Federal Aviation Administration

Report to Congress

National Plan of Integrated Airport Systems (NPIAS)

2007-2011

Cover Photographs (from top to bottom)

San Diego International Airport-Lindbergh Field – Terminal 2 first opened in 1979 and was remodeled in 1998. Photo courtesy of Chris Sloan, author and curator of Airchive.com.

DuPage Flight Center – A general aviation airport designated as a reliever for O'Hare and Midway Airports. Photo courtesy of DuPage Airport Authority.

American Airlines Terminal at Dallas Fort Worth International Airport – New international terminal opened in late 2004. Photo courtesy of Chris Sloan, author and curator of Airchive.com.

Minneapolis-Saint Paul International Airport – MSP's fourth runway, Runway 17/35, opened for service on October 27, 2005. Photo courtesy of Minnesota Department of Transportation, Office of Aeronautics.

Federal Aviation Administration
U.S. Department of Transportation

National Plan of Integrated Airport Systems (NPIAS) (2007-2011)

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

The NPIAS 2007-2011 report is available online at:
http://www.faa.gov/airports_airtraffic/airports/planning_capacity/

THE SECRETARY OF TRANSPORTATION
WASHINGTON, D.C. 20590

SEP 29 2006

The Honorable Richard B. Cheney
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), 2007-2011.

The NPIAS report estimates the costs associated with establishing a system of airports adequate to meet the needs of civil aviation and to support the Department of Defense and the 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,

Maria Cino
Acting Secretary

Enclosure

THE SECRETARY OF TRANSPORTATION
WASHINGTON, D.C. 20590

SEP 29 2006

The Honorable J. Dennis Hastert
Speaker of the House of Representatives
Washington, DC 20515

Dear Mr. ~~Speaker~~: SPEAKER,

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Executive Summary

The National Plan of Integrated Airport Systems (NPIAS) for 2007 to 2011 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 when the U.S. civil airport system was in its infancy.

The plan identifies 3,431 airports that are significant to national air transportation, and therefore, eligible to receive grants under the Federal Aviation Administration (FAA) Airport Improvement Program (AIP). The report estimates that over the next five years, there will be $41.2 billion of AIP eligible infrastructure development for all segments of civil aviation.

Since 2000, the aviation industry has been battered with 9/11, the spread of Severe Acute Respiratory Syndrome (SARS), and record high fuel prices. Over the last five years, major restructuring and downsizing among the mainline legacy carriers has occurred along with rapid growth among low-cost carriers, and exceptional growth among regional carriers. Two of the legacy carriers have filed for bankruptcy protection and two have recently emerged from bankruptcy protection.[1] Jet fuel, which is an airline's second largest expense, have more than doubled in cost in the past six years, hampering the ability of the carriers to return to profitability or emerge from bankruptcy.

While the financial outlook for airlines seems to be brightening, U.S. airlines are still expected to post approximately $5 billion in losses in 2006, according to the International Air Transport Association. In 2005, U.S. commercial airlines reported a net loss of $11.8 billion with a net loss of more than $37 billion over the last five years, totally erasing the $23 billion that airlines earned between 1995 and 2000. In response, the air carrier airports have adjusted their capital spending plans to reflect the uncertain financial environment for their air carrier tenants. However, large commercial U.S. airports continue to have the financial capability to provide safe and efficient air transportation and to raise the money needed to accommodate future growth in passenger and cargo demand.

For the second year in a row, passenger demand on U.S. airlines was strong with 49 million more passengers traveling. In 2005, commercial air carrier enplanements rose seven percent and were six percent higher than enplanements in 2000. With passenger levels back to pre-9/11 levels and air carriers shifting from larger aircraft to smaller regional jets, some airports experienced increased delays in 2005. Major airfield improvements together with enhanced technology are planned to help mitigate delays at those airports. However, the majority of airports in our national system have adequate airport capacity and few or no delays.

A new initiative, the National Strategy to Reduce Congestion on America's Transportation Network (NSRCATN), was announced by the Secretary of Transportation to reduce congestion in the short term and to build the foundation for successful longer-term congestion-reduction efforts. This

[1] Delta and Northwest have filed for bankruptcy protection, and United and USAirways have emerged from bankruptcy.

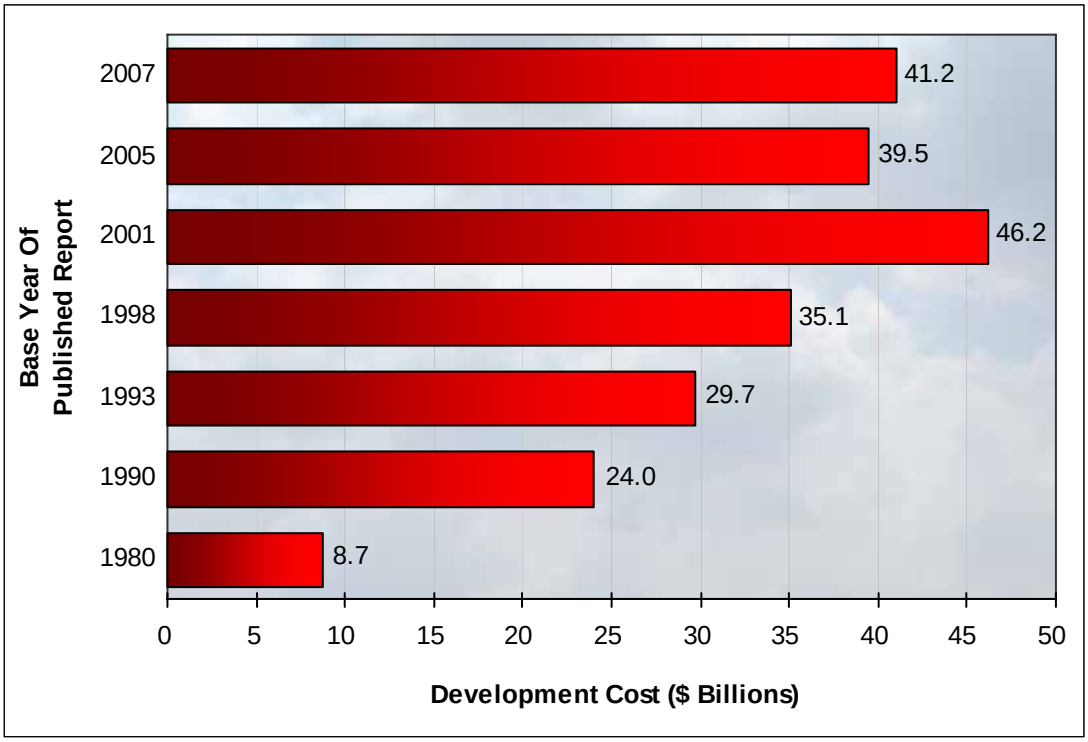
initiative will focus DOT's resources, funding, staff and technology on cutting traffic jams, relieving freight bottlenecks and reducing flight delays.

The NPIAS is used by FAA management in administering the AIP. It supports FAA's goals identified in the Flight Plan for safety and capacity by identifying the specific airport improvements that will contribute to achievement of those goals.

The NPIAS includes a section on the condition and performance of the 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 rents, fees, and taxes paid by users.

The cost estimates of future airport development included in this report are four percent higher than the preceding report, issued in 2004. However, costs are 11 percent lower than the pre-9/11 report issued in 2002. As shown in Figure 1 below, each edition since 1980 reflected an increase in development needs with a significant increase in 2001 followed by a decrease in 2005, and a moderate increase in 2007 reflecting the financial situation of airlines and airports.

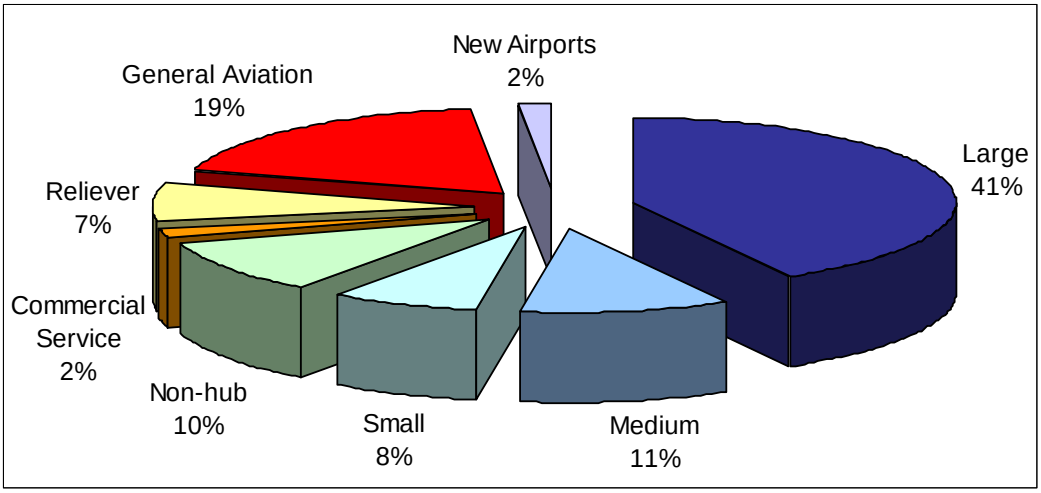
Figure 1: Five-Year Development Estimates from Published NPIAS Reports to Congress



Commercial service airports (large, medium, small, and non-hubs and non-primary commercial service airports) account for 74 percent of the total development. Development estimates increased

modestly for large, small, and non-hub airports while needs for medium hubs and non-primary commercial service airports decreased 12 and 11 percent, respectively. Large hubs account for 41 percent ($17 billion) of the $41.2 billion development identified in the report, an increase of one percent from the last report. Large hub airports have identified capacity development, such as runway and taxiway construction, as the largest development need over the next five years. This includes major development programs at Chicago, Atlanta, and Philadelphia. Terminal development is the second largest category of development for large hub airports (31 percent) down 3 percent from the last report and 39 percent from the 2001 report. Large hub airports continue to fund terminal rehabilitation, expansion, and new terminal development primarily through passenger facility charges (PFC). The large hub airports are also projecting significant pavement reconstruction needs through 2011. Figure 2 identifies development by airport type.

Figure 2: NPIAS Cost by Airport Type

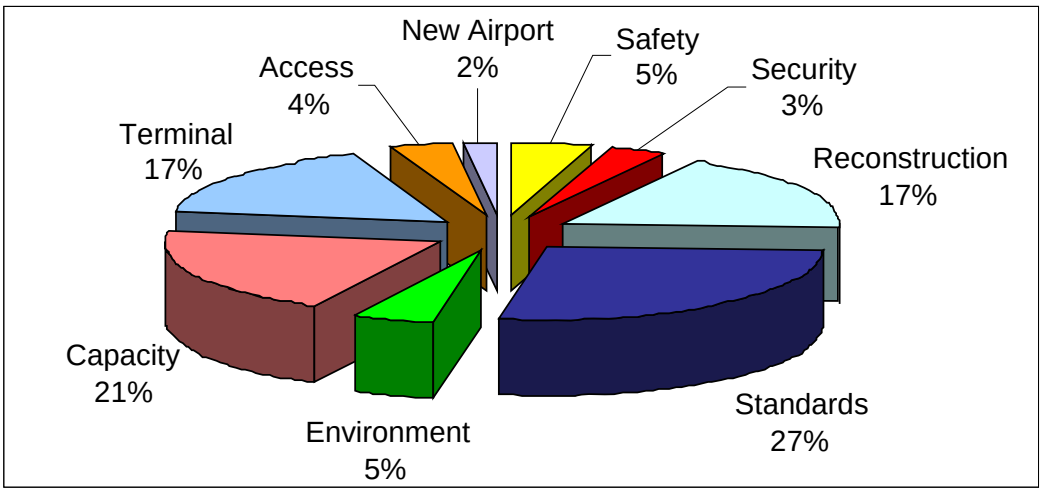


While general aviation and reliever airports make up 85 percent of the airports, they account for 26 percent of the total development contained in the report. Development at reliever airports increased moderately while needs at general aviation airports increased 11 percent. This increase reflects a continued focus, in part due to the non-primary entitlement funding which began in FY 2001, on identifying development (rehabilitating airfield pavement, removing obstructions, installing perimeter fencing, etc.) at these airports. [2] It is also due in part to the expanded eligibility for AIP funding of hangars, fuel facilities, and other items contained in Vision 100-Century of Aviation Reauthorization Act. The availability of non-primary entitlement has also allowed the funding of low priority items that were previously unlikely to be funded such as snow removal equipment, access road improvements, and general aviation terminal buildings.

[2] Beginning in FY 2001, with the enactment of Wendell H. Ford Aviation Investment and Reform Act for the 21st Century (AIR21), a total of 20 percent of the annual amount made available for obligation was apportioned for the use at non-primary commercial service, general aviation, and reliever airports within the States and insular areas. These airports are collectively referred to as "non-primary" airports. Non-primary airports are entitled to an individual apportionment based on the lesser of one-fifth of the airport's five-year capital needs as identified in the NPIAS Report, or $150,000.

Figure 3 identifies the cost by type of development. The purpose of planned development contained in the NPIAS is primarily to bring existing airports up to current design standards (27 percent) and to add airport capacity (21 percent). Replacing or rehabilitating airport facilities, mostly pavement and lighting systems, is the third largest development category (17 percent), increasing 39 percent since the last report. A significant amount of the identified funds (17 percent) is for the modification, replacement, and development of passenger terminal buildings to accommodate more passengers, larger aircraft, new security requirements, and increased competition among airlines. To accomplish this development, airports are directing the majority of their PFC revenues to landside projects such as terminals, ground access systems, noise mitigation, and the financing costs of these projects.

Figure 3: NPIAS Cost by Type of Development



As airports respond to a changing aviation environment, their development needs also change. The most significant change since the last report is the 40 percent increase in pavement reconstruction needs and the 21 percent decrease in development to bring airports up to FAA design criteria. The total estimated need for safety projects increased 45 percent reflecting the costs associated with improving runway safety areas. Security costs (including perimeter fencing and security devices) increased 91 percent from the last report.

Cost estimates in the NPIAS are obtained primarily from airport master and state system plans that were prepared by planning and engineering firms for 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 a realistic estimate of development needs that coincides with local and state capital improvement plans. It only includes development to be undertaken by airport sponsors. The development reflected in the NPIAS is based on planning documents available through early 2006. As a planning document, the NPIAS should not be used in evaluating investment priorities. The development estimates may include contingency costs (increase in cost based on design or construction uncertainty) but, generally, escalator costs (annual increase in costs) are not captured. It also does not reflect cost impacts from rising fuel prices.

For airports across the country, the infrastructure requirements needed to implement a lateral performance/vertical approach (LPV) using FAA's wide area augmentation system (WAAS) have not been fully assessed and, therefore, are not 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.

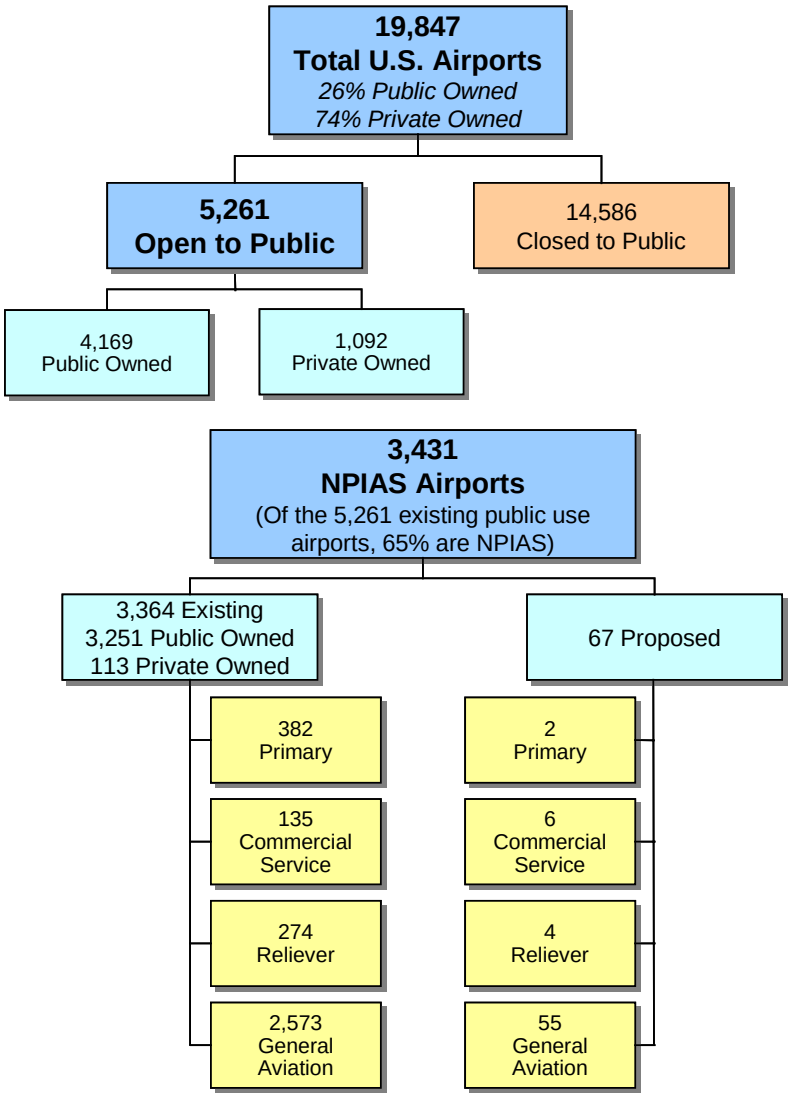
Funds for airport development are derived from a variety of sources including Federal/state/local grants, bond proceeds, passenger facility charges, airport generated funds (landing and terminal fees, parking and concessions revenues), and tenant and third party financing. The combination of funding sources and their adequacy varies with type of airport and level of activity. The NPIAS includes only planned development that is eligible to receive Federal grants under the AIP.

Chapter 1: System Composition

OVERVIEW

The United States accounts for approximately 40 percent of all commercial aviation and 50 percent of all general aviation activity in the world. An extensive system of almost 20,000 airports throughout the U.S. has been developed to support this activity. A primary purpose of the NPIAS is to identify the airports that are important to national transportation needs and, therefore, eligible to receive grants under the AIP. The NPIAS includes 65 percent of the 5,261 U.S. airports that are open to the public (see Figure 4). The plan contains all primary and commercial service airports; all general aviation airports designated as reliever airports by FAA, and selected general aviation airports.

Figure 4: Number of Existing and Proposed Airports by Ownership and Use (July 2006)



There are 1,897 public use airports that are not included in the NPIAS because they do not meet the minimum entry criteria,[3] are located at inadequate sites, or cannot be expanded and improved to provide a safe and efficient airport. The word "airport" includes landing areas developed for conventional fixed wing aircraft, helicopters, and seaplanes. As noted below, the NPIAS supports the FAA and U.S. Department of Transportation (DOT) objectives for the air transportation system.

U.S. DEPARTMENT OF TRANSPORTATION

The mission of DOT is to ensure that the U.S. has a fast, safe, efficient, accessible, and convenient transportation system that meets our vital national interests and enhances the quality of life of the American people, today and into the future. Toward this end, DOT has five strategic goals:[4]

1. *Safety*: Promote the public health and safety by working toward the elimination of transportation-related deaths and injuries.

2. *Mobility and Economic Growth*: Shape an accessible, affordable, reliable transportation system for all people, goods, and regions that sustain America's economic growth.

3. *Security*: Ensure the security of the transportation system for movement of people and goods, and support the national security strategy.

4. *Environment*: Protect and enhance communities and the natural environment affected by transportation.

5. *Organizational Excellence*: Advance DOT's ability to manage for results and innovation.

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.[5]

1. *Safety*: To achieve the lowest possible accident rate and constantly improve safety. There are five 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 meets projected demand in an environmentally sound manner. There are four specific objectives within the capacity goal.

[3] NPIAS entry criteria is contained in Order 5090.3C, Field Formulation of the NPIAS available online at: http://www.faa.gov/airports_airtraffic/airports/planning_capacity/npias/
[4] U.S. Department of Transportation Strategic Plan 2003-2008 available online at: http://www.dot.gov/PerfPlan2004/index.html
[5] Federal Aviation Administration Flight Plan 2006-2010 available online at: http://www.faa.gov/about/plans_reports/media/flight_plan_2006.pdf

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 workforce, enhanced cost-control measures, and improved decision-making based on reliable data. There are three specific objectives within the organizational excellence goal.

FAA'S OFFICE OF AIRPORTS

Each organization within FAA sets annual performance goals in support of FAA and DOT strategic goals. The NPIAS and AIP, by improving the safety, capacity, and condition of the airport system, contribute substantially to achieving the strategic goals as described in the FAA Flight Plan. Listed below are a few of the major goals that the Airports organization has set for FY 2006 and beyond:

- Where practicable, upgrade runway safety areas (RSA) to meet standards by the end of FY 2015. By the end of FY 2010, 92 percent of improvements will be completed (see Chapter 2, Safety section).

- Open up to eight new runway projects while increasing the annual service volume (ASV) of the 35 Operational Evaluation Plan (OEP) airports by at least one percent annually measured as a five-year moving average through FY 2010 (see Chapter 2, Capacity section).

- Ensure that 93 percent of runways at airports in the NPIAS are maintained at good or fair condition (see Chapter 2, Runway Pavement Condition section).

- Support efforts by large primary airports to update master plans and complete environmental studies for major airport development at large primary airports including major new and regional airports. Monthly reviews will be conducted to monitor the work (see Chapter 2, Capacity section).

- Reduce the number of people by 100,000 that live in residential communities in the Day-Night Average Sound Level (DNL) 65 decibel or greater noise contour through AIP funding of noise compatibility projects in the period from FY 2006 to FY 2010 (see Chapter 2, Aircraft Noise section).

- Maintain a level of 57 or fewer runway incursions resulting from pedestrian and vehicle driver actions in FY 2006 (see Chapter 2, Safety section).

GUIDING PRINCIPLES FOR THE NATIONAL AIRPORT SYSTEM

The airport system envisioned in the first National Airport Plan issued 60 years ago in 1946, when civil aviation was in its infancy, has been developed and nurtured by close cooperation between

Federal, state, and local 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, 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.
- 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 commuters with no more than 20 miles of travel to the nearest 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, 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 AIP.

AIRPORTS INCLUDED IN NPIAS

The NPIAS includes all commercial service, reliever (high capacity general aviation airports in metropolitan areas), and select general aviation airports. Figure 5 contains four maps showing the national distribution of NPIAS airports. The first map shows the 517 commercial service airports.

Figure 5: Geographic Coverage of NPIAS Airports*

517 Commercial Service Airports

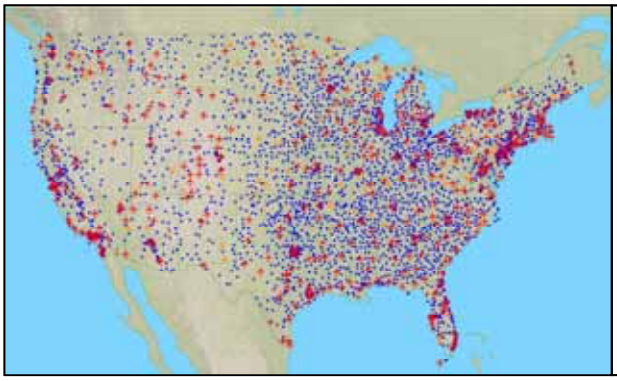
account for:
100% of enplanements
22% of general aviation aircraft
74% of NPIAS cost
65% of the population resides within 20 miles of these airports

274 Reliever Airports

account for:
0% of enplanements
29% of general aviation aircraft
7% of NPIAS cost
57% of the population resides within 20 miles of these airports

2,573 General Aviation Airports

account for:
0% of enplanements
41% of general aviation aircraft
19% of NPIAS cost
69% of the population resides within 20 miles of these airports



3,364 NPIAS Airports

account for:
100% of enplanements
92% of general aviation aircraft
100% of NPIAS cost
98% of the population resides within 20 miles of these airports

Primary ▲ Commercial Service ★ Reliever ● General Aviation

*Alaska and Hawaii are included in the statistics shown above. Proposed airports not shown and account for two percent of NPIAS costs.

The next map shows the 274 designated reliever airports. The third map identifies the 2,573 general aviation airports, and the final map shows all 3,364 NPIAS airports. This shows the extent to which the groups of airports serve passengers and general aviation aircraft, as well as how development costs of these groups contribute to the total system costs. The complete list of NPIAS airports is contained in Appendix A.

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

Table 1: Distribution of Activity (2004)

Number of Airports	Airport Type	Percentage of All Enplanements	Percentage of All Based Aircraft[1]
30	Large Hub Primary	68.7	1.1
37	Medium Hub Primary	20.0	3.0
72	Small Hub Primary	8.1	4.7
243	Non-hub Primary	3.0	10.6
135	Non-primary Commercial Service	0.1	2.4
274	Relievers	0.0	28.8
2,573	General Aviation	0.0	41.2
3,364	***Existing NPIAS Airports***	**99.9**	**91.8**
16,476	***Low Activity Landing Areas (Non-NPIAS)***	**0.1**	**8.2**

[1]Based on active aircraft fleet of 214,591 aircraft in 2005.

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 517 commercial service airports. 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 enplaned passengers (i.e., calendar year 2004 enplaned passengers determine fiscal year 2006 passenger apportionments).

Primary airports are grouped into four categories: large, medium, and small hubs, and non-hub airports. The FAA uses the term "hub" to identify very busy commercial service airports.

Large Hubs

Large hubs are those airports that each account for at least one percent of total U.S. passenger enplanements.[6] Some passengers originate in the local community and some consist of connecting passengers transferring from one flight to another. Several large hub airports (San Diego, Tampa, Fort Lauderdale, and LaGuardia) have little passenger transfer activity (10 percent or less), while

[6] 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).

transfers account for more than half of the traffic at others (Cincinnati, Charlotte, Atlanta, Memphis, Houston, Dallas-Ft. Worth and Chicago O'Hare, for example). The 30 large hub airports account for 69 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, Honolulu, Miami, and Phoenix) have an average of 316 general aviation based aircraft each,[7] but the other 26 large hubs average only 38 based aircraft each. Thus, locally based general aviation plays a relatively small role at most large hubs.

The nation's air traffic delay problems tend to be concentrated at the 30 large hub airports where the average delay per aircraft operation was six minutes in 2004.[8] Delays occur primarily during instrument weather conditions when runway capacity is reduced below that needed to accommodate traffic levels. These 30 large hub airports plus 5 of the busiest medium hub airports are included in FAA's 10-year plan to increase the capacity and efficiency of the national airspace system, known as the Operational Evolution Plan (see Capacity Section in Chapter 2).

Medium Hubs

Medium hubs are defined as airports that each account for between 0.25 percent and 1 percent of the total 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 600 based aircraft (Dallas Love Field and Santa Ana/Orange County) while the other 35 medium hub airports have an average of 148 based aircraft. The delay per operation averaged about three minutes at medium hub airports in 2004.

Small Hubs

Small hubs are defined as airports that enplane 0.05 percent to 0.25 percent of the total 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 139 based aircraft at each airport. These airports are typically uncongested and do not have significant air traffic delays.

Non-hub Primary

Commercial service airports that enplane less than 0.05 percent of all commercial passenger enplanements, but which have more than 10,000 annual enplanements are categorized as non-hub primary airports. There are 243 non-hub 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.

[7] Based aircraft include only general aviation aircraft.
[8] The source of delay data is FAA's Aviation System Performance Metric (ASPM) database and includes taxi-in, taxi-out, and airborne delays.

Non-primary Commercial Service

Commercial service airports that have from 2,500 to 10,000 annual passenger enplanements are categorized as non-primary commercial service airports. There are 135 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 38 based aircraft.

RELIEVER AIRPORTS

Due to different operating requirements between small general aviation aircraft and large commercial aircraft, general aviation pilots often find using a congested commercial service airport can be difficult.[9] 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 have 100 or more based aircraft or 25,000 annual itinerant operations. The 274 reliever airports have an average of 232 based aircraft, which is 29 percent of the nation's general aviation fleet. All airports that are designated as relievers by FAA are included in the NPIAS.

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 sites for general aviation airports if they account for enough activity (usually at least 10 locally based aircraft) and are at least 20 miles from the nearest NPIAS airport. The activity criterion may be relaxed for remote locations or in other mitigating circumstances. The 2,574 general aviation airports in the NPIAS tend to be distributed on a one-per-county basis in rural areas and are often located near the county seat. These airports, with an average of 33 based aircraft, account for 40 percent of the nation's general aviation fleet. They are the most convenient source of air transportation for about 19 percent of the population and are particularly important to rural areas.

NEW AIRPORTS

The NPIAS identifies 67 airports that are planned to open within the next five years. There are 55 new general aviation airports, 4 reliever, 6 non-primary commercial service and 2 new primary airports. One of the new primary airports replaces an existing commercial service airport (St. George, UT) and one airport provides additional commercial service to serve the Chicago area (Peotone, IL).

[9] Large commercial aircraft typically operate at much greater 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 wake turbulence considerations. In addition, general aviation pilots may be less familiar with air traffic control procedures used at airports that primarily serve air carrier operations.

An environmental impact statement was recently completed for a replacement commercial service airport to serve Panama City, FL. It is anticipated that this new airport will open within 6 to 10 years, and therefore it is not reflected in Appendix A, which only identifies new airports expected to open within the next 5 years. Several other communities have planning studies underway to examine the feasibility of replacing existing airports (Bowling Green, KY; San Diego, CA; and Hazleton, PA) or evaluate the need for an additional commercial service airport to serve the community (Las Vegas, NV).

AIRPORTS NOT INCLUDED IN NPIAS

The NPIAS includes 3,364 of the 5,261 U.S. airports that are open to the public. There are 1,897 airports open to the public that are not included in the NPIAS. There are 918 publicly owned, public use airports that are not included because they do not meet the minimum criteria for NPIAS of 10 based aircraft, or 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. FAA usually recommends replacement of inadequate airports. The remaining 979 airports are privately owned, public use airports that are not included because they are located at inadequate sites, are redundant to publicly owned airports, or have too little activity to qualify for inclusion. In addition, 14,586 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 33 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. The effort 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 are cost-effective and define an airport system that is consistent with established state goals and objectives regarding 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 interest.

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Chapter 2: System Performance

OVERVIEW

The Federal role in airport development is largely concerned with optimizing system performance. The primary purpose of this chapter is to describe how well the airport system is operating and to highlight any trends that are apparent. Six key factors have been selected to gauge the level of system performance: capacity, safety, environment, pavement condition, surface accessibility, and financial performance.

Each of the six factors is relevant to the quality of air transportation and, taken together, provide a good indication of system performance. The six factors are not equally sensitive to capital improvements, and increased investment in infrastructure is not necessarily the only way to improve performance. Federal aid to airports can be useful in focusing on specific issues, such as the provision for aircraft rescue and fire fighting equipment, development of safety areas around runways, removal of obstructions in runway approach zones, and planning and implementing noise compatibility measures

A section on monitoring the performance of terminal buildings will be added to future NPIAS reports, when a suitable monitoring technique is developed. FAA continues to make progress working with industry to develop best practice guidance on the planning, design, and development of airport terminal buildings.

National Strategy to Reduce Congestion on America's Transportation Network[10]

In May 2006, Secretary of Transportation Mineta announced a new initiative, the *National Strategy to Reduce Congestion on America's Transportation Network* (NSRCATN), providing a blueprint for Federal, state and local officials to tackle congestion. The U.S. Department of Transportation will focus its resources, funding, staff and technology on cutting traffic jams, relieving freight bottlenecks and reducing flight delays.

The initiative will seek Urban Partnership Agreements with a handful of communities willing to demonstrate new congestion relief strategies and will encourage states to pass legislation giving the private sector a broader opportunity to invest in transportation. It calls for more widespread deployment of new operational technologies and practices that will end traffic tie-ups, designate new interstate "corridors of the future," target port and border congestion, and expand aviation capacity.

The NSRCATN identifies six areas of emphasis with the potential for short and long-term congestion-reduction efforts. The Department identified addressing congestion in the aviation system by accelerating major aviation capacity projects and providing a future funding framework. The priority treatment of aviation system capacity enhancing projects at airports such as Philadelphia, Seattle, and Chicago will be very helpful.

[10] For further information, go to: http://www.dot.gov/affairs/dot5706.htm

The Secretary tasked the National Surface Transportation Policy and Revenue Commission with finding solutions that not only raise revenue for highway and transit projects, but also reduce the cost of congestion by focusing more on system performance. The commission was created under Section 1909 of the Safe, Accountable, Flexible, Efficient Transportation Equity Act—A Legacy for Users (SAFETEA-LU). It was created because members of the Congress declared, "that it is in the national interest to preserve and enhance the surface transportation system to meet the needs of the United States for the 21st century." It is comprised of 12 members, representing Federal, state and local governments, metropolitan planning organizations, transportation-related industries, and public interest organizations, working to examine not only the condition and future needs of the nation's surface transportation system, but also short and long-term alternatives to replace or supplement the fuel tax as the principal revenue source to support the Highway Trust Fund over the next 30 years.

Next Generation Air Transportation System (NGATS)

The Joint Planning and Development Office (JPDO) is developing a concept for 2025, which transitions the current national airspace system into the Next Generation Air Transportation System. This Next Generation Air Transportation System Initiative will address critical safety and economic needs in civil aviation while fully integrating national defense and homeland security improvements into this future system. The effort involves the Departments of Transportation, Homeland Security, Defense, and Commerce, as well as the National Aeronautics and Space Administration, Federal Aviation Administration, and the White House Office of Science and Technology Policy. Federal officials from these organizations along with members of the private sector are developing the operational concepts behind NGATS. The FAA Airports line of business has assumed the lead role for the Airport Infrastructure Integrated Product Team (IPT). The Airports IPT is identifying, developing, and facilitating the airport systems required to meet future capacity demands and provide the needed flexibility and efficiencies required to adopt to changing transportation needs.

FAA's challenge has been to find a way to ensure that the agency's planning can realize JPDO's vision for the Next Generation Air Transportation System. To meet this challenge, FAA has decided to expand the Operational Evolution Plan (OEP) into the agency's "one plan" to provide continuity between what is and what is to come. Expanding its scope beyond capacity, the new OEP (no official name has yet been assigned) will harmonize existing plans and concepts, and like its predecessor, will provide a real and tangible foundation against which the agency and its partners can chart the future. The new OEP will become the operational implementation plan for fulfilling the agency's portion of the NGATS vision.

The OEP is an ongoing 10-year plan developed by FAA to increase the capacity and efficiency of the NAS, while at the same time enhancing safety and security. The first plan was released in 2001 and is updated annually. The plan focuses its improvements at the OEP 35 airports (30 large hub airports, and 5 medium hub airports—Memphis, Cleveland, St. Louis, Pittsburgh, and Portland).

Airport Capacity – A National Look

In June 2004, FAA released a report on airport capacity titled "*Capacity Needs in the National Airspace System: An Analysis of Airport and Metropolitan Area Demand and Operational Capacity in the Future*." The goal of this study was to determine which commercial airports would need additional capacity in the future and why. In addition to identifying the airports, any constraints and

limitations to enhancing their capacity were also examined. The initial focus of this effort concentrated on the 35 OEP airports. This analysis was expanded to include nearly 300 commercial service airports in more than 200 metropolitan areas across the country. The idea of looking beyond the 35 OEP airports was to identify those airports and metropolitan areas where demand for air transportation is growing quickly enough to potentially result in the need for additional capacity. The study concluded that air traffic levels would continue to grow over time and will place additional demands on and strain the capacity of the national airspace system. Socioeconomic and demographic trends will continue to affect many of the same metropolitan areas that historically have had a need for additional capacity. This study indicated that the predominant trend over the next two decades would continue to be the expansion of existing airports to meet forecast demand. A copy of the June 2004 report is available at:
http://www.faa.gov/airports_airtraffic/airports/resources/publications/reports/

The analysis was coordinated with each of the identified airports to ensure the assumptions of fleet mix, runway configuration, and constraints or limitations to the operational flexibility of the airport were correct. The coordination also provided the opportunity to learn of any planned improvements. The findings from these meetings will be incorporated into a future version of this study.

A roundtable discussion was held to give industry leaders an inside look at the methodology used in the capacity study. The industry panel, which included representatives from aviation associations, consultants, and local airport authorities, found that the study shows promise as a tool for strategic planning at both the national and local levels. The attendees suggested that future versions contain more detailed information on the assumptions and findings.

This study is being updated with the new modeling data, findings of the airport visits, current demand forecasts, and agency plans contained in the current OEP. One finding of the capacity study indicated that the modeling was not as detailed at many of the non-OEP airports. Therefore, all the airports identified were modeled to the same level of detail resulting in ASV and airport capacity benchmarks being developed for each airport. It is also being updated to align the timing with the work that is being done as part of the Joint Planning and Development Office (JPDO). Potential solutions to improve capacity are being evaluated and the benefits will be determined at identified airports. The input received at an industry roundtable discussion will be included in this update.

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, and the application of technology. The majority of airports in our national system have adequate airport capacity and little or no delay. For those airports that need additional capacity, a runway project is one means to improve capacity. However, not all airports are able to build a new runway or extend an existing one. The Alternative Capacity Enhancement Measures section includes some non-capital alternatives that are being developed or have been implemented.

The process that is used to determine future airfield development is comprehensive. 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 value 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 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. Since major airfield improvements often take 10 or more years from concept to opening, the recommendation allows adequate lead-time so that the needed improvement can be completed before a 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 the Annual Service Volume (ASV). ASV is a model that calculates 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 increases gradually with rising levels of traffic. Therefore, the relationship between aircraft operations and delay is non-linear, and often exponential. For larger airports, it appears that the onset of more rapid growth in delay often occurs when delay is between four and six minutes per aircraft operation.

ASV is a measure included in the FAA Flight Plan. The goal is to increase the ASV of the Operational Evolution Plan (OEP) airports by at least one percent per year through 2010. The 12 new runways that have opened in the last 7 years as shown below in Table 2 are keeping FAA on track to achieve this goal.

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 large hub primary airports to ensure environmental studies for major runway projects are completed on schedule. FAA establishes environmental impact statement 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. Deadlines are set and monitored and a process is put in place to elevate and resolve disputes or disagreements between parties.

Congestion and Delay

Concentration of aircraft arrivals and departures at an airport can result in congestion and delay. 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 2005, the 20 airlines

reporting data posted an on-time arrival record of 77 percent, which is below the all-time best mark of 82.1 percent reached in 2002.

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.

Runways

The largest airport capacity increases can be achieved through new runway construction. Generally, new runways increase an airport's capacity by 30 to 60 percent. Since 1999, 12 new runways have opened (shown in Table 2) at airports identified in FAA's OEP, providing these airports with the ability to accommodate more than 1.6 million additional operations per year and increasing capacity of the 35 OEP airports by almost 9 percent.

Table 2: New Runways Opened Since 1999 at OEP Airports

Airport	Date New Runway Opened	Runway Identifier	Runway Length (Feet)
Philadelphia	December 1999	8/26	5,000
Phoenix	October 2000	7R/25L	7,800
Detroit	December 2001	4L/22R	10,000
Cleveland	August 2004	6L/24R	9,000
Denver	September 2003	16R/24L	16,000
Miami	September 2003	8/26	8,600
Houston	October 2003	8L/26R	9,000
Orlando	December 2003	17L/35R	9,000
Minneapolis-St. Paul	October 2005	17/35	8,000
Cincinnati-No. Kentucky	December 2005	18R/36L	8,000
Lambert-St. Louis	April 2006	11/29	9,000
Atlanta Hartsfield	June 2006	10/28	9,000

Currently, there are six runway projects (four new runways, one runway extension, and one airfield reconfiguration) under construction or in the pre-construction stage as shown in Table 3. Three of the six runways are capacity projects (Seattle, Washington, and Chicago), two of the projects are to reduce delays (Boston and Philadelphia) and one project (Los Angeles) is to improve the safety and efficiency of the airport. The three capacity project runways are anticipated to provide these airports with the ability to accommodate about 300,000 additional operations per year. In addition, there are seven other runway projects under consideration at OEP airports that are currently in the planning or environmental review stage.

Table 3: New OEP Runways and Runway Extensions (as of June 2006)

Airport	Anticipated Runway Opening Date	Status
Boston Logan	November 2006	Under construction
Philadelphia (Extension)	December 2007	Construction to begin August 2006
Los Angeles (Runway and Taxiway)	June 2008	Under construction
Seattle-Tacoma	November 2008	Under construction
Washington Dulles	November 2008	Under construction
Chicago O'Hare (Phase 1A New Runway)	Fall 2008	Under construction

Evaluation Measures

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 measures for the 35 major airports contained in the OEP 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, average enplanements per departure, and the average minutes of delay per operation.

Several things become evident from the data in Table 4. Most of the airports are served largely by air carrier aircraft (more than 60 seats), most have limited general aviation and military operations, about 22 of the airports serve largely originating passengers, and most of the airports have 3 or more runways. There are several figures that illustrate the data contained in Table 4.

Figure 6 shows the share of commuter and air carrier operations by airport. There are 5 airports where commuter aircraft (aircraft with 60 or fewer seats) operations are greater than air carrier operations: Cincinnati, Cleveland, Pittsburgh, Washington Dulles, and St. Louis. This is an increase of one airport, Cleveland, from the 2002 data.

In the past, the use of larger aircraft to move more passengers per operation, particularly at congested airports, increased runway efficiency. However, recent trends suggest that legacy carriers are using regional jets (RJ) to replace or supplement mainline routes served by narrow-body aircraft. These aircraft are being used to improve the airline profitability in thin to medium density markets while maintaining frequency of service but reducing seat capacity. As a result, regional airlines have increased their share of total passengers from 12 percent in 2000 to more than 20 percent in 2005.

This increase in RJ activity has the potential to aggravate airspace and airfield congestion. RJs use the same runways as larger jets, yet some climb and descend more slowly than large jets and carry fewer passengers. Also, RJs have an impact on airport terminal facilities. They have a lower sill height than larger aircraft so loading bridges have to be modified or retrofitted, which generally requires an extension of the bridge into the apron area.

Table 4: Selected Demand and Capacity Measures for 35 OEP Airports

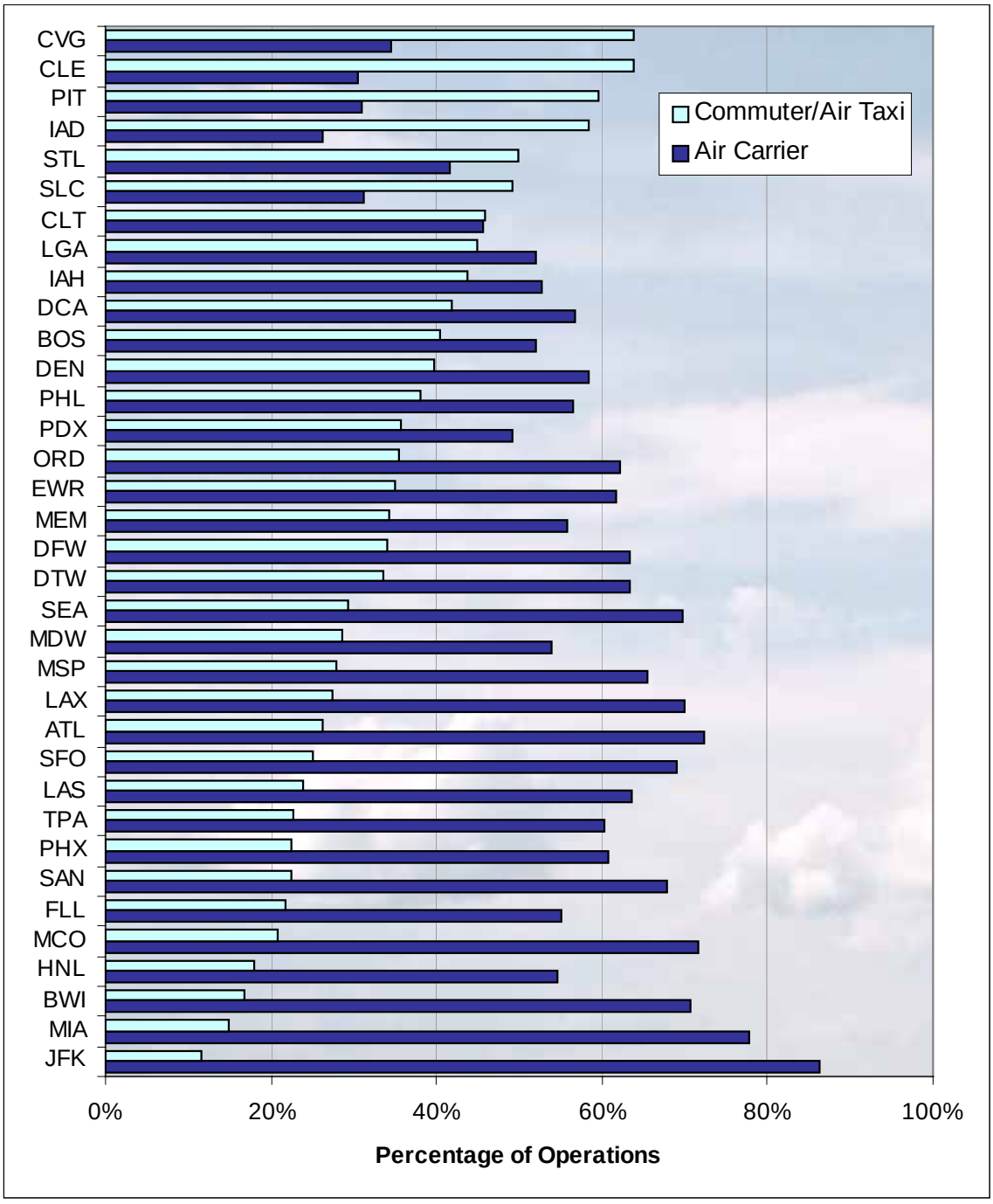
(2004 Data Ranked by Enplanements)

LOCID	Airport	Hub Size	Enplanements Rank	Operations Rank	Enplanements	Air Carrier Operations of Total (%)	Commuter Operations of Total (%)	GA and Military Operations (%)	Average Enplanements Per Department	Average Minutes of Delay	Origin Passengers (%)	Connecting Passengers (%)	Domestic (%)	International (%)	Number of Existing Runways
ATL	Atlanta	L	1	2	41,123,857	72%	26%	1%	86	8	34%	66%	92%	8%	5
ORD	Chicago	L	2	1	36,100,147	62%	35%	2%	75	8	41%	59%	86%	14%	6
LAX	Los Angeles	L	3	4	28,925,341	70%	27%	3%	91	5	60%	40%	74%	26%	4
DFW	Dallas/Fort Worth	L	4	3	28,063,035	63%	34%	2%	71	7	40%	60%	92%	8%	7
DEN	Denver	L	5	7	20,407,002	58%	40%	2%	73	4	50%	50%	96%	4%	6
LAS	Las Vegas	L	6	6	19,943,025	64%	24%	12%	79	5	84%	16%	97%	3%	4
PHX	Phoenix	L	7	5	19,336,099	61%	22%	17%	79	5	61%	39%	96%	4%	3
JFK	New York	L	8	32	18,586,863	86%	12%	2%	114	8	60%	40%	54%	46%	4
MSP	Minneapolis/St. Paul	L	9	8	17,482,627	65%	28%	7%	69	7	45%	55%	93%	7%	4
IAH	Houston	L	10	10	17,322,065	53%	44%	4%	69	8	39%	61%	82%	18%	5
DTW	Detroit	L	11	9	17,046,176	63%	34%	3%	67	6	45%	55%	89%	11%	6
EWR	Newark	L	12	16	15,827,675	62%	35%	3%	74	10	68%	32%	73%	27%	3
SFO	San Francisco	L	13	26	15,605,822	69%	25%	6%	94	4	62%	38%	77%	23%	4
MCO	Orlando	L	14	33	15,270,347	72%	21%	8%	101	4	88%	12%	94%	6%	4
MIA	Miami	L	15	20	14,515,591	78%	15%	7%	79	4	45%	55%	52%	48%	4
SEA	Seattle	L	16	23	14,092,285	70%	29%	1%	79	4	72%	28%	92%	8%	2
PHL	Philadelphia	L	17	13	13,824,332	57%	38%	5%	61	10	62%	38%	87%	13%	4
BOS	Boston	L	18	17	12,758,020	52%	41%	7%	65	6	85%	15%	85%	15%	5
CLT	Charlotte	L	19	14	12,499,476	46%	46%	9%	58	5	26%	74%	93%	7%	3
LGA	New York	L	20	19	12,312,561	52%	45%	3%	63	9	92%	8%	95%	5%	2
IAD	Washington Dulles	L	21	12	10,961,614	26%	58%	15%	51	7	47%	53%	79%	21%	3
CVG	Covington	L	22	11	10,864,547	34%	64%	2%	43	5	23%	77%	95%	5%	4
BWI	Baltimore/Washington	L	23	37	10,103,563	71%	17%	13%	75	4	83%	17%	96%	4%	4
FLL	Fort Lauderdale	L	24	35	10,040,598	55%	22%	23%	83	5	92%	8%	92%	8%	3
HNL	Honolulu	L	25	34	9,579,076	55%	18%	27%	82	3	67%	33%	78%	22%	4
MDW	Chicago Midway	L	26	29	9,238,592	54%	29%	17%	66	6	70%	30%	98%	2%	5
SLC	Salt Lake City	L	27	18	8,884,880	31%	49%	20%	53	5	50%	50%	99%	1%	4
TPA	Tampa	L	28	51	8,436,025	60%	23%	17%	83	3	93%	7%	98%	2%	3
SAN	San Diego	L	29	63	8,135,832	68%	22%	10%	84	4	97%	3%	99%	1%	1
DCA	Washington National	L	30	43	7,661,532	57%	42%	1%	57	5	86%	14%	98%	2%	3
PIT	Pittsburgh	M	32	31	6,606,117	31%	60%	9%	43	4	52%	48%	97%	3%	4
PDX	Portland	M	33	46	6,379,884	49%	36%	15%	57	2	85%	15%	97%	3%	3
STL	St. Louis	M	34	40	6,377,628	42%	50%	9%	48	3	81%	19%	98%	2%	6
CLE	Cleveland	M	35	45	5,389,196	30%	64%	6%	43	6	71%	29%	97%	3%	4
MEM	Memphis	M	36	21	5,295,062	56%	34%	10%	31	5	35%	65%	97%	3%	4

Sources:
Enplanements – FAA Air Carrier Activity Information System (ACAIS)
Operations (Air Carrier, Commuter, GA and Military) – FAA Air Traffic Activity System (ATADS)
Average Minutes of Delay – FAA Aviation System Performance Metrics (ASPM) – taxi in, taxi out, and airborne delay
Origin & Connecting Passengers – DOT Bureau of Transportation Statistics, T-100 & Originating Passenger Data Survey
Domestic and International Passengers – ACAIS
Number of Existing Runways – FAA Airport Master Record data (FAA Form 5010)

Figure 6: Percentage of Commuter and Air Carrier Operations at 35 OEP Airports in 2004

(Ranked by Highest Share of Commuter/Air Taxi Operations)

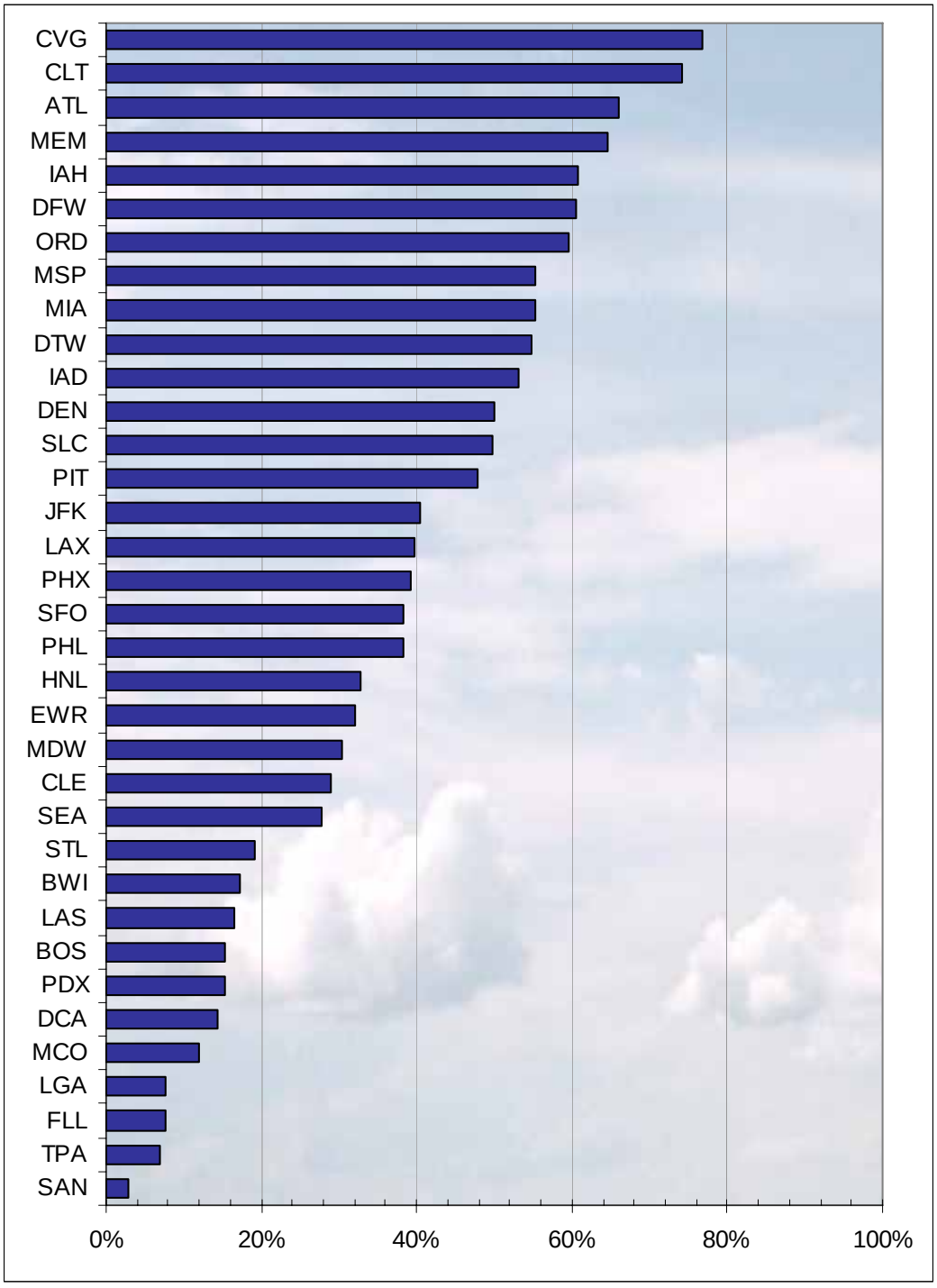


Air Carrier operations are those by aircraft with more than 60 passenger seats; general aviation and industry operators not shown.
Source: FAA Terminal Area Forecast

Figure 7 illustrates that the majority of passengers at 22 of the OEP airports are originating passengers (share greater than 50 percent). Eleven airports have connecting passenger levels greater

than their originating passenger levels, and of those 11 only 2 (Cincinnati and Charlotte) have more than 70 percent of their passengers connecting to other flights. Two airports have equal connecting and transfer passengers (Salt Lake City and Denver).

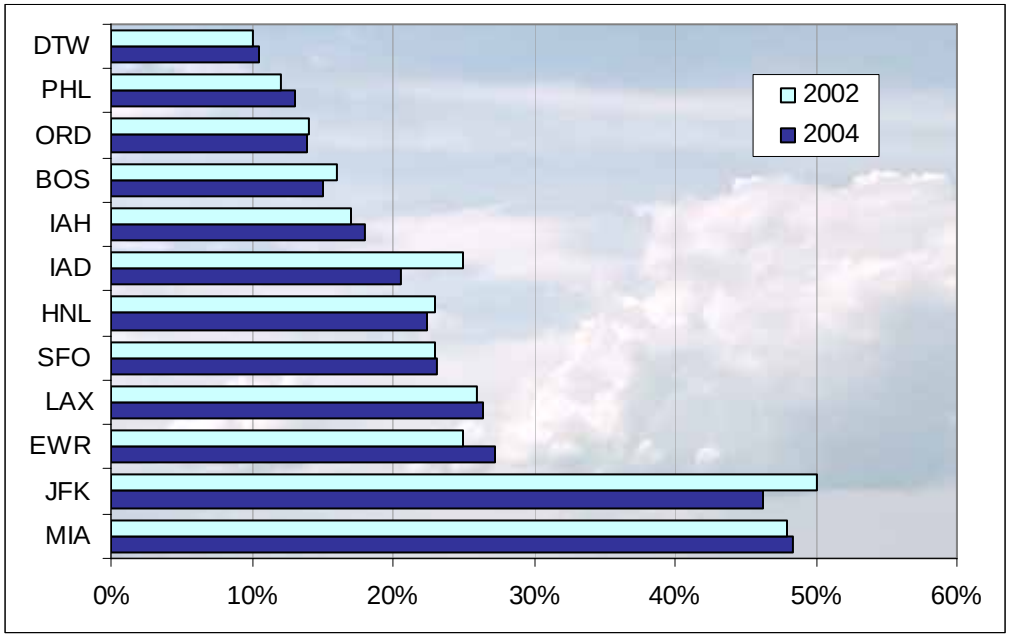
Figure 7: Percentage of Connecting Passengers at 35 OEP Airports in 2004



Source: U.S. Department of Transportation, Bureau of Transportation Statistics, 2004

Most U.S. airports serve domestic markets, while international passenger service is concentrated at 42 U.S. airports (29 large hubs, 10 medium hubs, and 3 small hubs). As shown in Figure 8, only 12 airports have international enplanements accounting for 10 percent or more of their activity and these 12 airports account for 70 percent of the passengers who boarded international flights in the U.S. This measure remained largely unchanged from the preceding NPIAS report, issued in 2004.

Figure 8: Airports with 10 Percent or More International Enplanements



Alternative Capacity Enhancement Methods

The construction of new runways is not the only response to improve capacity and reduce delay. Continued focus on other measures, termed Alternative Capacity Enhancement Measures, can help reduce delay without substantial investment.

Airspace/Procedural/Technology Approaches

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 procedures also have an impact on capacity. Mid-term agency commitments to increase capacity and reduce delays are being monitored through the OEP. A description of these initiatives can be found on the OEP website, www.faa.gov/programs/oep.

Airspace

Airspace design changes are being made to fit sectors to the traffic demand, and to establish more effective airspace structures in the long run. An example is the recently completed airspace redesign in southern Florida that made significant changes to en route and terminal airspace resulting in

dozens of new routes and airspace sectors. When implemented, it helped reduce delays and create more efficient routings from points north to Florida. Another example is the large-scale redesign of routes and sectors through the Great Lakes Corridor changing the way aircraft are routed, allowing for a more effective and efficient use of the airspace. New sectors have been added to address growing complexity. These route and sector changes will also better accommodate the new runways in the underlying airspace, including Detroit, Cleveland, Cincinnati, and Chicago.

Procedural

Domestic Reduced Vertical Separation Minima (DRVSM) was implemented early in 2006, resulting in aircraft achieving better, more fuel-efficient altitudes, and a reduction in en route bottlenecks. The procedure permits controllers to reduce minimum vertical separation from 2,000 to 1,000 feet at altitudes between 29,000 and 41,000 feet for aircraft equipped with dual altimeter system and autopilots. As such, DRVSM essentially doubles capacity at high altitudes, adding six flight levels above 29,000 feet. By providing greater access to high altitude flight levels, which are more fuel efficient, FAA estimates that DRVSM will save airlines approximately $5 billion in fuel costs through 2016.

Development of RNAV (Area Navigation) departure and arrival routes in terminal areas is underway. These routes provide savings for the airlines. For instance, the RNAV procedures implemented in Atlanta in 2005 resulted in projected annual savings of $16 million. High altitude RNAV routes (Q-routes) reduce flight distances and reliance on conventional ground-based navigational aids and allow for more efficient airspace design.

FAA is developing Required Navigation Performance approaches for specific airports that provide fuel savings from more direct approaches and departures that reduce mileage. New instrument approach procedures also being developed reduce flight distances that will enhance runway capacity during adverse weather. A new safety and capacity program is expected to facilitate aircraft taxiing in very low visibility weather conditions.

Technology

Over the next two decades, FAA expects additional enhancements due to advances in technology related to automation information systems, communications, navigation, surveillance, and weather. Much of this work will be under the NGATS initiative.

Slot/Congestion Management

Congestion management is a broad term that includes a number of policies designed to reduce congestion and delay. The imposition of peak/off-peak period landing fees is one form of congestion management. Such fees may encourage air carriers to use larger aircraft in peak periods or to shift flights to off-peak hours, both of which would reduce congestion. At a few airports, especially those located in major urban areas, adding substantial amounts of new capacity may not be possible. Properly structured landing/takeoff fees may encourage the more efficient use of scarce airport capacity. FAA and DOT are exploring congestion management as one of several ways of alleviating airport congestion at a small number of airports where demand may come to exceed capacity in the short term, pending capacity expansion, or in the long term if capacity expansion is not a practical option.

In January 2004, to alleviate the growing delay problems at Chicago O'Hare International (ORD), FAA and DOT secured an agreement between United and American, the two largest airlines serving ORD, to cut their operations during peak hours at ORD by five percent (62 scheduled flights) for six months. However, this agreement did not work as planned because other airlines operating at ORD filled the vacated slots. In August 2004, an order limiting scheduled operations at ORD went into effect. A series of schedule adjustments individually agreed to by the air carriers resulted in a voluntary peak hour arrival rate of 88 scheduled flights. This order is reviewed every six months to determine if the arrival rate should be adjusted. In announcing this agreement, both DOT and FAA emphasized that such a restriction of services is not an acceptable long-term solution to congestion. The city of Chicago recently completed the planning and environmental studies that examined the reconfiguration of the airfield at O'Hare to increase capacity and reduce delay. Site preparation and enabling work for the first phase of the airfield reconfiguration began in late 2005 and it is anticipated that the first phase will be completed during 2008. The FAA recently adopted regulations to address flight delays from persistent over-scheduling at ORD, which will terminate on October 31, 2008.[11]

FAA continues to explore congestion management alternatives in relation to capacity at LaGuardia Airport, which at times has accounted for as much as 25 percent of flight delays nationwide. By act of Congress, the High Density Rule slot controls at LaGuardia Airport will expire on January 1, 2007. Additional takeoff and landing slots created as part of AIR-21 in 2001, and allocated by a special lottery, will also expire on the same date. Without a congestion management program at LaGuardia, it is estimated that delayed flights of 15 minutes or more would increase by as much as 30 percent. For the longer term, FAA continues to examine congestion management alternatives to allocate limited runway capacity. Alternatives to the High Density Rule could limit the level of congestion and delay by continuing the limit of the number of aircraft landing and taking off at the airport and encouraging the use of larger aircraft through aircraft size incentives or requirements. To address the expiration at LaGuardia, the FAA also proposed a rule to cap flights operations and to increase airport utilization by encouraging use of larger aircraft. The FAA indicated, in the NPRM, that it plans to seek legislative authority to provide the opportunity for market-based solutions to address congestion at LaGuardia.[12]

Airline Schedules

Some airlines began to de-peak flight operations at their hub airports to reduce costs and increase efficiency in 2001. De-peaking evens out arrival and departure banks that concentrate airport operations into short time periods, increasing costs and leaving airlines susceptible to flight delays. The early success of de-peaking has resulted in several airlines operating schedules with smoother arrival and departure banks, thereby spreading operations more evenly throughout the day. Airlines are also focusing on shortening aircraft turn times to reduce average time at the gate.

[11] 14CFR Part 93, 71FR 51382-51404 "Congestion and Delay Reduction at Chicago O'Hare International Airport," August 29, 2006

[12] 14CFR Part 93, 71FR 51360-51380, "Congestion Management Rule for LaGuardia Airport," August 29, 2006. The FAA has also proposed an order to place temporary flight limitations at the airport, pending adoption of a final rule (FAA Docket 25755).

Demand for air travel has grown in the last two years with regional and low-cost carriers[13] growing much faster than the legacy carriers.[14] The rapid growth of some low-cost carriers has added to the financial difficulties of some legacy carriers. Legacy carriers are reducing operating costs replacing wide-body and larger narrow-body aircraft with smaller narrow-body and regional jet aircraft, and by reducing fares in markets served by low-cost carriers. The use of smaller narrow-body aircraft allows the air carrier to better match the number of seats to the number of passengers. In some cases, airlines have also downsized or closed hubs, redirecting capacity to their core or primary hubs.

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 and others designed for use by smaller, propeller-driven aircraft. Relievers have been very 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 (one percent of operations at Atlanta Hartsfield and Seattle; two percent of operations at John F. Kennedy Airport and Chicago O'Hare; three percent of operations at LaGuardia Airport, Newark, and Los Angeles).

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, such as Boston, Washington, San Francisco, Los Angeles, and New York. 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).

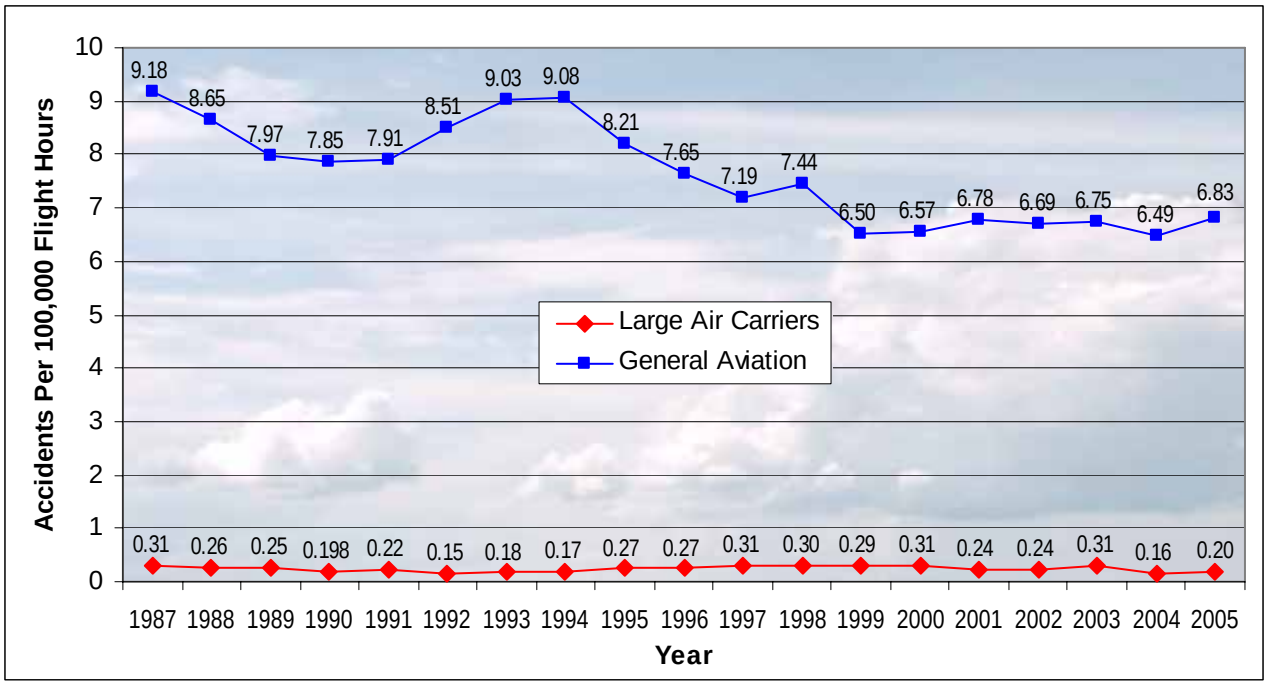
SAFETY

The U.S. has the largest, most complex, and safest aviation system in the world. Figure 9 below shows accidents per 100,000 flight hours for general aviation and large air carriers. The key component of the aviation system and resulting safety record is the airport. Although it is rare that the airport is determined to be a cause of an aircraft accident, it may be cited as a contributing factor that often affects the severity of the accident. Through AIP, funds are provided to airport operators for capital improvements to their facilities. All such improvements must meet standards adopted by FAA. Use of uniform standards at airports throughout the system promotes safety.

[13] American Trans Air, America West Airlines, AirTran Airways, Frontier Airlines, JetBlue Airways, Sun Country Airlines, Southwest Airlines, and Spirit Airlines

[14] Alaska Airlines, American Airlines, Continental Airlines, Delta Airlines, Northwest Airlines, United Airlines, and US Airways

Figure 9: Accident Rates



Source: National Transportation Safety Board Aviation Accident Statistics (Tables 5 and 10 available at: http://www.ntsb.gov/aviation/Stats.htm)

FAA standards address physical layout characteristics such as runway length and width, separation standards, lighting, signs, markings. Uniform standards for airport infrastructure promote safety. The standards also address material characteristics such as pavement, wiring, and luminance of lights. Standards are also issued for such things as aircraft rescue and firefighting equipment and operations, snow removal equipment and operations, and wildlife hazard management.

The remainder of this section focuses on how AIP has been used to fund development that supports FAA safety initiatives in the following three areas: airport certification, runway safety areas, and prevention of runway incursions.

Airport Certification

Since 1972, the FAA has had an airport certification program. This program is contained in 14 Code of Federal Regulations, Part 139 Certification of Airports. Prior to 2004, FAA certificated airports that had air carrier service for aircraft with a seating capacity of more than 30 passengers. Approximately 570 public-use airports are subject to initial safety certification inspection by FAA credentialed inspectors and annual re-inspection to determine continued compliance with regulatory safety standards.

Beginning in 2004, the certification program was expanded to include airports served by air carrier aircraft with a seating capacity of more than nine passengers. As a result of these changes, about 40 to 50 smaller airports are now required to meet FAA's Part 139 safety standards. While many of

these smaller airports had good safety records, the passengers and the air carrier crews can now expect an even safer environment since these airports are now required to meet the Part 139 requirements. AIP was used to fund development at these airports so that they could comply with the regulatory requirements of Part 139. One of the major changes that these small airports will experience is that now the airport personnel are required to have training in airport safety standards.

Part 139 establishes 18 general areas of safety standards, ranging from specific items, such as the condition of runway surfaces and training requirements for aircraft rescue and fire fighting personnel, to more general requirements for the development of an airport emergency plan and a wildlife hazard management plan. 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 acquire aircraft rescue and fire fighting equipment.

The International Civil Aviation Organization has adopted a requirement that commercial airport operators implement a safety management system, or SMS. To meet that requirement, the FAA has initiated a rulemaking project to propose that U.S. airports certificated under Part 139 be required to develop and maintain an SMS. A notice of proposed rulemaking is anticipated in 2007.

Runway Safety Areas

FAA airport design standards have developed over time and provide the necessary dimensions to accommodate aircraft operations along with an extra margin of safety. For example, the standards for runway safety areas (RSA) 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, should be in the runway safety area. These objects should 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 the aircraft have become larger, faster and more demanding the RSA dimensions have had to increase. As a result, many runway safety areas at commercial service airports do not meet current FAA standards. FAA is actively working with airport sponsors and local communities to improve runway safety areas that do not meet standards as rapidly as possible. This initiative is included in the FAA Flight Plan, 2006-2010. There are over 1,000 commercial service runways nationwide. The number of these runways with a full standard RSA has increased from 30 percent in 2000 to 46 percent in 2005. RSAs substantially meeting standards, defined as dimensions that are within 90 percent of the standard, have increased from 55 percent in 2000 to 66 percent in 2005.

In 2005, FAA completed a long-range schedule and financial plan for the improvement of most of the remaining non-standard RSAs. Plans are in place to improve approximately 250 RSAs to the extent practicable by the year 2015. By 2010, 210 of these RSA improvements should be complete. The estimated Federal AIP cost to implement these improvements was $1.68 billion in FY 2005. Although not all RSAs can be improved to standards because of costs and other constraints, over 66 percent will meet full standards and 86 percent will substantially meet standards when the

improvement program is complete. This program will result in a runway system with a significantly improved margin of safety for the aircraft they serve.

For those RSAs that cannot meet the full dimensional standards because of constraints, FAA amended the RSA standard to allow the use of Engineered Materials Arresting Systems (EMAS) as an equivalent alternative to a standard RSA in terms of safety enhancement. EMAS is a bed of highly crushable concrete blocks that are installed at the ends of the runway. 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. Figure 10 shows two illustrations of EMAS, one where the use of EMAS at JFK safety stopped an overrun, and the EMAS layout at MSP. As of 2005, 18 EMAS beds have been installed nationwide and many more are planned. EMAS will play an important role in allowing FAA to meet its long-range RSA improvement goals.

Figure 10: Illustration of Engineered Materials Arresting Systems (EMAS)

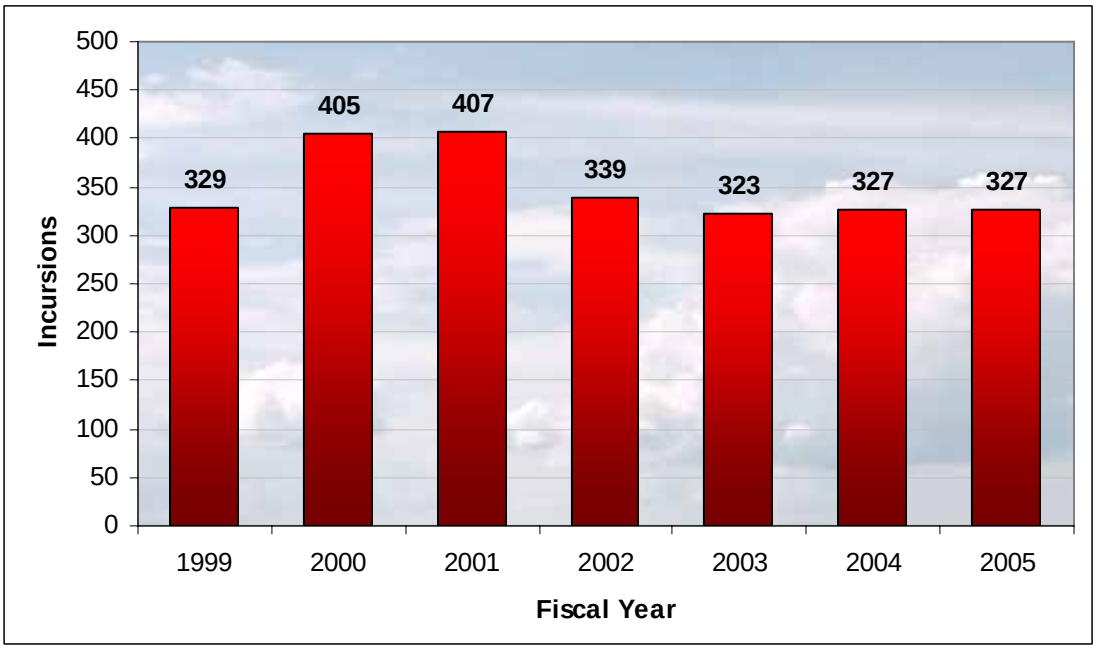
Aircraft stopped by EMAS at JFK

RSA and EMAS at MSP

Runway Incursion Prevention

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. When an aircraft, vehicle, person, or object on the ground creates a collision hazard that results in a loss of required separation with an aircraft taking off, intending to take off, landing, or intending to land, a runway incursion has occurred. Reducing the frequency of runway incursions and the risk of a runway collision is one of the FAA's top priorities. From FY 2001 to FY 2003, the total number of runway incursions decreased by 21 percent and has remained relatively constant for FY 2004 and FY 2005 (see Figure 11).

Figure 11: Number of Runway Incursions by Fiscal Year



Source: FAA Office of Runway Safety

The FAA divides runway incursions into three error types—pilot deviations, operational errors/deviations, and vehicle/pedestrian deviations. It is not an indication of the cause of the incursion, but refers to the last event in a chain of pilot, air traffic controller, and/or vehicle operator actions that led to the runway incursion.

The FAA strives to improve aircraft movement operations on the airport surface, and reduce the number of runway incursions through a combination of initiatives including technology, airport infrastructure improvements and training.

Technology

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. This system has been installed at the nation's top 34 airports. AMASS tracks ground movements and provides an alert to allow evasive action, if necessary. In addition, FAA is deploying a newer warning system called ASDE-X (Airport Surface Detection Equipment–Model X) to further enhance safety. It is a surveillance system that will ensure the most accurate information about aircraft location is displayed to the controller under all visibility conditions. ASDE-X capabilities will be added to some of the sites that already have AMASS, as well as be deployed to additional busy airports.

Airport Infrastructure Improvements

In terms of infrastructure improvements, AIP funds are also used to enhance airport safety and support the agency goal for reducing accidents, fatalities and runway incursions. For example, AIP funding is provided to airports to upgrade airfield marking, signs, and lighting; construct perimeter roads to eliminate the need for vehicles to cross runways; and build parallel taxiways so that aircraft do not have to taxi on runways.

Reconfigurations

At many airports, any modifications or improvements to the airfield have to be done within the existing boundaries of the airfield. AIP funding can be provided for airfield reconfiguration to move runways and taxiways to enhance safety. (In many cases the reconfiguration also reduces delays and increases capacity.) Projects in Los Angeles and Chicago are highlighted below.

- Los Angeles International Airport, the fourth busiest airport in the world in terms of aircraft operations, is relocating and reconstructing runway 7R/25L about 55 feet south of the existing centerline. This will allow construction of a new parallel taxiway between the two parallel runways. This reconfiguration is designed to reduce the number and severity of runway incursions. The reconfiguration is scheduled for completion in June 2008.

- Another example of an airfield reconfiguration is at the busiest airport in the world in terms of aircraft operations, Chicago O'Hare. The O'Hare Modernization Program (OMP) is the City of Chicago's proposal to realign three existing runways, extend two existing runways, and construct one new runway at O'Hare. This will result in an eight-runway configuration consisting of six parallel east/west runways and two crosswind runways. Overall delays will be reduced by 66 percent and the annual operational capacity will be increased from 974,000 to 1,194,000 aircraft operations. In addition to its primary capacity benefits, the OMP will conform to applicable FAA airport design standards and safety regulations including wind coverage, runway separation distances, and runway/taxiway crossings. Through a reduction in the number of runway intersections and specifically designed aircraft taxi procedures, OMP will result in fewer active runway crossings in the middle third of the runway than the current airfield, conforming with suggested best practices.

End-Around Taxiways

Another means to improve safety at a busy airport is to construct a taxiway around the end of a runway as an alternative to having aircraft cross an active runway. These taxiways will provide a safety benefit by allowing unrestricted taxi to the terminal rather than having aircraft hold and cross an active runway, and can also decrease delays. Although the taxiing distance will be longer, overall taxi time will decrease because the aircraft will not need to wait to cross an active runway. Two of the busiest airports in the U.S., Atlanta and Dallas-Ft. Worth, have plans underway for end-around taxiways and are highlighted below.

- Atlanta's Hartsfield-Jackson International Airport is the second busiest airport in the world in terms of aircraft operations. In June 2006, the airport opened a new runway and currently has an end-around taxiway at the approach end of runway 8R under construction. The

project is scheduled for completion in February 2007. Additionally, a capacity study is underway examining new airfield improvements. One of the alternatives being considered is an end-around taxiway around two runway ends, runway 9R and 9L.

- Dallas Ft. Worth International Airport (DFW) is the third busiest airport in terms of aircraft operations. The airport has approximately 1,700 runway crossings a day with some aircraft required to cross two runways to get to the terminal environment. Significantly reducing the number of daily runway crossings will reduce the chance of aircraft getting too close to each other. Construction is planned to start by the end of August 2006 and will take approximately 15-16 months to complete.

Making Improvements

FAA's analysis of runway incursions indicates that many runway incursions are attributed to pilots who acknowledge "hold short" instructions but then proceed to cross the holding position. To improve the pilot's situational awareness, FAA developed and adopted a standard for an enhanced taxiway centerline that alerts pilots that they are approaching a holding position. AIP funds can be used for the initial installation of this enhancement.

Training

To improve situational awareness of pilots, air traffic controller and airport personnel, three initiatives have been identified. First, to enhance general aviation runway safety education, FAA produced DVDs that highlight safe surface operations and proper communications procedures. A similar DVD for commercial pilots is currently in production. Second, FAA has developed simulated re-creations of actual incursions to enhance air traffic supervisor and controller discussions of serious runway incursions. The third initiative is to have 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.

Additionally, driving simulators are being explored as a potential component of a comprehensive ground-vehicle operator training program for the overall improvement of runway safety.

ENVIRONMENT

Community concern about environmental issues is a major constraint at existing airports. It impacts both their operation and expansion. It also makes it difficult to develop new airports. The problem is particularly serious in metropolitan areas. This is because there is high demand for airport services, which is accompanied by strong pressure to develop residential and other incompatible uses around airports. Historically, communities have been concerned about noise levels, however two increasingly visible areas of concern are air and water quality.

Noise

The noise situation around airports has improved dramatically since 1976. At that time, an estimated six to seven million people living near airports in the U.S. were exposed to significant levels of

aircraft noise.[15] In 2000, approximately 500,000 people in the U.S. lived in areas adjacent to airports with noise levels above 65dB DNL. The phase-out of air carrier aircraft that use older and louder engines (i.e., Stage 1 and 2 aircraft) helped greatly to reduce the number of people in DNL 65dB areas. This benefit was coupled with AIP funding for noise mitigation. The Stage 2 phase-out was completed on December 31, 1999. More modern Stage 3 aircraft with high bypass engines have lower noise emissions. As a result, there will be continued reduction as the fleet is modernized. On July 5, 2005, FAA published a Final Rule on a new noise standard for subsonic jet airplanes and subsonic transport category large airplanes. The new, more stringent standard applies to new airplane type designs filed after January 1, 2006. This new noise standard, Stage 4, ensures that the latest available noise reduction technology is incorporated into new aircraft designs. Research continues on quieter engine technology.

FAA's Part 150 program, established under the Aviation Safety and Noise Abatement Act of 1979 (recodified at 49 U.S.C. 47501 et seq), helps airport operators develop comprehensive programs. These programs reduce aviation noise in the community and achieve more compatible land uses in areas surrounding the airport. Part 150, which is a voluntary program, encourages airport operators to develop Noise Exposure Maps (NEM) and Noise Compatibility Programs (NCP). NEMs identify noise contours and land use incompatibilities. The airport operator uses NEMs to evaluate current noise impacts and to discourage future incompatible development. First, 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 measures to improve noise and land use compatibility.

Through Fiscal Year 2005, 266 airports are participating in the Part 150 program and 226 had NCPs approved by FAA. An FAA-approved NCP clears the way for an airport to obtain Federal aid for noise mitigation projects.[16] Since 1982, 247 airports have received grants for Part 150 studies and approximately $4.3 billion has been granted for airport noise compatibility projects. Besides AIP funding, airports have collected and used passenger facility charges for noise studies and mitigation totaling $12 million and $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. They include land acquisition and relocating residents from noise sensitive areas. Airports have acquired and installed noise monitoring equipment and noise barriers to reduce ground run-up noise. A few airports have even constructed taxiways and runways when the location of the new pavement was shown to provide a significant noise relief.

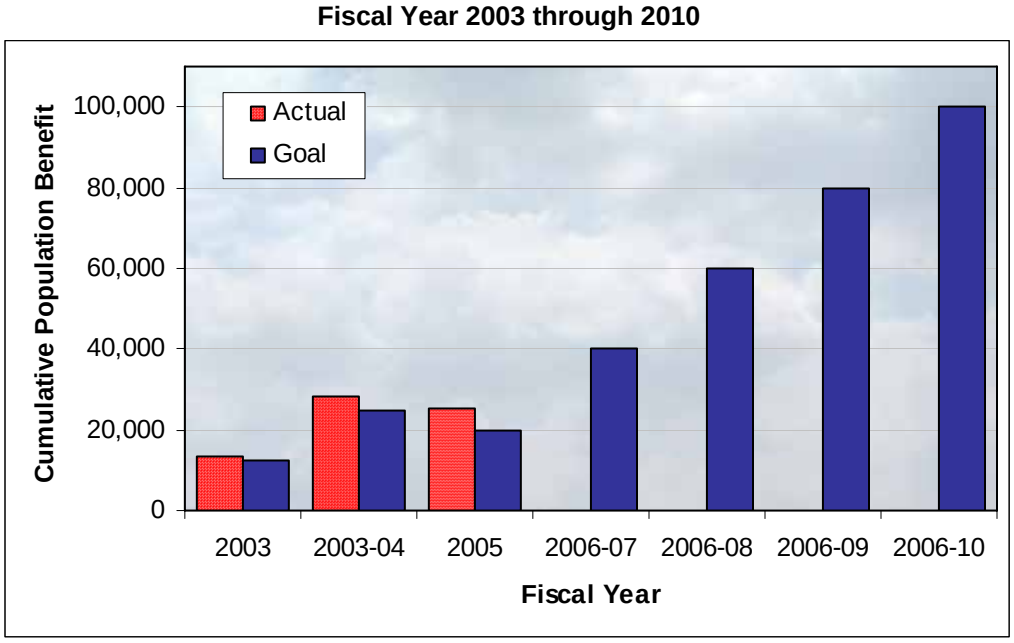
A few years ago, FAA evaluated the AIP set-aside program and set a performance goal. FAA's first goal was to reduce the residential population exposed to high levels (DNL 65dB or greater) of aircraft noise by 62,500 (expected population) over a five-year period, FY 2003 to FY 2007. AIP noise grants for FY 2003 and FY 2004 benefited 30,000 residents. In FY 2005, FAA changed the

[15] A significant level of noise is defined by the Federal government as a Yearly Day-Night Average Sound Level (DNL) 65dB or higher.

[16] Certain noise projects to benefit schools and medical facilities and mitigation in an approved FEIS can be federally funded without an approved NCP.

goal to include student population exposed to high noise levels. FAA now intends to reduce residential and student population exposed to aircraft noise at DNL 65dB by 100,000 over a five-year period, FY 2006 to FY 2010. In FY 2005, AIP noise grants are expected to benefit slightly more than 25,000 residents and students. Figure 12 shows the cumulative benefit of residents (FY 2003 and FY 2004) and residents and students (FY 2006 through FY 2010). Residents benefit either by having their homes insulated or by being relocated from the areas of significant airport noise. Students benefit through noise insulation of schools or school relocation.

Figure 12: Population Expected to Benefit from Noise Funding



Air Quality

Many of the nation's airports are located in air quality non-attainment or maintenance areas. Air quality improvements in these areas are accomplished through State Implementation Plans (SIP), which provide controls and measures to meet health-based National Ambient Air Quality Standards under the Clean Air Act (CAA). FAA provides financial aid support for required airport mitigation through the AIP and PFC programs. In addition, FAA encourages early airport actions to reduce local emissions through the Voluntary Airport Low Emission Program (VALE). The goal of the VALE Program is to reduce criteria 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.

Water Quality

Many of the nation's airports are located near waterways because years ago when airports were built, the cheapest, flattest, most desirable lands suitable for airports were located near water. Today,

many airport activities can cause adverse water quality impacts. In particular, construction or seasonal airport anti-icing/deicing are major concerns. Construction often causes sediment-laden runoff to enter waterways. Biological and chemical breakdown of deicing chemicals in airport runoff can cause severe dissolved oxygen demands on receiving waters.

For years, FAA has worked with the Environmental Protection Agency (EPA), airport operators, and airlines to address water quality issues. FAA is a member of steering committees reviewing proposed experiments that will examine the effects of glycol-based deicing agents on fish living at various water temperatures. FAA reviews proposed airport projects under the National Environmental Policy Act and the Clean Water Act. FAA works with airport sponsors and airlines in searching for alternatives to glycol-based aircraft deicing chemicals. Furthermore, FAA has encouraged airport sponsors to use acetate-based chemicals to treat runways, ramps, and taxiways because those chemicals cause low oxygen demands on receiving waters. FAA will remain active in the search for ways to reduce aviation effects on water quality.

Environmental Streamlining

FAA addresses airport-related impacts on noise, air, and other environmental concerns. To do so, it complies with many Federal laws, executive orders, and regulations. Among these are Congressional and Presidential directives addressing FAA's environmental review of certain airport projects. Title III of Vision 100 directs FAA to streamline (i.e., improve the efficiency and effectiveness) its environmental review of capacity projects at specific major airports.[17] That Title 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 designated by the Secretary of Transportation for "expedited processing" under Executive Order 13274, *Environmental Stewardship and Transportation Infrastructure Project Review*.

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.

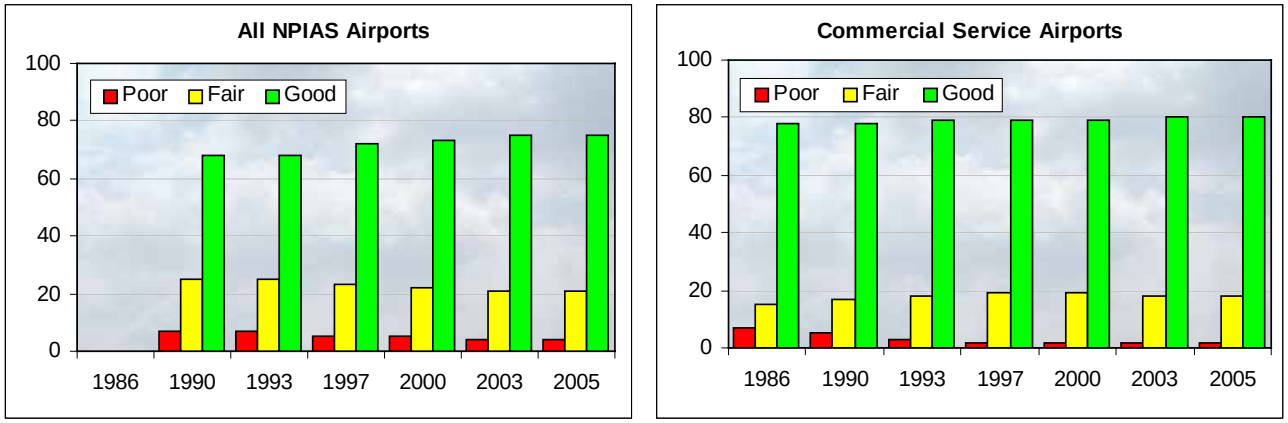
As part of airport inspections, FAA updates the Airport Master Records for public-use airports, and reports the results through the Airport Safety Data Program. Runway pavement condition is classified as good (all cracks and joints sealed), fair (mild surface cracking, unsealed joints, some slab edge spalling), or poor (large open cracks, slab surface and edge spalling, vegetation growing through cracks and joints). In 2004, FAA issued revised guidance for rating the surface condition of pavements (Advisory Circular 150/5320-17 Airfield Pavement Surface Evaluation and Rating Manuals). This guidance adds "excellent" and "failed" categories to runway condition and will be incorporated into the Form 5010 rating process in the future. When reporting runway pavement

[17] Airports listed in Table 1 of FAA's 2001 *Airport Capacity Benchmark Report.*

condition in future reports, the excellent and good categories will be combined, the fair category will remain the same, and the poor and failed categories will be combined.

FAA's performance goal is to ensure that 93 percent of runways at airports in the NPIAS are maintained in good or fair condition. Data for 2005 indicate that 96 percent of runways at NPIAS airports are rated good or fair (75 percent rated good, 21 percent rated fair) and 4 percent are rated poor. Specifically, pavement at commercial service airports is better, with 98 percent of the runway rated good or fair (80 percent good and 18 percent fair) and 2 percent rated poor. Figure 13 shows the percentage of runways reported in good, fair, and poor condition at NPIAS and commercial service airports over the last 20 years.[18]

Figure 13: Runway Pavement Condition (2005)



The pavement conditions are improved over 1986, when runways at commercial service airports were rated 78 percent good, 15 percent fair, and 7 percent poor. Because the rules for classification are straightforward and similar trends have been reported for almost 20 years, it is believed that the reported improvement is reliable. The pavement condition (using a standardized surface roughness index) of the interstate highway system, which is comparable to the commercial service airports, was rated 73 percent good, 25 percent fair, and 2 percent poor in fiscal year 2004. The pavement condition of the national highway system, which is comparable to the NPIAS airports, was rated 57 percent good, 36 percent fair, and 7 percent poor in fiscal year 2004. The favorable report on pavement condition at airports and the highway system is indicative of the focused Federal interest in these transportation systems. It is also a credit to the thousands of state and local agencies that operate airports.

In an effort to ensure that pavement receives the optimum level of maintenance, FAA has been authorized by Congress to permit the use of AIP grants for routine pavement maintenance at non-hub airports. In order for an eligible sponsor to receive an AIP grant for pavement maintenance, the sponsor must be unable to fund maintenance with its own resources and must implement a pavement maintenance management program.

[18] Runway pavement condition data was not available for NPIAS airports in 1986.

Pavement Research

Research has been integral to FAA's ability to achieve performance goals regarding 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, a 1,200 foot building with 900 feet of full-scale airport test pavement, that allows the FAA and industry to validate new design standards and proposed multiple wheel landing gear configurations. In FY 2005, two major accomplishments that will result in more efficient designs were completed:

- Reconstruction of National Airport Pavement Test Facility Rigid Test Pavements
- Release of an updated version of the FAA's airport pavement design software program http://www.faa.gov/airports_airtraffic/airports/construction/design_software/

Two independent airfield pavement research foundations (funded through FAA's appropriation at about $5 million for FY 2005 and FY 2006) contribute 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. Seven IPRF/FAA projects have been identified for the 2006 program. The Airfield Asphalt Pavement Technology Program (AAPTP) (www.aaptp.us) focuses on improving quality of hot mix asphalt pavements. Six AAPTP/FAA projects have been identified for the 2006 program.

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

Surface Accessibility

Airports generally are located to make air transportation as convenient and accessible as possible. A review of the 2000 Census reveals that most Americans reside within 20 miles of a NPIAS airport (See Table 5). 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 is within 20 miles of a NPIAS airport. Of the current total U.S. population of 294 million people, all but 5.2 million live within 20 miles of a NPIAS airport.

Table 5: 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%

Geographic proximity alone does not ensure that airports are easily accessible. Highway congestion in metropolitan areas can seriously impede ground access. Many airports are considering expanded use of public transportation to improve the convenience and reliability of airport surface access and to enhance air quality. Typically, public transportation to an airport consists of buses, rail and shared-ride vans.

Statistics for major airports indicate an important, but limited, role of public transportation in airport access. Generally, only a fraction of the passengers going to and leaving the airport come from any specific destination with a very small percentage coming or going from the city center. In choosing their mode of transportation, the traveler will consider reliability, accessibility, frequency of service, and price. Automobiles are still the dominant means of getting to and from the airport. However, an increasing number of airports are served by rail systems (see Table 6).

Table 6: Airports Served by Rail*

Reagan Washington National
Chicago Midway
Atlanta-Jackson Hartsfield
Boston Logan
Seattle-Tacoma
Chicago O'Hare
St. Louis Lambert
Cleveland
Los Angeles
Baltimore-Washington
Philadelphia
Portland
Newark
New York JFK
Burbank-Glendale-Pasadena
Miami
Minneapolis-St. Paul
Milwaukee Mitchell
San Francisco
Oakland

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

Experience to date suggests that public transportation (bus, rail, shared-ride vans) usually will not attract more than 25 percent of ground access trips to major airports. The same appears to be true in other countries, where high public transportation market shares are achieved only by airport linkages to extensive national rail systems that connect to cities beyond the metropolitan area served by the airport or where public transit serves airports isolated from the community.

In encouraging appropriate solutions to ground access problems, the Department of Transportation advocates a multimodal approach that is the most efficient and convenient to the public. In keeping with this, FAA encourages airport sponsors to be involved in the planning of airport access projects. FAA also encourages airport sponsors to plan airports in a manner consistent with ground access projects. As part of that multimodal approach, FAA has developed a document that highlights the best practices in planning surface access. The document offers recommendations on fostering effective coordination between aviation planning and metropolitan planning, and between airports and highway agencies/transit providers. FAA will continue to work with FHWA, FTA, state, and local agencies to address ground access issues at major airports.

As part of a department-wide cross modal initiative to enhance the nation's transportation capacity, DOT asked each mode to identify projects that involve the movement of freight and goods. FAA identifies potential high priority intermodal access projects for airports and continues to work with DOT to coordinate funding alternatives.

FINANCIAL PERFORMANCE

An understanding of airport finance is essential in 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 3,371 airports. However, commercial service airports, typically about 500 of the 3,364 NPIAS airports, are required by FAA to report financial data annually, including revenue and expense information. Financial information for the approximately 2,800 remaining NPIAS airports is much more difficult to obtain.

Data reported by 503 commercial service airports to FAA on Form 127 for fiscal years ending in 2004 are used to evaluate the financial performance of the airports. The statistics presented in Table 7 were derived from these data.

There is considerable variation in revenue sources and expenditures among airports as shown in Table 7. For example, concessions and rental car plus parking revenues are 22 percent of total revenues for large hub airports, 30 percent of revenues for medium hub airports, 25 percent for small hub airports, and 12 percent for non-hub primary and non-primary commercial service airports. The 31 large hub airports generated 63 percent of total airport revenues in 2004.

Total airport revenues for 503 commercial service airports were reported to be $16.5 billion in 2004. Airport operating revenue (aeronautical and non-aeronautical) totaled $11.8 billion and non-operating revenue (interest, grants, passenger facility fees) totaled $4.7 billion. The revenue from landing fees, rent from terminal and hangars and fuel sales, shown as aeronautical operating revenue, accounted for 39 percent or $6.4 billion. The fees from parking and rental car operations, concessions, and retail operations (non-aeronautical operating) accounted for 32 percent or $5.4 billion.

Table 7: Airport Operating and Financial Summary 2004 ($ millions)

Category	31 Large Hub	37 Medium Hub	68 Small Hub	367 Non-hub	503 Total
	Operating Revenue				
Aeronautical Operating Revenue					
Landing Fees	$1,826	$451	$149	$54	$2,480
Terminal Rents	$1,964	$512	$191	$63	$2,730
Cargo and Hangar Rentals	$253	$61	$47	$42	$402
Fixed Base Operator Revenue	$23	$32	$19	$29	$103
Apron Charges/Tie Downs	$58	$40	$19	$7	$124
Fuel Sales and Taxes	$110	$53	$23	$57	$243
Other Aeronautical Fees	$288	$29	$21	$23	$361
Total Aeronautical Operating Revenue	***$4,522***	***$1,178***	***$469***	***$275***	***$6,443***
Non-Aeronautical Operating Revenue					
Parking and Rental Car	$1,813	$878	$390	$128	$3,209
Concessions	$483	$95	$39	$15	$632
Terminal Rents	$319	$64	$20	$3	$406
Land Rental and Non-Terminal	$252	$81	$92	$81	$506
Other Non-Aeronautical Fees	$495	$49	$32	$31	$607
Total Non-Aeronautical Operating Revenue	***$3,362***	***$1,167***	***$573***	***$258***	***$5,360***
	Non-Operating Revenue				
Passenger Facility Charges	$1,483	$396	$155	$55	$2,089
Grant receipts	$653	$362	$425	$562	$2,002
Interest	$244	$65	$27	$12	$348
Other Non-Operating Revenue	$103	$59	$34	$72	$269
Total Non-Operating Revenue	***$2,483***	***$882***	***$641***	***$701***	***$4,708***
TOTAL REVENUE	**$10,367**	**$3,227**	**$1,683**	**$1,234**	**$16,511**
	Operating Expenses				
Personnel Compensation and Benefits	$1,842	$576	$341	$265	$3,024
Contractual Services	$1,210	$455	$154	$81	$1,900
Communications and Utilities	$473	$117	$73	$50	$713
Supplies and Materials	$431	$56	$48	$37	$573
Repairs and Maintenance	$394	$84	$54	$33	$565
Insurance, Claims, and Settlements	$129	$46	$24	$32	$231
Other	$462	$140	$45	$45	$691
Total Operating Expenses	***$4,941***	***$1,474***	***$739***	***$543***	***$7,698***
	Non-Operating Expenses				
Interest Expense	$1,780	$405	$150	$39	$2,374
Other	$110	$57	$27	$60	$254
Total Non-Operating Expenses	***$1,890***	***$462***	***$177***	***$99***	***$2,628***
TOTAL EXPENSES	**$6,831**	**$1,936**	**$916**	**$642**	**$10,325**
Depreciation	$2,056	$728	$407	$244	$3,435
NET INCOME	**$1,480**	**$563**	**$360**	**$348**	**$2,753**
Other Information:					
Bond Proceeds	$4,380	$1,126	$198	$73	$5,777
Sale of Property, Contributed Capital, Other	$492	$377	$320	$306	$1,495
Reporting Year Debt Payments	$2,138	$753	$291	$107	$3,288
Indebtedness at End of Year	$44,024	$10,480	$3,166	$921	$58,590
Net Assets	***$22,688***	***$8,919***	***$5,607***	***$4,879***	***$42,093***
Restricted Financial Assets	$17,759	$3,792	$1,116	$959	$23,626
Unrestricted Financial Assets Including Cash	$12,982	$5,589	$2,188	$1,917	$22,676

Source: Data collected by FAA on FAA Form 5100-127 (Operating and Financial Summary) for fiscal years ending in 2004. Due to rounding the numbers may not add exactly.

Our nation's air carrier airports continue to enjoy good financial health. Airports have maintained investment grade ratings for their existing debt and have been able to issue new debt. Over the last two years, airports have adjusted their capital spending plans to reflect the uncertain financial environment for their air carrier tenants, and have pursued airline lease modifications to give them greater control over their facilities and the revenue they generate. These modifications have included shorter lease terms and stronger minimum use requirements. Greater airport control over airline gates serves to facilitate reasonable access for requesting carriers and provides opportunities for airline competition.

As illustrated by Figure 14, total airport revenue and expenses reported by 529 commercial service airports in 2002 as compared to the financial data reported by 503 commercial service airports in 2004 has remained relatively stable.

Figure 14: Revenue and Expenses

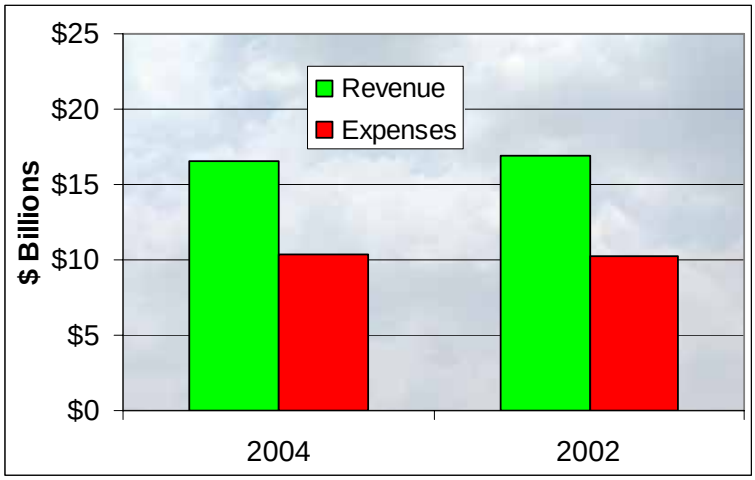
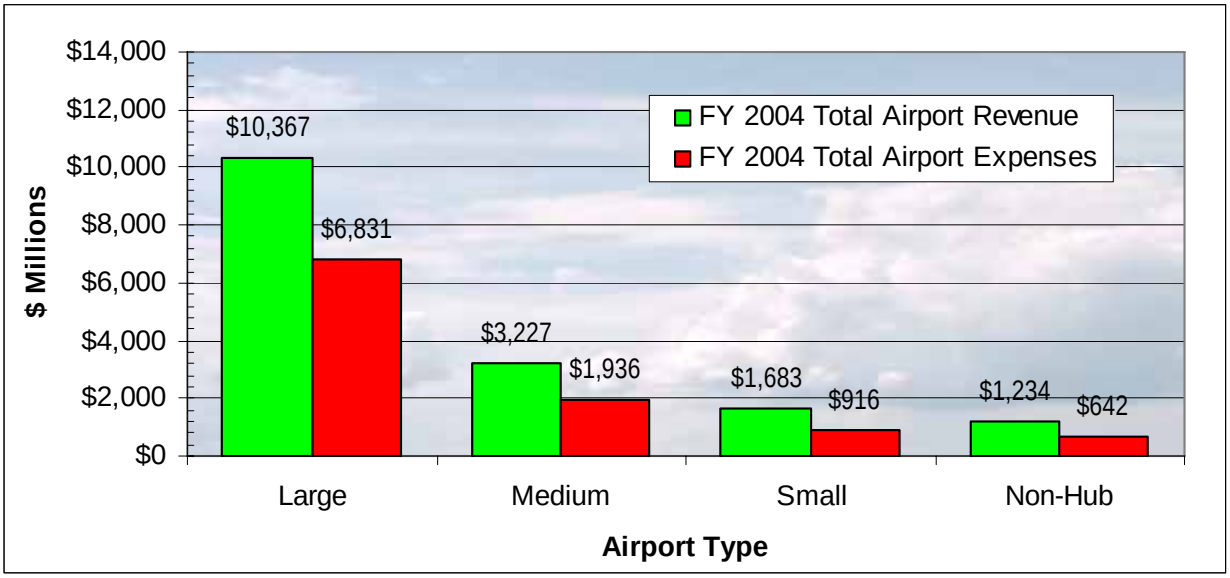


Figure 15 compares the revenue and expenses for the four categories of airports reporting financial information to FAA.

The commercial service airports received total non-operating revenues of $4.7 billion, which includes $2.1 billion from passenger facility charges, $2 billion from grants, $269 million from other types of non-operating sources, and $348 million in interest income. PFC revenue is approximately 14 percent of large and 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.
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 $10.3 billion, with $7.7 billion in operating expenses (75 percent) and $2.7 billion in non-operating expenses (25 percent).

Figure 15: Total Revenue and Expenses by Airport 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 general airport revenue bonds. Bond ratings range from A at the low end to AA at the high end. Airports with more economic and financial strength and diversity tend to achieve higher ratings and 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 vs. transferring), the number of commercial airports in the region, and the quantity and quality of service provided by the airlines.

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. Non-hub primary and non-primary 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.

Since the remaining 2,866 NPIAS airports are not required to report, financial information is much more difficult to obtain.

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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[19]

Since 2000, the aviation industry has been battered with 9/11, the spread of Severe Acute Respiratory Syndrome (SARS), and record high fuel prices. Over the last four years, major restructuring and downsizing among the mainline legacy carriers has occurred along with rapid growth among low-cost carriers and exceptional growth among regional carriers. However, for the second year in a row, passenger demand on U.S. airlines remained strong with 2005 passenger enplanements exceeding pre-9/11 levels by almost six percent.

High oil prices cost the airline industry about $9.6 billion last year, and decreasing yields resulted in a fifth consecutive year of air carrier losses with cumulative operating and net loses of more than $21 and $37 billion, respectively.

Legacy carriers reported a $10 billion net loss in 2005 with two (Delta and Northwest) of the seven legacy carriers (Alaska, American, Continental, United, US Airways, Delta, and Northwest) operating under Chapter 11 bankruptcy protection. Low-cost and regional carriers are struggling with higher fuel prices and the fallout from legacy carriers' financial problems, resulting in losses of $2.5 billion.

FAA's forecasts through 2017 are based on assumptions of continued economic growth, with the U.S. economy expected to grow at an annual rate of 3.1 percent and the worldwide economy projected to grow at a rate of 3.1 percent annually. Latin America is expected to grow at 3.8 percent per year, Asia/Pacific is projected to expand at 3.6 percent annually, and Europe/Africa/Middle East is anticipated to grow at 2.5 percent annually.

Domestic U.S. commercial enplanements (sum of air carriers and regionals/commuters) are forecast to increase at an average annual rate of 2.9 percent through 2017 and international enplanements are forecast to increase by 5.0 percent, for a system average annual growth rate of 3.1 percent. Both air carrier and regional/commuter aircraft operations are forecast to grow 2.4 percent annually (see Table 8). The future of regional carriers is closely tied to the fortunes of larger legacy carriers for whom they provide feeder service at major air carrier airports. New general aviation aircraft and avionics are expected to stimulate growth in the general aviation fleet and activity. General aviation operations are forecast to increase 1.9 percent per year.[20]

[19] Source: FAA Aerospace Forecasts FY 2006-2017 issued in March 2006.
[20] Forecast operations include activities at Federal Contract Towers.

Table 8: U.S. Aviation Activity Forecasts

Aviation Activity	FY 2005	FY 2017	Annual Growth
Enplanements (millions)			
Domestic	669.8	948.4	2.9%
International	68.9	123.1	5.0%
✈ Atlantic	21.6	33.8	3.8%
✈ Latin America	33.9	60.8	5.0%
✈ Pacific	13.2	28.5	6.6%
Total	**738.6**	**1,071.6**	**3.1%**
Aircraft Operations (millions)			
Air Carrier	13.5	18.0	2.4%
Commuter/Air Taxi	12.6	16.7	2.4%
General Aviation	34.1	42.7	1.9%
Military	2.9	2.9	0.1%
Total	**63.1**	**80.3**	**2.0%**

Source: FAA Aviation Forecasts FY 2006 to FY 2017

IMPLICATIONS OF FORECASTS

The 45 percent increase in passengers between 2005 and 2017 is expected to be accomplished by a 33 percent increase in air carrier operations. Over the next 12 years, 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. Between 2005 and 2011, the average domestic aircraft size will have decreased by 2.7 seats. This short-term decline in aircraft size is due to legacy carriers replacing their wide-body and larger narrow-body aircraft with smaller narrow-body aircraft as well as an increase in smaller aircraft flying longer distances. While the legacy carriers are reducing the size of aircraft flown domestically, regional carriers have been increasing the size of their aircraft. The greater number of the larger 70- and 90- seat regional jets increases the average domestic seating capacity of the regional fleet from 49.4 seats in 2005 to 55.1 seats in 2017. The recovery in passenger demand along with the shift in activity from larger aircraft to smaller regional jets has resulted in increased delays at some U.S. airports during 2005.

In addition, aircraft utilization is expected to continue 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. 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. The increase in air carrier operations at medium hubs will be accommodated by scheduling 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 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, 11 can be considered transfer airports (with 50 percent of their passengers connecting to another flight), 24 can

be considered origin airports (with 50 percent or more of their passengers originating at the airport). (See Table 4 in Chapter 2.) Nine of the 11 transfer airports have either opened a new runway, have a runway under construction, or are considering a new runway while 15 of the 24 origin airports have plans underway to build a new runway, extend an existing runway, or are examining the feasibility of building a new airport. Airlines selected transfer airports as hubs in part because of their potential for expansion, and airport management is 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 many of the airports that primarily serve origin and destination traffic. However, in a few cases, new runways are not feasible and the alternative of congestion management is being explored. (See Chapter 2 Alternative Capacity Enhancement Measures.)

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 within the next five years. Increased point-to-point service, bypassing hubs, is occurring when warranted by market considerations.

Lower-cost carriers usually serve major metropolitan areas by using uncongested, secondary commercial service airports where existing facilities are underutilized. 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.

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.

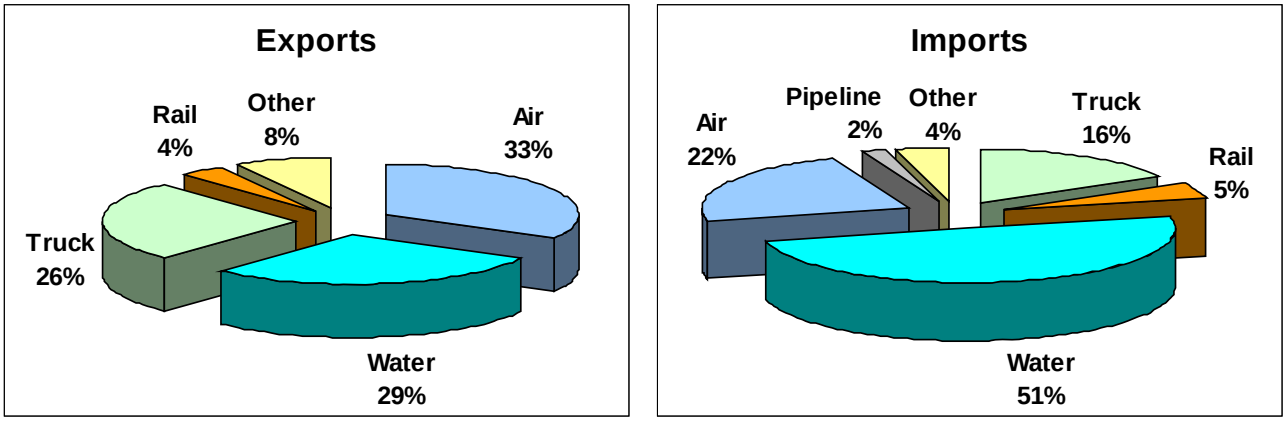
Cargo

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. These changes include new air cargo security regulations by FAA and the Transportation Security Administration (TSA); market maturation of the domestic package express market; shift

from air to other modes (especially truck); increases in fuel surcharges; growth in international trade from open skies; expanded 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 33 percent of exports and 22 percent of imports measured by value in 2004 were shipped by air (see Figure 16).[21] Air transportation is the preferred mode for the shipment of high-value, lightweight, and perishable goods. Lower shipping costs and more frequent service have made air cargo a major factor in the way global business is conducted.

Figure 16: Value of U.S. International Merchandise Exported and Imported by Mode 2004



The total air cargo revenue ton-miles flown by U.S. mainline air carriers and regionals/commuters are expected to grow at an annual rate of 5.2 percent through FY 2017. All-cargo carriers have increased their share of domestic cargo revenue ton-miles flown from 64.6 percent in 1996 to 80.8 percent in 2005 and are forecast to increase their share to 84.0 percent by 2017. This is due to significant growth in express service by FedEx and United Parcel Service, lack of growth of 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). Domestic revenue ton-miles for U.S. commercial air carriers are expected to increase at an average annual rate of 3.2 percent through 2017.

International cargo revenue tons miles are forecast to grow at an annual rate of 6.3 percent through 2017. All-cargo carriers increased their share of international cargo revenue ton-miles flown from 52.0 percent in 1996 to 63.8 percent in 2005 and are forecast to increase their share to 68.0 percent by 2017. This is due to an increase in demand for expedited service, increased activity from the war in Iraq, a change in reporting of contract services, and an increase in capacity.

[21] Compiled by U.S. Department of Transportation, Research and Innovative Technology Administration, Bureau of Transportation Statistics, October 2005 with Water and Air Data from U.S. Department of Commerce, U.S. Census Bureau, Foreign Trade Division, December 2004.

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. Improvements may also be warranted at selected airports, such as New York JFK, Los Angeles International, Chicago O'Hare, San Francisco, Dallas-Ft. Worth, and New Orleans to keep pace with rapid growth in international air cargo. Six of the top 20 U.S. foreign trade freight gateways in terms of value of shipment are airports, with New York JFK being the busiest U.S. foreign gateway.

New Large Aircraft (NLA)

Airports in the U.S. and around the world will have trouble accommodating the first new large aircraft (the A380) because of the 262-foot wingspan (that is 50 feet wider than the next largest aircraft). It will seat at least 150 more passengers than the largest aircraft in regular commercial service today. The distance between parallel taxiways and their runways and the layout of terminal buildings can limit wingspans and fuselage lengths, and the strength of pavement for underlying structures, such as bridges and culverts, will limit aircraft weight. Because of these factors, the number of airports that will be able to accommodate these aircraft is limited. It is anticipated to serve seven U.S. airports, including New York JFK, Los Angeles, San Francisco and Miami, with cargo service at Anchorage, Memphis, and Louisville. Two other airports (Orlando and Washington Dulles) may receive passenger service by the Airbus A-380. Two additional airports (Chicago O'Hare and Dallas-Ft. Worth) are likely to have passengers transported on NLA after 2010 and one additional airport (Indianapolis) is likely to have cargo service using NLA after 2010.

Many airports are undertaking large modernization projects to improve efficiency and to prepare for projected increases in activity. It is difficult to determine exactly how much of the cost of many projects is directly attributable to accommodating the NLA. Airports planning to receive service by the new large airplane started their preparations and financial planning for necessary improvements several years ago. They have all indicated that they will be ready to accept A380 service by the time service is scheduled to start at their airport.

Fractional Ownership

As a factor cited in the growth of business jet operations is the growth of fractionally owned aircraft. The concept of fractional ownership, where corporations or individuals purchase an interest in an aircraft (can be as little as $1/16^{th}$) and pay a fixed fee for operations and maintenance, was introduced in the mid-1980s. In the last few years, it has grown significantly and this trend is expected to continue to grow.

Very Light Jets (VLJs) or Microjets

Smaller affordable business jets, also referred to as very light jets (VLJ) or microjets, are expected to be delivered to owners late in 2006. Approximately 100 of these aircraft are expected to enter the active aircraft fleet in 2006 and the VLJ fleet will grow by 400 to 500 aircraft a year after that. They are expected to cost between $1 and 2 million each and provide seating capacity for five or six people. VLJs would be able to operate at smaller airports with shorter runways (anticipated 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 Part 135 requirements. These aircraft should be able to operate at most general aviation airports in the NPIAS without significant airfield improvements and with no significant impact on their capacity.

Conversion of Military Surplus Airfields

About 28 surplus military airfields are expected to be converted to civil use. Most of these military airfields have long runways and associated facilities that can accommodate large civil aircraft. Eight of the surplus military airfields have become commercial service airports (England AFB, LA; Myrtle Beach AFB, SC; Agana Guam NAS, GU; Pease AFB, NH; Scott AFB, IL; George AFB, CA; Bergstrom AFB, TX; and K.I. Sawyer AFB, MI) with Bergstrom and K.I. Sawyer replacing constrained civil airports. Two other surplus airfields (Mather AFB, CA and Rickenbacker AFB, OH) have attracted significant cargo service. The remaining surplus airfields are located in areas where general aviation and reliever airports are needed.

The 2005 Base Realignment and Closure Commission Report (BRAC) identifies more than 800 military installations across the country from the active National Guard and Reserve components that will either be closing or realigned. The Department of Defense is working with BRAC-affected communities, both those that will be losing an installation and those that will be gaining missions. Some communities already are taking measures to prepare themselves for the changes. The 2005 BRAC only contains a few military airfields. Three communities have contacted FAA to explore the potential aviation reuse of the military facility being closed.

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 five years.

Commercial Spaceports

Commercial space transportation refers to the launch of an object into space or the reentry of an object from space by a private, non-government entity. Typically, commercial space transportation concerns the activities of launch service providers, who place satellites into orbit under contract from corporations, governments, or other organizations. Objects are launched from licensed locations, referred to as commercial spaceports. There are currently five commercial spaceports in operation across the U.S. At this time, only one of the current spaceport locations (Mojave Airport, CA) involves a public-use airport contained in the NPIAS. A second airport is being evaluated as a possible spaceport site and is currently in the environmental review process (Clinton-Sherman, OK). However, future consideration may be given to utilizing other NPIAS airports as “spaceports.”

These airports are joint-use 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 will be limited to only a few airports at more remote locations. FAA will continue to work with the space and aviation industries in identifying potential spaceport locations and in developing standards to ensure that the joint operations at NPIAS airports can be conducted in a safe, efficient and environmentally responsible manner.

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Chapter 4: Development Requirements

OVERVIEW

Information on the development needed to provide an adequate national system of airports is derived primarily from locally prepared airport master plans and regional and state airport system plans. 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 development that comprises the database or evaluate whether the benefits of a specific development would exceed its costs. As a planning document, the NPIAS should not be used in evaluating investment priorities.

FAA requires benefit cost analysis (BCA) to demonstrate the merit of capacity projects for which airport sponsors are seeking AIP discretionary funds. Airport capacity projects meeting a dollar threshold of $5 million or more in AIP discretionary grants over the life of the project and all airport capacity projects requesting a letter of intent must be shown to have total discounted benefits that exceed total discounted costs. 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. The 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.

The development captured in this report was extracted from a new database, integrating development planning (NPIAS and ACIP) and funding (AIP).

PROCESS

There are two sources of data for the NPIAS: airport master plans and state system plans. Airport master plans are the principal source. 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 requirements, including the needs of national defense and the postal service. 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. Proposed development items that are either not justified by the forecast of aviation activity, such as additional runways, or ineligible for Federal funding, such as hangars,[22] are screened by FAA planners and are 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 in airport master plans.

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

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 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 area.

Airports and airlines frequently engage in discussions regarding 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 regarding the scope and schedule for proposed development. If proposals are downsized, rescheduled, or accomplished in stages, development costs could be significantly lower.

Costs are categorized by type of airport and by purpose of development: Safety, Security, Reconstruction, Standards, Environment, Airfield Capacity, Terminal Buildings, Ground Access, New Airports, and Other. These development costs are shown below in Table 9. For comparison purposes, Table 10 at the end of this chapter shows development requirements contained in the previous edition of the NPIAS.

Table 9: 2007 – 2011 NPIAS Cost by Airport and Development Category

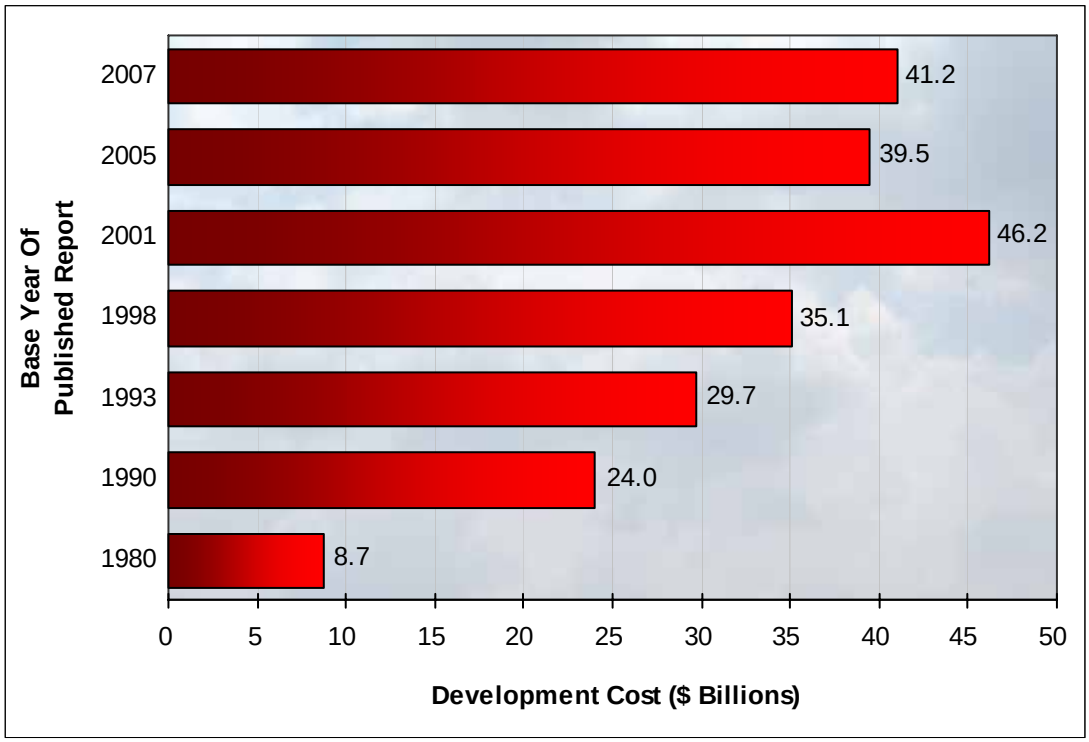
(2004 $ millions)

Development Category	Large Hub	Medium Hub	Small Hub	Non-Hub	Commercial Service	Reliever	GA	Total	Percent
Safety	$503	$369	$145	$612	$61	$74	$173	$1,937	4.7%
Security	$695	$241	$84	$44	$10	$54	$185	$1,313	3.2%
Reconstruction	$1,954	$976	$659	$952	$187	$618	$1,782	$7,128	17.3%
Standards	$1,356	$681	$834	$1,517	$366	$1,626	$4,730	$11,109	27.0%
Environment	$792	$468	$288	$130	$20	$80	$90	$1,868	4.5%
Capacity	$5,612	$1,470	$411	$255	$18	$315	$378	$8,459	20.6%
Terminal	$5,226	$366	$564	$563	$31	$28	$132	$6,910	16.8%
Access	$929	$89	$129	$106	$34	$84	$130	$1,501	3.6%
Other	$7	$8	$30	$24	$5	$17	$41	$132	0.3%
New Airports	-	-	-	-	-	-	-	$809	2.0%
Total	**$17,073**	**$4,667**	**$3,145**	**$4,203**	**$732**	**$2,896**	**$7,641**	**$41,167**	**100.0%**
Percentage	**41.5%**	**11.3%**	**7.6%**	**10.2%**	**1.8%**	**7.0%**	**18.6%**		

The costs associated with planning (master plans, state system plans, and environmental studies) are not reflected in Table 9 or Appendix A. For the five-year period covered by this report, planning costs total $266 million, an increase of 50 percent ($177 million) from the last report. Planning at large and medium hub airports account for 38 percent of the total, and general aviation airports account for 26 percent.

Figure 17 is a historical comparison of the five-year development costs identified in previous NPIAS Reports. The year shown is the base year for the five-year calculation (i.e., 2007 identified costs for 2007-2011). As shown below, each edition since 1980 reflected an increase in development needs with a 32 percent increase in 2001 followed by a 14 percent decrease in 2005, and a moderate 4 percent increase in 2007 reflecting the financial situation of airlines and airports. The $41.2 billion in development identified for 2007-2011 is 11 percent below the $46.2 billion identified for 2001-2005.

Figure 17: Five-Year Development Estimates from Published NPIAS Reports to Congress



DEVELOPMENT CATEGORIES

The total $41.2 billion in AIP eligible development contained in this report covering the years 2007-2011 is four percent higher than that shown in the preceding report covering 2005-2009. NPIAS is divided into categories on the basis of the principal purpose of development and is shown for each type of airport. Figures 18 and 19 compare the development by airport type and by development category over the last four published reports (1998, 2001, 2005, and 2007).

Figure 18 highlights a continued increase in the development at general aviation airports and fairly consistent development needs at small, non-hub, commercial service, and reliever airports. While the development contained in the 2001 report was higher across all categories of airports, the most significant increase was for large hubs. The total development captured in the 2005 report was down 14 percent with large hub airports decreasing by 30 percent as a result of significant projects being funded with passenger facility charges and terminal and access projects being deferred.

Figure 18: Comparison of Five-Year Development Costs by Airport Type

Years 1998, 2001, 2005 and 2007

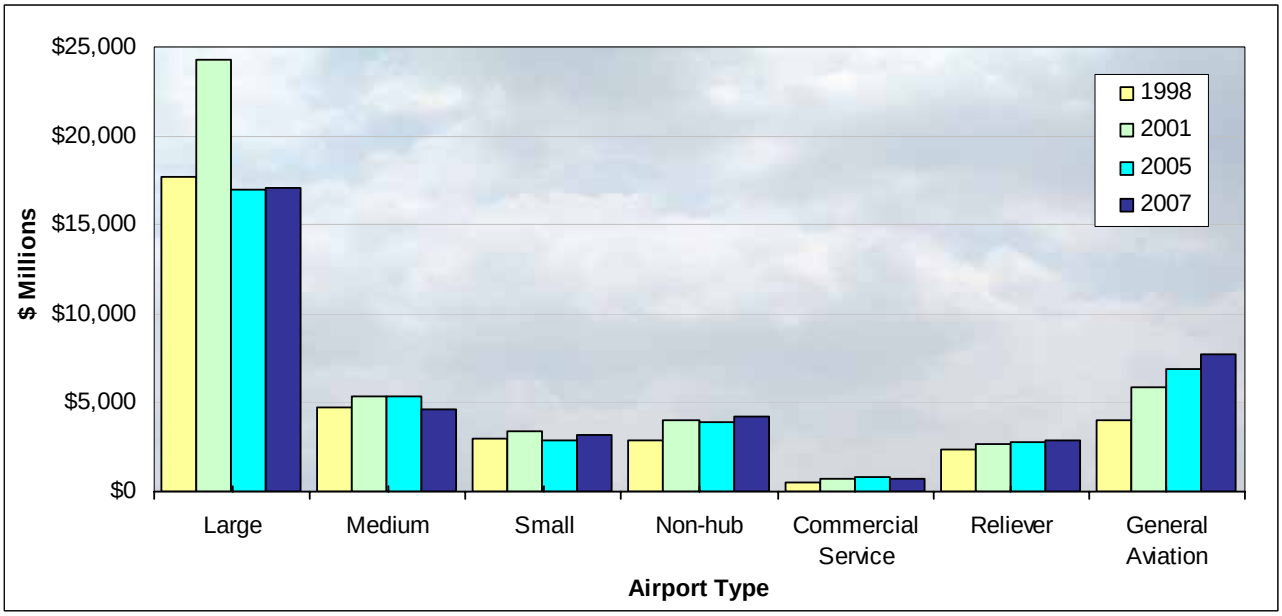


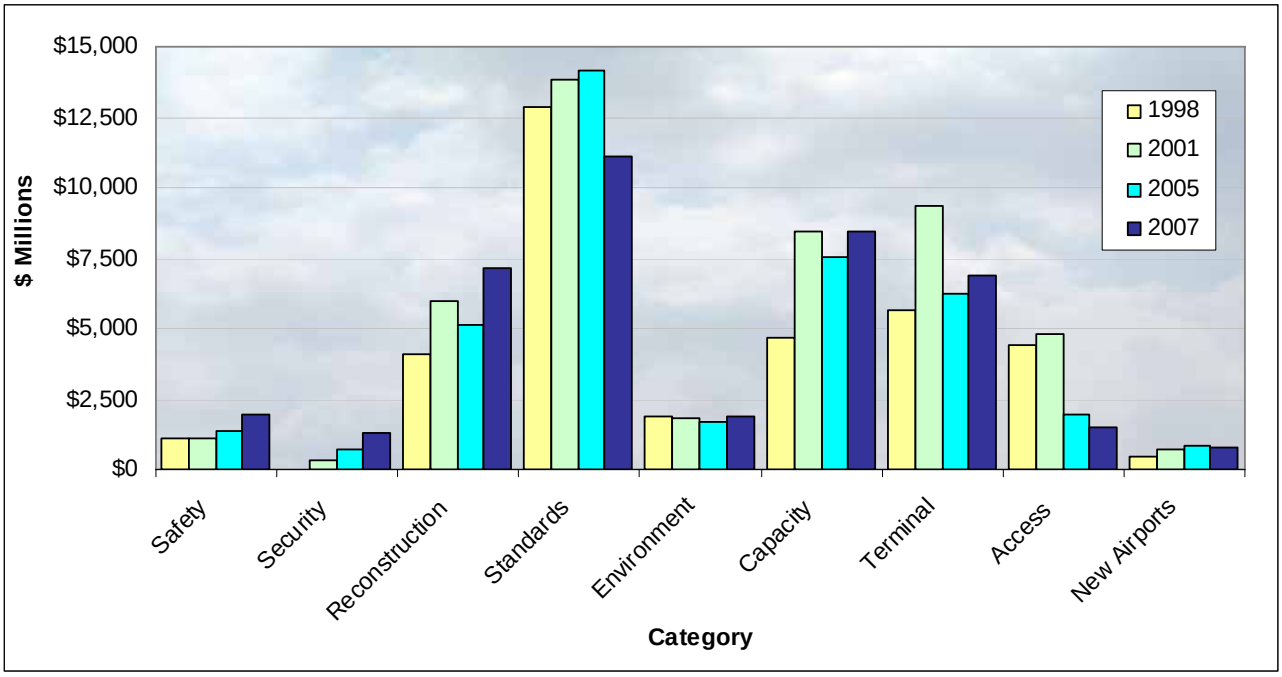
Figure 19 compares the type of needed development identified in the current report to the three previous reports. It shows continuing increases in safety and security along with continued decreases in access. This figure illustrates which categories have recovered to 2001 levels, such as capacity and environment, and which categories dropped significantly such as standards.

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 eight 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.

Figure 19: Comparison of Five-Year Development Costs by Category

Years 1998, 2001, 2005 and 2007



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 $1.9 billion, an increase of 45 percent ($602 million) from the last report. This increase reflects the costs associated with improving runway safety areas.

Security projects include perimeter fencing, security devices, and other security enhancements (82 percent). Costs associated with modifying terminals to accommodate explosive detection systems[23] account for 18 percent of the total security category with the majority of the costs at large hubs (large, 72 percent; medium, 25 percent; and small hubs, 3 percent). Security development totals $1.3 billion, an increase of 91 percent ($650 million), reflecting the continuing importance and focus on security.

Reconstruction

Reconstruction includes development to replace or rehabilitate airport facilities, primarily pavement and lighting systems that have deteriorated due to weather or use, and which have reached the end of their useful lives. This category, which accounts for about 17 percent, or $7.1 billion, of NPIAS funding needs, includes the rehabilitation of pavement on a 15- to 20-year cycle. This category of development increased for every airport type except non-primary commercial service with

[23] Section 142 of Vision 100 limits FAA AIP funding of terminal modification projects to install Explosive Detection System to entitlement funds only. The expectation is that the Transportation Security Administration will fund these types of projects. However, it is still an airport need and the airports that provided the FAA with project cost data for these projects are reflected in this report.

reconstruction costs at large hubs more than doubling. 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. While this still remains the largest development category, accounting for 27 percent of the NPIAS, this type of development saw a 21-percent decrease from the last report with a decrease at every category of airport. 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 an LPV, using FAA's wide area augmentation system (WAAS) have not been fully assessed and, therefore, are not 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 category called environment includes projects to achieve an acceptable balance between airport operational requirements and the expectations of residents of the surrounding area for a quiet and wholesome 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 four percent or $1.86 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. Eighty-five 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 public buildings. Increased cost is expected due to projects funded under VALE for reducing airport air emissions. Environmental costs are concentrated at airports with frequent flights by jet aircraft (43 percent large hubs, 24 percent medium hubs, 16 percent small hubs, 7 percent non-hubs, and 4 percent reliever 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). While terminal costs increased 10 percent ($660 million) from the last report and account for 17 percent of the NPIAS, it is 26 percent ($2.4 billion) lower than terminal costs identified in the 2001 report. The NPIAS only includes the portion of terminals that are eligible for Federal aid (about 50 to 60 percent) and excludes revenue-generating areas[24] 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 (76 percent large hubs, 5 percent medium hubs, 8 percent small hubs, and 8 percent non-hubs).

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 62 percent of the access development needs. Surface access currently accounts for 4 percent of the NPIAS, down from 5 percent in the last report and down 69 percent from 2001. This reflects the deferral of capital projects that resulted from the deteriorated financial situation at some airports. 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 second largest development category accounting for 20 percent of the NPIAS, and includes new runway, taxiway, and apron construction and extensions. Runway development that is warranted to relieve congestion but precluded because of political and environmental considerations is not included. The airfield capacity development included in this five-year plan will help to reduce congestion. However, problems will remain in certain large metropolitan areas such as New York, Los Angeles, and Chicago, and FAA will continue to focus on the need for additional capacity 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 five years, a number of new reliever and general aviation airports, along with a few small commercial service airports and

[24] Non-hub primary airports and smaller public use airports can use AIP for revenue producing aeronautical support facilities.

non-hub primary airports, are proposed. This category accounts for two percent of all NPIAS development.

Other

This category of development accounts for less than one-half of a percent of the total development in the NPIAS. It includes fuel farms, utilities, and construction and rehabilitation of parking lots. General aviation airports account for 31 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 passenger facility charges. Access to these sources of financing varies widely among airports, with some large airports maintaining substantial cash reserves, while the small commercial service and general aviation airports often require subsidies from local and state governments to fund operating expenses and finance modest improvements.

Since fiscal year 2001, AIP grants have exceeded $3 billion annually and for the last several years PFC collections have exceeded $2 billion annually. 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. Since 1990, annual funding for airport development has been in the range of $5.5 billion to $7.3 billion. In 2004, the commercial service airports reported expenditures of $8.5 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.[25] This is a decrease of about ten percent ($900 million) from FY 2002 reported expenditures of $9.4 billion.

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 non-hub 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

[25] Source: Airport Operating and Financial Summary FY 2002 (FAA Form 127).

cargo buildings, or the revenue-producing portion of large passenger terminal buildings.[26] It does not include development eligible under the passenger facility charge program but ineligible under the Federal grant program, such as gates and related areas. It also does not include improvements to highway and transit systems beyond the airport property line. The NPIAS does not include improvements funded by FAA's Facilities and Equipment program. This edition does not capture the costs at airports associated with implementation of Wide Area Augmentation System (WAAS).

The NPIAS is drawn from approved plans. It does not include development needed to relieve airfield congestion in metropolitan areas when there is no local consensus about how to address the problem.

Table 10 identifies the development requirements contained in the previous edition of the NPIAS, which covers 2005 – 2009.

Table 10: 2005 – 2009 NPIAS Cost by Airport and Development Category

($ millions)

Development Category	Large Hub	Medium Hub	Small Hub	Non-hub	Commercial Service	Reliever	GA	Total	Percentage
Safety	$235	$184	$157	$552	$111	$35	$57	$1,333	3.4%
Security	$310	$146	$66	$31	$7	$41	$116	$717	1.8%
Reconstruction	$833	$739	$498	$812	$205	$510	$1,512	$5,108	12.9%
Standards	$2,999	$1,575	$1,193	$1,866	$398	$1,669	$4,437	$14,137	35.7%
Environment	$790	$525	$212	$75	$2	$66	$37	$1,707	4.3%
Capacity	$4,696	$1,710	$488	$170	$11	$305	$140	$7,521	19.0%
Terminal	$5,741	$172	$178	$116	$11	$10	$22	$6,249	15.8%
Access	$1,338	$277	$59	$91	$21	$67	$94	$1,946	4.9%
New Airports	$0	$0	$0	$227	$54	$54	$496	$831	2.1%
Total	**$16,942**	**$5,328**	**$2,851**	**$3,941**	**$821**	**$2,757**	**$6,910**	**$39,550**	**100.0%**
Percent	**42.8%**	**13.5%**	**7.2%**	**10.0%**	**2.1%**	**7.0%**	**17.5%**	**100.0%**	

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

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