Practical Methods for Shifting General Aviation Traffic from Commercial Service Airports to Reliever Airports

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This report is intended to provide assistance to local governments managing the nation's busiest airports in the development of policies to respond to actual or imminent congestion. It reviews the causes of congestion at commercial-service airports. Legal principles limiting regulation by the airport owner and governing the setting of fees are reviewed. Regulatory and economic methods that local airport officials could use to shift general aviation (GA) traffic to other airports are reviewed and discussed. Three examples of commercial-service airports with a range of congestion problems (Portland International, Seattle-Tacoma International, and Boston Logan International) are analyzed and possible approaches to shifting GA traffic at each are theorized. Conclusions are then drawn as to actions that these and other commercial-service airport operators could use to shift GA traffic and to set appropriate fee levels.

THE PROBLEM

The nation's busiest airports are getting even busier. Between 1987 and 1999 total aircraft operations at towered airports are expected to increase by 33.5 percent, an annual growth rate of 2.4 percent (*1*). This increase in air traffic has been caused by rapid increases in the commercial-passenger, commuter, and air cargo segments of aviation. The increased air traffic has created overcrowding and delay both on the ground and in the air. The overcrowding is concentrated at hub airport locations, and 17 major air carrier airports were considered severely congested in 1985. The situation is expected to get worse; 41 more commercial-service airports are expected to become congested by the year 2000 (*2*).

The increase in passenger traffic is thought to have been the result of the decreasing relative cost of ticket prices. That the average actual cost has declined can be seen by examining the real yield [dividing the airline revenue per revenue passenger mile (R/RPM) by the consumer price index]. In 1977 the airline average yield was $0.0437 per revenue passenger mile. By 1987 the R/RPM yield had declined to $0.0330, a decline of 24.5 percent (*3*). The Airline Deregulation Act of 1978, changes in the aircraft fleet (caused by the introduction of more efficient new aircraft), and a healthy economy are commonly thought to have been the primary reasons for the airline ticket price decline (although on some routes with little competition or low traffic volumes ticket costs are higher than before deregulation). The era of lower prices may be at an end, however, because many airlines have merged or gone out of business and a number of the remaining airlines have indicated that price increases will occur in early 1989. Nonetheless, the 1988–1999 FAA forecast indicates that commercial air passenger traffic will continue to rise and that domestic revenue passenger miles will increase from 333 billion in 1988 to 566 billion in 1999 (*1*).

The hubbing concept and a desire for greater flight frequency have caused the airlines to use smaller aircraft, flying more often. This has increased the number of commercial operations at many primary commercial airports. In addition, the major airlines have also been developing feeder and commuter airline systems that have dramatically increased the number of commuter airline operations at many commercial-service airports (a 62 percent increase at Portland International Airport between 1986 and 1987, for example). These increased operations are forcing large commercial-service airports to adopt new policies to shift smaller aircraft elsewhere in order to make more efficient use of existing capacity. The purpose of these policies is to accommodate the increased passenger and air cargo demands and to generate more income. Capacity is usually measured in operations per hour. The airport operator, the FAA, and the airlines are all interested in increasing the number of operations per hour without compromising safety. From the air traffic controllers' standpoint, however, working at maximum capacity is undesirable. (Note the October 1988 reduction in maximum operations at O'Hare Airport in Chicago, for example.)

POSSIBLE SOLUTIONS

A variety of solutions have been suggested for the problem of overcrowding (or inadequate capacity) at congested airports. In economic terms these can be divided into three categories, those that (a) increase the supply (capacity), (b) reduce the demand, or (c) spread the demand more evenly over time, reducing peak demand.

In concrete terms the airport operator can adopt policies to limit or shift demand or increase capacity, or both. The FAA can attempt to increase capacity through improved equipment and procedures. The airlines can more realistically schedule flights, thus spreading flights over a wider range of

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hours. Ideally, the total traffic would be evenly distributed throughout the day to minimize peaking problems. Unfortunately, humans generally do not like to fly in the middle of the night.

Capacity improvements for the system can also be created through the construction of new airports, the addition of more runways to existing airports, and technological solutions. Technological solutions include sophisticated equipment that allows the addition of new independent arrival streams for aircraft, decreases in separation standards, improved air traffic routing of aircraft (such as the East Coast Plan), and improved operations in adverse weather.

The problem with the solutions aimed at increasing capacity has been succinctly summarized as follows: "The ultimate conclusion is inescapable: technology, new runways and new airports are all necessary to address the airport capacity issue; but if the demand grows in its historical manner and new construction/technology continue at their current pace, solutions will not be sufficient to address the capacity/delay issues" (*4*). The time it takes to implement technological solutions or to construct new facilities and the projected rapid growth of aviation traffic are all factors pointing to the need for alternative solutions.

There are other problems as well with technological solutions and new construction. The transport pilot's perception is that the skies are less safe today (*5, 6*). Pressure has been placed on the FAA to develop mechanisms to increase the number of operations per hour within given parts of the airspace, yet most of the technical solutions to capacity involve decreasing separations between aircraft, thus logically providing less of a safety margin between aircraft. Even though such new safety margins may be acceptable (for example, a 1-in-10-million accident risk), the reality is that there will be less margin for error, both on the part of the pilot and on the part of the air traffic controller.

One problem with new construction is the enormous financial cost (i.e., the competition for scarce public resources). A proposed new Denver airport, for example, is estimated to cost up to $3 billion when fully developed. Because of this cost, the airlines now operating at Denver are questioning the benefits of a new airport and are reluctant to financially support such an expensive project (*7*). (Other factors, such as concerns about increased room for competition and the rate of future growth of aviation, may also enter into this reluctance.) There is no doubt that new runways at most airports could accommodate growth in that area, and in some locations, such as Las Vegas McCarran International, Boise Air Terminal, and Cincinnati Lunken, such development can proceed without significant environmental problems. Notwithstanding these desirable circumstances, airports such as Los Angeles International, San Francisco International, Washington National, Seattle-Tacoma International, and Boston Logan International all face severe public opposition to expansion.

The environmental and political problems encountered in trying to expand a major airport in an urban area are well known. Noise problems, automobile congestion, and impacts on the environment (such as fills in rivers and estuaries) all contribute to vast political opposition, leading one to conclude that many major urban airports are unlikely to be able to expand in the foreseeable future.

THE NEED FOR REGULATION

As all users (GA, major air carriers, airfreight companies, military aviation, and commuter airlines) of the nation's primary commercial-service airports compete for increasingly limited capacity and technical improvements and new construction fail to keep pace, then administrative solutions become necessary. The only question is by whom and to what end. Kendall K. Hoyt, the Washington editor of *Airport Services Management*, says, "Unless capacity increases, 'first come first served' must give way to 'greatest good for the greatest number' " (*8*). The problem then becomes one of how to define the greatest good for the greatest number and how to achieve it. Although there can be instances in which the value of the cargo or the passengers may make a small airplane important to society (the organ being supplied for transplant or the government official arranging for the release of hostages), in general our democratic society views the value of one individual's time as being no more important than that of another. Therefore, the aircraft carrying the most passengers is considered to be more important, generally, than the aircraft carrying fewer passengers.

Administrative means can reduce aircraft operations during peak periods by shifting these operations to other times or reliever airports (airports that are nearby and act to relieve the pressure from the primary commercial-service airport). Several of these administrative options for decreasing or shifting demand have been described in *Airport System Development* (*9*) as follows:

> There are two basic approaches to managing demand, both with the same objective: to ease congestion by diverting some traffic to times and places where it can be managed more promptly and efficiently. This can [theoretically] be done through administrative means [although political and legal roadblocks may prevent actual implementation]; the airport authority or another governmental body may allocate airport access by setting quotas on passenger enplanements or on the number and type of aircraft operations that will be accommodated during a specific period [in theory, but only the FAA, under present law, may actually do so]. The alternative approach is economic—to structure the pricing system so that market forces allocate scarce airport facilities among competing users. Thus demand management does not add capacity; it promotes more effective or economically efficient use of existing resources (p. 109).

SHIFTING DEMAND

Although GA did not cause the present congestion problems, it is considered a good candidate to shift from primary commercial-service airports because GA aircraft

- Carry fewer passengers;
- Can usually operate at much smaller airports than can larger commercial aircraft;
- Are generally slower, lighter, and require greater separation from heavier commercial aircraft because of wake vortex; and
- Can take up to 10 min to take off and clear the airport and terminal area airspace.

Two or three commercial aircraft, accommodating hundreds

of passengers, can take off within the same period of time as a single GA aircraft carrying a handful of people. Thus the opportunity cost to the airport system is the delay GA operations cause and is the reason for seeking to shift such aircraft away from congested commercial airports during peak operational periods. The remainder of this paper focuses on local regulatory efforts to accomplish such a shift.

FEDERAL POLICY ON REGULATION

The federal policy on regulation is mixed. Congress has stated that "artificial restrictions on airport capacity are not in the public interest and should not be imposed to alleviate air traffic delays unless other reasonably available and less burdensome alternatives have first been attempted" (*10*). Although such sentiments are commendable, they do not alter the reality of congested airport facilities. In some cases, the FAA has been forced to impose capacity regulation [14 (CFR) 93.121-93.133] at some of the nation's busiest airports (D.C. National, Kennedy, O'Hare, and La Guardia) where capacity has been reached.

Slot assignment and prioritization are not available to the airport operator as regulatory or economic measures because they are preempted by federal law [49 USC § 1305 (a)(1)]. In part, this law states that no public airport owner "shall enact or enforce any law, rule, regulation, standard, or other provision . . . relating to rates, routes, or services of any air carrier." The assignment of slots is a regulation of the times during which air carriers can land and therefore is a power reserved to the FAA. Notwithstanding the present law, there are other reasons why slot assignment, and slot auctions in particular, are undesirable. These include antitrust implications, the limiting of entry by new airlines that have fewer financial resources, and the two-part question of who the right actually belongs to and who should receive the revenues once they are collected.

ALLOWED REGULATION

Airport managers can, however, indirectly regulate demand through economic methods. The proprietary right to set rates for airport usage has been established by Congress [49 USC § 1305 (b)] and upheld by the courts [*Evansville-Vanderburgh A.A. Dist.* v. *Delta Airlines Inc.*, 92 S.Ct. 1349 (1972)], although Congress has since passed the Anti-Head Tax Act prohibiting outright state and local taxes on passengers. In fact, there is an obligation for airports receiving federal funds to charge reasonable fees for the use of the airport in order to provide revenue to maintain the facility (49 USC § 1701). Fees and charges for airport usage, in addition to the primary purpose of providing revenues to the airport, have the effect of regulating demand. As will be seen, however, the imposition of such fees has been restricted by both Congress and the courts.

Other economic and regulatory disincentives in addition to usage fees are available. Regulatory disincentives include limiting facilities, services, and areas available for GA. Economic disincentives can include increasing landing fees, tie-down fees, lease fees, fuel flowage fees, and peak-hour surcharges.

REGULATORY DISINCENTIVES

Although airport operators are required to provide *equal access* to all aviation users, they are not required to provide *equal facilities or services*. Thus, a service policy could be adopted merely to provide minimal services to GA.

Airport operators have the option of adopting policies limiting FBO (fixed base operator) services. The Airport Master Plan can be used to limit the area designated as available for GA use. The request-for-proposal process for FBO selection, in addition to its traditional purpose of specifying the minimum level of services that is acceptable, can also be used to limit those services allowed. Typical GA FBO services that are magnets for attracting GA traffic can be limited or prohibited at primary commercial airports and encouraged and supported at reliever airports. These include:

- T-hangers
- aircraft tie-downs
- aircraft maintenance service and facilities
- aircraft refurbishing and rebuilding
- aircraft sales
- aircraft painting
- avionics repair

LIMITS TO LOCAL REGULATION

Airport owners are prohibited from preventing GA from landing or taking off during the most congested periods. Federal law (49 USC § 2210) requires that public-use airports upon which federal funds have been expended must make the airport available "for public use on fair and reasonable terms without unjust discrimination." Numerous court cases have concluded that the airport operator may not impose limits by class of use.

The FAA preemption of authority to regulate the use of publicly funded airports is based on federal supremacy in the regulation of interstate commerce. Although such federal limitation on the regulatory powers of other levels of government is appropriate for airspace use, it is not necessarily appropriate for limiting entry into congested aviation facilities. In any event, the federal government is currently the only level of government that can restrict entry into the nation's busiest airports based on pure regulation (i.e., slot assignments and establishment of limits on hourly airport operations).

ECONOMIC DISINCENTIVES

The Logan Airport battle in Boston over fees has highlighted the use of economic disincentives. Alfred Kahn, former Civil Aeronautics Board (CAB) chairman, has said that access to major airports "should only be available to those who are willing to pay a premium price for what is a valuable commodity" (*11*). Airport operators are now beginning to act on this philosophy.

The Port Authority of New York and New Jersey implemented a peak-period surcharge of $100 for GA in 1986 and claims that this has resulted in 30 percent of GA flights moving

TABLE 1 RATES AND CHARGES (AS OF JULY 1, 1988)

	Portland	Sea-Tac	Logan
Landing Fees/1,000 lbs.	$0.95[a]	$1.05[b]	$0.50[c]
Minimum	None	$25.00	$91.78

[a]Portland International Airport fees are adjusted every 6 months and have averaged $0.92 since 1981.
[b]Seattle-Tacoma fees are adjusted quarterly and the $1.05 is for the July–Sept. 1988 quarter.
[c]Logan's fees from July 1, 1988.

to nonpeak hours (*12*). Chicago's Midway Airport was considering raising GA landing fees to $100 in 1987 (*13*). Logan Airport in Boston, Massachusetts, prevailed in a U.S. District Court ruling in June 1988 allowing it to go ahead with a fee increase raising its minimum fees for GA to $91.78 plus $0.50/1,000 lb landed weight (Table 1) (*14*). Other major airports, including Los Angeles International, Denver Stapleton, and Chicago's Midway and O'Hare airports, are "hinting at" following suit (*15*).

These major airports are apparently choosing to escalate their minimum fees for GA rather than waiting for (and perhaps in some cases wanting) other types of capacity expansion. Because federal policy prohibits airport owners from regulating or excluding certain classes of users, they do not have any other options that are within their control.

ARE FEES FAIR TO GENERAL AVIATION?

Although GA users of the airport system pay a fuel tax into the Aviation Trust Fund, GA generally is considered to be subsidized by other users of the National Airway System (ultimately commercial-airline passengers). A study by the FAA estimated that in 1988 air carrier taxes would account for 96 percent of all federal tax revenues on aviation and would reimburse 95.5 percent of FAA National Airport and Airway System costs (*16*). On the other hand, GA was projected to reimburse only 7 percent of the costs it imposes on the system. For GA piston aircraft the situation is even worse, with approximately 3 percent of costs being recovered (based on 1985 data). Naturally, GA interests debate the proper allocation of these fees and claim that it pays its fair share of federal costs. The arguments that GA has raised in its defense sound similar to eating in the most expensive restaurant in town and then claiming that one should only have to pay McDonald's prices.

The Office of Technology Assessment (OTA) has stated that "general aviation landing fees vary greatly from airport to airport, ranging from charges equal to those paid by the commercial airlines to none at all. Most landing fees are assessed on the basis of certified weight" (*9*). The practice of basing landing fees on aircraft weight tends to promote use of commercial airports by GA. Because most GA aircraft are relatively light (less than 10,000 lb), they pay very low landing fees at most commercial airports—typically $10 or less. According to the OTA report, "Residual-cost airports and compensatory airports alike have landing fees for general aviation that are so small as to be negligible, either as a source of revenue to the airport or as a deterrent to use of congested facilities" (*9*).

DEVELOPMENT OF FEES

The setting of fees for commercial-service airports can go a long way to relieve congestion. Such fees, however, must be rationally constructed and fair to all users. In *Hendrick* v. *Maryland*, 35 S.Ct. 142 (1915), the U.S. Supreme Court ruled that

> where a state *at its own expense* furnishes special facilities for the use of those engaged in commerce, interstate as well as domestic, it may exact compensation therefor. The amount of the charges and the method of collection are primarily for determination by the state itself; and so long as they are reasonable and fixed according to some uniform, fair, and practical standard, they constitute no burden on interstate commerce (emphasis added).

RESTRICTIONS ON USING FEDERAL FUNDS IN THE RATE BASE

It can certainly be argued that FAA grants for specific construction projects are not furnished at the airport's expense. In fact, the Airport and Airway Safety and Capacity Expansion Act of 1987 prohibits the use of certain FAA-funded improvements in the calculation of costs for the airport in setting rates. Section 511 (9) of the act states that

> the airport operator or owner will maintain a fee and rental structure for the facilities which will make the airport as self-sustaining as possible under the circumstances existing at that particular airport, taking into account such factors as the volume of traffic and economy of collection, except that no part of the Federal share of an airport development or airport planning project for which a grant is made under this title or under the Federal Airport Act or the Airport and Airway Development Act of 1970 shall be included in the rate base in establishing fees, rates, and charges for users of that airport.

The charging of depreciation of major assets is not appropriate if those improvements were funded through federal dollars or from local taxes, especially where no reserve fund is set up to accumulate those revenues. Unless the airport anticipates having to rebuild completely those assets from its user revenues, it should not charge the public twice (once through taxes and once through revenues), especially when it is anticipated that the federal government or the local taxpayer will pay for the replacement of the improvements when needed. It would behoove all airport users to ensure that they are not being charged for depreciation of tax-funded improvements. In terms of accounting procedure it is much more logical and consistent with public budgeting policy to depreciate the book value of the tax-funded assets than to charge the depreciation against the income.

FEES MUST BE REASONABLE

Court rulings have placed limits on airport operators' rights to raise fees: "In 1981, the Indianapolis Airport Authorities brought suit against six airlines for refusing to pay new landing fee rates. The court eventually decided in favor of the airlines, ruling that the rate increase was *unreasonable* [emphasis added]. In 1976, a court in North Carolina ruled that the Raleigh-

Durham Airport could only raise its landing fees to 22.3¢ per 1,000 lb instead of the proposed 33¢ to 35¢ per 1,000 lb" (*8*). In a U.S. District Court ruling, Logan's right to impose such fees has been upheld, although the reasonableness of such fees was subject to close scrutiny.

U.S. District Court Judge D. J. Mazzone in his June 29, 1988, ruling on summary judgment for the Massachusetts Port Authority's (Massport's) adopted new fee structure states that

> [u]nder governing law only *reasonable* fees can be charged to those involved in interstate commerce, under the Commerce Clause. The Anti-Head Tax Act prohibits a fee unless the charge is a *reasonable* rental, landing fee or other assessment. [49 USC] Section 2210 requires that Logan be available under *reasonable* terms, and the Equal Protection Clause requires that the action taken by Massport have a rational relation to that state end (emphasis added) (*17*).

These rulings suggest that airport operators need to develop findings supporting the need for fee adjustments. [Massport's fees were approved because the judge was persuaded that they were reasonable, although this ruling is being appealed. See *New England Legal Foundation* v. *Massachusetts Port Authority*, C.A. 88-873-MA (D.Mass. June 29, 1988), appeal filed, No. 88-1971 (1st Cir. Sept. 28, 1988).]

FEE ALTERNATIVES

Capacity problems refer primarily to human beings and the amount of delay they, each and collectively, must endure. Ideally, any cost allocation scheme should reflect more accurately the costs and benefits accruing to each person using the aviation system, not the benefit to each aircraft.

Head Taxes

This type of charge assumes that each person should be charged an equal amount, under the theory that each receives equal benefit from the airport facility. If passenger space were the problem, higher charges per passenger would be appropriate. However, shortage of room for people in the terminal building is generally not the issue; rather, the runway landing and takeoff capacity, which is measured in aircraft operations per hour, needs to be considered. Under this theory, a single GA pilot delaying 500 other people would be charged the same fee as a passenger aboard a 747 aircraft. Because of the ease of ticket tax collection, this is how the largest percentage of federal aviation taxes is collected and is the dominant source of funds for the federal Airport and Airway Trust Fund. This method of charging is equitable among the passengers of commercial airlines but not equitable between GA and commercial passengers when capacity, and hence delay, becomes an issue. The Anti-Head Tax of 1973, however, prohibits local airports or other levels of government from enacting this type of fee or tax.

Landing Fees (By Weight of Aircraft)

This type of charge gained favor at airports as aircraft became larger and the jet age required substantially longer and stronger pavements. When condition of the pavement is the problem and pavement maintenance is the most important consideration, weight is an appropriate method of allocating costs. A close analogy is the concept of weight/mile taxes on the trucking industry. Pavement life is not used up by small aircraft, however, and deteriorating pavement is not the problem; the problem is the shortage of airport capacity. Landing fees are most often based on the weight of the aircraft because of convenience, not because weight-based landing fees are the most appropriate way to charge for the use of the airport. In fact, charging by weight is very similar in effect to the head tax, which has been prohibited.

Landing Fees (By Operation)

Under this scheme a charge is levied based on the operational costs of the airport divided by the total number of operations. In its purest form, all aircraft are charged the same landing fee. This, however, assumes that all aircraft have equal impacts on the airport and receive equal utility from the airport. The reality is that different types of aircraft carry different numbers of passengers, have different speed characteristics (the slower aircraft taking longer to land and take off), and weigh different amounts (heavier aircraft require stronger and longer runways). Logical pricing at capacity-limited airports would charge slower aircraft taking more time to land or take off more than faster aircraft. Nonetheless, it would probably be easier (from a political and practical standpoint) to set a uniform rate based on the average time of operation. In spite of uniformity concerns, this type of charge (or a permutation thereof) seems to best address concerns about capacity.

Peak-Hour Surcharge

A peak-hour surcharge is an opportunity-cost fee in addition to the basic cost of running the airport. This type of fee attempts to quantify the negative externalities imposed on others (i.e., the waiting cost to the airlines and the public). The average number of persons and flights delayed can be calculated. The cost of this collective delay can then be estimated to develop a cost-per-minute of delay. Each type of aircraft can then be classified as to the average time required to land and take off. A hypothetical example follows.

The FAA capacity study uses a figure of $23/person/hr (in 1985 dollars) to measure the cost of delay to the passengers (*18*). On the basis of an average passenger load of 130 people, 5 min is worth about $250 to the passengers for lost time. Assuming an aircraft and crew operating cost of $2,000/hr, 5 min is worth about $165 to the airline. Therefore, the cost of a 5-min delay for the hypothetical aircraft would be $415 (exclusive of airport and FAA costs). A slow single-engine aircraft can easily cause a delay of 10 min at hub airports, taking twice as long to land as a jet airliner. Assuming 130 persons per jet liner and a delay of 10 min for two airliners, the actual cost for the GA aircraft to land could be in excess of $1,660. This same capacity study estimated that in 1985 the total cost of airline delays from all causes approached $2.9 billion.

There are several problems with this type of charge. One is that although it is mathematically justifiable, it would have the effect of virtual exclusion of small aircraft. Another problem is that it would very likely be considered by the courts as discriminatory and confiscatory. Finally, this type of charge is not based on the expenses that the airport operator actually incurs; rather, it is based on externalized costs of the airlines and the commercial-airline passenger, and there does not seem to be any statutory basis for the airport operator to collect fees on this basis. (This is not to say that peak-hour landing fees based on foregone landings are not permissible.) This, however, does not mean that peak-hour surcharge fees are not appropriate, but merely that the evidence seems to indicate that the legal authority to levy or collect such a fee is questionable.

Assuming for the moment that Congress was willing to enact peak-hour fees (or to let the airports do so), the next question is "Who should receive the revenues?" Those who bear the brunt of the transferred societal costs would be a logical choice. Opportunity costs are the transferred societal costs to others, and the others at the airports are basically two parties, airlines and airline passengers.

The airports could collect these fees in addition to their basic landing fees and retain that portion of the opportunity-cost landing fee related directly to the airlines' out-of-pocket costs. The remainder could be remitted to the Airport and Airway Trust Fund (and eventually to the FAA) for airline passenger delay costs. The logic behind this proposal is that the airlines act as guarantors for the airports and generally agree to pay the necessary and usual charges of the airports through landing fees, leases, and assessments. Any additional monies derived from peak-hour landing fees by the airports would merely reduce the need for other airline charges at these airports.

The portion of peak-hour fees intended to reimburse the public for its costs could also go to the Airport and Airway Trust Fund. This would relate directly to the public's need for system improvements to reduce delays, which are primarily funded by the Federal Aviation Trust Fund and general federal tax dollars. The FAA recovers its costs principally through either aviation taxes or general tax dollars. To the extent that such user charges offset the general fund expenditures of the FAA, they would help balance the federal budget. [According to the *National Airway System Annual Report—FY 1987*, "In total, the general taxpayer subsidy to the FAA between 1982 and 1987 was about $7.5 billion" (*19*).]

Combination Fee (By Weight with a Peak-Hour Surcharge)

A fee structure for both GA and the airlines that combines a landing-weight fee with an opportunity-cost fee can be supported rationally. The airport operator would need to compile data showing the expected revenue from the average commercial operation and the average cost of operating the airport per operation. During nonpeak hours (assuming unused capacity) there would be no opportunity cost, but the basic cost of operating the airport would be charged. Some airports (John F. Kennedy and La Guardia, for example) have developed surcharge fees in an attempt to discourage GA during congested periods.

CASE STUDIES

Three commercial-service airports (Portland International, Seattle-Tacoma International, and Boston Logan International) are examined as follows to see how they could respond to current and future congestion problems. Although each of these airports is the largest in its respective state, they were chosen because they represent very different levels of commercial-service traffic (Table 2) and levels of congestion (i.e., below capacity, near capacity, and above capacity). They also differ in reliever airport systems and methods chosen to address actual or potential capacity problems.

Portland International

The port of Portland operates a four-airport system. The primary airport, Portland International Airport (PDX), is a transport airport and handled 241,000 operations in 1987. General aviation accounted for 62,000 (26 percent) of these (Table 3). The Practical Annual Capacity for PDX is approximately 300,000 operations. Because of additional constraints, however, including noise-abatement procedures, which "have the effect of limiting the airport to a single runway operation, special air traffic control (ATC) requirements for separation of aircraft, and 25 percent instrument approach conditions," the Annual Service Volume is estimated to be only 282,000 (Draft Portland International Airport Capacity Study. Executive Summary, unpublished). Demand at PDX is expected to exceed capacity by about the year 2000 (*20*). The three reliever airports, Hillsboro, Troutdale, and Mulino, have sufficient capacity to handle the GA traffic now using PDX, should the port choose to implement a policy of shifting GA traffic to reliever airports (with the exception of large private jets).

The port currently imposes no GA landing fees at any of its airports (Table 1). There is also no differential in the tie-down fees. Fuel flowage fees are $0.07/gal at PDX and $0.05 or $0.06/gal at the reliever airports. Ground-lease fees are basically the same at the three GA airports ($0.10 to $0.12/sq ft) but much higher at PDX for new leases ($0.35/sq ft). As a result, GA operations are unconstrained at all airports in the Portland system, and the mix of operations at each airport reflects the desirability of that facility, its convenience to the public, price, and the range and quality of FBO services. Portland International is the closest airport to the Portland city center and thus has the most desirable location for corporate and business GA users (who constitute about 80 percent of the GA traffic). Approximately 35 acres of land are

TABLE 2 COMMERCIAL CARRIER DATA (FAA DATA)

	Percentage of U.S. Enplanements	Passengers	Departures
Logan	2.42	9,695,876	111,799
Sea-Tac	1.66	6,651,868	92,003
Portland	.60	2,414,960	56,156

TABLE 3 TRAFFIC MIXTURE (FAA DATA)[a]

	Portland	Sea-Tac	Logan
Total operations, 1987	241,000	281,000	436,000
GA operations, 1987	62,000	17,000	50,000
GA as a percentage of total operations	26	6	11

[a]All operations data rounded to nearest 1,000.

currently used by GA for transient, corporate, and FBO activities, with more land for corporate use being made available in a newly developed area of the airport.

Port policy is the carrot-type approach to enticing GA traffic away from PDX to the relievers. The port maintains the relievers reasonably well (although maintenance is occasionally deferred and no permanent staff is assigned to two of the relievers) and has spent millions of dollars on capital improvements at the relievers over the last 10 yr. The port, however, has not provided any incentives to aircraft owners to move their based aircraft from PDX. Ground transportation is virtually nonexistent from the relievers to the city center and to PDX.

For an airport with excess capacity, such as PDX, the institution of a program to shift GA traffic is not warranted at this time. The institution of a minimum landing fee to end the subsidy for GA would, however, be appropriate from the standpoint of equity to the airlines and their commercial passengers.

Seattle-Tacoma International

The port of Seattle operates a single airport, the Seattle-Tacoma International Airport (Sea-Tac). The airport handled 281,000 operations in 1987, of which 17,000 (6 percent) were GA (Table 3). Other major airports in the Seattle metropolitan area are operated by a variety of private and public agencies. Although several of these are transport class, none of them are primary commercial-service airports. The Seattle-Tacoma International Airport is currently projected to exceed instrument flight rules (IFR) capacity by the year 2000 and visual flight rules (VFR) capacity by the year 2010 (*21*).

Adequate capacity exists at the other nearby airports to accommodate both local GA-based aircraft and total GA operations through the year 2000 and perhaps through the year 2020, depending on the rate of growth of GA aircraft within the Seattle metropolitan area. Boeing Field (King County International) is located 4 mi from Sea-Tac and is the primary GA airport in the Seattle-Tacoma metropolitan area. It is a very busy facility, having approximately the 10th highest number of itinerant operations in the United States. Because of the location of Boeing Field (closer to the Seattle city center than Sea-Tac is), there is very little pressure on Sea-Tac from GA. General aviation that does use Sea-Tac consists primarily of airline pilots flying to work, those wishing to clear customs, and corporate users wanting to transfer to connecting commercial flights. Very little land, less than 15 acres, is allocated at Sea-Tac for FBO and GA use. (The three existing FBOs collectively lease less than an acre and a half of land.) The port of Seattle has consciously limited the land for FBO use and has no plans to make more available (personal communication).

FBO lease fees at Sea-Tac are $0.40/sq ft. Overnight tiedown fees are $10 and minimum landing fees are $25 (Table 1); however, various pilots and FBO personnel interviewed indicated that they were not aware of the existence of the landing fee. This leads to the conclusion that collection efforts are not as efficient as they might be.

For airports with little GA traffic, such as Sea-Tac, shifting GA traffic will not have much effect on capacity.

Boston Logan International

The Massachusetts Port Authority operates a two-airport system, Boston Logan International and Hanscom Field, a reliever airport. Logan handled 436,000 operations in 1987; 50,000 (11 percent) of these were GA (Table 3). Logan has a heavy traffic load in part because it is a major point of departure for flights to Europe. Logan is the closest airport to the Boston city center and thus the most desirable location for corporate and business GA users.

Other major airports in the Boston metropolitan area are operated by a variety of private and public agencies. Although several of these airports are transport class, none is a primary commercial-service airport. This, however, is expected to change: "The Worcester, Mass., Airport plans to build a new, $12-million passenger terminal to accommodate explosive traffic growth. Three years ago the airport handled 58,000 passengers, and this year more than 300,000 are expected. The rapid growth of Worcester is supported by the Massachusetts Port Authority (Massport), which wants to help regional airports grow to relieve congestion at Boston's Logan International Airport" (*22*).

Logan Airport currently exceeds both VFR and IFR capacity during certain peak periods. Because of this, Massport has been attempting since 1980 to regulate demand with economic disincentives for small aircraft (or to charge actual costs, depending on one's point of view).

In August 1987, Massport announced a new plan to address delay and capacity problems. This plan is known as PACE (Program for Airport Capacity Efficiency). The following description is from PACE (*23*):

> At the current peak hour demand, delay in IFR-1 conditions reaches almost 65 minutes per airplane. Under such conditions the delay per airplane goes up to 20 minutes in the morning peak hour, drops to 10 minutes during the midday peak hours and then surges to over 60 minutes per airplane during the afternoon peak hours. . . . Based on this level of delay, almost 7000 passengers per hour . . . experience delay of up to 60 minutes each.
>
> [Under currently forecast increases in air traffic] the present maximum delay will rise from 60 minutes per person in IFR-1 conditions to 100 minutes per person in 1990 and to 280 minutes per person in 2000.

> General aviation operations constitute, on an average day, approximately 10% of the total operations at Logan while serving less than 1% of its passengers.
>
> [I]f the smaller planes were moved out of the peak hour, 98% of the passengers using Logan during peak hour would have delays cut by over 50 minutes each and less than 2% would suffer the inconvenience of using Logan before or after the peak hour.

Thus, Logan's rationale for raising the minimum fees is to create economic disincentives for smaller aircraft.

At Logan the new fee structure has two components. The first is based on time and includes all operational costs of Massport; the second is based on weight of the aircraft. This fee was purportedly formulated to cover the basic costs of operation (including fixed costs such as administration, navigational aids, lighting, crash/fire/rescue services, etc.), which, according to Massport, had previously been subsidized by passengers on commercial airlines. (The development of these fees has been the subject of considerable debate, especially with regard to the proper components of the rate base and the proper division of relative costs. That debate will be found in the legal records and not repeated herein.) The fee per pound of landed weight allegedly relates to the cost of construction and maintenance of the runway pavement. This fee structure does not contain an opportunity-cost component (peak-hour surcharge), although Logan is considering imposing such a fee in the future.

According to Massport officials, "general aviation operations at Boston Logan were down by more than one-third in the first month the PACE . . . plan was in effect at the airport" (*24*).

CONCLUSIONS

The type of GA using the airport needs to be analyzed carefully before an appropriate strategy can be chosen. For example, a Lear jet will fit into the commercial jet approach stream very well because of its speed characteristics. Business aviation desiring to connect with commercial flights will want to be as close as possible to the main terminal building, and so will smaller commuter flights and air taxi traffic. Therefore, the best GA candidates to shift to reliever airports will be other categories, such as recreational fliers, nonconnecting business traffic, and maintenance traffic (using aircraft maintenance and repair services). This discretionary type of GA user will be the most easily shifted with nominal fee levels.

For airports that do not have a delay problem, a fixed fee per operation would seem to be the most appropriate. For airports with a capacity problem, a fixed fee per operation and peak-hour pricing by length of time of approach and takeoff would act to smooth out peak demand and substantially reduce uneconomical use of the runways at these times by small aircraft.

Establishing Basic GA Fees

- Income derived from the airport, such as parking fees, building rental, agricultural leases, and other miscellaneous income, should be subtracted from the basic cost of airport operation.
- Other ineligible costs, including depreciation on the federally funded share of improvements, should then also be subtracted.
- The remaining cost can then be divided into the average number of landings handled in the previous year or expected for the next year. The resulting amount should then be compared with the regional average cost to ensure that extraordinary costs (or unreported expenses) are not distorting the true cost of operation.
- Determining the regional average cost of operation requires a survey of the airports within the geographic region, to determine the average cost of operating similar facilities.
- Based on such average costs and past experience for that particular airport, a basic cost for operating the facility can be estimated. This basic cost could also be apportioned between weight-related costs and operational costs.
- If the owner wishes to sell bonds for future improvements benefiting aviation, a surcharge can be calculated and added to the basic rate.
- The analysis then needs to be documented carefully.

Implementation of Peak-Hour Pricing

Peak-hour surcharges may require legislation allowing either the airport or the FAA to impose such a fee, depending on how the surcharge is structured.

One possibility for a peak-hour surcharge would be for the FAA to impose an FAA controller handling fee for each operation during peak hours. This fee would tend to discourage GA from using primary commercial-service airports during peak hours. Such fees are currently prohibited under the theory that such charges would cause pilots to avoid using the safety services the FAA provides. If such fees were legal, however, the FAA could require the airport operator to collect the fee. It could be piggybacked on the landing fee to make collection much simpler. This would implement true user-benefits, user-pays pricing for scarce controller time during peak traffic periods.

As a matter of equity, the institution of a usage-based fee system can be justified at all three of the airports studied. For airports with capacity problems the opportunity-cost, peak-hour pricing system can and should be considered. As James McCormick, vice president of economic affairs for the Airport Operators Council International, says:

> Peak-hour passenger charges are another market pricing option worthy of serious consideration, since air carriers schedule flights when they perceive passengers want to travel (creating peak hours) and would therefore not be very sensitive to differential landing fees. Passenger charges would allow airline customers to indicate if they really value traveling during congested periods, or are willing to travel during off-peak periods and save money. Such market signals could help optimize airline schedules and reduce congestion (*25*).

Assuming that congestion continues to worsen in spite of technological and new-construction efforts by the FAA, and assuming that airports are prevented from shifting demand by fees or regulation, the nation will be faced with two unpleasant specters: (a) no action and increasing delays at the

nation's busiest airports and (b) increased federal regulation through the application of the High-Density Rule (14 CFR Part 93.121) by the FAA at more airports.

POSTSCRIPT

Subsequent to U.S. District Judge Mazzone's ruling, the U.S. Department of Transportation instituted an investigation of Massport's landing fees (FAA Docket 13-88-2) to consider whether such fees violated federal law. Administrative Law Judge Burton S. Kolko determined that Massport's new fee schedule did violate federal law. Judge Kolko concluded that Massport's fees were not reasonably grounded, but fails to explain convincingly why such fees are not related to Massport's actual costs nor why such fees are unreasonable, and he does not define what he considers to be reasonable fee levels.

To paraphrase the *FAA Community Involvement Manual* (*26*), it is essential that FAA personnel operate in such a way that they use their professional expertise to help airport managers and sponsors figure out what they can do to solve a problem, rather than constantly using their expertise to tell airport management what they cannot do. Although there are limits of feasibility, legal mandates, and so on, airport managers must get the feeling that the professional is using that expertise to find solutions, to be responsive to the nation's airport needs.

In 1983, Secretary of Transportation Elizabeth Dole wrote to the CAB on the report of the Airport Access Task Force and said in part:

> The Department also finds unsatisfactory the conclusion of the report that the use of market mechanisms for the allocation of resources would "likely be highly disruptive to public service and almost surely would add to the cost of air transportation." The use of direct charges or other fee mechanisms does not necessarily have to add to the cost of air transportation. Revenues collected as a result of such mechanisms could be used as an offset against other charges based in whole or in part on an operator's time of day, aircraft noise levels, or a number of other different factors. While we do not advocate any particular alternative mechanism, such direct fees could be structured to be no more disruptive than current fees and, on the positive side, could provide incentives for creating a quieter environment around an airport in the long run *or for achieving other goals of the airport and the surrounding community. In addition, a system of direct charges, locally developed and administered, would not require any type of Federal intervention* (emphasis added) (Letter from Elizabeth Dole to Dan McKinnon, March 4, 1983).

It would seem appropriate for Congress to take another look at this issue and to provide clear policy direction on airport user fees. Following such clarification it would be very helpful to local airport authorities if the FAA developed an advisory circular describing how such fees can be developed without violation of other federal laws and regulations.

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