

Chapter 2

ORGANIZATIONS AND INSTITUTIONS

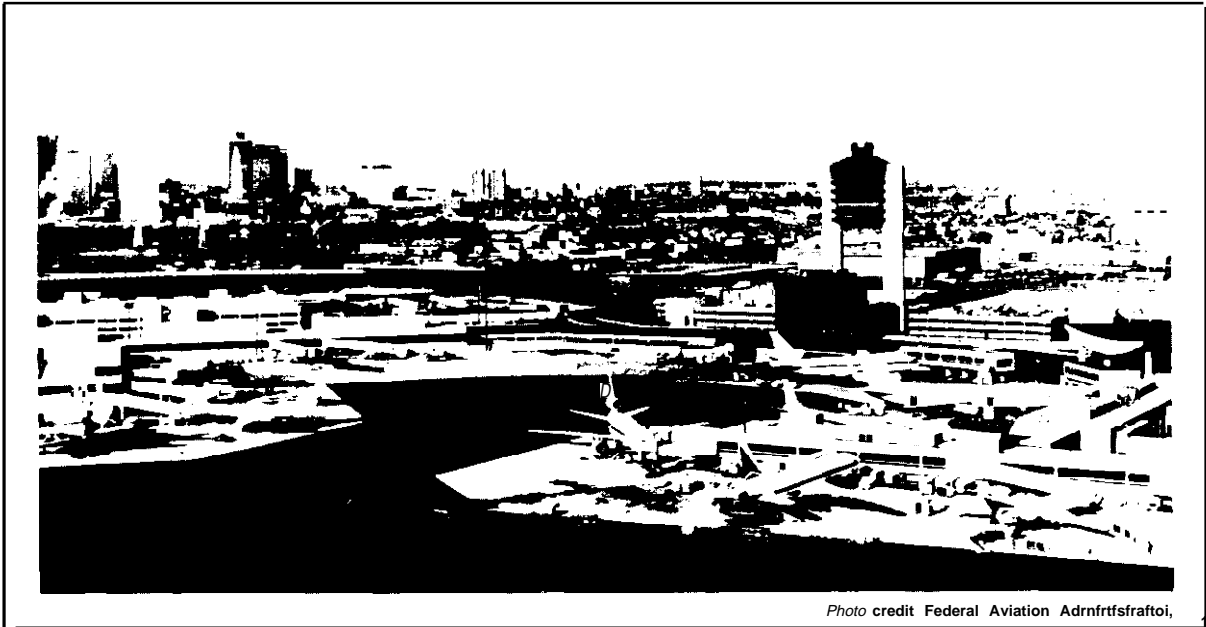


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ORGANIZATIONS AND INSTITUTIONS

A major commercial airport is a huge public enterprise. Some are literally cities in their own right, with their own fire and police departments, road systems, powerplants, hotels, restaurants, and even factories, schools, and churches located on the property. Administration of these facilities is the responsibility of the airport operator, usually a public entity such as a department of city government or a special aviation or port authority. Airports, however, also have a private character in that they must be operated in conjunction with airlines that provide air transportation *service* and with concessionaires and other firms doing business on airport property. This combination of public management and private enterprise distinguishes the operation of commercial airports from that of wholly public or wholly private

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Portions of this chapter are based on work performed by the Congressional Budget Office and published in *financing U.S. Airports in the 1980s*, April 1984.

enterprises. In addition, operation of an airport entails interaction with several other parties: general aviation, the public at large, agencies of local, regional, and State government, the Federal Aviation Administration (FAA), and other agencies of the Federal Government. Each of these parties approaches airport operation and development with a different set of concerns, responsibilities, and expectations.

This chapter surveys common types of airport ownership in the United States and reviews relationships between the airport operator and air carriers, general aviation, concessionaires, and other airport users. The roles of airport users and Federal, State, and regional agencies in airport planning and development are also examined, with special emphasis on the intergovernmental and institutional relations involved in building or expanding airports. The issue of aircraft noise and its effects on airport operation is also addressed.

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 may be owned and run by a city, county, or State, by the Federal Government, or by more than one jurisdiction (e.g., a city and a county). In some instances, however, 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,
- a State government, or
- the Federal Government.

More than half of the Nation's large and medium commercial airports, and a greater percent-

age of small commercial airports, are operated by municipal or county governments (see table 6). 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-run airports are similarly organized. Under this type of public operation, airport investment decisions are generally made in the broader context of city- or countywide public investment needs, budgetary constraints, and development goals. To raise investment capital, these airports usually rely on one of the two major forms of tax-exempt municipal bonding: general obligation bonds, which are backed by the full faith, credit, and taxing power of the issuing government; and revenue bonds, for which debt service is paid entirely out of revenues generated by the airport.^z

^zThese financing mechanisms are discussed further in ch. 7.

Table 6.—Public Operation of Commercial Airports by Size, 1983

Airport operator	Large		Medium		Small ^a	
	Number	Percent	Number	Percent	Number	Percent
Municipality or county	14	58	23	49	N/A	61
Port authority	5	21	6	13	N/A	3
Airport authority	3	13	12	26	N/A	31
State	1	4	5	11	N/A	5
Federal Government	1	4	1	2	N/A	0
Total	24	100	47	100	489	100

NOTE: Details in percent columns may not add because of rounding. N/A = Not available.

^aPercentages reflect data for 172 (35 percent) of 489 existing small commercial airports. There is no evidence to indicate that this is not a representative sample. Data for the remaining 317 small airports were not available.

SOURCE: Congressional Budget Office 1983 survey and data supplied by Airport Operators Council International and American Association of Airport Executives.

Some commercial airports in the United States are run by port authorities—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. Multipurpose port authorities run about 21 percent of the large commercial airports and 13 percent of the medium-size airports. In managing the properties under their jurisdiction, port authorities have extensive independence from 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 may include fees and charges from marine terminals and airports as well as proceeds (e.g., 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.

About one-eighth of all large, and one-fourth of medium-size commercial airports are operated by airport or aviation authorities. 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.

State-run airports are typically managed by the State's department of transportation. Either gen-

eral obligation or revenue bonding may be used to raise investment capital, and State taxes on aviation fuel may be applied to capital improvement projects. Although several States run their own commercial airports, only a handful of large and medium-size commercial airports are operated in this way—those in Alaska, Connecticut, Hawaii, and Maryland.

The Federal Government owns and operates two commercial airports serving the District of Columbia and environs—Washington National and Dunes International. FAA manages these two facilities, with capital development financed through congressional appropriations and project costs recouped by airport landing fees and terminal charges. The Federal Government also levies user taxes and disburses funds for the capital development of other airports through FAA's Airport Improvement Program, as discussed later in this chapter.

Publicly owned general aviation airports may be owned by a municipality, county, or State, or they may be the property of one or more of these jurisdictions but run by a separate public body as part of a multiairport system. Over 40 percent of all general aviation airports open to the public are privately owned. Most publicly owned general aviation airports (219 FAA-designated relievers and 2,424 other general aviation airports) are managed either by public operators—municipalities, counties, States, or independent authorities—or by private operators who charge for their services and remit a portion of their revenues to the airport owners. Reliever airports often are run as part of local or regional multiairport systems.

Airport-Air Carrier Relations

From the airlines' perspective, each airport is a node in a route system, a point for the pickup and transfer of passengers and freight. In order to operate efficiently, air carriers need certain facilities at each airport. These requirements, however, are not static; they change with traffic demand, economic conditions, and the competitive climate. Before airline deregulation in 1978, response to changes of this sort was slow and mediated by the regulatory process. Carriers had to apply to the Civil Aeronautics Board (CAB) for permission to add or to drop routes or to change fares. CAB deliberations involved published notices, comments from opposing parties, and sometimes hearings. Deliberations could take months, even years, and all members of the airline-airport community were aware of a carrier's intention to make a change long before the CAB gave permission. Since the Airline Deregulation Act of 1978, however, air carriers can change their routes without permission and on very short notice. With these route changes, airline requirements at airports can change with equal rapidity.

In contrast to airlines, which operate over a route system connecting many cities, airport operators must focus on accommodating the interests of a number of users at a single location. Changes in the way individual airlines operate may put

pressures on the airport's resources, requiring major capital expenditures or making obsolete a facility already constructed. Further, because airports are multimodal hubs, airport operators must accommodate many users and tenants other than the airlines and must be concerned with efficient use of terminal and landside facilities that are of little concern to the carriers, even though carriers' activities can severely affect (or be affected by) them.

Despite their different perspectives, air carriers and the airport management have a common interest in making the airport a stable and successful economic enterprise. Traditionally, airports and carriers have formalized their relationship through use agreements that establish the conditions and methods for setting fees and charges associated with use of the airport by air carriers. Most agreements also include formulas for adjusting those fees from year to year. The terms of a use agreement can vary widely, from short-term monthly or yearly arrangements to long-term leases of 25 years or more. Within the context of these use agreements, carriers negotiate with the airport to get the specific airport resources they need for day-to-day operations. For example, under the basic use agreement, the carrier may conduct subsidiary negotiations for the lease of terminal space for offices, passenger lounges, ticket counters, and other necessities.

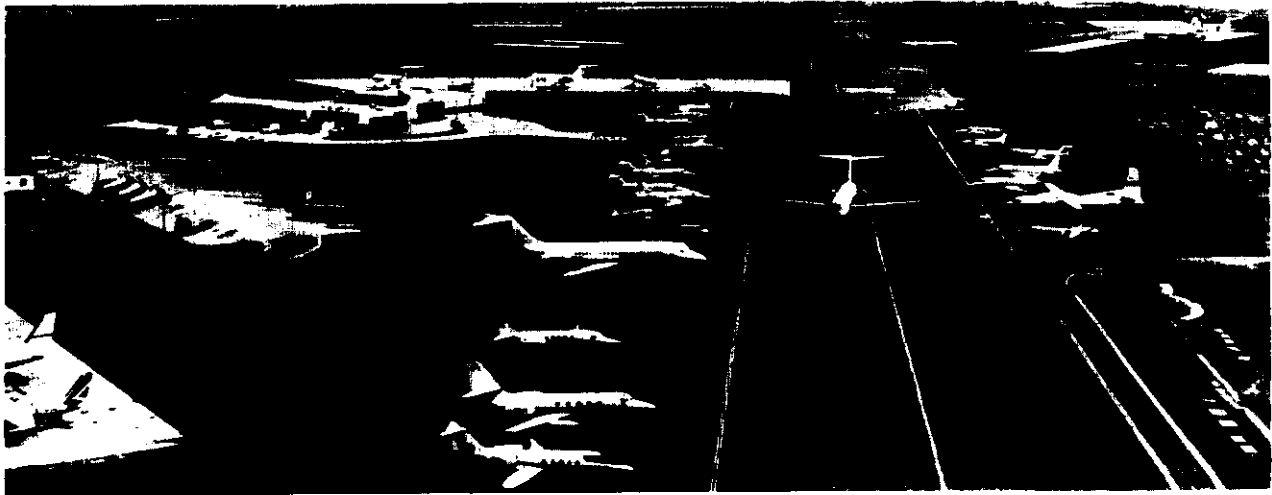


Photo credit" Federal Aviation Administration/on

Convergence and competition for airport access

Long-term agreements between airports and major airlines have traditionally been the rule. One reason is the long-lived nature of the investments involved. A runway may have an economic life of a decade or more, a terminal even longer. When an airport undertakes such an improvement for the benefit of the airlines, the airport may want long-term leases to help ensure that carriers will continue to use the facility and help pay for it. At some airports the use agreements and leases may hold all signatory carriers jointly and severally responsible for payments; at others airlines may be individually responsible for improvements made for their benefit.

As described in chapter 7, which deals with airport financing, revenue bond buyers lend money to the airport to construct a facility, and the airport authority applies the revenues from operation of the facility to repaying the principal and interest. To reduce the risk to bond buyers, and thus lower the interest rate, air carriers may agree to guarantee the airport sufficient revenue to pay the debt. For example, the use agreement may give the airport the right to charge landing fees to generate sufficient funds to cover operating costs and debt service.

In the past, investors perceived the major airlines, who operated as virtual regulated monopolies with clearly defined markets, as stronger firms and better credit risks than individual airports. In recent years, the perception of airlines as stable and the airports as risky has begun to change. Since deregulation, airlines are no longer under an obligation to serve a particular city, nor are they protected from competition by other carriers. They are free to compete, to change their routes, and to go out of business. On the other hand, certain airports have demonstrated that they are creditworthy and have strong travel markets. Regardless of what happens to an individual airline, these strong airports will continue to be served. In these locations, long-term agreements with individual carriers have become less important for airports seeking financing than the underlying economic strength of the community.

Due to the frequent route changes since deregulation, short-term use agreements and leases are becoming more common. Although the cost to

the carrier of a short-term lease may be higher, it has the advantage of allowing greater flexibility for both the carrier and the airport. A carrier testing a new market may not be able or willing to enter a long-term agreement or to assume responsibility for capital improvements until it is sure that the market will be profitable. At the same time, an airport may not want to enter into a long-term agreement with a new carrier that has not yet established a reputation for reliability. At some airports, several different kinds of use agreements may be in effect simultaneously.

In exchange for guaranteeing sufficient revenues to service long-term debt, airlines have traditionally assumed some control of, or at least major participation in, important decisions affecting airport operation and capital improvement, especially the latter. In many cases, airports are bound by "majority-in-interest" clauses in their lease agreements whereby they are contractually required to consult with the carriers on major capital improvements and must abide by decisions of the majority of the carriers with whom they have long-term agreements. The recent report of the Airport Access Task Force, chaired by CAB Chairman Dan McKinnon, raised the question of whether majority-in-interest clauses are anticompetitive since they might be used by incumbent carriers to veto airport operator's plans to build facilities for new entrants.³

As with major airport planning decisions, negotiations related to the day-to-day needs of the carriers have traditionally been carried out between the airport management and a negotiating committee, called a "top committee," made up of representatives of the scheduled airlines that are signatories to use agreements with the airport. Top committees have been an effective means of bringing the collective influence of the airlines to bear on airport management.

The nature of negotiations at some airports has changed radically since deregulation. Under reg-

³Report and Recommendations of the Airport Access Task Force, " March 1983, p. 59. The Task Force was directed by Congress, in the Airport and Airway Improvement Act of 1982, to take a comprehensive look at airport access problems. Members included leaders from all segments of the aviation industry.

ulation, the major carriers—though competitors—had reasonably similar interests and needs. They did not really compete on the basis of price, and the regulatory process guaranteed that no member of the community could surprise the others with sudden changes in operating strategy. The carriers' representatives were a small group of people who sat on the same side of the negotiating table at many different airports. Carriers generally worked with one another in an atmosphere of cooperation and presented a common position in negotiating with the management of an individual airport.

Since deregulation, however, the environment has been characterized by competition rather than cooperation. Carriers may radically alter their routes, service levels, or prices on very short notice. They are reluctant to share information about their plans for fear of giving an advantage to a competitor. These factors make group negotiations more difficult. Some airport proprietors have complained that, in this competitive atmosphere, carriers no longer give adequate advance warning of changes that might directly affect the operation of the airport. Nevertheless, negotiating committees continue to operate, principally because it is essential that there be some mechanism for communication between air carriers and airport management. The CAB Task Force noted that negotiating committees still exert great influence on all aspects of airport operation.⁴

The days when most major airports are dominated by a few large airlines with long-term agreements may be passing away. One reason is the proliferation of air carriers since deregulation. The wide variation in aircraft size and performance, number of passengers, and markets served means that different classes of carriers require somewhat different facilities. Commuter carriers, with their smaller aircraft, usually do not need the same gate and apron facilities as major carriers. While there were commuters before deregulation, they are coming to constitute a larger fraction of users at many airports. Other new entrants, including "no frills" carriers, may also have different needs from those of conventional air carriers—for example,

they may want more frequent gate access, but less baggage handling. These minority carriers may come to wield more power in negotiating with the airport for what they need and may challenge major carriers for a voice in investment decisions at an airport,

Not all aviation experts agree with this analysis, at least as an indication of long-term trends. They point out that half of the top 35 hub airports owe a majority of their traffic to no more than two airlines—a near monopoly dominance that is increasing since deregulation. This leads them to foresee that the ultimate effect of deregulation will be more, not less, concentration of the airline industry—major carriers and commuters alike. As the weaker competitors drop out or are absorbed by the stronger, the remaining airlines may exercise even greater dominance of certain large or medium-size airports that serve as home base or principal hubs.

Airport-Concessionaire Relations

Services such as restaurants, book stores, gift shops, parking facilities, car rental companies, and hotels are often operated under concession agreements or management contracts with the airport. These agreements vary greatly; but in the typical concession agreement, the airport extends to a firm the privilege of conducting business on airport property in exchange for payment of a minimum annual fee or a percentage of the revenues, whichever is greater. Some airports prefer to retain a larger share of revenues for themselves and employ an alternative arrangement called a management contract, under which a firm is hired to operate a particular service on behalf of the airport. The gross revenues are collected by the airport management, which pays the firm for operating expenses plus either a flat management fee or a percentage of revenues.

Revenues from concessions are very important to an airport. At some, concessionaires and their customers yield more revenue to the airport than airline fees and leases, resulting—in effect—in cross-subsidy of air carriers by nonaviation service concessions.

Parking and automobile rentals are typically large and important concessions at airports. De-

⁴*Ibid.*, p. 61.

spite growth in the use of buses and other high-occupancy vehicles, the continued importance of parking and car rental revenues is indicative of the symbiotic relationship between the airport and the automobile. An analysis of revenue sources at seven major airports found that public parking facilities were the largest nonairline source of revenues and that car rental revenues were the second largest. At two of these airports, the airport operator's share of parking and car rental fees (after concession or management fees were paid) constituted a larger revenue source than air carrier landing fees.⁵ At many locations, the park-

⁵Peat, Marwick, Mitchell & Co., "Comparative Rate Analysis, Dade County Aviation and Seaport Departments," August 1982.



red

ing and car rental firms operating on the airport are complemented by (or are in competition with) similar services operating off the airport property.

Another important type of concessionaire is the fixed base operator (FBO), who provides services for airport users lacking facilities of their own, primarily general aviation. Typically, the FBO sells fuel and operates facilities for aircraft service, repair, and maintenance. The FBO may also handle the leasing of hangars and rental of short-term aircraft parking facilities. Agreements between airports and FBOs vary. In some cases the FBO constructs and develops his own facilities on airport property; in other cases the FBO manages facilities belonging to the airport. FBOs also provide service to some commuter and startup carriers, especially those that have just entered a particular market and have not yet established (or have chosen not to set up) their own ground operations. The presence of an FBO capable of servicing small transport aircraft can sometimes be instrumental in a new carrier's decision to serve a particular airport.

In addition to concessionaires, some airport authorities serve as landlord to other tenants such as industrial parks, freight forwarders, and warehouses, all of which can provide significant revenue. These firms may lease space from the airport operator, or they may build their own facilities on the airport property.

Airport-General Aviation Relations

The relationship between airport operators and general aviation is seldom governed by the complex of use agreements and leases that characterize relationships with air carriers or concessionaires.

General aviation (GA) is a diverse group. At any given airport, the GA aircraft will be owned and operated by a variety of individuals and organizations for a number of personal, business, or instructional purposes. Because of the variety of ownership and the diversity of aircraft type and use, long-term agreements between the airport and GA users are not customary. GA users often lease airport facilities, especially storage space such as hangars and tie-downs, but the relationship is usually that of landlord and tenant. There are instances where owners and operators of GA

aircraft assume direct responsibility for capital development of an airport, but this is not common, even at airports where general aviation is a majority user.

It must be remembered that while GA activities make up about half of the aircraft operations at FAA towered airports, the average utilization of each aircraft is much lower than that of commercial aircraft. There are approximately 210,000 GA aircraft, compared to about 4,000 commercial aircraft. Most GA aircraft spend most of the time parked on the ground. Only a small number, usually those operated by large corporations as a sort of private airline for employees and high value goods, are used as intensively as commercial aircraft.

Thus, at the airport, the chief needs of GA are parking and storage space, along with facilities for fuel, maintenance, and repair. While an airliner may occupy a gate for an hour to load passengers and fuel, a GA user may need to park an aircraft for a day or a week while the passenger

conducts business in town. At the user's home base, long-term storage facilities are needed, and the aircraft owner may own or lease a hangar or tie-down spot. In most parts of the country, the chief airport capacity problem for GA is a shortage of parking and storage space at popular airports. At some airports in the Southwest and in California waiting lists for GA parking spaces are several years long.

Some airport operators deal directly with their general aviation customers. The airport management may operate a GA terminal, collect landing fees, and lease tie-downs or hangars to users. At some airports condominium hangars are available for sale to individual users. It is not uncommon for corporations with aircraft fleets to own hangar space at their base airport. Often, however, at least some of this responsibility is delegated to the FBO, who thus stands as a proxy for the airport operator in negotiating with the individual aircraft owners for use of airport facilities and collecting fees.

PLANNING AND DEVELOPMENT RESPONSIBILITIES

The airport operator is principally responsible for planning and development of airport improvements, but as in the case of daily operating decisions, that responsibility is shared with many other parties. The airlines and other users, concessionaires, FAA, the regional planning authority, and the surrounding communities may all have an influence on planning decisions and subsequent development.

Airport Users

The users with the strongest voice in airport planning decisions, especially at large operational hubs, are the air carriers, who negotiate individually and collectively for short- and long-term improvements that they believe will facilitate their use of the airport. Because carriers often underwrite the bonds to pay for capital improvements, they have great influence, and their support is crucial.

At airports where one or two carriers account for the majority of operations, decisions about air-

port development are sometimes dominated by the needs and interests of those carriers. For example, there can be little doubt that Atlanta Hartsfield was designed to serve the route structures of Delta and Eastern Airlines—hub-and-spoke systems with a high volume of transfer passengers. On the other hand, the design of Dallas-Fort Worth was greatly influenced by the type of service Braniff and American Airlines expected to provide there—long-haul origin-destination service, with little need for transfers within the airport. This design has been the source of landside congestion in recent years as carriers have made greater use of hub-and-spoke route structures that require passengers to change planes. Major improvements are being undertaken at the airport to enlarge passenger waiting areas and improve internal traffic circulation.

Some “minority” carriers, even though they are signatories to the long-term agreements, may not have strong negotiating positions. For example, most airports are dominated by passenger carriers, even though revenues from cargo carriers may

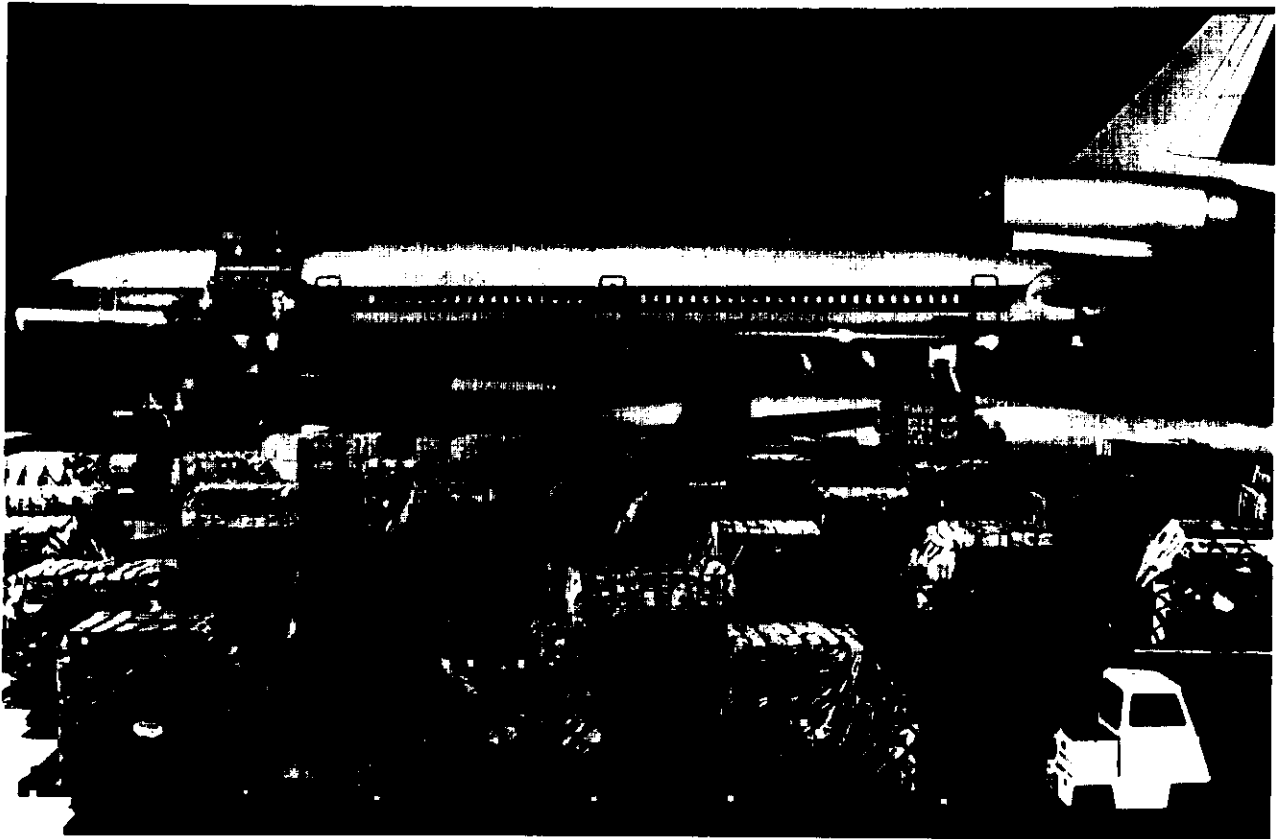


Photo credit: McDonnell/ Douglas

Air cargo moves mainly at night

make a significant contribution to the airport budget. Air cargo carriers have different facility needs, e.g., they need ramp space and room for sorting cargo rather than gate space and terminal lounges. In some cases, cargo carriers have been unable to interest the majority of carriers in underwriting airport bonds to build cargo facilities, and they have been forced to undertake development projects on their own, even though they are also paying landing fees that are used to underwrite development of passenger facilities.

General aviation, because of its disaggregate nature, is another group that often has little to say in the airport planning process. However, aviation interest groups, trade associations, and fixed base operators may sometimes help to present the position of GA users to the airport operator.

Federal Government

The Federal Government is a major participant in airport planning and development. FAA administers Federal grants to airports for planning and for capital improvements. Since 1970, these funds have come from the user-supported Airport and Airway Trust Fund. In 1983, planning grant funds authorized under the Airport Improvement Program amounted to about \$8.8 million, and capital development grants to almost \$800 million.^b

Federal funds may be spent only for certain classes of projects. In general, eligible projects are those for construction or improvement of facilities directly related to the use of aircraft—i.e., runways, taxiways, and ramps. In recent years,

^b*Second Annual Report of Accomplishments Under the Airport Improvement Program, Fiscal Year 1982* (Washington, DC: Federal Aviation Administration, May 1984).

eligibility has also been extended to include common-use areas of passenger terminals and other airport buildings related to the safety of persons or the provision of services to airport users. Federal funds cannot be used for the construction of revenue-producing facilities such as hangars and automobile parking areas or for building access roads off the airport property.⁷

It has been suggested that the availability of Federal funds at a favorable matching ratio has encouraged airports to concentrate on those types of improvements which are eligible for Federal aid. The Federal share for eligible improvements ranges from 70 to 90 percent depending on type of project; but since airports make many improvements without Federal aid, the Federal share of all capital investment at airports constitutes less than 40 percent.⁸ This percentage is even less at large airports, where Federal monies often make up less than 10 percent of the capital improvement budget. However, many operators of large airports believe that Federal funding is important for financing improvements that they feel are needed, but which the air carriers are reluctant to pay for.

FAA also influences airport operational decisions because it owns and operates the air traffic control system, including the air traffic control tower, navigational equipment, and landing aids at the airport itself. Airport improvements which require installing, moving, or upgrading this equipment have to be approved and carried out by FAA. Safety and operational standards for airports are also established by FAA. Airport facilities built with Federal funds must be designed in accordance with these standards, which are published in the Federal Aviation Regulations or in FAA Advisory Circulars, manuals, and handbooks.

Finally, FAA does airport system planning. The National Airport System Plan (NASP), a 10-year plan which was published in 1977 and updated in 1980, includes those airports that meet FAA's criteria of "national importance." In 1982 there were 3,203 such airports. The NASP is not a compilation of individual airport development plans.

⁷14 CFR 151.

⁸*Public Works Infrastructure: Policy Considerations for the 1980s* (Washington, DC: Congressional Budget Office, April 1983), p. 106.

Rather, it is a summary of projected improvements for each airport eligible for Federal aid, prepared by FAA based on information provided by individual airports, state agencies, and FAA regional offices.

State Aviation Agencies

Forty-seven States have aviation agencies. Most are within State departments of transportation, although eight are independent agencies or commissions. State authority and activity vary widely. All the States with aviation agencies provide some State financial assistance to airports. In most cases this aid is primarily for capital improvements, although a few States make funds available for high-cost operations and maintenance items such as snow removal equipment.⁹ In addition, many State agencies provide some technical and planning assistance, particularly to smaller airports. Some States carry out ongoing planning programs for a statewide airport system, complete with year-by-year scheduling for improvements at individual airports. In many cases, States also install and maintain navigation equipment and landing aids.

Some State governments have planning and development responsibilities as owners and operators of airports. Baltimore-Washington International is owned by the State of Maryland, for example, and Honolulu International is owned by the State of Hawaii. In general, however, most of the State-owned airports are general aviation rather than commercial service airports.

States provide much less airport development money than either the Federal Government or the local airport operators. As shown in table 7, State spending in 1982 for airport construction and improvement projects totaled \$276 million. This averages \$5.5 million per State, but the actual distribution is highly skewed. Table 7 shows that 25 States spent less than \$1 million each; 12 States spent between \$1 million and \$5 million, and 5 spent between \$5 million and \$10 million. Five States—Alaska, Connecticut, Hawaii, Illinois, and New York—spent **over \$10 million** for air-

⁹National Association of State Aviation officials, *DataBank 1983* (Washington, DC: NASAO, 1983), p. 2.

Table 7.-State Funding of Airport and Aviation Programs

State and year(s)	State-owned airports		Other airports		Landing & Navaidst	Other airport expenditures	Total	Airport planning
	Construction improvement	Operations maintenance	Construction improvement	Operations maintenance				
AL-IW82	\$ 200,750	—	402,721	—	—	—	603,471	—
AK-FY82	60,355,700	—	—	—	—	—	60,355,700	1,255,200
AZ-FY83	57,752	311,838	2,455,248	—	—	20,000 ^a	2,844,838	60,000
AR-FY82	—	—	750,000	—	50,000	—	800,000	—
CA-FY82	—	—	2,200,000	1,000,000	—	1,000,000 ^b	4,200,000	—
CT-FY82 ^c	100,700,000	500,000	780,000	—	—	—	101,980,000	100,000
DE-BI82/83	—	—	300,000	—	25,000	—	325,000	—
FL-FY82	—	—	5,030,500	—	—	—	5,030,000	250,000
GA-FY82	—	—	700,000	1,000,000	300,000	—	2,000,000	20,000
HI-FY82	15,581,268	77,313,810	—	—	—	—	92,895,078	160,289
ID-FY82	50,000	50,000	454,000	—	30,000	40,000 ^d	624,000	—
IL-FY83	—	—	10,269,229	—	9,000	—	10,278,229	31,000
IN-BI81/82	—	—	1,757,445	—	—	—	1,757,445	—
IA-FY82	—	—	635,600	—	60,000	25,000 ^e	720,600	—
KS-FY82	—	—	—	—	—	—	0	9,444
KY-FY82	—	—	610,000	—	100,900	—	710,900	—
LA-FY82	156,729	32,000	3,102,549	—	196,000	—	3,487,278	180,000
ME-BI82/83	303,434	344,000	799,539	—	27,000	324,000 ^f	1,797,973	18,237
MD-FY82	3,008,291	19,684,127	375,000	—	26,618	120,484 ^g	23,214,520	102,876
MA-FY82	—	—	225,549	—	22,000	—	247,549	18,522
MI-FY82	—	—	1,874,000	—	600,000	60,000 ^h	2,534,000	145,000
MN-FY82	5,9&l	—	3,983,500	1,117,200	598,000	299,000 ⁱ	6,003,600	—
MS-FY83	—	—	70,000	—	—	—	70,000	10,000
MO-FY82	—	—	327,973	228,471	—	—	556,444	—
MT-FY82	20,000	10,000	220,000	—	44,000	—	294,000	26,000
NB-FY82	134,531	223,760	424,031	—	266,292	—	1,048,614	7,757
NV-FY82	—	—	—	—	—	—	0	—
NH-BI82/83	131,607	27,000	—	18,000	35,000	—	211,607	30,000
NJ-FY82	—	—	—	—	—	—	0	—
NM-BI82/83	—	—	889,500	—	—	—	889,500	—
NY-FY83	—	—	27,700,000 ^d	—	—	—	27,700,000	33,000
NC-BI82/83	20,000	—	7,275,967	—	75,000	200,000 ^k	7,570,967	(191 ,000) ^t
ND-CY82	250,000	25,000	1,479,000	—	20,000	—	1,774,000	25,000
OH-FY82	—	—	550,000	—	—	—	550,000	—
OK-FY82	115,000	—	500,000	—	—	—	615,000	—
OR-BI82/83	255,800	407,728	150,000	—	—	—	813,528	—
PA-FY82	90,000	3,981,983	1,365,000	—	—	—	5,436,983	68,338
RI-BI81/82	2,657,255	49,937	—	—	59,221	197,283 ^l	2,963,696	225,000
SC-FY82	—	—	1,133,215	885,004	22,749	—	2,040,968	124,020
SD-CY82	—	—	143,182	—	30,466	—	173,648	—
TN-FY82	—	5 , G	1,600,000	100,000	60,000	—	1,785,000	13,000
TX-FY83	—	—	2,500,000	—	—	—	2,500,000	—
UT-FY82	—	10,000	230,000	—	2,000,06	—	2,240,000	45,000
VT-FY82	538,199	366,000	8,300	—	12,200	—	924,699	15,500
VA-FY82	—	22,500	428,000	72,600	37,000	—	560,100	51,700
WA-BI82/83	—	40,647	784,745	—	—	—	825,392	—
WV-FY82	—	—	330,951	—	—	—	330,951	—
WI-FY82	—	—	982,900	—	25,000	220,050 ^m	1,227,950	(64,20;t
WY-FY83	—	—	5,505,137	—	—	—	5,505,137	—
Totals:	\$164,632,216	103,405,330	91,302,781	4,421,275	4,751,446	2,505,817	391,018,775	3,017,883

^tSeveral additional States funded planning projects and nav/landing aids—amounts are included in total.

^aAZ—Contingency.

^bCA—Airport loans to local governments.

^cCT—\$100,000 is for special project at Bradley Airport.

^dID—Revolving inventory for navaid/light equipment, etc., for resale to municipally owned airports on State matching fund basis.

^eIA—Air markers.

^fME—Snow removal assistance.

^gMD—Zoning functions in connection with airport noise.

^hMI—Painting marking.

ⁱMN—Revolving Loan Program for aircraft hangar construction.

^jNY—\$21 million of total to be used as State matching funds for terminal area project at Buffalo.

^kNC—\$200,000 for 100 percent State funding for runway marking, tree clearing, and other safety projects.

^lRI—CFR and snow removal equipment; security fencing; environmental assessment reports.

^mWI—\$220,050 expended for land and equipment.

SOURCE: National Association of State Aviation Officials, *DataBank 1983* (Washington, DC: NASAO, 1983), pp. 9-10,

port development; all of these except New York and Illinois used these funds primarily for State-owned airports. The 28 States that made planning assistance funds available in 1982 spent a combined sum of about \$3 million. However, about 40 percent of this amount was spent by Alaska alone.

Total State capital assistance in 1982 for airports not owned by the State totaled \$91 million.¹⁷ Often, these funds provided the State share of federally funded projects. In other cases, State funds were used where Federal grants were not available for a project.

Despite the small amount overall, the State role is a vital one, especially for smaller airports. Few GA airports or small commercial service airports have the in-house staff to make traffic forecasts or to plan facility improvements. In addition, because small airport operators often do not have the technical expertise to complete an application for Federal assistance, State agencies are active in helping them through this process. Most State aviation agencies concentrate their resources on helping small commercial service and GA airports because they have found that large commercial airports can take care of themselves. Indeed, most State aviation agencies do not have the staff and expertise to deal with the details of planning and carrying out projects at major commercial service airports. In the case of major airports, the State role may simply be to keep informed of development activities and perhaps to provide some State matching funds.

State control over the distribution of Federal airport development funds varies widely with State law. In most cases, grants from FAA to airports for federally approved projects completely bypass the State agency. Some States, however, have channeling acts which give them some control over Federal funds. In these cases, projects must have State, as well as Federal, approval before the grant can be awarded to the airport. In some cases, too, State law requires that the State act as agent for Federal grant recipients, so that the State receives the funds and passes them through to the airport.

¹⁷Ibid., pp. 9-10.

Regional Planning Agencies

Many States have created regional planning authorities that combine planning and development functions. Regional planning responsibilities are sometimes assumed by Councils of Governments or similar associations of municipalities in a metropolitan area. Some regional agencies conduct extensive transportation and land use planning in their areas of jurisdiction and may be involved in plans for siting new airports or for expanding existing facilities.

Regional agencies are seldom involved in the actual project execution, but they can have great influence over the availability of funds. In some States, their approval of a master plan or of individual projects is required for the release of State grant funds. Often these same agencies are also responsible for approving the release of Federal funds. Rules for the release of Federal funds for major projects was formerly governed by Office of Management and Budget Circular A-9s, under which regional agencies were required to review major projects to certify that they met Federal guidelines on the use of grant moneys by State and local governments and to ensure that sufficient planning had gone into the project.

This procedure has changed somewhat since the release of Executive Order 12372. Under the new procedure, Federal agencies, such as FAA, are still required to consult and cooperate with State and local governments in the administration of Federal assistance and development programs, but the intent is to give the States more latitude in determining criteria for acceptable projects. Although *Executive Order 12372* places more emphasis on State priorities, the effect is still to require Federal, State, and local agreement before funds are released for major projects. In many cases, the approval power remains in the hands of the same regional planning agencies which handled the A-9s review process.

Other Parties

A commercial airport serves thousands, often millions, of airline passengers. Despite their large number, however, passengers typically have no formal way to voice opinion on the service being offered or to influence future airport plans. How-



Photo credit: Federal Aviation Administration

The wait begins

ever, the passengers' behavior—in terms of the preferred hours of travel and the preferred mode for arriving at the airport—will greatly affect how the airport operates, and passenger behavior is a frequent subject of study by airport planners. Moreover, passengers do have the ability to “vote with their feet” in areas where there is a choice of airports. Passenger preference is often among the reasons that one airport in a region is underutilized. If utilization of the airport is to be increased, the operator or the carriers must improve those features that passengers object to—e.g., inadequate groundside access, infrequent flights, or inconvenient parking.

The actions of concessionaires and off-airport firms offering services on the airport property can greatly affect airport development. Often these firms have little say in the long-range planning decisions. Where airport facilities do not accommodate their needs, improvised solutions may contribute to congestion and delay. For example, the use of high-occupancy vehicles, such as shuttle buses, for airport access and circulation should tend to reduce curbside congestion. However, ground access delays at some airports have actually been worsened by the uncontrolled proliferation of private shuttle bus services offered

by car rental firms, hotels, and others to carry passengers from the terminal to remote locations. In some cases, inviting these firms to participate in an earlier stage of the planning process and designing facilities to match the needs of shuttle buses rather than automobiles might have resulted in better coordination of airport circulation and less curbside congestion.

Nearly all commercial service airports are publicly owned, most by municipal governments. The city government which is also an airport sponsor must balance the economic benefits of the airport against any direct and indirect costs the airport may impose. The city government is responsible for a number of services which are vital to the airport but beyond the control of the airport manager—e.g., highway construction and mass transit access. Elected officials must choose to allocate funds between projects that might benefit the airport and those related to other municipal services such as hospitals, schools, and housing. The airport is seldom the first priority of the city government.

Other local governments may be involved in, or affected by, the airport planning process. Many major airports are surrounded by several municipalities. Some of these communities may be bothered by noise, automobile traffic, or other problems generated by the airport. Other communities may control services necessary to operation of the airport. In addition, the interests of individuals surrounding the airport may be represented not only by local governments but by public interest groups organized around a particular issue. These groups and individuals may be brought into the airport planning process through public hearings and other means, but their effectiveness and degree of participation vary widely as a function of the receptiveness of airport operators and the aggressiveness with which these groups pursue their interests.

CAPITAL IMPROVEMENT

The most obvious solution to the problem of airside delay at a busy airport is to increase capacity through capital improvements—either by building another airport or by expanding the ex-

isting one through construction of new runways, gates, terminals, or whatever is needed. Nearly all the major airports in the United States have gone through at least one period of major capital

improvement, many of them in the late 1960s and early 1970s to accommodate jet aircraft. As a solution to delay problems, however, construction of new airport facilities is not without problems, and airport operators can run into a number of difficulties in attempting major airport construction or expansion.

First of all, an airport is a system of interdependent parts. Major expansion of one part may necessitate expansion of another. For example, adding new runways and increasing the number of airside operations will result in the need for new gates and more terminal waiting areas for passengers, and possibly larger automobile parking areas and access roads with higher capacity. Because of the piecemeal way in which these different types of development may be handled, a bottleneck is often not eliminated, but simply moved to another point.

Another problem often encountered in expansion is the lack of suitable land. Many airports are closely surrounded by urbanized areas, land that would be extremely expensive to acquire. Although most airports were originally located on the edge of metropolitan areas, cities have expanded over the years to surround many of them. Some of this development, especially commercial and industrial uses, was actually drawn to the area by the proximity to air transportation. Residential uses often spring up if land use controls are inadequate. Once communities become established in the vicinity, the airport is often perceived as a poor neighbor—generating noise, traffic congestion, and other annoyances for the surrounding communities. Residents may oppose plans for airport expansion that would increase any of these problems.

This is not to say that expansion of a major airport is impossible. St. Louis Lambert, for instance, greatly increased airside and terminal capacity over a period of 5 years through development of an existing location. Improvements included lengthening existing runways and taxiways, terminal expansion, and construction of new gates. A major factor was the Environs Plan, a program to mitigate noise problems by installing sound insulation in residential buildings and purchasing property to serve as a noise buffer zone.

Chicago O'Hare is beginning a major expansion of terminal facilities, which will include constructing new loading gates and ramp areas and rebuilding parts of the taxiway system. At one time, construction of an additional runway was also considered, but then dropped in later planning stages. Studies indicated that an additional parallel runway would not provide a capacity increase great enough to justify the high cost. Historically, congestion problems at O'Hare have primarily been due to lack of gate space. The new runway would have required land acquisition and relocation of buildings. It would also have generated additional noise and led inevitably to conflicts with airport neighbors.

Expansion is expensive. At St. Louis, the noise abatement program alone (without which the expansion probably would not have been possible) is expected to cost about \$50 million over a 20-year period. The expansion of Chicago O'Hare is expected to cost about \$1 billion. Adding the new runway would have increased the cost by 25 percent.

Building a new airport far enough from populous areas to avoid noise problems and to take advantage of lower land prices is a desirable alternative. Ideally, the new airport site should be large enough to provide both room for growth and extensive buffer zones to protect it from encroaching urban development—a tract of many thousands of acres. The Dallas-Fort Worth airport covers an area of 17,600 acres and has agreements protecting an additional 4,000 acres; but, even there, noise is an issue as incompatible urban development moves closer to the airport.

In many metropolitan areas, a suitable tract of land might be distant from the city center, making ground access a problem. In selecting a distant site, several questions arise. If a new airport is a supplement to, rather than a substitute for, the existing airport, would passengers be willing to travel that far to use it? Would air carriers be willing to serve an airport that might attract fewer passengers than the old airport? That the answer to these questions can sometimes be “no” is demonstrated in the case of Dunes and National airports in Washington, DC.

Because of the increasing public concern about aircraft noise, community reaction against the possible siting of an airport has presented problems even in relatively underpopulated areas. The expansion of Lambert airport was made necessary because of the collapse of plans to build another airport outside of St. Louis. The vigorous opposition by citizen groups and local governments surrounding the proposed new site was a major factor in the decision not to build a new airport. This concern affects not only sites for commercial airports but also for GA and relievers airports.

Difficult as it is to find land for new airports, the task is becoming increasingly imperative in some cities. Many observers are pessimistic about the likelihood of constructing new major airports. The FAA, in the 1981 National Airspace System Plan, states that: "few new air carrier airports are anticipated and most major airports have limited

expansion capability due to physical, environmental, airspace, runway, and/or landside limitations."¹¹ The NASP includes the possibility of beginning construction on but one major new airport within the next 10 years.¹²

Despite this general skepticism, some will undoubtedly have to be built as traffic continues to grow. Some cities (Los Angeles and Atlanta, for instance) have anticipated this need and have set aside land for future airport sites. Most cities, however, have not had the foresight or ability to purchase a large tract of land and to protect it for future aviation use, and now even marginally suitable sites are rapidly being lost to other land uses.

¹¹*National Airspace System Plan* (Washington, DC: Federal Aviation Administration, December 1981).

¹²*National Airport System Plan: Revised Statistics, 1980-1989* (Washington, DC: Federal Aviation Administration, 1980), p. vi.

AIRCRAFT NOISE

Aviation noise is a fact of life at today's airports and a major, perhaps the major, constraint on airport expansion and development. Citizens living around airports have complained that aviation noise is annoying, disturbs sleep, interferes with conversation, and generally detracts from the enjoyable use of property. There is increasing evidence that high exposure to noise has adverse psychological and physiological effects. People repeatedly exposed to loud noises may exhibit high stress levels, nervous tension, and inability to concentrate.

Conflicts between airports and their neighbors have occurred since the early days of aviation, but airport noise became a more serious issue with the introduction of commercial jet aircraft in the 1960's. FAA estimates that the land area affected by aviation noise increased about sevenfold between 1960 and 1970. Even with this increase, the actual number of people affected by aviation noise is relatively small. It has been estimated that 6 million to 7 million people in the United States (under 5 percent of the population) experience significant annoyance due to aviation noise; about 10 percent of these people live in areas of severe

noise impact.¹³ Nevertheless, airport noise has become a major political issue in certain communities.

New aircraft are much quieter than earlier jets, and the noise levels at the busiest large airports have been reduced to the point that community opposition has abated in some instances, Denver, Atlanta, Houston, and Dallas-Fort Worth have been able to secure community agreement to proceed with airport expansion projects, including new runways. Expansion of terminal buildings, which implies an increase in air traffic, has also been accepted in New York and Chicago. On the other hand, noise levels threaten to increase as jet traffic is introduced at secondary airports in some metropolitan areas. Santa Ana (John Wayne) and Westchester County are notable examples of airports where the surrounding communities are pressing for curfews and other airport use restrictions.

Another trend that may intensify the noise issue is continuation of residential encroachment around airports. As more people come to live in

¹³Norman Ahford and Paul H. Wright, *Airport Engineering* (New York: John Wiley & Sons, 1979).



Photo credit: EPA-Documerica, Michael Philip Manheim

Homes under the approach path to Boston Logan

noise impact areas, the opportunities for annoyance increase. Equally important, the public has become more sensitive to the issue, and it has become highly politicized. Airport neighbors have sued airports for mental anguish as well as the reduced property values related to noise exposure. Airport operators have begun to adopt noise abatement and mitigation measures so as to reduce their liability and protect themselves in legal proceedings. The noise issue has been instrumental in slowing or stopping several airport expansion programs.

Federal Responsibilities

FAA's role is defined in a 1968 amendment to the Federal Aviation Act of 1958.¹⁴ The amendment charges the FAA Administrator to "prescribe and amend such rules and regulations as he may find necessary to provide for the control and abatement of aircraft noise and the sonic boom." FAA has worked to alleviate noise by controlling the source—i. e., quieting the aircraft and its engine. Federal Aviation Regulations (FAR) Part 36 establishes noise standards for newly manufactured aircraft engines. Air carriers are replacing noisy aircraft with new ones meeting these standards, so that noncomplying commercial aircraft

will eventually be phased out of the fleet. FAA has controlled sonic boom by prohibiting supersonic operations over land by civil aircraft. Military supersonic flights continue, but in a carefully controlled manner.

FAA has established guidelines for measurement of noise and suggested a procedure for carrying out local noise studies and abatement programs. Because FAA also has the authority and responsibility to control aircraft in flight and to prescribe flight paths, it assists local airport operators in developing noise mitigation procedures to suit their area.

FAA has been reluctant to impose a specific Federal standard for airport noise, as this might expose the Federal Government to liability for damages if the standard were to be exceeded. Current policy is that FAA shares responsibility for noise abatement, but does not bear liability. Recent statements by the FAA Administrator and the Secretary of Transportation have reemphasized that local governments and airport operators must take the lead in reducing airport noise. On the other hand, FAA discourages the proliferation of stringent local rules which may have a constraining effect on airport capacity or on interstate commerce.

Measurement of Noise

There are several methods for measuring aircraft noise and its effect on a community. The level of sound can be measured objectively; but noise—unwanted sound—is a very subjective matter, both because the human ear is more sensitive to some frequencies than others and because the degree of annoyance associated with a noise can be influenced by psychological factors such as the hearer's attitude or the type of activity in which engaged. Techniques have been developed to measure single events measured in units such as dBA (A-weighted sound level in decibels) or EPNdB (Effective Perceived Noise Decibels). These measure the level of noise in objective terms, giving extra weight to those sound frequencies that are most annoying to the human ear.

In some cases, annoyance is due not only to intensity of a single event, but to the cumulative effects of exposure to noise throughout the day.

¹⁴49 L.J. S.C. 1301 et. seq.

Methods to measure this effect objectively include aggregating single event measures to give a cumulative noise profile by means of such techniques as the Noise Exposure Forecast (NEF), the Community Noise Equivalent Level (CNEL), and the Day-Night Average Sound Level (Ldn). FM uses EPNdB to measure single event aircraft noise as part of its aircraft certification process. FAA has established dbA as the single event unit and the Ldn system as the standard measure of cumulative noise exposure to be used by airports in the preparation of noise abatement studies.

FAA has suggested, but not mandated, guidelines for determining land uses that are compatible with a given Ldn level. Ideally, residential uses should be located in areas below 65 Ldn. In the high noise impact areas (Ldn 80 to 85 or more) FAA suggests that parking, transportation facilities, mining and extraction, and similar activities are the most compatible (see table 8).

Noise and Land Use

The problem of aviation noise is intimately connected with the question of land use since one of the most effective insulators against annoying sound is distance. If possible, an airport should be surrounded by a noise buffer area of vacant or forested land, and the private property near the high noise impact area (e.g., under approach and departure paths and near aeronautical surfaces) should be used for activities that are less sensitive to noise—agriculture, highway interchanges, manufacturing, and other activities where a high level of ambient noise does not detract from performance. Unfortunately, many airports are surrounded by buildings devoted to incompatible activities—e.g., residences, schools, and auditoriums.

Zoning and land use planning are responsibilities of local governments. In many cases these governments have been unable or unwilling to provide mutual protection for airports and residential development. Land is a scarce resource in urban areas; and where there is great demand for housing and shopping centers, underutilized land around airports becomes extremely valuable. Even where local governments have enacted zoning ordinances to prevent encroachment, devel-

opers have been able to gain waivers. The tax revenues generated by the higher land uses may seem more important to city governments than the long-range need to protect the airport and the residential areas from one another. In some cases, local governments trying to enforce zoning rules have had them overturned when developers contested them in court.

At least part of the problem is ineffective intergovernmental cooperation. Few airports are located entirely within the borders of the municipality that owns and operates the facility. Surrounding municipalities may have conflicting practices, priorities, and philosophies of government; and each has separate zoning authority. For instance, St. Louis-Lambert Airport is surrounded by 29 municipalities, and Dallas-Fort Worth by 10. A municipality that owns an airport perceives advantages and disadvantages, and it must weigh the economic benefits of the airport against the problems of noise. A municipality that merely borders on an airport may see only disadvantages. Further, because the airport operator has sole liability for damage due to airport noise, some surrounding municipalities have felt little need to enforce zoning rules when complaints will not be directed to them but to the municipality that owns and operates the airport.

Even where sound intergovernmental agreements on zoning have been developed, time can erode them. When Dallas-Fort Worth airport was being planned and built, the surrounding municipalities developed agreements on zoning that were viewed as models of intergovernmental cooperation and coordination. Over the intervening years, there have been changes in local government, in priorities, and in the local economy. There is now encroaching development such that Dallas-Fort Worth now has noise problems, despite its huge 17,600-acre size.

Local Noise Abatement Programs

While aircraft are the source of noise at airports, aircraft operators are not liable for damage caused by noise. The courts have determined that the sole legal liability for aircraft noise rests with the airport operator. The Federal Government, by law and administrative action, has

Table 8.—Land Use Compatibility With Yearly Day-Night Average Sound Levels

Land use	Yearly day-night average sound level (Ldn) in decibels					
	<65	65-70	70-75	75-80	80-85	>85
Residential:						
Residential, other than mobile homes and transient lodgings	Y	N ^a	N ^a	N	N	N
Mobile home parks	Y	N	N	N	N	N
Transient lodgings	Y	N ^a	N ^a	N ^a	N	N
Public use:						
Schools, hospitals and nursing homes	Y	25	30	N	N	N
Churches, auditoriums, and concert halls	Y	25	30	N	N	N
Governmental services	Y	Y	25	30	N	N
Transportation	Y	Y	Y ^p	Y ^c	Y ^d	Y ^d
Parking	Y	Y	Y ^p	Y ^c	Y ^d	N
Commercial use:						
Offices, business and professional	Y	Y	25	30	N	N
Wholesale and retail—building materials, hardware and farm equipment,	Y	Y	Y ^p	Y ^c	Y ^d	N
Retail trade—general	Y	Y	25	30	N	N
Utilities	Y	Y	Y ^b	Y ^c	Y ^d	N
Communication	Y	Y	25	30	N	N
Manufacturing and production:						
Manufacturing, general	Y	Y	Y ^p	Y ^c	Y ^d	N
Photographic and optical	Y	Y	25	30	N	N
Agriculture (except Livestock) and forestry	Y	Y ^f	Y ^l	Y ^c	Y ^h	Y ^h
Livestock farming and breeding	Y	Y ⁱ	Y ⁻	N	N	N
Mining and fishing, resource production and extraction	Y	Y	Y	Y	Y	Y
Recreational:						
Outdoor sports arenas and spectator sports	Y	Y ^e	Y ^e	N	N	N
Outdoor music shells, amphitheaters	Y	N	N	N	N	N
Nature exhibits and zoos	Y	Y	N	N	N	N
Amusements, parks, resorts and camps	Y	Y	Y	N	N	N
Golf courses, riding stables and water recreation	Y	Y	25	30	N	N

NOTES: The designations contained in this table do not constitute a Federal determination that any use of land covered by the program is acceptable or unacceptable under Federal, State, or local law. The responsibility for determining the acceptable and permissible land uses remains with the local authorities. FAA determinations under Part 150 are not intended to substitute federally determined land uses for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving noise compatible land uses.

KEY: SLUCM—Standard Land Use Coding Manual.

Y (Yes)—Land use and related structures compatible without restrictions.

N (No)—Land use and related structures are not compatible and should be prohibited.

NLR—Noise Level Reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure. 25, 30, or 35—Land use and related structure generally compatible; measures to achieve NLR of 25, 30, or 35 must be incorporated into design and construction of structure.

¹Where the community determines that residential uses must be allowed, measures to achieve outdoor to indoor Noise Level Reduction (NLR) of at least 25 dB and 30 dB should be incorporated into building codes and be considered in individual approvals. Normal construction can be expected to provide a NLR of 20 dB; thus, the reduction requirements are often stated as 5, 10 or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year round. However, the use of NLR criteria will not eliminate outdoor noise problems.

²Measures to achieve NLR of 25 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas or where the normal noise level is low.

³Measures to achieve NLR of 30 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas or where the normal noise level is low.

⁴Measures to achieve NLR of 35 must be incorporated into the design and construction of portions of these buildings where the public is received, offices areas, noise-sensitive areas or where the normal noise level is low.

⁵Land use compatible provided special sound reinforcement systems are installed.

⁶Residential buildings require an NLR of 25.

⁷Residential buildings require an NLR of 30.

⁸Residential buildings not permitted.

SOURCE: Adapted from 14 CFR Part 150, Airport Noise Compatibility Planning.

preempted control of aircraft in flight. Because the Federal Government is immune from suit (without its consent) and because the aircraft operate under Federal regulation, litigants with complaints about aircraft noise have no recourse but to the airport operator. Courts have consistently

held that the airport proprietor has the authority to control the location, orientation, and size of the airport and from that authority flows the liability for the consequences of its operation, including the responsibility to protect citizens from residual noise. Litigants have used various ap-

preaches in suing airports and have collected damages on the grounds of trespass, nuisance, and inverse condemnation.

Balancing their extensive exposure to liability claims, airport operators have some authority—albeit limited—to control the use of their airports in order to reduce noise. Basically, any restriction of operations at the airport must be non-discriminatory. Further, no airport may impose a restriction that unduly burdens interstate commerce. The definition of “undue burden” is not precise, and restrictions at individual airports must be reviewed on a case-by-case basis. Restriction



Photo credit: Oorn McGr8th, Jr.

Noise contour map

tions must be meaningful and reasonable—i.e., a restriction adopted to reduce noise should actually have the effect of reducing noise. Finally, local restrictions must not interfere with safety or the Federal prerogative to control aircraft in the navigable airspace.

Under FAR Part 150, airport operators can undertake noise compatibility studies to determine the extent and nature of the noise problem at a given airport. They can develop noise exposure maps indicating the contours within which noise exposure is greater than a permissible level. They can identify the noncompatible land uses within those contours and develop a plan for mitigating present problems and preventing future ones. Unfortunately, the airport operator’s ability to prevent future problems is usually very limited. Unless the airport actually owns the land in question, the authority to make sure it is reserved for a compatible use is usually in the hands of a municipal zoning commission.

Many of these noise abatement programs allowed under current legislation are eligible for Federal aid. They include:

- takeoff and landing procedures to abate noise and preferential runway use to avoid noise-sensitive areas (which must be developed in cooperation with and approved by FAA);
- construction of sound barriers and sound-proofing of buildings;
- acquisition of land and interests therein, such as easements, air rights, and development rights to ensure uses compatible with airport operation;
- complete or partial curfews;
- denial of airport use to aircraft types or classes not meeting Federal noise standards;
- capacity limitations based on the relative noisiness of different types of aircraft; and
- differential landing fees based on FAA-certificated noise levels or on time of arrival and departure.¹⁸

¹⁸Adapted from J. E. Wesler, “Federal Policies Affecting Airport Noise Compatibility Programs,” prepared for American Institute of Aeronautics and Astronautics, International Air Transportation Conference, Atlantic City, NJ, May 1981.

FAA provides assistance to airport operators and air carriers in establishing or modifying flight paths to avoid noise-sensitive areas. In some cases, aircraft can be directed to use only certain runways, to stay above minimum altitudes, or to approach and depart over lakes, bays, rivers, or industrial areas rather than residential areas. Procedures may be developed to scatter the noise over several communities through some "equitable" rotation program. These noise-abatement procedures can have a negative effect on airport capacity. They may require circuitous routing of aircraft or use of a runway configuration that is less than optimum with respect to capacity.

Restrictions on airport access or on the number of operations have an even more deleterious effect on airport capacity. One form of restriction is the night curfew, which effectively shuts down the airport during certain hours. Only a few airports have officially instituted curfews. One such is Washington National Airport, which has a curfew based on FAA-certificated noise standards. Aircraft with noise ratings over 72 dbA on

takeoff or 85 dbA on approach may not use the airport between 10:00 p.m. and 7:00 a.m. This eliminates nearly all jet operations. Some other airports have reached informal agreements with carriers to refrain from operations after a certain hour, and some, like Cleveland, impose a curfew by not supplying jet fuel at night.

Air carriers are concerned about the spread of curfews as a noise abatement tool because they can play havoc with airline scheduling and reduce the capacity of the entire national airport system. Imposition of curfews at even two or three major airports on the east and west coast could reduce the "scheduling window" for transcontinental flights to only 4 or 5 hours daily (see fig. 3) and would also affect flights within each region. Curfews are especially threatening to air cargo operators, whose business is typically conducted at night. Some see widespread imposition of curfews as a burden on interstate commerce, and hence unconstitutional.

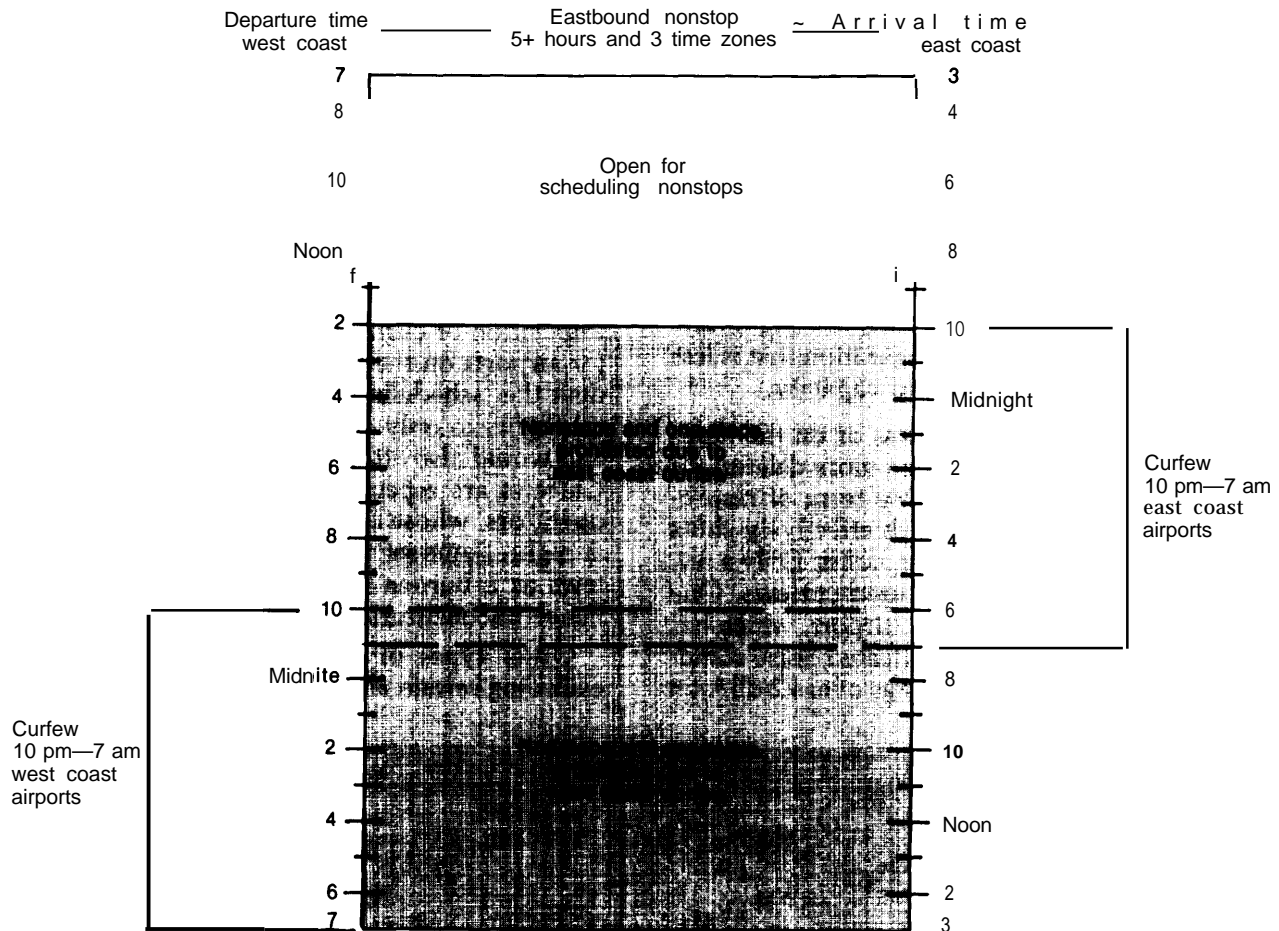
Other types of airport access restrictions—excluding certain aircraft types, instituting special



Photo credit: Dorn McGrath, Jr

Land bought and cleared of houses at Playa del Rey, west of Los Angeles

Figure 3.—Effects of Curfews on Scheduling Transcontinental Service



SOURCE: Peter D. Connolly, "Airport Access and Preservation of the National Airport System: Final Obstacles to a Free Marketplace," prepared for Federal Aviation Administration, *The Law of Aviation Symposium*, Dec. 1, 1981.

fees for noncomplying aircraft, or establishing hourly limits based on a "noise budget"—are subject to the legal tests of nondiscrimination and reasonableness. For example, the ban on jet aircraft instituted at Santa Monica airport was struck down by the court in 1979 because many new-technology jet aircraft that would have been banned by such a rule are quieter than the propeller-driven aircraft that would have been allowed to operate. A later ordinance by the city, banning operations by aircraft with a single-event noise rating of 76 dBA, was upheld. The court rejected the argument that enforcement of a local

standard violates Federal preemption.¹⁶ On the other hand, a Federal court struck down in 1983 the curfew-quota system in effect at Westchester County airport in New York. Under that system, an average of only six aircraft with noise ratings above 76 dBA were permitted to land between the hours of midnight and 6:30 a.m.

¹⁶Peter D. Connolly, "Airport Access and Preservation of the National Airport System: Final Obstacles to a Free Marketplace," prepared for the Federal Aviation Administration Law of Aviation Symposium, Dec. 1-2, 1981.

Both air carriers and airframe manufacturers have objected to the proliferation of local noise standards and noise-based quota systems. Boeing¹⁷ for example, has pointed out that airlines are already in the process of replacing or reengining their noisier aircraft in response to FAA regulations. This replacement will require a large capital outlay on the part of carriers—capital that will have to be generated largely by continued operation of the aircraft they already have. If airports adopt local noise standards more stringent than FAA's, carriers will have to accelerate their fleet replacement programs in order to continue serv-

¹⁷Boeing Commercial Airplane Co., "The Economic Impact on the Airlines of Local Airport Operation Limitations Designed To Reduce Community Noise," submitted to the DOT/CAB Airport Access Task Force, Nov. 29, 1982.

ing those markets. According to Boeing's estimates, such acceleration would be beyond the financial means of many airlines.

Federal funds are available to assist airport operators in soundproofing buildings or buying noise-impacted land. Usually, these are extremely expensive remedial measures, but a number of airports have been forced to undertake them. St. Louis Lambert Airport expects to spend about \$50 million over the next 20 years under its Environs Plan. The airport has soundproofed some buildings and returned them to public use. In other cases, it has purchased land and resold it for more compatible use. In some cases, the land was "sterilized," that is, the buildings *were torn* down and the land left vacant as a noise buffer zone.