U.S. Department
of Transportation
**Federal Aviation
Administration**

Report to Congress
National Plan of Integrated Airport Systems (NPIAS)

2019-2023

Cover Photographs

Snohomish County (Paine Field), Washington
Terminal building in Tennessee
Orange County Airport, Texas

Federal Aviation Administration
U.S. Department of Transportation

National Plan of Integrated Airport Systems (NPIAS) 2019–2023

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

The NPIAS 2019–2023 report will be available online at: NPIAS Report to Congress

THE SECRETARY OF TRANSPORTATION
WASHINGTON, DC 20590

September 26, 2018

The Honorable Michael R. Pence
President of the Senate
Washington, DC 20510

Dear Mr. President:

Enclosed is the National Plan of Integrated Airport Systems (NPIAS) report for 2019-2023, pursuant to Title 49 U.S. Code, Section 47103, which requires the Secretary of Transportation to submit this report to Congress every 2 years.

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

A similar letter has been sent to the Speaker of the U.S. House of Representatives.

Sincerely,

Elaine L. Chao

Enclosure

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WASHINGTON, DC 20590

September 26, 2018

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Speaker of the House of Representatives
Washington, DC 20515

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EXECUTIVE SUMMARY

The National Plan of Integrated Airport Systems (NPIAS) report for Fiscal Years (FY) 2019 to 2023 is submitted to Congress in accordance with title 49 United States Code (U.S.C.), section 47103. As required by the statute, the Federal Aviation Administration (FAA) "…shall maintain the plan for developing public-use airports in the United States." The statute also requires that:

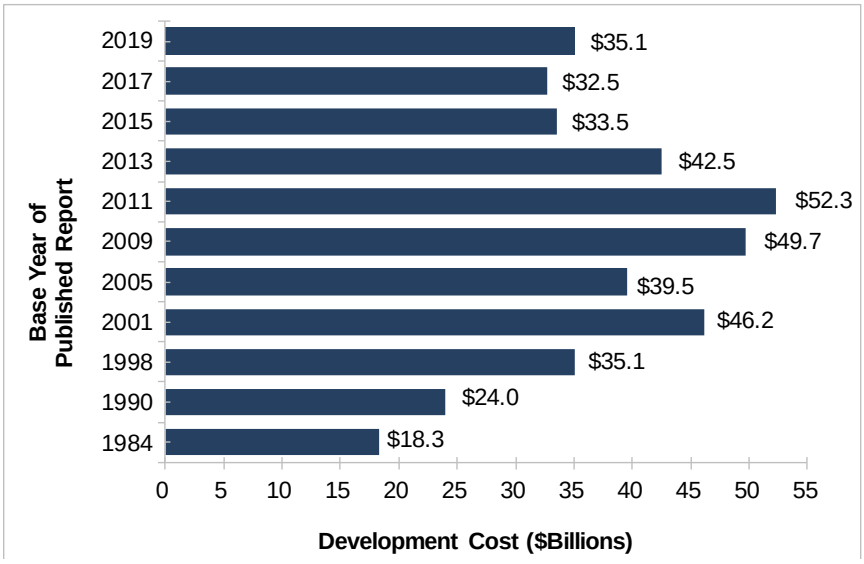
> "The plan shall include the kind and estimated cost of eligible airport development the Secretary of Transportation considers necessary to provide a safe, efficient, and integrated system of public-use airports adequate to anticipate and meet the needs of civil aeronautics, to meet the national defense requirements of the Secretary of Defense, and to meet identified needs of the United States Postal Service."

The FAA does not control which routes or airports the airlines serve. Nor does the FAA dictate or limit where privately owned aircraft can fly. Rather, the FAA's responsibility is to work with State and local units of government, as well as other stakeholders, to ensure effective planning of a safe and efficient system of airports to support the needs of the civil aviation industry.

Accordingly, this report identifies the airports included in the national airport system, the roles they currently serve, and the amounts and types of airport development eligible for Federal funding under the Airport Improvement Program (AIP) over the next 5 years. The FAA has been publishing the NPIAS since 1984.

This edition identifies 3,328 public-use airports[1] (3,321 existing and 7 proposed) that are important to national air transportation and estimates a need for approximately $35.1 billion in AIP-eligible airport projects between 2019 and 2023. This is an increase of $2.4 billion (7 percent) from the report issued 2 years ago. Figure 1 identifies total development costs from 1984-2019. These estimates reflect the costs at the time each report was prepared and do not reflect constant dollars. The development of primary and nonprimary airports continue to be based on

Figure 1: Development Totals, 1984-2019



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

eligible and justified needs and priorities consistent with the role of the airport in the national airport system.

Airport capital development needs are driven by current and forecasted traffic, use and age of facilities, and changing aircraft technology, which requires airports to update or replace equipment and infrastructure. Based on actual and projected aeronautical activity trends, AIP-eligible development needs are expected to increase at large and medium hubs and regional airports, but development needs at all other airport types are expected to increase more slowly or remain consistent with previous levels. Capacity-related development continues to decrease, while development to reconstruct pavement, bring an airport up to design standards, and expand or rehabilitate terminal buildings continue to increase. The increase in terminal projects reflected in this report is principally the result of projects at several large and medium hub airports.

After more than a decade, most major airport capacity projects and runway safety area (RSA) initiatives have successfully concluded. This included airport development to increase airport capacity, resulting in 23 major airports completing 27 airfield projects (new runways, runway extensions, or airfield reconfigurations), and to improve virtually all the nonstandard RSAs at commercial service airports to meet dimensional standards or an equivalent level of safety. A new national initiative to improve nonstandard surface geometry is now well underway to improve nonstandard airfield geometry to prevent runway incursions. While this report includes preliminary costs of almost $300 million through 2023 for this initiative, the next NPIAS report will more fully capture development costs as the FAA continues reviewing and refining solutions.

The FAA considers development included in the NPIAS in the Airports Capital Improvement Plan process. While all of these 5-year capital estimates are AIP-eligible, some may be funded by other sources, including Passenger Facility Charge (PFC) revenues or other airport revenue or financing. Funds for airport development are derived from a variety of sources, including Federal/State/local grants, bond proceeds, PFCs, airport-generated funds (landing and terminal fees, parking, aviation fuel, and concessions revenues), and tenant and third-party financing. The availability of funding sources (and their adequacy to meet needs) varies with each type of airport and levels of aeronautical activity.

Cost estimates in the NPIAS are obtained primarily from airport master and State system plans prepared by planning and engineering firms for airport sponsors and local and State aeronautical agencies. As these plans are typically funded in part by the FAA, the FAA ensures that they 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 were made to obtain realistic estimates of development needs that coincide with local and State capital improvement plans. The estimates only include development undertaken by airport sponsors (as opposed to nonpublic projects undertaken by airport tenants, such as airlines and air cargo operators). The development reflected in this report is based on planning documents and information available through 2017.

The NPIAS cost estimates are based upon planning estimates developed prior to design and full environmental evaluation, which may introduce additional costs. These development estimates

do not include contingency costs (increases in cost based on changes in design, construction uncertainty, or environmental mitigation) or normal price escalation due to inflation (annual increase in costs).

This report explains how the NPIAS supports the U.S. Department of Transportation's (DOT) and the FAA's goals of safety, infrastructure, innovation, and accountability. These goals are identified in chapter 2 of this report, which addresses the condition and performance of the national airport system, highlighting six topic areas: safety, capacity, environment, pavement condition, surface accessibility, and financial performance.

Overall, the findings are favorable, indicating the system is safe, convenient, and well maintained. For the largest and busiest airports, the majority of capital improvements are funded by nonfederal sources, such as airport revenues, bond proceeds and PFC revenues. Even for smaller airports, capital funding sources are diverse and well-leveraged. The majority of airports in the national airport system have adequate airport capacity and few delays. However, there are airports that consistently experience delays and a small percentage of airports that are seeing growing constraints in the terminal and landside areas.

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CHAPTER 1: AIRPORT SYSTEM COMPOSITION

OVERVIEW

The national airport system, envisioned when civil aviation was in its infancy, has been developed and nurtured by close cooperation with airport sponsors and other local agencies, as well as Federal and State agencies. Airports are critical to the national transportation system and contribute to a productive national economy and international competitiveness. The enduring principles guiding Federal involvement in the national airport system were articulated more than 25 years ago and were subsequently reaffirmed by the FAA and the aviation industry in 2011 as part of the national review of the airport system. To meet the demand for air transportation, airports and the national airport system should have the following attributes:

- Airports should be safe and efficient, located where people will use them, and developed and maintained to appropriate standards;
- Airports should be affordable to both users and the Government, relying primarily on producing self-sustaining revenue and placing minimal burden on the general revenues of the local, State, and Federal Governments;
- Airports should be flexible and expandable and able to meet increased demand and 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, the environment, and the requirements of residents;
- Airports should be developed in concert with improvements to the air traffic control system and technological advancement;
- The airport system should support a variety of critical national objectives, such as defense, emergency readiness, law enforcement, and postal delivery; and
- The airport system should be extensive, providing as many people as possible with convenient access to air transportation, typically by having most of the population within 20 miles of a NPIAS airport.

In addition to the above listed principles, a guiding principle for Federal infrastructure investment, as stated in Executive Order 12893,[2] is that Federal investments should be cost beneficial.[3] This Executive Order also included other key principles that the FAA supports through its administration of the NPIAS, including support of State and local planning and information management systems; support for private sector participation; and support for effective administration of grant programs like AIP.

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

[3]The 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. Moreover, virtually all development projects must be justified based on existing or reasonably anticipated civil aeronautical activity levels.

While the Nation's airports have evolved differently over the past decades, they are an integral part of U.S. lifestyle and commerce. Some airports are large in size and have multiple runways. Others are relatively small and may only need a short, single runway to serve a critical purpose. The role of an airport is not necessarily limited by its size, location, or facilities. Airports fulfill very diverse roles—from moving people and cargo and serving agricultural needs, to providing critical access to remote communities, including emergency medical services, to supporting private transportation using the smallest piston aircraft to the most sophisticated jets, and providing aeronautical access to manufacturers/assemblers and repair stations that support airlines and operators of all sizes in a global aerospace marketplace.

The latest statistics indicate 610,796 pilots, 213,050 active general aviation aircraft, and 18,203 air carrier aircraft utilize 19,627 landing areas, including private use (closed to the public) and public-use (open to the public) facilities. Listed below (Table 1) is the breakdown of private- and public-use landing areas in the United States by type of facility.

The FAA works closely with State aviation agencies and local planning organizations to identify public-use airports that are important to the system for inclusion in the NPIAS. About 65 percent (3,321) of the 5,099 public-use airports are included in the NPIAS. There are 1,778 existing public-use airports that are not included in the NPIAS, generally because they do not meet the minimum entry criteria,[4] are located at inadequate sites, cannot be expanded or improved to provide a safe and efficient airport, or are located within 20 miles of another NPIAS airport.

Table 1: Numbers and Types of Existing Airports in the United States (as of May 2018)

Type of Facility	Total U.S. Facilities	Private-Use Facilities	Public-Use Facilities	Existing NPIAS Facilities
Airport	13,117	8,302	4,815	3,273
Heliport	5,842	5,782	60	10
Seaplane Base	507	292	215	38
Ultralight	112	109	3	
Gliderport	35	30	5	
Balloonport	14	13	1	
Total	**19,627**	**14,528**	**5,099**	**3,321**

All commercial service airports[5] are included, and selected general aviation airports that meet requirements are included in the NPIAS. Ninety-eight percent of the facilities included in the NPIAS are airports. Throughout this report, the term "airport" includes landing areas developed for conventional fixed-wing aircraft, helicopters, and seaplanes.

The NPIAS report identifies the airports included in the national airport system, the roles they serve, and the amounts and types of AIP-eligible airport development needed over the next

[4]The NPIAS entry criteria is contained in FAA Order 5090.3C, Field Formulation of the National Plan of Integrated Airport Systems (NPIAS), available online at: http://www.faa.gov/regulations_policies/orders_notices/index.cfm/go/document.information/documentID/12754.

[5]Privately owned airports with scheduled air carrier service are not eligible for designation as a commercial service airport (i.e., Branson Airport in Branson, Missouri).

5 years. An airport must be included in the NPIAS to be eligible to receive a grant under the AIP. Because the capital development needs have historically exceeded available AIP resources, airport development needs included in the NPIAS may ultimately be funded by other funding sources, such as PFCs or other airport revenue or financing.

AIRPORTS IN THE NPIAS

The NPIAS contains 3,328 airports, including 3,321 existing and 7 proposed airports that are anticipated to open within the 5-year period covered by this report. The proposed airports are classified in the same categories as existing airports. Approximately 98 percent (3,249) of the NPIAS airports are owned by public entities (generally city, county or State) and 2 percent (72) are privately owned airports.

Airports are grouped by statute into two major categories: primary and nonprimary as shown in Figure 2 below. Primary airports are defined in the FAA's authorizing statute as public airports receiving scheduled air carrier service with 10,000 or more enplaned passengers per year. There are 380 primary airports based on calendar year (CY) 2016 data. Primary airports are further grouped into four categories defined in statute: large hub, medium hub, small hub, and nonhub.

Nonprimary airports primarily support general aviation aircraft. The nonprimary category includes nonprimary commercial service airports (public airports receiving scheduled passenger service and between 2,500 and 9,999 enplaned passengers per year), general aviation airports, and reliever[6] airports. There are 2,941 nonprimary airports. These airports are further grouped into five categories: national, regional, local, basic, and unclassified. Appendix C of this report contains the airport definitions contained in both statute and policy that are used in this report.

[6]The term "reliever" is defined in the FAA's authorizing statute at 49 U.S.C., section 47102, as "an airport the Secretary designates to relieve congestion at a commercial service airport and to provide more general aviation access to the overall community." The term "reliever" is relevant in a small number of contexts but is increasingly problematic because only a small number of commercial service airports still experience significant congestion. Regardless, because the term is still defined and used in statute, the FAA continues to report the current designations in this report.

Figure 2: NPIAS Airports by Category and Role

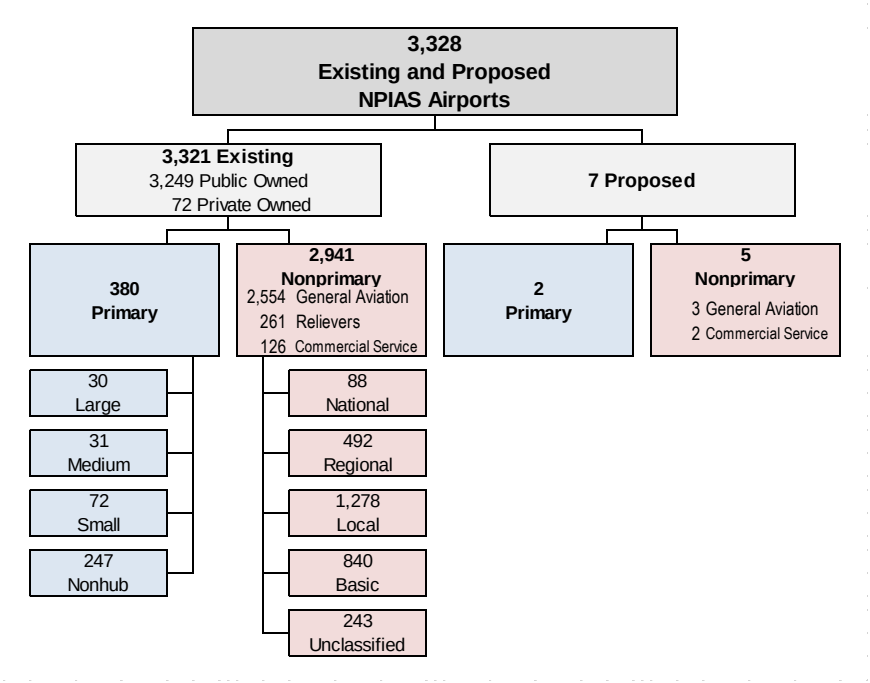


Table 2 reflects the number of existing NPIAS airports by category, as well as the percentage of enplanements, based aircraft, total aircraft operations, and total development.

Table 2: Activity and Development at NPIAS Airports

Number of Airports	Airport Category	Percentage of NPIAS Airports	Percentage of 2016 Total Enplanements[1]	Percentage of Aircraft Based at NPIAS Airports[2]	Percentage of Total Aircraft Operations	Percentage of NPIAS Cost[3]
30	Large Hub	1	72.48	0	13.1	23.5
31	Medium Hub	1	15.87	1.7	4.9	10.5
72	Small Hub	2	8.21	4.8	6.9	11.9
247	Nonhub	7	3.26	10.2	10.7	15.2
380	**Primary Subtotal**	**11**	**99.83**	**16.7**	**35.6**	**61.1**
88	National	3		10.5	8.4	5.3
492	Regional	14		22.3	24.5	12.1
1,278	Local	40		21.3	23.2	14.5
840	Basic	25		3.4	5.9	6.2
243	Unclassified	7		1.1	2.3	0.03
2,941	**Nonprimary Subtotal**	**89**	**0.13**	**58.6**	**64.3**	**38.1**
3,321	**Total NPIAS Airports**	**100**	**99.96**	**75.3**	**100**	**99.2**

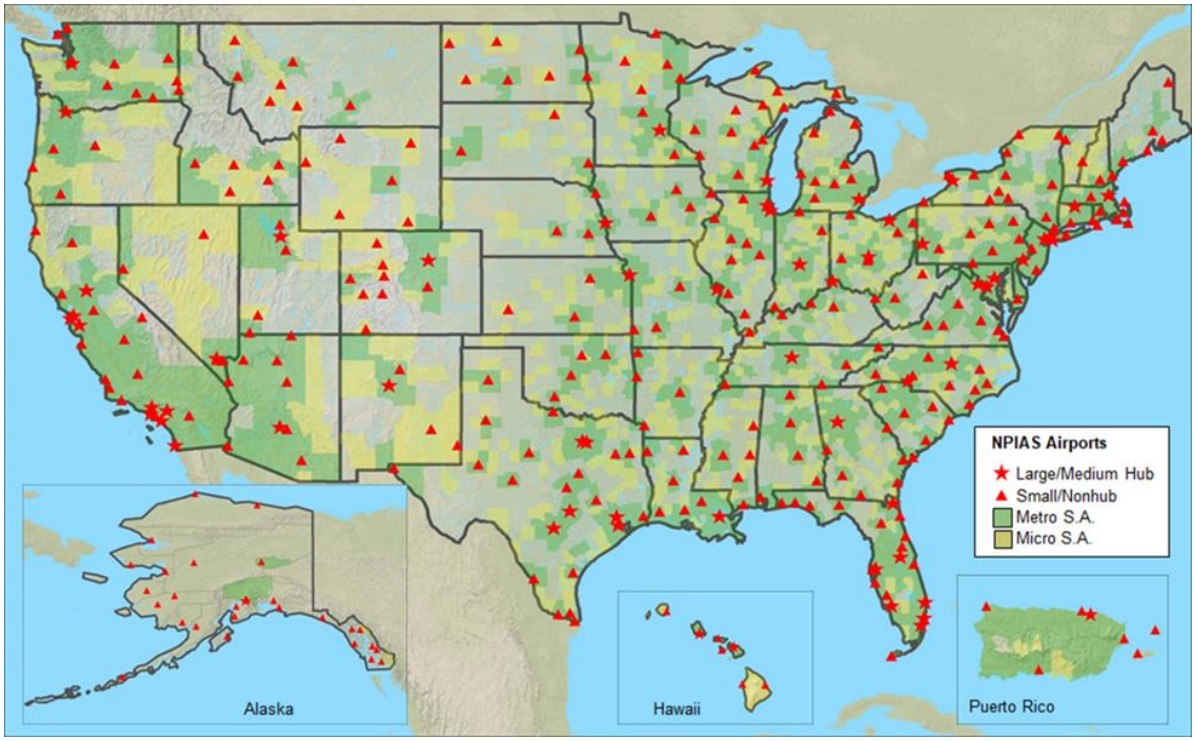
[1]The 126 nonprimary commercial service airports account for 0.07 percent of enplanements. The 2,815 nonprimary airports account for 0.06 percent of enplanements. The remaining 0.04 percent occurred at non-NPIAS airports.
[2]Based on active general aviation fleet of 211,793 aircraft in 2016. The remaining aircraft are based at non-NPIAS airports.
[3]These costs are rounded and do not include the cost for new airports (1 percent).

PRIMARY AIRPORTS

The 380 primary airports are grouped into four categories defined in statute: large, medium, small, and nonhub airports. Primary airports are eligible to receive an annual apportionment based on the number of enplaned passengers. CY 2017 enplanements determine FY 2019 service levels and passenger apportionments. Figure 3 shows the locations of the primary airports.

As shown in table 2, primary airports account for 99 percent of passenger enplanements, 36 percent of aircraft operations, and 61 percent of development contained in the NPIAS with the type of development needed varying by hub category. Further information on the various types of development is included in chapter 4.

Figure 3: Primary Airports



Large Hubs (30)

Large hubs are those airports that each account for 1 percent or more of total U.S. passenger enplanements.[7] The 30 large hub airports account for 72 percent of all passenger enplanements. Some of these passengers originate in the local community, and some are connecting passengers transferring from one flight to another. Nine of the large hub airports primarily serve passengers

[7]The FAA's use of the term "hub" airport is slightly different from that of airlines, which use it to denote an airport with significant connecting traffic by one or more carriers. The hub categories used by the FAA are defined in 49 U.S.C., section 40102.

that originate in the community or who are traveling specifically to those destinations.[8] Many other large hub airports support higher percentages of passengers who are traveling through the airport to connect to another flight, rather than starting or ending their travel at these airports. Such connecting traffic can account for more than 65 percent of passenger activity at the airport, such as Charlotte/Douglas International and Hartsfield-Jackson Atlanta International.

Large hub airports tend to concentrate on commercial airline and freight operations and have limited general aviation activity. Two large hub airports have an average of 170 based aircraft (Honolulu's Daniel K. Inouye International and Las Vegas McCarran International), and Salt Lake City International has more than 325 based aircraft, but the other 27 large hubs have an average of 29 based aircraft. Thus, locally based general aviation aircraft play a small role at most large hub airports.

The Nation's air traffic delay problems tend to be concentrated at certain large hub airports, particularly in the New York City area. Delays occur primarily during inclement weather conditions (i.e., thunderstorms or clouds that reduce ceiling and visibility) or when runway or airspace capacity is reduced below what is needed to accommodate traffic levels. Gate availability and airline schedules that exceed optimal airport capacity can also result in delays. Because of the number of connecting flights supported by these airports, delays at these airports can quickly ripple throughout the system causing delays at other airports nationwide.

Medium Hubs (31)

Medium hubs are defined in statute as airports that each account for between 0.25 percent and 1 percent of total U.S. passenger enplanements. The 31 medium hub airports account for 16 percent of all U.S. enplanements. Medium hub airports usually have sufficient capacity to accommodate air carrier operations and a substantial amount of general aviation activity. One medium hub airport (John Wayne Airport-Orange County) has 489 based aircraft, and three medium hub airports (Metropolitan Oakland International, Dallas Love Field, and William P. Hobby in Houston) each have an average of 270 based aircraft. The remaining 27 medium hub airports have an average of 81 based aircraft.

Small Hubs (72)

Small hubs are defined in statute as airports that enplane 0.05 percent to 0.25 percent of total U.S. passenger enplanements. There are 72 small hub airports that together account for almost 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 128 based aircraft at each airport. These airports are typically uncongested and do not have significant air traffic delays. One small hub airport, Fairbanks International, has 570 based aircraft. Three small hub airports—Fairbanks International, Cyril E. King in Charlotte Amalie, Virgin Islands, and Orlando Sanford International—have an average of 380 based aircraft. The remaining 68 small hub airports have an average of 124 based aircraft.

[8]The nine include the major airports in Boston, Fort Lauderdale, Orlando, San Diego, Tampa, Portland (Oregon), and Las Vegas, as well as New York LaGuardia and Ronald Reagan Washington National.

Nonhub Primary (247)

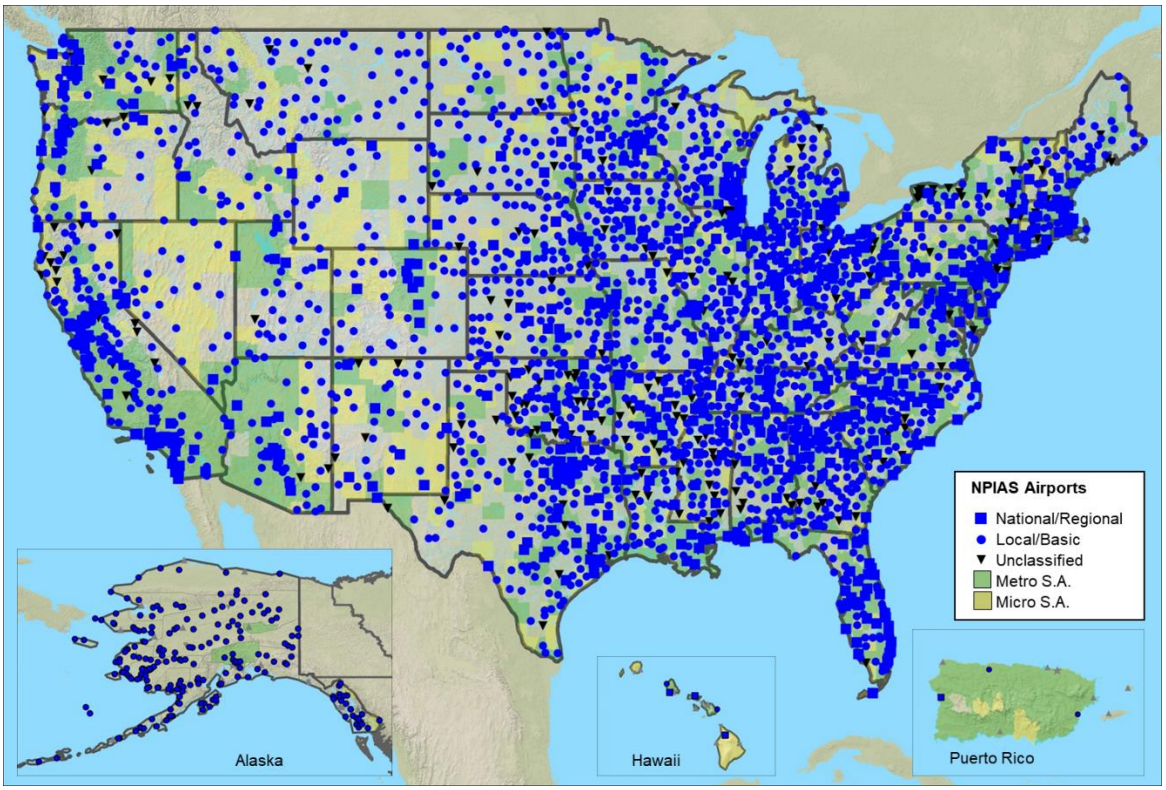
Commercial service airports that enplane less than 0.05 percent of all commercial passenger enplanements but have more than 10,000 annual enplanements are categorized as nonhub primary airports. There are 247 nonhub primary airports that together account for 3 percent of all enplanements. These airports are also heavily used by general aviation aircraft with an average of 87 based aircraft.

NONPRIMARY AIRPORTS

Nonprimary airports are mainly used by general aviation aircraft and include 126 nonprimary commercial service, 261 relievers, and 2,554 general aviation airports. Nonprimary airports are divided into five categories based on existing activity (e.g., the number and types of based aircraft and volume and types of flights), geographic factors, and public interest functions. These categories, illustrated in figure 4, are national, regional, local, basic, and unclassified.

The 2,941 nonprimary airports included in the NPIAS account for 59 percent of the active general aviation fleet, 64 percent of aircraft operations, and 38 percent of the AIP-eligible development through 2023. Development at nonprimary airports tends to focus on pavement reconstruction (runway, taxiway, and apron) and improvements to meet current airport design standards.

Figure 4: Nonprimary Airports



In preparation for the biennial report, the FAA reexamined the roles of nonprimary airports and coordinated with airport sponsors and State aviation agencies. The FAA continues to work with

industry to identify users of these facilities and their associated role in the State and national airport system.

As specialized functions emerge, the FAA will work with industry to incorporate them into the NPIAS categories. Each airport's category and role is reflected in appendix A. The next review of airport roles will be in FY 2020 in preparation for the 2021 NPIAS report due September 2020. Future development of nonprimary airports will continue to be based on eligible and justified needs and priorities consistent with the role of the airport in the national airport system.

National (88)

National airports are located in metropolitan areas near major business centers and support flying throughout the Nation and the world. These airports provide pilots with attractive alternatives to the busy primary airports. In fact, the FAA has designated 70 of these facilities as relievers for primary airports. National airports have very high levels of activity with many jets and multiengine propeller aircraft. Four national airports—Fort Lauderdale Executive, Phoenix Deer Valley, Centennial Airport in Denver, and Addison in Dallas—have more than 600 aircraft based at their airport. National airports average 249 total based aircraft, including 30 jets. The 88 national airports account for 5 percent of the development in this report.

Regional (492)

Regional airports are also in metropolitan areas and serve relatively large populations. These airports support regional economies with interstate and some long-distance flying and have high levels of activity, including some jets and multiengine propeller aircraft. Fifty-three of these airports have limited air carrier service, and the FAA has designated 140 regional airports as relievers for primary airports. Four regional airports (Falcon Field in Mesa, Arizona; Livermore Municipal in Livermore, California; Montgomery-Gibbs Executive in San Diego, California; and Caldwell Industrial in Caldwell, Idaho) each have more than 400 based aircraft. Regional airports average about 92 total based aircraft, including 3 jets. The 492 regional airports account for 12 percent of the development in this report.

Local (1,278)

Local airports are a critical component of our general aviation system, providing communities with access to local and regional markets. Typically, local airports are located near larger population centers but not necessarily in metropolitan areas. They also accommodate flight training and emergency services. These airports account for 39 percent of all NPIAS airports and have moderate levels of activity with some multiengine propeller aircraft. About 73 of these airports have limited air carrier service. Two local airports have more than 200 based aircraft (Nampa Municipal in Idaho and Birchwood Airport in Alaska). Local airports average about 34 based propeller-driven aircraft and no jets. The 1,278 local airports account for 14 percent of the development in this report.

Basic (840)

Basic airports fulfill the principal role of a community airport providing a means for private general aviation flying, linking the community with the national airport system, and making other unique contributions. In some instances, the airport is the only way to access the community and provides emergency response access, such as emergency medical or fire fighting and mail delivery. These airports have moderate levels of activity with an average of nine propeller-driven aircraft and no jets. Many of these airports are located in rural areas. The 840 basic airports account for 6 percent of the development in this report.

Unclassified (243)

These airports tend to have limited activity and include public- and private-owned airports. There are 188 public-owned unclassified airports. Of those, 57 have no based aircraft, 75 have between 1 and 4 based aircraft and 56 have between 5 and 8 based aircraft.

There are 55 privately owned unclassified airports. Of those, 23 are privately owned airports designated as relievers that do not meet existing criteria for AIP funding. About half of these airports have fewer than 50 based aircraft (compared to the long-established threshold of 100 based aircraft for designation as a reliever). Also included in the 55 are 32 privately owned general aviation airports. These airports do not meet the criteria for designation as a reliever and have never received an AIP development grant. These airports have been in the NPIAS for at least 20 years, and there is no indication they will ever meet the requirements to become classified. Over the next 2 years, the FAA will review these locations for continued inclusion in the NPIAS.

Two hundred and sixteen of the airports identified as unclassified airports in 2017 remain unclassified in this report. The activity or circumstances changed for 56 airports. The activity dropped at 27 airports, and they became unclassified. Activity increased at 29 airports, and they went from unclassified to basic (26), local (2), or regional (1).

NEW AIRPORTS (7)

The NPIAS identifies seven proposed airports, two primary and five nonprimary, that are anticipated to be developed and open over the 5-year period covered by this report[9]. One of the proposed new primary airports to help meet future aviation demand would be in the Chicago area and is still in the planning stages. The airport sponsor is currently evaluating methods for developing, financing, and operating the proposed airport. The other new primary airport will replace an existing commercial service airport in Williston, North Dakota, where airlines and general aviation are experiencing constraints due to increased activity caused by regional economic growth attributed to oil and natural gas production.

The five nonprimary airports are in Angoon, Alaska; Newtok, Alaska; Noatak, Alaska; Sioux Center, Iowa; and Griffin, Georgia. The replacement airport in Sioux Center, Iowa, will open in the fall of 2018 and the existing NPIAS airport (Orange City Municipal Airport) will close.

[9]Proposed new airports anticipated to open after 2023 are not listed in this report. However, needed development for those new airports between 2019 and 2023 is captured in Chapter 4, Table 6.

The new airports anticipated to open by 2023 are shown separately in appendix A and are also included in the State list of airports. They are identified by a location identifier beginning with a plus symbol (e.g., +07W). Appendix A does not identify new airports (planning sites) expected to open beyond 2023. Inclusion of a planning site in the NPIAS does not represent actual approval of the proposed airport (from a planning, environmental, or financial perspective), nor does it mean that the FAA has drawn a final conclusion about the need for (or technical or financial feasibility of) the proposed airport.

Since the last report, three new replacement airports opened in 2016 and 2017: Pilot Station, Alaska; Barter Island, Alaska; and Zuni, New Mexico. The three airports that were replaced have closed.

CONVERSION OF MILITARY AIRFIELDS AND USE OF MILITARY/CIVIL AIRFIELDS

The Defense Base Realignment and Closure (BRAC) Commission has made many military airfields available for conversion to civil aviation use since 1989. Local communities have converted about 32 surplus military airfields to civil use. Most of these military airfields have long runways and associated facilities that can accommodate large civil aircraft. Even before the establishment of the BRAC, military officials have cooperated with local communities across the country to provide civilian access to military airport facilities. These local arrangements add capacity to the national airport system and maximize public investment dollars by eliminating the duplication of airport facilities in a community for military and civilian activities. There are 21 military installations that also allow civilian aircraft activity. Many of the facilities are included in the NPIAS.

The U.S. Department of Defense (DOD) has found it advantageous to operate from civilian airfields. Similar to civilian uses on military airfields, military activity at civilian airfields reduces public investments in airport infrastructure by taking advantage of existing civilian airfield capabilities for military purposes. As specified in the National Guard Bureau Air National Guard Pamphlet 32-1001, Airport Joint Use Agreements for Military Use of Civilian Airfields, at airports where military units conduct a significant level of activity, the DOD entered into an agreement with the local community to pay for costs related to the military use of the airfield. As of 2017, the military has agreements in place with 90 civilian airports.

AIRPORT PRIVATIZATION

Public-use airports in the United States owned and operated by a public agency or a government entity, such as a county, city, or State government, are eligible to participate in the Airport Privatization Pilot Program. Congress established the pilot program (title 49 U.S.C., section 47134) in 1996 to determine if, once certain economic and legal impediments were removed, privatization could produce alternative sources of capital for airport development and provide benefits. The FAA's Modernization and Reform Act of 2012 expanded the pilot program from 5 to 10 airports, but left the requirement that the pilot program can include no more than one large hub airport and at least one general aviation airport unchanged. Public-

owned general aviation airports can be leased or sold; public-owned air carrier airports can only be leased. In February 2013, under the pilot program, the FAA approved a 40-year lease of Luis Muñoz Marin International Airport in San Juan, Puerto Rico, from the Puerto Rico Ports Authority (the public airport sponsor) to Aerostar (a private operator). Currently, Airglades Airport in Clewiston, Florida; Westchester County Airport in White Plains, New York; and St. Louis Lambert International Airport in St. Louis, Missouri, have applications under FAA consideration. Six pilot program slots (including one for a large hub airport) are still available.

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CHAPTER 2: SYSTEM GOALS AND PERFORMANCE

OVERVIEW

This chapter describes DOT and FAA goals for the national air transportation system. The NPIAS supports DOT and FAA goals for the air transportation system as shown below. This chapter highlights the performance of the airport system in six key areas: safety, capacity, environmental performance, runway pavement condition, surface transportation accessibility, and airport financial performance. The report also includes major FAA initiatives that will improve the performance of the national air transportation system in these key areas.

DOT AND FAA GOALS

The DOT's Strategic Plan for FY 2018 through FY 2022[10] sets the direction for DOT to provide safe, efficient, convenient, and sustainable transportation choices. These are reflected in four strategic goals supported by a wide-ranging management goal to make the DOT a high-performance, outcome-driven Agency. The FAA has also adopted these goals, but with a focus on the aviation mode. These DOT and FAA goals are:

1. **Safety:** Reduce transportation-related fatalities and serious injuries across the transportation system;
2. **Infrastructure:** Invest in infrastructure to ensure mobility and accessibility and to stimulate economic growth, productivity, and competitiveness for American workers and businesses;
3. **Innovation:** Lead in the development and deployment of innovative practices and technologies that improve the safety and performance of the Nation's transportation system; and
4. **Accountability:** Serve the Nation with reduced regulatory burden and greater efficiency, effectiveness, and accountability.

FACTORS INDICATING SYSTEM PERFORMANCE

Not all system performance factors are related in the same way to capital infrastructure improvements, and increased investment in airport infrastructure is not the only way to improve performance. For example, Federal aid to airports can be useful when focusing on specific issues, such as funding airport rescue and fire-fighting (ARFF) equipment, development of safety areas around runways, removal of obstructions in runway approach paths, and planning and implementing noise compatibility measures. By contrast, however, airports can take a number of operational and other measures (not involving construction) to improve safety, accessibility, efficiency, financial, and environmental performance.

[10]DOT's Draft FY 2018–22 Strategic Plan is available at: www.transportation.gov/dot-strategic-plan.

SAFETY

The United States has not only the largest and most complex aviation system in the world, but also one of the safest as demonstrated by the low accident rate. Airport facilities and operations are an important contributor to the resulting safety record. Although airport infrastructure is rarely determined to be a cause of an aircraft accident, it may be cited as a contributing factor that impacts the severity of an accident, and in many cases, airport facility and operational improvements supported by the FAA either help prevent or mitigate accidents. Additionally, the FAA and industry have been proactively addressing emerging safety risks by building on safety management principles. This systematic approach to safety, called Safety Management Systems, identifies hazards, assesses the risks from those hazards, and puts measures in place to mitigate those risks.

Runway Safety

To operate safely and efficiently, the aviation system relies on communication and coordination among air traffic controllers, pilots, airports sponsors, airport vehicle operators, and pedestrians. Their actions affect runway safety.

The International Civil Aviation Organization defines a runway incursion as any occurrence at an airport involving the incorrect presence of an aircraft, vehicle, or person on the protected area of a surface designated for the landing and takeoff of aircraft. Incursions in the United States are classified based on the severity of the event.

Additional methods of preventing runway incursions include recommending that airports improve how they provide information on rapidly changing runway and taxiway construction and closings.

The FAA uses AIP funds to enhance airport safety and support the Agency's goal of reducing accidents, fatalities, and runway incursions. With the help of the AIP, airports can reconfigure runways and taxiways to optimize both safety and efficiency. Airport operators can build perimeter roads around the airfield so vehicles do not have to be driven across runways and taxiways. AIP funds are also used to meet updated standards for runway marking and signs, and eliminating confusion on airfields. These updates have included changing the airfield marking standard for taxiway centerlines at certificated airports (based on enplanements) to require special markings that will alert pilots when they are approaching hold short lines and working with airport operators to install stop bars[11] at certain runway/taxiway intersections.

The FAA also has a Facilities and Equipment (F&E) program that focuses on runway safety, including Airport Surface Detection Equipment, Model X (ASDE-X), Airport Surface Surveillance Capability (ASSC), and Runway Status Lights (RWSL).[12]

[11]A stop bar is a series of in-pavement and elevated red lights that indicate to pilots that they may not cross.
[12]More information on these programs can be found in the FAA's Capital Investment Plan at: www.faa.gov/air_traffic/publications/cip/.

Maintaining Safe Airport Conditions

The FAA helps airports maintain safe conditions by developing airport design standards based on airport design categories that apply to facilities throughout the system. The FAA airport design standards have evolved over time and provide the necessary dimensions to accommodate aircraft operations, such as with the standards for RSAs discussed in the next section. Airports agree, to the extent practical, to meet these FAA design standards when they accept AIP funds for capital improvements to their facilities. The FAA standards address physical layout characteristics, such as runway length and width, separation between runways, taxiways and taxilanes, RSAs, lighting, signs, and markings. The standards also address material characteristics (e.g., pavement, wiring, and luminance of lights) and issues, such as ARFF equipment, training and operations, snow removal plans and supporting equipment, and wildlife hazard management.

Runway Safety Areas (RSAs)

The RSA (typically 500 feet wide and 1,000 feet beyond the runway end for runways used by airlines) is designed to minimize damage to aircraft and injuries to occupants when an aircraft unintentionally overruns or veers off the runway during an operation. This standard provides for smoothly graded areas contiguous to the runway edges. Only objects required to be there because of their function (such as runway lights or signs) can be in the RSA. These objects must be frangible so they break away if struck by an aircraft. This design standard ensures the consequences of incidents are less likely to be severe.

As aircraft became larger, faster, and more demanding, the required RSA dimensions increased. As a result, many RSAs at commercial service airports (many of which were built decades ago) did not meet the FAA's current standards. As of 2015, RSA improvements at more than 500 commercial airports were completed to meet dimensional standards or an equivalent level of safety, to the extent practicable, with the help of both AIP and PFC funds, as well as local investments. The FAA, working with airport sponsors and local communities, has spent the last 15 years completing this initiative.

For some airports, it is not possible to acquire sufficient land to meet RSA standards through full physical compliance. For those cases, the FAA, in partnership with industry and airport sponsors, conducted research to develop a soft-ground arrestor system to quickly stop aircraft that overrun the end of a runway. Based on that research, the FAA issued a specification for Engineered Materials Arresting Systems (EMAS). An EMAS is designed to stop an overrunning aircraft by exerting predictable deceleration forces on its landing gear as the EMAS material deforms. The EMAS have been installed at 113 runway ends at 68 airports, and there are plans to install 6 more EMAS at 5 additional U.S. airports over the next several years.[13] To date, there have been 13 incidents where EMAS has safely stopped 13 overrunning aircraft with a total of 288 crew and passengers aboard those flights.[14]

[13]Changes in the commercial marketplace are expected in the near term as manufacturers of EMAS enter and leave the U.S. market. This does not impact the EMAS planned to be installed at five airports.
[14]Additional information on EMAS arrestments is available at: https://www.faa.gov/news/fact_sheets/news_story.cfm?newsid=13754.

Runway Incursion Mitigation (RIM)

Runway incursions occur because of human error by a pilot, an air traffic controller, a pedestrian, or a vehicle operator. The FAA tracks runway incursions to help identify and reduce the causes of runway incursions. In a more focused, national-level effort to understand the root causes of runway incursions, the FAA analyzed national runway incursion data for 2007 through 2016.

Based on that analysis, the FAA has now developed an inventory of airport locations where runway incursions have occurred and is working with airport sponsors to identify, prioritize, and develop mitigation strategies to address runway incursion risks. Mitigation alternatives focus on improving existing geometry issues but may also include improved marking and lighting, airfield signage, operational solutions, or other developing technologies. The FAA may provide AIP funding to an airport sponsor to study alternatives to reduce the number of runway incursions at their airports or to address unclear taxiway markings, lighting or signage, or taxiway layout concerns. Many solutions may consist of a combination of two or more of these alternatives.

This NPIAS report includes approximately $300 million in estimated RIM projects and as these projects are further developed, the costs will be refined. The next NPIAS report will reflect a fuller account of development needed to mitigate incursion risks through this program.

Wildlife Hazard Mitigation

The FAA has supported a wildlife management program for more than 50 years in an effort to keep airports safe by making them less attractive to all types of wildlife. The FAA has continued a multifaceted approach for mitigating wildlife strikes, in close coordination with other Federal agencies, as well as State aeronautical agencies, individual airports, and the private sector. The FAA's initiatives include continuing a robust research program, making improvements to the National Wildlife Strike Database and outreach, incorporating new technology to increase and simplify strike reporting, and providing AIP funding to airports to conduct Wildlife Hazard Assessments and develop Wildlife Hazard Management Plans.

CAPACITY

The ability of the United States to effectively compete in a global economy requires air transportation services that operate efficiently and reliably to sustain economic opportunity throughout the Nation. The capacity of any given airport (and the airport system as a whole) is affected by many factors, including the layout of individual airports, the manner in which airspace is organized and used, individual airport operating procedures, weather conditions, the types and numbers of aircraft using the system (including airline business practices), and the application of technology.

The majority of airports in the NPIAS have adequate airport capacity and little or no consistent delays. However, at a small number of airports where consistent capacity constraints and delays regularly occur, they frequently impact the entire air transportation system. The FAA works with State and local units of government to enhance airport capacity where it is justified by current or anticipated aeronautical demand and where the benefits of additional capacity exceed the costs.

A major concern in airport planning is the adequacy of the runways and taxiways to handle anticipated aircraft operations safely and efficiently. A single runway with a parallel taxiway can normally accommodate approximately 200,000 annual aircraft operations. The FAA provides technical guidance to help airport sponsors decide when they should consider airfield capacity improvements. Current FAA guidance[15] recommends that capacity planning start when aircraft activity reaches 60 to 75 percent of an airport's airfield capacity. This is because major airfield modifications often involve significant land acquisition, changes in airspace, and the need to address community concerns. As a result, such initiatives can often take several years from concept to completion, so the FAA's recommendation to start early allows adequate lead time for improvements to be consider and implemented before congestion problems become critical.

Since 2000, infrastructure projects at 23 major airports have provided airports with the additional capacity to accommodate over 2 million additional aircraft operations each year. Moving forward, new airport infrastructure will continue to play a vital role in increasing capacity. This is true even with the capacity and efficiency benefits that are being realized with the NextGen program to modernize the National Airspace System (NAS).[16]

Where substantial new capacity is needed, new or expanded airfield infrastructure will generally represent the most viable means of achieving significant capacity increases. However, NextGen technologies and procedures can further enhance airport capacity and help optimize the efficient movement of flights to and from a new runway. NextGen will often be a critical enabler for a new runway, for example, by maximizing the capacity that can be achieved by using of performance-based navigation (PBN) procedures or approaches to closely spaced parallel runways. Going forward, both new runways and NextGen improvements are needed to improve efficiency at capacity-constrained airports. For more information, see section on Alternative Capacity Enhancement Methods.

Congestion and Delay

The concentration of aircraft arrivals and departures at an airport can result in congestion and delay. Consistent delays are an indicator that activity levels are approaching or exceeding throughput capacity of the airfield system, including runways, gates, and/or ramps. The impacts of delays can be measured in many ways and include:

- Direct costs, such as increased fuel use and crew time;
- Indirect costs, such as the extra travel time for passengers;
- Missed connections (resulting in delays on other airlines and their passengers); and
- Increased air emissions.

Delay is expressed in different metrics. For example, DOT tracks the on-time performance of airlines and reasons for flights arriving after their scheduled arrival times. Other delay statistics are collected and used for specific purposes. For example, air traffic controllers identify instances where aircraft are delayed 15 minutes or more in a phase of flight. The FAA uses this

[15]See Table 3-2 in FAA Order 5090.3C, Field Formulation of the National Plan of Integrated Airport Systems.
[16]Additional information about the Next Generation Air Transportation System, see: www.faa.gov/nextgen/.

information to monitor the day-to-day operations 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 the balance of demand versus capacity. This statistic can be forecasted and translated into a dollar cost of delay and used to inform infrastructure investment decisions.

Air Carrier On-Time Performance

The 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.

In 2017, the 14 carriers reporting on-time performance recorded an overall on-time arrival rate of 80.2 percent with 1.5 percent of the flights canceled.[17] Of the 18.1 percent of flights delayed in 2017:[18]

- 6.8 percent were delayed because the aircraft arrived late (previous flight with same aircraft arrived late, causing the present flight to depart late);
- 5 percent were delayed due to air carrier delay (circumstances within the airline's control, such as maintenance or crew problems, aircraft cleaning, baggage loading, and fueling);
- 5.6 percent were delayed due to national aviation system delays, such as significant aviation weather constraints (3.1 percent), runway closures (0.7 percent), heavy traffic volume (1.8 percent), and air traffic control;
- 0.5 percent were delayed due to extreme meteorological events that, in the judgment of the carrier, delayed or prevented the operation of a flight, such as tornado, blizzard, or hurricane; and
- 0.2 percent of the delays were attributed to diverted flights.

Delay Indicators

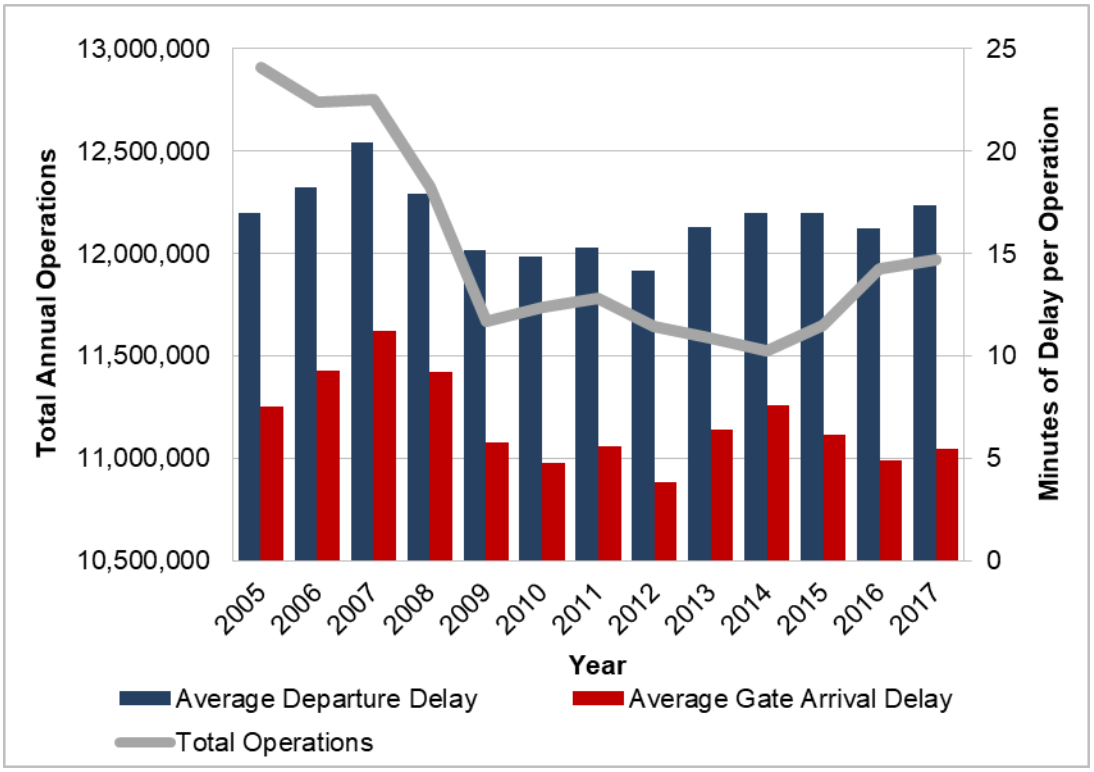
The FAA monitors the day-to-day operations of the NAS, including the operational efficiency of airports and the air traffic control system. Through the Aviation System Performance Metrics (ASPM) system, the FAA tracks delay indicators at the 30 busy hub airports, referred to as "core airports,"[19] using reporting from air traffic controllers and participating airlines.

Airport planners and designers use delay per aircraft operation as a measure of congestion to identify airport infrastructure projects that can enhance capacity. Figure 5 shows recent trends in aircraft operations and average delays at the 30 core airports from 2005 through 2017. Total aircraft operations are lower than the 2005 peak due to the effects of economic changes, airline consolidation, and the use of larger aircraft with more seats (commonly referred to as "upgauging"). Upgauging allows airlines to transport growing numbers of passengers with a slower growth or even declining numbers of flights. Delay trends have been generally lower, in part due to changes in operational demand but also due to additional capacity added to the

[17]Data available at: www.transtats.bts.gov/HomeDrillChart.asp.
[18]Data available at: www.transtats.bts.gov/OT_Delay/OT_DelayCause1.asp?pn=1.
[19]The FAA has identified those airports with the greatest impact on system performance as "core airports." These core airports have more than 1 percent of passenger enplanements or 0.75 percent or more of the total nonmilitary itinerant operations.

system with airport runway development and airspace modernization, including NextGen. Despite increasing numbers of operations in recent years, delay rates do not appear to be increasing as much.

Figure 5: Average Delays for Core 30 Airports



Source: ASPM. Data available at: https://aspm.faa.gov/aspm/entryASPM.asp.

Airport Capacity–A National Look

The FAA developed a series of analyses and reports, known as the Future Airport Capacity Task (FACT), to assess the future capacity of the Nation's airports and metropolitan areas. The first FACT report was published in 2004, and an update, FACT2, was published in 2007. A third report, FACT3, was published in 2015.[20] In light of robust growth in passenger demand at certain U.S. airports in recent years, the FAA is now considering how best to update those analyses.

Another series of reports issued by the FAA examined the capacity of the major U.S. airports. The Airport Capacity Profiles, formerly known as the Airport Capacity Benchmark Report, was updated in 2014.[21] Capacity for the purpose of this report was defined as the hourly throughput of arrivals and departures that an airport's runways are able to sustain during periods of high demand. Information was provided on the facility's layout, annual weather conditions, current operations, and recent and future improvements. Both air traffic control facility "call rates" and

[20]This report is available at: www.faa.gov/airports/planning_capacity/.
[21]Airport Capacity Profiles are available at: www.faa.gov/airports/planning_capacity/profiles/.

model-estimated hourly throughput rates are shown for the highest capacity configuration that is commonly used during visual, marginal, and instrument conditions. Updated airport profiles are published annually to the Web site for selected airports that have either seen enhancements to runway infrastructure or updated air traffic control procedures. The model used for this report was also used for FACT3, as well as for the NextGen systems analysis evaluations, and is available for use by airports in the United States.[22]

Alternative Capacity Enhancement Methods

While the construction of new runways and runway extensions can provide substantial improvements to capacity, new technology can also benefit some airports by reducing delays and increasing operational efficiency without substantial capital investment. Incorporating new technologies in the modernization of the NAS is a key component to the FAA's NextGen program.

In some cases, delays can be reduced or proactively managed, in part, by modifying air traffic control procedures or introducing new technologies to improve the flow of airborne aircraft. Changes in air traffic and flight procedures may also improve the efficiency of traffic flows or alleviate capacity constraints. Airspace design changes, for example, may be able to establish more effective airspace structures and provide better access and improved use of available runways.

NextGen improvements are benefiting airports today. For example, Data Communications (Data Comm) is improving departure efficiency and reducing departure delays by using speedy datalinks to deliver departure clearances and clearance revisions to aircraft. The increased use of advanced modern avionics and PBN routes and procedures in the NAS is improving access to general aviation airports and improving the airspace efficiency of busy, complex hub airports. Along with the FAA, airports and airlines are investing in surface surveillance systems and data sharing to comprehensively track surface movements in order to enhance safety and traffic flow, as well as to improve collaborative decisionmaking. Updated closely spaced parallel runway standards published in 2015 allow for increasing capacity on some existing runways while providing options to build new runways with reduced lateral spacing and less real estate. Comprehensive information is available in the FAA's annual NextGen Update.

Congestion Management

Congestion management is a broad term that includes a number of imposed administrative measures to reduce congestion and delay and allocate constrained capacity. Airport operators may seek to reduce congestion through revenue neutral peak-hour pricing to encourage airlines to move operations to a less congested time or secondary airport.[23]
The International Air Transport Association (IATA) established another congestion management technique, the Worldwide Slot Guidelines (WSG), to provide the global air transport community with uniform standards for the management of airport slots at congested airports. The FAA follows the standards and process in the WSG for slot administration to the extent there is no

[22]Model information is available at: www.faa.gov/airports/planning_capacity/runwaysimulator/.
[23]DOT's Policy Regarding Airport Rates and Charges, 73 Federal Register 40434 (July 14, 2008); see also *Air Transport Association of America* v. *U.S. Department of Transportation,* 613 F.3d 206 (D.C. Cir. July 13, 2010) (denying petition for review of policy).

conflict with U.S. law, rules, or administrative procedures. Under the WSG, airports are classified into one of three categories based on the degree of congestion and potential for delays:

- Level 1 is assigned where the capacity of airport infrastructure is generally adequate to meet demand and therefore there is no extensive pattern of delays;
- Level 2 is assigned where there is potential for congestion during some periods of the day, which can be managed through mutual cooperation of the carriers with the schedule facilitator to ensure scheduling within the airport's capacity; and
- Level 3 is assigned where infrastructure is inadequate to meet demand and there is significant potential for delays requiring mandatory slot control.

Most airports in the United States have adequate runway capacity and are categorized as Level 1 airports under the IATA WSG. Four airports in the United States—Chicago O'Hare International Airport, Los Angeles International Airport, San Francisco International Airport, and Newark Liberty International Airport—are categorized as Level 2. Three airports in the United States are categorized as Level 3 or equivalent—John F. Kennedy International, LaGuardia, and Ronald Reagan Washington National.

New York Metropolitan Area

Persistent demand for New York area airspace and airports and the limited ability to expand capacity presents the FAA with a challenge of how best to allocate scarce runway capacity. For decades, the FAA managed congestion at LaGuardia and John F. Kennedy International airports through the High Density Traffic Airports Rule (HDR). However, Congress mandated the expiration of the HDR at both airports on January 1, 2007. The FAA put temporary orders in place at all three New York metropolitan airports that cap scheduled operations to minimize congestion after the expiration of the HDR. The orders for John F. Kennedy International and LaGuardia were extended until October 24, 2020. Beginning with the winter 2016 scheduling season, the FAA changed the designation at Newark Liberty International under the WSG to Level 2 schedule facilitation.

To integrate the implementation of delay-reduction initiatives in the New York metropolitan area, the New York Area Program Integration Office was established with representatives from the FAA's Air Traffic, Aviation Safety, Airports, Policy, International Affairs, and Environment offices. The team has developed an Integrated Master Schedule and Delay Reduction Plan with all delay reduction initiatives and supporting projects.

The Port Authority of New York and New Jersey has a number of ongoing and planned projects to better serve passengers and improve operational efficiency at its system of airports. The Port Authority operates LaGuardia, John F. Kennedy International, Newark Liberty International, Stewart International, Teterboro, and Atlantic City International airports. The Port Authority also continues to evaluate ways to accommodate future demand for air travel in the New York metropolitan area.

Ronald Reagan Washington National Airport

At Ronald Reagan Washington National Airport, the equivalent of IATA Level 3 slot controls are in place pursuant to the HDR (14 CFR, part 93, subparts K and S) to govern operations daily,

from 6 a.m. to 11:59 p.m. Some additional operations are permitted by exemption on a limited basis pursuant to 49 U.S.C., sections 41714 and 41718.

Chicago O'Hare International Airport

As an IATA Level 2 schedule facilitated airport, the FAA continues to monitor congestion and delay at Chicago O'Hare International. The FAA obtains advance schedule information from United States and foreign air carriers, which enables the Agency to identify and work with the carriers to voluntarily mitigate excessive scheduling and delays.

San Francisco International Airport

The FAA determined that the demand and capacity balance at San Francisco International Airport warranted IATA Level 2 designation. The FAA continues to review the aggregate of planned schedules and determines whether they may cause significant congestion and delays in light of operational constraints and works with airlines to voluntarily adjust schedules to mitigate congestion and delay impact, as necessary.

Los Angeles International Airport

In 2015, the FAA designated Los Angeles International Airport as an IATA Level 2 airport due to the potential for congestion during the phases of the multiyear runway construction work, as well as forecasted schedule growth by multiple carriers.

ENVIRONMENTAL CONSIDERATIONS

Community concern about environmental issues can complicate plans to expand existing airports, as well as developing new airports. The problems can be particularly serious in metropolitan areas where there is high aviation demand and strong pressure to develop residential and other incompatible land uses near airports. In addition, airports in large metropolitan areas are frequently located in air quality nonattainment areas. Historically, communities have been concerned about noise levels, but they are also concerned about air quality, water quality, traffic congestion and a host of other environmental concerns.

As it evolves, NextGen capabilities will help reduce environmental issues by enabling more efficient movement of aircraft on the airport surface. New airframe and engine technologies will also improve noise, air quality, and greenhouse gas emissions. The introduction of PBN to the NAS introduces both opportunities and challenges for controlling noise exposure to communities. The highly configurable nature of PBN procedures allows the potential to design routes away from population centers while safely maintaining the narrower flight corridors, generally reducing noise impacts on the periphery of new or legacy flight paths, and allowing for increased efficiency. However, the narrower flight paths may focus noise levels directly under consolidated flight paths. The FAA continues to refine our ability to model environmental impacts associated with PBN, including noise and air quality. The FAA considers the potential impacts prior to implementing FAA actions.

Noise

The noise situation around airports has changed dramatically since 1976.[24] At that time, an estimated seven million people living near airports in the United States were exposed to significant levels of aircraft noise.[25] That number decreased markedly over time, despite significant increases in both passenger demand and flight operations. This reduction of aircraft noise levels for people living near or around airports who are exposed to aircraft noise is primarily due to reductions in aircraft source noise and the phaseout of older Stage 1 and 2 aircraft. It is estimated that the number of people in the United States living in areas adjacent to airports with noise levels above the DNL of 65 dB decreased from approximately 498,000 in CY 2005 to 408,000 in CY 2016 as shown in Figure 6.

In 1997, the FAA established a noise exposure performance target to reduce aircraft noise levels for people living near or around airports who are exposed to significant aircraft noise by 1 percent per year. This target was updated in 2007 from a reduction of 1 percent per year to 4 percent per year. In 2010, FAA established the 2005 baseline of 500,000 as the number of people exposed to significant aircraft noise against which to measure FAA's noise reduction goal. In 2011, FAA set an additional target to reduce the number of people living in areas of significant aircraft noise to 300,000 by 2018. This target is aligned with the 4-percent reduction per year that FAA has been working toward.

Although the FAA has succeeded in achieving this goal in the past, the number of people exposed to significant noise, which can fluctuate year to year, has been increasing the last several years. In FY 2017 (CY 2016), with a result of 408,000 people exposed to significant aircraft noise, the FAA did not achieve the noise exposure goal of keeping the number of people exposed to significant aircraft noise below 315,000. The increase in significant noise exposure from FY 2016 to FY 2017 was due to several factors including an increase in overall air carrier operations, an increase in nighttime operations (defined as occurring between 10 pm and 7 am local time), and an increase in population. In addition to these factors, the underlying modeling inputs were updated which also affected the noise exposure results.

Considerable effort[26] has been expended over the past 39 years to provide relief to noise-impacted areas by funding noise mitigation projects under the AIP. Noise mitigation projects include residential and public building sound insulation, land acquisition, and relocating residents from noise-impacted areas. Noise compatibility efforts also promote preventive measures, such as comprehensive planning, zoning, subdivision ordinances, building codes, and real estate disclosure. In addition, airports have acquired noise barriers to reduce ground run-up noise.

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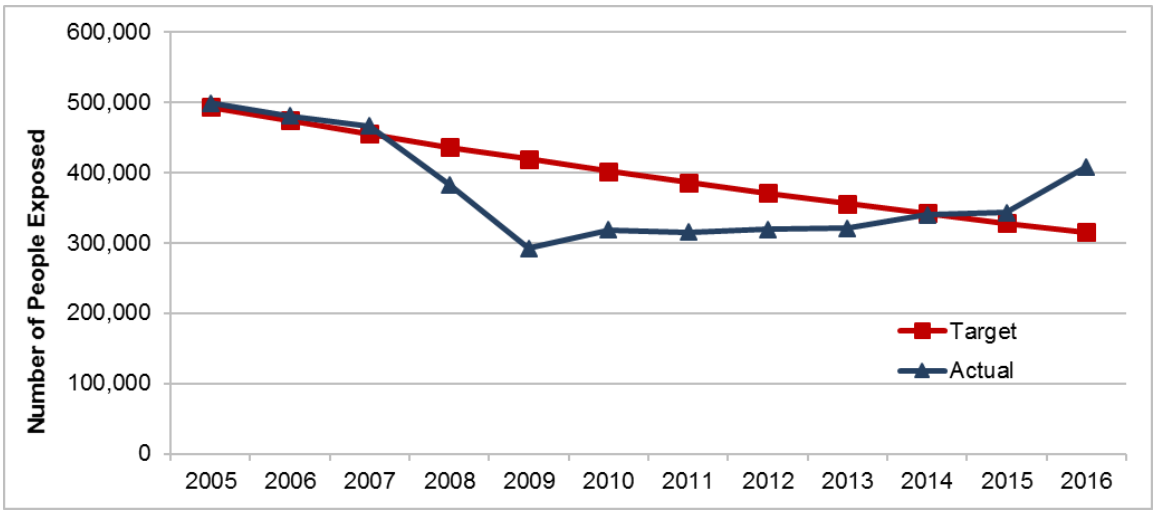
[24]In 1976, the DOT published its Aviation Noise Abatement Policy, which provided a course of action for reducing aviation noise impact. The principles contained in that document and subsequent legislative and regulatory action have resulted in a dramatic reduction in the number of Americans adversely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

[25]Defined as day/night average sound level (DNL) of 65 decibels (Db) or higher in title 14 CFR, part 150, section 7, and Appendix A (Table 1) for residential land uses.

[26]Airport Noise Compatibility Planning under Title 14 CFR part 150 helps airport operators develop comprehensive noise and land use compatibility programs.

Figure 6: Number of People Exposed to Significant Aircraft Noise (CY 2005-2016)



Air Quality

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

Water Quality

Many of the Nation's airports are located near waterways and wetlands because when airports were originally built, the most readily available land suitable for airports (flat and inexpensive) was found near water. Today, activities at these airports have the potential to cause adverse water quality impacts if they are not properly designed and managed. In particular, airport construction activities, fire-fighting activities, and seasonal aircraft and runway anti-icing/deicing operations are major concerns. Airport construction activities could cause a sediment-laden runoff to enter waterways. Chemicals in the aqueous film forming foams are now being regulated in some states because of their potential toxicity and persistence issues. Biological and chemical breakdown of aircraft and runway deicing chemicals in an airport runoff can reduce oxygen in receiving waters. Additives in deicing chemicals may be toxic to aquatic life, and the industry has taken steps to eliminate such additives.

The FAA continues to work with other Federal and State agencies, airport operators, airlines, and industry groups to address various water quality issues, and with airport operators and airlines in the search for alternatives to earlier generation runway deicing chemicals, methods to deice aircraft, and the use of centralized aircraft deicing facilities. The FAA is also working with airport sponsors, industry associations, and other Federal agencies to ensure water quality mitigation activities do not create safety concerns by attracting wildlife, notably large mammals or birds hazardous to aviation. The FAA also supports and participates in Airport Cooperative Research Program projects administered by the Transportation Research Board regarding water quality.

Environmental Streamlining

Before a new runway or major runway extension can be built, the FAA must assess potential environmental impacts in order to comply with a number of environmental laws. The FAA's authorizing statute requires the FAA to implement a process for expedited and coordinated environmental reviews of certain airport capacity, safety, and security projects, but in fact, the FAA routinely applies streamlining principles to virtually all proposed airports projects in order to minimize review time and ensure optimal coordination among and between Federal and state agencies. The FAA works with other Federal and state environmental resource agencies to achieve concurrent reviews and coordinated permit approvals to the greatest extent possible. This includes establishing and monitoring schedules and key milestones, as well as processes to quickly elevate and resolve disagreements between stakeholders.

The FAA will implement Executive Order 13604, Improving Performance of Federal Permitting and Review of Infrastructure Projects, which calls for the execution of Federal permitting and review processes, including environmental review processes, with maximum efficiency and effectiveness. Additionally, the FAA will implement Executive Order 13807, Establishing Discipline and Accountability in the Environmental Review and Permitting Process for Infrastructure Projects (2017), which directs Federal agencies to conduct environmental reviews and issue authorization decisions for "major infrastructure projects" in a coordinated, consistent, predictable, and timely manner.

RUNWAY PAVEMENT CONDITION

Airfield pavement needs regular preventive maintenance to seal cracks and repair damage, decreasing the frequency of major rehabilitation cycles. Preventive maintenance (e.g., seal coat surface treatment) or more significant rehabilitation may be needed on a 4- to 7-year cycle or a 15- to 25-year cycle, respectively, to remedy the effects of age, use, and exposure. Runway pavement in a state of good maintenance minimizes damage to aircraft and avoids unnecessary higher costs for major rehabilitation (e.g., full-depth reconstruction).

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

The FAA's longstanding goal is to ensure that at least 93 percent of paved runways at airports in the NPIAS are maintained in excellent, good, or fair condition. Data for FY 2017 indicates that 97.8 percent of runways at NPIAS airports are rated excellent, good, or fair. Pavements at commercial service airports are even better with 98.2 percent of the runways rated excellent, good, or fair.

It is important to note that even a runway in "poor" condition is still safe for flight operations. It simply requires more frequent inspections and often more intensive pavement maintenance (e.g., patching and crack-sealing). By the time a runway is in poor condition, the FAA expects the

airport to be well underway with the necessary planning and engineering design work to rehabilitate the runway (if it is still needed for flight operations).

Many older airports were built decades ago before jets were prevalent in the fleet. Such airports may have needed multiple runways in order to provide sufficient coverage for variable wind conditions for piston and turboprop aircraft.

Today, some industry stakeholders have pressed the FAA to establish clearer criteria for runways that need to continue to be available for flight operations based on current aircraft performance characteristics and operational requirements. Accordingly, at the time this report is being prepared, the FAA is engaged in two reviews: First, regarding the scope of runways that should continue to be the subject of the pavement condition goal in the future; and second, whether the existing system of classifying pavement condition remains the most beneficial to the public interest.

SURFACE ACCESSIBILITY

Airports are generally located to make air transportation as convenient and accessible as possible. The 2010 Census, extrapolated to 2017, reveals that 72 percent of the current U.S. population of 319.4 million people lives within 20 miles of a primary airport. When general aviation airports are also included, 98.5 percent of the population lives within 20 miles of a NPIAS airport.

Statistics for major airports in the United States show a limited but important role for public transportation to airports. The Intermodal Passenger Connectivity Database [27] includes information on more than 7,000 passenger transportation terminals and available intermodal connections. Data collected from 2007 to mid-2012 indicates that 29 percent of commercial service airports are served by another scheduled public transportation mode, predominately transit bus (citywide or metropolitan area buses). The airports with higher passenger traffic were more likely to have two or more other transport modes. Every large hub airport, 94 percent of the medium hubs, 45 percent of the small hubs, and 14 percent of the nonhubs have at least one public transportation mode servicing the airport. These options can be important for airport and airline employees, as well as for passengers.

FINANCIAL PERFORMANCE

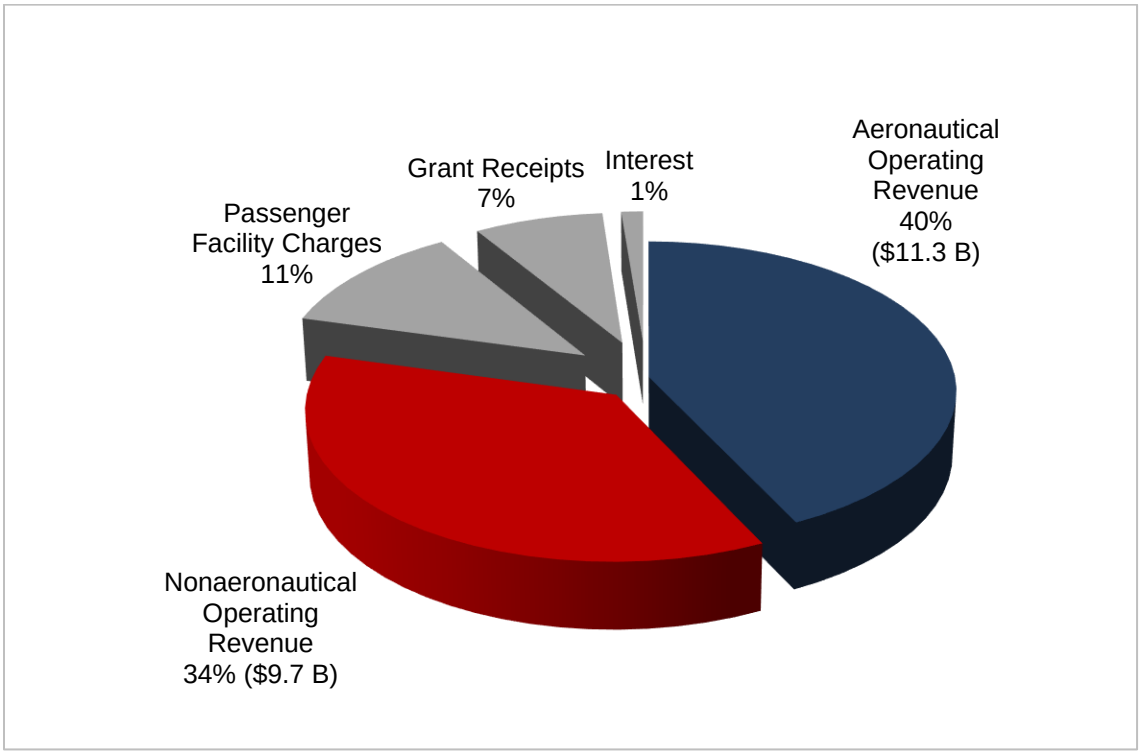
The NPIAS airports are owned and operated by thousands of State and local agencies and a few private owners. This makes compiling comprehensive data on the financial operations of all 3,321 existing NPIAS airports difficult. However, the FAA requires commercial service airports to report financial data annually, including revenue and expense information. Because the remaining 2,800 NPIAS airports are not required to report financial information, there is limited financial data available for general aviation airports.

[27]Research and Innovative Technology Administration, Bureau of Transportation Statistics, Intermodal Passenger Connectivity Database at: www.transtats.bts.gov/DatabaseInfo.asp?DB_ID=640&Link=0.

The FAA uses data provided by commercial service airports from FAA Form 5100-127, Operating and Financial Summary, for each fiscal year to evaluate the financial performance of the airports.[28] Data collected in these forms includes the following:

- Aeronautical and nonaeronautical revenues;
- Operating and nonoperating expenses;
- Beginning and ending balances for net assets; and
- Operating statistics.

Figure 7: 2016 Revenue at Commercial Service Airports by Type



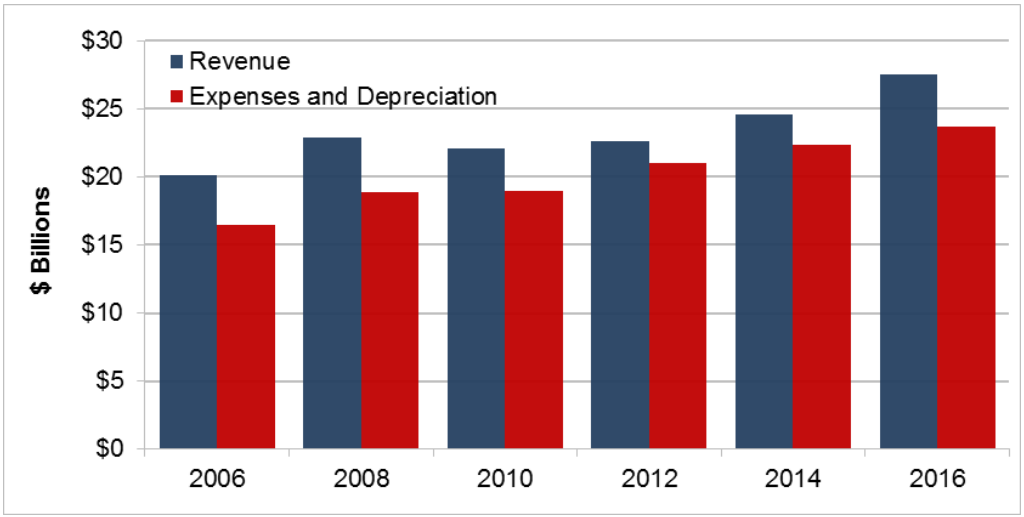
The costs of airport operations and maintenance are a function of the age of the facilities and the nature of airline activity and other operations. There is considerable variation in net income by hub type and year with large hubs accounting for 73 percent of the net income reported in 2016. There is also a variation in revenue sources and expenditures among airports. For example, for large hub airports, concessions, rental car, and parking revenues are 26 percent of total revenues, compared with 34 percent for medium hub airports, 30 percent for small hub airports, and 14 percent for nonhub primary and nonprimary commercial service airports. Table 4 provides a summary of 2016 revenue and expenses by hub type.

The financial status of the Nation's air carrier airports is generally stable with airports carefully managing operating, financing, and capital expenses. Airports continue to increase how efficiently they can manage their facilities, providing opportunities for competitive airline

[28] Source: Data collected by the FAA on FAA Form 5100-127 (Operating and Financial Summary) for fiscal years ending in 2016 (as of April 2018). Certification Activity Tracking System, http://cats.airports.faa.gov/.

service. Airports have the ability to diversify and maximize revenue from concessions and other assets allowing greater revenue diversity and growth. Between 2006 and 2016, the total airport revenue and expenses reported for commercial service airports increased (see Figure 8). In 2006, the total revenue at commercial service airports was $3.6 billion more than total expenses (including depreciation). In 2016, the total revenue at commercial service airports was $3.8 billion more than total expenses (including depreciation), an increase of 5.5 percent in the 10-year period.

Figure 8: Revenue and Expenses Plus Depreciation by Year



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

Capital markets evaluate the creditworthiness of an airport based on several factors. These factors include the demand for air service in the region, the type of passenger demand (originating versus transferring), the number of commercial airports in the region, and the quantity and quality of service provided by the airlines. The overall creditworthiness of U.S. airports as a group remains strong. Large and medium hub airports typically have had strong credit ratings, and this is not expected to change in the study timeframe. Nonhub primary and nonprimary commercial service airports have more limited incomes and generally do not have such robust operating surpluses to repay borrowed funds. As a result, smaller airports tend to rely more heavily on grants than larger airports to finance capital improvements.

Table 3: Airport Operating and Financial Summary for Commercial Service Airports 2016 ($ Millions)

Category	30 Large Hub	31 Medium Hub	72 Small Hub	388 Nonhub	521 Total
Aeronautical Operating Revenue					
Aeronautical Operating Revenue					
Landing Fees	$2,824	$576	$289	$94	$3,783
Terminal Rents	3,989	678	318	98	$5,083
Cargo and Hangar Rentals	421	77	83	80	$661
Fixed-Base Operator Revenue	107	50	44	58	$259
Apron Charges/Tie Downs	109	53	25	8	$195
Fuel Sales and Taxes	184	42	35	106	$367
Other Aeronautical Fees	806	60	60	77	$1,003
Total Aeronautical Operating Revenue	***$8,440***	***$1,536***	***$854***	***$521***	$11,351
Nonaeronautical Operating Revenue					
Parking and Rental Car	$3,637	$1,204	$765	$228	$5,834
Concessions	1,196	201	87	19	$1,503
Terminal Rents	361	46	38	10	$455
Land Rental and Nonterminal	348	100	107	121	$676
Other Nonaeronautical Fees	938	120	107	58	$1,223
Total Nonaeronautical Operating Revenue	***$6,480***	***$1,671***	***$1,104***	***$436***	***$9,691***
Nonoperating Revenue (Expenses) and Capital					
Passenger Facility Charges	$2,354	$493	$234	$75	$3,156
Grant Receipts	583	272	503	657	$2,015
Interest	268	43	21	7	$339
Other	334	220	160	236	$950
Total Nonoperating Revenue	***$3,539***	***$1,028***	***$918***	***$975***	***$6,460***
TOTAL REVENUE	**$18,459**	**$4,235**	**$2,876**	**$1,932**	**$27,502**
Operating Expenses					
Personnel Compensation and Benefits	$3,586	$818	$640	$429	$5,473
Contractual Services	3,154	695	324	216	4,389
Communications and Utilities	677	170	115	77	1,039
Supplies and Materials	344	95	94	80	$613
Insurance, Claims, and Settlements	129	37	29	25	$220
Other	1138	199	139	120	1,596
Total Operating Expenses	***$9,028***	***$2,014***	***$1,341***	***$947***	***$13,330***
Nonoperating Expenses					
Interest Expense	$2,706	$488	$188	$56	$3,438
Other	0	0	0	0	$0
Total Nonoperating Expenses	***$2,706***	***$488***	***$188***	***$56***	***$3,438***
TOTAL EXPENSES	**$11,734**	**$2,502**	**$1,529**	**$1,003**	**$16,768**
Depreciation	$4,337	$1,119	$910	$566	$6,932
NET INCOME	**$2,388**	**$614**	**$437**	**$363**	**$3,802**
Other Information					
Capital Expenditures	$6,902	$1,289	$1,016	$1,040	$10,247
Bond Proceeds	6,569	626	213	97	7,505
Sale of Property, Contributed Capital, Other	10	69	1	19	99
Reporting Year Debt Payments	8,705	1,612	755	241	11,313
Indebtedness at End of Year	$70,256	$11,920	$4,416	$1,423	$88,015

Nonhub Note: Included in the Nonhub column are nonhub primary and nonprimary commercial service airports along with approximately 77 State of Alaska airports, which are consolidated into one reporting entity.

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CHAPTER 3: USE OF THE AIRPORT SYSTEM

OVERVIEW

There are several factors that impact airport development requirements. The largest factors affecting airport facility requirements and capital investment are the current type and level of operations and future demand for air transportation.

The FAA uses a comprehensive process to guide airfield development. It includes airport master planning, FAA airspace studies, airfield modeling, and capacity/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.

Forecasts of future levels of aviation activity, which typically are part of an airport master plan, are the basis for airport planning decisions. These projections are used to determine the need and timing for new or expanded facilities at individual airports.

The FAA issues an annual aerospace forecast that is a top-down (national level) forecast for aviation activity in the United States for the next 20 years. The national forecast[29] examines current commercial operations (passenger and cargo) and general aviation, as well as emerging aircraft operations (e.g., commercial space and unmanned aircraft systems) and projects future activity. The FAA also develops a bottom-up forecast, known as the Terminal Area Forecast (TAF), for each individual NPIAS airport.[30] These forecasts are prepared to meet the budget and planning needs of the FAA and to provide information that may be useful for State and local authorities, the aviation industry, and other stakeholders.

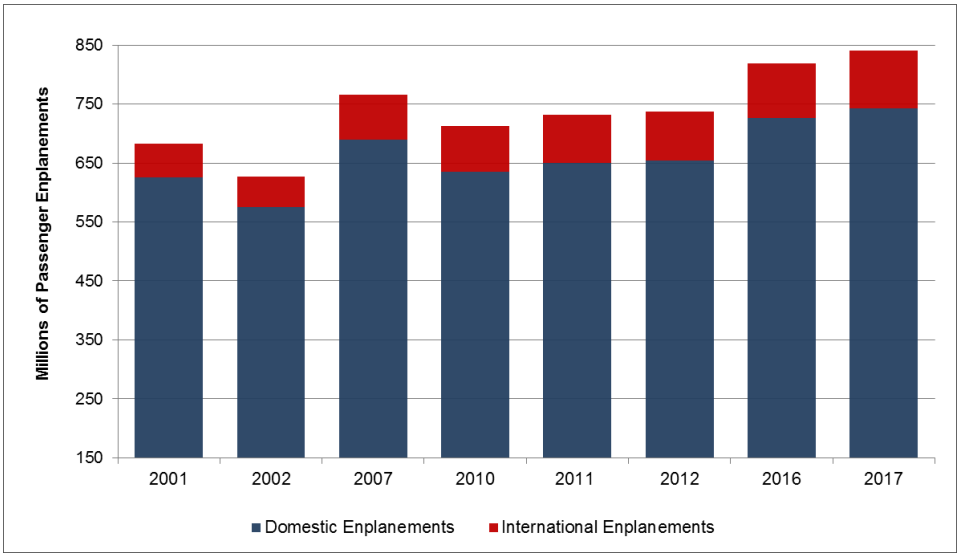
COMMERCIAL AIRLINE SERVICE

The national airport system is a reflection of the types of aircraft using the airports and subsequent economic activity. Of the 3,321 airports contained in the NPIAS, approximately 506 of these airports are commercial service airports. Commercial airline service represents the most widely known aspect of the aviation industry and includes the carriage of passengers on aircraft.

The last 17 years have been turbulent for U.S. commercial air carriers, resulting in variations in annual passenger boardings at U.S. airports as shown in Figure 9. In FY 2017, total enplanements reached an all-time high of 840 million, with international enplanements of 97 million and domestic enplanements of 743 million. Domestic enplanements represent approximately 88 percent of total U.S. passenger traffic at commercial service airports.

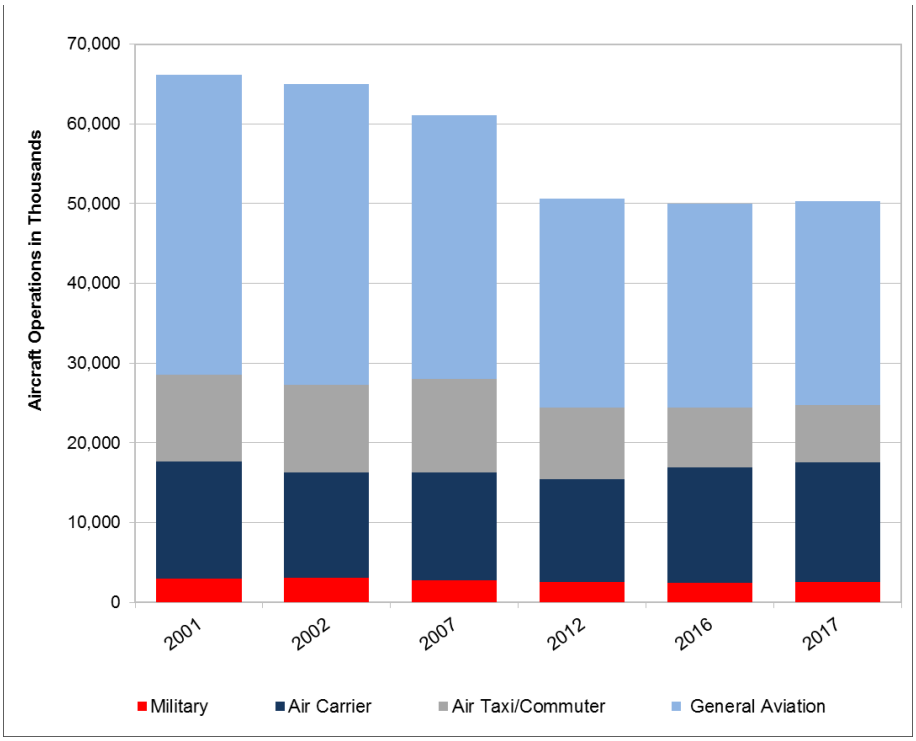
[29]FAA Aerospace Forecast, FY 2018-2038, is available online at: www.faa.gov/data_research/aviation/.
[30]The 2017 TAF is available online at: taf.faa.gov/.

Figure 9: Domestic and International Enplanements (2001–2017)



There have been changes in aircraft operations as measured at the airports with airport traffic control towers as shown in Figure 10. Currently, 517 airport traffic control towers report traffic counts. Air carrier operations increased 16 percent in the last 5 years. Ondemand/commuter and general aviation operations at towered airports continue to decline.

Figure 10: Aircraft Operations at Airports with FAA and Contract Control Towers (2001-2017)



The changes in aircraft operations reflect air carriers' capacity restraint in better matching available seats with demand, the shifting of larger aircraft to international services, and the use of 70- to 90-seat regional jet aircraft in place of smaller 50-seat regional jets. The combined activities of air carrier and air taxi/commuter operations account for 44 percent of total operations at airports with airport traffic control towers. Operations by military aircraft at commercial service airports are approximately 5 percent of the total operations. General aviation operations at airports with airport traffic control towers have decreased 32 percent since 2002. Many of these operations have shifted to the surrounding nonprimary airports.

Forecast for Commercial Aviation

The FAA forecasts that despite growth in passenger demand, aviation traffic in terms of flight operations will continue to grow more slowly over the long term, averaging 1.5 percent growth per year. Air carriers continued to fine-tune their business models to minimize financial losses by lowering operating costs, eliminating unprofitable routes, and grounding older, less fuel-efficient aircraft. To increase operating revenues, air carriers initiated new services that customers are willing to purchase. These changes, along with capacity discipline, have resulted in an eighth consecutive year of profitability for the industry. Going into the next decade, there is optimism that the industry has transformed from a capital intensive, highly cyclical industry to an industry that generates solid returns on capital and sustained profits.

CARGO

Air cargo (domestic and international freight air/express and mail) is moved in both the bellies of passenger aircraft and in dedicated all-cargo aircraft. Air cargo carriers face price competition from alternative shipping modes, such as trucks, container ships, and rail cars. Air transportation is generally the preferred mode for the shipment of high-value, lightweight, and perishable goods.[31] In 2017, 29 percent of exports and 26 percent of imports measured by value were shipped by air.[32] In 2015, 8 of the 25 busiest international freight gateways (seaports, land ports, and airports) by value of shipment were airports.[33] Lower shipping costs and more frequent service have made air cargo a major factor in the way global business is conducted.

Air cargo is generally concentrated at busy commercial service airports. The majority of 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 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.

[31]Air cargo accounts for less than 1 percent of imports and exports by weight.
[32]Source for air, water, and total – U.S. Department of Commerce, U.S. Census Bureau, Foreign Trade. FT920: U.S. Merchandise Trade: Exhibit 1–U.S. Exports and Exhibit 4–U.S. General Imports, December 2017. Available at: www.census.gov/foreign-trade/Press-Release/2017pr/12/ft920/index.html.
[33]Source – U.S. Department of Transportation, Bureau of Transportation Statistics, Transportation Statistics Annual Report 2017, Chapter 3, available at: www.bts.gov/TSAR as of March 2018.

Forecast for Cargo

Factors that affect air cargo growth are Gross Domestic Product, fuel prices, real yields, and globalization. The fleet of cargo jet aircraft is expected to increase from 855 in 2017 to 1,178 in 2038. Revenue Ton Miles (RTMs) are expected to increase at an average annual rate of 3.8 percent over the next 20 years. In 2017, all-cargo carriers carried 89 percent of domestic cargo RTMs.

GENERAL AVIATION

Eighty-nine percent of NPIAS airports are classified as nonprimary airports and serve mainly general aviation activity. General aviation activity, as measured by total operations at airports with control towers, has decreased 2 percent in the last 5 years and 34 percent since 2000. Much of the decline in the later parts of the decade can be attributed to economic conditions, high fuel prices, and other factors.

The term "general aviation" encompasses a diverse range of commercial, governmental, and recreational uses. While it is often easier to consider what general aviation does not include—scheduled airline and military activity—this does not sufficiently define general aviation activity. To better understand this segment of the industry and the resulting requirements for the airport and air traffic system, each year the FAA surveys the general aviation community through general aviation and 14 CFR, part 135,[34] activity surveys. These surveys ask respondents to indicate the types of uses of their aircraft and the number of hours flown, as well as the type of aircraft flown, flying conditions, fuel consumption, and aircraft age.

Table 5 summarizes the results of the CY 2014 and CY 2016 surveys by types of uses. The percentages are based on the number of actual hours flown. While personal use of general aviation aircraft (31.7 percent) is the single largest use category, the combined nonpersonal uses of general aviation aircraft represent the majority (54.3 percent) of all general aviation activity. It is notable that instructional uses comprise the second largest use category and is increasing.

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

[34] 14 CFR, part 135, Operating Requirements: Commuter and On Demand Operations and Rules Governing Persons On Board Such Aircraft.

Table 4: General Aviation and CFR Part 135 Activity Survey, Actual Hours Flown by Use, CY 2014 and CY 2016

Category	Percent of Total	
	2014	2016
General Aviation Use		
Personal Use[1]	29.5%	31.7%
Instructional	16.4%	19.7%
Corporate/Executive (with paid flight crew)	12.2%	10.3%
Business (without paid flight crew)	7.5%	7.2%
Aerial Observation	6.4%	5.8%
Other[2]	4.5%	3.8%
Aerial Application Agriculture	4.0%	3.5%
Other Work Use	1.1%	1.7%
External Load (Rotorcraft)	0.7%	0.6%
Aerial Application Other	0.7%	0.6%
Sightseeing	0.8%	0.7%
Air Medical	0.5%	0.4%
Subtotal	**84.3%**	**86.0%**
On-Demand Federal Aviation Regulation Part 135 Use		
Air Taxi and Air Tours	12.6%	11.0%
Part 135 Air Medical	3.1%	3.0%
Subtotal Part 135 Use	**15.7%**	14.0%
Total All Uses	**100.0%**	**100.0%**

[1] "Personal use" includes recreational flying, family use and tourism, but also includes flying in order to stay current with license requirements.

[2] "Other" is defined as positioning flights, proficiency flights, training, ferrying, sales demos, etc.

Source: General Aviation and Part 135 Activity Surveys – CY 2016

The results of the survey demonstrate the role general aviation plays in accommodating commerce throughout the United States. It is estimated that thousands of passengers are carried on business and corporate aircraft each year. Business and corporate aircraft also move airfreight,[35] ensuring overnight delivery of high-priority business documents and providing just-in-time delivery of parts to manufacturing plants.

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

[35]Large transport aircraft carrying air cargo are included with the air carrier counts as many of these operators operate under similar regulations to commercial airlines carrying passengers.

General aviation also encompasses public aircraft operations within these use categories. Examples include the use of general aviation, which provides nearly all inland search and rescue services, homeland security, law enforcement, and disaster relief activities by other nonmilitary government agencies. These activities are not identified separately, but are included within each use category. In 2016, public-use aircraft flew 7.1 percent of the total general aviation hours. General aviation also includes the humanitarian services, such as transporting patients to medical centers or delivering relief supplies to areas following natural disasters.

As evidenced by the diverse range of activities, general aviation has various land use, airspace, and air traffic requirements that are much different from the requirements for commercial air service. This necessitates a system of airports that is flexible in design and construction to accommodate these uses. General aviation airports are included in the NPIAS because they have the capacity to accommodate these varied uses and roles.

Forecast for General Aviation

The FAA forecasts the fleet[36] and hours flown for single-engine piston aircraft, multiengine piston, turboprops, turbojets, piston and turbine-powered rotorcraft, experimental and sport aircraft, and "other" (which consists of gliders and lighter than air vehicles).

The U.S. general aviation manufacturing sector experienced a significant decline (48 percent) in deliveries in 2009 and in 2016 (4 percent). Single engine piston aircraft accounted for 45 percent of the deliveries in 2016 and business jet deliveries showed modest increase, but turboprop deliveries continued to decline. Based on figures released by the General Aviation Manufacturers Association (GAMA),[37] U.S. manufacturers of general aviation aircraft delivered an estimated 1,525 aircraft in CY 2016, 4.2 percent less than in CY 2015.

The long-term outlook for general aviation driven by turbine aircraft activity remains stable. The active general aviation fleet is projected to remain flat over the next 20 years. The more expensive and sophisticated turbine-powered fleet is projected to grow at an average annual rate of 2.0 percent with the turbine jet portion increasing at 2.2 percent a year. Fixed-wing piston aircraft, the largest segment of the general fleet, is predicted to shrink over the forecast period by 23,750 aircraft (at an average annual rate of 0.9 percent). Created in 2005, the light-sport aircraft category is the smallest segment of the fleet but forecasted to grow by 3.6 percent annually, adding about 2,850 new aircraft by 2038.

OTHER FACTORS IMPACTING AIRPORTS

Capacity is affected not only by the volume of air transportation but also by the way in which airlines and other users operate. The FAA anticipates that airlines will 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 new airline hubs are expected to arise within the next 5 years.

[36]The FAA forecasts active aircraft only. An active aircraft is one that flies at least 1 hour during the year.
[37]GAMA 2016 General Aviation Statistical Databook and Industry Outlook is available online at: gama.aero/facts-and-statistics/statistical-databook-and-industry-outlook/.

Low-cost carriers frequently serve major metropolitan areas by using less-congested, secondary commercial service airports where existing facilities are underutilized. In the past, this occurred in communities where a legacy carrier served the major hub airport. More recently, low-cost carriers have also been initiating service at major airports.

The globalization of the airline industry, the rapid growth of air transportation in other parts of the world, and the increased range and flexibility in the size of international aircraft will combine to bring international passenger service to more U.S. airports. There are more than 400 routes connecting North America and cities in Europe, an increase of 25 percent since 2012. Low cost carriers (both U.S. and European) are branching into international service and providing nonstop international flights to nontraditional gateways in the U.S. and Europe. 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 was previously limited but is now increasing.

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

Large Aircraft

Airports in the United States continue to plan and develop facilities for large aircraft currently operating in the system. The Airbus A380 and the Boeing 747-8 may require special consideration due to their fuselage length, wingspan, and weight. Airports continuously upgrade terminals and airfield configuration, including underlying structures, such as bridges and culverts, to accommodate the aircraft's heavier weight or taxiing routes.

Industrial Aviation

Many airports support activities that are more industrial in nature, ranging from maintenance, repair, and overhaul (MRO) (which occurs nationwide)[38], to specialized aviation services, such as paint and interior completion, to aircraft assembly, fabrication, and manufacturing. A number of airports that support industrial activities have a military history, due in part, to the infrastructure developed by the military and left behind, sometimes including large hangars and specialized facilities capable of supporting industrial aviation activities.

While the landside facilities supporting this type of activity are generally not AIP-eligible, the FAA continues to work with industry stakeholders to determine how industrial activities might be considered in determining an airport's role in the national airport system as described in chapter 1. Airports with industrial aviation tend to be primary airports or large nonprimary airports that already meet the NPIAS criteria. A better understanding and characterization of these industrial aviation facilities is important to keeping domestic airports competitive in a global aerospace industry. Industrial airports provide critical infrastructure that supports essential services that are relied upon by the broader aviation community. A few examples of airports with industrial aviation components are listed below:

[38]Source: 2018-2028 Global Fleet and MRO Market Economic Assessment (arsa.org/news-media/economic-data/).

- Boeing Field/King County International Airport in Seattle, Washington (primary)
- Charleston Air Force Base/International Airport in Charleston, South Carolina (primary)
- Savannah/Hilton Head International Airport in Savannah, Georgia (primary)
- Pensacola International Airport in Pensacola, Florida (primary)
- Melbourne International Airport in Melbourne, Florida (primary)
- Snohomish County (Paine Field) in Everett, Washington (nonprimary)
- Cecil Airport in Jacksonville, Florida (nonprimary and commercial space launch site)
- Kelly Field in San Antonio, Texas (nonprimary)

Industrial airports are often large in scale and require substantial land, as well as varying levels of access to the airfield, depending upon the specific functions involved. Because of the commercial nature of the facilities, effective planning for such functions requires extensive early coordination with the FAA's planning, environmental, and compliance specialists. Although some industrial aviation activities require considerable real estate (airside and landside), industrial aviation activities are rarely airspace-intensive.

Rural Aviation

Transportation systems (including air, rail, highways, and waterways) connect communities, business, people, and provide critical support functions. These connections are important to Americans, particularly those 86.3 million people living in rural areas, where a general aviation airport may provide the only means of transportation, providing critical community access for aeromedical flights, disaster relief, search and rescue, aerial application of agricultural agents, time-critical delivery of medicine, tools, mail and other documents, and other key functions.

Aviation is critical for rural areas for other reasons as well, recognizing that the Nation's ability to generate sufficient food for the U.S. populace depends heavily on widespread agricultural regions and the people who make a living in these endeavors. For example, swift delivery of a replacement part for an irrigation system may be the critical factor in being able to save an entire season's crop yield.

More than 1,000 NPIAS airports are located in areas that are outside of metropolitan or micropolitan statistical areas, and many of these airports are vital to the livelihood of these communities for the functions outlined above.

Unmanned Aircraft Systems

An unmanned aircraft systems (UAS), sometimes called a drone, includes an aircraft without a human pilot onboard, a ground-based control station, and a communications link connecting all the components. In recent years, UAS have become more and more popular both as a hobby and for commercial purposes. UAS are changing the way countless jobs are done, from movie filming and real estate marketing to agricultural mapping and disaster response. The FAA is monitoring these trends closely in order to evaluate and quantify how the growth of UAS may affect future trends in more traditional general aviation activity.

UAS come in a variety of shapes and sizes and serve diverse purposes. They may have a wingspan as large as a Boeing 737 or be smaller than a radio-controlled model airplane. Regardless of size, they are all aircraft, and the responsibility to fly safely applies equally to manned and unmanned aircraft operations.

The FAA is working closely with a broad range of Federal agencies, as well as State, county, and local governments to address the regulatory requirements necessary to accommodate and integrate UAS operations without impacting the safety and efficiency of the traditional air transportation system. Additional information is available online at: www.faa.gov/uas/.

Commercial Space Transportation

The FAA licenses and regulates U.S. commercial space launches and reentries and the operation of commercial space launch and reentry sites. As defined in statute, the FAA's mission in this context is to ensure protection of the public, property, the national security, and foreign policy interests of the United States during commercial launch or reentry activities and to encourage, facilitate, and promote U.S. commercial space transportation.

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

Vehicles are launched from licensed launch sites referred to as commercial spaceports. The FAA has granted launch site operator licenses to 10 commercial space launch sites located in the following seven States: Alaska, California, New Mexico, Oklahoma, Virginia, Texas, and Florida. At this time, five licensed launch sites are collocated with public-use NPIAS airports that accommodate both aviation and space operations. The collocated licensed launch sites are listed below:

- Mojave Air and Space Port – Mojave, California;
- Clinton-Sherman Airport – Burns Flat, Oklahoma;
- Midland International Air and Space Port – Midland, Texas;
- Houston Spaceport at Ellington Airport – Houston, Texas; and
- Cecil Airport – Jacksonville, Florida.

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CHAPTER 4: DEVELOPMENT REQUIREMENTS

CAPITAL PLANNING OVERVIEW

The development needed to provide an adequate national airport system, as shown in this report, is derived from locally prepared airport master plans, airport system plans[39], capital improvement plans, and airport inspections. These airport planning documents consider all significant aviation requirements and are tied to the current use and condition of each airport and the forecast increase in activity. Typically, operators of individual airports prepare airport master plans usually with the assistance of consultants.

FAA planners compile data on development that is eligible for Federal AIP funding and likely to be justified by the aviation activity forecast over the next 5 years. This process results in a reasonable and well-documented estimate of future airport project requirements. However, the actual timing and cost of development may vary from the airport master plan. For instance, projects may be deferred or developed in phases in order to reduce immediate costs or, conversely, an unexpectedly rapid increase in aeronautical activity may justify accelerating certain development.

State airport system plans are also used as a data source for the NPIAS. The State system plan includes airport locations considered important to State air transportation objectives, as well as those that are of sufficient national interest to be included in the NPIAS. These plans play a part in the development of the airport role and conditions and performance information. However, aviation system plan recommendations on capital development at individual airports (or for a State aviation system plan) are usually secondary to airport master plan information. The State or regional system plan typically identifies broad needs or priorities within its jurisdiction, rather than detailed projects and cost estimates.

The FAA encourages airports to consult with airlines and other user groups about major airport investment programs. Airlines have questioned the scope and timing of specific development proposals, including major new airports, ground access projects, and certain terminal and airfield improvements. The NPIAS generally reflects the airport operator's viewpoint about the scope and timeframe for proposed development.

All development projects reflected in the NPIAS have been determined by the FAA to be eligible for AIP funding and likely to be justified within the 5-year timeframe. However, the planned development consistently exceeds the funding available from the AIP each year. In addition, although some projects are AIP-eligible, the individual airport may not have access to sufficient AIP funds in eligible categories. As but one notable example, public-use portions of passenger terminals are eligible for AIP funding—but only nonhub primary airports and designated relievers can get AIP discretionary funding for terminals. Other types of airports would have to use AIP entitlement funds for terminal projects. Therefore, although all of these

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

5-year capital estimates are AIP-eligible, some project may ultimately be funded by other sources, including PFC revenues or other airport revenue or financing provisions.

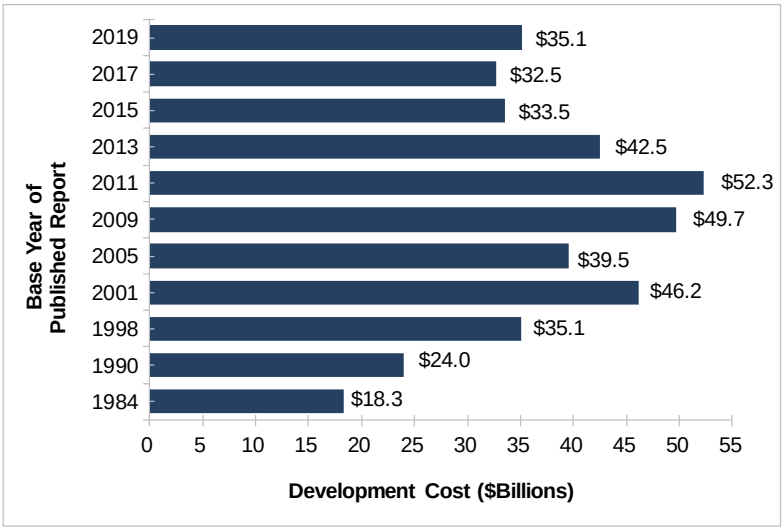
It is also important to note that even for a project that has been determined to be eligible and justified, a benefit-cost analysis (BCA) is also required for capacity projects involving $10 million in AIP discretionary funds over the life of the project or for any project where the airport sponsor is requesting a letter of intent (a multiyear commitment of Federal AIP support). In some cases, the estimate contained in this report may include projects for which a BCA has not yet been completed or validated by the FAA.

While a project may be justified operationally by relatively few operations of a new aircraft or class of aircraft, quantifying the associated benefit of these operations can be a challenge. In addition, BCAs do not consider the mere shift of passengers or operations from one airport to another as a benefit to the system because it is done from a national perspective; such transfers between regions are considered to have a neutral overall impact on the national economy. Many benefits will not be realized until a project is completed and commissioned, which may be years after the BCA was completed.

The authorizing statute exempts other types of projects, particularly safety and standards projects, from the BCA process because the underlying value of the type of project has already been subject to economic evaluations required through FAA regulations and advisory circulars.

Moreover, although the FAA relies on BCA results, and other considerations in making AIP discretionary funding decisions for capacity projects, the FAA does not generally use BCA results to determine a project's ranking on the FAA's list of reviewed projects that are eligible for AIP discretionary funds in a given year. Governing legislation for the AIP identifies a number of other factors, such as safety, congestion relief, intermodal connections, quality of the environment, and capacity, for priority consideration.

Figure 11: Development Needs (1984-2019)



DEVELOPMENT COSTS

This report reflects the costs associated with capital development projects needed between 2019 through 2023 that are AIP eligible and do not have funding sources identified. The 5-year estimates contained in this report ($35.1 billion) are 7.4 percent higher than those found in the 2017 edition. These estimates were largely compiled in FY 2017 and validated in FY 2018. Since the last report was prepared 2 years ago, construction costs have increased 0.4 percent.[40]

[40]Source: Civil Works Construction Cost Index System calculated by the U.S. Army Corps of Engineers, September 30, 2015. Comparing construction costs for FY 2015 and FY 2016.

The $35.1 billion total is comprised of approximately 16,350 projects at 2,955 existing and 7 new airports. Eighty-nine percent of the airports have AIP-eligible development identified through 2023. However, 372 airports do not have development identified over the next 5 years, including 236 unclassified airports.

Airport projects in the NPIAS are based on eligible and justified needs consistent with the role of the airport in the national system. Projects are categorized by the principal purpose of the development and the airport type or role. There are 11 project purposes and 10 airport types. Development totals by airport type and purpose are shown in Table 6. Costs associated with planning (master, regional, and State system plans and environmental studies) are not reflected in tables 6 and 7 or in appendix A. For the 5-year period covered by this report, planning costs total $397 million, which is an increase of $16.5 million (4.4 percent) with nonprimary airports accounting for 52 percent and primary airports accounting for 48 percent.

Table 5: 2019–2023 NPIAS Costs by Airport and Development Category (2017 $ Millions)

Development Category	Large	Medium	Small	Nonhub	National	Regional	Local	Basic	Unclas-sified	Proposed Airport	Total	% of Costs
Safety	$84	$63	$164	$326	$91	$117	$72	$36	$0	$0	$953	2.72%
Security	$0	$9	$9	$19	$11	$5	$5	$2	$0	$0	$60	0.17%
Reconstruction	$2,697	$1,771	$1,544	$1,848	$765	$1,811	$1,914	$789	$7	$0	$13,146	37.50%
Standards	$1,452	$785	$880	$2,038	$825	$1,806	$2,633	$1,146	$0	$0	$11,565	32.99%
Environmental	$215	$116	$141	$50	$4	$20	$9	$22	$0	$0	$577	1.65%
Noise	$381	$37	$67	$65	$33	$22	$0	$0	$0	$0	$605	1.73%
Capacity	$2,001	$98	$202	$172	$65	$269	$249	$93	$0	$0	$3,149	8.98%
Terminal	$1,427	$760	$1,076	$625	$18	$71	$82	$40	$0	$0	$4,099	11.69%
Access	$0	$37	$78	$146	$30	$81	$62	$32	$0	$0	$466	1.33%
New Airport	$0	$0	$0	$0	$0	$0	$0	$0	$0	$282	$282	0.80%
Other	$0	$0	$1	$43	$2	$38	$45	$27	$0		$156	0.44%
Total	$8,257	$3,676	$4,162	$5,332	$1,844	$4,240	$5,071	$2,187	$7	$282	$35,058	100.0%
Percentage	23.55%	10.48%	11.87%	15.21%	5.26%	12.09%	14.46%	6.24%	0.02%	0.8%	100.0%	

For comparison purposes, the development requirements contained in the previous edition of the NPIAS (2017–2021) are shown in Table 6.

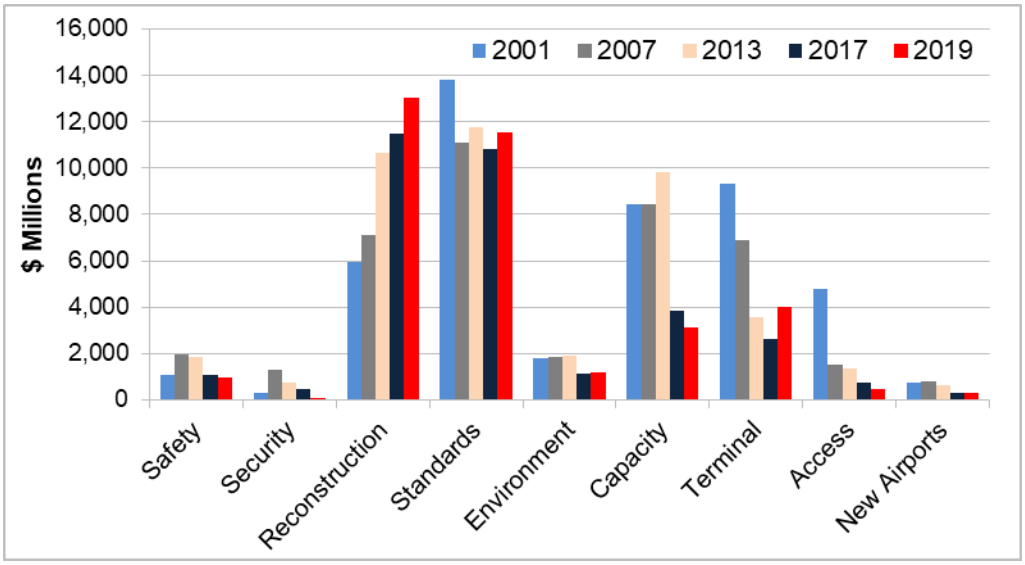
Table 6: 2017–2021 NPIAS Costs by Airport and Development Category (2015 $ Millions)

Development Category	Large	Medium	Small	Nonhub	National	Regional	Local	Basic	Unclas-sified	Proposed Airport	Total	Percent
Safety	$250	$105	$140	$313	$68	$68	$72	$38	$0	$0	$1,052	3.2%
Security	$50	$20	$25	$53	$67	$61	$127	$72	$0	$0	$475	1.5%
Reconstruction	$2,180	$1,403	$1,426	$1,920	$683	$1,531	$1,649	$703	$6	$0	$11,502	35.2%
Standards	$892	$675	$922	$1,803	$728	$1,894	$2,748	$1,181	$2	$0	$10,845	33.2%
Environmental	$64	$56	$182	$55	$2	$17	$16	$13	$0	$0	$406	1.2%
Noise	$416	$83	$82	$91	$44	$17	$2	$0	$0	$0	$735	2.3%
Capacity	$2,379	$337	$245	$176	$109	$207	$175	$67	$0	$0	$3,696	11.8%
Terminal	$401	$368	$1,084	$661	$2	$39	$56	$25	$0	$0	$2,636	8.1%
Access	$176	$74	$60	$175	$42	$105	$93	$32	$0	$0	$758	2.3%
Other	$0	$2	$1	$13	$3	$29	$48	$26	$0	$0	$122	0.4%
New Airport	$0	$0	$0	$0	$0	$0	$0	$0	$0	$321	$321	1.0%
Total	$6,807	$3,123	$4,168	$5,260	$1,747	$3,968	$4,988	$2,157	$8	$321	$32,548	100%
Percentage	20.9%	9.6%	12.8%	16.2%	5.4%	12.2%	15.3%	6.6%	0.03%	1%	100%	

DEVELOPMENT BY TYPE

All AIP-eligible projects are categorized based on the principal purpose of the development. Figure 12 compares the type of development identified in the current report to the five previous reports. Increases in reconstruction, standards, and terminal projects are anticipated over the next 5 years. Decreases in safety, security, and capacity projects are anticipated through 2023.

Figure 12: 5-Year AIP-Eligible Development Costs by Category, FYs 2001–2019

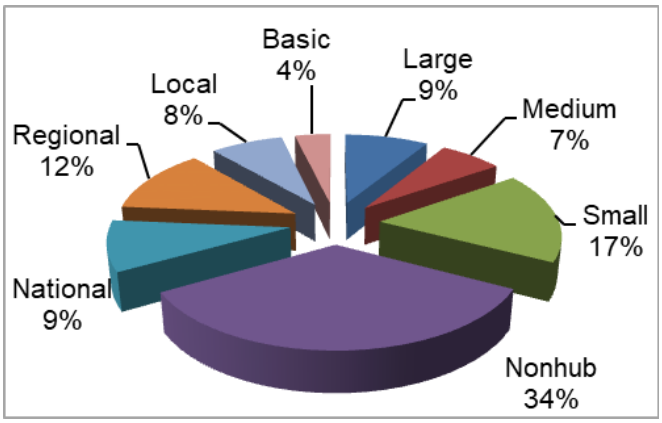


Listed on the following pages are the development categories, a short description of each, charts illustrating the percentage of development by airport category, and other relevant information.

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 almost 3 percent ($1 billion) of the funding needs identified in the NPIAS. The FAA gives safety and security development the highest priority to ensure rapid implementation and to achieve the highest possible levels of safety and security.

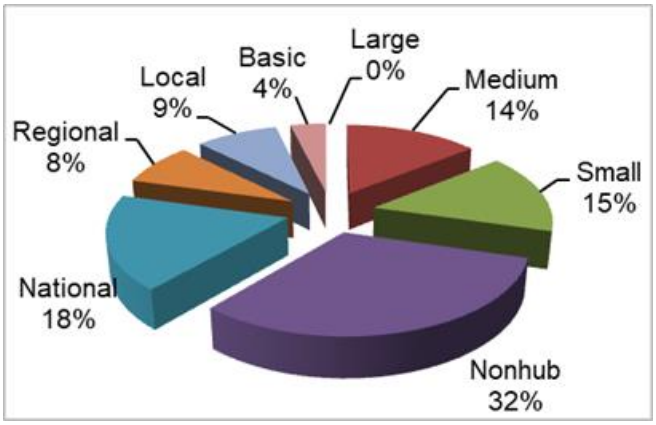
Figure 13: Safety



Projects included in the safety category include obstruction lighting and removal, acquisition of ARFF equipment required by Part 139, construction or expansion of ARFF buildings, and continued improvements to RSAs. Safety development totals almost $1 billion, a decrease of $99 million from the last report, largely reflecting the fact that many significant RSA improvements have now been funded and implemented. The 380 primary airports account for 67 percent of the safety projects with nonhub airports accounting for 34 percent. The 2,941 nonprimary airports account for 33 percent of these projects.

Security projects include security fencing, access control from aircraft movement areas to the terminal, and other security enhancements required by 49 CFR, part 1542, regulation. Security development totals $61 million, a decrease of $414 million from the last report. Primary airports have identified access control systems and other security improvement projects totaling $37 million (61 percent). Nonprimary airports have identified approximately $23 million (39 percent) in perimeter fencing.

Figure 14: Security



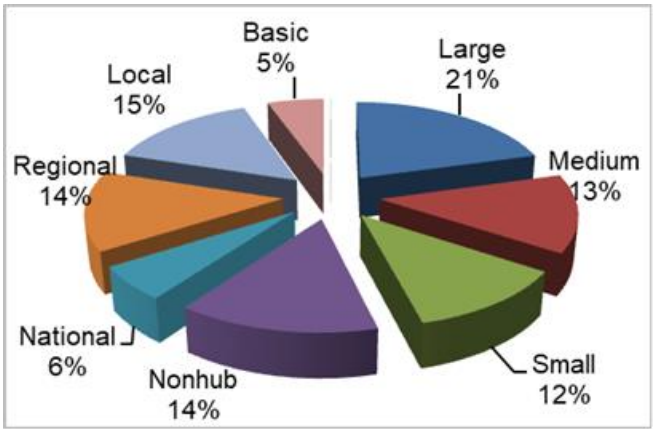
Reconstruction

Reconstruction includes development to replace or rehabilitate airport facilities, primarily runway, taxiway, and apron pavement and lighting systems that have deteriorated due to weather or use and that have reached the end of their useful lives. Failure to replace deteriorating pavement increases airport maintenance costs and can result in damage to aircraft propellers and engines, pooling water, and ice deposits that can jeopardize braking and directional control and eventually cause 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.

This category is the largest development category accounting for about 37 percent or $13 billion of NPIAS funding needs and includes the rehabilitation of pavement on a 15- to 20-year cycle. This category of development increased by 14 percent and reflects an increase in reconstruction costs by almost every type of NPIAS airport. The primary airports account for 60 percent of this development with large hub airports accounting for 20 percent. The nonprimary airports account for 40 percent of this development.

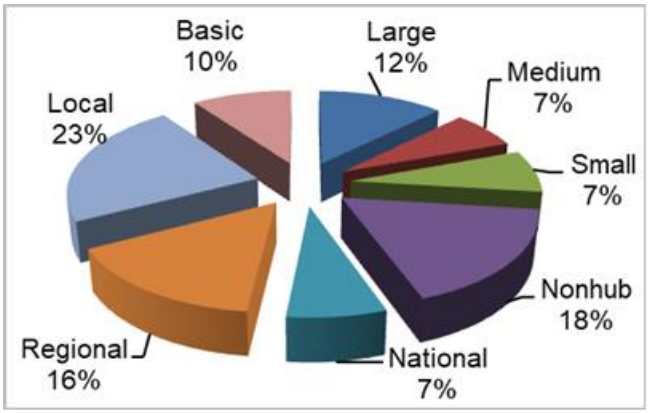
Figure 15: Reconstruction



Standards

Many airports were designed and built more than 50 years ago to serve relatively small and slow aircraft. They now serve 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, taxiway geometry must be improved to correct confusing layouts, 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. The FAA usually requires proof that an aircraft type or group will account for at least 500 annual local and itinerant operations at an airport (excluding touch and go operations) before the development to accommodate it is included in the NPIAS.

Figure 16: Standards

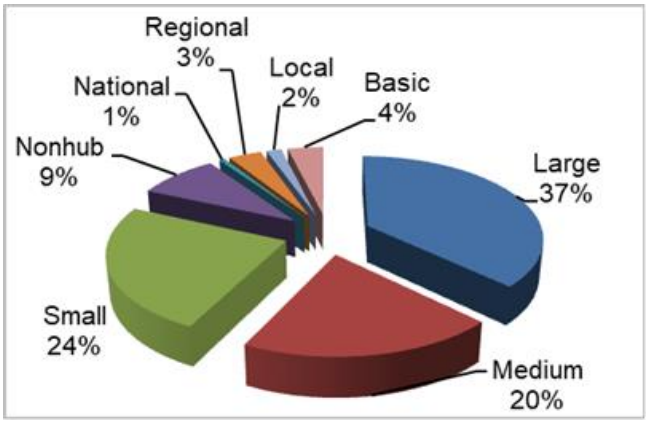


Standards projects include development that is needed to bring an existing airport into design criteria recommended by the FAA. It also includes development that is needed to comply with FAA technical and operational specifications. Examples of these projects include strengthening, widening, narrowing, relocating or extending runways and taxiways, and associated lighting; expansion of existing or construction of new aprons; acquiring equipment (e.g., snow removal, deicing, weather reporting, and approach lighting and guidance systems); and buildings for equipment, primarily for snow removal equipment or aircraft hangars.

This development category accounts for 33 percent ($11.6 billion) of the NPIAS funding needs, an increase of $724 million from the last report. Nonprimary airports account for 55 percent of this development and primary airports account for 45 percent.

Environment

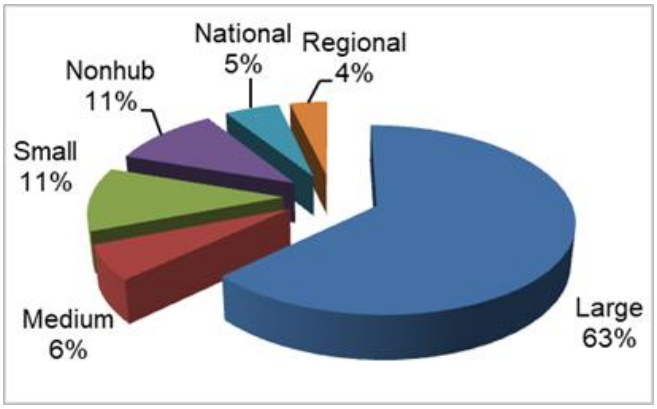
Figure 17: Environment



The environment category includes projects designed to achieve an acceptable balance between airport operational requirements and environmental requirements. These projects include replacing impacted wetlands, removing wildlife attractants, constructing deicing containment facilities, acquiring energy efficient equipment, and purchasing specialized equipment or infrastructure to help reduce airport-related air quality impacts. This category accounts for 1.6 percent ($578 million) of the NPIAS costs with large hub airports accounting for 37 percent. Thirty-eight percent of these environmental projects are for constructing deicing containment and treatment facilities.

Noise

Figure 18: Noise

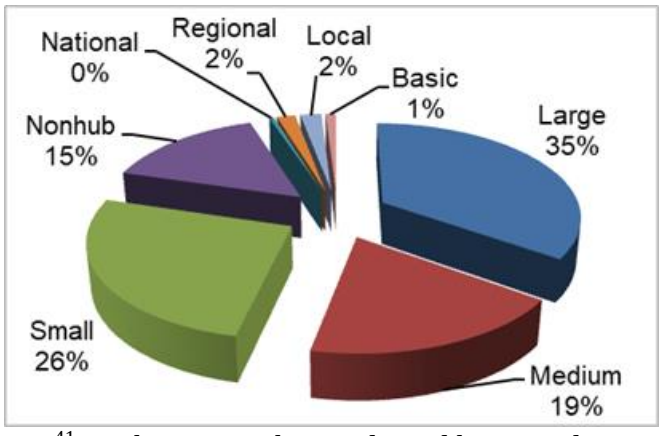


Development in this category includes projects to meet the expectations of residents of the surrounding area for a quiet and clean environment. This development supplements the noise reductions that have been achieved by quieter aircraft and the use of noise abatement flight procedures. This category accounts for almost 2 percent ($604 million) of NPIAS costs with 63 percent of the costs at large hubs. Costs are concentrated at airports with frequent flights by jet aircraft and include the relocation of households and sound insulation of residences and public buildings in noise impacted areas underlying aircraft approach and departure paths. This development is part of an extensive Federal and industry program involving land use planning, quieter aircraft, and noise abatement procedures that have reduced the estimated number of people exposed to significant noise. Development in this category includes projects to mitigate noise for residences or public buildings, noise monitoring systems, and compensation to property owners for overflights.

Terminal Building

Terminal building costs are incurred for development to accommodate more passengers and changes in aircraft fleet. This is the third largest development category accounting for 12 percent ($4.1 billion) of the NPIAS costs. Terminal costs had decreased over the last 8 years, but this report reflects a 56 percent increase in terminal costs with the large and medium hub airports showing significant increases from the 2017 report. The NPIAS only includes the public-use portion of terminals that are AIP eligible (about 50 to 60 percent) and excludes revenue-generating areas[41], such as areas that are leased by a single tenant or used by concessions, such as gift shops and restaurants.

Figure 19: Terminal Building

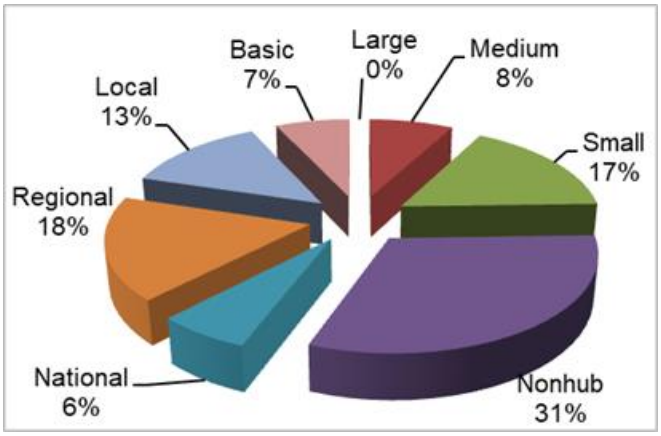


Terminal development is concentrated at the busiest commercial service airports. Funding of terminal projects, especially at large and medium hubs, tends to be accomplished through PFCs and other funding sources rather than through AIP funding.

Surface Access

Access includes the portion of airport ground access via highways and transit that is within the airport property line and eligible for grants under the AIP. Surface access currently accounts for 1 percent ($466 million) of the NPIAS costs, down 38 percent from the last report. The nonhub airports account for 31 percent of the access development needs ($145 million). The FAA encourages airport sponsors and State and local officials to develop airport master plans and airport system plans that consider passenger convenience, airport ground access, and access to airport facilities. As new airport master planning begins to explore and analyze these aspects of the airport, the decreasing trend in access projects may reverse as new and innovative surface projects are identified.

Figure 20: Surface Access

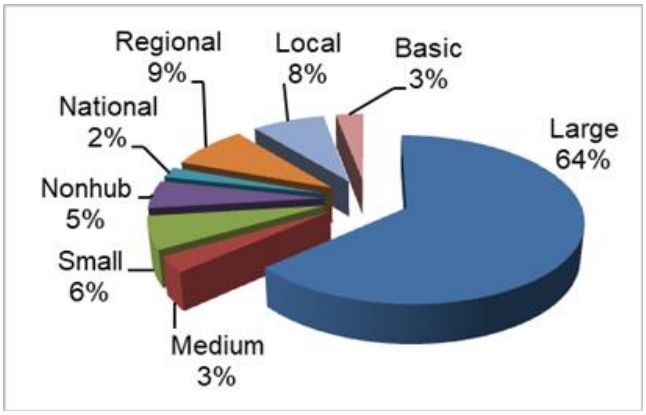


[41]Some smaller public-use airports, such as nonhub primary airports, can use AIP funds for public-use areas of a terminal that are revenue producing.

Airport Capacity

Airport 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 fourth largest development category, accounting for 9 percent ($3.1 billion) of the NPIAS, and includes new runway, taxiway, and apron construction and extensions. Large hub airports account for 64 percent of the development to improve capacity or reduce delay.

Figure 21: Airport Capacity



Development to improve airfield capacity decreased 19 percent from the last report. This decrease may be due to the completion or funding of major runway extensions or new runways in the last several years. The remaining airfield capacity development included in this 5-year plan will help to reduce congestion. However, congestion problems will remain in certain large metropolitan areas, such as New York and San Francisco. The FAA will continue to focus on the need for additional capacity and increased efficiency at those locations.

New Airports

New airports and helipads are proposed 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 general aviation airports are recommended for communities where existing airports are congested and cannot be expanded to meet the forecast demand for air transportation. During the next 5 years, three general aviation airports, two nonprimary commercial service airports, and two primary airports are anticipated to open or be under development. New airport costs account for almost 1 percent ($282 million) of all NPIAS development. Development costs in this category decreased by 12 percent from the last report. This category also includes continuing AIP-eligible capital costs for new airports that recently opened or are under construction and will open beyond 2023.

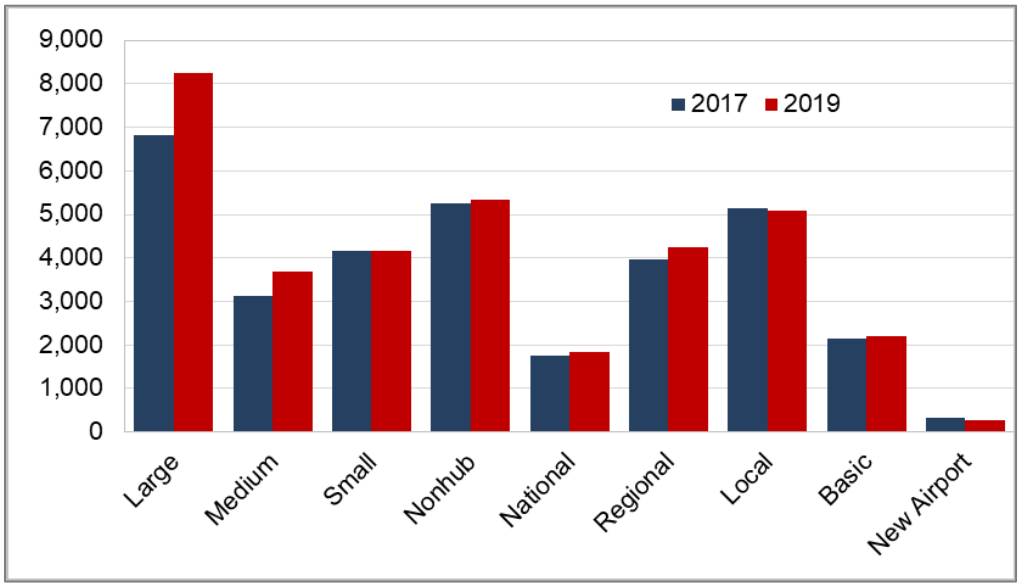
Other

This category of development accounts for about 0.4 percent ($156 million) of the total development in the NPIAS. It includes fuel farms, utilities, and construction and rehabilitation of parking lots. National, regional, local, and basic nonprimary airports account for 87 percent of this development.

DEVELOPMENT BY AIRPORT HUB AND ROLE

Figure 22 highlights the change in total AIP-eligible development by airport category from the last report. The AIP-eligible development needs increased at large and medium hub airports, 18 percent and 17 percent, respectively. Small and nonhub airports are flat or show a slight decrease in needs, -0.1 percent and 0.7 percent, respectively. Development increased at the national and regional airports, 2.5 percent and 6.7 percent, while needs at local and unclassified decreased and basic airports increased only slightly.

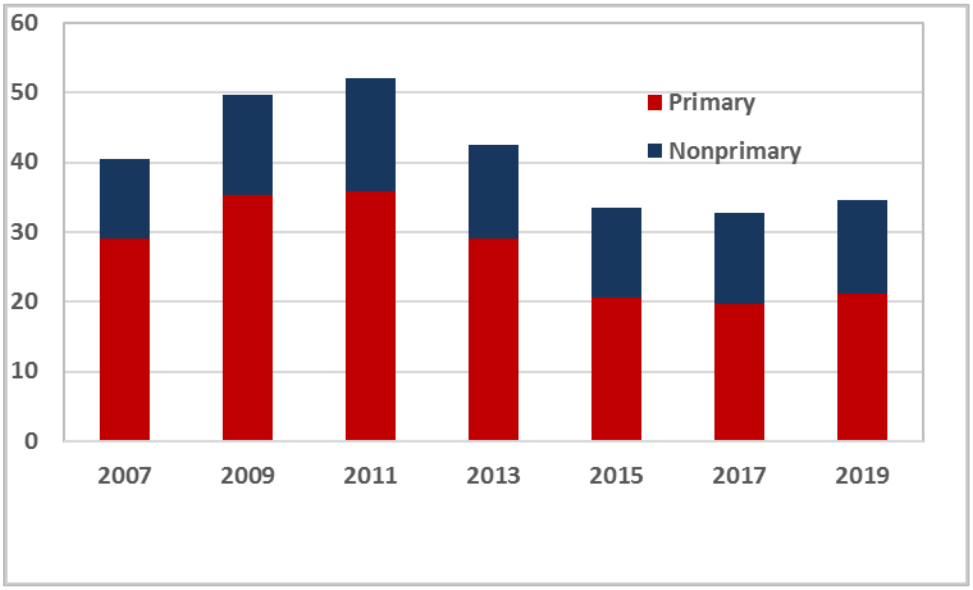
Figure 22: 5-Year AIP-Eligible Development Costs by Airport Type 2017 and 2019 Reports ($ Millions)



The $1.2 billion increase in AIP-eligible development at the large hub airports reflects an increase in terminal development along with a focus on reconstruction. While terminal projects (rehabilitation or expansion) at large and medium hub airports are generally funded with PFCs or other funding sources, they are still technically eligible for AIP funding and therefore the associated costs are properly reflected in this report. Accordingly, seven airports have identified major terminal projects that are now reflected in the report ($1.7 billion in AIP-eligible terminal development).

Figure 23 highlights the total development for primary and nonprimary airports over the last 12 years. In 2007, primary airports accounted for 73 percent ($29 billion) of the NPIAS 5-year development, and in 2019, primary airports will account for 61 percent (about $21 billion). In 2007, nonprimary airports accounted for 27 percent ($11.3 billion) of the development, and in 2019, nonprimary airports will account for $13 billion or 39 percent of the total 5-year development costs.

Figure 23: NPIAS Development–Primary and Nonprimary Airports, 2007-2019 ($ Billions)



Development to replace or rehabilitate airport pavement and lighting systems is the largest category for primary airports. The second largest development category is to bring the airport up to current FAA design standards, followed by development to improve or construct terminal buildings. Development to bring an airport up to current FAA design standards is the largest category for nonprimary airports. The second largest development category is replacing or rehabilitating airport pavement and lighting systems, followed by development to increase capacity.

ANTICIPATED SOURCES OF FUNDING

There are four major sources of funds used to finance airport capital development: airport revenue, bond proceeds, Federal/State/local grants, and PFCs. Access to these sources of financing varies widely among airports with some large airports able to generate and apply significant cash flow to capital projects and the small commercial service and general aviation airports often requiring subsidies from local and State governments to fund operating expenses and finance modest improvements.

Over the last 17 years, AIP grants have exceeded $3 billion annually. For the last 15 years, PFC collections have exceeded $2 billion annually (in many cases leveraged to pay debt service on much larger bond issues). Since 2014, PFC collections have exceeded $3 billion annually. Approximately $7.5 billion in airport bonds were issued in 2016.[42]

[42]This is the proceeds from the sale of bonds (refinancing, as well as new bonds) reported by commercial service airports for 2016 on FAA Form 5100-127.

In 2016, the commercial service airports reported to the FAA grant receipts totaling $2.01 billion and PFC collections totaling $3.2 billion. These same airports reported total expenditures of $10.3 billion in capital expenditures and construction for airport development projects, including projects eligible for AIP grants and projects ineligible for AIP grants, like automobile parking garages, and hangars.[43]

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 generally predictable amounts to large and medium hub airports. As a result, large and medium hub airports in particular have been directing the majority of their PFC revenues to terminal and landside projects, including debt financing costs, as well as noise mitigation. The majority of nonhub primary airports use PFC revenues as the local matching funds for AIP grants.

ADDITIONAL COSTS NOT INCLUDED IN THE NPIAS

The NPIAS only includes development that is eligible to receive Federal grants under the AIP. It does not include ineligible airport development, such as automobile parking structures, hangars, air cargo buildings, or the revenue-producing portion of large passenger terminal buildings.[44] In addition, it does not include:

- Development eligible under the PFC Program but ineligible under the AIP, such as leased gates and related areas;
- Improvements to assist airports to withstand or recover from severe weather events;
- Improvements to highway and transit systems beyond the airport property line;
- Improvements to air traffic control and navigation aids that may be funded by the FAA's F&E Program, including most equipment for NextGen;
- Costs associated with modifying terminals to accommodate explosive detection systems. The FAA is prohibited from funding these projects with AIP funding. However, these projects remain eligible under the PFC Program and under the Transportation Security Administration's grant program; [45]
- Development needed to address capacity shortfalls where no clear solution has yet emerged; and
- While costs associated with planning (master plans, regional and State system plans, and environmental studies) are eligible for AIP funding, they are not captured as development in this report. Between 2019 and 2023, total costs for airport planning (airport master plans, regional and State system plans, and environmental studies) are estimated at $397 million.

[43]Source: FAA Form 5100-127, Operating and Financial Summary.
[44]The authorizing legislation allows nonprimary entitlement funds to be used for hangars, provided FAA believes the airport has an adequate plan for financing all airside needs.
[45]Beginning in FY 2004, and in every year since, FAA appropriations legislation has prohibited using AIP grant funds on explosive detection systems or any building modifications that are necessary to support or install such a system.