United States General Accounting Office

GAO

Report to the Chairman, Subcommittee on Transportation and Related Agencies, Committee on Appropriations, U.S. Senate

June 1994

AIRPORT IMPROVEMENT PROGRAM

Reliever Airport Set-Aside Funds Could Be Redirected

GAO/RCED-94-226

GAO

United States
General Accounting Office
Washington, D.C. 20548

Resources, Community, and
Economic Development Division

B-257609

June 30, 1994

The Honorable Frank R. Lautenberg
Chairman, Subcommittee on Transportation
and Related Agencies
Committee on Appropriations
United States Senate

Dear Mr. Chairman:

This report is one of a series of reports responding to your request that we review the Airport Improvement Program (AIP), the nation's major program for planning and improving its airport infrastructure.[1] Administered by the Federal Aviation Administration (FAA), this multibillion-dollar program includes set-asides, or legislatively established funding categories, for specific uses. One set-aside provides AIP funds for projects at general aviation[2] airports called "relievers." This set-aside was created by the Congress to (1) reduce congestion at commercial airports by improving reliever airports and (2) provide general aviation with additional access to airports. As agreed with your office, we examined the degree to which these objectives have been addressed. In addition, as agreed, we are also providing you with information regarding FAA's allocation of the reliever set-aside funds and potential alternatives to the current set-aside structure.

Results in Brief

FAA does not consider general aviation to be a significant factor in congestion at commercial airports today. During 1983 to 1991, the proportion of general aviation traffic decreased by 38 percent at the nation's congested commercial airports. This decrease can be attributed to an overall decline in general aviation activity, not the presence of reliever airports. Further, FAA and aviation industry group officials consider access to general aviation facilities to be sufficient—and often more than sufficient—in most areas where relievers are located. At five major metropolitan areas we reviewed, most reliever operators said that

[1]Other reports include Airport Improvement Program: Allocation of Funds From 1982 to 1992 (GAO/RCED-94-14FS, Oct. 19, 1993), Airport Improvement Program: Better Management Needed for Funds Provided Under Letter of Intent (GAO/RCED-94-100, Feb. 2, 1994), and Airport Improvement Program: Military Airport Program Has Not Achieved Intended Impact (GAO/RCED-94-209, June 30, 1994).

[2]General aviation consists primarily of noncommercial aviation traffic, involving corporate jets and turboprop aircraft, or recreational light single or twin engine aircraft, for instance.

diminishing general aviation traffic resulted in competition among airports for the same general aviation users.

FAA still plans to continue to designate 5 percent of all Airport Improvement Program funds to add to the $2 billion already set aside since 1982 for reliever airport projects. However, FAA does not know whether funding projects at relievers has actually reduced congestion or improved general aviation access to airports because it has not analyzed the effect of this funding on the airport system. Moreover, although FAA projects only a relatively small growth in general aviation traffic over the next 12 years, it has not analyzed whether the growth justifies the future expenditure of funds for reliever airports.

The reliever airport set-aside funds could be redirected. One option is to reduce the number of airports designated as relievers so that only those that currently have the facilities to accommodate large general aviation aircraft—the only forecasted growth segment of general aviation—would be included in the set-aside. A second option is to eliminate the designation altogether and have these airports compete with all other general aviation airports for general aviation development funds.

Background

Through AIP, FAA provides grants to support airport planning and development projects that enhance capacity, safety, and security and mitigate noise at airports included in FAA's National Plan of Integrated Airport Systems (NPIAS).[3] FAA allocates most AIP funds on the basis of a legislated entitlement formula and has set-aside categories earmarked for specific types of airports or projects. The set-aside that supports reliever airports is one of five specially legislated categories (see app. I for a description of AIP funding categories).

The Congress defined relievers as those airports that (1) relieved congestion at a commercial airport and (2) provided additional general aviation access to the community. From 1982 to 1993, the Congress set aside 10 percent of all AIP funds, or about $160 million a year, for reliever airports.[4] In 1994, the Congress reduced the reliever set-aside from 10 percent to 5 percent and appropriated only about half of the total AIP funding requested by the administration. This resulted in the reliever

[3]NPIAS is FAA's 10-year planning document intended to identify airports and projects critical to the national system. NPIAS includes approximately 3,300 airports. An airport must be included in NPIAS to be eligible for AIP funding.

[4]All dollar amounts used in this report have been adjusted to 1993 fiscal year constant dollars.

airport set-aside's receiving about $40 million for projects in 1994.[5] FAA officials said they proposed the reliever set-aside's reduction because they felt reliever airports had been fully developed and no longer required as much funding as had been previously allocated. The Congress also provides AIP funds to more than 2,400 public-use general aviation airports that have not been designated as reliever airports. Through a legislated formula, AIP provides 11 percent of total AIP funding to projects at general aviation airports. This formula remained unchanged in the 1994 legislation.

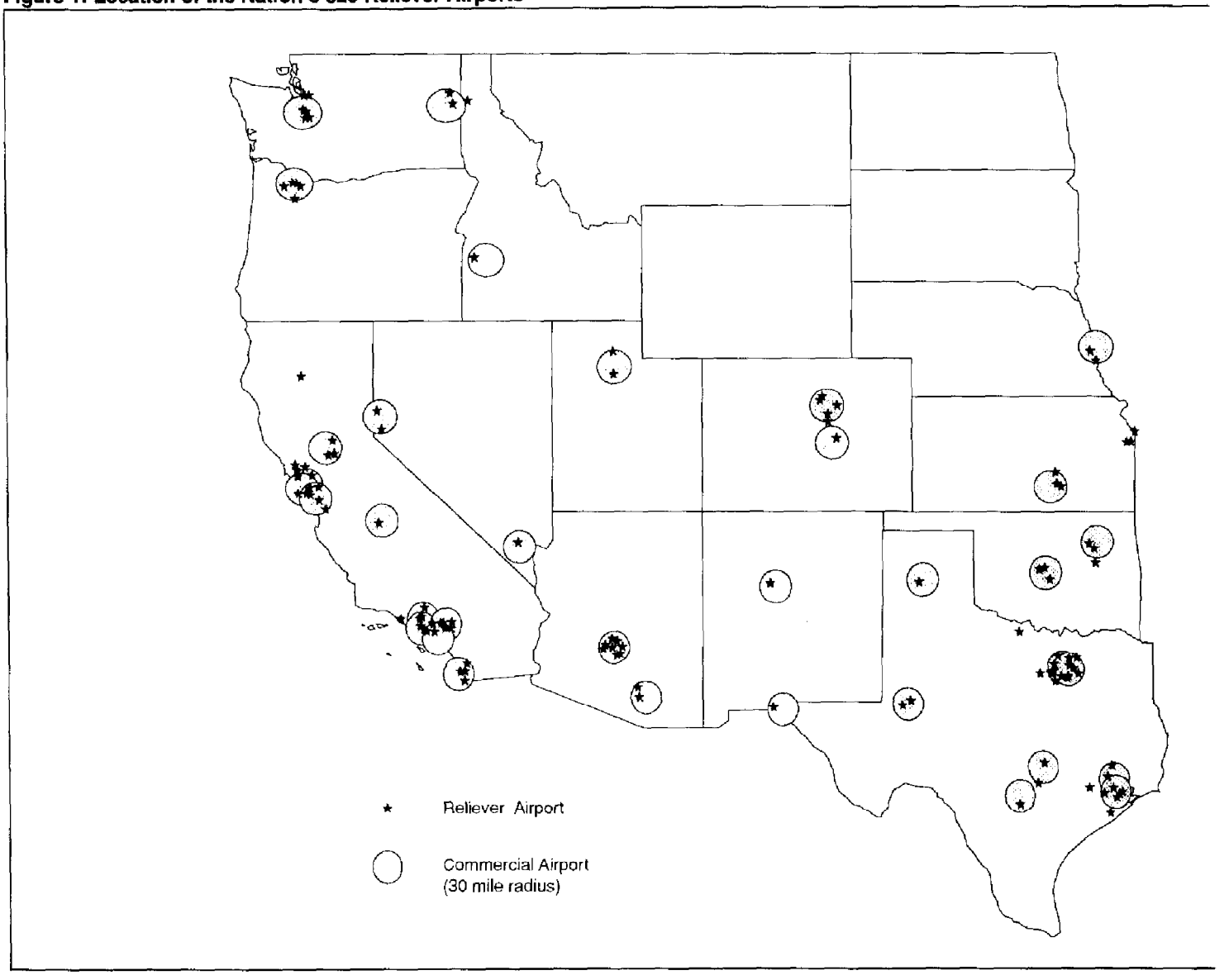
FAA's eligibility criteria for reliever airports have remained the same although the set-aside was reduced. FAA required that to be a reliever, the airport should have at least 50 aircraft based at the airport or a minimum of 35,000 annual operations (take-offs and landings). FAA may also name an airport a reliever if it determines that the airport is in a desirable location for instrument training activity. With FAA's concurrence, state and local planning authorities can designate an airport as a reliever even if it does not meet the above criteria.

Since 1982, FAA has designated 329 reliever airports.[6] NPIAS unites, or "links," 246 of these relievers to specific commercial airports. Most of the 329 relievers are located near major metropolitan areas (see fig. 1).

[5]The 1994 Airport Improvement Program Temporary Extension Act (P.L. 103-260) was signed into law on May 26, 1994.

[6]Some of the 329 reliever airports either are not yet operational or have developed into commercial airports.

Figure 1: Location of the Nation's 329 Reliever Airports



Relievers range greatly in size and equipment. For example, one reliever airport in Van Nuys, California, has an 8,000-foot runway, navigational aids for all-weather landings, over 450,000 annual operations, and almost 1,000 aircraft based there. Another reliever in Albany, New York, has a 2,860-foot runway, no navigational aids, about 16,000 annual operations,

and fewer than 40 aircraft based there. Airports such as the one in Van Nuys can accommodate larger general aviation aircraft, such as corporate jets and turboprops, for which a longer runway is preferable. Such airports also have the ability to operate in all types of weather. On the other hand, airports like the one in Albany accommodate only the smaller general aviation aircraft and do not operate in inclement weather.

Since fiscal year 1982, the reliever set-aside has funded a total of about $2 billion in grants. FAA regions rank each reliever airport's application for project funding on a priority system relative to other applications within the region and then send their list to FAA headquarters. FAA then allocates this money among eight of its nine regions (the Alaska region has no reliever airports) on a project-by-project basis. The reliever funds can provide up to 90 percent of a project's cost. The grants usually are for general capital improvements, such as runway or taxiway development, expansion, or reconstruction, but FAA also approves grants for such other uses as airport master plans, airfield lighting, or security fencing.

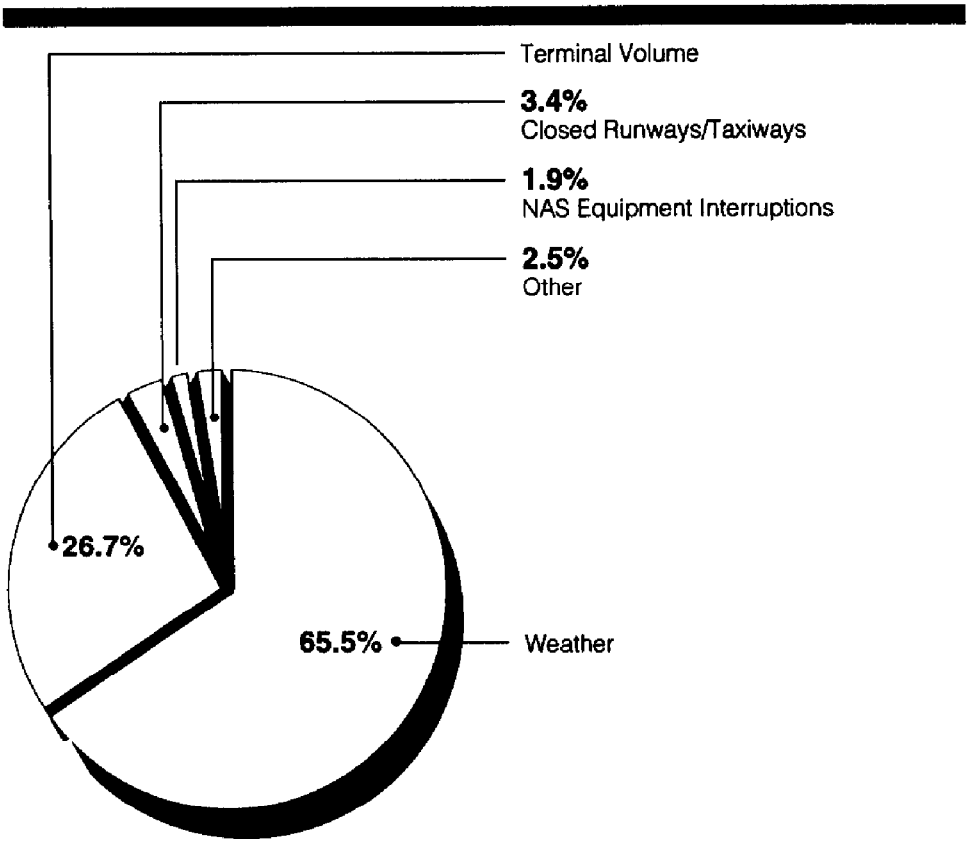
Conditions That Prompted Establishment of Relievers Are Currently Not of Concern

The conditions that led to setting aside AIP funds for reliever airports do not generally exist today. According to FAA's 1993 Aviation System Capacity Plan, the current level of general aviation traffic at the nation's commercial airports is not a major factor in congestion and delays. Further, the decline in general aviation traffic has meant that an oversupply of general aviation capacity now exists among reliever airports in many areas.

General Aviation Not a Factor in Delays at Commercial Airports

To analyze current delays in the air traffic control system, FAA, in its 1993 capacity plan, compiled data from the air traffic operations management system and airlines for calendar year 1991, the most recent year for which complete data were available. FAA's analysis showed the dominant cause for delays in the air traffic system was weather conditions, followed by terminal volume, closed runways and taxiways, and equipment problems. General aviation was not identified as a major cause of delay (see fig. 2).

Figure 2: FAA's Determination of Primary Causes of Delay in the Air Traffic System, Fiscal Year 1991



Source: FAA.

Between 1979 and 1993, the amount of general aviation traffic nationwide at all airports with FAA control towers declined by about 32 percent, according to FAA. Our analysis of general aviation traffic at commercial airports showed that between 1983 and 1991, general aviation traffic declined by about 19 percent at the 91 commercial airports that have relievers around them; for the nation's 23 congested airports,[7] the figure was 24 percent. In addition, we found that there was a decline of about 28 percent in general aviation traffic as a proportion of total air traffic at the 91 commercial airports that have relievers around them; for the 23 congested airports, the figure was 38 percent.

[7]For the purposes of this report, we use the term "congested airport" to replace FAA's term "delay problem airport." See app. II for further information about these congested airports.

FAA's criteria suggest that general aviation traffic could be a major problem at only 1 of the nation's 23 congested airports—Honolulu International. FAA's 1993 capacity plan states that reliever airports could help reduce delays at congested airports if general aviation traffic constitutes more than 25 percent of all aircraft operations. Honolulu International, having 28 percent general aviation traffic in 1991, is the only one of the nation's congested airports that meets this criterion.

Although congestion caused by general aviation at commercial airports was a consideration when the reliever program was established, it has largely ceased to be one now. However, relievers appear to have played an extremely limited role in bringing this about. Using a regression model, we tested the relationship between the level of general aviation activity at commercial airports in 1991 and such factors as the number of relievers linked to these airports, the amount of set-aside funding these relievers received, and the facilities they had.[8] If a clear relationship existed, one would expect, for example, that general aviation traffic would be lower at those commercial airports that had more relievers, or relievers that were better equipped. However, our analysis showed no notable relationship between the level of general aviation at commercial airports and any of the characteristics associated with the reliever airports around them. The results of our analyses suggest strongly that an overall decline in nationwide general aviation traffic, rather than characteristics associated with reliever airports, is what is having the strongest effect on keeping general aviation levels down at commercial airports (see app. III for a more detailed technical discussion of the regression model and its results).

[8]A regression model is a type of statistical model that investigates relationships among variables. For this study, we used an ordinary least squares regression model to examine which factors were associated with the 1991 general aviation traffic levels at commercial airports having at least one linked reliever airport receiving AIP set-aside funding between fiscal year 1982 and fiscal year 1993. We developed several variations on the model, looking at the contribution that each factor made to the predictive ability of the model, and the overall explanatory power of the model. We included two control variables—the 1983 level of general aviation traffic at the commercial airport and a measure of the airport's size—in the versions of the model we tested. We also included various combinations and interactions of factors in the analysis. We included in the final model only those factors that contributed significantly to its predictive ability.

General Aviation Access Often Considered Excessive in Areas Where Relievers Are Located

To provide an indication of whether general aviation has adequate access to airport facilities, we analyzed five major metropolitan centers with a total of 34 relievers linked to their commercial airports.[9] We interviewed officials at 28 of these 34 relievers to, among other things, obtain their views as to the adequacy of general aviation access in the area. Officials at 22 of the 28 reliever airports told us they considered reliever airports within their metropolitan system to be underused. They pointed to the shrinking size of the general aviation market as a cause and said the shrinking market was forcing them to compete for customers.

The situation in the Phoenix metropolitan area was representative of the conditions we found. The area has six reliever airports for Phoenix Sky Harbor International Airport. Operators of five relievers told us their airports were underused and could accommodate more traffic. The reliever set-aside funded expansion, improvement, or development projects at all of these airports between 1982 and 1993. Apart from work under the reliever program, FAA has recommended developing an additional runway for Phoenix Sky Harbor. However, 23 percent of Phoenix Sky Harbor's air traffic in 1991 was general aviation, placing it close to FAA's 25-percent indicator that reliever airports could help reduce delays at busy airports. According to this criterion, the additional runway may not be needed if some of Phoenix Sky Harbor's general aviation traffic used nearby reliever airports. In addition, a recently closed U.S. Air Force base plans to open for civilian use by the fall of 1994 and will be able to accommodate both general aviation and commercial traffic.

The situation in Houston, Texas, was similar. The area had eight relievers for Houston Intercontinental Airport and Houston Hobby International Airport, including two that are now commercial airports. All eight airports received set-aside funds for planning or improvement projects. The operators of the remaining six reliever airports said they had to compete with one another for diminishing general aviation traffic. As part of the reliever program, FAA has also funded planning studies for the development of a new Houston reliever airport, although all of the reliever airport operators said there was no need for more general aviation access.

[9]The five metropolitan centers were as follows: Boston, Massachusetts (Boston-Logan International Airport); Chicago, Illinois (Chicago O'Hare International Airport and Chicago Midway International Airport); Houston, Texas (Houston Intercontinental Airport and Houston Hobby Airport); Phoenix, Arizona (Phoenix Sky Harbor International Airport); and Seattle, Washington (Seattle-Tacoma International Airport).

FAA Lacks Information to Determine If Current Set-Aside Is Needed

FAA continues to allocate funds to reliever airports but does not know whether set-aside funds have actually reduced congestion or improved general aviation access because it has not analyzed the effect of funding reliever airports on the airport system. Moreover, although FAA projects only a relatively small growth in general aviation traffic over the next 12 years, it has not analyzed whether the growth justifies future funding for reliever airports.

FAA Does Not Have Data to Measure Impact of Current Projects

FAA officials acknowledge that general aviation is not a factor in congestion at busy commercial airports and that they do not know how many relievers are needed to provide adequate general aviation access. However, FAA continues to allocate set-aside funds to relievers on a project-by-project basis. FAA does not assess a region's need for reliever airports relative to overall system needs. Likewise, in deciding which reliever projects to fund within the region, FAA officials do not determine the general aviation capacity needs of the metropolitan area involved or consider the number of relievers with specific facilities already serving the area. Thus, the reliever set-aside funds may go for a project that is important to an airport's operation, such as runway reconstruction, without consideration of whether the airport itself is needed in the reliever system.

Although expenditures under the reliever set-aside have produced many improvements for the airports involved, the current allocation method generally lacks clear direction and purpose. For example, the Chicago metropolitan area has eight reliever airports to serve the area's two commercial airports, Chicago O'Hare International and Midway International. Airport officials for both airports said that Chicago O'Hare International Airport's congestion problem is not attributable to general aviation traffic. Moreover, the officials consider the only airports truly capable of relieving O'Hare to be nearby commercial airports, such as Rockford International, that can accommodate larger commercial aircraft. However, Rockford International is not part of the reliever system. Meanwhile, underused airports exist among the relievers; of the six reliever airport operators we met with, four said their airports were underutilized, and five said they competed with one another for limited general aviation traffic. Yet the eight reliever airports have received more than $140 million, or about 7 percent of reliever set-aside funds allocated since fiscal year 1982, to improve their facilities.

FAA Projects Little General Aviation Growth but Does Not Know Future Capacity Needs

FAA's projections for general aviation traffic suggest that the future role of reliever airports in alleviating congestion and delays would likely remain small. However, FAA has not conducted any comprehensive analysis to determine how much general aviation capacity exists and how much may be required in the future. In its Aviation Forecasts: Fiscal Years 1994-2005, FAA projected relatively little growth in overall general aviation activity over the next 12 years. FAA's forecast assumes that proposed legislation limiting the liability of manufacturers of general aviation aircraft will be enacted in 1994-95 timeframe. Without passage of this product liability legislation, FAA's forecast could be considerably lower. In the current forecast, FAA does foresee a significant increase in one segment of general aviation—larger general aviation aircraft such as turboprops and turbojets.[10] These types of aircraft, which constitute about 5 percent of the general aviation fleet, are the ones that aviation association officials say are most likely to use commercial airports.

If the larger general aviation aircraft market does contribute to congestion at commercial airports in the future, most reliever airports would likely be of little help. Most reliever facilities or locations cannot accommodate the larger general aviation market. Aviation association officials told us that pilots of larger general aviation aircraft generally prefer airports that have at least a 5,000-foot runway, navigational aids (like an instrument landing system) that allow all-weather operations, and a location near major business centers. Currently, FAA does not consider facilities or proximity to major business centers when it designates reliever airports. Moreover, FAA does not determine whether reliever airports are strategically located near areas that may incur growth in larger general aviation traffic in the future. Of the 246 reliever airports linked to a commercial airport, 67, or 27 percent, have the facilities desired by larger general aviation aircraft pilots. But of the 67, only 32 are located near congested airports.

Options for Restructuring Reliever Set-Aside

The recent reduction in the reliever set-aside changed the funding for the nation's reliever airports, but their mission—to reduce congestion and provide additional access—remains the same. Although fewer funds will be set aside for relievers, FAA does not foresee changing the eligibility requirements for reliever airports. A senior FAA headquarters official told us that reliever airports had been fully developed and do not require as much funding as previously received. Given that there is no demonstrated impact of reliever set-aside funds on congested commercial airport

[10]FAA projects that the hours flown by single engine piston and multiengine piston general aviation aircraft will decrease by 13.39 percent by the year 2005. FAA projects that the hours flown by turboprop and turbojet general aviation aircraft will increase by 56.7 percent by the year 2005.

capacity, and given the limited need for additional general aviation access that relievers provide, the set-aside funds could be further redirected. One option would be to further reduce the set-aside and reduce the number of designated reliever airports. In this option, only those relievers that could accommodate larger general aviation aircraft traffic—the only forecasted growth segment of general aviation—would be included in the set-aside. Another option would be to eliminate the designation of "reliever" entirely and eliminate the set-aside altogether.

Reducing the Number of Airports Designated as Relievers

Scaling back the number of relievers appears to have wide support. Some FAA and general aviation association officials agree that too many airports are in the reliever program. FAA officials said most relievers were designated years ago and continue in the program because it is FAA's only way to show priority among over 2,400 public-use general aviation airports. Our interviews with operators of reliever airports also showed widespread feelings that there may be too much competition for federal funds among relievers.

FAA and aviation association officials discussed the feasibility of creating a two-tiered system of relievers, similar to an approach studied by the state of Illinois, when deciding how to fund projects at reliever airports.[11] This scenario could provide FAA with a method to target scare resources to those reliever airports that may provide the most benefit to the national air transportation system. The first tier would include those reliever airports that could accommodate larger general aviation traffic. In the Illinois plan, first-tier relievers must already have such facilities as a runway at least 5,000 feet long, a precision instrument landing approach, and an FAA or FAA-contract air traffic control tower. Currently, 67 of the designated relievers meet the requirements, and only 32 of those are linked to congested commercial airports. Second-tier relievers essentially relieve the first-tier relievers of their small single and multiengine general aviation aircraft traffic.

The option of a reduced program, however, has a potential problem. Given that neither congestion nor access is a current concern, it may be difficult to identify which airports should be retained in a reduced program and receive set-aside funds. FAA has not developed a means to assess overall general aviation access needs to determine how many relievers, regardless

[11]Illinois participates in FAA's State Block Grant Pilot Program. States participating in the program receive AIP funding that FAA would traditionally allocate to projects at general aviation and reliever airports in these states. The states then determine which projects and which airports receive the AIP funds.

of their facilities, are needed. One possibility could be to narrow the list to only those airports that (1) are linked to congested commercial airports and (2) have facilities that can serve larger general aviation aircraft. This would reduce the number of relievers from 329 to as few as 32.

If the number of relievers is reduced, a reexamination of the set-aside would be appropriate. FAA intends to use the 5-percent set-aside to fund projects at the same number of reliever airports as were eligible for funding under the 10-percent set-aside. A more narrowly defined reliever program would allow the set-aside funding to be more effectively directed to those airports that currently meet the set-aside's objectives. The remaining relievers that do not meet both objectives could be funded the same as all other general aviation airports.

Eliminating the Designation of Relievers Within AIP

Discontinuing the reliever set-aside has support among some FAA officials who view the set-aside as restricting their flexibility to use AIP funds for projects they deem most essential regardless of the type of airport. If the reliever set-aside were eliminated from AIP, reliever airports could be funded the same as all other general aviation airports. FAA officials cautioned, however, that without the set-aside, most funding could go to larger airports that have extensive project needs.

Understandably, operators of reliever airports would prefer to compete in a set-aside that provided proportionally more AIP funds than in a category that provided proportionally less funds to a greater number of airports. However, many airport operators thought that their airport would receive about the same level of AIP funds with or without the set-aside. The operators believed that FAA would continue to prioritize their projects above other general aviation airports regardless of the structure of the set-aside. The operators perceived that FAA would place more importance on their projects because they played a more strategic role in the regional system.

Conclusions

The reliever set-aside is at a crossroads. The conditions that the reliever set-aside was created to address do not exist today, largely because of a long and steady decline in general aviation traffic—a trend unforeseen when the set-aside was created. FAA acknowledges that the nation may have too many reliever airports but has not conducted any detailed studies or analysis to identify which relievers contribute to the national system of airports. Without data to identify and prioritize reliever airports, FAA may

be providing funds to relievers that are not in a position to play a prominent role in the nation's airport system. With the appropriate information, FAA would be in a better position to target its AIP resources to public-use airports that could contribute to enhancing the national air transportation system.

Recommendations

The Administrator, Federal Aviation Administration, should undertake the following steps to improve FAA's ability to determine the use of reliever set-aside funds:

- Develop and formalize criteria to determine (1) when reliever airports could provide relief from congestion caused by general aviation traffic and (2) how much general aviation access is required nationwide and for metropolitan areas that have commercial airports.
- Develop and analyze data to determine whether the current number of relievers—in combination with other general aviation airports—is appropriate for serving the current and future general aviation traffic.
- Use the newly developed criteria and data to validate future development needs at reliever and general aviation airports.

Matters for Congressional Consideration

To ensure that AIP project funds are directed at the most important needs in the nation's air transportation system, the Congress may wish to consider reducing the number of eligible reliever airports or further reducing the set-aside for reliever airports upon receipt of information from FAA regarding the need for such airports. If it chooses to further downsize the program, the Congress would need to specify the percentage of AIP funds to be set aside for relievers and redirect any remaining portion of the set-aside for other purposes. Likewise, if it chooses to eliminate the program, the Congress would need to specify how the current set-aside is to be redirected.

Agency Comments

As requested, we did not obtain written comments on a draft of this report. However, we discussed our findings and recommendations with FAA's Manager, Airports Financial Assistance Division, Office of Airport Planning and Programming; Manager, Programming Branch, Airports Financial Assistance Division, Office of Airport Planning and Programming; and with FAA and Department of Transportation officials. FAA officials generally agreed with our finding that the conditions contributing to the creation of the reliever set-aside no longer exist, but

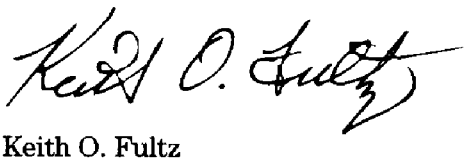
they felt that we had not acknowledged the role played by reliever airports in changing these conditions. However, the findings of our regression analyses did not support a conclusion that reliever airports have had a significant role. Our regression analyses strongly suggest that an overall decline in nationwide general aviation traffic, rather than any of the characteristics associated with reliever airports, is what is having the strongest effect on reducing general aviation levels at commercial airports. FAA officials were unable to provide other data supporting their view. For all other issues raised by FAA officials, we incorporated their comments and made clarifications in the text as appropriate. FAA officials generally agreed with our policy options and recommendations.

We performed our review between October 1993 and June 1994 in accordance with generally accepted government accounting standards. Additional details on our scope and methodology are contained in appendix III.

As agreed with your office, unless you publicly announce its contents earlier, we plan no further distribution of this report until 10 days from the date of this letter. At that time, we will send copies to appropriate congressional committees; the Secretary of Transportation; the Administrator, FAA; the Director, Office of Management and Budget; and other interested parties. We will make copies available to others on request.

This report was prepared under the direction of Kenneth M. Mead, Director, Transportation Issues, who may be reached at (202) 512-2834. Other major contributors are listed in appendix IV.

Sincerely yours,



Keith O. Fultz
Assistant Comptroller General

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Abbreviations

AIP	Airport Improvement Program
FAA	Federal Aviation Administration
NPIAS	National Plan of Integrated Airport Systems

Description of Airport Improvement Program Funding Categories

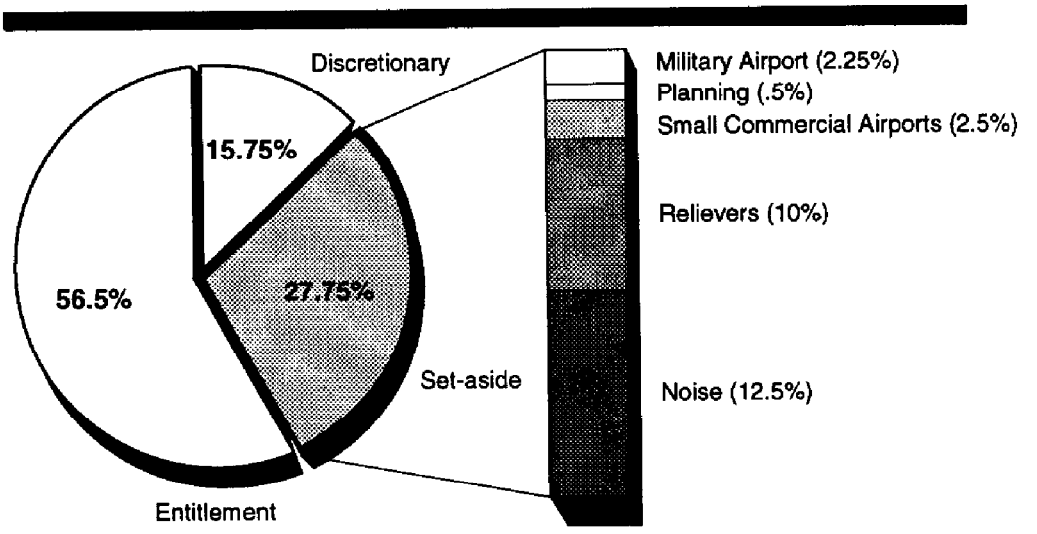
As authorized by the Airport and Airway Improvement Act of 1982 and amended in 1987, 1990, 1992, and 1994, the Airport Improvement Program (AIP) provides grants to improve our nation's airport infrastructure and enhance systemwide capacity. To attain these goals, FAA is required to allocate over half of the total annual AIP funding through entitlement formulas to primary and cargo airports and to states for use at general aviation airports. As shown in figure I.1, the Congress also established five set-aside categories with specified funding limits to direct about 28 percent of AIP funds to certain types of airports and projects.[1] These five set-asides are for (1) reliever airports; (2) the Military Airport Program (MAP), (3) small commercial service airports,[2] (4) noise mitigation, and (5) planning. The remaining AIP funds can be allocated at FAA's discretion, but most go to projects related to capacity, safety, security, or noise mitigation. Our prior work discusses in detail the AIP and FAA's process for allocating these funds[3].

[1]The Airport Improvement Program Temporary Extension Act of 1994 (P.L. 103-206) decreased the amount of total funding directed to the 5 set-aside categories in fiscal year 1994 to 22.25 percent.

[2]Small commercial service airports enplane more than 2,500 but less than 10,000 passengers annually.

[3]Airport Improvement Program: Allocation of Funds from 1982 to 1992 (GAO/RCED-94-14FS)

Figure I.1: AIP Funding Categories Through Fiscal Year 1993



Note: The 1994 legislation reauthorizing the AIP increased the planning set-aside from 0.5 to 0.75 percent and decreased the small airports and the reliever set-asides from 2.5 to 1.5 percent and from 10 to 5 percent, respectively. The MAP and noise set-asides remain unchanged.

Source: GAO's analysis of data from The Airport and Airway Safety, Capacity, Noise Improvement, and Intermodal Transportation Act of 1992 (P.L. 102-581).

General Aviation Traffic at the Nation's Congested Airports

Table II.1 shows the percentage change in general aviation from 1983 to 1991 at the 23 airports identified by the FAA as having delay problems.

Table II.1: Percentage Change in General Aviation Traffic as a Proportion of All Air Traffic at the Nation's 23 Congested Commercial Airports, 1983 to 1991

Airport	Percentage	Airport	Percentage
Atlanta-Hartsfield	–46	Newark	–64
Boston Logan	–47	New York-Kennedy	–44
Charlotte	–48	New York-LaGuardia	–49
Chicago O'Hare	–42	Orlando	–32
Dallas-Fort Worth	–58	Philadelphia	–40
Denver (Stapleton)	–57	Phoenix	–42
Detroit Metropolitan	–41	Pittsburgh	–59
Honolulu	4	San Francisco	–40
Houston Intercontinental	–35	Seattle-Tacoma	–77
Los Angeles	–33	St. Louis-Lambert	–43
Miami	–13	Washington National	–24
Minneapolis-St. Paul	–20		

Table II.2 shows the amount of general aviation traffic (as a percentage of all air traffic) at the 23 airports in 1991.

Table II.2: Percentage of Total Air Traffic Composed of General Aviation at the Nation's 23 Congested Commercial Airports, 1991

Airport	Percentage	Airport	Percentage
Atlanta-Hartsfield	3	Newark	5
Boston Logan	7	New York-Kennedy	5
Charlotte	15	New York-LaGuardia	5
Chicago O'Hare	4	Orlando	9
Dallas-Fort Worth	2	Philadelphia	13
Denver (Stapleton)	7	Phoenix	23
Detroit Metropolitan	13	Pittsburgh	5
Honolulu	28	San Francisco	8
Houston Intercontinental	14	Seattle-Tacoma	3
Los Angeles	8	St. Louis-Lambert	9
Miami	15	Washington National	19
Minneapolis-St. Paul	19		

Scope and Methodology

To obtain necessary data about the operation of the Airport Improvement Program (AIP), we reviewed information from a variety of sources. We began by reviewing legislation authorizing AIP together with FAA regulations, policies, and procedures for administering the program. To discuss FAA's method of reliever selection, project funding, and performance measurement, we interviewed FAA headquarters officials from (1) the Airports Financial Assistance Division, Programming Branch and (2) the Office of Aviation Policy, Plans, and Management Analysis; and officials in five of FAA's nine regions. To obtain information on the airport operators' perspectives on the program, we interviewed airport officials at 28 reliever airports and 7 commercial airports and discussed reliever airports' role in reducing congestion and providing additional general aviation access. We also interviewed officials from the Aviation Operators and Pilots Association; General Aviation Manufacturers' Association; National Association of State Aviation Organizations; and National Business Aviation Association to discuss their views on the reliever set-aside.

The following is a list of FAA regions and airports visited.

FAA Regions

Great Lakes Region, Des Plaines, IL
New England Region, Burlington, MA
Northwest Mountain Region, Renton, WA
Southern Region, Airport District Office, Memphis, TN
Southwest Region, Fort Worth, TX

Commercial Airports

Boston Logan International Airport, Boston, MA
Chicago O'Hare International Airport, Chicago, IL
Ellington Field, Houston, TX
Houston Intercontinental (Houston Department of Aviation), Houston, TX
St. Louis-Lambert International Airport, St. Louis, MO
Phoenix Sky Harbor International Airport, Phoenix, AZ
Seattle-Tacoma International Airport, Seattle, WA

Reliever Airports

Auburn Municipal Airport, Auburn, WA
Aurora Municipal Airport, Sugar Grove, IL

Bedford-Hanscom Airport, Bedford, MA
Beverly Municipal Airport, Beverly, MA
Boire Field, Nashua, NH
Brazoria County Airport, Angleton, TX
Chandler Municipal Airport, Chandler, AZ
Clover Field, Houston, TX
David Wayne Hooks Airport, Tomball, TX
Dupage Airport, West Chicago, IL
Glendale Municipal Airport, Glendale, AZ
La Porte Municipal Airport, La Porte, TX
Lansing Municipal Airport, Lansing, IL
Lawrence Municipal Airport, North Andover, MA
Lewis Municipal Airport, Romeoville, IL
Mesa/Falcon Field, Mesa, AZ
Montgomery County Airport, Conroe, TX
Norwood Municipal Airport, Norwood, MA
Paine Field, Everett, WA
Palwaukee Municipal Airport, Wheeling, IL
Phoenix Deer Valley Airport, Deer Valley, AZ
Phoenix Goodyear Airport, Goodyear, AZ
Scottsdale Airport, Scottsdale, AZ
Sugar Land Municipal Airport, Sugar Land, TX
Waukegan Municipal Airport, Waukegan, IL
West Houston Airport, Houston, TX

Regression Analysis

We developed a regression model to examine the factors associated with 1991 general aviation traffic levels at commercial airports with linked reliever airports. A regression model is a type of statistical model that investigates the relationships among variables. For this study, we used regression analysis to explore which factors, called independent variables, are associated with the 1991 general aviation traffic levels, called the dependent variable.

We developed the data set necessary for our model using data from three sources. The first source was AIP project data for 1982-93, which we obtained from the FAA officials in the Airports Financial Assistance Division, Programming Branch. This database contains a record for any project at a reliever airport that received AIP set-aside funding, including information on the type of project and the funding amount. The second source was automated airport control tower aircraft records for 1983-91, which we obtained from FAA's Office of Aviation Policy, Plans, and

Management Analysis. This database contains records for any airport with a control tower, and includes variables related to the traffic levels/patterns at that airport. We did not test the reliability of either of these automated databases; however, in using the data we did not find any values that seemed improbable. The third source was a database we developed from airport facility directories obtained from the FAA's program manager for Landing. This database contains a record for each of 329 reliever airports, including variables related to the particular facilities available at that airport, such as runway length and the presence of navigational aids (particularly, an instrument landing system) at the two longest runways at each reliever airport. From these three sources we developed a data set that included characteristics of both the commercial airport and its linked relievers. The data set contained a record for each commercial airport whose linked relievers received any AIP set-aside funding between fiscal year 1982 and fiscal year 1993. The final data set had a record for each of 91 commercial airports; however, we deleted 1 of these airports because its relievers had developed commercial service. Therefore, the regression model was based on data for 90 commercial airports having at least 1 linked reliever airport receiving AIP set-aside funding between fiscal year 1982 and fiscal year 1993.

To examine which factors are associated with the 1991 general aviation traffic levels at these 90 commercial airports, we used an ordinary least squares regression model. We developed several different models, looking at the contribution each independent variable made to the predictive ability of the model, and the overall explanatory power of the model as measured by the R-squared. R-squared is a measure of the proportion of the total variation in the dependent variable that can be explained by the independent variables in that particular model.

The different models we tried contained various combinations and interactions of independent variables. Our initial dependent variable was the level of general aviation traffic at the commercial airport in 1991, measured as the proportion of total operations in 1991 due to either local or itinerant general aviation operations. In these models, we included two variables to control for particular characteristics of the commercial airport. The first of these control variables was the historic level of general aviation traffic at the commercial airport, measured as the proportion of the total operations in 1983 due to either local or itinerant general aviation operations. The second control variable was the number of total operations at the commercial airport in 1991, a measure of the airport's size. We chose the other independent variables to determine if the

characteristics of a commercial airport's linked relievers were associated with the level of general aviation traffic at that commercial airport. We included in the model factors related to the AIP set-aside program that measured the particular characteristics of the commercial airport's linked relievers, as well as the amount of AIP funding received by these relievers. These other independent variables included in the models are the following:

- The amount of AIP set-aside funding received by the commercial airports' linked relievers between fiscal year 1982 and fiscal year 1993 (in constant fiscal year 1993 dollars).
- The amount of AIP set-aside funding (in constant fiscal year 1993 dollars) received by the commercial airports' linked relievers between fiscal year 1982 and fiscal year 1993, specifically related to either lengthening of runways, addition of navigational aids such as an instrument landing system, addition of lighting, and airport expansion.
- The number of reliever airports linked to the commercial airport.
- The shortest straight-line mile between the commercial airport and its linked reliever airports.
- The longest straight-line mile between the commercial airport and its linked reliever airports.
- The average straight-line miles between the commercial airport and its linked reliever airports.[1]
- The number of runways that were 5,000 feet or longer at reliever airports linked to the commercial airport (for the two runways at each reliever for which we had data).
- An indicator variable whose value was 1 if at least one of the runways at reliever airports linked to a commercial airport was at least 5,000 feet or longer (for the two runways for which we had data). For all other commercial airports the indicator's value was 0.
- The number of runways with an instrument landing system at reliever airports linked to the commercial airport (for the two runways at each reliever for which we had data).
- An indicator variable whose value was 1 if at least one of the runways at reliever airports linked to the commercial airport had at least one runway having an instrument landing system (for the two runways for which we had data). For all other commercial airports the indicator's value was 0.
- The number of runways that either had an instrument landing system or were 5,000 feet or longer at reliever airports linked to the commercial airport (for the two runways at each reliever for which we had data).

[1]We were unable to calculate the straight-line miles between three of the commercial airports and one of each of their reliever airports. Therefore, for these three airports all distances are based only on the remaining linked relievers.

- An indicator variable whose value was 1 if at least one of the commercial airport's linked reliever airports had at least one runway that was either 5,000 feet or longer, or had an instrument landing system (for the two runways for which we had data). For all other commercial airports the indicator's value was 0.
- The number of runways with an instrument landing system that were 5,000 feet or longer at reliever airports linked to the commercial airport (for the two runways at each reliever for which we had data).
- An indicator variable whose value was 1 if at least one of the commercial airport's linked reliever airports had at least one runway that was both 5,000 feet or longer, and had an instrument landing system (for the two runways for which we had data). For all other commercial airports the indicator's value was 0.

None of the coefficients for these other independent variables were statistically significant at the 95 percent confidence level in any of the models we developed that included our two control variables. In addition, only one of these control variables, the 1983 general aviation traffic level at the commercial airport, had a statistically significant coefficient at the 95 percent confidence level. Therefore, our resulting model had only one independent variable—the level of general aviation traffic at the commercial airport in 1983. However, diagnostic plots and tests revealed evidence that two of the inherent assumptions in the regression model were violated. To remedy these violations, we transformed the dependent variable. The transformation that remedied both problems was the square root. That is, our new dependent variable was the square root of our original dependent variable.

With this new dependent variable, we re-tested all the independent variables, again including in each model the two variables that control for characteristics of the commercial airport (the 1983 level of general aviation traffic and the measure of size). In each model including the control variables, none of the coefficients for the other independent variables were statistically significant at the 95 percent confidence level. The only independent variables in the resulting model with statistically significant coefficients at the 95 percent confidence level were the two control variables. Diagnostic plots and tests revealed no evidence that the inherent assumptions in the regression model were violated, so this became our final regression model.

The dependent variable in our final model was the 1991 general aviation traffic level, measured as the square root of the proportion of 1991

operations at the commercial airport due to either local or itinerant general aviation operations. The final model has two independent variables. The first independent variable is the level of general aviation traffic in 1983, measured as the proportion of total operations due to either local or itinerant general aviation operations. The second variable is the number of total operations at the commercial airport in 1991, included as a measure of size. The R-squared value is .89 for this model. Table III.1 contains the results of this regression model.

Table III.1: Estimates of the Parameters for Regression Model

Explanatory Factor	Coefficient	Standardized Coefficients[a]
Intercept	.2579 (.0001)	.0000
Proportion of total operations in 1983 due to either local or itinerant general aviation operations at the commercial airport	.7699 (.0001)	.8610
Number of total operations in 1991 at the commercial airport	-.0000002 (.0016)	- 1388

Note: The p-values for the coefficients are in parentheses.

[a]The standardized coefficients are computed by dividing the coefficient by the ratio of the sample standard deviation of the dependent variable to the sample standard deviation of the factor.

These regression results indicate that none of the characteristics of the commercial airport's linked relievers we tested were associated with the 1991 level of general aviation traffic at that airport, once the airport's historic level of general aviation traffic and size are taken into account.

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