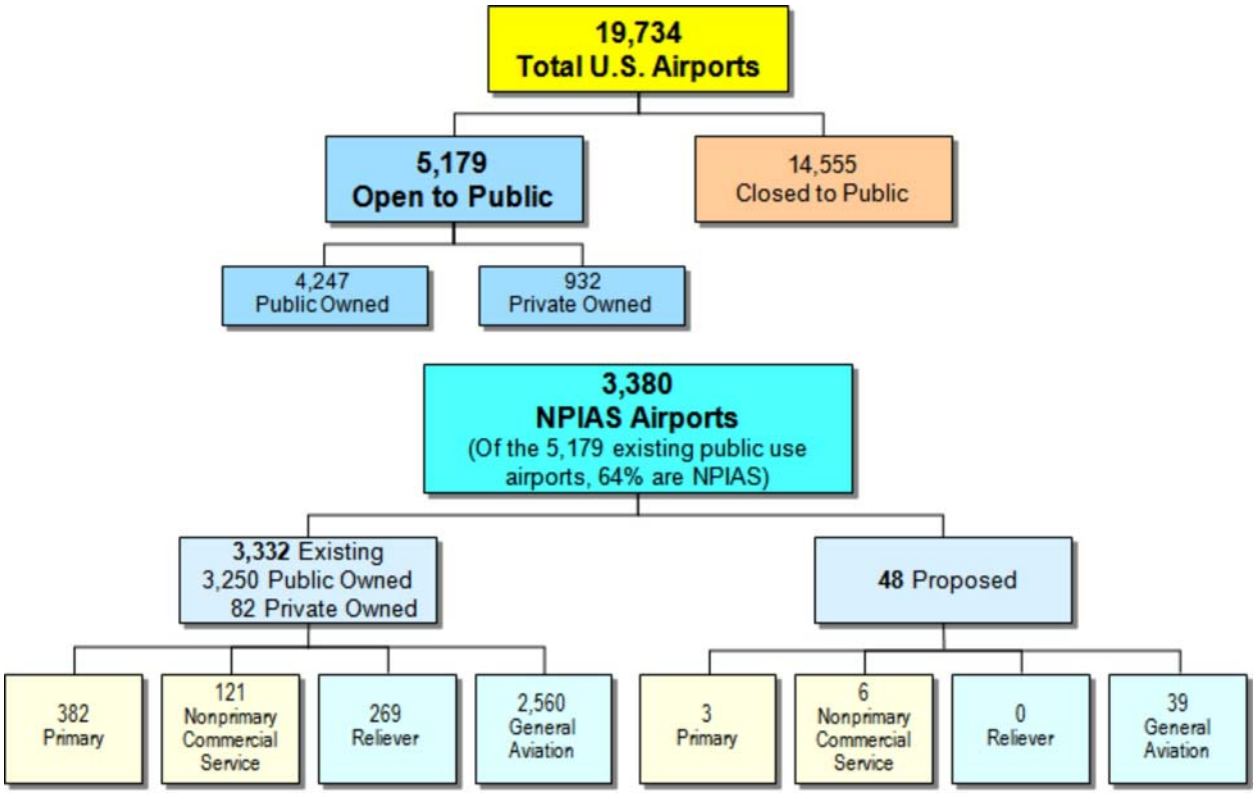
OVERVIEW

The aviation system plays a key role in the success, strength, and growth of the U.S. economy. Approximately 590,000 active pilots, 232,000 general aviation aircraft, and 4,520 air carrier jets utilize 19,734 landing areas consisting of 5,179 public-use (open to the public) and 14,555 private use (closed to the public) facilities. This includes 13,477 airports, 5,576 heliports, 495 seaplane bases, 35 glider ports, 13 balloon ports, and 138 ultra light parks.

FAA, in concert with State aviation agencies and local planning organizations, identifies public-use airports that are important to the system for inclusion in the NPIAS. Sixty-four percent (3,332) [8] of the 5,179 existing public-use airports are included in the NPIAS (see Figure 6 below).

The NPIAS report identifies for Congress and the public those airports included in the national system, the role they serve, and the amounts and types of airport development eligible for Federal funding under the AIP over the next 5 years. An airport must be included in the NPIAS to be eligible to receive a grant under the AIP.

Figure 6: Number of Existing and Proposed Airports by Ownership and Use (as of February 2010)



[8] In this report, the term "airports" also includes heliports and seaplanes bases.

There are 1,847 existing public-use airports that are not included in the NPIAS because they do not meet the minimum entry criteria,[9] are located at inadequate sites, cannot be expanded and improved to provide a safe and efficient airport, or are located within 20 miles of another NPIAS airport. All primary and commercial service airports, all general aviation airports currently designated as reliever airports by FAA, and selected general aviation airports are included in the NPIAS.

SUPPORTING AIR TRANSPORTATION SYSTEM OBJECTIVES

The NPIAS supports the U.S. Department of Transportation (DOT) and FAA objectives for the air transportation system, as shown below. DOT and FAA objectives are currently being reviewed and revised, and final strategic objectives for the 2010-2015 timeframe had not been released at the time this report was prepared.

U.S. Department of Transportation

Both DOT and FAA have in the past consistently recognized Safety and Environmental Stewardship/Sustainability as important components of their strategic plans, and can be expected to do so in some form in next 5-year period.

Federal Aviation Administration

FAA supports the DOT strategic goals with four mission-based strategic goals listed below. The specific objectives within each goal are available online.[10]

1. *Safety:* To achieve the lowest possible accident rate and constantly improve safety, there are six specific objectives within the safety goal.

2. *Capacity:* Work with local governments and airspace users to provide capacity in the U.S. airspace system that reduces congestion and meets projected demand in an environmentally sound manner. There are three specific objectives within the capacity goal.

3. *International Leadership:* Increase the safety and capacity of the global civil aerospace system in an environmentally sound manner. There are two specific objectives within the international leadership goal.

4. *Organizational Excellence:* Ensure the success of FAA's mission through stronger leadership, a better trained and safer workforce, enhanced cost-control measures, and improved decision making based on reliable data. There are four specific objectives within the organizational excellence goal.

[9] NPIAS entry criteria is contained in FAA Order 5090.3C, Field Formulation of the NPIAS, available online at: http://www.faa.gov/regulations_policies/orders_notices/index.cfm/go/document.information/documentID/12754.
[10] Federal Aviation Administration Flight Plan 2009-2013 is available online at: http://www.faa.gov/about/plans_reports/media/flight_plan_2009-2013.pdf.

FAA's Office of the Associate Administrator for Airports

Each organization within FAA sets annual performance goals in support of FAA and DOT strategic goals. The Airports organization is responsible for creating the NPIAS and administering the AIP which by improving the safety, capacity, and condition of the airport system, contribute substantially to achieving the strategic goals described in the FAA Flight Plan and the FAA Airports Business Plan. Listed below are a few of the major goals that the Airports organization has set for FY 2010:

- Commission nine runway/taxiway projects, increasing the annual service volume (ASV) of the 35 Operational Evaluation Plan (OEP) airports by at least 1 percent annually, measured as a 5-year moving average through FY 2013 (see Chapter 2, Capacity section).
- Ensure that 93 percent of runways at airports in the NPIAS are maintained at excellent, good, or fair condition (see Chapter 2, Runway Pavement Condition section).
- Direct AIP funding to reduce capacity constraints of and provide greater access to regional airports located within the seven major metropolitan areas (see Chapter 2, Capacity section).
- Provide AIP funding for noise compatibility projects that benefit an expected 15,000 resident and student populations per year (see Chapter 2, Environmental section).
- Maintain three or less Category A and B vehicle/pedestrian deviations in FY 2010 (see Chapter 2, Safety section).
- Design and implement Safety Management Systems (SMS) for airport regulation and certification (see Chapter 2, Safety section).

GUIDING PRINCIPLES FOR THE NATIONAL AIRPORT SYSTEM

The airport system envisioned in the first National Airport Plan in 1946, when civil aviation was in its infancy, has been developed and nurtured by close cooperation with airport sponsors and other local agencies, as well as Federal and State agencies. The general principles guiding Federal involvement have remained largely unchanged; the airport system should have the following attributes to meet the demand for air transportation:

- Airports should be safe and efficient, located at optimum sites, and developed and maintained to appropriate standards.
- Airports should be affordable to both users and Government, relying primarily on user fees and placing minimal burden on the general revenues of the local, State, and Federal governments.
- Airports should be flexible and expandable, and able to meet increased demand and to accommodate new aircraft types.
- Airports should be permanent with assurance that they will remain open for aeronautical use over the long term.

- Airports should be compatible with surrounding communities, maintaining a balance between the needs of aviation and the requirements of residents in neighboring areas.

- Airports should be developed in concert with improvements to the air traffic control system and technological advancements.

- The airport system should support national objectives for defense, emergency readiness, and postal delivery.

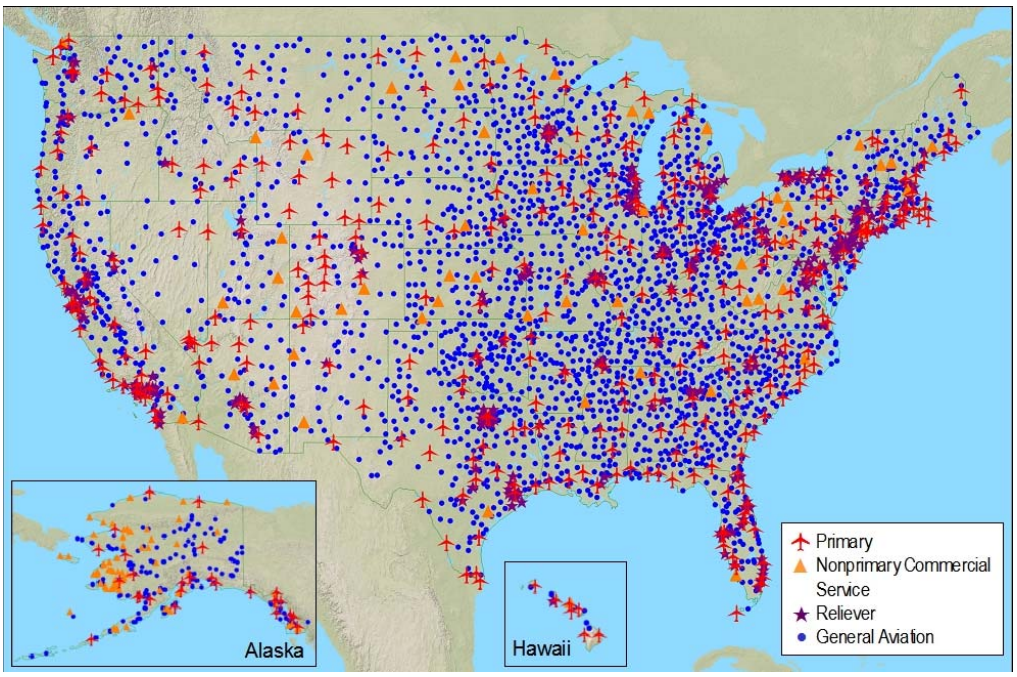
- The airport system should be extensive, providing as many people as possible with convenient access to air transportation, typically by having most of the population within 20 miles of a NPIAS airport.

- The airport system should help air transportation contribute to a productive national economy and international competitiveness.

In addition to these principles specific to airport development, a guiding principle for Federal infrastructure investment, as stated in Executive Order 12893,[11] is that such investments must be cost beneficial. FAA implements these principles by using program guidance to ensure the effective use of Federal aid. A national priority system guides the distribution of funds supplemented when necessary by specific requirements for additional analysis or justification. For example, larger airport capacity development projects must be shown to be cost beneficial in order to receive support under the AIP.

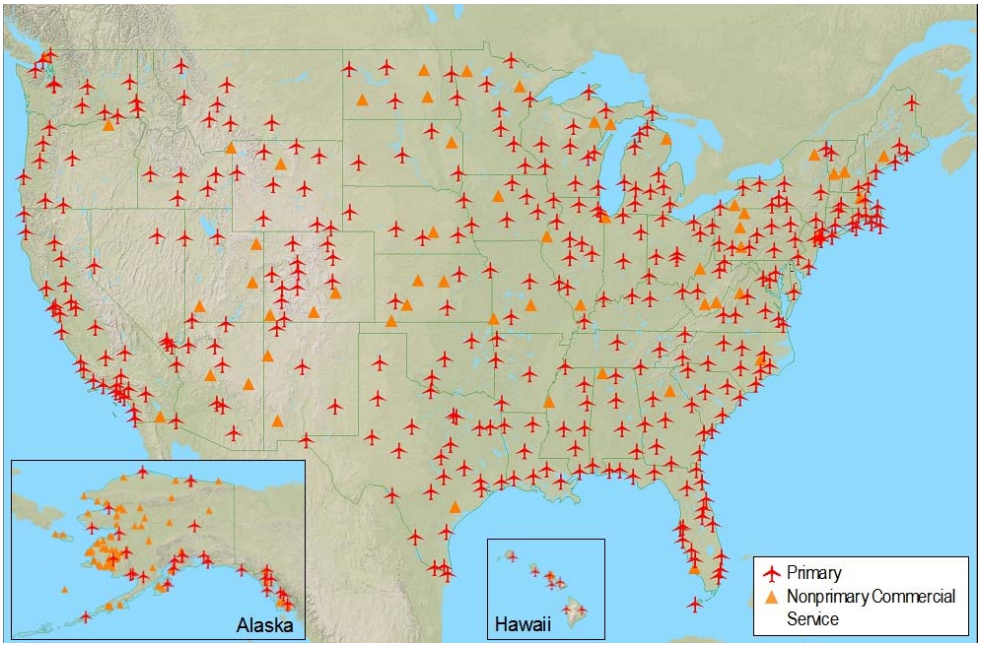
[11] Executive Order 12893, Principles for Federal Infrastructure Investments, was issued in the Federal Register on January 31, 1994 and has not been revoked. See http://www.archives.gov/federal-register/executive-orders/pdf/12893.pdf.

AIRPORTS INCLUDED IN THE NPIAS



The NPIAS includes all commercial service, reliever (high-capacity general aviation airports in metropolitan areas), and select general aviation airports. The complete list of NPIAS airports is contained in Appendix A.

COMMERCIAL SERVICE AIRPORTS



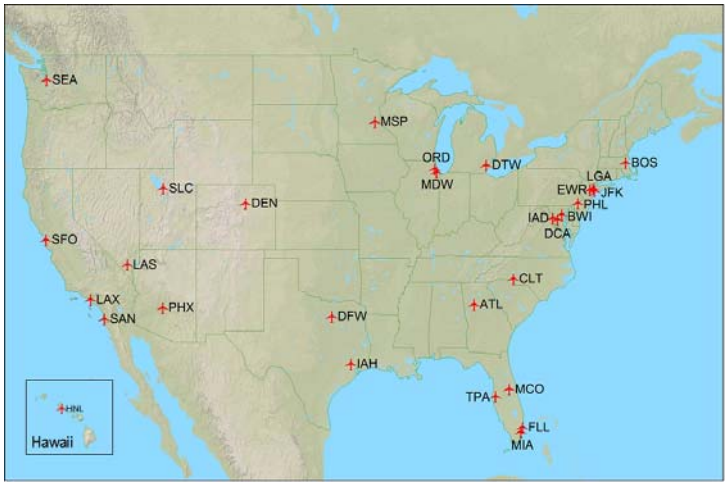
Commercial service airports are defined as public airports receiving scheduled passenger service and having 2,500 or more enplaned passengers per year. There are 503 commercial service airports.[12] Of these, 382 have more than 10,000 annual passenger enplanements (also referred to as boardings) and are classified as primary airports. Primary airports receive an annual apportionment of at least $1 million in AIP funds (when AIP funding levels meet or exceed $3.2 billion), with the amount determined by the number of

[12] In May 2009, Branson Airport in Branson, Missouri, opened. The privately owned public-use airport was built with private funds and has scheduled air carrier service. As a privately owned airport, it does not meet the legislative requirement to be classified as a commercial service airport so it is not included in the NPIAS.

enplaned passengers (Calendar Year (CY) 2008 enplaned passengers determine FY 2010 passenger apportionments).

Primary airports are grouped into four categories: large, medium, and small hubs, and nonhub airports. FAA uses the term "hub" to identify very busy primary airports.

Large Hubs



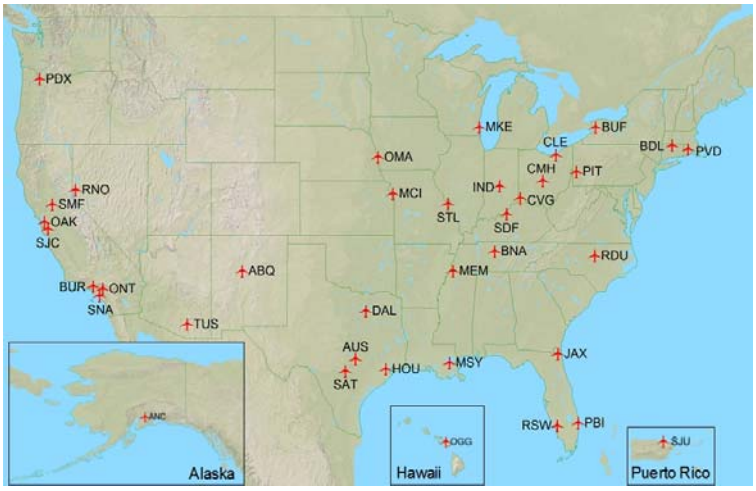
Large hubs are those airports that each account for at least 1 percent of total U.S. passenger enplanements.[13] Some of these passengers originate in the local community and some are connecting passengers transferring from one flight to another. Five large hub airports — San Diego International, Tampa International, La Guardia, General Edward Lawrence Logan International, and Orlando International — have little passenger transfer activity (12 percent or less), while transfers account for more than 65 percent of passenger activity at three other airports: Charlotte/Douglas International, Hartsfield-Jackson Atlanta International, and George Bush Intercontinental/Houston. The 29 large hub airports account for 68 percent of all passenger enplanements.

Large hub airports tend to concentrate on airline passenger and freight operations and have limited general aviation activity. Four large hub airports (Salt Lake City International, Honolulu International, McCarran International, and Minneapolis-St. Paul International/Wold-Chamberlain) have an average of 197 based aircraft, but the other 25 large hubs have an average of 30 based aircraft. Thus, locally based general aviation plays a relatively small role at most large hub airports.

The Nation's air traffic delay problems tend to be concentrated at certain of the 29 large hub airports. Delays occur primarily during instrument weather conditions (i.e., reduced ceiling and visibility) when runway capacity is reduced below that needed to accommodate traffic levels. These 29 large hub airports plus five of the busiest medium hub airports are included in the NextGen Implementation Plan, FAA's plan to increase the capacity and efficiency of the national airspace system (see Chapter 2, Capacity section).

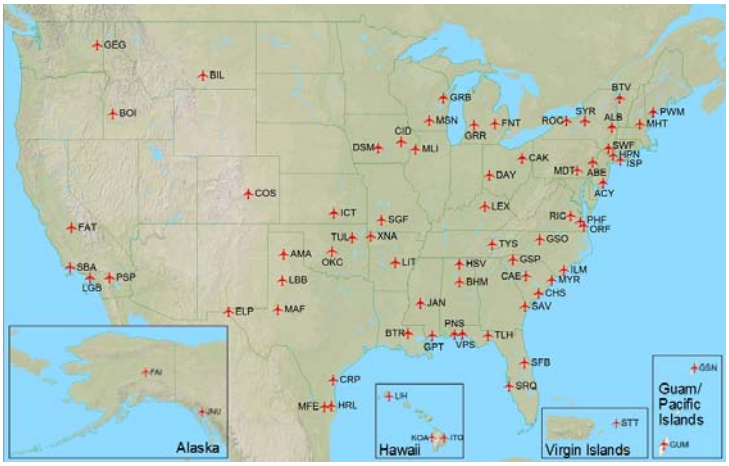
[13] FAA's use of the term hub airport is somewhat different than that of airlines, which use it to denote an airport with significant connecting traffic by one or more carriers. The hub categories used by FAA are defined in Section 40102 of Title 49 of the United States Code (2004).

Medium Hubs



Medium hubs are defined as airports that each account for between 0.25 percent and 1 percent of total U.S. passenger enplanements. There are 37 medium hub airports accounting for 20 percent of all enplanements. Medium hub airports usually have sufficient capacity to accommodate air carrier operations and a substantial amount of general aviation activity. Two medium hub airports have an average of 650 based aircraft—Dallas Love Field and John Wayne Airport-Orange County—while the other 35 medium hub airports have an average of 97 based aircraft.

Small Hubs

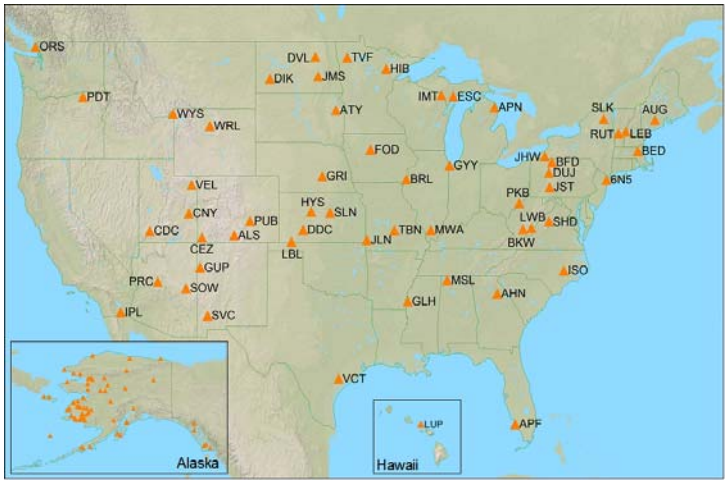


Small hubs are defined as airports that enplane 0.05 percent to 0.25 percent of total U.S. passenger enplanements. There are 72 small hub airports that together account for 8 percent of all enplanements. Less than 25 percent of the runway capacity at small hub airports is used by airline operations, so these airports can accommodate a great deal of general aviation activity, with an average of 127 based aircraft at each airport. These airports are typically uncongested and do not have significant air traffic delays.

Nonhub Primary

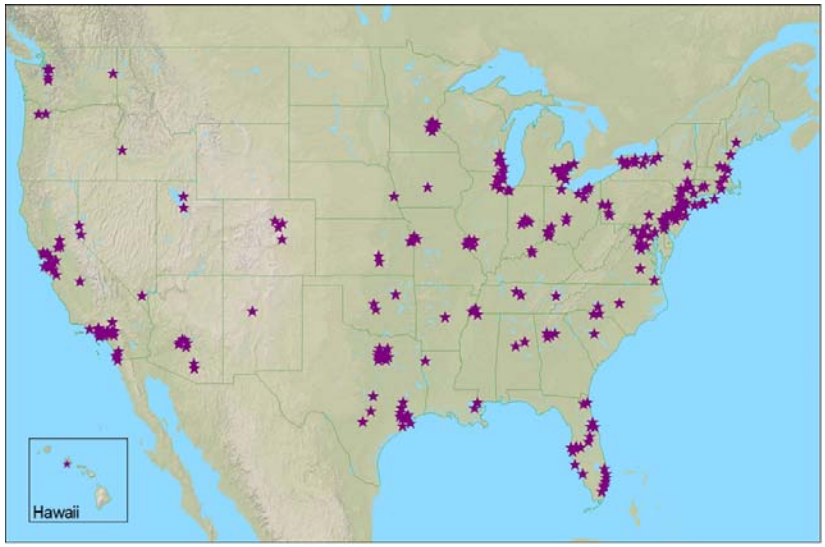
Commercial service airports that enplane less than 0.05 percent of all commercial passenger enplanements but have more than 10,000 annual enplanements are categorized as nonhub primary airports. There are 244 nonhub primary airports that together account for 3 percent of all enplanements. These airports are heavily used by general aviation aircraft with an average of 95 based aircraft per airport.

Nonprimary Commercial Service



Commercial service airports that have between 2,500 and 10,000 annual passenger enplanements are categorized as nonprimary commercial service airports. There are 121 of these airports in the NPIAS, and they account for 0.1 percent of all enplanements. These airports are used mainly by general aviation and have an average of 30 based aircraft.

RELIEVER AIRPORTS

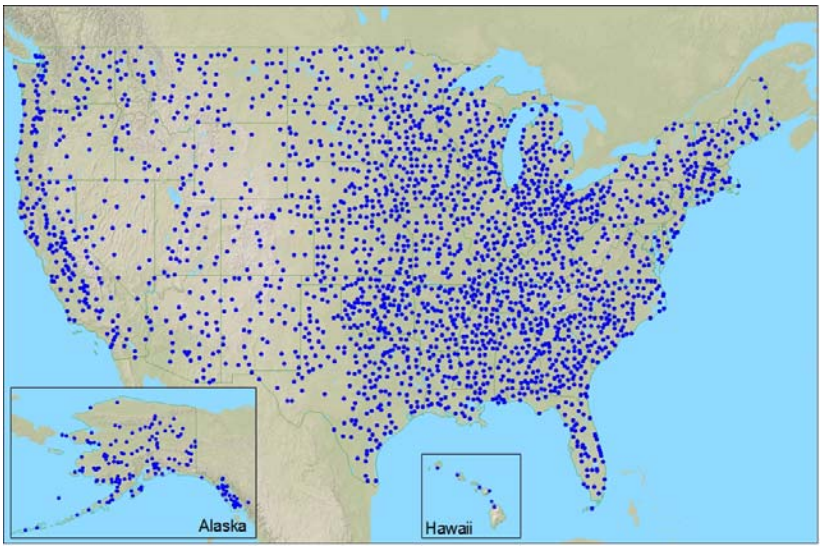


Due to different operating requirements between small general aviation aircraft and large commercial aircraft, general aviation pilots often find it difficult to use a congested commercial service airport.[14] In recognition of this, FAA has encouraged the development of high-capacity general aviation airports in major metropolitan areas.

These specialized airports, called relievers, provide pilots with attractive alternatives to using congested hub airports. They also provide general aviation access to the surrounding area. To be eligible for reliever designation, these airports must be open to the public, have 100 or more based aircraft, or have 25,000 annual itinerant operations. The 269 reliever airports have an average of 186 based aircraft, which in total represents 22 percent of the Nation's general aviation fleet.

[14] Large commercial aircraft typically operate at much higher speeds than small general aviation aircraft, thereby, making it difficult to have both types of aircraft use the same runways during periods of high commercial aircraft activity. This is due, in part, to variances in approach airspeed and to wake turbulence considerations. Some of the busiest airports are in Class B and C airspace, which have specific requirements for aircraft equipage and pilot qualifications. In addition, general aviation pilots may be less familiar with air traffic control procedures used at airports that primarily serve air carrier operations.

GENERAL AVIATION AIRPORTS



Communities that do not receive scheduled commercial service or that do not meet the criteria for classification as a commercial service airport may be included in the NPIAS as general aviation airports if they account for enough activity (having usually at least ten locally based aircraft) and are at least 20 miles from the nearest NPIAS airport. These 2,560 airports, with an average of 31 based aircraft, account for 34 percent of the Nation's general aviation fleet. They are the closest source of air transportation for about 19 percent of the population and are particularly important to rural areas.

Table 1 shows the number of NPIAS airports by type, as well as the percentage of enplanements, based aircraft, and percentage of total development.

Table 1: Airport Statistics

Number of Airports	Airport Type	Percentage of 2008 Total Enplanements	Percentage of All Based Aircraft[1]	Percentage of NPIAS 2011-2015 Cost[2]
29	Large Hub Primary	68.0	0.7	33.8
37	Medium Hub Primary	20.0	2.1	14.1
72	Small Hub Primary	8.0	4.0	8.6
244	Nonhub Primary	3.0	10.1	11.3
121	Nonprimary Commercial Service	0.1	1.6	1.9
269	Relievers	0.0	21.9	7.2
2,560	General Aviation	0.0	34.4	21.4
3,332	**Existing NPIAS Airports**	**99.1**	**74.8**	**98.3**
16,402	**Existing Low Activity Landing Areas (NonNPIAS)**	**0.9**	**25.2**	

[1]Based on active aircraft fleet of 228,668 aircraft in 2008.
[2] NPIAS includes proposed airports which account for 1.6% of total AIP eligible development which is not included in this table.

NEW AIRPORTS

The NPIAS identifies 48 airports that are anticipated to open within the next 5 years. These new airports are shown separately in Appendix A and are also included in the list of airports by State in

Appendix A. New airports are identified by a location identifier beginning with a plus symbol (i.e., +081) and include 39 new general aviation airports, 6 nonprimary commercial service, and 3 new primary airports. Two of the new primary airports replace existing commercial service airports (St. George Municipal, Utah and Panama City-Bay County International, Florida), and one airport would provide additional commercial service to serve the Chicago area (Peotone, Illinois). Panama City-Bay County International Airport opened on May 23, 2010 and St. George Municipal Airport is scheduled to open in January 2011. New airports not expected to open by 2015 are not identified in Appendix A.

AIRPORTS NOT INCLUDED IN THE NPIAS

There are 5,179 public-use airports in the United States (4,247 are owned by public entities and 932 are owned by private entities). Of these existing public-use airports, 3,332 are included in the NPIAS. There are 1,847 airports open to the public not included in the NPIAS. There are 850 privately owned public-use airports that are not included because they are redundant to publicly owned airports or have too little activity to qualify for inclusion. There are 997 publicly owned, public-use airports that are not included in the NPIAS. These publicly owned airports are not included because they do not meet the minimum criteria of having ten based aircraft; are within 20 miles of a NPIAS airport; are located at inadequate sites; cannot be expanded and improved to provide safe and efficient airport facilities; or do not have adequate justification showing a significant national interest. In addition, 14,555 civil landing areas that are not open to the general public are not included in the NPIAS. The airports not included in the NPIAS have an average of one based aircraft compared to 35 based aircraft at the average NPIAS general aviation airport.

State System Plans Include More Airports

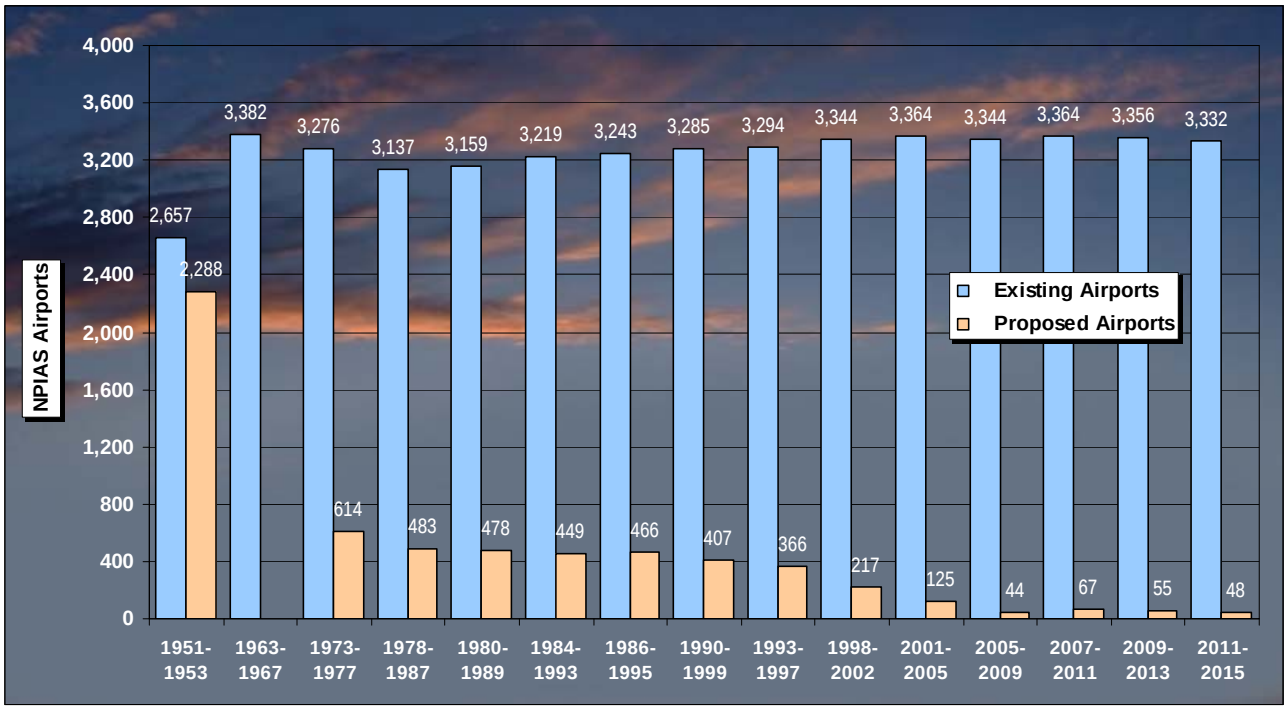
Each State has an aviation system plan that determines the development needed to establish a viable system of airports within that State. Each system plan involves examining the interaction of the airports with the aviation service requirements, economy, population, and surface transportation of a State's geographic area. State plans define an airport system that is consistent with established State goals and objectives for economic development, transportation, land use, and environmental matters. State plans contain about 5,000 airports, about 33 percent more than the NPIAS. Airports included in the State plans but not in the NPIAS are usually smaller airports that have State or regional significance, but are not considered to be of national significance.

EVOLUTION OF THE NATIONAL AIRPORT SYSTEM

The United States turned its attention to the development of civilian aviation after the end of World War II. This included the development of a national network of airports and a national airport plan. The plan identified existing airports and proposed new airports to serve the commercial and general aviation needs of a growing and dispersed population. Specific criteria were established to ensure that the network of airports met national needs at a reasonable cost. Based on the type of airport, these criteria include number of based aircraft, number of annual operations, scheduled air carrier service, and proximity to other airports in the national plan. Criteria also permitted inclusion of airports that met special needs such as access to remote populations.

As noted in Figure 7, the national airport plan released in 1951 identified 2,657 existing airports and 2,288 proposed airports. Many of the proposed airports identified in the 1951 plan were constructed in the 1950s, and today less than 2 percent of the national plan airports are proposed new airports. Over the last 30 years, aviation in the United States has matured, resulting in a fairly consistent number of airports included in the Nation's airport plan. Although the number of federally designated NPIAS airports has remained steady, many airports have changed in size and complexity to meet the travel demands of a growing population and expanding economy.

Figure 7: Historical - Existing and Proposed NPIAS Airports



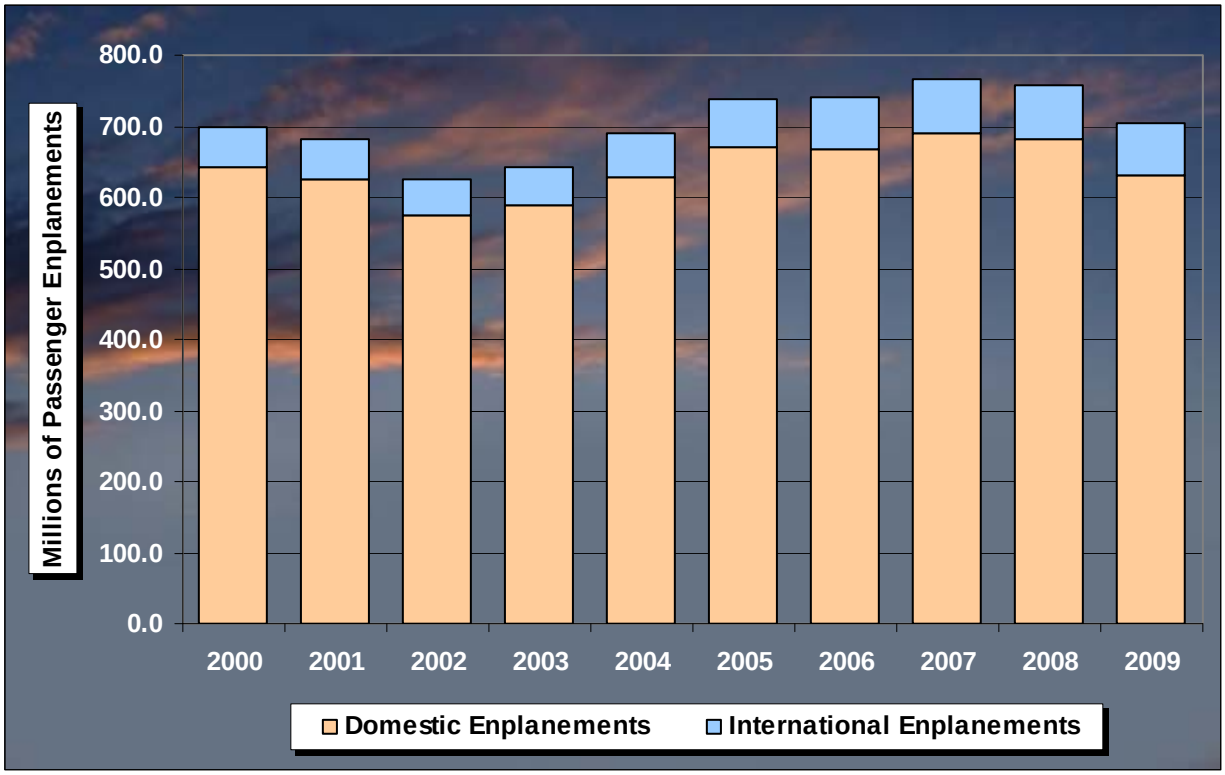
FAA is actively working to develop a more strategic approach to investment decisions for the Nation's smaller airports. There are 503 airports throughout the United States that are served by commercial airlines. In addition, there are more than 2,800 smaller public-use airports in the designated system of U.S. airports supporting a number of other critical aviation functions. Many of these airports relieve congestion at the larger airports by providing an alternative location for smaller aircraft. Others provide vital linkage for corporate and industrial businesses. Still others provide critical medical and emergency response services to remote areas. Each type of airport has different infrastructure requirements.

FAA is working with several State aeronautical agencies and other aviation industry stakeholders to define roles, functions, and infrastructure needs for these smaller airports. We anticipate completing this effort over the next 24 months and hope this will also help provide a blueprint for Federal investment priorities.

USE OF AIRPORT SYSTEM

The national airport system is a reflection of the types of aircraft using the airports and subsequent economic activity. Of the 3,332 airports contained in the NPIAS, 503 of these airports accommodate commercial airline services. Commercial airline service represents the most widely known aspect of the aviation industry and includes the carriage of passengers on a variety of piston and turbine-powered aircraft. Figure 8 summarizes the revenue passenger enplanements by U.S. commercial air carriers over the past 10 years at NPIAS airports. The past ten years have been very turbulent for commercial air service resulting in wide variations in annual passenger enplanements. Large declines in enplanements in 2001 and 2002 were the result of the events of 9/11 and economic recession. The declines in 2008 and most notably 2009 were the result of the most recent recession. As shown in the figure, total passenger enplanements and domestic passenger enplanements on U.S. carriers peaked in 2007. International passenger enplanements on U.S. carriers peaked in 2008. Even considering the effects of the recent recession on passenger enplanements, the 2009 total passenger enplanements are approximately 6.4 million higher than at the beginning of the decade. Domestic enplanements represent approximately 90 percent of total U.S. passenger traffic at NPIAS commercial service airports.

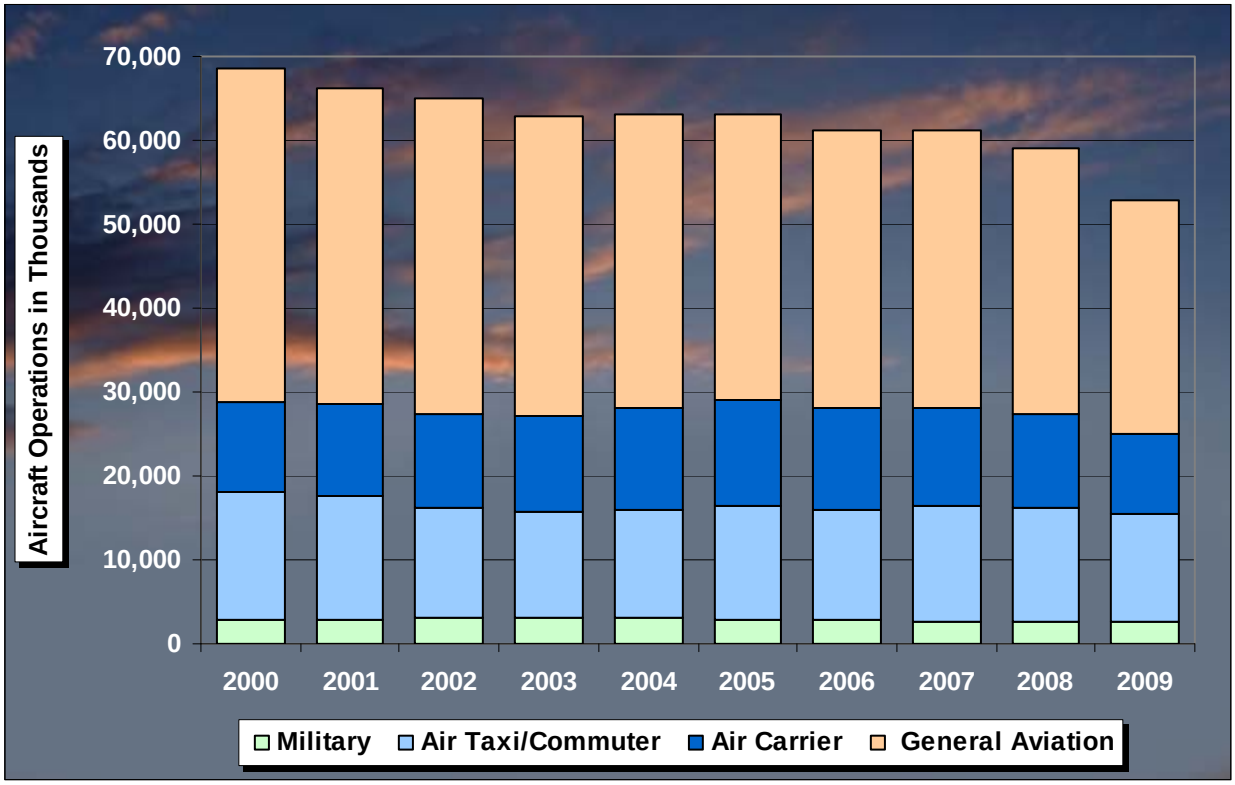
Figure 8: U.S. Commercial Air Carriers
Total Scheduled U.S. Passenger Traffic



While total system passenger enplanements at the end of 2009 were slightly higher than in 2000 and experienced wide annual fluctuations over the past 10 years, total air carrier and air taxi/commuter operations (takeoffs and landings) were down.

Figure 9 depicts the trends in aircraft operations at airports with air traffic control towers between 2000 and 2009. In 2009, air carrier operations were down more than 15 percent from the 10-year high experienced in 2000. Air taxi/commuter operations were down 24 percent in 2009 from their 2005 high. The reductions in aircraft operations are reflective of the capacity reductions the air carriers made to better match available seats with demand. In particular, large capacity cuts were made in 2009 to shed capacity built up through the peak of passenger enplanements in 2007. Air taxi/commuter operations grew annually through 2005 as the major air carriers shifted flights to their regional partners. The combined activities of air carrier and air taxi/commuter operations account for approximately 42 percent of total operations at airports with air traffic control towers. Total operations by military aircraft were slightly higher in 2009 than 2008, which was the lowest annual total in the past ten years. Overall, military aircraft activity was lower in 2009 than in 2000, similar to general aviation and air carrier/air taxi/commuter activities. Military operations are a function of defense missions and can fluctuate annually based upon national defense needs.

Figure 9: Total Combined Aircraft Operations at Airports with FAA and Contract Traffic Control Service



The 2,829 NPIAS airports classified as general aviation and reliever airports serve mainly general aviation activity. General aviation activity has seen declining numbers of total operations since 2000, on average, declining at an annual rate of 3.9 percent. Much of the decline in the later parts of the decade can be attributed to economic conditions and high fuel prices.

The term “general aviation” encompasses a broad spectrum of the aviation industry that includes a diverse range of commercial and recreational uses. While it is often easier to consider what general

aviation doesn't include—scheduled airline and military activity— this does not sufficiently define general aviation activity. To better understand this segment of the industry and the resulting requirements for the airport and air traffic system, each year FAA surveys the general aviation community through general aviation and Part 135[15] activity surveys. These surveys ask respondents to indicate the types of uses of their aircraft and the number of hours flown, as well as the type of aircraft flown, flying conditions, fuel consumption, and aircraft age.

Table 2 summarizes the results of the CY 2008 surveys by types of uses. The percentages are based upon the number of actual hours flown. While personal use of general aviation aircraft (31.8 percent) is the single largest use category, the combined nonpersonal uses of general aviation aircraft represent the majority of all general aviation activity. In 2008, the combined non-personal uses and the FAR Part 135 uses represented approximately 63.3 percent of total hours flown. While some of this activity may have occurred at commercial service airports, the majority of activity occurred primarily at general aviation airports.

Table 2: General Aviation and Part 135 Activity Survey
Actual Hours Flown by Use
Calendar Year 2008

Category	Percent of Total
General Aviation Use	
Personal Use	31.8%
Instructional	17.0%
Corporate	11.9%
Business	9.6%
Aerial Observation	5.5%
Other	4.4%
Aerial Application	3.5%
Other Work	1.2%
Aerial Other	1.0%
External Load (Rotorcraft)	0.6%
Sightseeing	0.6%
Air Medical	0.4%
Subtotal	**87.5%**
On-Demand FAR Part 135 Use	
Air Taxi and Air Tours	10.1%
Part 135 Air Medical	2.5%
Subtotal Part 135 Use	**12.6%**
Total All Uses	**100.0%**

Source: General Aviation and Part 135 Activity Surveys – CY 2008
Note: Totals may not add due to rounding

[15] Title 14, Part 135 – Operating Requirements: Commuter and On-Demand Operations and Rules Governing Persons on Board Such Aircraft.

It is notable that instructional uses comprise the second largest use category. For nearly 20 years, the majority of commercial airline pilots have been trained through civilian training systems rather than through the military. Instructional training for all pilots, whether pursuing flying professionally or as a career, is best conducted away from commercial service airports to preserve commercial service airport capacity and enhance reliability for airline schedules. For these reasons, instructional training is currently focused at general aviation airports.

The results of the survey are also representative of the role that general aviation plays in accommodating commerce throughout the United States. It is estimated that thousands of passengers are carried on business and corporate aircraft each year. Business and corporate aircraft also move air freight,[16] such as high-priority business documents from rural communities to ensure overnight delivery for customers or the just-in-time delivery of parts to manufacturing plants.

On-demand air taxi services provide air access to communities not served by commercial airlines. Air medical services provide rapid access to emergency medical services that cannot be provided on scheduled airline aircraft and in many rural parts of the country, which may not be served by scheduled airline activity. Aerial application includes activities such as fertilizing for agricultural purposes or fighting forest fires. Aerial observations include patrolling pipelines or the electrical grid infrastructure to ensure safety and reliability of these energy systems, flights to discover forest fires, or wildlife and natural habitats.

General aviation also encompasses many activities not fully captured by these use categories. This includes the Civil Air Patrol, which provides nearly all of the inland search and rescue missions or the roles of other governmental agencies for homeland security, law enforcement, and disaster relief. General aviation also includes the humanitarian roles provided by general aviation such as transporting patients to medical centers or delivering relief supplies to areas following natural disasters.

As evidenced by the diverse range of activities, general aviation has various land use, airspace, and air traffic requirements that are much different from the requirements for commercial air service. This requires a system of airports that is flexible in design and construction to accommodate these uses. General aviation airports are included in the NPIAS because they have the capacity to accommodate these varied uses and roles. General aviation airports, in particular reliever airports, preserve capacity at commercial service airports and enhance the safety and efficiency of scheduled airline operations by offering a location away from commercial service airports for general aviation. Additionally, many of the general aviation airports are included in the NPIAS as they are located in population centers away from commercial service airports that still need access to the national airspace system to conduct commerce.

[16] It should be noted that large transport aircraft carrying air cargo are included with the air carrier counts as many of these operators operate under similar regulations to commercial airlines carrying passengers.

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Chapter 2: System Performance

OVERVIEW

The Federal role in airport development is largely concerned with assuring a high level of system performance. This chapter describes the major initiatives underway to evaluate and improve the performance of the air transportation system. It also describes how well the airport system is operating and highlights trends.

MAJOR INITIATIVES

Ongoing major FAA initiatives will advance and transform the national system of airports over the next two decades through the implementation of the next generation national air transportation system (NextGen) and the advancement of airport-related research.

NextGen

NextGen is not a single system that is "turned on," but rather an incremental implementation of new technologies and flight procedures that will make the overall flow of air traffic more efficient and stable. In 2010, FAA released an updated version of its NextGen Implementation Plan.[17] This plan details agency commitments in the near- and mid-term (2012-2018) and further engages aviation community stakeholders as NextGen development and deployment continue. The next version of the NextGen Implementation Plan is scheduled for publication in March 2011.

NextGen will benefit airports by providing tools to better accommodate future growth in a safe, efficient, and environmentally responsible manner. Over the last decade, infrastructure projects at 19 of the busiest airports across the country have also provided these airports with the potential to accommodate more than 2 million additional operations each year. This is a significant accomplishment. Moving forward, new airport infrastructure will continue to play a very important role in increasing capacity. The greatest benefits, however, will come from integrated airport planning and development along with the implementation of planned NextGen performance based navigation (PBN) procedures and capabilities. Collaboration between stakeholders will continue to be critical.

As NextGen evolves, changes to airport planning and design standards will provide guidance on the way airports operate and plan for future infrastructure. For example, several approaches to improving closely spaced parallel runway procedures are being evaluated by the FAA. Changes like this may give airports greater design flexibility by allowing better use of existing runway layouts and even opening the potential for new runways to be added within existing airport footprints. There are a number of airports today that could benefit from such procedures.

[17]The 2010 NextGen Implementation Plan is available at: http://www.faa.gov/about/initiatives/nextgen/.

NextGen will help to reduce growth in delays and congestion at the busiest airports and in congested metropolitan areas. Most delays occur due to weather. With the precise separation of aircraft with Automatic Dependent Surveillance-Broadcast (ADS-B) surveillance, area navigation (RNAV), and required navigation performance (RNP), runways throughout can be maintained at busy airports during inclement weather. However, less congested airports will also see meaningful benefits from NextGen. With enhanced capabilities such as wide area augmentation system (WAAS) and localizer performance with vertical guidance (LPV) approaches, general aviation and reliever airports may be part of potential regional solutions to capacity problems in congested metropolitan areas.

Airports Geographic Information Systems (GIS)

FAA is implementing a GIS pilot program to allow incorporation of aviation data into a centralized data-sharing environment to support safe and efficient aviation activities. Airport data from GIS surveys are a NextGen enabler that will be used to develop new approach procedures, conduct obstruction analyses, and support flight deck moving maps. The Airports GIS program has established a standard methodology[18] for collecting and storing airport survey data into a single, web-based repository that supports both FAA and airport needs. In addition, data collected through an Airport GIS will enable an airport to produce an electronic Airport Layout Plan.

Airport Cooperative Research Program

Congress established the Airport Cooperative Research Program (ACRP) through Vision 100-Century of Aviation Reauthorization Act. The objective of the ACRP is to carry out applied research on problems that are shared by airport operators and are too difficult for individual airports to resolve on their own. Additionally, the ACRP studies issues that are not being adequately addressed by existing Federal research programs. FAA funds the program. The National Academies, acting through its Transportation Research Board (TRB), administers the program. The ACRP Oversight Committee, an independent governing board of airport managers and other aviation officials appointed by the U.S. Secretary of Transportation, selects the program's projects.

The ACRP undertakes research in a variety of airport subject areas, including administration, environment, policy and planning, safety, security, human resources, design, construction, maintenance, and operations. Starting in FY 2010, $5 million of annual ACRP funding is being allocated directly toward environmental projects in order to address the many environmental issues airports face.

As of February 2010, the ACRP has initiated 180 research projects and produced 56 publications. A complete listing of all ACRP research projects and research results is available free of charge on the TRB ACRP Web site.[19] Selected studies set to begin in 2010 include:

- Policy
  - Business planning for general aviation airports
  - Considering and evaluating airport privatization

[18] Standard methodology contained in FAA Advisory Circulars 150/5300-12, 17, and 18.
[19] The TRB ACRP Web site is located at: http://www.trb.org/acrp/.

- Environment
  - Evaluating green engineering and construction practices at airports
  - Evaluation of stormwater system design conditions for deicing management
  - Evaluating the impact of aviation noise on learning

- Policy and Planning
  - Defining and measuring aircraft delay
  - Integrating aviation into passenger rail systems planning in congested corridors

FACTORS INDICATING SYSTEM PERFORMANCE

Six key factors help identify the level of system performance: capacity, safety, environmental performance, pavement condition, surface transportation accessibility, and financial performance. However, the six factors are not equally sensitive to capital improvements, and increased investment in airport infrastructure is not the only way to improve performance. For example, Federal aid to airports can be useful when focusing on specific issues, such as the provision of airport rescue and firefighting equipment, development of safety areas around runways, removal of obstructions in runway approach paths, and planning and implementing noise compatibility measures.

CAPACITY

The capacity of the airport system is affected by many factors, including the layout of individual airports, the manner in which airspace is organized and used, airport operating procedures, weather conditions, the aircraft type using the system, and the application of technology. The majority of airports in our national system have adequate airport capacity and little or no delay.

FAA uses a comprehensive process to guide future airfield development. It includes airport master planning, FAA airspace studies, environmental analysis and documentation, airfield modeling, and delay analysis, as well as benefit-cost analyses for larger capacity projects. Airfield simulation models are employed to estimate the level of delay associated with current and forecast operations for both the existing airfield and for planned improvements. Benefit-cost analyses are applied to determine the benefit of the airfield improvements in relation to the cost of improvements.

A major concern in airport planning is the adequacy of the runways and taxiways to handle anticipated aircraft operations safely and efficiently. A single runway with a parallel taxiway can normally accommodate approximately 200,000 annual aircraft operations. FAA provides guidance to help airport sponsors in deciding when airfield capacity improvements should be considered. Current FAA guidance recommends that capacity planning start when aircraft activity reaches 60 to 75 percent of an airport's airfield capacity. With major airfield improvements often taking ten or more years from concept to opening, this recommendation allows adequate lead time so the needed improvement can be completed before the problem becomes critical.

One of the tools used by airport planners to estimate the timing of capacity improvements and allow the airport to plan accordingly is annual service volume (ASV). ASV is an estimate of the number

of aircraft operations that can be reasonably accommodated at an airport over a period of a year at a particular level of delay. It is not an absolute capacity number. Rather, it is the capability of the airport to accommodate aircraft operations with a given delay level. Experience shows that airfield delay usually increases gradually with rising levels of traffic. As airports reach capacity, delay can grow exponentially.

Before a new runway or runway extension can be built, FAA must assess potential environmental impacts that may result from airport development projects. In the Vision 100-Century of Aviation Reauthorization Act, Congress directed FAA to implement a process for expedited and coordinated environmental reviews of airport capacity, safety, and security projects. In addition, FAA is continuing to work closely with the busiest airports to ensure environmental studies for major runway projects or airfield reconfigurations are completed on schedule. FAA establishes environmental impact analysis teams, maximizes the use of available staff and consultant resources, and utilizes recommended best practices for accomplishing its environmental work in a timely manner. FAA works with other Federal and State environmental resource agencies to achieve concurrent reviews, analyses, and permit approvals to the greatest extent possible. Schedules are established with key milestones and monitored along with a process to elevate and resolve disputes or disagreements between parties.

Runway and Taxiway Improvements

In the past decade, FAA has focused airport improvement funding toward new runway development and airfield reconfigurations. This type of development can provide the largest capacity increases for airports. Since 1999, 22 airfield projects have opened at 19 of the 35 Operational Evolution Plan (OEP)[20] airports, providing these airports with the ability to accommodate more than 2 million additional operations each year as shown in Table 3. These include 16 new runways, 3 taxiways, 1 runway extension, and 2 airfield reconfigurations.

[20] In FY 2010, FAA began a review of the 35 OEP airports. A new list of airports will be in place in FY 2011.

Table 3: New Runways and Airfield Reconfigurations Opened Since 1999 at OEP Airports

Airport	Date Opened	Runway Identifier	Runway Length (Feet)
Philadelphia	Dec-99	8/26	5,000
Phoenix	Oct-00	7R/25L	7,800
Detroit	Dec-01	4L/22R	10,000
Cleveland	Dec-02 Aug-04	6L/24R 6L/24R Extension	7,145 9,000
Denver	Sep-03	16R/24L	16,000
Miami	Sep-03	8/26	8,600
Houston	Oct-03	8L/26R	9,000
Orlando	Dec-03	17L/35R	9,000
Minneapolis-St. Paul	Oct-05	17/35	8,000
Cincinnati-No. Kentucky	Dec-05	18R/36L	8,000
Lambert-St. Louis	Apr-06	11/29	9,000
Atlanta Hartsfield	Jun-06	10/28	9,000
Boston Logan	Nov-06	14/32	5,000
Atlanta Hartsfield	Apr-07	Taxiway V	
Los Angeles	Jun-08	Southside Reconfiguration	Relocated 7R/25L and New Taxiway
Seattle-Tacoma	Nov-08	16R/34L	8,500
Washington Dulles	Nov-08	1L/19R	9,400
Chicago O'Hare (Phase 1)	Sep-08 Nov-08	9R/27L *Extension* 9L/27R	13,000 7,500
Dallas-Ft. Worth	Dec-08	Southeast Taxiway	
Philadelphia	Feb-09	17/35 *Extension*	8,500
Boston Logan	Jul-09	Centerfield Taxiway	
Charlotte	Feb-10	18R/36L	9,000

Currently, three OEP airports have airfield projects (a runway extension at Portland, a relocated runway under construction at Chicago O'Hare, and a runway extension at Ft. Lauderdale) under construction.

Another means of improving efficiency and capacity on congested airports is optimizing the configuration of taxiways to minimize taxi time and reduce or eliminate runway crossings. In locations where high activity levels and the airfield layout justifies them—and where there is adequate space to achieve required separations—end-around taxiways can provide unrestricted or controlled taxi routing around runway ends. In other highly congested locations, multiple parallel taxiways can make a significant difference by providing controllers with options to optimize surface traffic flow, separating arriving and departing traffic to reduce taxi-in and taxi-out distances and durations.

Evaluation Measures for 35 OEP Airports

There are a number of measures that can be used to evaluate the capacity of major airports where even moderate improvements in delay have the potential for large cost savings. Table 4 contains selected performance indicators for the 35 OEP airports that can be examined to determine their

performance. These include the aircraft mix, percentage of originating and transfer traffic, percentage of international enplanements, number of runways, and average enplanements per departure.

Hartsfield-Jackson Atlanta International was the busiest OEP airport in 2009 in terms of both passenger enplanements and aircraft operations. Chicago-O'Hare International, Los Angeles International, Dallas/Ft. Worth International, and Denver International are the remaining top five passenger enplaning airports in 2009. These airports are also the top five airports based on aircraft operations.

Figure 10 shows the share of commuter and air carrier operations by airport. There are three OEP airports where commuter aircraft (aircraft with 60 or fewer seats) operations are equal to or greater than air carrier operations: Cincinnati, Cleveland, and Houston Intercontinental. This is a change from 2006 when five airports had commuter aircraft operations greater than air carrier operations: Cincinnati, Cleveland, Pittsburgh, Washington Dulles, and Houston Intercontinental. The shift in airports and the number of commuter operations are reflective of recent changes in major airline hubs, including large capacity cuts, most notably to the frequency and numbers of smaller airports served through those hub airports and the move toward larger regional jets.

Table 4: Selected Demand and Capacity Indicators for the 35 OEP Airports

Locid	Airport	Hub Size	Enplanement Rank (2008)[1]	Operations Rank (2008)[2]	CY 08 Enplanements (millions)	CY 08 Total Operations (thousands)	Air Carrier Operations as % of Total Operations	Commuter Operations as % of Total Operations	GA & Military Operations as % of Total Operations	Average Enplanements per Departure	Originating Passengers % of Total Passengers	Connecting Passengers % of Total Passengers[3]	Domestic Passengers % of Total Passengers	International Passengers % of Total Passengers	Number of Existing Runways[4]
ATL	Atlanta	L	1	1	43.8	978.1	77%	22%	1%	89	32%	68%	89%	11%	5
BWI	Baltimore/Washington	L	23	28	10.2	277.9	73%	16%	10%	74	82%	18%	98%	2%	4
BOS	Boston	L	19	19	12.8	375.4	51%	43%	5%	68	88%	12%	86%	14%	6
CLT	Charlotte	L	13	8	17.3	537.6	59%	35%	6%	64	27%	73%	93%	7%	4
MDW	Chicago/Midway	L	29	29	8.0	267.5	70%	11%	19%	60	72%	28%	100%	0%	5
ORD	Chicago/O'Hare	L	2	2	33.7	881.6	66%	33%	1%	76	47%	53%	84%	16%	7
CVG	Cincinnati	M	32	25	6.6	286.1	27%	70%	2%	46	29%	71%	95%	5%	4
CLE	Cleveland	M	34	33	5.4	236.0	29%	66%	5%	46	55%	45%	97%	3%	4
DFW	Dallas/Fort Worth	L	4	3	27.2	655.3	73%	26%	1%	83	43%	57%	91%	9%	7
DEN	Denver	L	5	4	24.3	625.8	74%	26%	1%	78	52%	48%	96%	4%	6
DTW	Detroit	L	14	11	17.0	462.5	52%	46%	2%	74	49%	51%	89%	11%	6
FLL	Fort Lauderdale	L	22	24	11.0	295.7	66%	18%	16%	75	86%	14%	86%	14%	3
HNL	Honolulu	L	25	26	9.0	282.1	54%	24%	21%	64	67%	33%	81%	19%	6
IAH	Houston	L	8	7	20.0	578.3	48%	50%	2%	69	32%	68%	81%	19%	5
LAS	Las Vegas	L	7	6	21.0	578.9	67%	24%	9%	73	81%	19%	95%	5%	4
LAX	Los Angeles	L	3	5	28.9	622.5	73%	24%	3%	93	62%	38%	72%	28%	4
MEM	Memphis	M	36	21	5.4	363.0	57%	36%	7%	30	36%	64%	96%	4%	4
MIA	Miami	L	15	20	16.4	371.5	80%	14%	6%	88	44%	56%	51%	49%	4
MSP	Minneapolis	L	16	12	16.4	450.0	64%	32%	4%	73	50%	50%	92%	8%	4
JFK	New York/Kennedy	L	6	13	23.6	447.0	80%	19%	2%	106	54%	46%	53%	47%	4
LGA	New York/La Guardia	L	20	18	11.6	384.1	53%	45%	2%	60	90%	10%	95%	5%	2
EWR	Newark	L	11	14	17.6	442.1	65%	32%	3%	80	62%	38%	69%	31%	3
MCO	Orlando	L	12	23	17.3	343.4	85%	9%	6%	101	88%	12%	93%	7%	4
PHL	Philadelphia	L	18	10	15.6	492.0	57%	38%	5%	63	61%	39%	88%	12%	4
PHX	Phoenix	L	9	9	19.5	502.5	78%	15%	7%	77	61%	39%	95%	5%	3
PIT	Pittsburgh	M	43	35	4.3	167.7	53%	34%	13%	51	91%	9%	99%	1%	4
PDX	Portland	M	30	30	7.1	253.1	61%	27%	12%	56	84%	16%	95%	5%	3
SLC	Salt Lake City	L	24	16	10.0	389.9	43%	41%	16%	51	55%	45%	97%	3%	4
SAN	San Diego	L	26	34	9.0	228.2	72%	20%	8%	79	96%	4%	99%	1%	1
SFO	San Francisco	L	10	17	18.1	388.1	73%	22%	5%	93	69%	31%	77%	23%	4
SEA	Seattle	L	17	22	15.8	345.1	89%	10%	1%	92	71%	29%	91%	9%	3
STL	St. Louis	M	31	31	6.7	248.4	50%	44%	5%	54	77%	23%	99%	1%	4
TPA	Tampa	L	27	32	8.9	238.3	69%	17%	14%	74	93%	7%	98%	2%	3
IAD	Washington Dulles	L	21	15	11.3	391.6	48%	38%	14%	58	49%	51%	74%	26%	4
DCA	Washington National	L	28	27	8.7	277.9	62%	36%	2%	63	80%	20%	98%	2%	3

[1]Ranking among all commercial service airports

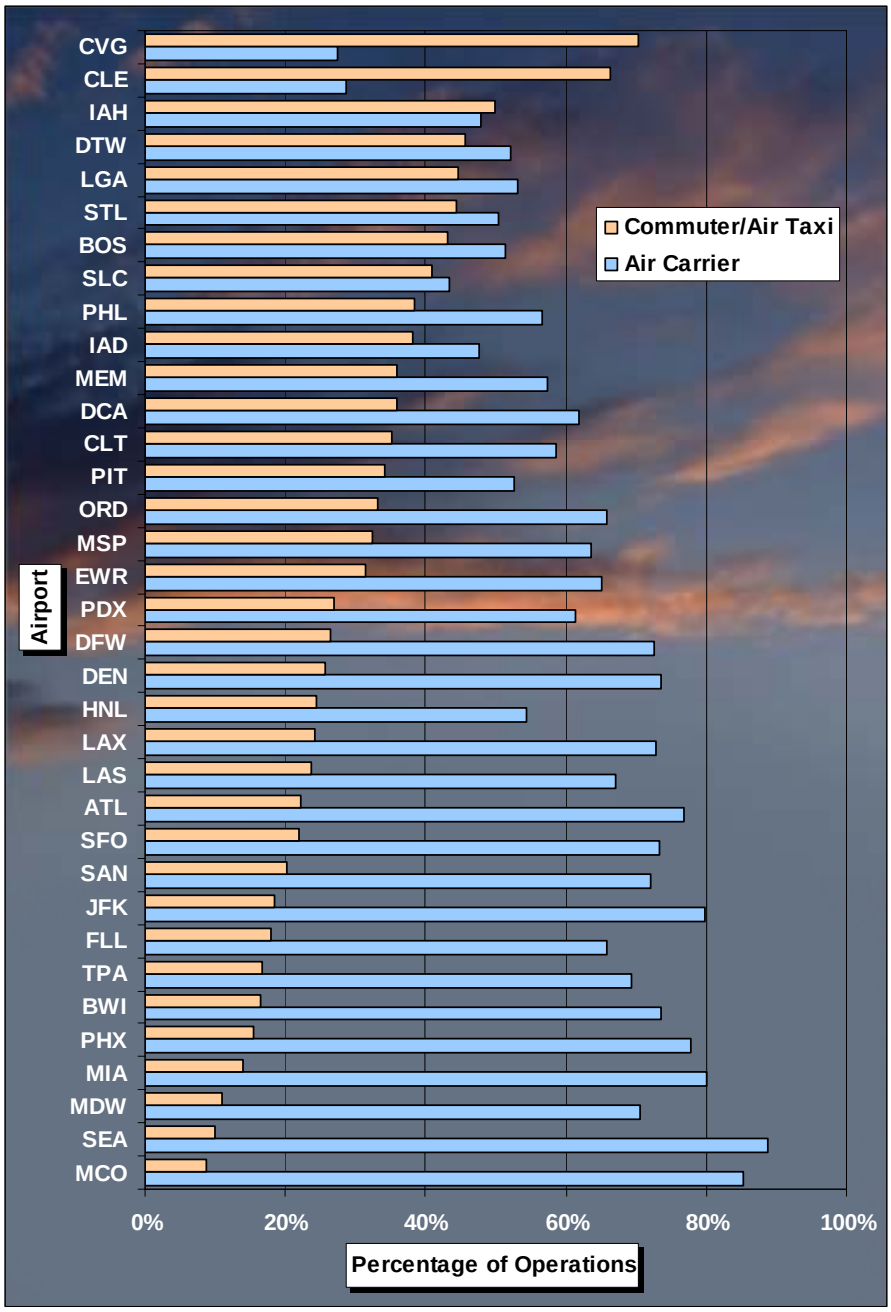
[2]OEP 35 ranking by total operations

[3]Connecting Flight: A flight that requires the passengers to change from one plane or airline to another at an intermediate point (called connecting point) on way to their final destination.

[4]Number of Existing Runways: FAA 5010-1 Form

Sources: Enplanements - FAA Air Carrier Activity Information System (ACAIS)
Operations - FAA Air Traffic Activity System (ATADS)
Origin & Connecting Passengers - Form DB1B Originating Passengers on Scheduled Flights
Domestic and International Passengers - Form T100 Enplanements on Scheduled Flights

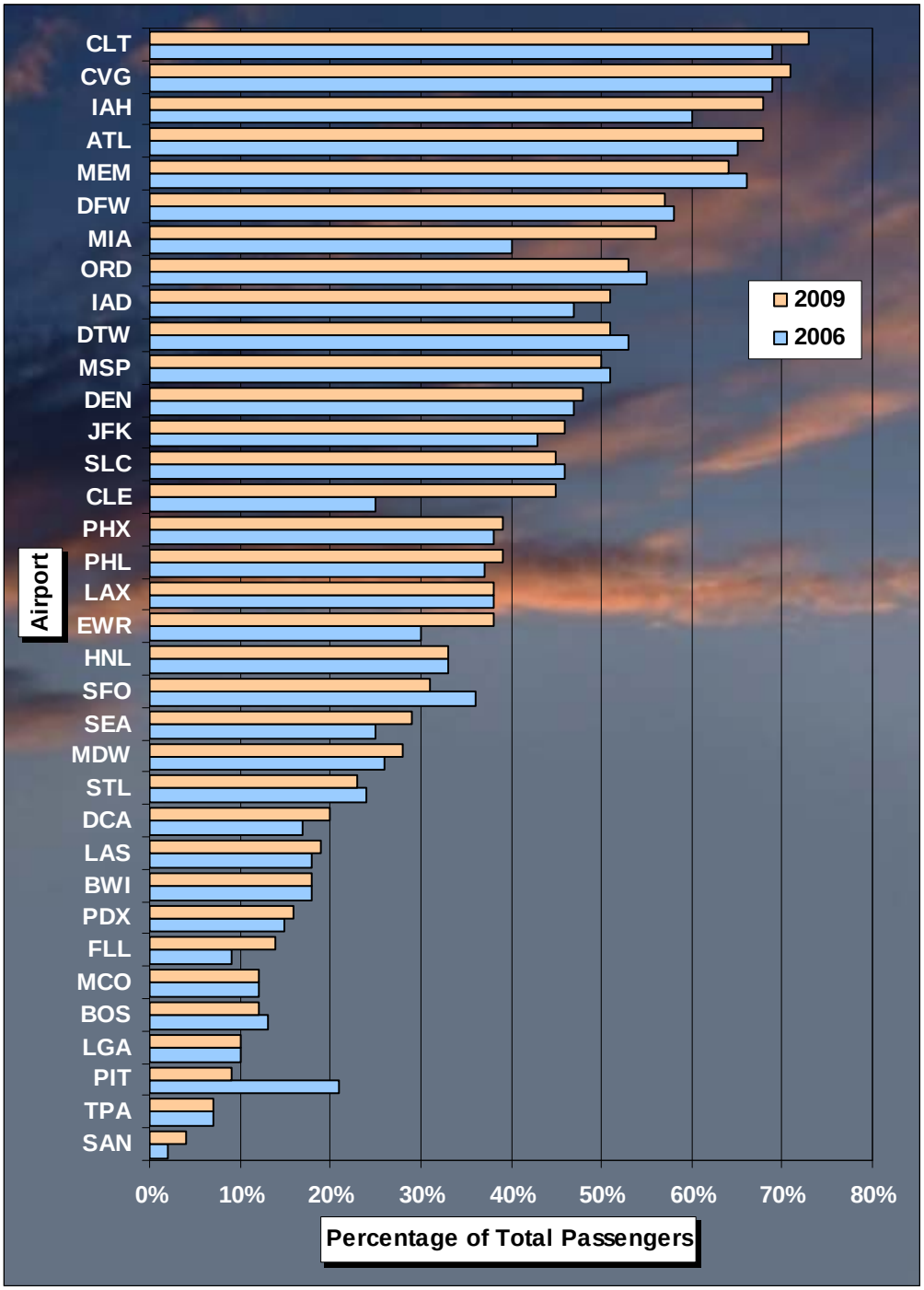
Figure 10: Percentage of Commuter and Air Carrier Operations at 35 OEP Airports in 2009 (Ranked by Highest Share of Commuter/Air Taxi Operations)



Air carrier operations are those by aircraft with more than 60 passenger seats; general aviation and industry operators not shown.
Source: FAA Air Traffic Activity Data System, http://aspm.faa.gov/opsnet/sys/Main.asp

Figure 11 illustrates that the majority of passengers at 25 of the OEP airports are entering the system at these airports (originating passengers). Ten airports have connecting passenger levels greater than their originating passenger levels, and of those 10, only 5 (Charlotte, Cincinnati, Houston, Atlanta, and Memphis) have more than 60 percent of their passengers connecting to other flights.

Figure 11: Connecting Passengers as Percentage of Total Airport Passengers at 35 OEP Airports 2009 and 2006

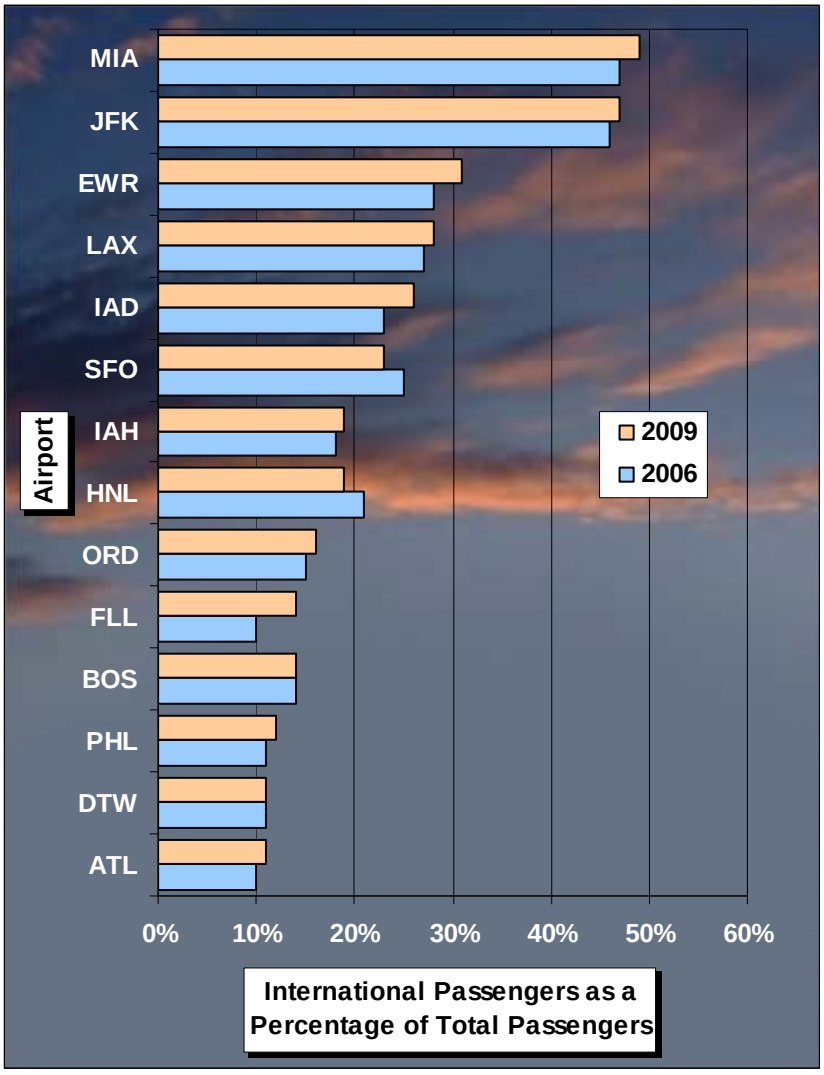


Source: DOT Bureau of Transportation Statistics, 2009

Most U.S. airports serve domestic markets, while international passenger service is concentrated at 25 U.S. airports (23 large hubs, 1 medium hub, and 1 small hub) accounting for 94 percent of international passenger activity. As shown in Figure 12, only 14 airports have international

enplanements accounting for 10 percent or more of their activity. These airports account for 70 percent of the passengers who boarded international flights in the United States. Miami, New York Kennedy, Newark Liberty, Los Angeles, Washington Dulles, Chicago O'Hare, Ft. Lauderdale, Philadelphia, Atlanta, and Houston saw an increase in their percentage of international passengers between 2006 and 2009.

Figure 12: Airports with 10 Percent or More International Enplanements 2009 and 2006



Congestion and Delay

The concentration of aircraft arrivals and departures at an airport can result in congestion and delay. Delay is an indicator that activity levels are approaching or exceeding throughput capacity levels. The impacts of delays can be measured in many ways and include direct costs such as increased fuel use and crew time, indirect costs such as the extra travel time for passengers, missed connections, resulting in delays on other airlines and their passengers, and increased air emissions.

Delay is expressed in different metrics. For example, DOT tracks the on-time performance of airlines and reasons for flights arriving after their scheduled arrival times. Other delay statistics are collected and used for specific purposes. For example, air traffic controllers identify instances where aircraft are delayed 15 minutes or more in a given flight segment. FAA uses this information to monitor the day-to-day operation of the air traffic control system. Airport planners and designers use the average delay per aircraft operation as a measure of congestion, which is related to demand and capacity. This statistic can be forecasted and translated into a dollar cost of delay.

Air Carrier On-Time Performance

DOT defines a delayed operation as an aircraft arriving at or departing from a gate 15 minutes or more after its scheduled time. The number of arrivals and departures that are delayed 15 minutes or more is compiled by DOT for busy airports and is reported monthly. In 2009,[21] the 19 carriers reporting on-time performance recorded an overall on-time arrival rate of 79 percent, an improvement over 2008's rate of 71 percent and the best annual record since the 81 percent on-time rate of 2002.

Of the 20.8 percent of flights delayed in 2009,[22] 6.2 percent were delayed because the aircraft arrived late (previous flight with same aircraft arrived late, causing the present flight to depart late), 7 percent were delayed due to national aviation system delays (such as nonextreme weather conditions, runway closures, heavy traffic volume, and air traffic control), 5 percent were delayed due to air carrier delay (circumstances within the airline's control such as maintenance or crew problems, aircraft cleaning, baggage loading, and fueling), 1.6 percent of the delays were attributed to cancelled or diverted flights, and less than 1 percent were delayed due to significant meteorological conditions that, in the judgment of the carrier, delayed or prevented the operation of a flight, such as tornado, blizzard, or hurricane.

Delay Indicators

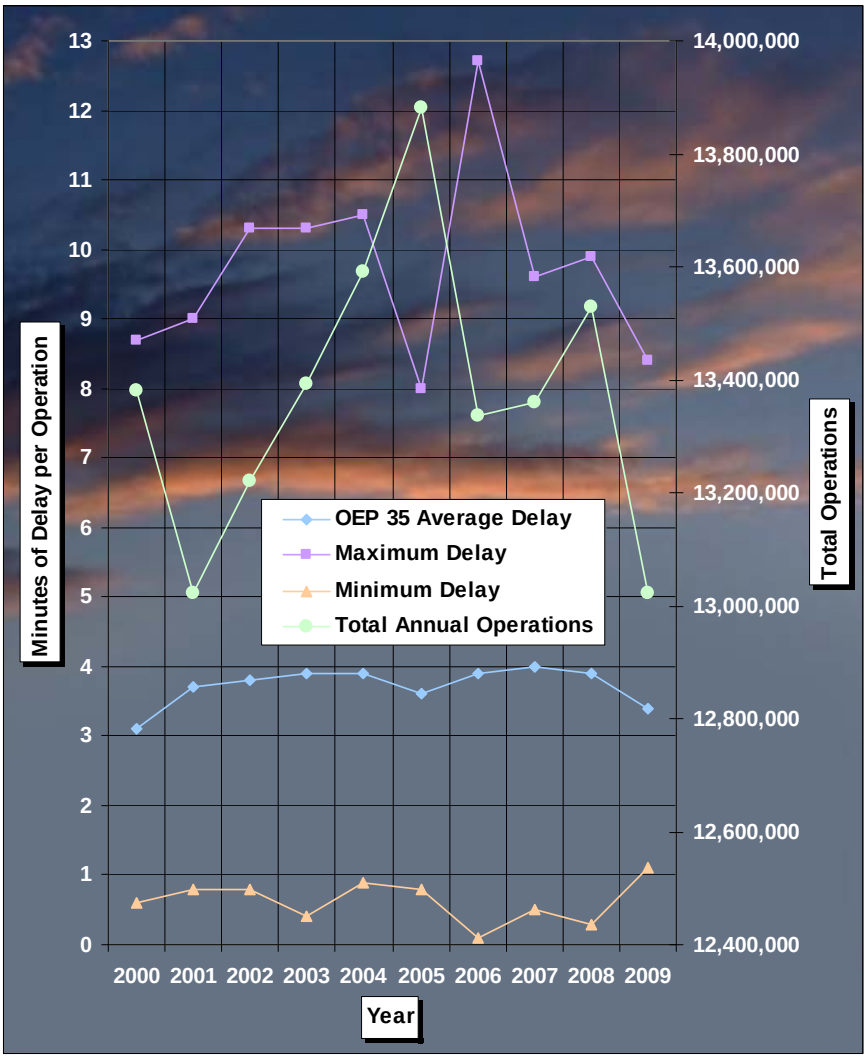
Through the Aviation System Performance Metrics (ASPM) system, FAA tracks delay indicators at the 35 OEP airports using reporting from participating airlines. Figure 12 depicts the range of delay experienced at the OEP airports between 2000 and 2009 considering both taxi out, taxi in, and airborne delay factors. As shown in Figure 13, the OEP 35 airports experienced a consistent delay level of between 3 and 4 minutes per operation each year during the period. Since 2007, this average delay level has dropped from its peak of 4 minutes per operation to 3.4 minutes per operation. Delay has not changed proportionally to reductions in aircraft operations. Total annual operations declined by approximately 6 percent between 2007 and 2009; however, average delay per operation declined by approximately 15 percent. This indicates that average delay improved due to a combination of factors including improvements as a result of reduced operational levels. However, delay improvements also resulted from added capacity at OEP airports such as new runways and taxiways and changes in air traffic procedures.

While improving in recent years, the average delay per operation is still persistent at the OEP 35 airports and can vary widely between individual airports. Figure 13 depicts the maximum

[21]Data available at: http://www.transtats.bts.gov/HomeDrillChart.asp.
[22]Data available at: http://www.transtats.bts.gov/OT_Delay/OT_DelayCause1.asp?pn=1.

and minimum delay per operation experienced at an OEP airport between 2000 and 2009. The maximum average delay at the most congested airports ranged from a high of 12.7 minutes per operation to a low of 0.1 minutes per operation at the least congested airports. On average, the difference between airports with the lowest levels of delay and those with the highest levels of delay is approximately 9 minutes per operation. This reveals that capacity enhancements need to be focused at certain airports with the most congested airports typically being in a major metropolitan area. A review of average delay figures reveals certain metropolitan regions such as Atlanta, Boston, New York, Chicago, Houston, and Philadelphia each experience average delay over 4 minutes per operation. Minneapolis, Denver, Detroit, Charlotte, and Cincinnati also experience similar levels of delay. The sections below discuss FAA's approach to capacity enhancement at those airports experiencing the most delay.

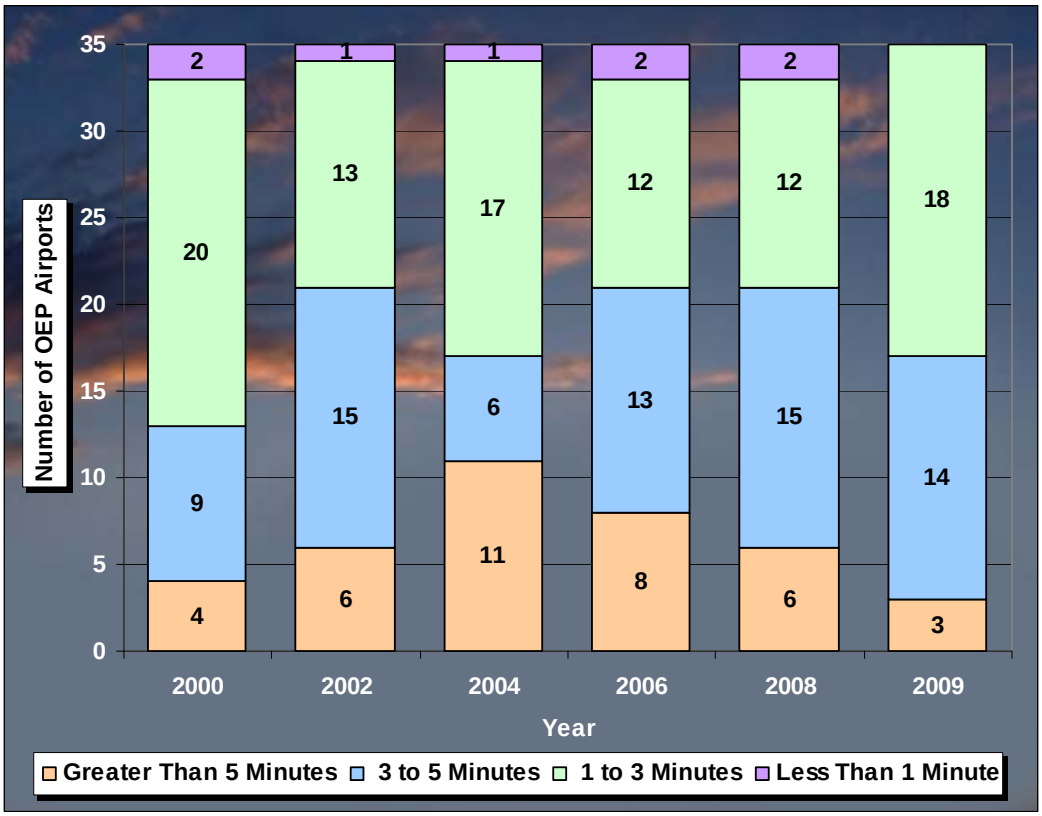
Figure 13: Average Delay per Operations vs. Total Annual Operations at OEP Airports



Source: FAA Aviation System Performance Metrics & Air Traffic Activity Data System, http://aspm.faa.gov/opsnet/sys/Main.asp

Figure 14 groups the OEP 35 airports according to minutes of delay per operation. As shown in the figure, the number of airports that experience 5 minutes of delay or more per operation has declined from a high of 11 in 2004 to 3 in 2009. The number of airports with delay per operation ranging between 3 to 5 minutes has averaged approximately 14 over the last 3 years. The number of airports with delay between 1 and 3 minutes per operations has increased in recent years from 12 to 18.

Figure 14: Delay per Operation Groupings: OEP 35 Airports



Airport Capacity – A National Look

In recognition of delays and congestion detailed above, FAA has been analyzing future capacity of the Nation's airports and metropolitan areas through a team of experts known as the FACT. Since 2003, this team has conducted two comprehensive analyses of the Nation's airport capacity needs. These systemwide analyses are intended to provide FAA with data about the timing and need for infrastructure improvements at the national level for agency planning purposes.

The results of the latest FACT analysis referred to as FACT 2 were documented in May 2007 in the FAA report, *Capacity Needs in the National Airspace System, An Analysis of Airport and Metropolitan Area Demand and Operational Capacity in the Future*.[23] The FACT 2 analysis identified a significant number of U.S. airports and metropolitan areas that can be expected to

[23]The FACT 2 report is available online at: http://www.faa.gov/airports/resources/publications/reports/media/fact_2.pdf.

require additional capacity in the future if demand reaches forecast levels. This analysis not only highlights the importance of moving forward with current improvement plans, and keeping such plans on schedule, but of seeking new solutions to add even more capacity and efficiency than is currently being planned by airports and communities.

Since publication, the FACT team has continued to update and refine modeling assumptions, and has worked closely with select airports to develop toolboxes and implementation plans for potential solutions to improve capacity and reduce delays. The toolboxes contain a list of potential solutions that range from AIP eligible items to NextGen solutions. Table 5 provides an example of the type of projects and detail included in these toolboxes. The Airport Action Plans that have been developed through ongoing coordination between FAA and airport sponsors incorporate information and actions needed for the implementation of the toolbox initiatives. Future initiatives will expand the analysis to incorporate the ongoing evolution in planned NextGen operational improvements benefiting runway capacity and will consider airspace, surface, gate, and terminal/passenger flow constraints.

Table 5: Sample Toolbox Solutions

Category	Description	No. of Airports
Airport (Metro/Regional)	Regional airport planning (use of nearby airports)	7
Airport (Terminal Infrastructure)	Expand terminal building, gates, apron	7
Airport (Metro/Regional)	Multi-modal solutions	6
Airport (Taxiway Infrastructure)	High speed exits	5
Airport (Taxiway Infrastructure)	Holding pads, multiple runway entries	5
Airport (Taxiway Infrastructure)	Improve ramp area circulation	5
Airport (Taxiway Infrastructure)	Additional taxiways for better ground flow	5
Airport (Taxiway Infrastructure)	End-Around taxiway	2
ATC (Terminal Airspace-TRACON)	Reduced longitudinal separation minima on final	9
ATC (Terminal Airspace-TRACON)	Reduced wake vortex separations – same runway	9
ATC (Terminal Airspace-TRACON)	Reduce delivery variability (RNAV routes)	8
New Technology	Lower minima for use of visual separation	6
New Technology	Runway/taxiway surveillance	5
Airport (Runway Infrastructure)	WAAS/LAAS	3
ATC (Enroute Airspace-Center)	Reduce restrictions due to special use airspace	3
ATC (Terminal Airspace-TRACON)	Arrival-departure routes for parallel runways	2
ATC (Terminal Airspace-TRACON)	Simultaneous converging instrument approaches	2
ATC (Terminal Airspace-TRACON)	Reduce excessive spacing on final	2
ATC (Terminal Airspace-TRACON)	Reduce route conflicts between airports	2
ATC (Terminal Airspace-TRACON)	Additional arrival fixes, departure gates	2

In 2011, FAA will begin a new multiyear effort to reexamine the capacity needs of the Nation's most congested airports and metropolitan regions. Commonly referred to as FACT 3, this effort will expand the analysis to incorporate the ongoing evolution in planned NextGen operational improvements benefiting runway capacity and to consider airspace, surface, gate, and terminal/passenger flow constraints. FACT 3 will also identify regions where the airspace will not be able to accommodate anticipated demand. The purpose of this analysis will be to identify where airport capacity enhancements may be limited unless airspace issues are addressed.

Alternative Capacity Enhancement Methods

While the construction of new runways and runway extensions can provide substantial improvement to capacity, noninfrastructure improvements can also benefit some airports by reducing delays and increasing operational efficiency without substantial capital investment.

Airspace/Flight Procedures/Technology

Delays can be reduced, in part, by modifying air traffic control procedures or introducing new technologies to improve the flow of aircraft en route and in the terminal area. Changes in air traffic and flight procedures also have an impact on capacity. Airspace design changes, for example, can establish more effective airspace structures and provide better access and improved use of available runways. Agency initiatives to meet long-term aviation demand and transition to NextGen are outlined in the NextGen Implementation Plan.[24]

Today, radar is the primary tool used by air traffic control (ATC) to track aircraft in the air and on the ground. In NextGen, ADS-B will be the primary surveillance system and will provide more precision than radar. The ADS-B surveillance data can be shared among ATC facilities, as well as with airlines, airports, and other users to promote situational awareness. ADS-B will also provide a continuously updated broadcast of traffic and flight (such as weather) information to equipped aircraft. Effectively, ADS-B will bring the precision and reliability of satellite-based surveillance to the Nation's air traffic controllers and pilots. ADS-B can also provide capacity benefits, as precise surveillance may eventually allow aircraft to fly safely with less distance between them. For this reason, ADS-B is a key system for improving operations to closely spaced parallel runways.

This technology is already showing benefits in safety. In Alaska, there was a substantial drop in the accident rate of aircraft equipped with ADS-B avionics. The United Parcel Service voluntarily equipped its aircraft with ADS-B cockpit displays and is saving time and money on flights to and from its Louisville hub due to the improved efficiency available with satellite technology.

PBN procedures can increase airport capacity by offering more efficient arrival and departure paths. Two types of PBN procedures are RNAV and RNP. RNAV, which provides an aircraft with the ability to navigate from point to point, uses GPS. RNP will be used at specific locations where extra precision is needed for aircraft navigation—such as approaches to airports with challenging terrain or in congested metroplex areas where precise navigation is needed to deconflict arrival and departure routes for multiple airports in close proximity.

The benefits of PBN are apparent. RNAV and RNP specifications facilitate more efficient design of airspace and procedures, which collectively result in improved safety, access, capacity, predictability, operational efficiency, and environment. Specifically, improved access and flexibility for point-to-point operations help enhance reliability and reduce delays by defining more precise terminal area procedures. RNAV procedures at locations including Phoenix, Atlanta, Dallas-Ft. Worth, and San Diego have improved efficiency, increased capacity, and significantly reduced fuel consumption and emissions.

[24] For more information, see http://www.faa.gov/about/initiatives/nextgen/.

New RNAV instrument approach procedures can also improve airport access during inclement weather. WAAS/LPV provides precision approach capabilities to many airports where it was previously not practical with ground-based navigational aids.[25] These new approaches can provide lower approach minimums and vertical guidance, thus improving safety and providing increased access, especially during poor weather. Over the last several years, FAA has directed AIP funding for surveys in support of the development of WAAS/LPV procedures. FAA plans to publish WAAS/LPV procedures for all qualified runway ends in the NAS.

Another system, the Ground Based Augmentation System (GBAS), is planned to provide instrument approach procedures for near-zero and zero-visibility operations, similar to today's Category II and III ILS. However, a single GBAS installation at an airport can support up to 26 individual instrument approach procedures for all runway ends, without the critical area constraints of ILS installations.

As a component of its Trajectory-Based Operations (TBO) NextGen initiative, FAA has authorized development of arrival procedures with vertical profiles optimized to facilitate a continuous descent from the top of descent to touchdown. OPD flight procedures use the capabilities of the aircraft's Flight Management System to fly a continuous, descending path without level segments, based on the actual performance of the aircraft under current flight conditions. These TBO initiatives, such as OPD, result in fuel savings and noise and emissions reductions by keeping aircraft at higher altitude and at lower thrust levels than traditional step-down approaches. Simplifying routes using OPD also reduces radio transmissions between pilots and controllers.

OPD flight demonstrations have been conducted at five airports: Louisville-Standiford International, Hartsfield-Jackson Atlanta International, Miami International, Charleston International, and Los Angeles International Airports. Flight demonstrations at Louisville and Atlanta have demonstrated an average fuel saving of 50 to 60 gallons per approach. Four vertically-optimized arrival procedures have been designed and successfully instituted at Los Angeles International Airport allowing aircraft to fly a stable descent down to the runway using reduced power starting approximately 70 miles east of the airport. So far, Los Angeles International Airport is the only airport in the United States that has been able to accommodate a fully-optimized OPD.

Congestion Management

Congestion management is a broad term that includes a number of federally imposed administrative measures (e.g., slots, which limit the number of flights that may be scheduled) to reduce congestion and delay and allocate constrained capacity. Airport operators may seek to reduce congestion through revenue neutral peak hour pricing to encourage airlines to move operations to a less congested time or secondary airport.[26] FAA prefers to expand capacity in an environmentally sound manner to meet demand because the aviation industry is a major economic engine providing support and jobs both for the country as a whole and for local communities. However, there are a handful of airports where demand exceeds capacity in the short term, pending capacity expansions, or in the

[25] Navigational aids (NAVAIDS) are equipment that provides aircraft with the ability to navigate to and from the airport under a variety of weather and visibility conditions.

[26] DOT Policy Regarding Airport Rates and Charges, 73 Federal Register 40, 434 (July 14, 2008); see also, Air Transport Association of America v. U.S. Department of Transportation, -- F3d --, C.A.D.C (July 13, 2010) (No. 08-1293) denying petition for review of policy.

long term, where capacity expansion is not a practical option (such as at New York's LaGuardia Airport). At these airports, we need to find a way to address congestion and allocate limited space efficiently and fairly.

New York Metro Area

With persistent demand for New York area airspace and the limited ability to expand capacity, FAA is presented with a challenge of how best to allocate scarce runway capacity. Until relatively recently, FAA managed congestion at LaGuardia and John F. Kennedy International Airports through the High Density Rule (HDR). However, Congress mandated the expiration of the HDR at both airports on January 1, 2007. To prevent the anticipated congestion at LaGuardia after the expiration of the HDR, the FAA put temporary orders in place at all three New York metro airports that cap scheduled operations and will remain in place until October 29, 2011.

The New York Area Program Integration Office (NYAPIO) was established to integrate the implementation of delay reduction initiatives in the New York metropolitan area, and leads a matrix team with representatives from ATO, Aviation Safety, Airports, and Aviation Policy, Planning and Environment. The team has developed an Integrated Master Schedule and Delay Reduction Plan with all delay reduction initiatives and supporting projects.

Chicago Metropolitan Area

FAA also continues to monitor congestion and delay at Chicago O'Hare International Airport although the airport is not operating under a regulatory limit on scheduled operations anymore. On October 13, 2006, FAA adopted a Final Rule limiting scheduled flights at O'Hare. The rule was intended to minimize flight delays from persistent over scheduling at O'Hare while the city of Chicago modernizes and expands the airport as part of the O'Hare Modernization Program (OMP). The Congestion Management rule expired October 31, 2008. The sunset date was chosen in conjunction with the opening of the first new OMP runway in November 2008. However, in order to keep a pulse on the traffic levels, FAA designated O'Hare as a Level 2 schedules facilitated airport. In designating the airport as a Level 2 airport, FAA obtains advance schedule information from U.S. and foreign air carriers, which will enable FAA to identify and work with the carriers to voluntarily mitigate excessive scheduling and delays.

Metropolitan Region Capacity Studies

Regional planning is also being conducted in the San Francisco Bay Metropolitan area, as well as in Atlanta to better define regional capacity solutions in these areas. In addition, FAA is beginning a national study that will develop tools for measuring and documenting the benefits of preserving or improving access and greater capacity at general aviation, reliever, and nonprimary commercial service airports and the metropolitan systems in which they operate or very rural systems with unique access or transportation needs.

Airline Schedules

Congestion and delay are particularly sensitive to demand levels during peak periods. In periods where there are more flights planned than the actual throughput capacity of an airport, delay levels can increase. While the number of air passengers and air carrier operations were down in 2009 from a ten-year peak in 2007, peak period demand levels remain high. Schedule reductions by the airlines

to better meet travel demand have occurred during off peak hours. In making capacity reductions, the major airlines have shifted flights to smaller regional airline partners. While this gives better capacity control to airlines, it does not change the peak period demand levels.

Use of Reliever and Secondary Airports

Redistribution of traffic among airports to make more efficient use of facilities is another measure that can be used to reduce delays. Reliever airports have been identified and improved in metropolitan areas to provide general aviation pilots an attractive alternative to congested commercial service airports. Large metropolitan areas usually have a system of reliever airports, one or more of which can accommodate corporate jet aircraft, with others designed for use by smaller, propeller-driven aircraft. Many former military airfields, with long runways and associated facilities, have been successfully converted to civil aviation use as reliever and secondary airports. Relievers have been successful at relocating general aviation activity from congested airports. As a result, general aviation activity at congested airports is a small and decreasing percentage of total operations (1 percent of operations at Hartsfield-Jackson Atlanta, Seattle, Ronald Reagan Washington National, and Dallas-Ft. Worth; 2 percent of operations at John F. Kennedy, Cincinnati, and Denver International).

Another factor that helps to limit delay is the ability of carriers to introduce service to outlying, suburban airports using them to relieve congestion at the principal airport. This regional approach is particularly effective in very large cities that are the origin or destination point for many trips by air. Low-cost carriers have begun serving alternative airports in metropolitan areas and providing competition to carriers at the principal airport. Traffic has increased significantly at the alternative airports that attracted low-cost carriers. Examples include Boston (Manchester and Providence); Washington (Baltimore-Washington); San Francisco (Oakland, San Jose, and Sacramento); Miami (Ft. Lauderdale); Chicago (Midway); and Los Angeles (Long Beach, Burbank, Ontario, and Orange County).

Research – Capacity

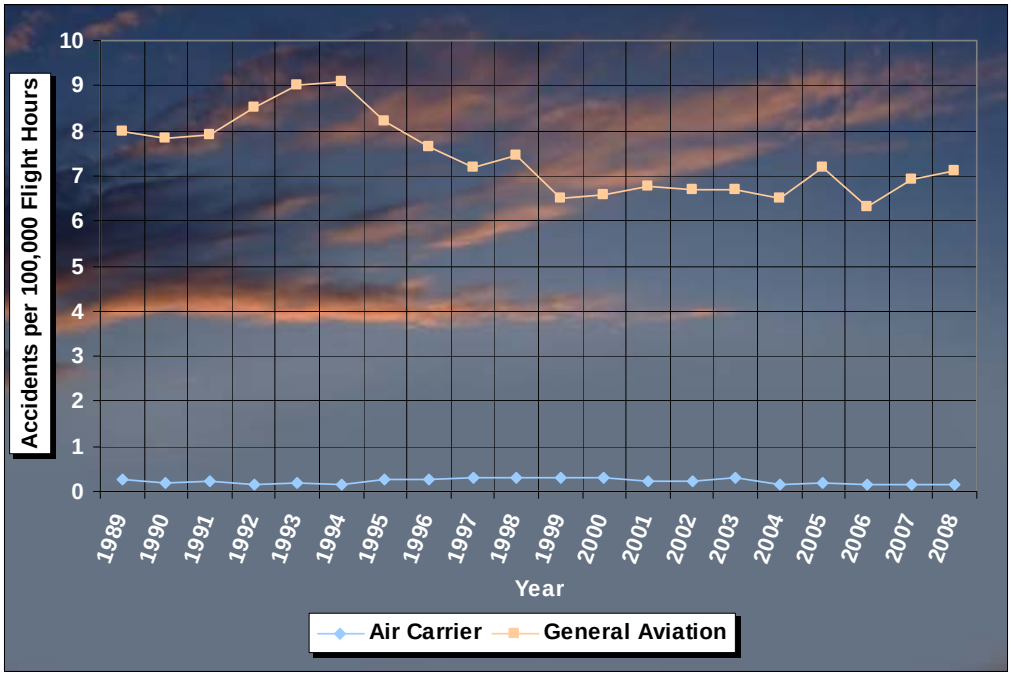
Through the ACRP, research is being conducted to provide better airport planning and design. Future aviation demand will rely on the ability of airports to accommodate increased aircraft operations, larger aircraft, and more efficient passenger throughput. This capacity research program will prepare for those future needs while simultaneously solving near-term and current airport capacity issues. Two primary studies are currently underway.

The objective of project 03-17, Evaluating Airfield Capacity, is to develop a guidebook to assist airport planners with airfield and airspace capacity evaluation. The guidebook will present capacity modeling guidelines that will improve the decision making process for determining the appropriate level of modeling sophistication for a given study or project to make the process more consistent between airports. A functional prototype of modeling tools is also part of the project. ACRP project 03-20, Defining and Measuring Aircraft Delay and Airport Capacity Thresholds, is intended to describe the various types of aircraft/flight delays and how these are calculated through existing major delays metrics and offer guidance about when each delay metric should be used to evaluate airport improvements. The results of both of these projects will be used to update FAA's Advisory Circular 150/5060-5, Airport Capacity and Delay.

SAFETY

The United States has not only the largest and most complex aviation system in the world, but also one of the safest as demonstrated by the low accident rate (see Figure 15). The airport, as a key component of the aviation system, is an important contributor to the resulting safety record. Although the airport is rarely determined to be a cause of an aircraft accident, it may be cited as a contributing factor that impacts the severity of an accident.

Figure 15: Accident Rates



Source: National Transportation Safety Board Aviation Accident Statistics, http://www.ntsb.gov/aviation/Stats.htm

Call to Action

FAA has made runway safety a focus since 1999, and the aviation community has made great progress over the years in improving runway safety. FAA and industry leaders have identified short-term steps to improve runway safety. These initiatives focused on improved procedures, increased training for airport and airline personnel, and enhanced airport signs and markings. Another short-term initiative is an agreement with the National Air Traffic Controllers Association (NATCA) for a voluntary reporting system. Mid- and long-term goals are being pursued to address maximizing situational awareness, minimizing pilot distraction, and eliminating runway incursions using procedures and technologies.

The Runway Safety Council

Formed in October 2008, the Runway Safety Council is a joint effort between the FAA and the aviation industry to look into the root causes of runway incursions. The Council is comprised of representatives from various parts of the aviation industry. A working group integrates investigations of severe runway incursions and conducts a root cause analysis. The working group

then presents its root cause analysis to the Council and makes recommendations on ways to improve runway safety. The Council reviews the recommendations. If accepted, the recommendations are assigned to the part of FAA and/or the industry that is best able to control the root cause and prevent further runway incursions. The Council tracks recommendations to make sure appropriate action is taken.

Preventing Runway Incursions[27]

To operate safely and efficiently, the aviation system relies on communication and coordination among air traffic controllers, pilots, airports, and airport vehicle operators. Their actions can cause or avert a runway incursion. From FY 1999 through FY 2007, FAA defined a runway incursion as an aircraft, vehicle, person, or object on the ground that created a collision hazard resulting in a loss of required separation with an aircraft taking off, intending to take off, landing, or intending to land. That definition changed on October 1, 2007 (FY 2008), when FAA began using the International Civil Aviation Organization's (ICAO) definition of a runway incursion.

ICAO defines a runway incursion as any occurrence at an airport involving the incorrect presence of an aircraft, vehicle, or person on the protected area of a surface designated for the landing and takeoff of aircraft. Each incursion is classified based on the severity of the incident into one of four categories. Category A, the most severe, is where a collision was narrowly avoided and Category D, the least severe, is where there was no collision hazard. In 2008, the United States implemented the ICAO definition of a runway incursion and incidents formerly classified as a surface incident[28] are now classified as a runway incursion. As a result, the number of reported incursions increased due to the inclusion of nonconflict events (classified as Category D). Table 6 summarizes runway incursion data since 1999, reflecting the previous and current methodologies for incursion classification.

Table 6: Historical Runway Incursions

Year	Number of Incursions
Previous Methodology	
1999	329
2000	405
2001	407
2002	339
2003	323
2004	326
2005	327
2006	330
2007	370
Current Methodology (ICAO)	
2008	1,009
2009	951

Source: FAA Office of Runway Safety

[27] The runway incursion program focuses largely on airports with air traffic control towers.

[28] An incident without an aircraft in potential conflict, such as an unauthorized aircraft crossing an empty runway, was defined as a surface incident and not a runway incursion.

The reduction in the number and severity of runway incursions is one of FAA's top priorities. The number of serious runway incursions—classified as Categories A and B—dropped by more than 63 percent from FY 2000 through FY 2008. In FY 2009, which ended September 30—there were 12 serious runway incursions, 50 percent fewer than the previous fiscal year.

Initiatives to Reduce Runway Incursions

FAA has deployed advanced technologies to address runway incursions and reduce the risks of runway collisions at commercial airports. The Airport Movement Area Safety System (AMASS) surface surveillance system identifies potential collisions of aircraft and vehicles and provides visual and aural warnings to controllers. AMASS alerts allow controllers to intervene and resolve potentially dangerous conflicts. This system has been installed at 34 of the Nation's major airports.

In addition, FAA is deploying a newer ground surveillance system called ASDE-X to further enhance safety. The ASDE-X is a multi-sensor system that displays highly accurate aircraft position and identification information to the controller under all visibility conditions. ASDE-X capability will be deployed to the 35 large and medium hub airports.

FAA has developed RWSL technology to increase situational awareness for aircrews and airport vehicle drivers and thus serve as an added layer of runway safety. RWSL systems derive traffic information from surface and approach surveillance systems and illuminate red in-pavement airport lights to signal a potentially unsafe situation. Runway Entrance Lights (REL) are deployed at a taxiway/runway crossing and illuminate red when there is high-speed traffic on or approaching the runway to signal that it is unsafe to enter the runway. Takeoff Hold Lights (THL) are deployed on the runway by the departure hold zone and illuminate red when there is an aircraft in position for departure, and the runway is occupied by another aircraft or vehicle. RWSL technology is currently under evaluation at three test airports: Dallas-Ft. Worth, San Diego, and Los Angeles. FAA will deploy RWSLs at the following 22 airports: Atlanta, Boston, Charlotte, Chicago (O'Hare), Dallas-Ft. Worth, Denver, Detroit, Ft. Lauderdale, Houston (George Bush), Las Vegas, Los Angeles, Minneapolis, New York (John F. Kennedy, LaGuardia, and Newark), Orlando, Philadelphia, Phoenix, San Diego, Seattle, and Washington (Baltimore and Dulles).

In terms of infrastructure improvements, AIP funds are also used to enhance airport safety and support the agency's goal of reducing accidents, fatalities, and runway incursions. Through the AIP program, airports can help reconfigure taxiways to optimize both safety and efficiency. Airport operators can build perimeter roads around the airfield so that vehicles do not have to be driven across taxiways and runways. AIP funds are also used to meet updated standards for runway marking and signs, eliminating confusion on airfields. Some of those updates include changing the airfield markings (paint) standard for taxiway centerlines at 75 airports (based on enplanements) to require new markings that will alert pilots when they are approaching hold short lines, and working with airport operators to install stop bars at certain runway/taxiway intersections. (A stop bar is a series of in-pavement and elevated red lights that indicate to pilots that they may not cross.)

Additional methods include recommending that airports improve how they provide information on rapidly changing runway and taxiway construction and closings. FAA wants airports to provide airlines and pilots with diagrams giving the latest information on runway construction and closings.

They could distribute this information by email, on a Web site, or by hand. It would supplement Notices to Airmen, which are printed as text or delivered verbally, and thus do not have diagrams.

The majority of runway incursions are caused by pilots in violation of regulations and air traffic control instructions—also known as pilot deviations. FAA completed an analysis of taxi clearances and found that more explicit instructions are needed from controllers to pilots. FAA has issued new requirements for controllers to give explicit directions to pilots on precise routes to travel from the gate to the runway. FAA has also issued new requirements for aircraft to have crossed all intervening runways prior to receiving a takeoff clearance. Future requirements will cover runway crossing clearances, takeoff and landing clearances, and the adaptation of international surface phraseology.

For additional outreach efforts, FAA published a booklet for pilots, which highlights communication procedures for safe surface operations at towered and nontowered airports. In conjunction with the Aircraft Owners and Pilots Association (AOPA), FAA created two online courses that educate pilots on runway safety. One is tailored for commercial aviation pilots and the other for general aviation pilots. In addition, FAA conducts hundreds of safety seminars across the country every year to encourage safe practices on the airfield.

The role of Flight Service Station specialists was expanded to provide runway safety information to pilots using towered and nontowered airports. FAA aviation safety inspectors now verify that pilots have current surface movement charts (airport diagrams) available and that they are in use. FAA, in conjunction with AOPA and the National Association of Flight Instructors, distributed a runway safety brochure and a DVD with four relevant runway safety videos to 400,000 U.S. pilots and flight instructors.

To improve situational awareness, FAA produced DVDs to highlight safe surface operations and proper communications procedures for both general aviation and commercial pilots. To enhance air traffic supervisor and controller discussions of serious runway incursions during team briefings, FAA is developing simulated re-creations of actual incursions. Airport managers and fixed-base operators participate in Runway Safety Action Teams to address airport-specific factors (e.g., procedures, environment, and infrastructure) that affect runway safety. FAA requires driver training programs for all airport operators who access the airfield movement areas at commercial airports. The agency developed and initiated controller training to enhance their skills in teamwork, communication, problem solving, situational awareness, and managing workloads.[29]

Airport Design Standards Including Runway Safety Areas (RSA)

FAA helps airports maintain safe conditions by developing uniform airport design standards that apply to facilities throughout the system. Airports agree to meet these FAA standards when they accept AIP funds for capital improvements to their facilities. FAA standards address physical layout characteristics such as runway length and width, runway/taxiway/taxilane separation, runway safety areas, lighting, signs, and markings. The standards also address material characteristics such as pavement, wiring, and luminance of lights. Standards are also issued for such issues as aircraft

[29] For more information on FAA runway safety initiatives, visit http://www.faa.gov/airports/runway_safety/.

rescue and firefighting equipment and operations, snow removal equipment and operations, and wildlife hazard management.

FAA airport design standards have developed over time and provide the necessary dimensions to accommodate aircraft operations, as well as an extra margin of safety. For example, the standards for RSAs are designed to minimize damage to aircraft and injuries to occupants when an aircraft unintentionally leaves the runway. The standards provide for graded areas contiguous to the runway edges that are free of ruts, humps, and other surface irregularities. Only objects required to be there because of their function, such as runway lights or signs, can be in the RSA. These objects must be mounted so that they break away if struck by an aircraft. The consequences of incidents are less likely to be severe because of the adherence to design standards.

However, as aircraft have become larger, faster, and more demanding, the RSA dimensions have had to increase. As a result, many RSAs at commercial service airports do not meet current FAA standards. FAA is actively working with airport sponsors and local communities to improve, as rapidly as possible, RSAs that do not meet standards. This initiative is included in the FAA Flight Plan, 2010-2014.

FAA accelerated the improvement of RSAs that do not meet agency design standards. Between 2000 and 2009, 78 percent of the RSAs identified as "high priority" were improved. The FAA expects to make all practicable improvements by the end of 2015.

FAA, in partnership with industry and airport operators, conducted research to develop a soft-ground arrestor system to quickly stop aircraft that overrun the end of a runway. On the basis of that research, the FAA issued a specification for Engineered Material Arresting Systems (EMAS). EMAS is a bed of highly crushable concrete blocks that are installed at the ends of the runway. An EMAS bed provides a safety enhancement on runway ends where there is not enough level, cleared land for a standard RSA. When an aircraft leaves the runway traveling at high speed, the landing gear will crush the EMAS bed and the aircraft will come to a quick and safe stop. EMAS has been installed at more than 44 runway ends at 28 airports and there are plans to install 16 additional EMAS systems at 11 more airports in the United States.

Airport Certification

Since 1972, FAA has had an airport certification program. This program is contained in Title 14 Code of Federal Regulations, Part 139, Certification of Airports. Part 139 establishes 18 areas of safety standards, ranging from specific items, such as the condition of runway surfaces and training requirements for aircraft rescue and firefighting personnel, to more general requirements for the development of an Airport Emergency Plan and a Wildlife Hazard Management Plan (WHMP). There are currently 556 public-use airports subject to annual Part 139 safety inspections to determine continued compliance with regulatory safety standards. While all areas identified in Part 139 are inspected, special inspection initiatives may emphasize one or more aspects of Part 139. A certificated airport may use AIP funding to meet certain requirements under Part 139 certification standards, such as acquiring aircraft rescue and firefighting equipment.

14 CFR Part 139 Safety Management System (SMS) Pilot Studies

In 2001, ICAO adopted an amendment to Annex 14, Aerodromes, of the Convention on International Civil Aviation requiring all member states to establish SMS initiatives for airport operators. ICAO defines an SMS as a "systematic approach to managing safety, including the necessary organizational structures, accountabilities, policies, and procedures."[30] An SMS provides an organization's management with a set of decision making tools that can be used to plan, organize, direct, and control its business activities in a manner that enhances safety and ensures compliance with regulatory standards. FAA supports harmonization of international standards making U.S. aviation safety regulations consistent with ICAO standards and recommended practices.

Therefore, FAA is developing SMS standards for certificated airports under 14 CFR Part 139. Since 2007, FAA has initiated numerous pilot studies to evaluate the development of SMS at a variety of certificated airports.[31] More than 30 certificated airports of varying size and operations have participated in the studies. Under the studies, participating airports reviewed existing safety standards to determine if they met the intent of typical SMS requirements. They then developed SMS manuals and implementation plans based in part on their findings.

The pilot studies allowed airports and FAA to gain experience establishing airport-specific SMS that are tailored for the individual airport. Additionally, this experience provided best practices and lessons learned that FAA is using as it considers how to incorporate SMS standards into Part 139.

To continue our analysis into the next phase of SMS, FAA launched another study in FY 2010 aimed at implementing SMS at a small number of airports. The study provides funding for participating airports to implement certain processes developed under the original pilot studies. It also requires the airports to conduct safety risk analysis to proactively identify hazards and mitigate risks in their operations and development, as well as conduct audits and inspections of their SMS programs to gain lessons learned from implementation and review the effectiveness of their SMS in proactively identifying safety issues on the airport.

Safety Risk Management

The FAA Airports organization is also implementing a pilot program in 2010 to incorporate safety risk analysis into the planning and improvement of both general aviation and commercial service airports. This program will include several participating airports conducting a Safety Risk Management (SRM) assessment of proposed capital projects. The intent is to develop a streamlined procedure that can be replicated at NPIAS airports through the system in future years so that safety issues are fully considered throughout the entire project development cycle from planning to construction.

Wildlife Hazard Mitigation

The US Airways Flight 1549 bird strike and resulting emergency landing in the Hudson River on January 15, 2009 reinvigorated public awareness of wildlife hazard management at airports in the United States. The FAA Airports organization has overseen a wildlife management program for

[30] See ICAO, Safety Management Manual, at 6.5.3 ICAO Doc. 9859-AN/474 (2nd ed. 2009).
[31] A list of participating airports is available online at: http://www.faa.gov/airports/airport_safety/safety_management_systems/external/pilot_studies/.

nearly 50 years in an effort to keep airports safe by making them less attractive to all types of wildlife. The FAA program manages airport wildlife hazards through a number of avenues including regulation, agency guidance, advisory circulars, and ongoing education.

A number of new wildlife hazard management initiatives were implemented in 2009 and 2010 including:

- Making the national wildlife strike database available to the public—prior to this, only portions of the database were publicly available. The new public database redacts only a small amount of information containing privacy information. FAA began collecting data in the 1990s for use by the Airports organization, academia, and researchers as a means of improving airport safety and reducing wildlife hazards.

- The FAA issued a certification alert to airport operators on June 11, 2009 reminding them of their obligation under Part 139 to conduct wildlife hazard assessments if they experience a "triggering event" as outlined in Part 139.337 (b)[32]. After issuing the certification alert, FAA identified 96 airports that had experienced these types of events but had not conducted an assessment. FAA notified the airport operators at these airports and required them to do an evaluation. As of December 2009, approximately 16 airports had completed assessments, 51 had begun assessments, and 21 were slated to begin assessments in 2010. FAA provides AIP funds for assessments and for the development of a follow-on WHMP, if needed.

- FAA believes all airports should understand the level of wildlife activity on or near their airports. FAA is considering a new rulemaking in this area and hopes to publish a Notice of Proposed Rulemaking by the end of 2010.

- FAA is developing a program to conduct wildlife hazard assessments at approximately 2,000 general aviation airports. FAA expects this program to begin later this year in a phased-in approach that will take several years to complete because of the large number of assessments required. FAA will make AIP funding available for these assessments.

- FAA identified gaps among certificated airports, air carriers, and general aviation airports in reporting wildlife strikes. FAA is conducting outreach to the aviation community to close the reporting gaps.[33]

- FAA conducted a study to determine if the bird strike reporting rate had increased since the 20 percent level that was estimated from the limited studies conducted in the 1980s. The study was conducted by Dr. Dolbeer, an internationally recognized wildlife hazard mitigation biologist. Dr. Dolbeer did the 1980 studies that estimated the 20 percent reporting rate. The Dolbeer study was completed in 2009. It found that due to years of outreach and training by FAA and the U.S. Department of Agriculture (USDA) Wildlife Services that the estimated bird strike reporting rate had increased to 39 percent. It stated that a 39 percent reporting rate was adequate to determine trends and for FAA to develop a national wildlife hazard mitigation policy. FAA provided the study to the National Transportation Safety Board (NTSB) to support FAA view

[32] For additional information on Part 139 go to: http://www.faa.gov/airports/airport_safety/part139_cert/.
[33] A copy of the report can be found on http://www.airporttech.tc.faa.gov/safety/downloads.

that mandatory bird strike reporting was not needed. The NTSB responded to FAA on May 27, 2010 stating that FAA's voluntary bird strike reporting program was an acceptable alternative to NTSB's recommendation for mandatory strike reporting.

- FAA conducted usability studies and retooled the wildlife hazard Web site (http://wildlife-mitigation.tc.faa.gov) to make it more user friendly and to allow more advanced data mining. The new site (http://wildlife.faa.gov) has search fields that enable users to find data on specific airports, airlines, and engine types, as well as by date and state without having to download the entire database. The new Web site became active in January 2010. In addition to online wildlife strike reporting, FAA developed software to enable wildlife-strike reporting with handheld mobile devices. This capability also became active in January 2010.

- FAA continued evaluating low cost portable bird radars that are capable of detecting and tracking birds on or near airports. The radars are being evaluated at Seattle, John F. Kennedy and Chicago O'Hare airports. The intent is to develop a performance specification that will enable airports that need this capability to competitively procure bird radars using AIP grant funding.

For the last 15 years, FAA and the USDA have conducted a research program to make airports safer by reducing the risks of aircraft-wildlife collisions. The research efforts designed to improve wildlife management techniques and practices on and near airports include:

- Methods for making airport habitats less attractive to species that are the most dangerous in terms of aircraft collisions. This is accomplished by studying which species use the airport property, how they behave in that environment, and why they are attracted;

- Techniques for controlling species by restricting access to attractive features like stormwater ponds;

- Technologies for harassing and deterring hazardous species.

FAA cosponsors the Bird Strike Committee USA as part of its continued public outreach and education effort to increase awareness within the aviation community about wildlife hazards. This is an international forum where biologists, engineers, airline personnel, and others come together to exchange ideas and learn about the latest technology to mitigate wildlife hazards.

ENVIRONMENTAL

Community concern about environmental issues can impact both expansion and operation of existing airports. Environmental constraints also increase the difficulty of developing new airports. The problem is particularly serious in metropolitan areas where there is high aviation demand and also strong pressure to develop residential and other incompatible land uses near airports. In addition, airports in large metropolitan areas are frequently located in air quality nonattainment areas. Although historically communities have been concerned about noise levels, they are also concerned about air quality, water pollution, and, most recently, climate change.

Airports will be better neighbors as NextGen evolves. New flight procedures for aircraft have the potential to reduce fuel consumption and air quality emissions near airports. Optimized profile descent arrivals (OPDs), formerly known as continuous descent arrivals (CDAs), allow aircraft to descend in the shortest route and at a minimum power setting, thereby reducing fuel consumption and emissions. New airframe and engine technologies and the development of renewable sustainable fuels will also provide positive noise, air quality, and greenhouse gas emission improvements for the airport environment.

Air Quality

Many of the Nation's airports are located in air quality nonattainment or maintenance areas. Air quality improvements in these areas are accomplished through State Implementation Plans (SIPs), which provide controls and measures to meet health-based National Ambient Air Quality Standards under the Clean Air Act. FAA provides financial support for required airport air quality mitigation through the AIP and PFC Program.

FAA encourages early airport actions to reduce local emissions through the Voluntary Airport Low Emissions (VALE) Program. The goal of the VALE Program is to reduce air pollutants caused by ground transportation sources at commercial service airports. It is designed to provide airport sponsors with financial and regulatory incentives to stimulate early investment in proven low-emission airport technologies, including alternative fuel vehicles and low-emission infrastructure. The VALE Program was established in FY 2005, and to date, approximately $51 million in AIP funds has been invested in VALE projects.

In addition, FAA is developing enhanced aircraft arrival capabilities that will decrease aircraft fuel consumption, thereby reducing costs and emissions. OPD has proven, through both simulation and flight demonstration tests, to be highly advantageous over conventional arrival and approach procedures that require combinations of level flight segments and descents. The environmental and economic benefits of OPDs were demonstrated in flight tests at Louisville International Airport in 2002 and 2004, Atlanta Hartsfield-Jackson International Airport in 2007, and Miami International Airport in 2008. Successful implementation was achieved at Los Angeles International Airport in 2007 and Atlanta in 2009. From the environmental perspective, there are reductions in noise along portions of the flight path (due to reductions in thrust and a higher average altitude) and reductions in fuel burn and emissions (due to reductions in thrust). From an economic viewpoint, there are significant fuel and flight time savings (due to reductions in thrust and a higher average speed), as well as the potential to meet or exceed current runway throughput without the need to vector aircraft.

Airport Sustainability Efforts

FAA has joined forces with other aviation entities to determine how the aviation industry can conduct its activities in ways that will sustain (i.e., support) our environment. FAA's airport sustainability efforts include:

- FAA, in cooperation with an ACRP Task Force, helped develop and publish a synthesis report addressing airport operator environmental sustainability efforts throughout the United States, Canada, Europe, and Asia.

- FAA participated in the Sustainable Airport Guidance Alliance (SAGA), a volunteer group representing various aviation interests. SAGA aids airport operators of all sizes and in all locations to design, implement, and maintain a sustainable program at their respective airports. SAGA does so by consolidating existing sustainable practices into an online resource that can be tailored to the unique needs of an individual airport. This resource will be updated as new sustainable practices emerge.

- FAA has implemented a Sustainable Master Plan Pilot Program that involves funding several studies at airports around the country addressing sustainability as part of airport planning. The pilot program will allow selected airports to develop and integrate sustainable principles as part of a standalone airport sustainability management plan or as a section or chapter of a comprehensive airport master plan. By tying sustainability principles into the planning process, a roadmap can be created that will help airports identify ways to reduce energy consumption, reduce environmental impacts, reduce their carbon footprint, and become a more environmentally friendly business and neighbor. Knowledge gained through the pilot project will support development of program guidance in this growing area of interest to airports.

Environmental Streamlining

FAA addresses airport-related impacts on noise, air quality, and other environmental concerns. In doing so, it complies with many Federal laws, executive orders, and regulations. By direction of Congress, Title III of the Vision 100-Century of Aviation Reauthorization Act directs FAA to streamline (i.e., improve efficiency and effectiveness) its environmental review of capacity projects at congested airports.[34] Title III also requires FAA to conduct streamlined environmental reviews for Administrator-designated safety or security projects at any airport. Further, FAA streamlines its environmental review of any airport project the U.S. Secretary of Transportation chooses for "expedited processing" under Executive Order 13274, Environmental Stewardship and Transportation Infrastructure Project Reviews.[35]

Environmental Research

The FAA-funded ACRP is examining areas of airport-related environmental concerns and advancing the science and technology necessary for creating an environmentally friendly airport system. In addition to the ACRP efforts noted in the Water Quality section of this report, FAA's ACRP efforts are also focusing on:

- Airport-related hazardous air pollutants and greenhouse gasses
- The impact of airports on climate change and community noise
- Developing alternative aviation fuels
- Developing advanced noise and air emissions models
- Promoting airport sustainability
- Land use compatibility

[34] For a list, see the airports listed in Table 1 of FAA's 2001 Airport Capacity Benchmark Report available online at: http://www.faa.gov/about/office_org/headquarters_offices/ato/publications/bench/.

[35] Executive Order 13274 of September 18, 2002, was issued in the Federal Register on September 23, 2002 and has not been revoked. See https://hsdl.org/?view&doc=62596&coll=public.

- Environmental management systems
- Integrating airport development and environmental review processes

Between 2005 and 2009, FAA has allocated $48 million toward an array of aviation design, construction, operation, and environmental research projects. In FY 2010, $15 million is to be provided for research, including $5 million specifically for environmental research.

Environmental Management Systems at Airports

FAA Advisory Circular 150/5050-8, Environmental Management Systems for Airport Sponsors, provides guidance to airport sponsors wanting to develop Environmental Management Systems (EMS).[36] It also provides guidance to airport sponsors on the needed parts of an EMS. An EMS is a management framework based on the Plan-Do-Check-Act model. It helps organizations that adopt an EMS to balance environmental performance with business objectives through a process of continual improvement. It has resulted in significant savings and cost avoidance for many organizations, including airport sponsors. Sponsors of large and medium hub airports can obtain AIP funding to assist in developing an EMS.[37]

Livability

DOT's Livability Initiative is intended to enhance the economic and social well-being of all Americans by creating and maintaining a safe, reliable, integrated, and accessible transportation network that enhances choices for transportation users, provides easy access to employment opportunities and other destinations, and promotes positive effects on the surrounding community. FAA supports this initiative through the VALE Program described above. FAA also supports the expansion of public transit connections to airports. Public transit connections are discussed later in the Surface Accessibility section.

Water Quality

Many of the Nation's airports are found near waterways and wetlands because when airports were originally built, the best available land suitable for an airport (flat and inexpensive) was found near water. Today, many airport activities can cause adverse water quality impacts. In particular, airport construction activities and seasonal airport anti-icing/deicing operations are major concerns. Airport construction activities often cause sediment-laden runoff to enter waterways. Biological and chemical breakdown of deicing chemicals in airport runoff can cause dissolved oxygen demands on receiving waters. Additives in deicing chemicals may be toxic to aquatic life.

For years, FAA has worked with the U.S. Environmental Protection Agency (EPA), airport operators, airlines, and industry groups on various water quality issues. Most recently:

- FAA consulted with EPA as EPA prepared its draft Notice of Proposed Rulemaking to set up effluent limit guidelines for airport deicing activities.

[36] Advisory Circular 150/5050-8 is available online at: http://www.faa.gov/documentLibrary/media/advisory_circular/150-5050-8/150_5050_8.pdf.
[37] Program Guidance Letter 07-06 will be available online at: http://www.faa.gov/airports/aip/guidance_letters/media/PGL_07_06.pdf.

- FAA is taking part in ACRP projects administered by the TRB:
  - Addressing water quality issues important to airport planners;
  - Selecting equipment to monitor accurately airport and aircraft deicing materials;
  - Defining the winter storm event to design properly stormwater management facilities; and
  - Reviewing proposed experiments that will examine the effects of glycol-based deicing agents on fish living at various water temperatures.

FAA continues to work with airport sponsors and airlines in the search for alternatives to glycol-based aircraft deicing chemicals. FAA is also working with airport sponsors, industry associations, and other Federal agencies to ensure water quality mitigation does not create or improve habitats that attract wildlife and birds that are hazardous to aviation safety.

Noise

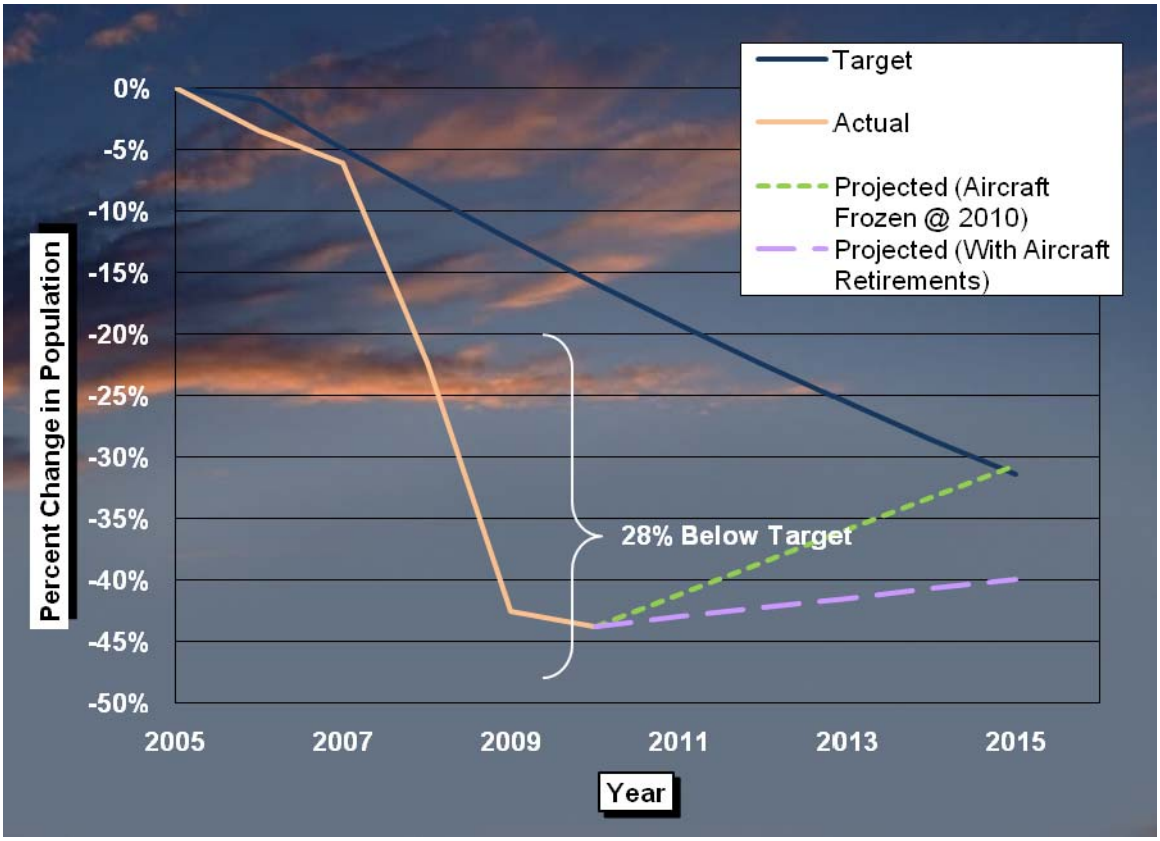
The noise situation around airports has improved dramatically since 1976.[38] At that time, an estimated 6 to 7 million people living near airports in the United States were exposed to significant levels of aircraft noise.[39] The number has gradually decreased over time. In 2005, it was estimated that approximately 500,000 people in the United States lived in areas adjacent to airports with noise levels above the day/night equivalent sound level (DNL) of 65 decibels (dB). This decreased to 481,000 in 2006; 468,000 in 2007; and 387,000 in 2008. The 2008 level represents a 94.5 percent reduction in the number of people exposed to significant levels of aircraft noise since 1976. The gradual phase-out of commercial aircraft that used older and louder engines helped to greatly reduce the number of people in 65dB DNL areas. On July 5, 2005, FAA published a Final Rule on a new noise standard for subsonic jet airplanes and subsonic transport category large airplanes. This new noise standard, Stage 4, ensures that the latest available noise reduction technology is incorporated into new aircraft designs. Research continues on quieter aircraft technology.

The FAA established a noise exposure performance target in 1997 to reduce the number of people in the United States exposed to significant noise by 1 percent per year. This target was updated to reduce the number of people exposed to significant noise by 4 percent per year in 2007 and rebaselined in 2010 to define 2005 as the base year. Currently, FAA is exceeding the performance target by 28 percent, achieving a 44 percent reduction in population exposed to significant noise since 2005 as is shown in Figure 16. Figure 16 also shows FAA projections up to the year 2015 under two scenarios, one assuming that the aircraft fleet remains identical to the 2010 fleet, and the other assuming that older aircraft are retired over time and replaced by newer technology and quieter aircraft.

[38] In 1976, the Department of Transportation published its Aviation Noise Abatement Policy, which provided a course of action for reducing aviation noise impact. The principles contained in that document and subsequent legislative and regulatory action have resulted in a dramatic reduction in the number of Americans adversely exposed to aviation noise. An excerpt of that policy is available online at http://www.faa.gov/about/office_org/headquarters_offices/aep/planning_toolkit/

[39] A significant level of noise is defined by the Federal Government as a DNL of 65dB or higher.

Figure 16: Percent Change in Number of People Exposed to Significant Noise (65 dB DNL) from Base Year 2005



FAA's Part 150 Program,[40] established under the Aviation Safety and Noise Abatement Act of 1979 (recodified at 49 United States Code 47501 et. seq.), helps airport operators develop comprehensive noise and land use compatibility programs. These programs identify noise mitigation projects and procedures to reduce aviation noise in the community and achieve more compatible land uses in areas surrounding the airport. Part 150 is a voluntary program encouraging airport operators to develop noise exposure maps (NEMs) and Noise Compatibility Programs (NCPs). NEMs identify noise contours and land use incompatibilities. The airport operator uses NEMs to evaluate current noise impacts and future incompatible development. FAA determines whether the airport operator has prepared NEMs in accordance with Part 150. After active and direct participation of affected parties, the airport operator can then submit an NCP outlining mitigation measures to improve noise and land use compatibility.

As of the end of FY 2009, there are 274 airports participating in the Part 150 Program, and 245 had NCPs approved by FAA. In addition to first-time NCP approvals, FAA has approved 108 updates to these programs. An FAA-approved NCP clears the way for an airport to obtain Federal aid for noise mitigation projects.[41] Since 1982, 255 airports have received grants for Part 150 studies, and over $5.3 billion has been granted for airport noise compatibility projects. Besides AIP funding, airports

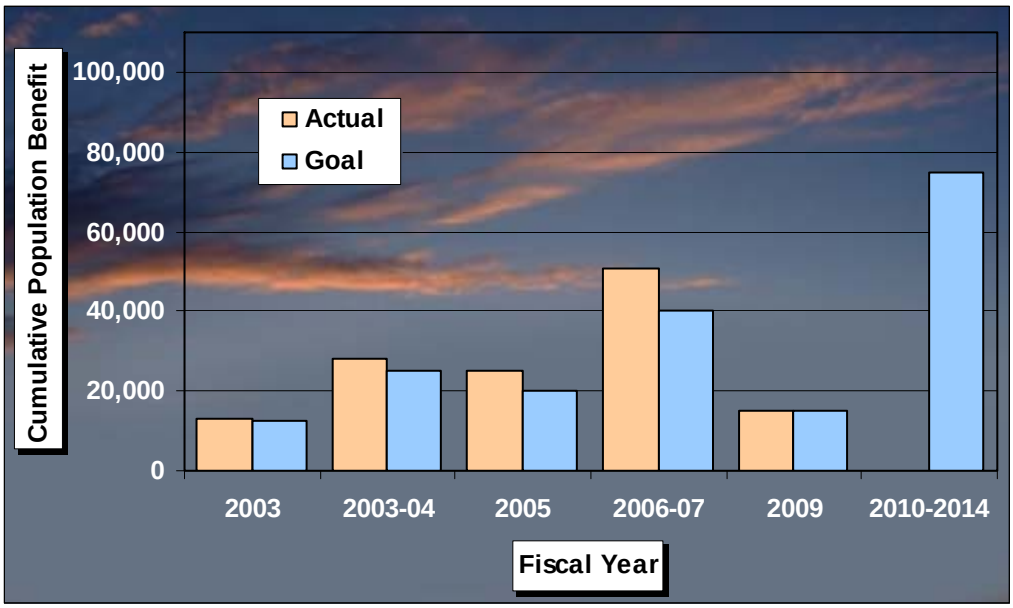
[40] 14 Code of Federal Regulations Part 150, "Airport Noise Compatibility Planning."
[41] Certain noise projects to benefit schools and medical facilities and mitigation in an approved Final Environmental Impact Statement can be Federally funded without an approved NCP.

have collected and used passenger facility charges for noise studies and mitigation totaling $12.2 million and nearly $3.3 billion, respectively.

Over the past 35 years, considerable effort has been expended to provide relief to noise-impacted areas by funding noise compatibility projects under the AIP. Noise compatibility projects include residential and public building sound insulation, land acquisition, and relocating residents from significantly noise-impacted areas. Airports have acquired noise-monitoring equipment and installed noise barriers to reduce ground run-up noise.

Since it was established in FY 2003, FAA has tracked an annual performance measure of the AIP noise set-aside program. The intent of the performance measure is to reduce the population exposed to high levels (DNL 65dB or greater) of aircraft noise. In FY 2003 and 2004, this measure tracked only resident population benefiting from noise funding. In FY 2005, this was expanded to include student populations. Residents' benefits are tracked if they have either had their homes insulated or been relocated from the areas of significant airport noise. Students' benefits are tracked when the airport has completed noise insulation of schools or school relocation. Figure 17 shows the cumulative benefit of residents expected to benefit from noise funding. The 2010 Airports Business Plan establishes the target of a reduction of 15,000 resident and student populations each year through 2014.

Figure 17: Population Expected to Benefit from Noise Funding FY 2003 through 2014



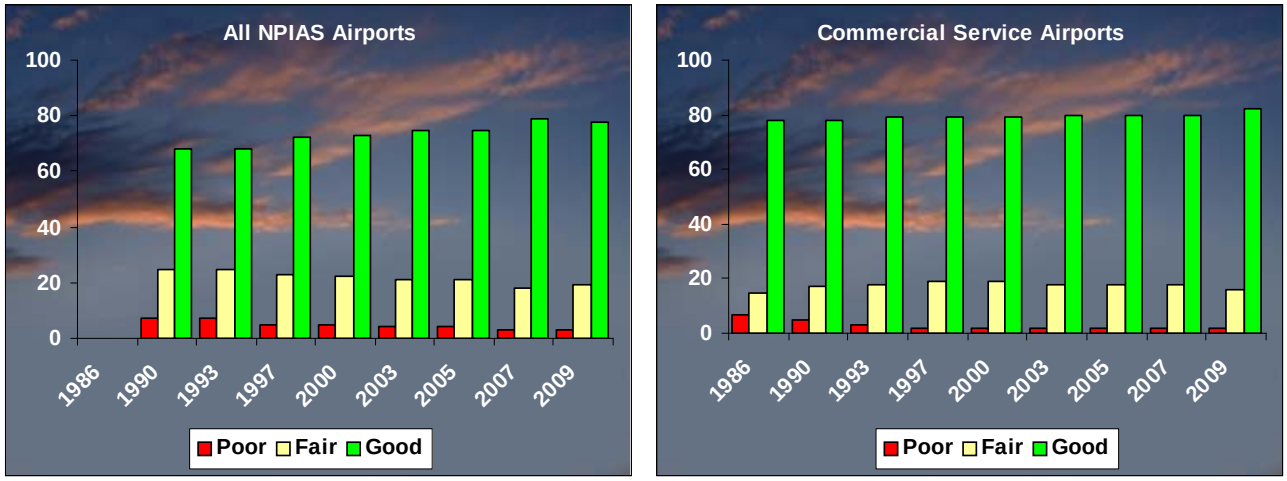
RUNWAY PAVEMENT CONDITION

Airfield pavement needs regular maintenance to seal cracks and repair damage; major rehabilitation is needed on a 15- to 20-year cycle to remedy the effects of age, use, and exposure. If pavement maintenance is neglected, severe deterioration can cause damage to aircraft propellers, turbine engines, and landing gear and can lead to higher costs for rehabilitation.

As part of airport inspections, FAA updates airport master records for public-use airports and reports the results through the Airport Safety Data Program. Runway pavement condition is classified as excellent (no visible deterioration), good (all cracks and joints sealed), fair (mild surface cracking, unsealed joints, some slab edge spalling), poor (large open cracks, slab surface and edge spalling, vegetation growing through cracks and joints), or failed (widespread, severe cracking with raveling and deterioration). For the purposes of this report, the excellent and good categories are combined into a good category and the poor and failed categories are combined into a poor category.

FAA's performance goal is to ensure that not less than 93 percent of runways at airports in the NPIAS are maintained in excellent, good, or fair condition. Data for 2009 indicates that 97 percent of runways at NPIAS airports are rated excellent, good, or fair and 3 percent are rated poor or failed. Pavement at commercial service airports is better, with 98 percent of the runways rated excellent, good, or fair and 2 percent rated poor or failed. Figure 18 shows the percentage of runways reported in excellent/good, fair, and poor/failed condition at NPIAS and commercial service airports over the last 20 years.

Figure 18: Runway Pavement Condition (2009)[42]



In an effort to ensure that pavement receives the optimum level of maintenance, Congress authorized FAA[43] to permit the use of AIP grants for routine pavement maintenance at nonhub airports. In order for an eligible sponsor to receive an AIP grant for pavement maintenance, the sponsor must be

[42] Runway pavement condition data was not available for NPIAS airports in 1986.
[43] Congress authorized pavement maintenance at nonhub airports under Section 47102(3)(H) and also Section 47105(e) of Title 49 of the United States Code.

unable to fund maintenance with its own resources and must implement an effective pavement maintenance management program.

Pavement Research

Research has been integral to FAA's ability to achieve performance goals for runway pavement condition. Several concentrated pavement-related research programs help address the continued need to improve FAA airport design, construction, and maintenance standards. The majority of pavement research is conducted at FAA's William J. Hughes Technical Center (Tech Center) in Atlantic City. The Tech Center houses the National Airport Pavement Test Facility (NAPTF), a 1,200-foot building with 900 feet of full-scale airport test pavement. The NAPTF allows FAA and industry to validate new design standards for existing and proposed multiple wheel landing gear configurations.

In September 2009, FAA released an updated version of Advisory Circular 150/5320-6E, Airport Pavement Design and Evaluation, and interactive advance pavement design software that develops state-of-the-art airfield pavement design standards using results from full-scale testing programs and other industry research.[44]

Two independent airfield pavement research foundations funded through FAA's appropriations have contributed to airfield pavement knowledge through applied research. The Innovative Pavement Research Foundation (IPRF) (www.iprf.org) is focused primarily on improving rigid concrete airfield pavement performance and was funded at $2 million per year in FY 2001 through FY 2006. The Airfield Asphalt Pavement Technology Program (AAPTP) (www.aaptp.us) focuses on improving the quality of hot mix asphalt pavements and was funded at $2 million per year in FY 2004 through FY 2006. During this period, a total of 20 AAPTP/FAA projects were identified and funded. Additionally, a mandated program for research related to lithium technologies for Alkali-Silica Reactivity (ASR) in concrete pavements was funded at $1 million per year in FY 2003 through FY 2006. For efficiency, the lithium technology research is administered by the IPRF program.

Funding for these independent research programs was not provided in FY 2007, FY 2008, or FY 2009. Collaborative efforts between IPRF and AAPTP resulted in improved understanding of airport pavement marking practices and contributed directly to improvements in FAA guidance.

Other research is conducted through FAA-funded Centers of Excellence located throughout the United States (www.coe.faa.gov).

[44] The final Advisory Circular and design programs are available online at: http://www.faa.gov/airports_airtraffic/airports/.

SURFACE ACCESSIBILITY

Airports generally are located to make air transportation as convenient and accessible as possible. The 2000 Census, extrapolated to 2009, reveals that most Americans reside within 20 miles of a NPIAS airport (see Table 7). Commercial service airports are within 20 miles of 65 percent of the population (77 percent when reliever airports are included). When general aviation airports are also included, 98 percent of the population lives within 20 miles of a NPIAS airport. Of the current total U.S. population of 306 million people, all but 5.6 million live within 20 miles of a NPIAS airport.

Table 7: Population within 20 Miles of a NPIAS Airport

Airport Categories	Percentage of U.S. Population
Commercial Service Airports	65%
Commercial Service and Relievers	77%
All NPIAS Airports	98%

An important component of the DOT Livability Initiative is to enhance transportation choices for users. Providing public transportation to airports is a means of meeting this goal. Statistics for major airports in the United States indicate an important, but limited, role of public transportation in airport access. Data collected in 2007[45] indicates that 35 percent of commercial service airports are served by another scheduled public transportation mode, predominately transit bus (city-wide or metropolitan area buses). Increasingly, commercial service airports are linked with public rail services. Table 8 provides a list of these U.S. airports and the type of rail service. Nationwide, air and rail are linked at 25 busy airports, including 5 airports served by more than one rail mode. Most recently, light rail connections were completed to Seattle-Tacoma International Airport and Phoenix Sky Harbor International Airport. Current plans include the extension of heavy rail to Washington-Dulles International Airport, Metropolitan Oakland International Airport, and Honolulu International Airport. This will reduce travel time by providing direct links to the airport and avoid traffic delays incurred by automobiles and buses. Airports are eligible to fund the dedicated on-airport portions of transit links through their approved Passenger Facility Charge programs.

[45] Bureau of Transportation Statistics, U.S. Department of Transportation, Special Report, *Making Connections: Intermodal Links in the Public Transportation System*, September 2007. See http://www.bts.gov/publications/bts_special_report/2007_09_18/index.html.

Table 8: Airports Served by Rail*

Ronald Reagan Washington National	Heavy Rail
Chicago Midway	Heavy Rail
Hartsfield-Jackson Atlanta	Heavy Rail
Boston Logan	Heavy Rail
Chicago O'Hare	Commuter and Heavy Rail
St. Louis Lambert	Light Rail
Cleveland	Heavy Rail
Los Angeles	Light Rail
Baltimore-Washington	Intercity, Commuter and Light Rail
Philadelphia	Commuter Rail
Portland	Light Rail
Phoenix	Light Rail
New York Newark	Intercity and Commuter
New York JFK	Heavy Rail
Burbank-Glendale-Pasadena	Intercity and Commuter Rail
Miami	Commuter Rail
Minneapolis-St. Paul	Light Rail
Milwaukee Mitchell	Intercity (Amtrak)
San Francisco	Heavy Rail
Oakland	Intercity
Anchorage	Intercity (Amtrak)
Dallas-Ft. Worth	Commuter Rail
Ft. Lauderdale	Commuter Rail
South Bend	Commuter Rail
Seattle-Tacoma	Light Rail

*Some direct rail connections to the airport require a bus, people mover or other connections to connect to the airport terminals.

The link between the airport and surface/ground transportation modes is important. Airports must always be considered critical elements of the total transportation system. FAA developed the document *Best Practices–Surface Access to Airports* to assist airport sponsors in planning and developing effective surface transportation to airports including public transportation.[46] This document links to the following ground transportation planning documents: *Intermodal Ground Access to Airports: A Planning Guide*, *Improving Public Transportation Access to Large Airports*, and *Strategies for Improving Public Transportation Access to Large Airports.* The recently completed ACRP Report, "*Airport Curbside and Terminal Area Roadway Operation*s," provides modeling tools to assist airports in planning for terminal curb and access roadway capacity enhancements based upon a level of service concept.

The High-Speed Intercity Passenger Rail (HSIPR) Program launched in June 2009 calls for a collaborative effort among the Federal Government, States, railroads, and other key stakeholders to help transform America's transportation system through the creation of a national network of high-

[46] Best Practices-Surface Access to Airports issued in 2006 is available online at http://www.faa.gov/airports/resources/publications/reports/media/bulletin_1_surface_access_best_practices.pdf

speed rail corridors. For aviation, high speed rail has the opportunity to offer travelers options of travel in high density corridors which may help relieve congestion at capacity-constrained airports. High-speed rail could expand destination choices with reduced travel times in comparison to bus or automobile service. Each of these benefits meets the goals of the DOT Livability Initiative.

ACRP has initiated a new study, *Integrating Aviation into Passenger Rail Systems Planning in Congested Corridors.* The objectives of this research are to (1) provide guidance to airport and rail operators, State and regional transportation planners, elected officials, and interested stakeholders that identifies planning process options, funding challenges, and potential actions; and (2) develop methods and tools necessary to improve integration of rail services with airports, particularly in congested corridors.

FINANCIAL PERFORMANCE

An understanding of airport finance is essential to the formulation of a national aviation funding policy. Because NPIAS airports are owned and operated by thousands of State and local agencies, it is difficult to compile comprehensive data on the financial operations of all 3,332 existing NPIAS airports. However, FAA requires commercial service airports, typically about 500 of the NPIAS airports, to report financial data annually, including revenue and expense information. Since the over 2,800 NPIAS airports are not required to report financial information, there is limited financial data available for general aviation airports.

Data reported to FAA by 521 commercial service airports on FAA Form 5100-127, "Operating and Financial Summary," for fiscal years ending in 2008 were used to evaluate the financial performance of the airports. The statistics presented in Table 9 were derived from these data. There is considerable variation in revenue sources and expenditures among airports, as shown in Table 9. For example, concessions, rental car, and parking revenues are 23 percent of total revenues for large hub airports, 29 percent of revenues for medium hub airports, 25 percent for small hub airports, and 11 percent for nonhub primary and nonprimary commercial service airports.

In April 2010, FAA completed modifications to FAA Form 5100-127 for use in reporting financial information beginning in FY 2009. These changes included the following:

- Added two categories of aeronautical revenue to distinguish between passenger and cargo;
- Providing for beginning and ending balances for Net Assets;
- Adding a new section called Operating Statistics; and
- Revising the definition of unrestricted financial assets to clarify that Unrestricted Net Assets come from the Net Assets section of the balance sheet, as of the end of the airport's fiscal year. Airports are to leave the line blank when balance sheet information is not available.

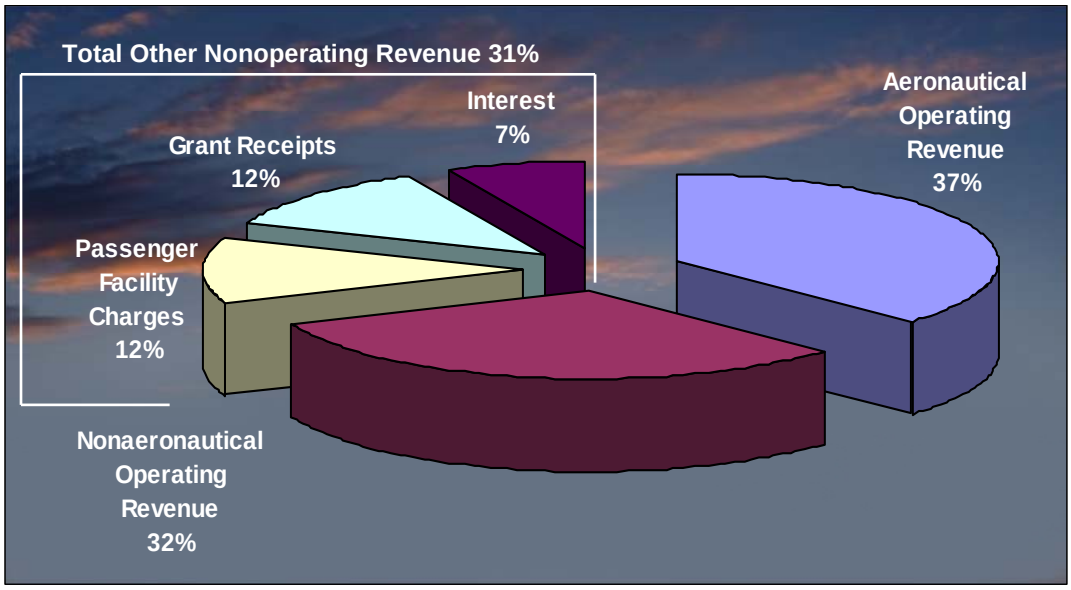
Table 9: Airport Operating and Financial Summary 2008 ($ millions)

Category	30 Large Hub	38 Medium Hub	68 Small Hub	385 Nonhub	521 Total
Aeronautical Operating Revenue					
Aeronautical Operating Revenue					
Landing Fees	$2,177	$586	$150	$63	$2,976
Terminal Rents	$2,768	$616	$221	$78	$3,684
Cargo and Hangar Rentals	$341	$91	$57	$58	$547
Fixed-Base Operator Revenue	$77	$41	$30	$42	$190
Apron Charges/Tie Downs	$58	$41	$22	$11	$132
Fuel Sales and Taxes	$151	$63	$29	$77	$321
Other Aeronautical Fees	$402	$85	$32	$35	$554
Total Aeronautical Operating Revenue	***$5,973***	***$1,524***	***$542***	***$363***	***$8,403***
Nonaeronautical Operating Revenue					
Parking and Rental Car	$2,588	$1,176	$498	$172	$4,434
Concessions	$973	$171	$54	$10	$1,208
Terminal Rents	$318	$49	$22	$10	$399
Land Rental and Nonterminal	$276	$89	$91	$102	$558
Other Nonaeronautical Fees	$721	$83	$48	$31	$882
Total Nonaeronautical Operating Revenue	***$4,877***	***$1,567***	***$714***	***$324***	***$7,482***
Nonoperating Revenue					
Passenger Facility Charges	$1,928	$538	$185	$72	$2,722
Grant Receipts	$821	$439	$502	$916	$2,678
Interest	$1,132	$339	$115	$117	$1,702
Total Nonoperating Revenue	***$3,881***	***$1,316***	***$801***	***$1,104***	***$7,102***
TOTAL REVENUE	**$14,731**	**$4,407**	**$2,057**	**$1,792**	**$22,987**
Operating Expenses					
Personnel Compensation and Benefits	$2,514	$792	$414	$329	$4,050
Contractual Services	$1,712	$594	$199	$123	$2,627
Communications and Utilities	$675	$183	$96	$70	$1,024
Supplies and Materials	$600	$91	$58	$62	$811
Repairs and Maintenance	$696	$133	$72	$55	$956
Insurance, Claims, and Settlements	$153	$49	$28	$26	$256
Other	$584	$195	$62	$46	$887
Total Operating Expenses	***$6,934***	***$2,038***	***$928***	***$710***	***$10,611***
Nonoperating Expenses					
Interest Expense	$2,465	$517	$150	$48	$3,181
Other	$383	$84	$16	$32	$515
Total Nonoperating Expenses	***$2,848***	***$601***	***$166***	***$80***	***$3,695***
TOTAL EXPENSES	**$9,782**	**$2,640**	**$1,094**	**$790**	**$14,306**
Depreciation	$2,805	$998	$491	$364	$4,659
NET INCOME	**$2,143**	**$769**	**$472**	**$638**	**$4,022**
Other Information					
Capital Expenditures	$6,729	$2,168	$958	$1,131	$10,986
Bond Proceeds	$7,268	$2,217	$417	$44	$9,946
Sale of Property, Contributed Capital, Other	$7	$0	$12	$18	$38
Reporting Year Debt Payments	$4,880	$1,570	$324	$92	$6,867
Indebtedness at End of Year	$52,867	$12,819	$3,362	$1,049	$70,096

Source: Data collected by FAA on FAA Form 5100-127 (Operating and Financial Summary) for fiscal years ending in 2008. Compliance Activity Tracking System, http://cats.airports.faa.gov/. Numbers may not add exactly due to rounding.

Total airport revenues for 521 commercial service airports[47] were reported to be nearly $23 billion in 2008, with the 30 large hub airports accounting for 64 percent of total airport revenues. As seen in Figure 19, airport operating revenue (aeronautical and nonaeronautical) totaled $15.8 billion (69 percent) and nonoperating revenue (interest, grants, and passenger facility fees) totaled $7.1 billion (31 percent). The revenue from landing fees, rent from terminal and hangars, and fuel sales (shown as aeronautical operating revenue) accounted for $8.4 billion or 36 percent. The fees from parking and rental car operations, concessions, and retail operations (nonaeronautical operating) accounted for $6.4 billion or 32 percent.

Figure 19: Distribution of Airport Revenues



The commercial service airports received total nonoperating revenues of $7.1 billion, which includes $2.7 billion from passenger facility charges, $2.6 billion from grants, and $1.7 million in interest income. Passenger facility charge revenue is approximately 13 percent of large hub airport revenue, 12 percent of medium hub airport revenue, and 9 percent of revenues of small hub airports. Detailed information on Federal grants can be obtained from FAA's annual reports.[48]

The costs of airport operations and maintenance are a function of the age of the facilities and the nature of airline activity and other operations. Total expenses for the airports reporting financial information were estimated to be $14.3 billion, with $10.6 billion in operating expenses (74 percent) and $3.6 billion in nonoperating expenses (26 percent). These exclude depreciation of $4.6 billion and bond proceeds of $9.9 billion.

The financial status of our Nation's air carrier airports is stable; however, airports are carefully managing operating, financing, and capital expenses. Airports are moving to shorter-term airline

[47] Airport classification for fiscal year financial filing is based on the passenger activity in the preceding calendar year, i.e., an airport classified as commercial service in calendar year 2007 must file a report for its 2008 fiscal year.
[48] AIP Annual Reports are available online at: http://www.faa.gov/airports/aip/grant_histories/.

lease agreements in order to more efficiently control their assets and provide opportunities for competitive airline service. Airline lease agreements provide a measure of service and revenue stability. Airports have the ability to diversify and maximize revenue from concessions and other assets allowing greater revenue diversity and growth. As illustrated by Figure 20, total airport revenue and expenses reported for commercial service airports increased between 2002 and 2008. Airport revenue increased 35 percent and expenses increased 44 percent from 2002 to 2008.

Figure 20: Revenue and Expenses

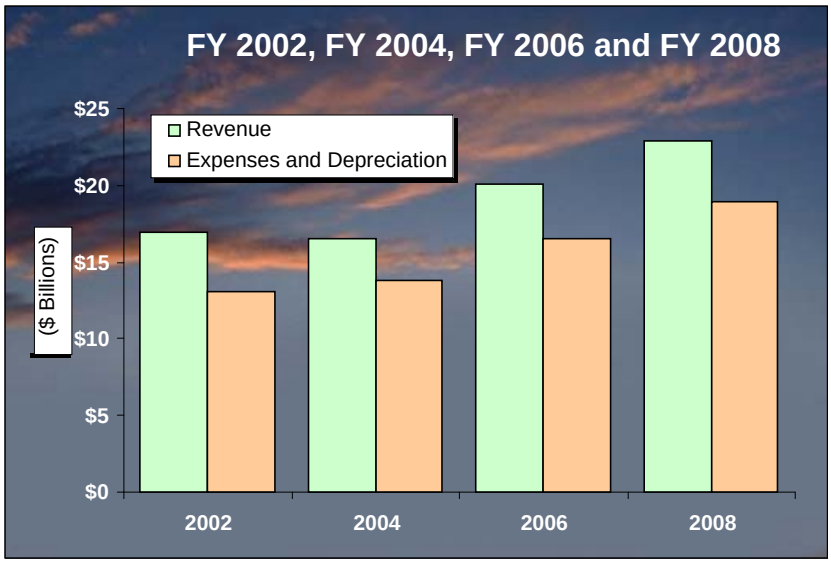
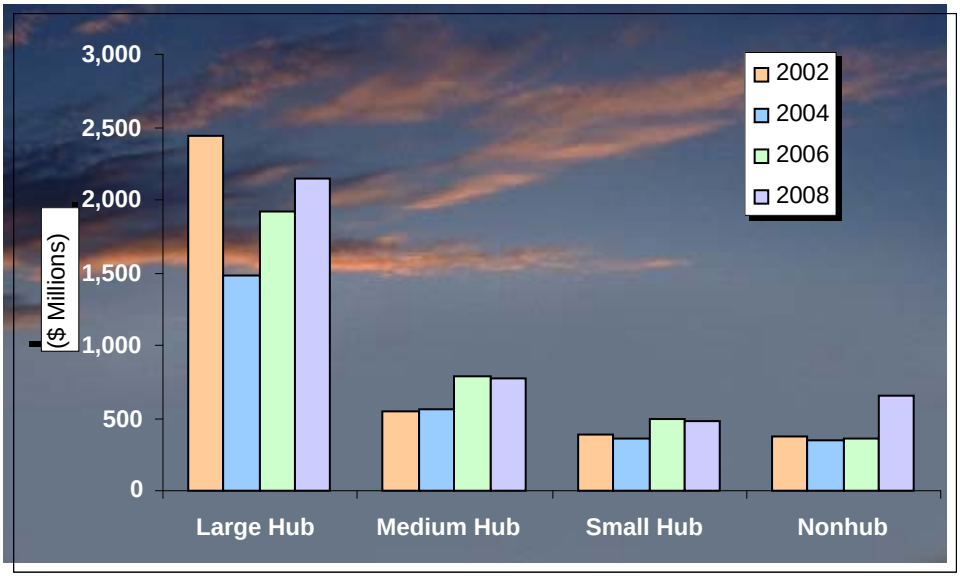


Figure 21 compares the net income for each of the four categories of airports reporting financial information to the FAA for 2002, 2004, 2006, and 2008.

Figure 21: Net Income by Year and Hub Type



Commercial service airports have several sources to fund airport development projects, including Federal/State/local grants, bond proceeds, passenger facility charges, airport-generated funds (landing and terminal fees, parking and concessions revenues), and tenant and third-party financing. A majority of the development projects at major U.S. airports are funded through the capital markets, most commonly through airport revenue bonds. Bond ratings range from B at the low end to AA at the high end. Airports with more economic and financial strength and diversity tend to achieve higher ratings, while smaller airports tend to be rated lower.

Capital markets evaluate the creditworthiness of an airport based on several factors. These factors include the demand for air service in the region, the type of passenger demand (originating versus transferring), the number of commercial airports in the region, and the quantity and quality of service provided by the airlines. The overall creditworthiness of U.S. airports remains strong even as the negative industry trends continue to prevail in 2010 due to the extended economic downturn and resulting drop in air travelers. Stabilizing factors include airports being financially well-positioned as a result of the growth years between 2003 and 2007 and a reduction in debt-financed projects due to reduced air travel demand which can impact an airport's capital requirements. Ongoing negative factors include increased budget pressures as a result of declining nonaeronautical revenues due to lower passenger levels and airline capacity reductions which can reduce aeronautical revenues. Long-term factors, which can impact creditworthiness, include airline industry consolidation or failures, which can reduce competition and service.

Large and medium hubs typically have had excellent credit ratings and often borrow funds to accomplish some portion of needed development. However, these airports may face constraints, such as restrictions in use agreements, bond documents, and local ordinances, which can limit access to external debt financing. The pressure to remain cost competitive with other airports may limit the amount of borrowing an airport elects to undertake with revenue bonds. Nonhub primary and nonprimary commercial service airports have limited incomes and generally do not have adequate operating surpluses to repay borrowed funds. As a result, small airports tend to rely heavily on grants to finance capital improvements.

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Chapter 3: Activity Forecasts

OVERVIEW

Increased demand for air transportation will affect the future pattern of capital investment in airports. Continued growth will lead communities to examine and undertake projects to expand their airport facilities.

ACTIVITY FORECASTS[49]

Commercial Aviation

FAA projects aviation will continue to grow over the long term, despite current global economic conditions. Since 2000, U.S. airlines have dealt with the impacts of 9/11, the reorganization under Chapter 11 bankruptcy protection of four network carriers, record high fuel prices, the most serious economic downturn since the Great Depression, and concerns about the threat of a pandemic flu. In spite of these challenges, the number of passengers traveling continues to grow over the long term, demonstrating the value of air transportation to the public. While there has been a slowdown in air travel growth, the forecast for commercial aviation calls for level activity in the near term and a return to growth over the long term. FAA now forecasts one billion passengers will be flown in 2023.

System capacity in available seat miles (ASMs)—the overall yardstick for how busy commercial airline activity is both domestically and internationally—is projected to drop 1.6 percent in 2010, after posting a 7.4 percent decrease during 2009, and then grow at an average of 3.6 percent per year through 2030. In the domestic market, capacity is expected to drop 1.1 percent in 2010, after posting the largest percentage decline in ASMs (down 8.9 percent in FY 2009) since the industry's deregulation. Domestic mainline carrier capacity will decline 1.6 percent (marking the third straight year of declines). For the regional carriers, domestic capacity will grow 1.9 percent from 2009 levels—resuming growth after shrinking in 2009 for the first time since deregulation. Commercial air carrier domestic revenue passenger miles are forecast to grow 0.4 percent in 2010, and then grow at an average of 3.2 percent per year through 2030.

Following previous downturns (e.g., the recessions in 1991 and 2001), carriers stimulated passenger demand by sharply reducing fares. The industry's initial response to the current economic downturn was to modestly cut fares and to better match supply (seats) and demand (passengers). It quickly became apparent that dramatic (not modest) cuts in fares would be the only way to stimulate passenger demand, and carriers responded with multiple sales throughout the year. In addition, to help minimize losses, carriers also reduced flying to hold the line on costs. With no evidence of pent up demand, FAA does not anticipate a return to previously forecasted passenger levels even when recovery takes hold.

[49] Source: FAA Aerospace Forecasts, FY 2010-2030, issued in March 2010. See http://www.faa.gov/data_research/aviation/aerospace_forecasts/2010-2030/.

The shaky global economy that took hold in the latter part of 2008 is expected to continue its impact on air travel demand through 2010. Profitability for U.S. network carriers may hinge on the return of demand for corporate air travel, the ability to pass along fare increases to leisure travelers, a stable environment for fuel prices, and additional efforts to lower costs in general. To navigate the volatile operating environment, mainline carriers will continue to drive down their costs by better matching flight frequencies and/or aircraft gauge with demand, delaying deliveries of newer aircraft and/or grounding older aircraft, and reducing regional affiliates for contract flying. Over the long term, FAA projects a competitive and profitable industry characterized by increasing demand for air travel and air fares growing more slowly than inflation.

Table 10 summarizes commercial aviation forecasts. Enplanements are forecast to grow 0.4 percent in 2010, following a 7.3 percent decline in 2009. Over the entire forecast period, domestic enplanements are projected to grow at an average annual rate of 2.4 percent with mainline carriers growing more slowly than regional carriers (2.2 versus 3.0 percent a year, respectively). International growth rates are projected to be slightly stronger with Latin America travel projected to grow at 4.2 percent annually, Pacific travel at 4.7 percent annually, and Atlantic travel at 3.1 percent annually.

Table 10: U.S. Aviation Activity Forecasts

Aviation Activity	FY 2009[1]	FY 2030	Annual Growth
Enplanements (millions)			
Domestic	631.3	1,045.5	2.4%
International			
• Atlantic	24.7	47.5	3.1%
• Latin America	35.9	85.6	4.2%
• Pacific	12.0	31.4	4.7%
Total	**704.0**	**1,210.0**	**2.6%**
Aircraft Operations (thousands) [2]			
Air Carrier	12,831.3	19,481.9	2.0%
Commuter/Air Taxi	9,510.4	12,514.7	1.3%
General Aviation	27,974.4	35,064.5	1.1%
Military	2,556.5	2,516.6	-0.1%
Total	**52,872.6**	**69,577.7**	**1.3%**
Air Cargo Revenue Ton Miles (millions)			
• Domestic	11,860.0	18,506.5	2.1%
• International	18,965.3	68,139.2	6.3%
Total	**30,825.2**	**86,645.7**	**5.0%**
Active Aircraft			
• Piston-Powered	162,096	165,243	0.1%
• Turbine-Powered	20,428	39,059	3.1%
• Rotorcraft	10,206	18,195	2.8%
• Light-Sport	7,311	16,311	3.9%
• Experimental/Other	29,108	39,915	1.5%
Total	**229,149**	**278,723**	**0.9%**

Source: FAA Aerospace Forecasts, FY 2010-2030, issued in March 2010. See http://www.faa.gov/data_research/aviation/aerospace_forecasts/2010-2030/

[1] Estimated

[2] FAA and Contract Towers

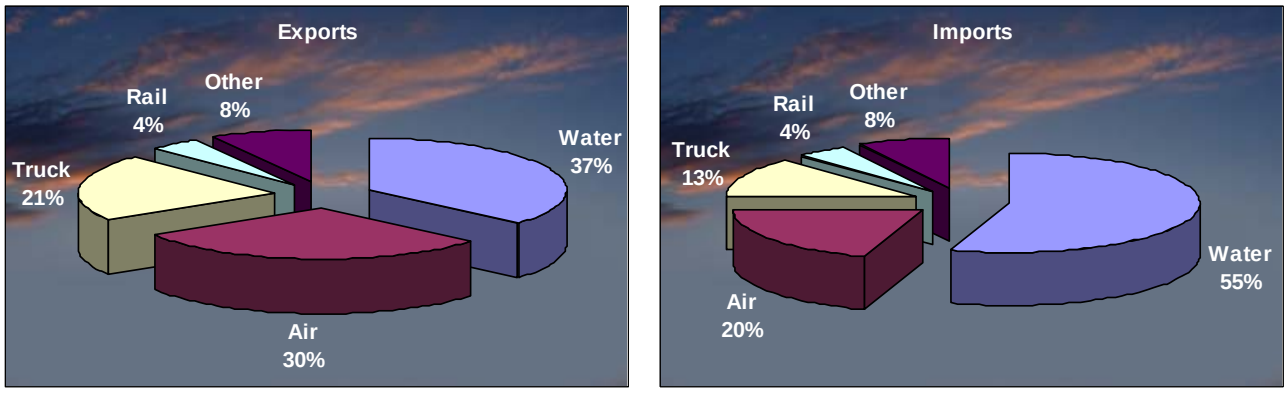
Cargo

Air cargo, domestic and international freight/express and mail, is moved in the bellies of passenger aircraft and in dedicated all-cargo aircraft. Significant changes have occurred in the air cargo industry.

Historically, air cargo activity tracks with the gross domestic product. In recent years, the global financial crisis, declining real yields, and globalization have impacted the growth in air cargo traffic. In addition, significant structural changes have occurred in the air cargo industry including air cargo security regulations by the FAA and TSA, market maturation of the domestic express market, modal shift from air to other modes (especially truck), increases in air fuel surcharges, growth in international trade from open skies agreements, use of all-cargo carriers (e.g., FedEx) by the U.S. Postal Service to transport mail, and increased use of mail substitutes (e.g., e-mail).

Air cargo is very important to the U.S. economy, as illustrated by the fact that 30 percent of exports and 20 percent of imports measured by value in 2008 were shipped by air (see Figure 22).[50] Air transportation is the preferred mode for the shipment of high-value, lightweight, and perishable goods.[51] Lower shipping costs and more frequent service have made air cargo a major factor in the way global business is conducted.

Figure 22: Value of U.S. International Merchandise Exported and Imported by Mode 2008



The forecasts of Revenue Ton Miles (RTMs) are based on several assumptions specific to the cargo industry. First, security restrictions on air cargo transportation will remain in place. Second, most of the shift from air to ground transportation has occurred. Finally, long-term cargo activity will be tied to economic growth. Total RTMs are forecast to grow 3.4 percent in 2010 and by 4.9 percent in 2011. For the balance of the forecast period, driven by steady economic growth, total RTMs are forecast to increase at an average annual rate of 5.1 percent. The forecast of 86.6 billion RTMs in 2030 represents an average annual increase of 5.0 percent over the entire forecast period. All-cargo carriers have increased their share of domestic cargo revenue ton-miles flown from 65.4 percent in 1997 to 86.2 percent in 2009. This is due to significant growth in express service by FedEx and United Parcel Service, lack of growth

[50] Compiled by U.S. Department of Transportation, Research and Innovative Technology Administration, Bureau of Transportation Statistics, Pocket Guide to Transportation, 2007.
[51] Air cargo accounts for less than 1 percent of imports and exports by weight.

in domestic freight/express business for passenger carriers, increases in wide-body capacity for all-cargo carriers, and security considerations (which limit the cargo carried in passenger aircraft).

International cargo RTMs are forecasted to rise 4.7 percent in 2010, reflecting a recovery from the global economic downturn, and grow 6.6 percent in 2011 as world economic growth rebounds and trade expands. For the balance of the forecast period, international cargo RTMs are forecast to increase an average of 6.3 percent a year based on projected growth in world gross domestic product. The forecasted 68.1 billion RTMs in 2030 represents an average annual increase of 6.3 percent over the entire forecast period.

Air cargo is generally concentrated at busy commercial service airports. Air-cargo flights usually occur during off-peak periods and do not substantially contribute to airport congestion and delay problems. The principal need for airport development to support cargo operations is related to the cargo sorting and transfer facilities developed by the package express carriers. These airports must have high-capacity, all-weather runway systems to support reliable operations. The introduction of new large aircraft, such as the Airbus A380 and Boeing 747-8, in cargo service may demand facility improvements due to their size and weight capacities. Improvements may also be warranted at selected airports, such as JFK, Los Angeles International, Chicago O'Hare, San Francisco, Dallas-Ft. Worth, Anchorage, Atlanta, New Orleans, and Miami to keep pace with rapid growth in international air cargo. Nine of the top 25 U.S. foreign trade freight gateways in terms of value of shipment are airports, with JFK being the busiest U.S. foreign gateway.

General Aviation

FAA forecasts the fleet and hours flown for single-engine piston aircraft, multi-engine piston, turboprops, turbojets, piston and turbine-powered rotorcraft, light-sport, experimental, and other (which consists of gliders and lighter than air vehicles). FAA forecasts "active aircraft,"[52] not total aircraft.

With the onset of the economic downturn, weakening of the general aviation industry became apparent in 2008. In 2009, the weakening was even more pronounced with record declines by several measures of activity and double digit declines by most measures. According to numbers released by the General Aviation Manufacturers Association (GAMA),[53] U.S. manufacturers of general aviation aircraft delivered 1,587 aircraft in CY 2009, 48.9 percent fewer than in CY 2008. This translates into a second consecutive year of decline in shipments that was preceded by 4 years of sustained growth. The turbine categories, turbojets, and turboprops were down 46.2 and 16.5 percent, respectively. Overall piston deliveries declined 56.3 percent, with single-engine down 56 percent and the much smaller multi-engine category down 62.6 percent.

The demand for business jet aircraft has grown over the past several years. New product offerings, the introduction of very light jets, and increasing foreign demand have helped to drive this growth. In addition, corporate safety/security concerns for corporate staff, combined with increasing flight delays at some U.S. airports, have made fractional, corporate, and on-demand charter flights practical alternatives to travel on commercial flights. Despite the hard impact of the recession felt in

[52] An active aircraft is one that flies at least 1 hour during the year.
[53] Source is available at http://www.speednews.com/DataList.aspx?tagId=5&name=GAMA+Deliveries.

the business jet market, the forecast calls for robust growth in the long term and predicts business usage of general aviation aircraft will expand at a faster pace than that for personal/recreational use.

The downturn in the economy has dampened the near-term prospects for the general aviation industry, but the long-term outlook remains favorable. FAA projects growth in business aviation demand over the long term driven by a growing U.S. and world economy. As shown in Table 12, the active general aviation fleet is projected to increase at an average annual rate of 0.9 percent over the 21-year forecast period, growing from an estimated 229,149 in 2009 to 278,723 aircraft by 2030. The more expensive and sophisticated turbine-powered fleet (including rotorcraft) is projected to grow at an average of 3.0 percent a year over the forecast period, with the turbine jet portion increasing at 4.2 percent a year.

IMPLICATIONS OF FORECASTS

The anticipated 72-percent increase in passengers over the 20-year period between 2010 and 2030 is expected to result from a 42-percent increase in air carrier operations. Over the next 20 years, system capacity is projected to increase an average of 3.6 percent per year. FAA anticipates that passenger trip length will continue to increase, reflecting the growth in longer international and domestic trips resulting from increased point-to-point service.

Domestic aircraft size[54] increased in 2009 by 1.3 seats to 121.9 seats. The increase was partly driven by a large increase in aircraft size by the regional carriers (up 2.2 seats) and the mainline carriers parking older, fuel inefficient aircraft (i.e., MD-80s and 737-300/400/500) (up 1.4 seats). The increase in regional aircraft size was caused by the retirement of 50-seat jet aircraft as larger 70- to 90-seat jet aircraft entered the fleet. Domestic seats per aircraft is expected to fall in 2010 (down 0.3 seats) as mainline carriers continue to cut capacity while their regional counterparts grow. Over the course of the forecast, domestic seats per aircraft are projected to gradually increase to 123.6 seats by 2030, an average of 0.1 seats per year.

In the near term (through 2011), the forecast incorporates several carrier assumptions: (1) mainline carriers desire to constrain capacity growth; (2) network carrier "own metal" service on longer-haul routes; (3) the retirement of older inefficient aircraft (many of which are narrow-body); (4) the shifting of wide-body and larger narrow-body aircraft to international services; and (5) growing use of 70- to 90-seat regional jet aircraft. In the longer term, network carriers will replace their wide-body and larger narrow-body aircraft in their domestic route networks with smaller, next generation, narrow-body aircraft. The use of smaller narrow-body aircraft allows mainline carriers to better serve their customers by boosting frequency, as well as improve profitability by more closely matching supply (the number of seats) with demand (the number of passengers).

While mainline aircraft size is expected to remain static, regional carrier aircraft size flown domestically is projected to grow at a much faster pace than their mainline counterparts. The faster growth in regional aircraft size is stimulated by the wave of 70- to 90-seat regional jet aircraft that are entering the fleet as well as reductions in the 50-seat and under jet fleet.

[54] Defined as seats per mile flown and computed by dividing ASMs by miles flown.

In addition, aircraft utilization is expected to increase as more carriers seek to make more intensive use of costly capital equipment. Load factors are also expected to remain at historical high levels with moderate growth over the forecast period, pushing record load levels higher. The implication is that the increase in air carrier aircraft operations will vary, depending on activity levels at individual airports. The growth will present little problem for most low-activity airports that have unused runway capacity. Medium hub airports have several options to address the increase in air carrier flights, such as working with air carriers to schedule more flights for off-peak periods, accommodating a portion of general aviation activity at reliever airports, and developing new runways to increase airfield capacity.

A substantial increase in aircraft operations at the busiest airports may warrant development of additional runways by the airport proprietor. The increases in regional aircraft used to increase frequency and better match capacity may impact capacity even as total passengers carried grows at a slower rate. This is due to the number of operations by aircraft in the 70- to100-seat range that transport fewer passengers, yet still require the same runway access in the peak period as larger aircraft with more seating capacity.

The planning and environmental overview processes, which must be completed before a new runway can be built, generally take many years to complete and are typically controversial within the local community. Of the 35 OEP airports, 10 can be considered primarily transfer airports (with 50 percent of their passengers connecting to another flight) and 25 can be considered primarily origin airports (with 50 percent or more of their passengers originating at the airport). (See Table 4 in Chapter 2.)

Airlines select transfer airports as hubs for many reasons, including their potential for expansion, and airport management is often eager to provide adequate runway capacity in order to ensure that the airlines continue to operate there, rather than switching hub operations to a competing airport. Much of the additional capacity at transfer hubs is intended for use by commuter and regional airline aircraft, which transport passengers from smaller cities within several hundred miles of the hub. This traffic is expected to grow as regional carriers continue to acquire jet aircraft.

Capacity-enhancing efforts are also underway at several of the airports that primarily serve originating passengers. However, new runways are not always feasible and alternative methods to increase capacity and reduce delays are being explored. (See the Capacity section in Chapter 2.)

OTHER FACTORS

Capacity is affected not only by the volume of air transportation but also by the way in which it is provided. Airlines are expected to continue to concentrate their schedules at their primary hubs, where large numbers of flights converge in short periods of time to maximize the opportunity for passenger transfers. No additional airline hubs are expected to arise within the next 5 years. Increased point-to-point service, bypassing hubs, is occurring when warranted by market considerations.

Low-cost carriers usually serve major metropolitan areas by using uncongested, secondary commercial service airports where existing facilities are underutilized. In the past, this occurred in communities where the major hub was served by a legacy carrier. However, more recently, secondary airports are becoming a focus where the major hub is nearing capacity and is served by low-cost carriers. As an example, Phoenix-Mesa Gateway Airport now has regularly scheduled air service even though the major hub airport is served by low-cost carriers. In some cases, however, service has been initiated at major airports. For example, low-cost carriers presently operate a significant number of flights at the major airports in Las Vegas, Phoenix, Los Angeles, St. Louis, and Philadelphia. New low-cost service also recently began in the large hubs of Boston and New York LaGuardia.

The globalization of the airline industry, the rapid growth of air transportation in other parts of the world, and the increased range and reduced size of aircraft will combine to bring international passengers to more U.S. airports. The effects will vary, but may include requirements for longer runways, terminal building expansion, and provision of Federal inspection facilities for immigration, customs, and agriculture at airports where international traffic is increasing.

The increased number of jet aircraft in the general aviation fleet will result in a demand for longer runways at certain reliever and general aviation airports, particularly those with substantial use (500 or more annual operations) by business and corporate aircraft.

New Large Aircraft

Airports in the United States are continuing to plan and develop new facilities for the next generation of large aircraft. The Airbus A380 (already in service) and the new Boeing 747-8 (planned for service in late 2010 or early 2011) require special consideration due to their length, wingspan, and weight. The Airbus 380's 262-foot wingspan is 48 feet wider than the next largest aircraft, the 80-foot tail height is 16 feet taller than the next tallest aircraft, and the maximum takeoff weight of approximately 1.3 million pounds is 420,000 pounds heavier than the next largest aircraft in the fleet. The Boeing 747-8, at 250 feet, will be 18 feet longer than the Airbus A380. The current distance between parallel taxiways and their runways, the configuration of taxiway systems, and the layout of terminal buildings are affected by the oversized wingspan. Underlying structures, such as bridges and culverts, will require reinforcement to accommodate the aircraft's heavier weight.

Initially, the A380 is being operated by four foreign flag carriers primarily into Los Angeles International Airport and New York's John F. Kennedy International Airport with service also anticipated in San Francisco and Miami. Up to a total of 12 airports could receive A380 service in the future. Freighter versions are also planned and could serve Anchorage and Memphis. The orders for the 747-8 are skewed toward freighter versions and toward international freight operators. Therefore, the locations for these aircraft could mirror those airports receiving A380 service now.

Several airports are undertaking large modernization projects to improve airfield safety and efficiency and to prepare for projected increases in airplane size and passenger activity. Because airports are continuously upgrading terminals and airfields, it is difficult to determine exactly how much of those costs are solely attributable to accommodating the new large aircraft. Airports planning to receive service by new large aircraft started their preparations and financial planning for

necessary improvements several years ago. Until all improvements can be made, FAA is working on a series of procedures to safely accommodate these aircraft at existing airports.

Fractional Ownership

An important factor cited in the growth of business jet operations is the growth of fractionally owned aircraft. The concept of fractional ownership is where corporations or individuals purchase an interest in an aircraft (can be as little as a 1/16 share) and pay a fixed fee for operations and maintenance. Since beginning in 1986, fractional jet programs have flourished. Table 11 summarizes the growth in fractional shares between 1986 and 2006.

Table 11: Fractional Shares and Number of Aircraft in Use

Year	Number of Shares	Number of Aircraft
1986	3	Not Available
1987	5	
1988	26	
1989	51	
1990	57	
1991	71	
1992	84	
1993	110	
1994	158	
1995	285	
1996	548	
1997	957	
1998	1,551	
1999	2,607	
2000	3,834	
2001	3,415	696
2002	4,098	776
2003	4,516	826
2004	4,765	865
2005	4,691	949
2006	4,863	984
2007	5,168	1,030
2008	5,179	1,094
2009	4,881	1,037

Source: GAMA

Very Light Jets or Microjets

Delivery of smaller affordable business jets, also referred to as very light jets (VLJs) or microjets, began in 2007. Even with the bankruptcy and cessation of production of the Eclipse 500 jet in 2009, there are several VLJs available. The Cessna Mustang celebrated its 300th delivery in 2010. Over 100 of the Phenom 100 aircraft manufactured by Embraer have been delivered in the past year. The

new Eclipse Aerospace[55] plans to complete assembly and delivery of unfinished aircraft and start production in the next few years. New product offerings of single-engine jets are expected from Piper, Honda, and Cirrus as upgrades to high performance piston-powered aircraft.
The advent of the relatively inexpensive twin-engine VLJs raised many questions about the potential future impact they may have. The lower acquisition and operating costs of VLJs were believed to have the potential to revolutionize the business jet market, particularly by being able to sustain a true on-demand air taxi service. While initial forecasts called for over 400 aircraft to be delivered a year, events such as the recession along with the bankruptcy of Eclipse and DayJet (the largest on-demand air taxi service) have led FAA to temper more recent forecasts. The worldwide delivery of VLJs in 2010 held up relatively well compared to the turbine jet market as a whole, helped in large part by the introduction of Embraer's Phenom 100 to the market. Despite that, the impacts of the recession have led to dampened expectations. The current forecast calls for 440 VLJs to enter the U.S. fleet over the next 3 years, with an average of 216 aircraft a year for the balance of the forecast period.

VLJs are able to operate at smaller airports with shorter runways (runway lengths of 3,000 to 3,500 feet), thereby improving access to the national airspace system for rural areas and less-populated urban areas. However, VLJs used in air taxi service may require longer runway lengths due to Title 14, Code of Federal Regulation, Part 135 requirements.[56]

Light-Sport Aircraft

On July 21, 2004, FAA published the final rule for sport aircraft, "*Certification of Aircraft and Airmen for the Operation of Light-Sport Aircraft,"* which went into effect on September 1, 2004. This final rule establishes new light-sport aircraft categories and allows aircraft manufacturers to build and sell completed aircraft without obtaining type and production certificates. Instead, aircraft manufacturers will build to industry consensus standards. This reduces development costs and subsequent aircraft acquisition costs. This new category places specific conditions on the design of the aircraft to limit them to "slow (less than 120 knots maximum) and simple" performance aircraft. New pilot training times are reduced and offer more flexibility in the type of aircraft the pilot would be allowed to operate.

Viewed by many within the general aviation industry as a revolutionary change in the regulation of recreational aircraft, this new rule is anticipated to significantly increase access to general aviation by reducing the time required to earn a pilot's license and the cost of owning and operating an aircraft. These regulations are aimed primarily at the recreational aircraft owner/operator. By 2030, FAA expects there to be 16,300 of these aircraft in the national fleet.

Unmanned Aircraft Systems

International industry development, growth, and investment over the past several years have allowed Unmanned Aircraft Systems (UAS) to evolve from remotely piloted vehicles with limited capabilities to semi and fully autonomous systems for commercial applications. There are some

[55] In September 2009, a group of Eclipse owners, former deposit holders, and investors formed Eclipse Aerospace International and purchased the assets of the previous Eclipse Aviation. They are re-establishing service, support, and the parts supply chain, and hope to re-start production of the EA-500 aircraft. See http://www.eclipseaerospace.net/.
[56] Title 14 CFR Part 135, Operating Requirements: Commuter and On Demand Operations and Rules Governing Persons on Board Such Aircraft.

100 U.S. companies, academic institutions, and government organizations developing over 300 UAS designs. Currently, the U.S. Government uses unmanned aircraft for military combat, surveillance, and reconnaissance.

The UAS term is used because it includes the entire system (aircraft, data links, control station, and other elements). UAS also vary widely in size, shape, and capabilities. Some unmanned aircraft weigh 1,900 pounds and can remain aloft for 30 hours or more because there is no need for them to land to change pilots. Some are as small as just 6 inches in length. Others can perform dangerous missions without risking loss of life.

In its broadest context, there are three major market segments: military, civil government, and commercial. While market drivers and dynamics among these segments differ significantly, they share common objectives: to provide a service that cannot be accomplished by manned aircraft and/or to perform an existing manned operation at a lower cost. Because of increased interest and activity, UAS have the potential to become a major part of the commercial aerospace industry within the United States.

Federal agencies are planning to increase their use of UAS. State and local governments envision using UAS to aid in law enforcement and fire fighting. Potential commercial uses are also possible, for example, in real estate photography or pipeline inspection. UAS could perform some manned aircraft missions with less noise and fewer emissions.

Because the industry is in its infancy, forecasts of the number of units are relatively few and have considerable variation. Recent work by Radio Technical Commission for Aeronautics, Inc., (RTCA)[57] has identified the drivers and impediments to future growth in the aforementioned three-market segments and has included forecasts of the number of UAS units by market segment. The forecasts generally assumed that (1) commercial activities would not begin until 2018; (2) no significant technological or extraordinary demand would accelerate the introduction of UAS; and (3) costs of UAS systems would decline as the technology matures and as the scale of operations increases. Currently, the majority of UAS are operated by the military and have little impact on the national airspace system. As the technology matures, increasing numbers of units will be operated by civil and commercial users and could have greater impacts on the National Airspace System. However, the expected volume of units is relatively small—approximately 15,000 units by 2020 and 30,000 units by 2030.

Conversion of Military Surplus Airfields

Since 1989, the Base Realignment and Closure (BRAC) Commission has made many military airfields available for conversion to civil aviation use. About 30 surplus military airfields have been converted to civil use by local communities (see Table 12). Most of these military airfields have long runways and associated facilities that can accommodate large civil aircraft. Twelve of the surplus military airfields have become commercial service airports. Two other surplus airfields (Sacramento Mather Airport, CA, and Rickenbacker International Airport, OH) have attracted significant cargo service. The remaining surplus airfields are located in areas where general aviation and reliever airports are needed.

[57] For more information on RTCA, see http://www.rtca.org/default.asp.

Table 12: Military Airfields Transferred to Civil Sponsors

State	Principal City	Civil Airport Name	Name of Former Military Installation	Locid	Service Level
AZ	Mesa	Phoenix-Mesa Gateway Airport	Williams AFB	IWA	Reliever
AR	Blytheville	Arkansas International Airport	Eaker AFB	BYH	GA
CA	San Bernardino	San Bernardino International Airport	Norton AFB	SBD	Reliever
CA	Sacramento	Sacramento Mather Airport	Mather AFB	MHR	Reliever
CA	Victorville	Southern California Logistics	George AFB	VCV	Reliever
CA	Atwater	Castle Airport	Castle AFB	MER	GA
FL	Jacksonville	Cecil Field	Jacksonville NAS	VQQ	GA
FL	Homestead	Homestead General Aviation Airport	Homestead AFB	X51	GA
GU	Agana	Guam International	Agana NAS	GUM	Primary
HI	Kapolei	Kalaeloa (John Rodgers Field)	NAS Barbers Point	JRF	Reliever
IL	Rantoul	Rantoul National Aviation Center-Frank Elliott Field	Chanute AFB	TIP	GA
LA	Alexandria	Alexandria International	England AFB	AEX	Primary
MD	Odenton	Tipton Airfield	Tipton AAF	FME	Reliever
ME	Brunswick	Brunswick	Brunswick Naval Air Station (NAS)	NHZ	General Aviation
MI	Marquette	Sawyer International Airport	K.I. Sawyer AFB	SAW	Primary
MI	Sault Ste. Marie	Chippewa County International Airport	Kincheloe AFB	CIU	Primary
MI	Oscoda	Oscoda-Wurtsmith Airport	Wurtsmith AFB	OSC	GA
NE	Lincoln	Lincoln Airport	Lincoln AFB	LNK	Primary
NH	Portsmouth	Portsmouth International Airport at Pease	Pease AFB	PSM	Primary
NY	Newburg	Stewart International Airport	Stewart AFB	SWF	Primary
NY	Plattsburgh	Plattsburgh International Airport	Plattsburgh AFB	PBG	GA
NY	Rome	Griffiss Airfield	Griffiss AFB	RME	GA
OH	Columbus	Rickenbacker International Airport	Rickenbacker AFB	LCK	Nonprimary Commercial Service
PR	Ceiba	Jose Aponte de la Torre Airport	Roosevelt Roads	RVR	Reliever
SC	Myrtle Beach	Myrtle Beach International	Myrtle Beach AFB	MYR	Primary
TN	Smyrna	Smyrna Airport	Sewart AFB	MQY	Reliever
TN	Millington	Millington Regional Jetport	Memphis NAS	NQA	GA
TX	Houston	Ellington Field	Ellington AFB	EFD	Reliever
TX	Laredo	Laredo International Airport	Laredo AFB	LRD	Primary
TX	Austin	Austin-Bergstrom International	Bergstrom AFB	AUS	Primary

Military/Civilian Joint Use

Even before the establishment of the BRAC, military officials have cooperated with local communities across the country to provide civilian access to military airport facilities. These local arrangements add capacity to the national airport system and maximize public investment dollars by eliminating the duplication of airport facilities in a community for military and civilian activities. Table 13 summarizes the current military bases in the United States that also accommodate civilian activities.

Table 13: Military Installations with Civilian Use

Military Installation	City, State
Air Force	
Air Force Plant 42	Palmdale, CA
Barter Island LRRS	Barter Island, AK
Charleston Air Force Base	Charleston, SC
Dover Air Force Base	Dover, DE
Eglin Air Force Base	Valparaiso, FL
Grissom Air Force Base	Peru, IL
Kelly Air Force Base	San Antonio, TX
March Air Reserve Base	Riverside, CA
Pt. Lay LRRS [1]	Point Lay, AK
Scott Air Force Base	Belleville, IL
Sheppard Air Force Base	Wichita Falls, TX
Westover Air Force Base	Chicopee, MA
Army	
Blackstone Army Airfield (Ft. Pickett)	Blackstone, VA
Camp Guernsey Army Airfield	Guernsey, WY
Dillingham Army Airfield	Waialua, HI
Forney Army Airfield	Ft. Leonard Wood, MO
Gray Army Airfield (Ft. Hood)	Killeen, TX
Grayling Army Airfield	Camp Grayling, MI
Libby Army Airfield (Ft. Huachuca)	Sierra Vista, AZ
Sherman Army Airfield (Ft. Leavenworth)	Leavenworth, KS
Sparta (Ft. McCoy)	Sparta, WI
Navy	
Marine Corps Air Station Yuma	Yuma, AZ

[1] Long Range Radar Site or Long Range Radar Station

The Department of Defense (DoD) has found it advantageous to operate from civilian airfields. Similar to civilian uses on military airfields, military activity at civilian airfields reduces public investments in airport infrastructure by taking advantage of existing civilian airfield capabilities for military purposes. At airports where military units conduct a significant level of activity as specified in National Guard Bureau Air National Guard Pamphlet 32-1001, *Airport Joint Use Agreements for Military Use of Civilian Airfields*, the DoD enters into an agreement with the local community to pay for costs related to the military use of the airfield. As of 2010, the military has nearly 65 civilian airports with agreements in place. These locations are shown in Table 14.

Table 14: Civilian Airports with Military Installations

Airport	State	Unit
Albuquerque International Sunport	NM	150 FW
Allen C. Thompson Field	MS	172 AW
Atlantic City Airport	NJ	177th FW
Bangor Airport	ME	101st ARW
Barnes Airport	MA	104th FW
Birmingham Airport	AL	117th ARW
Boise Terminal	ID	124 WG
Bradley Airport	CT	103rd AW
Burlington Airport	VT	158th FW
Charlotte/Douglas Airport	NC	145th AW
Cheyenne Airport	WY	153rd AW
Colorado Springs Municipal	CO	302 AW
Des Moines Airport	IA	132nd FW
Duluth Airport	MN	148 FW
Eastern West Virginia Airport	WV	167th AW
Forbes Field	KS	190th ARW
Fort Smith Airport	AR	188th FW
Fort Wayne International Airport	IN	122 FW
Francis S. Gabreski Airport	NY	106th RW
Fresno Yosemite Airport	CA	144th FW
General Mitchell Airport	WI	128 ARW
Great Falls Airport	MT	120 FW/441st AW
Greater Peoria Airport	IL	182 AW
Hancock Field	NY	174 FW/442nd AW
Harrisburg Airport	PA	193 SOW/443 AW
Hector International Airport	ND	119th WG/444th AW
Jacksonville Airport	FL	125 FW/446th AW
Joe Foss Field	SD	114th FW/447th AW
Key Field	MS	186 ARW448th AW
Klamath Falls Airport	OR	173 FW
Klamath Falls Airport/Kingsley Field	OR	449th AW
Lambert-St Louis Airport	MO	450th AW
Lincoln Airport	NE	155 ARW/451st AW
Luis Munoz Marin International Airport	PR	156 AW/453rd AW
Mansfield Lahm Airport	OH	179th AW
Martin State Airport	MD	175 WG
McGhee Tyson Airport	TN	134 ARW
Memphis Airport	TN	164th AW
Minneapolis-St Paul Airport	MN	133 AW/934th ARW
Moffett Field	CA	129th RW
Montgomery Regional Airport	AL	187th FW
Nashville Airport	TN	118th AW
New Castle County Airport	DE	166th AW
Niagara Falls Airport	NY	107th AW/914th AW
Pease International Tradeport	NH	157th ARW

Table 14 (continued): Civilian Airports with Military Installations

Airport	State	Unit
Pittsburgh Airport	PA	171 ARW/911th AW
Portland Airport	OR	142nd FW/939th ARW
Quonset State Airport	RI	143rd AW
Reno/Tahoe Airport	NV	152nd AW
Rosecrans Memorial Airport	MO	139th AW
Salt Lake City Airport	UT	151st ARW
Savannah Hilton Head Airport	GA	165th AW
Schenectady County Airport	NY	109th AW
Sioux Gateway Airport	IA	185th ARW
Sky Harbor Airport	AZ	161st ARW
Springfield-Beckley Airport	OH	178th FW
Standiford Field	KY	123 AW/452nd AW
Stewart International Airport	NY	105 AW
Ted Stevens International Airport	AK	176 WG
Toledo-Express Airport	OH	180th FW
Truax Field	WI	115th FW
Tucson International Airport	AZ	162 FW
Tulsa Airport	OK	138th FW
WK Kellogg Airport	MI	110th FW
Yeager Airport	WV	130th AW
Youngstown-Warren Airport	OH	910th AW

Other Innovations

Efforts are underway to develop transportation and communication technology that may eventually affect the demand for conventional air transportation. Tiltrotor aircraft may evolve into effective vehicles for air travel between city centers or suburban areas, bypassing congested airports. High-speed trains are being demonstrated that could attract more passengers to rail in specific markets, and research is underway into magnetic levitation (maglev) vehicles. Teleconferencing and other electronic communication techniques could affect the demand for business air travel. These innovations may eventually have a significant effect on airport development needs, but this is not expected to occur during the next 5 years.

Commercial Spaceports

FAA's Office of Commercial Space Transportation (AST) licenses and regulates U.S. commercial space launch activity including launch vehicles, launch sites co-located with Federal installations, and non-Federal launch sites authorized by Executive Order 12465 and 49 United States Code, Subtitle IX, Chapter 701 (formerly the *Commercial Space Launch Act).* Title 49 and the Executive Order also direct the DOT to encourage, facilitate, and promote commercial space transportation, which it does through FAA. AST's mission is to license and regulate commercial space launch and reentry operations and launch sites to protect public health and safety, the safety of property, and the national security interests of the United States.

Commercial space transportation generally consists of the launch of payloads or human participants into orbit for either commercial or government customers by private, nongovernment entities called launch services providers. Commercial space transportation also covers suborbital launches, where a vehicle containing a payload or human participants is launched on a trajectory that briefly goes into space but returns to Earth without going into orbit. AST also regulates the purposeful reentry of objects from space to Earth.

Vehicles are launched from licensed locations, referred to as commercial spaceports. There were 5 FAA-licensed launches, all orbital, in 2009, down from 11 in 2008. In May 2009, FAA and the Commercial Space Transportation Advisory Committee (COMSTAC) published their annual global forecast for commercial launch demand, the *2009 Commercial Space Transportation Forecasts*. The report forecasts an average of 26.7 commercial orbital launches per year of geosynchronous orbit and nongeosynchronous orbit payloads through 2018.

Seven commercial spaceports—located in Alaska, California (Vandenberg Air Force Base and Mojave Air and Space Port), New Mexico, Oklahoma, Virginia, and Florida—currently have FAA launch site operator licenses. Several other commercial spaceports around the United States are under development. At this time, three of the current spaceport locations (Mojave Airport, CA; Clinton-Sherman Oklahoma Spaceport, OK; and Cecil Field Spaceport, FL) are co-located with a public-use airport contained in the NPIAS. Future consideration will be given to utilizing other NPIAS airports as spaceports through established application procedures. These airports have co-located facilities that accommodate both aviation and space operations, particularly space operations involving horizontally launched reusable vehicles.

The initial demand for this type of joint-use facility was limited to a few airports at more remote locations, away from population centers. However, Cecil Field Spaceport near Jacksonville, FL, is a licensed launch site operating close to a major population center. This effort represented the successful culmination of efforts to responsibly integrate FAA's public and property safety requirements with the local economic development needs of the aviation and commercial space industries and local governments. FAA will continue to work with the space and aviation industries to identify spaceport locations and in developing standards to ensure joint air and space operations are conducted in a safe, efficient, and environmentally responsible manner for all users of the National Airspace System.

Airport Privatization

Public-use airports in the United States that are owned and operated by a public agency or a government entity such as a county, city, or state government are eligible for participation in the Airport Privatization Pilot Program. Congress established the Pilot Program (Title 49, Section 47134) in 1996 to determine if, once certain economic and legal impediments were removed, privatization could produce alternative sources of capital for airport development and provide benefits, such as improvements in customer service. The Pilot Program is limited to 5 participants to include no more than one large hub airport and at least one general aviation airport. General aviation airports can be leased or sold; air carrier airports can only be leased.

A total of eight airports have applied to the program. Four applications were either voluntarily withdrawn or terminated. Stewart International Airport located in Newburgh, NY, was the first

airport fully approved for participation in the Pilot Program. Between 2000 and 2007, the airport was leased to National Express Group, a British company, under a 99-year lease. In 2007, the airport left the Pilot Program when National Express Group sold its leasehold interest in the airport to the Port Authority of New York and New Jersey.

Airports currently participating in the program include: Chicago Midway International Airport (the only large hub airport that can participate), Louis Armstrong New Orleans International Airport, Luis Munoz Marin International Airport in San Juan, Puerto Rico, and Gwinnett County Briscoe Field Airport in Lawrenceville, GA. While Chicago Midway International Airport selected a private operator to operate under a lease, the potential lessor was unable to finance the project in 2009, and subsequently, the proposed lease was abandoned. The city of Chicago was reviewing a revised timeline in 2010 to continue the privatization plan.

Chapter 4: Development Requirements

OVERVIEW

Information on the development needed to provide an adequate national system of airports is derived from locally prepared airport master plans and airport system plans.[58] The development recommendations are tied to the current use and condition of each airport and the forecast increase in activity. Because the NPIAS is an aggregation of airport capital development identified through the local planning process rather than a spending plan, no attempt is made to prioritize the included development or evaluate whether the benefits of a specific development project would exceed its costs. As a planning document, the NPIAS should not be used in evaluating investment priorities. The development captured in this report was extracted from an FAA database that integrates development planning and potential AIP funding.

The amounts available under AIP fall into two basic categories: apportioned funds (also known as entitlement funds) and discretionary funds. Entitlement funds are funds apportioned by a formula each year to specific airport sponsors, types of airports, or States. The remaining amount of AIP funding is known as discretionary funding. FAA requires benefit-cost analysis (BCA) to demonstrate the merit of capacity projects for which airport sponsors are seeking AIP discretionary funds.[59]

Airport capacity projects meeting a particular threshold in AIP discretionary grants over the life of the project, and all airport capacity projects requesting a Letter of Intent (LOI), must be shown to have total discounted benefits that exceed total discounted costs. An airport sponsor may request an LOI for a project that will preserve or enhance capacity, with funding, including reimbursement, distributed over several years. Projects subject to the BCA are those projects that enhance airfield capacity in terms of increased aircraft operations, increased aircraft seating capacity or reduced airfield operational delays, or support development directly related to the project. FAA policy requiring BCA does not apply to projects undertaken solely, or principally, for the objectives of safety, security, conformance with FAA standards, or environmental mitigation.

PROCESS

Most of the data contained in the NPIAS is based upon individual airports' master plans and capital improvement plans (CIPs). These documents are prepared to support the modernization or expansion of existing airports, or the creation of new airports. Typically, operators of individual airports prepare airport master plans, usually with the assistance of consultants. FAA field offices review these plans, which follow a standard outline contained in an FAA advisory circular that links development to current and forecast activity. The plans include consideration of all significant aviation

[58] An airport master plan is a detailed, long-term development plan for an individual airport. Airport system plans (regional and State) study the performance and interaction of an entire aviation system to understand the interrelationships among and between individual airports.

[59] For further information about the BCA process, see http://www.faa.gov/airports/aip/bc_analysis/.

requirements, including the needs of national defense and the postal service. Periodically, FAA offices will meet with airport sponsors and review the CIP making adjustments to reflect the current airport development needs. Plans for major development, such as new runways or runway extensions, tend to be controversial, and the planning process provides interested parties with the opportunity to request a public hearing.

Development that is not justified by the aviation activity forecast or is ineligible for Federal funding is screened by FAA planners and is not entered into the NPIAS database. The combination of a planning process that links development to activity, an FAA review that culls out unnecessary and ineligible development, and the discussion of controversial proposals at public hearings results in reasonable and well-documented estimates of future airport project requirements. However, the actual timing and cost of development may vary from the airport master plan. For instance, projects may be deferred or developed in stages in order to reduce immediate costs, or conversely, an unexpected rapid increase in activity may justify accelerating certain development.

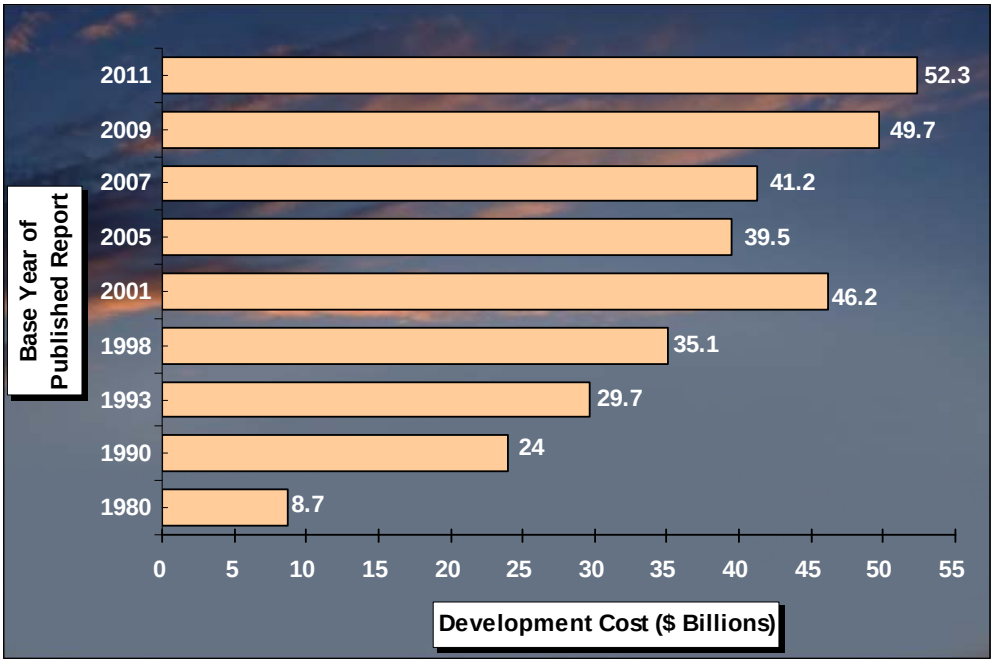
State system plans are also used as a data source for the NPIAS. The state system plan includes airport locations considered important to State air transportation objectives, as well as those that are of sufficient national interest to be incorporated into the NPIAS. An important function of the State planning process is to identify airports that meet national interest criteria, but which might not be identified as such by FAA alone. These plans play a part in the development of airport role, condition, and performance information. However, aviation system plan recommendations on capital development at individual airports or at a system of airports are usually secondary to master plan information. In these cases, the State or regional system plan identifies broad needs or priorities within its jurisdiction.

FAA encourages airports to consult with airlines and other user groups about major airport investment programs. Airlines have questioned the scope and timing of specific development proposals, including major new airports, ground access projects, and certain terminal and airfield improvements. The NPIAS generally reflects the airport operator's viewpoint about the scope and schedule for proposed development. If proposals are downsized, rescheduled, or accomplished in stages, development costs could be significantly lower.

DEVELOPMENT COSTS

The cost estimates of future development needs included in this report of $52 billion are 5 percent higher than those found in the 2009 edition. Figure 23 compares the development costs identified in previous NPIAS reports.

Figure 23: 5-Year Development Estimates from Published NPIAS Reports to Congress [60]



NPIAS costs are categorized by type of airport and by purpose of development. These development totals are shown in Table 15. For comparison purposes, Table 18 shows development requirements contained in the previous edition of the NPIAS.

Table 15: 2011 – 2015 NPIAS Cost by Airport and Development Category (2010 $ millions)

Development Category	Large Hub	Medium Hub	Small Hub	Nonhub	Nonprimary Commercial Service	Reliever	GA	Total	Percent
Safety	$ 586	$ 265	$ 214	$ 642	$ 89	$ 81	$ 225	$ 2,101	4.0
Security	$ 540	$ 104	$ 33	$ 70	$ 13	$ 73	$ 258	$ 1,091	2.1
Reconstruction	$ 2,800	$ 1,636	$ 1,298	$ 1,762	$ 289	$ 1,083	$ 2,859	$11,748	22.2
Standards	$ 1,122	$ 1,381	$ 1,439	$ 1,966	$ 492	$ 1,982	$ 6,698	$15,116	28.4
Environmental	$ 1,404	$ 649	$ 222	$ 180	$ 7	$ 64	$ 103	$ 2,633	5.0
Capacity	$ 6,823	$ 1,288	$ 313	$ 278	$ 41	$ 292	$ 515	$ 9,573	19.5
Terminal	$ 3,009	$ 1,473	$ 793	$ 787	$ 37	$ 53	$ 162	$ 6,315	11.9
Access	$ 1,355	$ 553	$ 121	$ 182	$ 34	$ 83	$ 231	$ 2,561	4.8
Other	$ 27	$ 17	$ 55	$ 49	$ 7	$ 23	$ 97	$ 275	0.5
New Airport	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 869	1.6
Total	**$17,668**	**$7,366**	**$4,489**	**$5,916**	**$1,009**	**$3,734**	**$11,148**	**$52,199**	**100.0**
Percent	**33.8**	**14.1**	**8.6**	**11.3**	**1.9**	**7.2**	**21.4**		

Costs associated with planning (master plans, regional and State system plans, and environmental studies) are not reflected in Table 15, Table 16, or Appendix A. For the 5-year period covered by this report, planning costs total $775 million, an increase of 137 percent ($448 million) from the last

[60] The year shown is the base year for the 5-year calculation (i.e., 2009 identified costs for 2009 to 2013).

report. Medium hub airports account for 60 percent of the total planning cost and general aviation airports account for 15 percent.

Table 16: 2009 – 2013 NPIAS Cost by Airport and Development Category (2008 $ millions)

Development Category	Large Hub	Medium Hub	Small Hub	Nonhub	Nonprimary Commercial Service	Reliever	GA	Total	Percent
Safety	$ 457	$ 290	$ 174	$ 692	$ 46	$ 65	$ 161	$ 1,885	3.80%
Security	$ 386	$ 166	$ 59	$ 66	$ 22	$ 43	$ 224	$ 966	1.90%
Reconstruction	$ 2,484	$ 1,106	$ 988	$ 1,360	$ 367	$ 863	$ 2,441	$ 9,610	19.30%
Standards	$ 1,360	$ 1,034	$ 1,214	$ 1,762	$ 449	$ 1,844	$ 5,718	$ 13,382	26.90%
Environmental	$ 1,166	$ 607	$ 320	$ 199	$ 1	$ 7	$ 123	$ 2,502	5.30%
Capacity	$ 5,729	$ 1,432	$ 396	$ 189	$ 16	$ 414	$ 458	$ 8,634	17.40%
Terminal	$ 5,393	$ 2,009	$ 813	$ 675	$ 50	$ 29	$ 145	$ 9,115	18.30%
Access	$ 994	$ 508	$ 155	$ 124	$ 27	$ 110	$ 183	$ 2,101	4.20%
Other	$ 41	$ 14	$ 35	$ 33	$ 11	$ 23	$ 61	$ 218	0.40%
New Airport	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 1,305	2.60%
Total	**$ 18,009**	**$ 7,165**	**$ 4,155**	**$ 5,101**	**$ 990**	**$ 3,476**	**$ 9,516**	**$ 49,717**	**100.00%**
Percentage	**36.20**	**14.40**	**8.40**	**10.30**	**2.00**	**7.00**	**19.10**		

Development is divided into categories on the basis of the principal purpose of development and by type of airport. Figures 24 and 25 compare the development by airport type and by development category over the last 10 years (2001, 2005, 2007, 2009, and 2011). Figure 24 highlights a continued increase in the development at general aviation airports and fairly consistent development needs at small, nonhub, general aviation, and reliever airports.

Figure 24: Comparison of 5-Year Development Costs by Airport Type Years 2001, 2005, 2007, 2009 and 2011

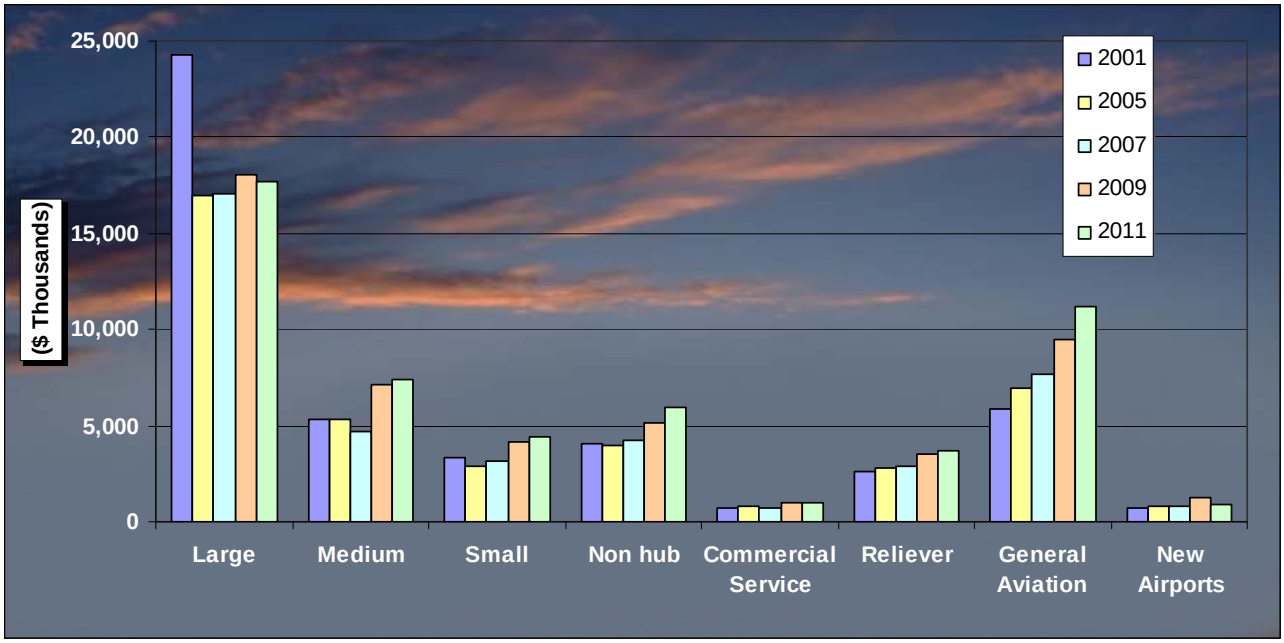
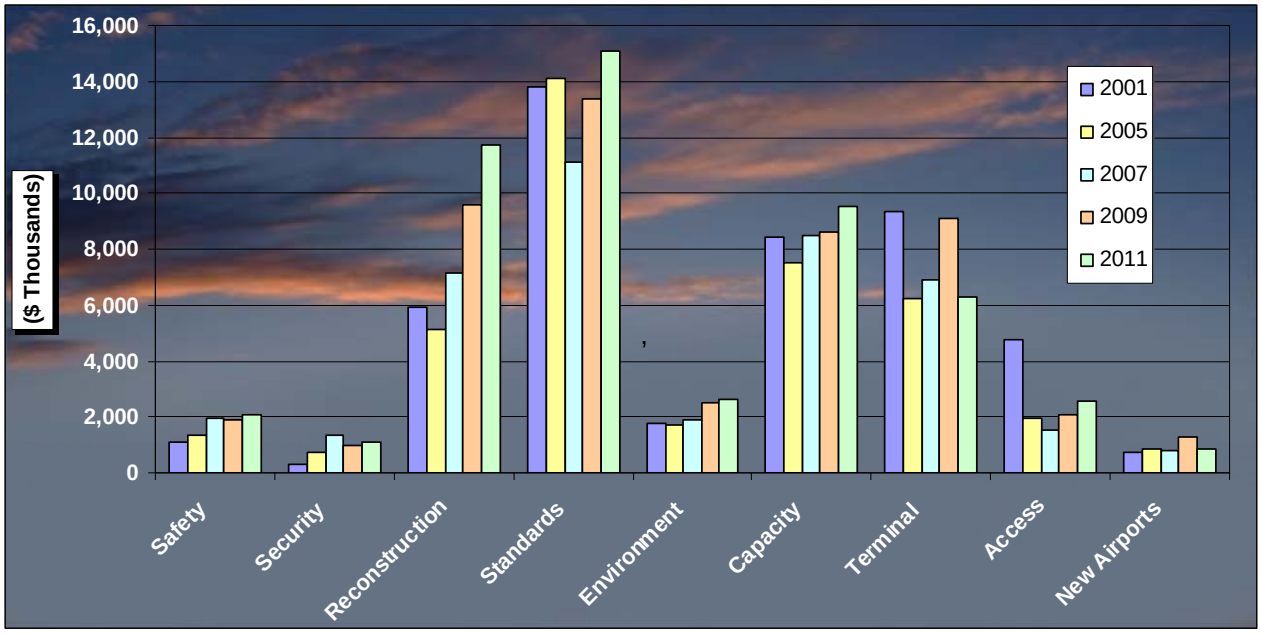


Figure 25 compares the type of needed development identified in the current report to the 5 previous reports. The trend continues from the last report, which saw continuing increases in reconstruction needs and increases in improvements to bring airports up to recommended design standards.

Figure 25: Comparison of 5-Year Development Costs by Category Years 2001, 2005, 2007, 2009, and 2011



DEVELOPMENT CATEGORIES

Safety and Security

Safety and security projects include development that is required by Federal regulation, airport certification procedures or design standards, and are intended primarily for the protection of human life. These two categories account for 6 percent ($3.2 billion) of the funding needs identified in the NPIAS. FAA gives safety and security development the highest priority to ensure rapid implementation and to achieve the highest possible levels of safety and security.

Projects included in the safety category include obstruction lighting and removal, acquisition of fire and rescue equipment, and improvements to runway safety areas. Safety development totals $2.1 billion, which is an increase of 11 percent ($212 million) from the last report.

Security projects include perimeter fencing, security devices, and other security enhancements. Security development totals $1.1 billion, an increase of 13 percent ($124 million). Costs associated with modifying terminals to accommodate explosive detection systems are not included in this report because FAA is prohibited from funding these projects with AIP funding. However, these projects remain eligible under the PFC Program and under TSA's grant program.

Reconstruction

Reconstruction includes development to replace or rehabilitate airport facilities, primarily pavement and lighting systems that have deteriorated due to weather or use and that have reached the end of their useful lives. This category, which accounts for about 22 percent, or $11.7 billion, of NPIAS funding needs, includes the rehabilitation of pavement on a 15- to 20-year cycle. This category of development increased by 22 percent and reflects an increase in reconstruction costs by every type of NPIAS airport. Failure to replace deteriorating pavement increases airport maintenance costs and can result in damage to aircraft propellers and engines, pooling of water and ice deposits, and eventually potholes that can damage landing gear. Airfield lighting cables and fixtures deteriorate with age, resulting in dim and unreliable lighting if they are not replaced. Reconstruction is included in the NPIAS when normal maintenance procedures are no longer economical and effective.

Standards

Standards projects include development to bring existing airports up to design criteria recommended by FAA. This remains the largest development category, accounting for 29 percent of the NPIAS. Many commercial service airports were designed more than 50 years ago to serve relatively small and slow aircraft but are now being used by larger and faster turboprop and jet aircraft. As a result, runways and taxiways must be relocated to provide greater clearance for aircraft with larger wingspans, and aircraft parking areas must be adapted to accommodate larger aircraft. Standards development at general aviation and reliever airports is generally justified to accommodate a substantial number of operations by a "critical" aircraft with sizes and operating characteristics that were not foreseen at the time of original construction. If this work is not undertaken, aircraft may be required to limit fuel or passenger loads because of inadequate runway length. FAA usually requires an indication that an aircraft type will account for at least 500 annual itinerant operations at an airport before development is included in the NPIAS to accommodate it.

For airports across the country, the infrastructure requirements needed to implement an approach, such as a lateral precision performance with vertical guidance (LPV) using FAA's WAAS, have not been independently assessed and, therefore, may not be specifically captured in this report. Aerial surveys are currently underway nationwide to help assess the obstacles that may impact the approach minimums to a particular runway. In addition, ongoing evaluations of airport master plans are occurring, which consider the airport infrastructure, like a parallel taxiway, that may need to be constructed to accommodate an LPV approach.

Environment

The environment category includes projects designed to achieve an acceptable balance between airport operational requirements, environmental requirements, and the expectations of residents of the surrounding area for a quiet and clean environment. This development supplements the large noise reductions that have been achieved by quieter aircraft and the use of noise abatement procedures. It accounts for 5 percent, or $2.6 billion, of NPIAS costs and includes the relocation of households and soundproofing of residences and public buildings in areas underlying aircraft approach and departure paths. Seventy-seven percent of the cost is for land acquisition in fee simple (complete ownership), for easements (partial ownership) to compensate property owners for

overflights, or for noise mitigation for residences or public buildings. 23 percent of the cost is for environmental mitigation (i.e., deicing handling and recycling facilities, replacement of impacted wetlands and hazardous wildlife mitigation and specialized equipment to support the Voluntary Airport Low Emissions Program for reducing airport air emissions).

Environmental costs are concentrated at airports with frequent flights by jet aircraft (54 percent large hubs, 25 percent medium hubs, 8 percent small hubs, 7 percent nonhubs, and 6 percent reliever and general aviation airports). This development is part of an extensive Federal and industry program—involving land use planning, quieter aircraft, and noise abatement procedures—that has reduced the estimated number of people exposed to significant noise.

Terminal Building

Terminal building costs are incurred for development to accommodate more passengers and different aircraft (small regional jets and new large aircraft). Although this is the fourth largest development category accounting for 12 percent of the NPIAS costs, terminal costs decreased 31 percent ($2.8 billion) from the last report with the large hubs accounting for $2.4 billion (85 percent) of this decrease. This reflects the funding of a few terminal projects through the PFCs and the deferral of a few projects beyond 2015. Terminal development for large, medium, and small hub airports decreased while nonhubs, relievers, and general aviation airports increased.

The NPIAS only includes the portion of terminals that are eligible for Federal aid (about 50 to 60 percent) and excludes revenue-generating areas[61] used exclusively by a single tenant or by concessions, such as gift shops and restaurants. The development is concentrated at the busiest commercial service airports (48 percent large hubs, 23 percent medium hubs, 13 percent small hubs, and 12 percent nonhubs).

Surface Access

Access includes the portion of airport ground access (highways and transit) that is within the airport property line and eligible for grants under the AIP. The large hubs account for 53 percent, and medium hubs account for 21 percent of the access development needs. Surface access currently accounts for 5 percent of the NPIAS costs, up 22 percent from the last report. FAA currently has research underway to assess the most critical surface access problems identified by airport sponsors. This includes curbside improvements and improving passenger access to the airport terminal from surface transportation facilities. The results of the research will be reported in the next edition of this report.

Airfield Capacity

Airfield capacity is development that will improve an airport for the primary purpose of reducing delay and/or accommodating more passengers, cargo, aircraft operations, or based aircraft. This is the third largest development category, accounting for 18 percent of the NPIAS, and includes new runway, taxiway, and apron construction and extensions. The airfield capacity development

[61] Nonhub primary airports and smaller public-use airports can use AIP funds for revenue-producing aeronautical support facilities.

included in this five-year plan will help to reduce congestion. However, problems will remain in certain large metropolitan areas such as New York and Los Angeles, and FAA will continue to focus on the need for additional capacity and increased efficiency at those locations.

New Airports

New airports are recommended in the NPIAS for communities that generate a substantial demand for air transportation and either do not have an airport or have an airport that cannot be improved to meet minimum standards of safety and efficiency. In addition, new commercial service and reliever airports are recommended for communities where existing airports are congested and cannot be expanded to meet the forecast demand for air transportation. During the next 5 years, a number of new reliever and general aviation airports, along with a few small commercial service airports and nonhub primary airports, are proposed. This category accounts for almost 2 percent of all NPIAS development. Development costs in this category decreased by 33 percent from the last report.

Other

This category of development accounts for about one-half of 1 percent of the total development in the NPIAS. It includes fuel farms, utilities, and construction and rehabilitation of parking lots. General aviation and reliever airports account for 44 percent of this development.

ANTICIPATED SOURCES OF FUNDING

There are generally four sources of funds used to finance airport development: airport cash flow, revenue and general obligation bonds, Federal/State/local grants, and PFCs. Access to these sources of financing varies widely among airports, with some large airports maintaining substantial cash reserves and the small commercial service and general aviation airports often requiring subsidies from local and State governments to fund operating expenses and finance modest improvements.

Since FY 2001, AIP grants have exceeded $3 billion annually, and for the last 7 years, PFC collections have exceeded $2 billion annually (in many cases leveraged to pay debt service or much larger bond issues). Together, AIP grants and PFC collections account for about 40 percent of annual U.S. airport capital spending needs. Historically, the combined resources have been adequate to achieve needed development.

In 2008, the commercial service airports reported expenditures of $10.9 billion in airport development projects representing the total public spending, including projects eligible for AIP grants (NPIAS) and projects ineligible for AIP grants, like automobile parking garages and hangars.[62] This is an increase of 17 percent or $1.6 billion from reported expenditures in 2006 of $9.3 billion.

[62] Airport Operating and Financial Summary, FY 2008 (FAA Form 127).

On February 17, 2009, President Obama signed Public Law 111-5. The legislation, referred to as the American Recovery and Reinvestment Act of 2009 (ARRA), provided to DOT, among other things, $48.1 billion for infrastructure development. Of this amount, $1.1 billion was provided to FAA from the General Fund for airport-related purposes to be administered under the requirements of AIP discretionary funding. The Office of Airports issued its first grant on March 23, 2009, and its last grant on December 31, 2009. As of July 6, 2010, the FAA had allocated all of the $1,097,800,000 billion for airport improvement projects with 326 grants for 362 airport projects. The types of projects funded through the ARRA include runway, taxiway, apron, terminal, aircraft rescue and firefighting buildings, airport equipment, new airport construction, noise mitigation, runway safety area enhancements, and security.

In addition, the ARRA provided a 2-year exemption to the Alternative Minimum Tax (AMT) for general airport revenue bonds. The AMT exemption made airport revenue bonds more attractive to investors and reduced the interest rate to the airport. The reduced financing costs for large airport capital improvement projects means airport sponsors now have more capital to invest in infrastructure. The Build America Bonds (BAB), a component of the ARRA, provides funding for State and local governments to complete capital project at lower borrowing costs. Airports are benefiting from BAB because of reduced interest payments on taxable bonds through a Federal subsidy equal to 35 percent of the interest paid. In some instances, airports are electing to issue taxable BAB bonds instead of traditional municipal tax-free bonds to further reduce debt payments in some instances. Between March 2009 and July 2010, 43 airport sponsors have issued approximately $14 billion in bonds. Approximately $10.5 billion (75 percent) of the $14 million represents 68 different bonds at 34 airports, which benefited from the AMT and BAB provisions in the ARRA.

The AIP serves as an effective investment tool to fund safety, security, and airfield projects that rank highest in national priority. The PFC Program has broader eligibility than the AIP, particularly for terminal projects, noise compatibility measures, and costs associated with debt financing, and is available in significant and predictable amounts to large and medium hub airports. As a result, airports, especially large and medium hubs, have been directing the majority of their PFC revenues to landside projects such as terminal development, ground access systems, noise mitigation, and the financing costs of these projects. The majority of nonhub primary airports use PFC revenues as the local “match” funds for AIP grants.

ADDITIONAL COSTS NOT INCLUDED IN THE NPIAS

The NPIAS only includes development that is eligible to receive Federal grants under the AIP. It does not include ineligible airport development, such as automobile parking structures, hangars, air cargo buildings, or the revenue-producing portion of large passenger terminal buildings.[63] It also does not include:

- Development eligible under the PFC Program but ineligible under the Federal grant program, such as gates and related areas.

[63] Vision-100 legislation changed eligibility for nonprimary airports and allows nonprimary entitlement funds to be used for hangars, provided FAA believes the airport has an adequate plan for financing all airside needs.

- Improvements to highway and transit systems beyond the airport property line.
- Improvements funded by FAA's Facilities and Equipment Program.
- Costs at airports for infrastructure improvements needed to take full advantage of WAAS LPV approaches.
- Development needed to relieve airfield congestion in metropolitan areas when there is no local consensus about how to address the problem. The NPIAS is drawn from approved plans only.