Seventh Edition

Airport
Planning
& Management

McGraw Hill Education

Seth B. Young | Alexander T. Wells

Airport Planning and Management

About the Authors

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An online glossary can be found at www.mhprofessional.com/young7e

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Preface

In 1986, the first edition of *Airport Planning and Management* pioneered an innovative structure for a basic airport principles course designed for two similar, yet distinct, markets: the college student enrolled in an aviation prorgam, seeking to gain insight into a possible future career in airport management, as well as someone currently in the field of airport management or operations who is seeking further education toward career advancement. Since that time, five subsequent editions of the text were published, each edition reflecting updates that have occurred in the constantly evolving aviation industry. The response of both professors and students over the years has been gratifying. *Airport Planning and Management* and its accompanying test bank have been more widely used than any other teaching material for an airport course.

In the thirty-two years since the first edition of this text was published, the world of civil aviation, including airport management, has witnessed tremendous changes in technology, structure, and political environments. The aviation industry adjusted to major regulatory change, experienced economic woes, experienced record economic prosperity, adapted to a new world of enhanced security, and most recently, struggled through a worldwide economic downturn, and is poised for an entirely new paradigm of technology. In addition, the world of airport management has continued to evolve into more of an analytic and business-oriented discipline, applying theories of operations, economics, finance, customer service, communications, and public administration to adapt to ever-changing environments.

With the retirement of Dr. Alex Wells, Dr. Seth Young has taken on the sole responsibility for updating this text for its next and future editions. Dr. Young, with assistance and guidance from other key leaders in the airport industry, has made it a priority to bring the seventh edition of *Airport Planning and Management* to a new standard of quality as a resource for current and future airport managers. The entire text has been critically revised, and updated. In addition, significant text has been added and rewritten. Clear and interesting communication has been a priority, as in past editions.

Recognizing that a course in airport planning and management is normally a student's first exposure to the field, this text provides a significant amount of introductory material. While no one text can be the exhaustive source on any particular topic, this text attempts to provide a body of information that will allow students to gain knowledge of the various facets of airport planning and management at a fundamental, yet also comprehensively rich, level. The focus of this text is to build a solid foundation of understanding of all the elements that are of concern to airport management. Influenced by the combined experience of more than 60 years in teaching

aviation management at the college level, the authors, current and retired, believe that the information contained in this text is commensurate with university level study.

It is recognized that instructors will supplement the material found in this text with current case studies, examples drawn from their own experiences, timely news and Internet sources, and industry and academic journals. Students are encouraged to explore and keep abreast of current periodicals, such as *Airport*, *Airport Business*, *Air Transport World*, and *Aviation Week*, as well as be consistent in keeping up to date with the latest airport related events, and airport communications found on the Internet. It is hoped that the ability to reason accurately and objectively about issues facing airports and the development of a lasting interest in airport planning and management will be two valuable byproducts of the text's basic objectives.

Organization of the Seventh Edition

The nearly eight years since the publication of the sixth edition of this text witnessed another cycle in the United States' national economy, from the "Great Recession" to full economic recovery, as evidenced from an airline industry fraught with bankruptcies and mergers to a consolidated industry of profitable air carriers. Air traffic has reached record levels. Aircraft technology has improved, resulting in air service between new markets. Other technologies, from the proliferation of the NextGen air traffic management system, to the emergence of Unmanned Aerial Systems, to the proliferation of Internet-based communications and "smart" technologies, have created new opportunities and challenges for airport management. This seventh edition attempts to address the new environment, while not forgetting the fundamentals of airport planning and management.

The text is once again organized into three parts: Airports and Airport Systems, Airport Operations Management, and Airport Administrative Management. Each part is designed to address airport planning and management from specific perspectives.

Part I: Airports and Airport Systems

Part I provides an overview of airports from a systems perspective and provides background and historical information regarding the development of airports and the rules that airport management must adhere to. Within this part are three chapters.

Chapter 1: *Airports and airport systems: An introduction* provides a comprehensive overview of airports in the United States, the national administrative structure of airports, and basic definitions that describe airports and types of airport activity.

Chapter 2: *Airports and airport systems: Organization and administration* describes the public and private ownership and administrative structures that exist for civil use airports in the United States and internationally. A comprehensive sample of employment positions that exist at airports is presented, as are descriptions of the duties of the airport manager, and an introduction to the public relations issues facing airport management.

Chapter 3: *Airports and airport systems: A historical and legislative perspective* includes an account of the development of airports within the civil aviation system that has been thoroughly reviewed and updated through 2017, including the latest short-term funding legislation.

Part II: Airport Operations Management

Part II has been written to provide the airport management student, as well as the new airport management employee, with a comprehensive information source describing the facilities and operations that exist within an airport's property including the airfield, airspace, terminals, and ground access systems. This part may be valuable not only as a text but also as a reference guide for those not in academic study. Within this part are five chapters.

Chapter 4: *The airfield* describes the facilities that exist on an airport to facilitate the operation of aircraft, including a full description of runways, taxiways, and navigational aids, along with associated signage, lighting, and markings. Much of the information contained in this chapter is sourced directly from the Federal Aviation Administration's *Airman's Information Manual,* a guide designed to provide pilots of civil aircraft with full descriptions of the aviation environment.

Chapter 5: *Airspace and air traffic management* provides a fundamental, yet detailed, description of the national airspace and air traffic control system, as it relates to airport management. A brief history of air traffic control is provided, as is a description of the management structure of the current air traffic control system. The basics of air traffic control are described, including the various classes of airspace and the rules by which they are operated. In addition, a description of the current and future planned enhancements to the air traffic control system is provided, to allow the airport manager to best prepare for the future of air traffic management.

Chapter 6: *Airport operations management under 14 CFR Part 139* discusses how the facilities described in Chapters 4 and 5 must be managed at airports certified to accommodate commercial air service under FAR Part 139—Certification of Airports.

Chapter 7: *Airport terminals and ground access* describe the infrastructure used to facilitate the transfer of passengers and cargo between aircraft and their ultimate origins and destinations within a metropolitan area. The chapter includes a historical account of the development of airport terminals, a description of the various airport terminal geometries that have been constructed, the components of the airport terminal, including aircraft aprons and gates, passenger processing facilities, and vehicle access facilities, such as roadways, curbsides, parking lots, and public transit systems. The chapter is updated to address the adaptation of new airport terminal technologies and ground transportation business models.

Chapter 8: *Airport security* has been updated to describe the historical, current, and possible future of the operation of an airport from security perspectives. Historical accounts of airport security–related events are described, as is a comprehensive analysis of the events of September 11, 2001. The Transportation Security Administration and the associated regulations that affect airport management are discussed. In addition, current and future technologies that may be used to enhance airport security are described.

Part III: Airport Administrative Management

Part III has been designed to provide the airport management student with fundamental concepts and regulations that govern the administrative side of airport planning and management. This part focuses on the financial, administrative, and planning aspects of airport management. This part contains five chapters.

Chapter 9: *Airport financial management* presents the various strategies that exist to account and pay for the land, labor, and capital required to maintain financially stable airport operations and development. Airport accounting strategies are described, as are issues concerning airport insurance, revenue generating strategies, airport budgeting, and airport funding and financing strategies.

Chapter 10: *The economic, political, and social role of airports* describes the impacts that airports have on their surrounding communities, including the economic benefits of additional transportation service and associated economic activity and the environmental impacts such as noise, air and water quality, and industrialization. In addition, the political role of airport management when dealing with tenants of the airport and the outside community is described.

Chapter 11: *Airport planning* describes the strategies employed on local, regional, and national levels to prepare airports for future aviation activity. The chapter describes system planning on national and regional levels, and focuses on airport master planning, including demand forecasting, airport layout plans, runway orientation, land use planning, obstruction clearances, terminal area plans, and economic evaluation of planning alternatives. This chapter is designed to prepare the university level student for more advanced study in airport planning and design.

Chapter 12: *Airport capacity and delay* have been enhanced from previous editions by adding updated information regarding the latest developments in regulations and technologies that affect airport capacity and delay. In addition, this chapter introduces fundamental concepts that govern the laws of airport capacity and delay.

Chapter 13: *The future of airport management* concludes the text by presenting issues that may potentially have significant impacts on the future of airport planning and management. Included in this chapter are descriptions of new aircraft technologies, ranging from existing "very large" passenger and cargo aircraft to the emergence of unmanned aerial systems. The text concludes with a brief discussion regarding the needs of future airport managers to further educate themselves in the many facets of management, particularly from a business perspective, as airports further develop as efficient business focused operating systems.

Learning Tools

The purpose of this book is to help students learn the basic ingredients in the process of planning and managing an airport and also to provide a reference for those currently in the business of airport management. Toward these ends, we have employed various learning tools that recur throughout the text, including:

- *Chapter objectives:* Each chapter includes the broad objectives that the student should be able to accomplish upon completing the chapter.

- *Figures, tables, and pictures:* Within each chapter are graphical representations of the material to compliment the text.

- *Logical organization and frequent headings:* The material covered has been put in a systematic framework so that the reader can find continuity and logic in the flow of the text.

- *Key terms:* Each chapter concludes with a list of key terms and other references used in the text. The terms may also be found in a glossary at the end of the text.

- *Review questions:* A series of questions posed for review and discussion follow at the end of each chapter. These questions are intended to encourage the student to summarize and further discuss the information learned from reading the chapter material.

- *Suggested readings:* A list of suggested reading is included after the end of each chapter for those who wish to pursue the material covered in more depth.

- *Glossary:* All key terms appearing at the end of each chapter, as well as many other terms used in the text and other of significance in airport planning and management, are included in the glossary.

- *Complete index:* The text includes a complete index to help the reader find needed information.

Supplemental Materials

The material contained in this text is supplemented for instructors with effective teaching tools, including a test bank with over 1,000 questions in true/false, multiple choice, and fill-in-the-blank format, covering all chapters of the text; outlines of each chapter; as well as color graphics of many images found with in the text, in Microsoft Power Point format. These materials may be requested by instructors by contacting the publisher or authors.

It is hoped that this latest edition of *Airport Planning and Management* continues to meet the needs of students, instructors, and those already in the airport management industry as they seek fundamental knowledge of concern to airport planners and managers. As always, we welcome any feedback from our readers. Learning about the exciting world of airport planning and management should be educational and enjoyable. As university professors, industry professionals, and authors, we hope that we have contributed to this mission with this text.

Seth Young & Alex Wells (ret.)

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Acknowledgments

This seventh edition of *Airport Planning and Management* is my third opportunity to revise this the second as primary author, and the first as solely responsible for this revision. In nearly 15 years since Dr. Wells first invited me to co-author this text, I have been blessed to see students who were the first users of the last edition become leaders in the airport industry, many of whom provided guidance in creating this latest edition. I hope that yet a new generation of airport planners and managers may benefit from this text in the years to come. I continue to thank my students and colleagues, current and past, at The Ohio State University, Embry-Riddle Aeronautical University, the American Association of Airport Executives, the Transportation Research Board, the University of California at Berkeley, the Federal Aviation Administration, and my fellow airport planning and management colleagues throughout the world for their support and professional relationships. I would like to specifically thank Mr. Jeff Price, for his contributions to the text's chapters on airport security; Dr. David Byers for his contributions to the text's chapters on airport financial management, and Ms. Keri Spencer Lyons for her contributions to the text's chapters on managing airports under FAR Part 139 and the National Plan of Integrated Airport Systems. My sincere thanks go out to all of my airport and aviation industry partners. Special thanks, of course, to Dr. Alex Wells, who honored me with the opportunity take sole responsibility for this text while he enjoys a much deserved retirement. I hope that the material found within our text is aptly able to communicate the great body of information I've gained from their valuable sources of knowledge.

Finally, most special thanks to my friends and family, especially my father, Dennis Young, esteemed professor and author in his own right, my mother, Rosalie Young, to whom this book is dedicated, who during her lifetime instilled in me the qualities to be an effective teacher, writer, and person, and my lovely wife, Wendy Young, who entered my life shortly after the publication of the sixth edition of this text. With no equivalence, she has been the greatest new edition of my life's story.

Seth Young

I am sincerely appreciative of the many public and private institutions that have provided resource material from which I was able to shape this text. In this regard, I am particularly indebted to the Federal Aviation Administration for their numerous publications.

Faculty and students at University Aviation Association institutions who have reviewed material in the previous four editions have significantly shaped this book. To

them I owe a special thanks because they represent the true constituency of any textbook author.

I am also indebted to many practicing airport planners and managers for their ideas and to the American Association of Airport Executives (AAAE) who adopted this book in their certification program for a number of years before developing their own material.

Finally, I must thank my wife, Mary, for considerable patience and encouragement throughout the process.

Alex Wells

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Airports and Airport Systems: An Introduction

Objectives

The objectives of this section are to educate the reader with information to:

- Discuss the ownership characteristics of airports in the United States and internationally
- Describe the National Plan of Integrated Airport Systems (NPIAS) and its application to categorizing public-use airports in the United States
- Describe the governmental administrative organizations in the United States that oversee airports
- Identify federal regulations and advisory circulars that influence airport operations
- Be aware of the variety of professional organizations that exist to support airport operations, planning, and management

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Introduction

It is often said that "If you've seen one airport, well, you've seen one airport!" referring to the fact that every one of the more than 25,000 airports in the world are very much unique, serving a unique combination of aircraft, passengers, cargo, and purposes in their own unique environments. As a result, each airport is planned, designed, and managed in its own unique way. This makes the field of airport planning and management very challenging, and yet very exciting.

It is also often said that managing an airport is like being mayor of a city. Similar to a city, an airport is comprised of a huge variety of facilities, systems, users, workers, rules, and regulations. Also, just as cities thrive on trade and commerce with other cities, airports are successful in part by their ability to successfully be the location where passengers and cargo travel to and from other airports. Furthermore, just as cities find

their place as part of its county's, state's, and country's economy, airports, too, must operate successfully as part of the nation's system of airports.

In this chapter, a high-level overview of airports around the world will be presented, followed by a more detailed investigation of the airports in the United States. The policy by which the United States categorizes their airports, known as the National Plan of Integrated Airport Systems, will be a large focus of this chapter. This chapter will also present an administrative overview of airports in the United States and internationally, from the organizations that oversee airports, to the rules, regulations, and guidance documents that form the basis for airport planning, operations, and management. Finally, this chapter will identify the numerous professional organizations that exist to assist and support airport management with the successful operation of their respective facilities.

The World's Airports

According to the United States Central Intelligence Agency's World Fact Book, there are nearly 42,000 recognized civil use airports in the world. Some nations, such as the United States, Brazil, and Mexico, have thousands of these airports, while others have only a few. Some of these airports are among the largest in the world, while others are very small, privately owned facilities. Each of these airports plays a role in serving world travel through air transportation, and do so in their own unique ways. Each airport has its own unique ownership structures, operating rules, employees, and users. Each airport serves its unique communities and contributes the world's economy in its own unique way. And yet, each airport has one primary mission, to provide facilities for the safe departure and arrival of aircraft, as they travel through the world's airspace, contributing to the advancement of trade, commerce, health, safety, and recreation of the world's people (Table 1.1).

While all airports share the same role of facilitating the safe departure and arrival of aircraft traveling through the world's airspace, the types of aircraft they serve, and the missions those aircraft perform are highly varied. Most airports familiar to the general public are designed to accommodate the world's commercial air carriers, as they take their passengers to their desired destinations around the globe. These airports are commonly known as "commercial service" airports. These airports operate under very specific federal regulations, as well as state and local governments, all with the purposes of ensuring safety of the traveling public (Fig. 1.1).

In addition to the airports that serve the world's air carriers, thousands of airports serve the wide variety of other "general aviation" activity, including flight training, personal transportation, corporate and charter flights, aerial agricultural operations, pipeline patrol, search and rescue operations, law enforcement, fire fighting, medical transport, and the many other industrial commercial and recreational uses of airplanes and helicopters. Airports that serve general aviation activity exclusively, or have very little "commercial service" activity, are commonly known as "general aviation" airports. The variety of "general aviation" airports is truly expansive, ranging from some of the largest and busiest airports in the world to the smallest private grass strips (Fig. 1.2).

While "commercial service airport" and "general aviation airport" are very common terms used by the general public to describe airports, there is much more to how airports are categorized by airport management. Airport ownership, their accessibility

Nations with the Most Civil Use Airports

Rank	Nation	# Airports
1	United States	13,513
2	Brazil	4,093
3	Mexico	1,714
4	Canada	1,467
5	Russia	1,218
6	Argentina	1,138
7	Bolivia	855
8	Colombia	836
9	Paraguay	799
10	Indonesia	673
11	South Africa	566
12	Papua New Guinea	561
13	Germany	539
14	China	507
15	Chile	481
16	Australia	480
17	France	464
18	United Kingdom	460
19	Venezuela	444
20	Ecuador	432
21	India	346
22	Iran	319
23	Guatemala	291
24	Philippines	247
25	Sweden	231

Source: US CIA World Factbook
Data reported 2013-2016

TABLE 1.1   Nations with the most civil use airports. (*Source*: Airports Council International.)

FIGURE 1.1 A busy "commercial service" airport. (*Source*: Wikimedia Commons.)

FIGURE 1.2 Many airports are no more than private grass strips. (*Photo courtesy* Seth Young.)

to the public, their levels of activity, and their "importance to air transportation" are all important factors in categorizing the world's airports, which in turn provide significant contributions to how these airports are planned, managed, operated, and even funded.

Airports in the United States

The United States has by far the greatest number of airports in the world. Nearly half the world's airports and more than two-thirds of the world's 400 busiest airports are located in the United States. There are more than 19,000 civil landing areas in the United States, including heliports, seaplane bases, balloon-ports, and facilities for ultralight aircraft (Table 1.2). More than 13,500 of the civil landing areas in the United States are considered "airports," with facilities to accommodate the landing and takeoff of fixed-wing aircraft. Most of these facilities are considered "private-use" and are used solely by their private owners or visitors with permission. Such facilities include helipads operated at hospitals and office buildings, private lakes for seaplane operations, and, most common, small private airstrips that accommodate the local owners of small aircraft operations. Many of these facilities are nothing more than a cleared area known as a "grass strip." Nevertheless, they are recognized and registered as civil-use landing areas and are, at least, operationally part of the United States system of airports.

Approximately 5,000 civil landing facilities are "public-use" or "open to the public." Most of these public-use facilities are also publicly owned and operated by local municipalities, counties, states, or by an "authority," a semi-autonomous public organization typically overseen by a board of local municipal, county, and/or state officials (more on airport ownership structures in Chap. 2).

The vast majority of the 5,000 public-use civil landing facilities are "airports" designed to accommodate the takeoff and landing of fixed wing aircraft on some form of a "runway," consisting of a strip of land with a paved, gravel, or grass surface. The planning and management of these public use airports will be the focus of this text, although much of the material within this text will be of relevance to private-use airports, as well as heliports, seaplane bases, or facilities that accommodate other aircraft, such as balloons, gliders, ultralight aircraft, and unmanned aerial vehicles.

Two states, Hawaii and Rhode Island, own and operate their respective airports, operating as a broad airport system. The federal government used to operate two civil

Type	Private-Use	Public-Use	Total
Airport	8,321	4,847	**13,168**
Heliport	5,643	66	**5,709**
Seaplane Base	279	214	**493**
Balloonport	12	1	**13**
Gliderport	30	5	**35**
Ultralight Strip	115	3	**118**
Total:	**14,400**	**5,136**	**19,536**

Source: FAA National Plan of Integrated Airport Systems (2017–2021)

TABLE 1.2   Numbers and Types of Airports in the United States (as of February 2016)

airports Ronald Reagan Washington National Airport and Washington Dulles International Airport. In 1987, ownership was transferred to an independent public authority known as the Metropolitan Washington Airports Authority (MWAA). Many airports in the United States were originally owned by the federal government, specifically the military, as they were created for military use during World Wars I and II. Since then, many of these airports were transferred to local municipal ownership. The transfers of most of these airports were made with provisions that permit the federal government to recapture its interest under certain conditions and also to review and approve any transfer of formal federal properties destined for nonairport use. Approximately 600 civil airports have these encumbrances. In addition, Army, Air Force Reserve, and National Guard units operate out of many civil airports, usually under some type of lease arrangements. There are also approximately 20 airports that are primarily used for military purposes and are owned by the U.S. Department of Defense but also are available for civil use. These airports are known as "**joint-use**" **airports**.

The vast majority of airports in the United States, whether private-use or public-use, are actually quite small, each serving a very small portion of the nation's number of aircraft operations (takeoffs and landings) and even a smaller portion of the total number of commercial air transportation passengers. Much of the activity that occurs at these airports includes operations in small aircraft for recreational purposes, flight training, and transportation by individuals and small private groups. Although most of the flying public rarely, if ever, utilizes many of these airports, the smaller airport facilities play a vital role in the United States system of airports.

Airports are often described by their levels of activity. The activity, services, and investment levels vary greatly among the nation's airports. The most common measures used to describe the level of activity at an airport are the number of passengers served, the amount of cargo carried, the number of aircraft based at the airport, and the number of operations performed at the airport on a daily, seasonal, and annual basis.

The number of passengers served at an airport is typically used to measure the level of activity at airports that predominately serve commercial passengers traveling on the world's air carriers. Measuring passenger activity provides airport management with information that will allow for the proper planning and management for facilities used by passengers, including passenger terminals, parking garages, gate areas, and concessions.

Specifically, the term **enplanements** (or *enplaned passengers*) is used to describe the number of passengers that board an aircraft at an airport. Annual enplanements are often used to measure the amount of airport activity, and even evaluate the amount of funding to be provided for improvement projects. Table 1.3 lists the top 50 airports in the United States by their number of annual enplanements. The term **deplanements** (or *deplaned passengers*) is used to describe the number of passengers that deplane an aircraft at an airport.

The term *total passengers* is used to describe the number of passengers that either board or deplane an aircraft at an airport. At many airports, the number of total passengers is roughly double the number of annual enplanements. However, at airports where the majority of passengers are **transfer passengers,** the number of passengers is more than double the number of enplanements. This is because transfer passengers are counted twice, once when deplaning their arriving flight, and then again when boarding their next flight. Because of this distortion, passenger volumes are not often used to

Rank	Airport	2016 Enplanements
1	Hartsfield—Jackson Atlanta International	50,501,858
2	Los Angeles International	39,636,042
3	Chicago O'Hare International	37,589,899
4	Dallas-Fort Worth International	31,283,579
5	John F Kennedy International	29,239,151
6	Denver International	28,267,394
7	San Francisco International	25,707,101
8	McCarran International	22,833,267
9	Seattle-Tacoma International	21,887,110
10	Charlotte/Douglas International	21,511,880
11	Phoenix Sky Harbor International	20,896,265
12	Miami International	20,875,813
13	Orlando International	20,283,541
14	George Bush Intercontinental/Houston	20,062,072
15	Newark Liberty International	19,923,009
16	Minneapolis-St Paul International/Wold-Chamberlain	18,123,844
17	General Edward Lawrence Logan Boston International	17,759,044
18	Detroit Metropolitan Wayne County	16,847,135
19	New York LaGuardia	14,762,593
20	Philadelphia International	14,564,419
21	Fort Lauderdale/Hollywood International	14,263,270
22	Baltimore/Washington International Thurgood Marshall	12,340,972
23	Ronald Reagan Washington National	11,470,854
24	Salt Lake City International	11,143,738
25	Chicago Midway International	11,044,387
26	Washington Dulles International	10,596,942
27	San Diego International	10,340,164
28	Daniel K Inouye International/Honolulu	9,656,340
29	Tampa International	9,194,994
30	Portland (Oregon) International	9,071,154
31	Dallas Love Field	7,554,596
32	St Louis Lambert International	6,793,076
33	Nashville International	6,338,517
34	William P Hobby/Houston	6,285,181

TABLE 1.3   Top 50 Airports by Enplanements, 2016.

Rank	Airport	2016 Enplanements
35	Austin-Bergstrom International	6,095,545
36	Metropolitan Oakland International	5,934,639
37	Louis Armstrong New Orleans International	5,569,705
38	Raleigh-Durham International	5,401,714
39	Kansas City International	5,391,557
40	Norman Y Mineta San Jose International	5,321,603
41	John Wayne Airport-Orange County	5,217,242
42	Sacramento International	4,969,366
43	Luis Munoz Marin International/San Juan	4,343,354
44	Southwest Florida International	4,239,261
45	Indianapolis International	4,216,766
46	San Antonio International	4,179,994
47	Cleveland-Hopkins International	4,083,476
48	Pittsburgh International	3,986,114
49	John Glenn Columbus International	3,567,864
50	Kahului Hawaii Airport/Maui	3,352,813

Source: FAA (https://www.faa.gov/airports/planning_capacity/passenger_allcargo_stats/passenger/media/cy16-commercial-service-enplanements.pdf)

TABLE 1.3   Top 50 Airports by Enplanements, 2016 (*Continued*)

estimate passenger activity at an airport, although the largest airports serving as airline hubs often use the passenger volumes to advertise their grandeur. To remove this bias, most official measures of airport passenger activity are given in terms of enplanements.

Cargo activity is typically used to measure the level of activity at airports that handle freight and mail. Airports located near major seaports, railroad hubs, and large metropolitan areas, as well as airports served by the nation's cargo carriers (such as FedEx and UPS) accommodate thousands of tons of cargo annually.

In 2017, the busiest U.S. airports in terms of cargo tonnage were Memphis (Tennessee) International Airport (the home base of FedEx), Ted Stevens Anchorage (Alaska) International Airport (a major transfer point for cargo shipped between Asia and the Americas), and Louisville (Kentucky) International Airport (home base of UPS). These three airports are ranked second, fifth, and seventh in the world, respectively. Hong Kong's Chep Lap Kok Airport ranks first in the world in terms of cargo tonnage served, Shanghai Pudong International Airport (China) ranks third, Incheon International Airport (South Korea) ranks, fourth, and Dubai International Airport (United Arab Emirates) ranks sixth. (*Source*: Airports Council International.)

The number of **aircraft operations** is used as a measure of activity at all airports, but is the primary measure of activity at general aviation (GA) airports. An aircraft operation is defined as a takeoff or a landing. When an aircraft makes a landing and then

immediately takes off again, it is known as a "touch and go" and is counted as two operations. This activity is common at many GA airports where there is a significant amount of flight training. When an aircraft takes off and lands at an airport without landing at any other airport, the aircraft is said to be performing **local operations**. An **itinerant operation** is a flight that takes off from one airport and lands at another.

Table 1.4 lists the top airports in the United States by their number of annual operations. It is interesting to note that this list of airports is slightly different than in Table 1.3.

Another, albeit, indirect measure of airport activity is identified by the number of aircraft "based" at the airport. A **based aircraft** is an aircraft that is registered as a "resident" of the airport. Typically, the owner of such an aircraft will pay a monthly or annual fee to park the aircraft at the airport, either outside in a designated aircraft parking area or in an indoor hangar facility. The number of based aircraft is used to indirectly measure activity primarily at smaller airports where private "general" aviation is dominant. At airports that primarily handle the air carriers, relatively few aircraft are actually based.

Table 1.5 provides a list of the airports in the United States with the most based aircraft. It is interesting to note that the airports on this list are generally those that do not serve the air carriers.

Operations and based aircraft are measures of activity that influence the planning and management primarily of the **airside** of airports, such as the planning and management of runways, taxiways, navigational aids, gates, and aircraft parking areas. Passenger enplanements, while influencing the planning of the airside, also greatly influence the planning and management of the (bold) landside (unbold) of airports, including terminals, parking, and ground transportation facilities.

In general, airports measure the activity levels of their airports on the basis of all levels of passenger, cargo, operations, and based aircraft activity; virtually all airports, especially the largest airports in the nation, accommodate passengers and cargo, as well as air carrier and private aircraft operations.

Rank	Airport	2016 Operations
1	Hartsfield—Jackson Atlanta International	898,356
2	Chicago O'Hare International	867,635
3	Los Angeles International	697,138
4	Dallas-Fort Worth International	672,748
5	Denver International	565,503
6	Charlotte/Douglass International	545,742
7	Las Vegas McCarran International	541,428
8	George Bush Intercontinental/Houston	470,780
9	Toronto Pearson International	456,536
10	John F Kennedy International	452,415
11	San Francisco International	450,388
12	Phoenix Sky Harbor International	440,643
13	Newark Liberty International	435,907

TABLE 1.4 Top 50 Airports by Operations, 2016

Rank	Airport	2016 Operations
14	Miami International	414,234
15	Minneapolis-St Paul International/Wold-Chamberlain	412,872
16	Seattle-Tacoma International	412,170
17	Philadelphia International	394,022
18	Detroit Metropolitan Wayne County	393,427
19	General Edward Lawrence Logan Boston International	391,222
20	Phoenix Deer Valley	370,034
21	New York LaGuardia	369,987
22	Salt Lake City International	320,137
23	Vancouver international	319,593
24	Grand Forks International	318,506
25	Orlando International	316,981
26	Daniel K Inouye International/Honolulu	316,154
27	Daytona Beach International	307,333
28	Long Beach (California)	305,801
29	Ronald Reagan Washington National	295,038
30	Fort Lauderdale/Hollywood International	290,239
31	Sanford International (Florida)	289,759
32	John Wayne Airport-Orange County	284,246
33	Anchorage Ted Stevens International	279,861
34	Washington Dulles International	265,743
35	Chicago Midway	253,046
36	Baltimore/Washington International Thurgood Marshall	248,585
37	Phoenix Mesa Gateway	246,298
38	Portland (Oregon) International	227,709
39	Montreal Dorval	225,203
40	Calgary International	224,828
41	Memphis International	224,705
42	Dallas Love Field	224,193
43	Metropolitan Oakland International	222,771
44	Los Angeles Van Nuys	213,721
45	William P Hobby/Houston	200,741
46	San Diego International	197,132
47	Nashville International	194,758
48	Austin-Bergstrom International	192,032
49	Raleigh-Durham International	191,348
50	St. Louis Lambert International	190,560

Source: ACI-NA (hence includes Canada airports)

TABLE 1.4 Top 50 Airports by Operations, 2016 (*Continued*)

Rank	Airport	2018 Based Aircraft
1	Lake Hood, Anchorage, Alaska	1,032
2	Fort Lauderdale Executive, Ft. Lauderdale, Florida	963
3	Phoenix Deer Valley, Phoenix, Arizona	949
4	Centennial Airport, Denver, Colorado	860
5	Merrill Field, Anchorage, Alaska	844
6	Gillespie Field, San Diego, California	728
7	Falcon Field, Mesa, Arizona	659
8	Oakland County International, Pontiac, Michigan	577
9	Fairbanks International, Fairbanks, Alaska	570
10	Van Nuys Airport, Van Nuys, California	566
11	Addison Airport, Dallas, Texas	564
12	Snohomish County Prairie Field, Everett, Washington	564
13	North Las Vegas Airport, Las Vegas, Nevada	536
14	Richard Lloyd Jones Jr. Airport, Tulsa, Oklahoma	515
15	Republic Airport, Farmingdale, New York	507
16	Camarillo Airport, Camarillo, California	488
17	Chino Airport, Chino, California	480
18	Whiteman Airport, Los Angeles, California	475
19	Livermore Municipal, Livermore, California	462
20	Montgomery Field, San Diego, CA	460
21	John Wayne Airport, Orange County, California	437
22	Aurora State Airport, Aurora, Oregon	435
23	Miami Executive, Miami, Florida	434
24	Spirit of St. Louis, St. Louis, Missouri	421
25	Boeing Field, King County, Seattle, Washington	419
26	Zamperini Field, Torrance, California	411
27	Arlington Municipal, Arlington, Washington	409
28	Fort Worth Meachham International, Ft. Worth, Texas	397
29	Buchanan Field, Concord, California	392
30	Dekalb-Peachtree Airport, Atlanta, Georgia	391
31	Hayward Executive, Hayward, California	390
32	Meadow Lake Airport, Colorado Springs, Colorado	389
33	Manassas Regional Harry P Davis Field, Washington, DC	389
34	Caldwell Industrial Airport, Caldwell, Idaho	388
35	Rocky Mountain Metropolitan, Denver, Colorado	385
36	Watsonville Municipal, Watsonville, California	382
37	Long Beach Daugherty Field, Long Beach, California	366
38	Denton Enterprise Airport, Denton, Texas	360
39	Laurence Hanscom Field, Bedford, Massachusetts	346

TABLE 1.5 Top 50 Airports by Based Aircraft, 2018

Rank	Airport	2018 Based Aircraft
40	Richard Fleming Field, South St. Paul, Minnesota	346
41	Orlando Sanford International, Orlando, Florida	344
42	Aurora Municipal, Aurora, Illinois	344
43	Sacramento Executive, Sacramento, California	340
44	Salt Lake City International, Salt Lake City, Utah	337
45	Shreveport Downtown Airport, Shreveport, Louisiana	334
46	Anoka County Blaine Airport, Minneapolis, Minnesota	328
47	Juneau International, Juneau, Alaska	325
49	Scottsdale Airport, Scottsdale, Arizona	325
50	Naples Municipal, Naples, Florida	322

Source: FAA National Plan of Integrated Airport Systems

TABLE 1.5   Top 50 Airports by Based Aircraft, 2018 (*Continued*)

The National (and International) Oversight of Airports

All civil-use airports in the United States, large and small, in one way or another, utilize the United States' **National Airspace System** (known as the **NAS** for short). The NAS is an integral part of the United States' transportation infrastructure. This vital infrastructure is administered through the United States **Department of Transportation (DOT),** led by the Secretary of Transportation.

The DOT is divided into several administrations that oversee the various modes of national and regional transportation in the United States. These administrations include:

FHWA—The Federal Highway Administration

FMCSA—The Federal Motor Carrier Safety Administration

FRA—The Federal Railroad Administration

FTA—The Federal Transit Administration

MARAD—The Maritime Administration

NHTSA—The National Highway Traffic Safety Administration

PHMSA—Pipeline and Hazardous Materials Safety Administration

SLSDC—Saint Lawrence Seaway Development Corporation

The administration that oversees civil aviation is the **Federal Aviation Administration (FAA).** The FAA's primary mission is to oversee the safety of civil aviation. The FAA is responsible for the certification of aircraft, pilots, and airports, particularly those serving commercial air carriers. The FAA operates the nation's air traffic control system, including most air traffic control towers found at airports, and owns, installs, and maintains visual and electronic navigational aids found on and around airports. In addition, the FAA administers the majority of the rules that govern civil aviation and airport
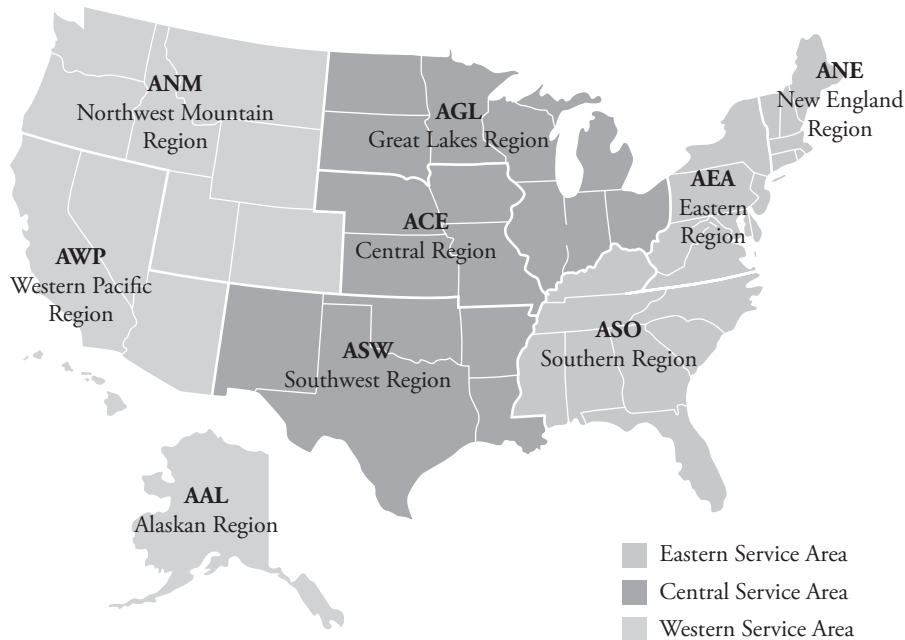
FIGURE 1.3   FAA Regions. (*Source*: FAA.)

operations, as well as plays a large role in the funding of airports for improvement and expansion. The FAA is led by an administrator who is appointed by the secretary of transportation for a 5-year term.

The FAA is headquartered in Washington, D.C. Headquarter offices within the FAA include the Air Traffic Organization (ATO) and the offices of Security and Hazardous Materials (ASH), Commercial Space Transportation (AST), and Airports (ARP).

Within the Office of Airports lies the Office of Airport Compliance and Management Analysis (ACO), Office of Airport Safety and Standards (AAS), and the Office of Planning and Programming (APP). It is in these offices where Federal Aviation Regulations and policies specific to airports are administered.

Airport managers typically communicate with the FAA through a regional Airports District/Development Office (ADO). FAA staff at the ADO's are often the first point of contact with airports to ensure compliance with federal regulations and to assist airport management in safe and efficient airport operations, as well as supporting airport planning efforts. Figure 1.3 illustrates the nine regions within the ADO's operate, each region covers a selected number of states.

Many civil-use airports, including those that are not directly regulated by the FAA, are often in some way regulated or otherwise governed by their respective state governments, individual states, which in turn have their own departments of transportation and associated aviation offices. Airport management at individual airports should be familiar with all federal, state, and even local levels of administration that govern their facilities.

Internationally, the recommended standards for the operation and management of civil-use airports are provided by the **International Civil Aviation Organization (ICAO).** ICAO, headquartered in Montreal, Quebec, Canada, is a membership-based

organization, comprised of 191 contracting states that span the world. ICAO came into existence as a part of the 1944 Chicago Convention on International Civil Aviation for the purpose of providing a source of communication and standardization among participating states with respect to civil aviation operations. ICAO publishes a series of recommended policies and regulations to be applied by individual states in the management of their airports and civil aviation systems.

In most individual countries, airports are managed directly by the federal government, most often under the ministry of transport. Similar to the United States, many airports around the world are privately owned and operated, although, despite private ownership, they are still subject to much of the country's regulations regarding aviation operations.

The National Plan of Integrated Airport Systems

Since 1984, the FAA has recognized a subset of the nation's public use airports as being vital to serving the public needs for air transportation, through the **National Plan of Integrated Airport Systems (NPIAS)**. The primary purpose of the NPIAS is to provide a plan for categorizing current (and some future planned) airports by how they contribute to the nation's air transportation system, and to provide guidance toward authorizing and allocating federal funding for airport improvements over a 5-year period. The NPIAS is updated every 2 years, to reflect the changes in airport activity over time. In 2017, 3,332 of the nation's public-use airports were in the NPIAS. Eight additional airports are proposed to enter the NPIAS in future years.

The NPIAS places airports into two major categories, **primary airports** and **nonprimary airports** (Fig. 1.4). Within these categories, multiple subcategories exist to further define the role of an airport within the NPIAS.

Primary airports are public airports that receive scheduled air carrier service and serve at least 10,000 enplanements annually (Fig. 1.5). In 2017, there were 382 airports categorized as primary airports in the NPIAS. Within this exclusive group of airports, the range of airport size and activity level is very wide, and the distribution of passenger enplanements is highly skewed. About half of the primary airports serve relatively small numbers of passengers, while the vast majority of enplanements occur through relatively few very large airports. This phenomenon is due in part to the size of the population of the metropolitan area within which the airport is located, and also in part to the largest airlines' flight networks, known as the "hub and spoke" system.

Because of the wide range of airport size, primary airports are subcategorized within the NPIAS as **large hub**, **medium hub**, **small, hub**, or **nonhub** airports. (It should be noted that the term "hub" used by the FAA in the NPIAS is very different than the term used by the airline industry. Whereas the airline industry uses the term "hub" as an airport where the majority of an airline's passengers will transfer between flights to reach their ultimate destinations, the FAA defines hub strictly by the number of annual enplaned passengers to use the airport.) This subcategorization is made in the following way: **large hub** airports are those that serve at least 1 percent of the nation's total annual enplanements. The 30 large hubs account for more than 72 percent of all passenger enplanements in the United States. **Medium hub** airports serve between 0.25 and 0.99 percent of the nation's total annual enplanements. **Small hub** airports serve between 0.05 and 0.24 percent of the nation's total annual enplanements. **Nonhub** airports serve between 10,000 and 0.049 percent of the nation's total annual enplanements.
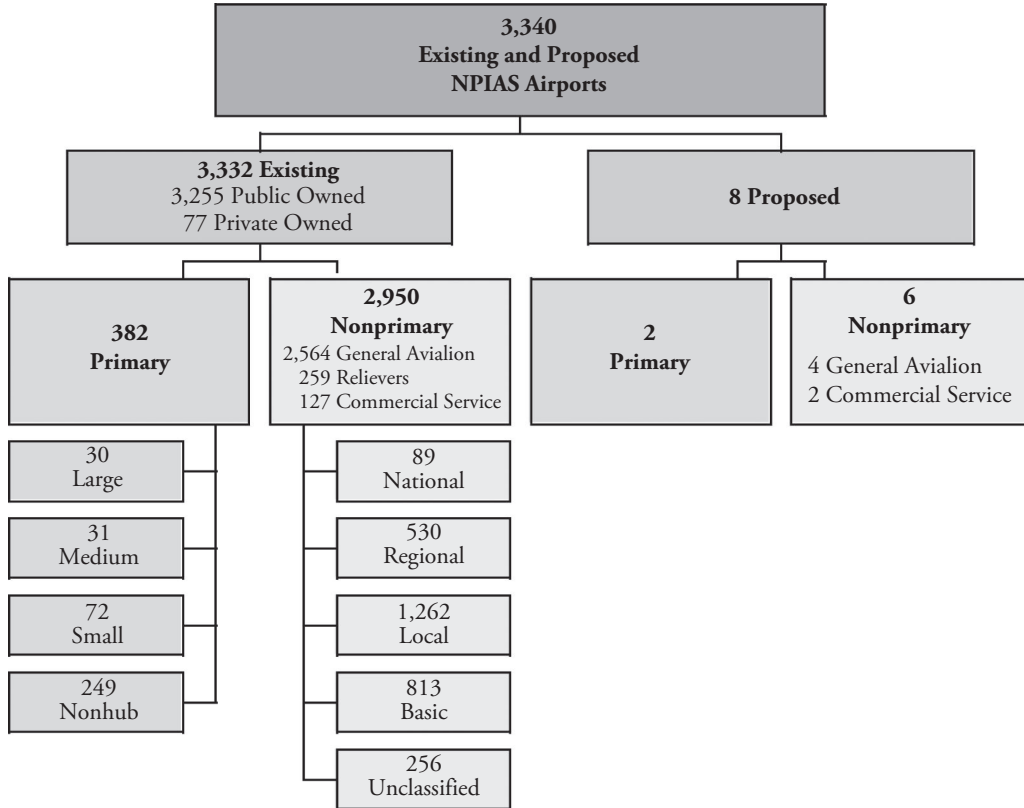
FIGURE 1.4   NPIAS airports by classification.

Nonprimary airports are those airports that serve less than 10,000 annual enplanements (Fig. 1.6). Nonprimary airports are further categorized as **Nonprimary commercial service** (also known as a "nonprimary nonhub") airports, **GA airports**, or **reliever airports**. **Nonprimary commercial service** airports have scheduled air carrier service and serve between 2,500 and 9,999 enplanements annually. **GA** airports are those public airports that serve less than 2,500 enplanements on scheduled air carrier service, including the many airports that do not have scheduled service at all. Some GA airports receive the special classification as **reliever airports** are those airports designated to "relieve congestion at a nearby commercial service airport and to provide more general aviation access to the overall community" it serves. As the name suggests, reliever airports are intended to encourage general aviation activity to use the facility rather than the busier nearby primary airport, by providing facilities of similar quality and convenience.

Nonprimary airports vary widely in their characteristics. Many of these airports are small facilities, with typically a single runway long enough to accommodate only small aircraft, and are limited in their facilities. These small airports primarily serve as a base for a few aircraft. Other nonprimary airports have facilities and activity that rival their primary counterparts. These airports have multiple runways, at least one long enough

FIGURE 1.5 NPIAS primary airports.

to accommodate corporate and larger-size jet aircraft, and have a full spectrum of maintenance, fueling, and other service facilities as well as rental car, restaurant, and hotel services to accommodate their customers.

As with primary airports, nonprimary airports are further categorized into **national**, **regional**, **local**, or **basic** airports. These categories are roughly based on some minimum quantitative criteria, such as number of annual operations, amount of cargo transported, number of based aircraft, of distance from another NPIAS airport, and based on the role the airport fulfills for the national airspace system. **National** and **regional airports** for example, fill the roles of supporting the system by providing their communities with access to regional, national, and international markets, have relatively high levels of aviation activity, including jets and multiengine propeller aircraft, and are generally located within larger metropolitan regions. Nearly all nonprimary nonhub airports and reliever airports are categorized as national or regional airports.

On the other end of the spectrum, **local** and **basic airports** fulfill the roles of serving local communities by supporting general aviation activities, including emergency response, air ambulance, flight training, and personal flying," and may have as few as 10 based aircraft.

The official criteria for categorizing nonprimary airports into these subcategories are illustrated in (Table 1.6). It should be noted that as opposed to the very quantitative and objective categorization of primary airports, the categorization of nonprimary airports is more subjectively determined.
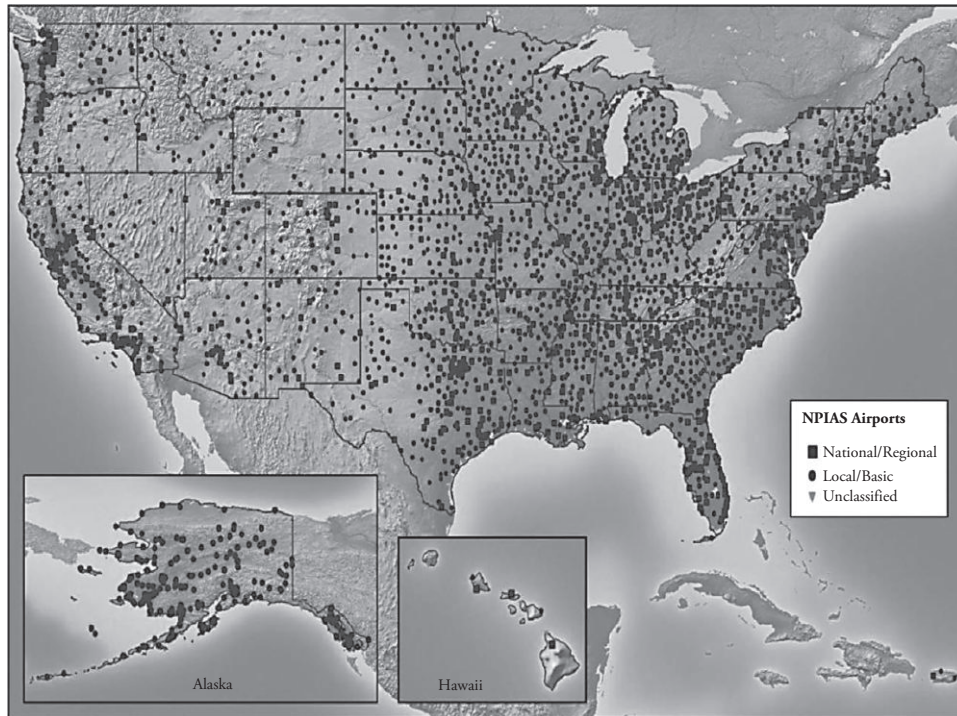
FIGURE 1.6 NPIAS nonprimary airports.

The very smallest of airports within the NPIAS are categorized as **unclassified airports**. These airports have very limited activity. The FAA continues to include any of these airports in the NPIAS, reserving the possibility of placing them into one of the NPIAS categories in future years if activity at the airport warrants.

As will be discussed in Chap. 9 of this text, the purpose of classifying airports within the NPIAS is not only to help determine the role of an airport within the system but also to guide the FAA in supporting these airports by providing appropriate levels of funding for airport improvements. Such improvements may include enhancements to an airport's runways and taxiways, acquisition of new firefighting, emergency, or snow and ice removal equipment, or the development of plans to improve safety of the airport, through wildlife hazard mitigation, for example, or for plans the environmental impact of the airport. Table 1.7 illustrates the percentage of NPIAS funding allocated to the various categories of airports, noting that nearly 60 percent of all funding is allocated to the 382 primary airports, and 40 percent to the 2,950 nonprimary airports.

Many of the thousands of airports not included in the NPIAS are not eligible for federal funding. However, the airports are often included in their respective state and/or local airport plans, and thus may receive some level of funding support. More than 12,000 civil landing areas that are private-use and not open to the general public are also not included in the NPIAS, and typically are not funded by any public entity. They are considered part of our national system of airports, as they are used to access the rest of the NAS.

If a nonprimary Airport is Classified as	It Fulfills This Role in the System:	And Meets one of the Following Minimum Criteria for *Annual* Activity:
National	Supports the national airport system by providing communities access to national and international markets in multiple states and throughout the United States. National airports have very high levels of aviation activity with many jets and multiengine propeller aircraft.	• 5,000 or more instrument operations, 11 or more based Jets, and 20 or more international flights or 500 or more interstate departures. • 10,000 or more enplanements and at least 1 enplanement by a large certificated air carrier. • 500 million pounds or more of landed cargo weight.
Regional	Supports regional economies by connecting communities to regional and national markets. Generally located in metropolitan areas and serve relatively large populations. Regional airports have high levels of activity with some jets and multiengine propeller aircraft. The metropolitan areas in which regional airports are located can be metropolitan statistical areas with an urban core population of at least 50,000 or micropolitan statistical areas with a core urban population between 10,000 and 50,000.	• In a metropolitan statistical area, 10 or more domestic flights over 500 miles, 1,000 or more instrument operations, **and** 1 or more based jet or 100 or more based aircraft. • Reliever with 90 or more based aircraft. • Nonprimary commercial service airport (requiring scheduled service) within a metropolitan statistical area.
Local	Supplements local communities by providing access to markets within a State or Immediate region. Local airports are most often located near larger population centers, but not necessarily in metropolitan or micropolitan areas. Most of the flying at local airports is by piston aircraft in support of business and personal needs. These airports typically accommodate flight training, emergency services, and charter passenger service.	• Public owned and 10 or more Instrument operations and 15 or more based aircraft. • Public owned and 2,500 or more annual enplanements.
Basic	Provides a means for general aviation flying and link the community to the national airport system. These airports support general aviation activities, such as emergency response, air ambulance service, flight training, and personal flying. Most of the flying at basic airports is self-piloted for business and personal reasons using propeller-driven aircraft. They often fulfill their role with a single runway or helipad and minimal infrastructure.	• Public owned with 10 or more based aircraft or 4 or more based helicopters if a heliport. • Public owned located 30 or more miles from the nearest NPIAS airport. • Owned or serving a Native American community. • Identified and used by the U.S. Forest Service, U.S. Marshals Service, U.S. Customs and Border Protection (designated, International or landing rights), U.S. Postal Service (air stops), or has Essential Air Service. • A new or replacement (public owned) airport that has opened within the last 10 years. • Unique circumstances related to special aeronautical use.

TABLE 1.6 NPIAS Asset Categories for Non-Primary Airports. (*Source*: FAA National Plan of Integrated Airport Systems.)

If a nonprimary Airport is Classified as	It Fulfills This Role in the System:	And Meets one of the Following Minimum Criteria for *Annual* Activity:
Unclassified	Currently in the NPIAS but with limited activity. If the next review of an unclassified airport's activity shows levels that meet the criteria for one of the classifications, that airport will be reclassified in the next published NPIAS.	

TABLE 1.6   NPIAS Asset Categories for Non-Primary Airports. (*Source*: FAA National Plan of Integrated Airport Systems.) (*Continued*)

Number of Airports	Airport Category	Percentage of NPIAS Airports	Percentage of 2014 Total Enplanements[1]	Percentage of All Based Aircraft[2]	Percentage of NPIAS Cost[3]
30	Large Hub	1	72	0.7	20.9
31	Medium Hub	1	15	1.7	9.6
72	Small Hub	2	8	4.7	12.8
249	Nonhub	7	4	11.6	16.2
382	**Primary Subtotal**	**11**	**99**	**18.6**	**59.4**
89	National	3		11.5	5.4
531	Regional	16		25.6	12.2
1,261	Local	38		21.2	15.3
813	Basic	24		3.2	6.6
256	Unclasified	8		1.0	0.03
2,950	**Nonprimary Subtotal**	**89**		**62.6**	**39.5**
3,332	**Total NPIAS Airports**	**100**	**99**	**81.2**	**99.0**

[1]The remaining 1 percent of enplanements occurred at non-NPIAS airports.
[2]Based on an active general aviation fleet of 203,880 aircraft in 2015.
[3]These costs are rounded and do not include the cost for new airports (1 percent).
Source: 2017-2021 National Plan of Integrated Airport Systems, FAA

TABLE 1.7   NPIAS Cost Allocations

The Rules that Govern Airports

As with any system intended for use by the public, a complex system of federal, state, and often local regulations have been put in place by legislation to ensure the safe and efficient operation of public-use airports. All airports included in the NPIAS are subject to a variety of **Federal Aviation Regulations (FAR).** FARs are found in Title 14 of the United States **Code of Federal Regulations (CFR)** (14 CFR—Aeronautics and Space). The 14 CFR series is made up of over 100 chapters, known as parts, each of which provide regulatory mandates that govern various elements of the civil aviation system, including regulations for pilots, GA and commercial flight operations, and, of course, airport operations and management. Within airport management, regulations regarding

airport operations, environmental policies, financial policies, administrative policies, airport planning, and other issues of direct concern to airports are covered.

Although all FARs are important to airport management, the following FARs are of specific importance to airport management, operations, and planning, and will be referenced in detail in this text:

14 CFR Part 1	Definitions and Abbreviations
14 CFR Part 11	General Rulemaking Procedures
14 CFR Part 13	Investigative and Enforcement Procedures
14 CFR Part 16	Rules of Practices for Federally-Assisted Airport Enforcement Proceedings
14 CFR Part 36	Noise Standards: Aircraft Type and Airworthiness Certification
14 CFR Part 71	Designation of Classes A, B, C, D, and E Airspace Areas; Air Traffic Service Routes; and Reporting Points
14 CFR Part 73	Special Use Airspace
14 CFR Part 77	Safe, Efficient Use, and Preservation of the Navigable Airspace
14 CFR Part 91	General Operating and Flight Rules
14 CFR Part 93	Special Air Traffic Rules
14 CFR Part 97	Standard Instrument Procedures
14 CFR Part 121	Operating Requirements: Domestic, Flag, and Supplemental Operations
14 CFR Part 129	Operations: Foreign Air Carriers and Foreign Operators of U.S. Registered Aircraft Engaged in Common Carriage
14 CFR Part 139	Certification of Airports
14 CFR Part 150	Airport Noise Compatibility Planning
14 CFR Part 151	Federal Aid to Airports
14 CFR Part 152	Airport Aid Program
14 CFR Part 156	State Block Grant Pilot Program
14 CFR Part 157	Notice of Construction, Alteration, Activation, and Deactivation of Airports
14 CFR Part 158	Passenger Facility Charges
14 CFR Part 161	Notice and Approval of Airport Noise and Access Restrictions
14 CFR Part 169	Expenditure of Federal Funds for Nonmilitary Airports or Air Navigation Facilities Thereon

In addition to the 14 CFR series, regulations regarding the security of airport and other civil aviation operations are published under Title 49 of the Code of Federal Regulations (49 CFR—Transportation) and are known as **Transportation Security Regulations (TSRs).** TSRs are enforced by the TSA. Discussed further in Chap. 8, TSRs of specific importance to airport management include:

49 CFR Part 1500	Applicability, Terms, and Abbreviations
49 CFR Part 1502	Organization, Functions, and Procedures

49 CFR Part 1503   Investigative and Enforcement Procedures

49 CFR Part 1510   Passenger Civil Aviation Security Service Fees

49 CFR Part 1511   Aviation Security Infrastructure Fee

49 CFR Part 1520   Protection of Security Information

49 CFR Part 1540   Civil Aviation Security: General Rules

49 CFR Part 1542   Airport Security

49 CFR Part 1544   Aircraft Operator Security: Air Carriers and Commercial Operators

49 CFR Part 1546   Foreign Air Carrier Security

49 CFR Part 1549   Indirect Air Carrier Security

49 CFR Part 1550   Aircraft Security Under General Operating and Flight Rules

To assist airport management and other aviation operations in understanding and applying procedures dictated by federal regulations, the FAA makes available a series of **advisory circulars (ACs)** associated with each regulation and policies. The ACs specific to airports are compiled into the 150 Series of Advisory Circulars. There are over 100 current and historical ACs in the 150 series available to airport management. Those ACs of particular general interest to airport management are referenced throughout this text. Some of these include:

AC 150/5020-1   Noise Control and Compatibility Planning for Airports

AC 150/5060-5   Airport Capacity and Delay

AC 150/5070-6C   Airport Master Plans

AC 150/5190-5   Exclusive Rights and Minimum Standards for Commercial Aeronautical Activities

AC 150/5200-28F   Notices to Airmen (NOTAMS) for Airport Operators

AC 150/5200-30F   Airport Winter Safety and Operations

AC 150/5200-31C   Airport Emergency Plan

AC 150/5300-13A   Airport Design

AC 150/5325-4B   Runway Length Requirements for Airport Design

AC 150/5340-1L   Standards for Airport Markings

AC 150/5360-12F   Airport Signing and Graphics

AC 150/5360-13   Planning and Design Guidelines for Airport Terminal Facilities

AC 150/5360-14   Access to Airports by Individuals with Disabilities

ACs are constantly updated and often changed. The latest available ACs as well as FARs may be found by contacting the FAA. The latest information regarding TSRs may be found by contacting the TSA.

Airports are also subject to state and local civil regulations specific to the airport's metropolitan area. In addition, airport management itself may impose regulations and policies governing the operation and administration of the airport. Each airport is encouraged to have a published set of rules and regulations covering all the applicable federal, state, local, and individual airport policies to be made available for all employees and airport users on an as-needed basis. A complete list of current and historical

Federal Aviation Regulations and Advisory Circulars may be found at the FAA website at http://www.faa.gov.

Airports outside of the United States are operated subject to the rules and regulations improved by their respective countries. Much of these rules and regulations are based on ICAO's recommended policies and regulations, known as Annexes. In particular, **ICAO Annex 14—Standards and Aerodrome Certification** is the primary guidance document for the design and certification of airport facilities internationally. The following ICAO documents associated with ICAO Annex 14 provide specific guidance in areas of importance to airport management internationally:

ICAO Document 9184	Airport Planning Manual
ICAO Document 9157	Aerodrome Design Manual
ICAO Document 9137	Airport Services Manual
ICAO Document 9774	Manual on Certification of Aerodromes
ICAO Document 9859	Safety Management Manual (SMM)
ICAO Document 9981	Procedures for Air Navigation Services—Aerodromes

In recent years, the both ICAO and the FAA have begun to mutually adopt and guidance their respective regulations, advisory circulars, annexes and documents, in an effort to create more consistency between United States and the rest of the world when it comes to the planning and management of the world's airports.

Professional Organizations Supporting Airport Management

There are many national organizational and regional organizations that are deeply interested in the operation of airports. Most of these organizations are interested in developing and preserving airports because of their role in the national air transportation system and their value to the areas they serve. The primary goal of these groups is to provide political support for their causes with hopes to influence federal, state, and local laws concerning airports and aviation operations in their favor. In addition, these groups provide statistics and informational publications and provide guest speakers and information sessions to assist airport management and other members of the aviation community in order to provide support for civil aviation.

Each of these organizations is particularly concerned with the interests of their constituents; however there are numerous times when they close ranks and work together for mutual goals affecting the aviation community in general. The following is a brief listing of the most prominent associations. A complete listing can be found in the *World Aviation Directory* published by McGraw-Hill. These organizations, by virtue of the alphabetic acronyms they are most commonly referred by, make up the "alphabet soup" of aviation-related support organizations.

- *Aerospace Industries Association (AIA)—founded 1919.* Member companies represent the primary manufacturers of military and large commercial aircraft, engines, accessories, rockets, spacecraft, and related items.
- *Aircraft Owners & Pilots Association (AOPA)—founded 1939.* With more than 400,000 members, AOPA represents the interests of general aviation pilots.

AOPA provides insurance plans, flight planning, and other services, as well as sponsors large fly-in meetings. In addition the AOPA's Airport Support Network plays a large role in the support and development of all airports, with particular support to smaller GA airports.

- *Air Line Pilots Association (ALPA)—founded 1931.*   The Air Line Pilots Association is the oldest and largest airline pilots' union, supporting the interests of the commercial pilots and commercial air carrier airports.

- *Airports Council International–North America (ACI–NA)—founded 1991.*   First established as the Airport Operators Council in 1947, the ACI–NA considers itself the "voice of airports" representing local, regional, and state governing bodies that own and operate commercial airports throughout the United States and Canada. As of 2003, 725 member airports throughout belong to ACI–NA. The mission of the ACI–NA is to identify, develop, and enhance common policies and programs for the enhancement and promotion of airports and their management that are effective, efficient, and responsive to consumer and community needs. The ACI-NA is a sub-group to the larger *Airports Council International (ACI)*, representing airports around the globe.

- *Air Transport Association of America (ATA)—founded 1936.*   The ATA represents the nation's certificated air carriers in a broad spectrum of technical and economic issues. Promotes safety, industrywide programs, policies, and public understanding of airlines.

- *American Association of Airport Executives (AAAE)—founded 1928.*   A division of the Aeronautical Chamber of Commerce at its inception, the AAAE became an independent entity in 1939. Membership includes individual representatives from airports of all sizes throughout the United States, as well as partners in the aviation industry and academia.

- *Aviation Distributors and Manufacturers Association (ADMA)—founded 1943.*   Represents the interests of a wide variety of aviation firms including fixed-base operators (FBOs) who serve GA operations and aircraft component part manufacturers. The ADMA is a strong proponent of aviation education.

- *Experimental Aircraft Association (EAA)—founded 1953.*   The EAA, with over 700 local chapters, promotes the interests of homebuilt and sport aircraft owners. EAA hosts two of the world's largest fly-in conventions each year, at Oshkosh, Wisconsin, and Lakeland, Florida.

- *Flight Safety Foundation (FSF)—founded 1947.*   The primary function of the FSF is to promote air transport safety. Its members include airport and airline executives and consultants.

- *General Aviation Manufacturers Association (GAMA)—founded 1970.*   GAMA's members include manufacturers of GA aircraft, engines, accessories, and avionics equipment. GAMA is a strong proponent of GA airports.

- *Helicopter Association International (HAI)—founded 1948.*   Members of HAI represent over 1,500 member organizations in 51 countries that operate, manufacture, and support civil helicopter operations.

- *International Air Transport Association (IATA)—founded 1945.*   IATA is an association of more than 220 international air carriers whose main functions include

coordination of airline fares and operations. IATA annually assesses international airports for their service quality and publishes their findings industrywide.

- *National Agricultural Aviation Association (NAAA)—founded 1967.*   As the voice of the aerial application industry, NAAA represents the interests of agricultural aviation operators. The NAAA represents over 1,250 members including owners of aerial application businesses; pilots; manufacturers of aircraft, engines, and equipment; and those in related businesses.

- *National Air Transportation Association (NATA)—founded 1941.*   First known as the National Aviation Training Association and later Trades Association, NATA represents the interests of FBOs, air taxi services, and related suppliers and manufacturers.

- *National Association of State Aviation Officials (NASAO)—founded 1931.*   The NASAO represents departments of transportation and state aviation departments and commissions from 50 states, Puerto Rico, and Guam. NASAO encourages cooperation and mutual aid among local, state, and federal governments.

- *National Business Aviation Association (NBAA)—founded 1947.*   The NBAA represents the aviation interests of over 7,400 companies that own or operate GA aircraft as an aid to the conduct of their business, or are involved with some other aspect of business aviation.

- *Professional Aviation Maintenance Association (PAMA)—founded 1972.*   PAMA promotes the interest of airframe and power plant (A&P) technicians.

- *Regional Airline Association (RAA)—founded 1971.*   The RAA represents the interests of short- and medium-haul scheduled passenger air carriers, known as "regional airlines," and cargo carriers.

Concluding Remarks

As described in these introductory remarks, the complex system of civil airports is made up of individual airport facilities of varying sizes, serving various purposes, all categorized at regional, national, and international levels. The range of rules, regulations, and policies, administered from varying levels of government, cover the full spectrum of airport and aviation system operations. Furthermore, a large number of professional and industry organizations play a large part in influencing the policies by which airport management must operate their facilities. By understanding where an airport manager's airport falls within the civil aviation system, what rules must be followed, and what sources of support and assistance exist, the task of efficiently managing the complex system that is an airport, becomes highly facilitated.

Key Terms

advisory circulars (AC)
aircraft operations
Airports District/Development Office (ADO)
based aircraft
basic airport

Code of Federal Regulations (CFR)
Department of Transportation (DOT)
deplanements
enplanements (enplaned passengers)
Federal Aviation Administration (FAA)
Federal Aviation Regulations (FAR)
general aviation airport
International Civil Aviation Organization (ICAO)
itinerant operations
joint-use airports
large hub
local airport
local operations
medium hub
national airport
National Plan of Integrated Airport Systems (NPIAS)
nonhub
nonprimary airport
nonprimary commercial service airport
primary airport
regional airport
reliever airport
small hub
transfer passengers
Transportation Security Regulations (TSR)
unclassified airport

Questions for Review and Discussion

1. How many airports exist in the United States?

2. Who owns airports in the United States?

3. What is the difference between a private-use airport and a public-use airport?

4. What are the different types of airports in the United States, as described in the NPIAS?

5. What are the leading airports in the United States in terms of enplaned passengers?

6. What are the leading airports in the United States in terms of aircraft operations?

7. What are the leading airports in the United States in terms of base aircraft?

8. What are the different hub classifications described in the NPIAS?

9. What are the different classifications for non-primary airports?

10. What purposes do nonprimary airports serve?

11. What federal agencies exist in part to support and supervise airport operations?

12. What independent professional agencies exist to support airports?

13. What specific rules and regulations are used to operate airports?

14. What are advisory circulars? What purpose do they serve for airport management?

15. Assuming a total of 750 million annual enplanements in the United States, what are the enplanement levels that would determine the NPIAS primary airport hub categories?

Suggested Readings

de Neufville, Richard. *Airport System Planning.* London, England: Macmillan, 1976.

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Sixteenth Annual Report of Accomplishments under the Airport Improvement Program. FY 1997. Washington, D.C.: FAA, April 1999.

Wiley, John R. *Airport Administration and Management.* Westport, CT: Eno Foundation for Transportation, 1986.

Suggested Internet Resources

CIA World Fact book, list of the world's airports, 2016: https://www.cia.gov/library/publications/the-world-factbook/fields/2053.html

FAA: www.faa.gov

FAA Advisory Circulars: https://www.faa.gov/regulations_policies/advisory_circulars/

ICAO: www.icao.int

List of FAA Regulations: https://www.faa.gov/regulations_policies/faa_regulations/

NPIAS: https://www.faa.gov/airports/planning_capacity/npias/

Airports and Airport Systems: Organization and Administration

Objectives

The objectives of this section are to educate the reader with information to:

- Discuss the ownership structures of airports
- Identify the various jobs that exist at airports
- Understand an airport organization chart
- Discuss airport management as a potential career
- Understand the public relations issues that are associated with airport management

Introduction

Whether privately owned or part of a public system, there are fundamental characteristics of the administrative and organizational structure of an airport. The number of people employed at a given airport can range from as few as one, at the smallest of general aviation facilities, to as many as 50,000 at the world's largest airport organizations.

Those airports that employ fewer numbers of people expect these people to accept a wider range of responsibilities. For example, an airport management employee at a small airport might be responsible for maintaining the airfield, managing finances, and maintaining good relations with the local public. At the larger airports, employees are typically given very specific responsibilities for a particular segment of airport management.

Airport Ownership and Operation

Public airports in the United States are owned and operated under a variety of organizational and jurisdictional arrangements. Usually, ownership and operation coincide:

commercial airports might be owned and operated by a city, county, or state; or by more than one jurisdiction (a city and a county). In some cases, a commercial airport is owned by one or more of these governmental entities but operated by a separate public body, such as an airport authority specifically created for the purpose of managing the airport. Regardless of ownership, legal responsibility for day-to-day operation and administration can be vested in any of five kinds of governmental or public entities: a municipal or county government, a multipurpose port authority, an airport authority, or a state government, all with some level of direct or indirect regulatory oversight or guidance from the federal government.

A typical **municipally operated airport** is city owned and run as a department of the city, with policy direction by the city council and, in some cases, by a separate airport commission or advisory board. **County operated airports** are similarly organized. Under this type of public operation, airport policy decisions are generally made in the broader context of city or county public investment needs, budgetary constraints, and development goals.

Some commercial airports in the United States are run by multipurpose port authorities. **Port authorities** are legally chartered institutions with the status of public corporations that operate a variety of publicly owned facilities, such as harbors, airports, toll roads, and bridges. In managing the properties under their jurisdiction, port authorities have extensive independence from the state and local governments. Their financial independence rests largely on the power to issue their own debt, in the form of revenue bonds, and on the breadth of their revenue bases, which might include fees and charges from marine terminals and airports as well as proceeds (such as bridge or tunnel tolls) from other port authority properties. In addition, some port authorities have the power to tax within the port district, although it is rarely exercised.

Another type of arrangement is the single-purpose **airport authority.** Similar in structure and in legal charter to port authorities, these single-purpose authorities also have considerable independence from the state or local governments, which often retain ownership of the airport or airports operated by the authority. Like multipurpose port authorities, airport authorities have the power to issue their own debt for financing capital development, and in a few cases, the power to tax. Compared to port authorities, however, they must rely on a much narrower base of revenues to run a financially self-sustaining enterprise.

Since the early 1950s, there has been a steady transition from city and county controlled airports to the independent single or multipurpose authorities. While the vast majority of airports in the United States are still municipally owned and operated, the trend toward the airport authority model, particularly in larger metropolitan areas, has been largely in part to the following reasons:

- Many airport market or service areas have outgrown the political jurisdiction whose responsibility the airport entails. In some cases, there is considerable, actual or potential, tax liability to a rather limited area. In these cases, the creation of an authority to "spread the potential or actual tax support" for the airport might be recommended. By spreading the tax base of support for the airport, more equitable treatment of the individual taxpayer can result and the taxpayers supporting the airport in most cases more nearly match the actual users of the facility.

- Authority control of an airport is that such an organization allows the board to concentrate and specialize on airport matters.

- Aviation authorities can provide efficiency of operation and economies of scale when several political jurisdictions, each with separate airport responsibilities, choose to combine these under one board. This has been done quite successfully in many areas of the country. Normally, the staff required by an airport authority will be quite small compared to the personnel requirements of a city or county government. This factor generally results in better coordination with the airport management team.

- Authorities can also provide on-scene decision makers, rates, and charges unclouded by off-airport costs, and with less political impact on the business of running the airport.

State-operated airports are typically managed by the state's department of transportation. Under this model, the State may directly control the financial planning of the airport, and provide funding and financing through state means.

Although several states operate their commercial airports, only a handful of large- and medium-size commercial airports are operated in this way, primarily in Alaska, Connecticut, Hawaii, Maryland, and Rhode Island.

Airport Privatization

Several airports in the United States are managed by private companies generally operating under a fixed-fee contract with a local government. By contrast, many U.S. airports are managed by the local government, but a significant number of airport functions are contracted out to private contractors, including janitorial, security, maintenance, and concession management. In some cases, entire passenger terminals are managed, or even owned, by private companies. These situations are not particularly controversial, nor are the economics of these arrangements unusual.

Privatization, however, refers to shifting governmental functions and responsibilities, in whole or in part, to the private sector. The most extensive privatizations involve the sale or lease of public assets. Airport privatization, in particular, typically involves the lease of airport property and/or facilities to a private company to build, operate, and/or manage commercial services offered at the airport. No commercial airport property in the United States has been completely sold to a private entity. Long-term operating leases are the standard privatization contract.

Although no U.S. commercial airport has been outright sold to a private entity, publicly owned airports, however, do have extensive private sector involvement. Most services now performed at large commercial airports, such as airline passenger processing, baggage handling, cleaning, retail concessions, and ground transportation, are provided by private firms. Some estimates indicate as many as 90 percent of the people working at the nation's largest airports are employed by private firms. The remaining 10 percent of the employees are local and state government personnel performing administrative or public safety duties; federal employees, such as FAA air traffic controllers and Transportation Security Administration (TSA) security screeners; or other public employees. Airports have been increasingly dependent on the private sector to provide services as a way to reduce costs and improve the quality and the range of services offered.

In the mid-1990s, some public administrations contracted with private firms to manage their airports; most notably, in 1995, the Indianapolis Airport Authority became one of the first U.S. airports to contract with a private firm, the British Airports Authority, to manage its system of airports, including the Indianapolis International Airport. This agreement ended in 2007, in favor of returning the airport to direct management by the Indianapolis Airport Authority.

Since 1995, several, but not many, airports have been contracted out for full private management of portions of their operations. More commonly, a portion of the airport, such as an airport terminal, concessions, parking, and so forth, has been subcontracted for management by private sector firms.

In 1997, the FAA implemented the **Airport Privatization Pilot Program**, under which five public-use airports were to be operated under a private management group. The airports selected to participate in the program included Stewart International Airport in Newburgh, New York; Brown Field in San Diego, California; Rafael Hern*á*ndez Airport in Aguadilla, Puerto Rico; New Orleans Lakefront Airport in New Orleans, Louisiana; and Niagara Falls International Airport in Niagara Falls, New York. The program was met with limited success, with only Stewart International Airport fully completing the privatization process. In 2008, Stewart International was acquired by the Port Authority of New York and New Jersey, an autonomous public agency that operates many of the region's ports, airports, bridges, and tunnels.

Coincidently, in 2008, an attempt was made to privatize Chicago's Midway Airport through a sale to a private consortium that included YVR Airport Services, which owns and operates Vancouver International Airport and other airports worldwide. The attempt failed, however, when the consortium failed to receive the desired financing to complete the effort. In 2010, the effort to privatize Midway was revived, only to be canceled again in 2013.

As of 2018, one airport in the United States, The Luis Munoz Marin International Airport in San Juan Puerto Rico, is privatized, operating under a 40-year agreement with Aerostar Airport Holdings since 2013. Three other airports, Hendry County Airglades Airport in Florida, St. Louis's Lambert International Airport, and Westchester County (New York) Airport are in the final application process to be privatized.

Rather than entirely privatizing, airports are now relying more on **private-public partnerships**, known as (**P3** or **PPP**), for enhanced management, financing, and capital development efficiencies. Through these partnerships, airports have sought to diversify their sources of capital development funding, including the amount of private sector financing. Traditionally, airports have relied on the airlines and federal grants to finance their operations and development. However, in recent years, airports, especially the larger ones, have sought to decrease their reliance on airlines while increasing revenue from other sources. Nonairline revenue, such as concession receipts, now account for more than 50 percent of the total revenue larger airports receive.

In most other countries, the national government owns and operates airports. However, a growing number of countries, including Canada, Australia, and India, have been implementing strategies, including full privatization, to more extensively involve the private sector as a way to provide capital for development and improve efficiency. These privatization activities range from contracting out services and infrastructure development, in a role similar to private sector activities at U.S. airports, to the sale or lease of nationally owned airports.

For example, Mexico passed legislation in 1995 to lease 58 major airports on a long-term basis. Most countries' privatization efforts do not transfer ownership of airports to