

Defining the Philadelphia Regional Reliever Airport System

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This paper describes the federally funded procedure developed to identify the necessary "reliever" airports in the Delaware Valley Region. The resulting study is the product of regional planning with input from local aviation and business interests. In order to analyze noncommercial airports in the region to determine necessary level of reliever facilities, eight criteria were developed. These criteria are (a) airport capacity contrasted with current and future demand, (b) compatibility with surrounding land uses, (c) final destination of arriving passengers, (d) public and private development commitment, (e) status of airport in state's plans, (f) geographic density of airport's coverage, (g) instrument flight rule coverage, potential and airspace conflicts, and (h) pilot/user amenities. Each airport was evaluated and scored with respect to each criterion and available federal standards. Comparative rankings were assigned to each facility. Criteria scores were totaled for each airport and ranges of total scores established for existing relievers and existing general aviation facilities. The major findings of the study, which were adopted regionally and transmitted to FAA as the local priority reliever system, are (a) each of the 12 current reliever airports should retain its classification; (b) eight airports currently classified as general aviation facilities should remain so in the regional, state, and federal system plans; and (c) four general aviation airports have operating characteristics and demand estimates at higher levels than the other general aviation airports and they are within the range of reliever airport scores—these four facilities should be reclassified as reliever for state and federal funding purposes.

The Delaware Valley Regional Planning Commission (DVRPC) has, since 1980, participated with the FAA in the planning for development of the Aviation System in the Philadelphia area. The DVRPC planning area includes over 5,000 sq mi in four states surrounding Philadelphia. The 12 counties making up the planning area are Bucks, Chester, Montgomery, Delaware, and Philadelphia in Pennsylvania; Camden, Gloucester, Mercer, Burlington, and Salem in New Jersey; New Castle in Delaware; and Cecil in Maryland. In this vast area there are over 100 airports and heliports, both privately and publicly owned, in operation privately or for the public. Under FAA contract, DVRPC, between 1980 and 1982, developed the Regional Airport Systems Plan (RASP) which identified 37 existing and 8 proposed aviation facilities which were determined by DVRPC and FAA to be the critical aviation infrastructure in the region (1). This RASP document has been maintained by DVRPC in a dynamic state since 1982 and is incorporated in the National Plan of Integrated Airport Systems (NPIAS) as the principal source of local input to FAA aviation funding priorities (2).

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Inclusion of airport facilities into the NPIAS is a necessary ingredient for public sector funding of certain capital improvements at both private and public airports in the region. FAA does not guarantee federal funding, which can be as high as 90 percent of project cost to NPIAS facilities, nor does it necessarily adopt into the NPIAS the facilities from the RASP automatically. Inclusion in the RASP, however, is the major channel through which federal and related states' funds flow to airports in the DVRPC region.

In order to distribute FAA development funds in a manner that supports the needs of diverse aviation functions in the region, all of the DVRPC RASP airports also contained in the NPIAS are classified in one of three service level categories. These categories, Primary and Other Commercial (C), Reliever (RL), and General Aviation (GA), correspond to percentage allocations of the annual federal grant funding under the Airport and Airway Improvement Act applicable through Federal FY1987. Airports in similar service level categories, other than commercial, within each federal region and state, compete with each other for these scarce allocations, on the basis of relative local need and impact of potential improvements. Introduction of new reliever airports will heighten the competitive atmosphere surrounding the grant program in the Delaware Valley Region. The purpose of this paper is for the 12-county region to develop a technical rationale and identify which airports, of the acknowledged RASP/NPIAS facilities, should be considered as relievers as opposed to general aviation facilities. Funding opportunities and potential development ramifications, based on FAA adoption of this study's conclusions, may be significant to certain local airport facilities.

Eligible airports for FAA Airport Improvement Program (AIP) funding must be open to public/corporate use and may be either publicly or privately owned. These airports fall into one of the three categories listed in the previous paragraph, which are described as follows:

- Primary Commercial—having .01 percent of U. S. annual total of passenger enplanements per year. Other Commercial—having 2,500 or more enplanements per year and scheduled service.
- Reliever Airport—General aviation airports that divert general aviation traffic from commercial airports, as well as serve a high level of local general aviation operations and based aircraft. The airport must also have instrument landing potential.
- General Aviation Airport—local airports intended to serve smaller craft used for a variety of business, personal, and training functions (2).

Given the future scarcity of public airport improvement funding, reliever airports represent, from a systems viewpoint, a funding mechanism that aids in the preservation of that portion of the regional airport system that is in private ownership. These private facilities may experience financial pressure to close because of operating losses or attractive nonaviation development buy-out. This is demonstrated by the closing sale, in recent years, of six privately owned public-use facilities in the RASP. Reliever status must, therefore, be considered for its impact to maintain the system as well as to operationally relieve demand during peak aircraft use periods.

STUDY OBJECTIVES AND METHODOLOGY

Legislatively, FAA funding for the commercial airports in the DVRPC RASP—Philadelphia International, Mercer County, and Wilmington—is established on a formula basis and directly related to passenger enplanements. These airports are publicly owned, are heavily supported by the investments of the air carriers based there, and form the backbone of the regional aviation system. However, the general aviation support subsystem embodied by the 23 reliever and general aviation airports in the RASP and the NPIAS have a far less definite future, because of indefinite public and private capital funding and economic developmental pressures. At the same time, the local need for these facilities increases to divert general aviation traffic from Philadelphia International, which is experiencing rapid growth in commercial operations.

The objectives of this study are to examine current RASP system general aviation facilities' demand and capacity and development trends in service areas, determine the potential of facilities to be expanded physically and enhanced operationally, and then to identify deficiencies and arrive at an updated recommended plan of reliever airports for the DVRPC system. This plan, after review input from local aviation interests, will be presented to FAA for potential amendment of the NPIAS.

The methodology used to accomplish this analysis is the following:

1. Identify RASP general aviation facilities.
2. Define regional criteria/priorities for reliever status (expanded and quantified from FAA criteria through input from local aviation operators, air traffic control, government agencies, and others.)
3. Gather demographic and operations data describing the 24 study airports with regard to the above criteria, the airport's operation relation to the regional system, and relation to ground market area services.
4. Rank study airports on the basis of each criterion and summarize rankings for each airport.
5. Determine suggested relievers and general aviation classifications on the basis of rankings.

DESCRIPTION OF STUDY AIRPORTS

Since the RASP process, between 1980 and 1982, developed the regional plan of critical facilities considering location, public access, and operator commitment, this study assumes that any warranted additional relievers would be chosen from the RASP group of general aviation airports, of which 21 have

been incorporated into the NPIAS. Given the active local political involvement in public transportation projects planning, the scarce supply of available land for new facilities, the excess storage capacity at some existing RASP airports, and the limited nature of public and private funds for airport development, the likelihood of implementation and advantage of proposing new facilities are not significant. Figure 1 locates each facility in the regional overview with detail given concerning geographic orientation of the runway or runways. Next to each airport are the letters GA or RL indicating its current status in the NPIAS. Figure 2 is an outline of information gathered from telephone interviews, published materials, and site visits for each facility (3). The data form the basis of the evaluation of each airport relative to its reliever potential, according to the eight criteria described later.

Study Airport Inventory (General Aviation Facilities) (1)

- Privately Owned Public Use: 19 (11 in Pennsylvania, 6 in New Jersey, 1 in Delaware, and 1 in Maryland). These are all in suburban counties, have no precision instrument approaches, are single runway (one airport has a crosswind runway in bad repair), have limited maintenance and repair facilities, and are usually owned by an individual or privately held corporation.
- Publicly Owned Public Use: 5 (all in Pennsylvania). These are all in suburban counties—except Northeast Philadelphia Airport. Two have precision approaches, more complete repair and storage facilities, and are owned and operated by county or city where they are located.

CRITERIA FOR RELIEVER AIRPORT EVALUATION

Which physical, financial, economic, demographic, and geographic attributes of local airport facilities qualify a general aviation airport for reliever status in the RASP was a subject addressed by the Aviation Technical Advisory Committee (ATAC) with input from FAA, local operators, and local government. Initially, it was realized that the importance, functions, and impacts of reliever airports to a regional aviation system were much more diverse than just taking general aviation overflow from Philadelphia International Airport. Therefore, a set of eight criteria was proposed by DVRPC to the ATAC in November 1985, discussed by that group subsequently, revised, and again reviewed by the ATAC in February 1986 before being finalized. The criteria and tests used in this study area are summarized in Table 1 and discussed in the following subsections.

1. *Reliever capacity for operations and storage.* Reliever airports provide operating and storage locations more convenient and less costly than those found at PHL. Thus, the capacity of our general aviation and reliever airports becomes critical to their role as satellites for basing of local aircraft necessary for local business development and, thereby, as a means of decreasing the operations and storage pressure of PHL by those general aviation aircraft. This criterion rates the 24 airports by capacity in dimensions. First, runway configuration will be examined, using FAA guidelines to establish operations capacity based on mix of aircraft using the facility (4). Second, and

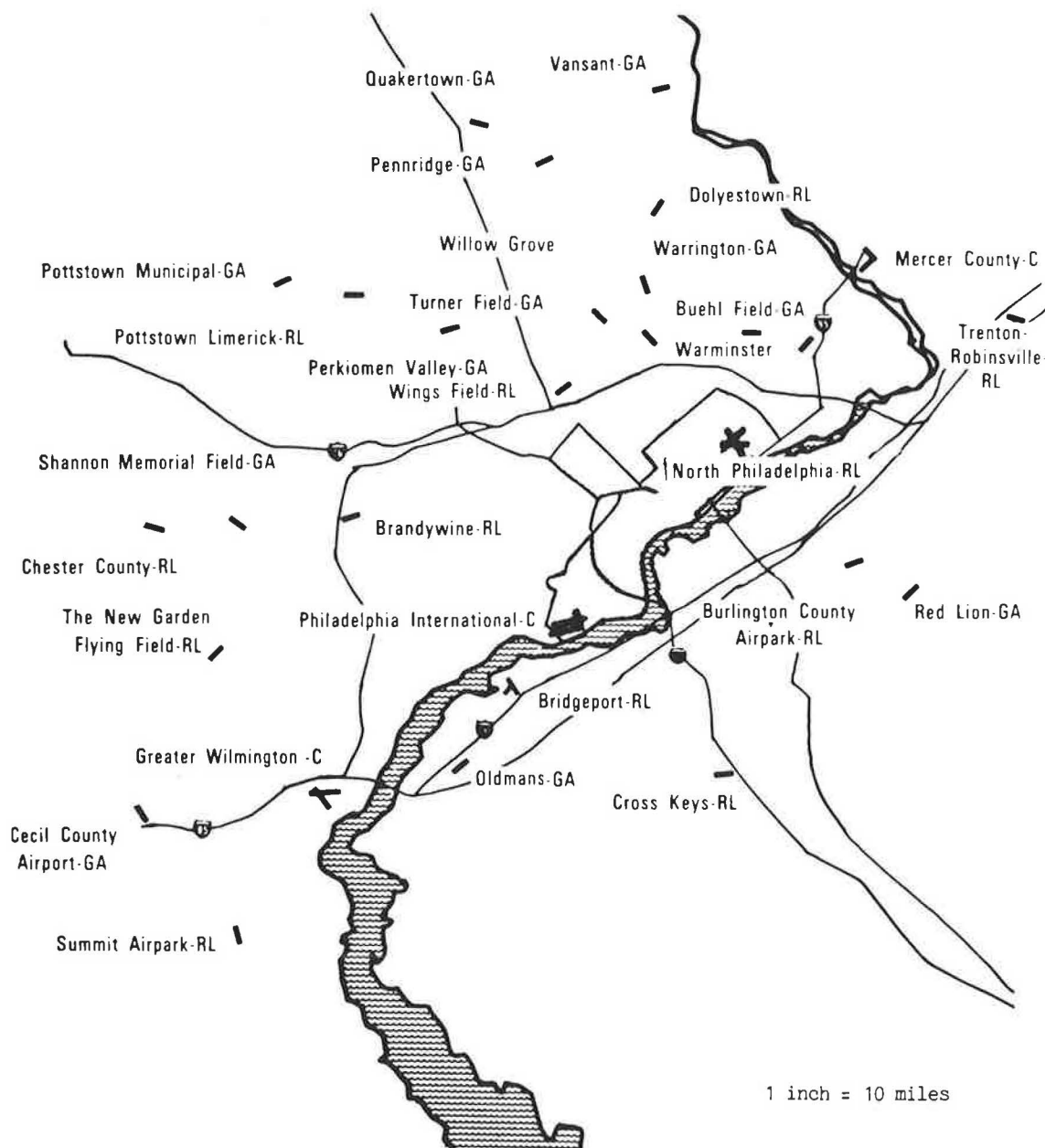


FIGURE 1 Delaware Valley airports, including runway orientations and designations as reliever or general airports.

more critical to potential operations levels, is the rating of each airport by storage capacity in hangars and outside tie-down slots. In conjunction with the capacity indicators in the above criterion is a ranking of the facilities on the basis of demand indicators quantified in the study. These include based aircraft, types of aircraft (single engine or twin jets, helicopter) as reported by each operator, level of scheduled service, if any, and annual operations as estimated in 1982 in the RASP. Excesses or deficiencies in capacity are then noted.

2. *Compatibility with local land uses.* Perhaps the most significant constraint to suburban airport facilities and operations growth is conflicts with neighbors and local governments. This conflict may result from noise, aircraft accidents or fear of such an occurrence; developmental, economic, and political pressures on local governing bodies; airport owners; traffic congestion; or any number of other issues. To rank the 24 study

airports with regard to this criterion, three data parameters will be examined. These are total contiguous acreage of the airport, existence of local airport zoning to protect against developmental or natural obstructions, and type of adjacent land uses, if any (5). From these parameters a ranking of the facility will be established that estimates the relatively local operating environment of each airport.

3. *Final destination of arriving passengers.* The location of satellite airports, from the viewpoint of PHL Air Traffic Control (ATC), with regard to their proximity to employment and residential centers, is a critical indicator of an airport's value in the regional aviation system. Business and personal use, and potential future use of facilities, is directly related to ground access time, assuming some conformity between airports with regard to operations ease and ground amenities. To determine the relative market areas of the study airports and the growth of

<u>Airport</u>	<u>Market Area</u> <u>(by airport - 5-mile radius)</u>
Owner	
Operator (FBO)	<u>GEOGRAPHIC</u>
Address	Townships
<u>DIMENSIONS</u>	States
Runway Configuration	<u>DEMOGRAPHIC</u>
Runway Lengths	Population - 1980-2000
Storage Capacity (aircraft)	Employment - 1980-2000
- Tee Hangar	Population - % change
- Hangar	Employment - % change
- Paved tiedown	
- Non-paved tiedown	
Facility Total Area (acres)	
Clearance (principal runway ends)	
Surrounding Uses	
<u>LOCAL DEMAND</u>	
Based Aircraft	
Customers, Corporations, etc.	
Mix of Aircraft by Engine Type	
Annual Operations (estimates)	
Scheduled Service-enplanements	
Planned Annual Growth in % operations	
<u>RECENT CAPITAL INVESTMENTS</u>	
Funding Source	
- Federal Assurances?	
Types of Improvements	
Master Planning Studies	
<u>AMENITIES</u>	
Operating Times	
Fuel Availability	
Security	
Nav aids	
Ground Transportation	
Food, Rest Rooms,	
Training School	
Maintenance & Repair Facilities	

FIGURE 2 Airport and market data used in the nontowered facility reliever study.

each market area, data on employment and residential levels for 1980 and 2000 are summarized for the municipalities containing and surrounding each airport. These numbers represent a level of "gravity" or attraction to each airport, and the trend from 1980 to 2000 gives an indication of the change in each airport's critical role in the future regional aviation system.

4. *Private/public development commitment.* In order to expand operations and business as well as improve safety and levels of service and amenities, all 24 airports have periodically had capital improvements. In the case of publicly owned facilities, these improvements were funded predominantly by FAA AIP funds with the 10 percent local share coming from a mix of state or local government resources. Private reliever airports have also received public funding through AIP, but usually a portion of the local share comes from the private resources of the owner/operator. Privately owned general aviation airports have, to date, relied on private funds for all improvements. Typically, in the 1980-1985 period, improvements funded through the FAA include runway extensions, taxiway paving,

runway lighting, and other safety and capacity improvements. Privately funded projects at publicly owned airports include revenue generating improvements such as hangars, repair shops, passenger lounges, and so on. At privately owned general aviation airports, all improvements, whether safety related or not, are the responsibility of the operator. With regard to current private relievers, either FAA funded planning studies leading to capital improvement grants, or actual grants themselves, been executed at several airports. In order to receive the federal assistance, the facilities have obligated themselves to continue operating for up to 20 years. In many cases, these private airports have also spent considerable private improvement funds without federal match. It is, therefore, expected that most current private relievers will remain so in the NPIAS for the foreseeable future. However, as a strategy to maximize federal funding to the region, public relievers could be reclassified to general aviation where they would qualify for federal funding in that category, and thereby potentially create reliever status for a current private general aviation facility.

TABLE 1 EVALUATION CRITERIA AND DATA TESTS

Criterion	Category	Data Tests Used in Ranking
1	Reliever capacity for operations and storage contrasted with demand	Level of based aircraft Based aircraft storage availability Estimated operations in comparison to runway capacity
2	Compatibility with local land uses	Size of airport property in acres Level of municipal zoning protecting airport Compatibility of adjacent uses—resident, open farmland
3	Final destination of arriving passengers	Magnitude of 1980 population Magnitude of 1980 employment Percentage of population growth in 2000 Percentage of employment growth to 2000
4	Private/public development commitment	Degree of ongoing planning Level of public funding support Level of private investment in facility
5	Status of facilities in respective state plans	Funding classification of facility in state plan (none to commercial service) Service level in state plan (basic utility to transport)
6	Local geographic airport coverage	Distance to nearest general aviation facility Distance to nearest reliever facility
7	Instrument flight rules coverage, potential and approach conflicts	Runway length (existing) Runway expandability Percentage of based aircraft other than single engine Approach conflicts with other airports Proximity to 4,200-ft runway
8	Pilot/passenger/tenant amenities	Level of navigational aids, VFR to IFR Number of operating services (fuels, avionics shop, etc.) Degree of operations features and passenger/pilot amenities

To evaluate this criterion, operating commitment in the form of recent capital improvements, both private and public, as well as ongoing planning studies, will be identified for each facility. These data as reported to DVRPC during the winter of 1985–1986 are indicative of the ongoing private or local economic basis of the facility as well as the federal/state determination of local importance of the facility.

5. *Status of facilities in respective state plans.* New Jersey, Delaware, and Pennsylvania maintain state aviation plans as a guide for the expenditure of state funds for airport improvements. Status in those plans directly influences the potential of general aviation airports, in each state, to receive state match for federal funds, as well as for direct single-source grants. Each state maintains criteria and minimum standards for entry into the state plan. Status of each study airport in its respective state plan, including functional classification, will be noted and ranked in this criterion (6).

6. *Local geographic airport coverage.* Of the 23 functioning general aviation airports and 3 towered nonprimary airports in the RASP, FAA has designated 12 as reliever airports in the NPIAS; 10 of these airports are privately owned and would therefore not qualify for FAA capital grant funding without reliever status. These current reliever facilities are located, with relation to Philadelphia International Airport (PHL), as shown on Figure 1. According to Philadelphia International Air Traffic Control, approach and departure routes to PHL are interchangeable with traffic loads and weather conditions. Therefore, airport location, as a corridor alternative to PHL approaches during congested periods, is not a critical criterion for reliever designation. Air traffic control indicates that airport location in relation to ground destination for general aviation traffic is the critical selection criterion for traffic passing through the traffic control area and landing at satellite facilities

to PHL. This criterion will examine airports in relation to their location to one another with rankings given to areas with lower concentration of satellite airport options.

7. *Instrument flight rules coverage, potential and approach conflicts.* In order for suburban airports to handle the increasing general aviation traffic, in the form of single, twin, and jet engine aircraft oriented towards the suburbs, these airports must develop flexibility to accommodate takeoffs and landings in adverse IFR weather conditions. Most RASP relievers and general aviation facilities currently have FAA approved non-precision approaches directed by PHL tower to certain minimum elevations. Of the noncommercial airports, only Chester County and Northeast Philadelphia airports currently have precision ILS approaches with adequate runway length and approach clearance. Pottstown-Limerick, also a private reliever, is in the process of FAA installation of an instrument landing system to be completed in mid-1987. In order to thoroughly serve the IFR demand for relievers, it is desirable to establish these ILS approaches in major quadrants of the study area. This criterion ranks the study airports by their potential for upgrading to full IFR operation. This potential is established here by examining data that are indicative of runway length and expandability, airspace conflicts, and availability of other potential ILS facilities in the area.

8. *Pilot/passenger/tenant amenities.* Most nontowered airports in the RASP are operated by one or more Fixed Base Operators (FBOs) who provide a variety of services for pilots, aircraft, and passengers. These services contribute to the pilots' decisions to choose a facility for itinerant operations and as a location to base their aircraft. The study airports have been surveyed with regard to quantifiable services and features and each airport has been given according to the diversity of amenities available. Operationally, fueling services, maintenance and repair, hours of operations and navigational aids

were considered. Customer services including availability of aircraft security, ground transportation, restaurant, and restrooms were surveyed.

EVALUATION OF AIRPORTS AND FINDINGS

Using the data gathered in this analysis, each of the 24 study airports was ranked in eight categories corresponding to the study criteria just described. Each airport was assigned qualitative rankings of high, medium, or low, based on the determination of its relative standing compared to all other airports. Each airport's rankings were then totaled for all criteria and a systemwide determination of the most significant current and future facilities was made.

According to the FAA criteria, a general aviation airport can qualify for reliever status by having 50 or more based aircraft, or annual operations of 25,000 itinerant or 35,000 local (2). Using that standard, 23 of the 24 study facilities would qualify as relievers if only the federal criteria were used. However, geographic redundancy of reliever service without local demand to warrant reliever status probably will not be accepted by FAA in the NPIAS. Also, FAA capital grant funds may be reduced from FY1985 to FY1986 and FY1987 while costs of projects are increasing, thereby suggesting fewer FAA-funded projects in the future. Therefore, locally developed criteria were introduced in this study in order to more selectively identify critical reliever airports from the local perspective.

With a more thorough analysis locally of the necessary reliever system, the regional recommendations contained in this report are more useful by the FAA in shaping the NPIAS and upcoming funding programs.

To achieve a more definitive analysis of reliever needs, the locally developed criteria were incorporated with existing FAA criteria. Equal weighting was given to all study criteria, partly because of the qualitative nature of the rankings and the recommendatory nature of the study conclusion from the perspective of the FAA in the NPIAS. However, certain criteria analyses contain more variables from which airports are ranked than other criteria. Consequently, the significance of those criteria will be greater in each airport's total ranking. Specifically, criteria 3 and 7 evaluating final ground destination of air travelers and IFR potential, respectively, can be said to have the most influence due to their higher number of tests.

A draft version of the completed analysis, including individual scores in all criteria, was reviewed by the Aviation Technical Advisory Committee and certain scores were revised based on that input. Table 2 summarizes the qualitative scores for all eight criteria analyzed by assigning a numerical grade of 3, 2, or 1 to each high, medium, and low, respectively, and totaling the ratings for each criterion. The far-right column presents the additive total score for each airport based on all 25 ratings in the eight criteria.

Table 3 compares scores and ranges for airports classified as reliever in the NPIAS with those classified general aviation

TABLE 2 SUMMARY OF CRITERIA RATINGS

Airport	(1) Three Tests	(2) Three Tests	(3) Four Tests	(4) Three Tests	(5) Two Tests	(6) Two Tests	(7) Five Tests	(8) Three Tests	Overall
Bucks County									
Buehl	6	7	11	2	4	4	12	6	52
Vansant	6	8	4	3	4	5	10	5	45
Quakertown	6	6	4	4	5	4	8	8	45
Pennridge	7	8	4	4	4	3	13	9	52
Doylestown	7	6	7	4	6	5	9	7	51
Warrington	6	6	12	2	4	4	7	3	45
Montgomery County									
Turner	8	6	12	4	4	3	7	6	50
Wings	7	6	10	5	6	4	13	8	59
Perkiomen Valley	6	5	8	5	4	4	11	7	50
Pottstown Limerick	6	7	7	9	6	5	13	6	59
Pottstown Municipal	5	6	6	5	4	3	13	8	50
Chester County									
Brandywine	6	7	8	8	6	4	13	4	50
Shannon	6	6	8	4	4	3	9	6	46
Chester County	7	9	6	6	6	4	14	8	60
New Garden	5	6	4	7	6	5	13	5	51
Mercer County									
Trenton-Robbinsville	7	9	9	3	6	6	13	7	60
Burlington County									
Burlington County	8	8	9	2	6	4	14	6	57
Red Lion	6	7	8	3	4	3	11	6	48
Gloucester County									
Cross Keys	8	8	10	5	6	5	12	6	61
Bridgeport	7	6	6	4	6	5	10	6	50
Salem County									
Oldmans	6	8	4	3	3	4	11	4	42
New Castle County									
Summit	7	6	4	8	6	6	15	9	61
Cecil County									
Cecil County	6	5	8	2	4	5	11	6	47
Philadelphia									
Philadelphia Northeast	8	8	10	6	6	5	15	9	67

TABLE 3 COMPARISON OF SCORES, STUDY RECOMMENDATIONS

Airport	Scores			
	Current Reliever Airports	Current General Aviation Airports	Not Recommended as Reliever	Recommended as Reliever
Bucks County				
Buehl		52		X ^a
Vansant		45	X	
Quakertown		45	X	
Pennridge		52		X ^a
Doylestown	51			X
Warrington		45	X	
Montgomery County				
Turner		50		X ^a
Wings	59			X
Perkiomen Valley		50		X ^a
Pottstown Limerick	59			X
Pottstown Municipal		50	X	
Chester County				
Brandywine	56			X
Shannon		46	X	
Chester County	60			X
New Garden	51			X
Mercer County				
Trenton-Robbinsville	60			X
Burlington County				
Burlington County	57			X
Red Lion		48	X	
Gloucester County				
Cross Keys	61			X
Bridgeport	50			X
Salem County				
Oldmans		42	X	
New Castle County				
Summit	61			X
Cecil County				
Cecil County		47	X	
Philadelphia				
Philadelphia Northeast	67			X

^aNew recommended reliever airport requires modification to RASP and NPIAS.

airports. Existing relievers have an average of 57.6 points with a range of 50 to 67 while general aviation airports average 47.6 points with a range of 42 to 52. Based on the overlap of general aviation airport scores into the reliever range and the individual situations of specific airports, the last column in Table 3 identifies those airports that DVRPC recommends qualify to be relievers, according to the criteria of this study.

Specifically, several RASP general aviation airports—Vansant, Quakertown, Warrington, Shannon, Red Lion, Oldmans, and Cecil County—score under the reliever average and out of the reliever range and therefore are considered not to qualify for reliever classification. Publicly owned Pottstown Municipal Airport, a general aviation facility in the NPIAS, scored in the reliever range but is recommended to remain general aviation. Pottstown Municipal was classified reliever in the original DVRPC reliever system recommendation to FAA in March 1983, but subsequently was reclassified by FAA to general aviation in the NPIAS, where it can receive developmental AIP funds as a publicly owned airport.

Buehl, Pennridge, Turner, and Perkiomen Valley airports, all privately owned and operated, had total scores that equaled or exceeded the lower end of the reliever range. The study finds that, from a local service and development perspective, these airports should be classified reliever, while all existing relievers also retain reliever classification.

CONCLUSIONS

Several conclusions can be made from the process and results documented in the study:

- The study process, by which technical criteria are generated in a committee structure of aviation interests from both the private and public sector, proved to be objective and functional. Results of evaluation were acceptable to the local aviation community and elected officials represented on the Regional Planning Agency Board. FAA participation ensures the validity of the results as the local priority position for federal consideration. FAA indicates it is considering changes in the NPIAS with regard to the DVRPC region, based on the findings of this study, and notes similar infrastructure trends and needs affecting other urbanized areas. This may precipitate modification of national policies and programs.

- Since all existing reliever airports (1982 RASP adoption) achieved relatively high scores, the study process confirmed those selections as critical facilities, while identifying four additional airports which, by comparison, now warrant reliever status on the basis of intensifying demand or diminishing alternatives.

- The study findings have infrastructure ramifications which make them appropriate input to the update of the Regional

Airport Systems Plan which occurs every 10 years and has a planning horizon of 20 years.

REFERENCES

1. *Delaware Valley Regional Airport System Plan*. Delaware Valley Regional Planning Commission (DVRPC), Philadelphia, Pa., Sept. 1982.
2. *National Plan of Integrated Airport Systems, 1984-1993*. FAA, Aug. 1985.
3. *Year 2000 Population Forecasts for the Delaware Valley Region*. DVRPC, Feb. 1985; and *Year 2000 Municipal Employment Forecasts for the Delaware Valley Region*. DVRPC, Sept. 1985.
4. *Airport Capacity and Delay*. AC 150/5060-5. FAA, U.S. Department of Transportation, Sept. 1983.
5. *Airport Zoning Survey*. Commonwealth of Pennsylvania, Bureau of Community Planning, Philadelphia, Jan. 1985.
6. State Airport System Plans for New Jersey, Pennsylvania, Delaware, and Maryland.

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