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INVESTMENT NEEDS AND SELF-FINANCING CAPABILITIES: U.S. AIRPORTS--ETC(U)
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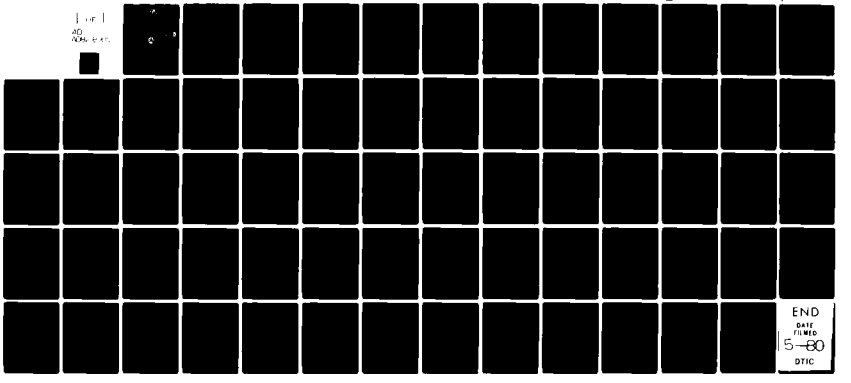

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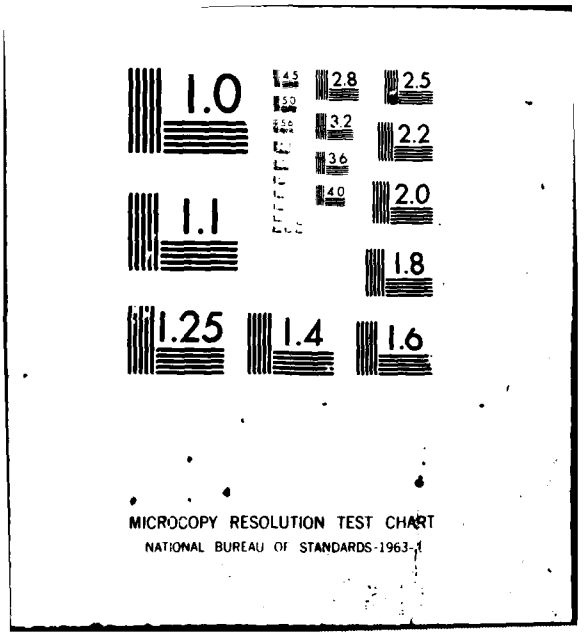
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LEVEL II

INVESTMENT NEEDS AND SELF-FINANCING CAPABILITIES: U.S. AIRPORTS FISCAL YEARS 1981-1990

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JULY 1978

FINAL REPORT

Prepared for

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16. Abstract

This report addresses the estimated investment needs of U.S. airports and presents an evaluation of their capability of self-finance that investment during the time period FY 1981-1990. The report is intended for use as background material in evaluating policy alternatives for renewal of the Airport Development Aid Program (ADAP).

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I. INTRODUCTION

This report addresses the estimated investment needs of U.S. airports and presents an evaluation of their capability to self-finance that investment during the time period FY 1981-1990. The report is intended for use as background material in evaluating policy alternatives for renewal of the Airport Development Aid Program (ADAP).

The analysis undertaken in the report is similar to the analysis performed by the U.S. Senate Commerce Committee in 1968 as part of its consideration of legislation which became the ADAP in 1969. The Commerce Committee analysis appeared in Senate Report No. 1355; 90th Congress, 2nd Session (July 1, 1968).

This report provides a basis for estimating the total magnitude of airport investment needs and for estimating these needs for airport groupings according to size (level of activity). This report also provides a basis for evaluating the capability of airports of various sizes to generate net income to support funding of capital investment. The data and analyses in this report should not be construed as precise measures of the investment needs and net income generating capability of any particular airport.

The evaluation of the net income generating capability of airports in this report is based primarily on data supplied by the Federal Aviation Administration as contained in:

> "Terminal Area Financial Data Study"; Data Base, Volumes I and II; prepared under Contract No. DOT-FA76WA-3883 by Aerospace Systems, Inc; January 1978.

The financial data in the base are in the form of income and expense statements and sources and uses of funds statements for the latest fiscal year available at the time of survey; in most cases data for 1976 were provided. The data base is grouped as follows:

- Large Hub Airport
- Medium Hub Airports
- Small Hub Airports
- Non Hub Airports
- Large General Aviation Airports
- Medium General Aviation Airports
- Small General Aviation Airports

The data base used to estimate capital development requirements for airports during the period 1981-1990 is as contained in the Federal Aviation Administration's "National Airport System Plan 1978-87" published on December 20, 1977. To provide estimates for airport capital development for facilities not covered in the NASP and for the period 1988-1990, the contractor designed estimating equations which were then checked for general accuracy against individual airport capital budget programs and against empirical data for the period 1970-77.

This report groups airports as follows:

- o Air Carrier
  - Over 4 million total annual passengers
  - One to 4 million total annual passengers
  - 300,000 to 1 million total annual passengers
  - Less then 300,000 total annual passengers
- o General Aviation
  - Large (over 200 based aircraft)
  - Medium (25-200 based aircraft)
  - Small (less than 25 based aircraft)

These groups were chosen so that the analysis in this report might at some later date be conveniently compared to the Senate Commerce Committee analysis previously referenced and to an analysis prepared in 1973 by the Aerospace Corporation: "Financial & Statistical Data & Estimating Relationships for Airport Planning." The Senate analysis grouped airports by hub size while the latter report grouped them by passenger enplanement or aircraft operations levels identical to or very close to those used in this report.

A note on methodology is germane at this point. First, in the simplest of terms, to have any self financing capability at all a facility must earn net operating revenue (operating revenues must exceed operating expenses). This net operating revenue plus any non-operating revenue (usually from interest on investments and from local taxes or local government contributions) must be sufficient to cover non-operating expenses (the bulk of which are interest expenses) and leave a residual for amortization of principal on existing debt. Any amount then remaining is available for servicing new debt (interest plus amortization).

This report attempts to estimate these financial results for a large segment of the airport industry. Working with a data base which is but a sample of the entire industry and which is bound to have understandable errors, any conclusions which are drawn must be very general and very tentative even though such conclusions may be drawn to aid in the formulation of general policy directions.

The remainder of the report is divided into the following main sections:

- o Evaluation of Data Base
- o Evaluation of Airport Financial Results
- o Estimation of Airport Investment Needs
- o Analysis of Self-Financing Capability

II. EVALUATION OF DATA BASE

The data base referenced on page 1 was developed by use of the direct survey method and use of a common data format for each airport. Airports have been surveyed in this manner many times before and for many years airport members of the Airport Operators Council International have provided that organization with annual financial data in a similar format.

The financial results of primary interest for this report are the operating profit figure shown as item C and the operating income figure shown as item F on the Income & Expense Statement form which was sent to each airport. A copy of this form is included in the Appendix. The operating revenue and operating expense items used to derive the operating profit (which is called net operating revenue in this report) were complete with one exception: it was not clear whether local municipal services often provided to some airports had been shown as expense items. Accounting practices vary. Services provided are sometimes not shown in an airport's financial statement and are sometimes shown as a non-operating expense item. While this is not a major defect in the data base it is noted here for information purposes. The operating income figure (called net income in this report) did not always account for first deducting interest expenses. Where this deficiency was detected the figure was not included for subsequent analysis.

The data base for certain airports was not used in subsequent analyses of the relationship between financial performance and traffic activity. It is worthwhile discussing some of the reasons for excluding certain airports. Miami was not considered for subsequent analysis because of the high proportion of its total operating income accounted for by Hangar & Building Area Revenues (about 45%). This income is fixed by lease and does not vary with activity levels. Miami is a base of operations for several airlines and this feature is a primary reason for the large proportion of fixed building revenues. Atlanta was excluded because it has a large element of transfer traffic. Transfer passengers are not intensive users of airport concessions, thus concession revenue (a large component of large air carrier airport total revenues) is not as responsive to changes in traffic volumes. Chicago was excluded because of the nature of the use agreement in effect there with the airlines. While that agreement guarantees the airport sufficient net revenues to pay all expenses and existing debt service, this same feature limits the responsiveness of revenue to traffic levels.

There were a few other exclusions of individual airport data from further analysis based on incomplete or confusing data provided on the survey form. There were probably many undetectable errors in the financial statements provided by the various airports. We use the term errors advisedly for in all cases we suspect that each airport tried to complete the financial statement to the best of its ability and to the extent permitted by its own accounting format. It is also recognized that airports were providing the latest data available and in some cases this may have meant subsequent adjustments would have been made after final audit. In dealing with large volumes of data the analyst must rely somewhat on the notion of compensating "errors": overestimates will be offset by underestimates.

III. EVALUATION OF AIRPORT FINANCIAL RESULTS

A. General

Using the purged data base, airports were placed into categories based on some direct or indirect measurement of their activity level. Airports classified as Large, Medium, Small and Non Hubs in the data base were placed into categories according to their annual level of total passengers (enplaned plus deplaned, air carrier and commuter carrier) as follows:

- o More than 4 million annual passengers
- o One to 4 million annual passengers
- o 300,000 to 1 million annual passengers
- o Less than 300,000 annual passengers

General aviation airports were placed into categories based on based aircraft as a surrogate variable for activity level as follows:

- o Large (more than 200 based aircraft)
- o Medium (25-200 based aircraft)
- o Small (less than 25 based aircraft)

In this section the analysis was directed at operating and non-operating revenue and expenses. As the report is concerned with the capability of airports to finance future development from their own revenue, the items of interest are:

- o Net operating revenue (operating revenue minus operating expense).
- o Net income (net operating revenue plus non-operating revenues minus non-operating expenses).
- o Amortization (payment of principal on existing debt).

As interest payments on existing debt are a non-operating expense, the amount available for future debt service (interest plus amortization) is the remainder of net income minus amortization.

Time is not a factor in the analysis. All data in the base were for fiscal years 1975 and 1976 often with an overlap. It was assumed for simplification that all data were for the same year. By removing time as a factor and viewing airports grouped by activity level, a picture of airport financial results as a function of activity level is presented.

Regressions were run for each airport category to test the relationship between operating revenues and expenses (and, thus net operating revenue) and passenger volumes of air carrier airports and aircraft operations for general aviation airports. Changes in passenger traffic proved to be significant indicators of changes in operating revenues and expenses (and, thus, net operating revenue) for air carrier airports. Changes in aircraft operations proved to be poor indicators of changes in operating revenues and expenses (and, thus, net operating income) for general aviation airports.

Regressions were also run for net income (net operating revenue plus non-operating revenues les non-operating expenses) and amortization. Changes in passenger traffic proved to be significant indicators of these two variables only in the case of airports with over one million annual passengers. For other airport size groups no traffic measure proved to be a reliable indicator of changes in net income and amortization. Traffic measures were poor indicators in other size groups with correlation coefficients generally in the 0.20 to 0.30 range.

All correlation coefficients were tested for signficance at the 0.05 level using the "t-test". Unless otherwise stated the correlation coefficients stated are significant at the 0.05 level and variations in financial results have a linear relationship to changes in activity levels.

B. Regression Analysis: Operating Revenue and Expenses, Net Operating Revenue

1. Airports With Over 4 Million Annual Passengers

Fourteen airports in this category were analyzed as shown in Table 1 (Operating Revenues) and Table 2 (Operating Expenses). Operating revenues ranged from $6.1 million to $50.9 million while operating expenses ranged from $2.9 million to $23.4 million. Annual passenger levels ranged from 4.4 million to 24.6 million.

Several regression forms were run for both operating revenues and expenses. In both cases the form which produced the best "fit" was $Y = b + mX$. Using this linear form the regression equation for operating revenues is:

$$\text{OP REVS} = \$116{,}830 + \$2.024\ (\text{TOT PASS})$$

The coefficient of correlation for the linear regression equation with these values is 0.947, R^2 equals 0.897, and t equals 10.21.

The regression equation for operating expenses is:

$$\text{OP EXP} = \$592{,}000 + \$0.98\ (\text{TOT PASS})$$

The coefficient of correlation for the linear regression equation with these values is 0.875, R^2 equals 0.766 and t equals 6.26.

A net operating revenue regression equation can be derived from the equations for operating revenues and operating expenses; its values are:

$$\text{NET OP REVENUE} = \$-476{,}000 + \$1.044\ (\text{TOT PASS})$$

Figure 1 portrays these equations visually. The graph in Figure 1 states the very high probability that all airports in the over 4 million annual passenger group can be expected to earn net operating revenue. (In fact, we know of no U.S. airport in this category which does not earn net operating revenue). The reader is cautioned not to use the estimating equations to derive specific financial results for a particular airport. The equations are descriptive of the financial operating results for a group of airports, not for individual cases.

TABLE 1

OPERATING REVENUES
AIRPORTS WITH MORE THAN 4 MILLION
ANNUAL PASSENGERS

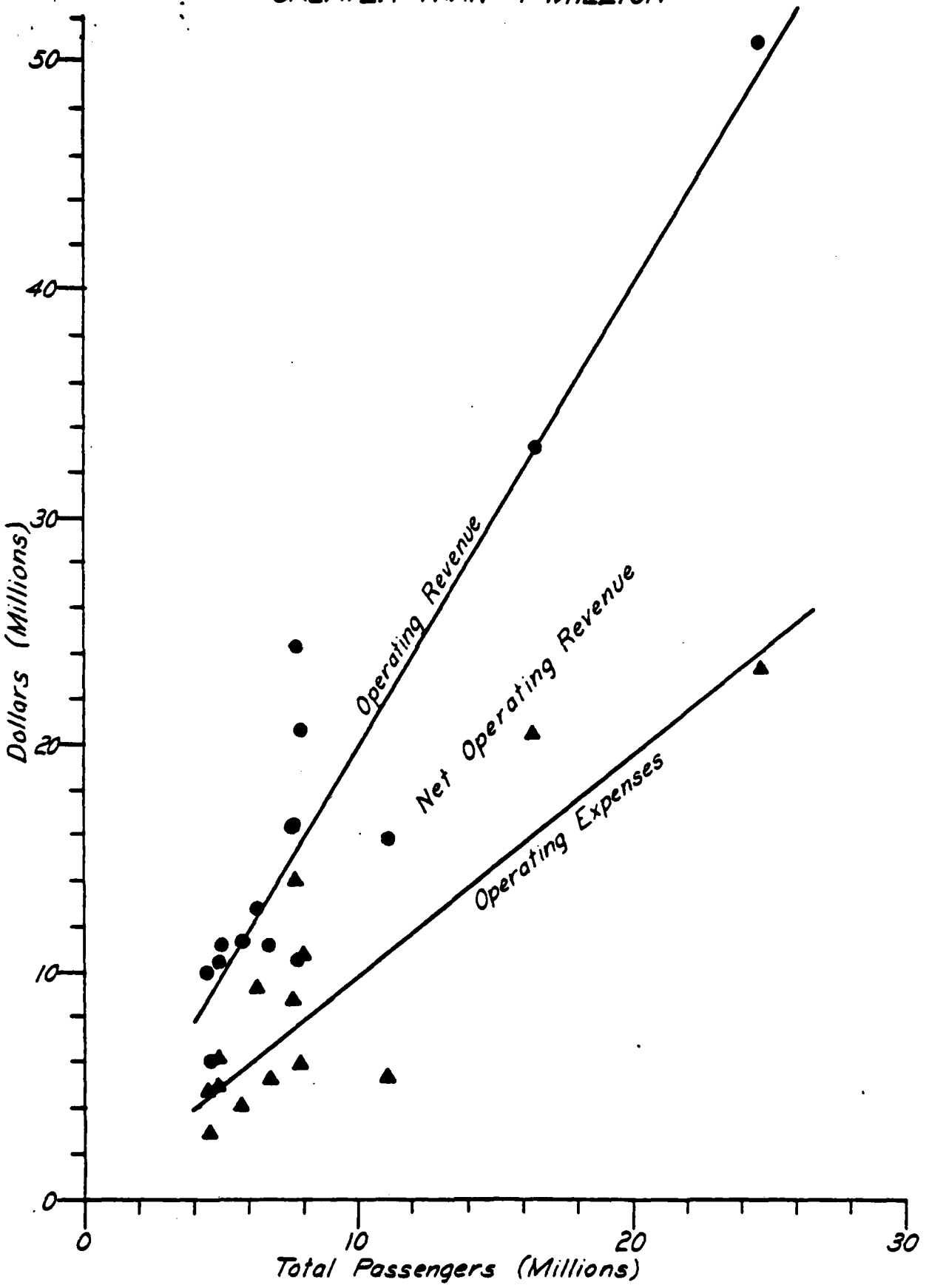
AIRPORT	OPERATING REVENUES ($000)	TOTAL PASSENGERS (000)
Phoenix	10,037	4,458
Los Angeles	50,988	24,670
San Francisco	33,199	16,332
Denver	16,036	11,050
Tampa	10,420	4,826
New Orleans	6,180	4,570
Detroit	24,478	7,654
Kansas City	11,358	4,948
St. Louis	10,609	7,812
Las Vegas	11,324	6,688
Cleveland	10,940	5,704
Philadelphia	20,709	7,924
Pittsburgh	16,440	7,572
Houston	12,981	6,336

TABLE 2

OPERATING EXPENSES
AIRPORTS WITH MORE THAN 4 MILLION
ANNUAL PASSENGERS

AIRPORT	OPERATING EXPENSES ($000)	TOTAL PASSENGERS (000)
Phoenix	4,747	4,458
Los Angeles	23,461	24,670
San Francisco	20,583	16,332
Denver	5,412	11,050
Tampa	4,825	4,826
New Orleans	2,930	4,570
Detroit	14,087	7,654
Kansas City	6,179	4,948
St. Louis	6,067	7,812
Las Vegas	5,352	6,688
Cleveland	4,317	5,704
Philadelphia	10,783	7,924
Pittsburgh	8,715	7,572
Houston	9,213	6,336

FIGURE 1
AIRPORTS WITH TOTAL ANNUAL PASSENGERS
GREATER THAN 4 MILLION



2. Airports With One Million to Four Million Annual Passengers

Thirteen airports in this category were analyzed as shown in Table 3 (Operating Revenues) and Table 4 (Operating Expenses). Operating revenues ranged from $1.4 million to $6.5 million. Operating expenses ranged from $1.1 million to $6.1 million. Annual passenger levels ranged from 1.0 million to 3.0 million.

Again, several regression forms were run for both operating revenues and expenses. Again, in both cases, the form which produced the best "fit" was $Y = b + mX$. Using this linear form the regression equation for operating revenues is:

$$\text{OP REV} = \$-1{,}171{,}000 + \$2.50\ (\text{TOT PASS})$$

The coefficient of correlation for the linear regression equation with these values is 0.907, R^2 equals 0.823 and t equals 7.15.

The regression equation for operating expenses is:

$$\text{OP EXP} = \$-992{,}000 + \$1.99\ (\text{TOT PASS})$$

The coefficient of correlation for the linear regression equation with these values is 0.76, R^2 equals 0.578 and t equals 3.88.

A net operating revenue regression equation can be derived from the equations for operating revenues and operating expenses; its values are:

$$\textit{NET OP REVENUE} = \$-179{,}000 + \$0.51\ (\text{TOT PASS})$$

Figure 2 portrays these equations visually. The graph in Figure 2 states the very high probability that airports in the 1 million to 4 million annual passengers group can be expected to earn net operating revenue. Note, however, that one airport (Reno) in the sample recorded a net operating loss of $656,000. The reader is cautioned not to use the estimating equations to derive specific results for a particular airport. The equations are descriptive of the financial operating results for a group of airports, not for individual cases.

3. Airports With 300,000 to One Million Annual Passengers

Twelve airports in this category were analyzed as shown in Table 5 (Operating Revenues) and Table 6 (Operating Expenses). Operating revenues ranged from $392,000 to $1.9 million while operating expenses ranged from $261,000 to $1.3 million. Annual passenger levels ranged from 332,000 to 858,000.

TABLE 3

OPERATING REVENUES
AIRPORTS WITH 1 to 4 MILLION
ANNUAL PASSENGERS

AIRPORT	OPERATING REVENUES ($000)	TOTAL PASSENGERS (000)
Tucson	2,986	1,438
West Palm Beach	2,892	1,512
Indianapolis	6,301	2,592
Louisville	4,065	1,746
Baltimore/Washington Int'l	6,597	3,012
Omaha	2,661	1,616
Albuquerque	1,890	1,620
Reno	1,435	1,090
Albany	1,602	1,122
Rochester	2,526	1,600
Columbus	4,772	2,144
Nashville	2,975	1,778
Salt Lake City	4,169	2,708

TABLE 4

OPERATING EXPENSES
AIRPORTS WITH 1 to 4 MILLION
ANNUAL PASSENGERS

AIRPORT	OPERATING EXPENSES ($000)	TOTAL PASSENGERS (000)
Tucson	2,543	1,438
West Palm Beach	2,226	1,512
Indianapolis	5,690	2,592
Louisville	2,547	1,746
Baltimore/Washington Int'l	6,128	3,012
Omaha	1,271	1,616
Albuquerque	1,152	1,620
Reno	2,091	1,090
Albany	1,384	1,122
Rochester	2,044	1,600
Columbus	3,470	2,144
Nashville	2,153	1,778
Salt Lake City	2,230	2,708

TABLE 5

OPERATING REVENUES
AIRPORTS WITH 300,000 to 1 MILLION
ANNUAL PASSENGERS

AIRPORT	OPERATING REVENUES ($000)	TOTAL PASSENGERS (000)
Fresno	1,145	770
Colorado Springs	884	572
Boise	1,254	858
Jackson	1,899	702
Billings	1,023	580
Toledo	942	582
Charleston (W.VA)	720	510
Sioux Falls	692	496
Baton Rouge	559	376
Portland (Maine)	529	338
Lansing	682	346
Eugene	392	332

TABLE 6

OPERATING EXPENSES
AIRPORTS WITH 300,000 to 1 MILLION
ANNUAL PASSENGERS

AIRPORT	OPERATING EXPENSES ($000)	TOTAL PASSENGERS (000)
Fresno	842	770
Colorado Springs	337	572
Boise	1,032	858
Jackson	1,336	702
Billings	927	580
Toledo	918	582
Charleston (W.VA)	448	510
Sioux Falls	455	496
Baton Rouge	533	376
Portland (Maine)	261	338
Lansing	700	346
Eugene	357	332

TABLE 7

OPERATING REVENUES
AIRPORTS WITH LESS THAN 300,000
ANNUAL PASSENGERS

AIRPORTS	OPERATING REVENUES ($000)	TOTAL PASSENGERS (000)
Tuscaloosa	87	72
Chico (Cal.)	118	68
New Haven	38	66
Paducah	137	106
Orleans (Mass.)	349	194
Lebanon	39	80
Kinston	61	102
Bismark	594	238
Lawton	127	106
Burlington	489	279
Charlottesville	142	112
Yakima	201	124

TABLE 8

OPERATING EXPENSES
AIRPORTS WITH LESS THAN 300,000
ANNUAL PASSENGERS

AIRPORT	OPERATING EXPENSES ($000)	TOTAL PASSENGERS (000)
Tuscaloosa	218	72
Chico (Cal.)	119	68
New Haven	176	66
Paducah	135	106
Orleans (Mass.)	359	194
Lebanon	93	80
Kinston	95	102
Bismark	421	238
Lawton	102	106
Burlington	486	279
Charlottesville	133	112
Yakima	236	124

Several regression forms were run and the best "fit" was provided by the linear form $Y = b + mX$. Using this form the regression equation for operating revenues is:

$$\text{OP REV} = \$-116{,}000 + \$1.875 \text{ (TOT PASS)}$$

The coefficient of correlation for the linear regression equation with these values is 0.80, R^2 equals 0.64 and t equals 4.21.

The regression equation for operating expenses is:

$$\text{OP EXP} = \$-47{,}000 + \$1.348 \text{ (TOT PASS)}$$

The coefficient of correlation for the linear regression equation with these values is 0.70, R^2 equals 0.49 and t equals 3.09.

A net operating revenue regression equation can be derived from the equations for operating revenues and operating expenses; its values are:

$$\text{NET OP REVENUE} = \$-69{,}000 + \$0.535 \text{ (TOT PASS)}$$

Figure 3 portrays these equations visually. The graph in Figure 3 states the probability that airports in the 300,000 to 1 million group will earn net operating revenues especially if their total annual passengers exceed 500,000.

4. Airports with Less Than 300,000 Annual Passengers

Twelve airports in this category were analyzed as shown in Table 7 (Operating Revenues) and Table 8 (Operating Expenses). Operating revenues ranged from \$39,000 to \$594,000 while operating expenses ranged from \$93,000 to \$486,000. Annual passenger levels ranged from 66,000 to 279,000.

The regression form which provided the best "fit" was again $Y = b + mX$. Using this linear form the regression equation for operating revenues is:

$$\text{OP REV} = \$-100{,}000 + \$2.37 \text{ (TOT PASS)}$$

The coefficient of correlation for the linear regression equation with these values is 0.93, R^2 equals 0.865 and t equals 8.00.

The regression equation for operating expenses is:

$$\text{OP EXP} = \$-13{,}000 + \$1.76 \text{ (TOT PASS)}$$

FIGURE 2

AIRPORTS WITH TOTAL ANNUAL PASSENGERS
GREATER THAN 1 MILLION & LESS THAN 4 MILLION

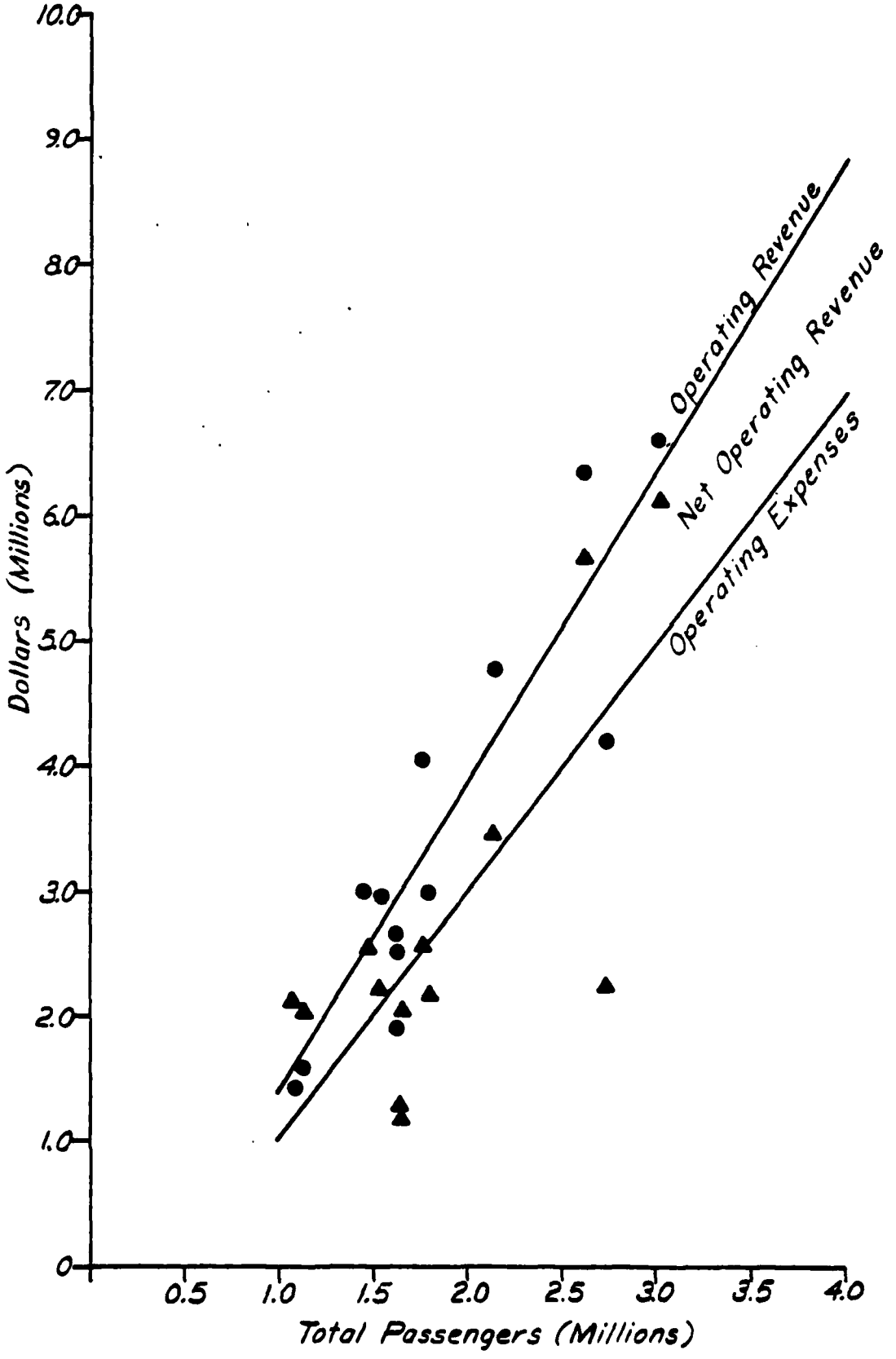
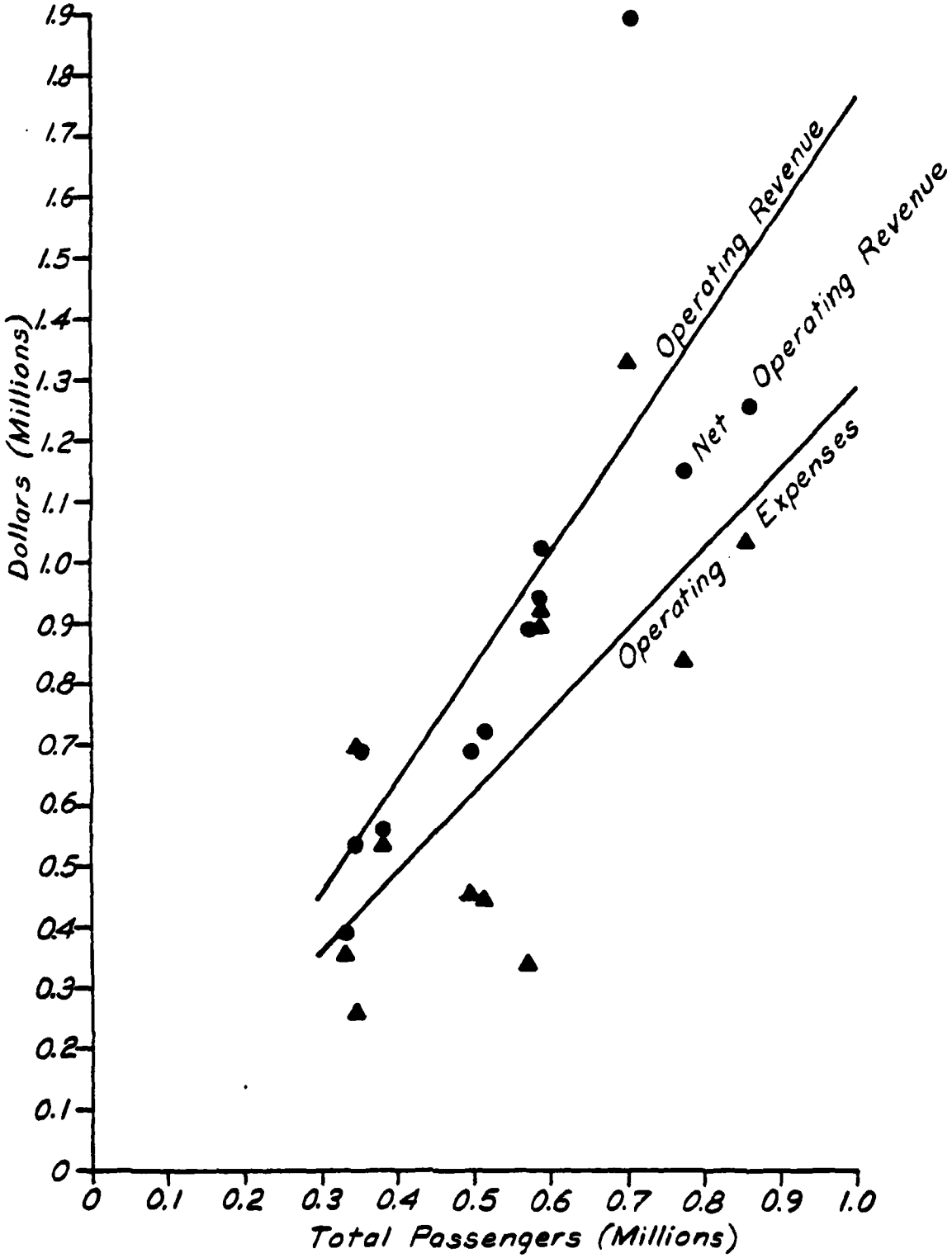


FIGURE 3

AIRPORTS WITH TOTAL ANNUAL PASSENGERS
GREATER THAN 0.3 MILLION & LESS THAN 1 MILLION



The coefficient of correlation for the linear regression equation with these values is 0.91, R^2 equals 0.828 and t equals 6.94.

A net operating revenue regression equation can be derived from the equations for operating revenues and operating expenses; its values are:

NET OP REVENUE = $-87,000 + $0.61 (TOT PASS)

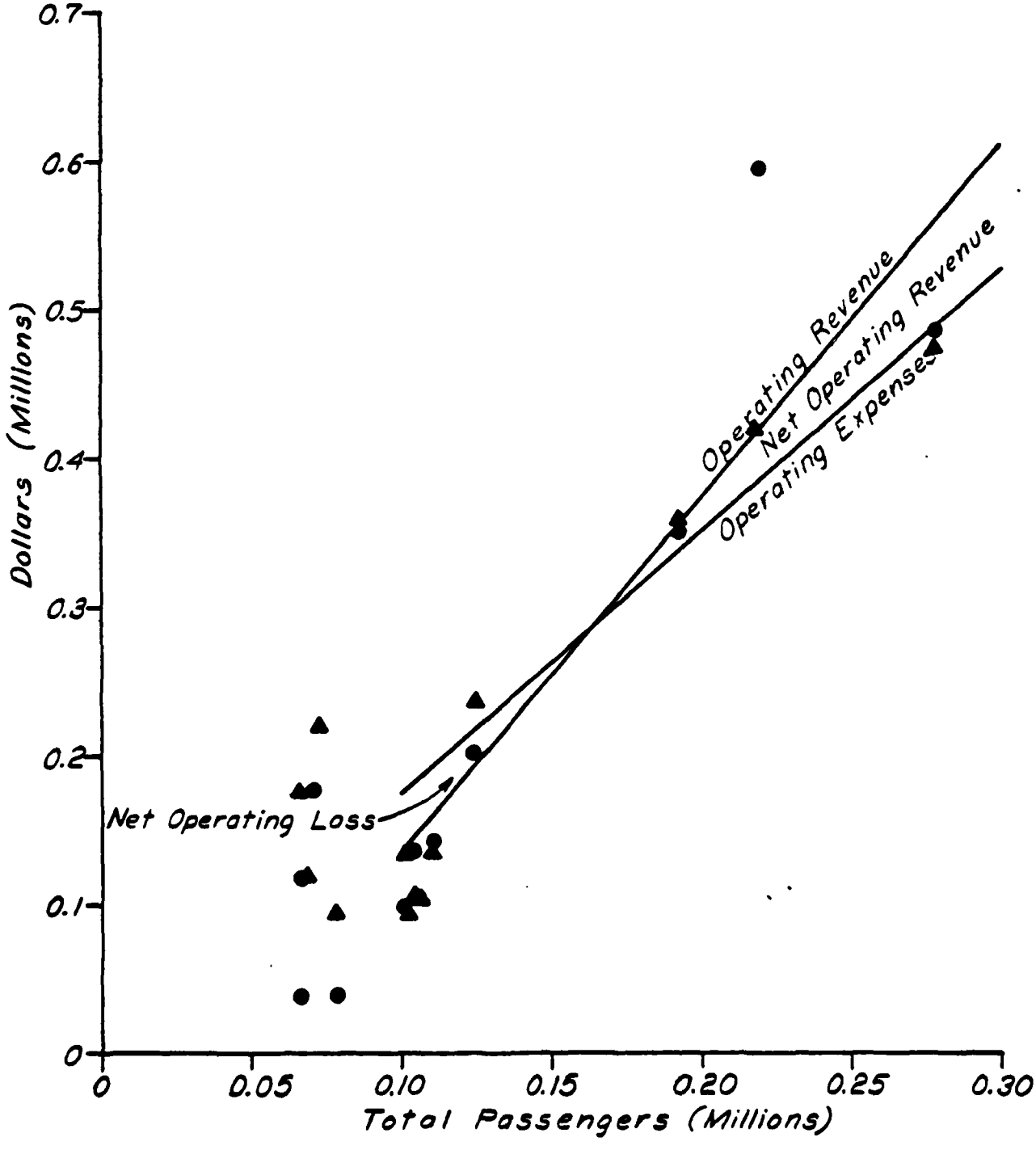
Figure 4 portrays these equations visually. The graph in Figure 4 states that airports below 150,000 annual passengers may not be expected to earn net operating revenues while airports above 150,000 annual passengers have a chance to earn some net operating revenues. The distribution of data suggests that the chances of earning net operating revenues are slim in the 150,000 to 250,000 range and improve to better than 50% in the 250,000 to 300,000 range.

5. General Aviation Airports

Various regression forms were run for general aviation airports in the Large, Medium and Small categories. Neither operating revenues nor operating expenses were found to relate in a statistically significant way to annual aircraft operations levels. The highest coefficient of correlation achieved on any of the regression runs was 0.34. Thus, no estimating equations of value were derived.

An examination of the data base suggests that it is the unusual general aviation airport which earns net operating revenues. The general aviation airport which does so will usually have well-developed industrial property or a large number of based aircraft (100-200) with noticeable corporate aircraft activity. Herndon Airport in Orlando, Florida is but one case in point. In 1976 that airport earned net operating income of $144,629 on operating revenues of $395,949. Revenues of $218,160 from commercial/industrial leases accounted for 55% of total operating revenues. The financial survival of general aviation airports is largely attributable to the tax support of local governments as evidenced by the financial statements provided in the data base.

FIGURE 4
AIRPORTS WITH
LESS THAN 0.3 MILLION TOTAL
ANNUAL PASSENGERS



C. Regression Analysis: Net Income, Amortization

1. Airports With Over 4 Million Annual Passengers

Regressions were run for airports in this category (see Table 9) and a good "fit" was obtained with the form $Y = b + mX$. For net income the values of the derived regression equation are:

$$\text{NET INC} = \$-2,245.00 + 1.028 \text{ (TOT PASS)}$$

The coefficient of correlation for this regression equation is 0.97 R^2 equals 0.95 and t equals 15.71.

For amortization, the values of the derived regression equation are:

$$\text{AMORT} = \$-863,000 + \$0.37 \text{ (TOT PASS)}$$

The coefficient of correlation for this regression equation is 0.89, R^2 equals 0.79 and t equals 5.82.

2. Airports With 1 Million to 4 Million Annual Passengers

Regressions were run for airports in this category (see Table 10) and good "fits" could not be obtained with initial efforts. For net income a reasonable fit was obtained only by deleting Indianapolis, Baltimore/Washington Int'l and Reno (all showing negative net income) from the data base. The regression equation obtained after these deletions is:

$$\text{NET INC} = \$-1,241,000 + \$1.17 \text{ (TOT PASS)}$$

The coefficient of correlation for this regression equation is 0.77, R^2 equals 0.59 and t equals 3.79.

The regression equation obtained using all data points in the sample is:

$$\text{NET INC} = 156,000 + 0.30 \text{ (TOT PASS)}$$

with a correlation coefficient of 0.288.

Amortization does not relate well to activity indicators whether passengers or aircraft operations. The "best" regression obtained was as follows:

$$\text{AMORT} = \$-22,000 + \$0.47 \text{ (TOT PASS)}$$

The coefficient of correlation for this regression equation is 0.23..

TABLE 9

NET INCOME & AMORTIZATION
AIRPORTS WITH OVER 4 MILLION
ANNUAL PASSENGERS

AIRPORT	NET INCOME ($000)	AMORTIZATION ($000)	TOTAL PASSENGERS (000)
Phoenix	4,958	2,040	4,458
Los Angeles	23,248	9,270	24,670
San Francisco	UNK *	UNK	16,332
Denver	10,789	1,084	11,050
Tampa	1,680	1,891	4,826
New Orleans	2,319	585	4,570
Detroit	3,895	UNK	7,654
Kansas City	3,564	1,250	4,948
St. Louis	4,157	610	7,812
Las Vegas	4,692	924	6,688
Cleveland	4,212	2,451	5,704
Philadelphia	5,620	UNK	7,924
Pittsburgh	5,071	UNK	7,572
Houston	3,768	UNK	6,336

*UNK indicates that interest expense was not shown in non-operating expenses so that the net income figure would be incorrect.

TABLE 10

NET INCOME & AMORTIZATION
AIRPORTS WITH 1 TO 4 MILLION
ANNUAL PASSENGERS

AIRPORT	NET INCOME ($000)	AMORTIZATION ($000)	TOTAL PASSENGERS (000)
Tucson	254	170	1,438
West Palm Beach	628	125	1,512
Indianapolis	(593)	1,360	2,592
Louisville	1,475	750	1,746
Balt/Washington Int'l	(65)	UNK	3,012
Omaha	1,280	259	1,616
Albuquerque	397	UNK	1,620
Reno	(398)	218	1,090
Albany	31	270	1,122
Rochester	38	UNK	1,600
Columbus	1,050	UNK	2,144
Nashville	688	3,708	1,778
Salt Lake City	1,835	325	2,708

3. Airports With 300,000 to 1 Million Annual Passengers

For airports in this category (see Table 11) all regressions run were unsatisfactory yielding negative relationships between traffic levels, net income and amortization. Coefficients of correlation were negative and low value (less than 0.15).

4. Airports With Less Than 300,000 Annual Passengers

For airports in this category (see Table 12) all regressions run were unsatisfactory yielding little relationship between traffic levels, net income and amortization. It is important to note that airports in this category reported significant amounts of tax income or other local funds in non-operating revenues.

5. General Aviation Airports

As with earlier attempts to estimate operating revenues and expenses for these airports, regression runs for net income and amortization were unsatisfactory. No significant relationships between traffic levels, net income and amortization were found.

D. Evaluation and Discussion

1. Relationship of Financial Results to Traffic Level

One would intuitively expect to find that an airport's financial operating results bear some relationship to some measure of its activity: passengers, or aircraft operations, or both. The analysis in this section suggests such a relationship does in fact exist and can be demonstrated using empirical data. But there are changes in the extent of the relationship as air carrier airports with lower activity levels are analysed and the relationship at general aviation airports is not nearly as strong as it is at air carrier airports. Also, except for the larger airports, the relationship between activity and net income, amortization is not very strong at all. There are some rather reasonable explanations for these deviations and it is worthwhile to discuss the major ones.

a. Variation In Pricing Policy

At the large air carrier airport it can be said for all practical purposes that a fee is charged by the airport for every function or activity that takes place at the airport. Landings and takeoffs, parking and storage of aircraft, use of space in all buildings, use of land, parking of automobiles, use of taxies, rental cars, restaurants, purchase of newspapers, watching of television and use of the bathrooms are all items for which the airport has established a price and receives revenue. The establishment of prices for these functions and activities is usually the result of detailed study of the airport's operating and financing costs so that the airport management seeks to set prices that assure recovery of these costs.

TABLE 11

NET INCOME & AMORTIZATION
AIRPORTS WITH 300,000 TO 1 MILLION
ANNUAL PASSENGERS

AIRPORT	NET INCOME ($000)	AMORTIZATION ($000)	TOTAL PASSENGERS (000)
Fresno	352	UNK	770
Colorado Springs	539	78	572
Boises	222	70	858
Jackson	444	UNK	702
Billings	105	70	580
Toledo	(46)	0	582
Charleston (W. VA)	850	312	510
Sioux Falls	202	60	496
Baton Rouge	44	0	376
Portland (Maine)	268	UNK	338
Lansing	1,033	0	346
Eugene	10	65	332

TABLE 12

NET INCOME & AMORTIZATION
AIRPORTS WITH LESS THAN 300,000
ANNUAL PASSENGERS

AIRPORT	NET INCOME ($000)	AMORTIZATION ($000)	TOTAL PASSENGERS (000)
Tuscaloosa	(156)	0	72
Chico (Cal.)	154	UNK	68
New Haven	(149)	125	66
Paducah	28	UNK	106
Orleans (Mass.)	(9)	UNK	194
Lebanon	10	UNK	80
Kinston	.2	UNK	102
Bismark	284	102	238
Lawton	130	0	106
Burlington	120	UNK	279
Charlottesville	10	0	112
Yakima	(2)	10	124

Some prices are set by administrative fiat -- these are ordained -- while others are set by the "marketplace" either through negotiations (bargaining) with users or through a bidding process in which many offerors (concessionnaires) compete for limited airport space and win space only if they are equal in service and highest in bid.

This alliance between prices and activity at the larger airports assures a direct relationship between activity and operating revenues. The alliance is strong (prices can reflect at least costs) because larger airports are valuable centers of concentrated economic activity (large hubs account for about 68% of total passengers in the U.S.); thus a high demand for their use virtually assures a sound financial condition.

Such is not the case as one moves down the activity spectrum among air carrier airports and especially when one views circumstances at general aviation airports. Many activities at general aviation airports are "free" (but costless only to the user). More often than not at general aviation airports there is no landing fee and no auto parking fee (two of the largest revenue sources at larger airports). Instead revenues come from aircraft hangaring and storage fees, fuel flowage fees, rentals for maintenance and repair shops, etc. The relationship between these fees and traffic activity is remote. For example, of two aircraft hangared at an airport and paying an identical monthly charge for the hangars, one might be flown every day and the other only once a month. Some based aircraft may purchase most of their fuel at their home airport while others may frequently buy elsewhere.

There is also a difference in market strength among airports. The smaller air carrier airport because of its lower activity level is not as economically attractive to an individual airline or prospective concessionnaire as is the larger high activity airport. Thus, the smaller airport is likely to receive a lesser price for the services it provides and some services (such as auto parking lots) may not yield any revenue to the airport while other services (e.g., restaurants) may not be provided at all and are thus lost as revenue sources.

Variation in pricing policy and its close relative, market strength, are major reasons why the relationship of operating revenue and traffic activity weakens as airport activity decreases; they are also major reasons why, typically, smaller airports have difficulty in earning operating revenues sufficient to cover operating expenses.

b. Variations In Asset Cost, Age; Financing Mechanism

The regressions for net income and amortization vs. traffic levels showed a significant coefficient of correlation only at airports with over 1 million annual passengers (though amortization for airports in the 1 million to 4 million category had a low coefficient of correlation).

It was not expected that a relationship between activity level, net income and amortization would necessarily be found to obtain for all airport groups and there are reasons to believe that the relationship would

not obtain for a particular airport over time. The logic for this runs along the following lines: Net income is a residual of the difference between net operating revenues plus non-operating revenues less non-operating expenses. For many airports the major source of non-operating revenues is interest earned on investments; these investments are usually sources obtained from bond financing and placed in short-term notes until needed. For these same airports the primary non-operating expense is for interest on existing debt. Thus, for these airports the bulk of non-operating revenues and expenses is related to financing of debt for development. Debt for development is issued primarily to build facilities for future traffic levels, thus one would not expect non-operating revenues and expenses and therefore net income to relate very strongly to current traffic levels.

It is also useful to note that the initial cost and age of assets varies from airport to airport even among those with comparable traffic levels. Two airports with comparable traffic (and perhaps comparable existing traffic capacity) may have been built ten or more years apart. The airport built more recently could show higher amounts on its books for interest and amortization for any one of several reasons:

- Cost of the younger airport's initial facilities were higher due to inflation
- The older airport may have retired most or all of its initial debt
- The younger airport may have built a greater capacity and thus incurred a greater debt

Another non-traffic factor which affects the level of interest expense and amortization is the financing mechanism used. Many larger airports use revenue bonds as the primary vehicle for financing capital development. Some larger airports and many smaller airports have used general obligation bonds as the primary vehicle. The general obligation bond will usually have an effective interest rate which is 1% to 1.5% lower than the interest rate of a revenue bond. Airports where general obligation bonds are used would thus show a lower interest expense than airports using revenue bonds.

2. "Break-even" Traffic Levels; "Efficiency" Factors

It has been shown up to this point that a larger airport has a better chance of earning net operating revenues and net income than does a smaller airport. Yet even within each airport size group there are variations of this earning capability. The regression equations developed in this report show that airports in the over 4 million annual passengers category do not cover operating expenses (operating break-even) until traffic reaches a level of approximately 456,000 passengers. For an airport in this group with 5 million annual passengers to net operating revenue would be $4,744,000 or $0.948 per passenger. For an airport in this category with 15 million annual passengers the net operating revenue would be $15,184,000 or $1.01 per passenger. Thus, the larger airports in these groups are able to earn higher per passenger net operating revenues than are the smaller airports in this category. Call this the efficiency factor. It is important for the efficiency factor to increase

with airport size within an airport size category for it was found by regression analysis of debt service (interest plus amortization) that debt service per passenger increases with airport size. For airports in the over 4 million category for example debt service per passenger at 5 million annual passengers is $0.56 while at 15 million annual passengers it is $0.63 [NOTE: The regression equation obtained for debt service as a function of annual passengers for airports in the over 4 million annual passengers category is:

$$\text{DEBT SER} = \$-524{,}000 + 0.669\ (\text{TOT PASS})$$

with correlation coefficient of 0.84] This finding must be noted with some care in light of the suggestion that debt service reflects investment for expansion and, thus, some level of traffic higher than currently exists.

Efficiency factors for the various airport size groups can be summarized as follows for selected passenger traffic levels:

TABLE 13

NET OPERATING REVENUE
"EFFICIENCY" FACTORS

- Airports Over 4 Million Passengers
  - At 5 Million Passengers - 0.948
  - At 15 Million Passengers - 1.01
  - At 25 Million Passengers - 1.02
- Airports With 1 Million to 4 Million Passengers
  - At 1 Million Passengers - 0.331
  - At 2.5 Million Passengers - 0.438
  - At 3.5 Million Passengers - 0.458
- Airports With 300,000 to 1 Million Passengers
  - At 300,000 Passengers - 0.305
  - At 600,000 Passengers - 0.42
  - At 900,000 Passengers - 0.458
- Airports With Less Than 300,000 Passengers
  - At 100,000 Passengers - (0.26)
  - At 175,000 Passengers - 0.112
  - At 250,000 Passengers - 0.262

An important feature to note from this listing of efficiency factors is that in each airport size group there is an increase in the efficiency factor as traffic increases but the rate of that increase declines as traffic increases. This suggests analytically what one would expect intuitively: that an airport of a given facility size has an optimal level of traffic activity; optimal in the economic sense being defined as that traffic level where marginal revenue equals marginal costs -- the point at which any increase in traffic would cause the efficiency factor to decline.

3. Requirements for Local Funds

An important additional finding is that as airport size decreases the amount of local tax revenues and other local cash contributions in non-operating revenues increases. This reflects the inability of smaller airports to generate net operating revenues sufficient to cover interest expense and amortization. Significant amounts of these monies begin to show up in the 300,000 to 1 million annual passengers category and become much more widespread for airports in the less than 300,000 annual passengers category. Of the twelve airports in the less than 300,000 category shown in Table 12, only five had some net income without local taxes or other local tax contributions. The need for local funds is acute at general aviation airports even at some of the larger ones.

4. Some Tentative Conclusions

The preceding analysis suggests certain statements that may be made about the financial status of air carrier airports within groups classed by level of passenger activity and about the financial status of general aviation airports. The statements must be regarded as general and suggestive taking precaution to note that the financial status of any particular airport may vary considerably from the "norm" for its group. The statements follow:

a. Larger air carrier airports (over 4 million annual passengers) earn net operating revenues. The net operating revenue earning capability is directly related to traffic volume and net operating revenue per passenger increases with activity.

b. The net operating revenue of larger air carrier airports when combined with non-operating revenue is sufficient to pay annual interest charges and amortization of existing debt and still retain a margin of income for additional financing.

c. Air carrier airports with 1 to 4 million annual passengers typically earn net operating revenue although there are a few exceptions to this generalization. Net operating revenue is normally related to traffic volume but again there are exceptions.

d. The net operating revenue of air carrier airports with 1 to 4 million annual passengers when combined with non-operating revenue is typically sufficient to pay annual interest charges although there are exceptions to this generalization even for airports in the higher activity range of this category.

Capability to pay amortization is mixed with about half of the airports in this group showing sufficient net income to do so. After payment of amortization a few airports in this group have a surplus to support additional financing.

e. Air carrier airports with 300,000 to 1 million annual passengers typically earn net operating revenue although there is an occassional operating loss and the amount so earned is often measured in tens of thousands of dollars.

f. For a few of the airports in the 300,000 to 1 million category, net operating revenue plus non-operating revenue (without additional local taxes or other funds) is sufficient to pay annual interest and amortization. For others in this group local funds are required to accomplish this. Little additional financing capability exists.

g. Air carrier airports with less than 300,000 annual passengers more often than not will show an operating loss especially if the annual passenger volume is less than 150,000.

h. Airports with less than 300,000 annual passengers generally show a positive net income only because of local taxes and other local cash contributions which are made in direct support of operations. Income from airport operations is rarely sufficient to support any financing of development.

i. General aviation airports rarely earn net income from operations sufficient to support any kind of development financing.

5. Net Income, Amortization Regressions as Predictors

Net income and amortization regresssions derived for airports in the one to four million and over four million passengers categories can be tested for their usefulness in predicting the net income or amortization for airports at various activity levels. Table 13A shows actual net income vs net income computed using the regression equations for airports in the one to four million and over four million passenger categories. Table 13B shows actual amortization vs computed amortization for the over four million category.

TABLE 13A

ACTUAL VS. COMPUTED
NET INCOME

AIRPORT	TOTAL PASS. (000)	ACTUAL NET INCOME ($000)	NET INCOME COMPUTED FROM REGRESSION EQUATION ($000)	DIFFERENCE COMPUTED FROM ACTUAL + - %
Phoenix	4,458	4,958	2,339	- 53
Los Angeles	24,670	23,248	23,122	< 1
Denver	11,050	10,789	9,117	- 15
Tampa	4,826	1,680	2,717	+ 61
New Orleans	4,570	2,319	2,454	+ 6
Detroit	7,654	3,895	5,625	+ 44
Kansas City	4,948	3,564	2,842	- 20
St. Louis	7,812	4,157	5,787	+ 39
Las Vegas	6,688	4,692	4,632	- 1
Cleveland	5,704	4,212	3,620	- 14
Philadelphia	7,924	5,620	5,903	+ 5
Pittsburgh	7,572	5,071	5,541	+ 9
Houston	6,336	3,768	4,270	+ 13
Tucson	1,438	254	441	+ 74
West Palm Beach	1,512	628	528	+ 16
Louisville	1,746	1,475	802	- 46
Omaha	1,616	1,280	650	- 49
Albuquerque	1,620	397	654	+ 65
Albany	1,122	31	72	+ 132
Rochester	1,600	38	631	+1560
Columbus	2,144	1,050	1,267	+ 21
Nashville	1,778	688	839	+ 22
Salt Lake City	2,708	1,835	1,927	+ 5

TABLE 13B

ACTUAL VS. COMPUTED
AMORTIZATION

AIRPORT	TOTAL PASS. (000)	ACTUAL AMORTIZATION ($000)	AMORTIZATION COMPUTED FROM REGRESSION EQUATION ($000)	DIFFERENCE OF COMPUTED FROM ACTUAL + - %
Phoenix	4,458	2,040	786	- 61
Los Angeles	24,670	9,270	8,264	- 11
Denver	11,050	1,084	3,225	+ 197
Tampa	4,826	1,891	922	- 51
New Orleans	4,570	585	828	+ 41
Kansas City	4,948	1,250	968	- 23
St. Louis	7,812	610	2,027	+ 232
Las Vegas	6,688	924	1,611	+ 74
Cleveland	5,704	2,451	1,247	- 49

As the Tables show, the regression equations are good predictors (with plus or minus 20% as criteria) in some cases, coming within 1% or less of actual net income in two cases, and bad predictors in other cases, missing by as much as 1560% in one case (albeit an extreme one). We are interested in the balance of net income minus amortization as it is this amount which is available for servicing additional debt (interest plus amortization). Thus Table 13C compares this actual balance vs. the balance computed from the regression equations for net income and amortization.

TABLE 13C

BALANCE OF NET INCOME LESS AMORTIZATION
ACTUAL VS. COMPUTED
(Derived from Table 13A & 13B)

AIRPORT	ACTUAL BALANCE ($000)	BALANCE BASED ON REGRESSION EQUATIONS ($000)	DIFFERENCE OF REGRESSION BALANCE FROM ACTUAL + - %
Phoenix	2,918	1,553	- 47
Los Angeles	13,978	14,858	+ 6
Denver	9,705	5,892	- 39
Tampa	- 211	1,795	+ 950
New Orleans	1,734	1,626	+ 6
Kansas City	2,314	1,874	- 19
St. Louis	3,547	3,760	+ 6
Las Vegas	3,768	3,021	- 20
Cleveland	1,761	2,373	+ 35

Table 13C provides some comfort for the analyst attempting to project the net funds available for servicing additional debt for airport development. On balance, the analyst would prefer to underestimate the availability of these net funds based on the simple premise that it is better to have money left over than to run short. Table 13C suggests that use of the net income and amortization regression equations for airports in the over four million enplanements category will underestimate the net funds available for additional financing for about half of the cases and overestimate by a small margin for about a third of the cases. The table also suggests there would be limited cases where use of the equations would considerably overestimate net funds available. In the Tampa case the overestimate is 950%. This point will be returned to in Section V.

IV. ESTIMATION OF AIRPORT INVESTMENT NEEDS DURING THE FY 1981 THROUGH FY 1990 PERIOD

A. Methodology

In order to arrive at an estimate of the total investment to be required for all airports in the National Airport System Plan during the 1981 through 1990 period analyses of selected available data were made.

Air Carrier airports were placed in the same size groups as in section III of this report. Comparison of the Hub classification with the size groups used in this report is shown below.

TABLE 14

AIR CARRIER AIRPORT GROUPS DEFINED BY PASSENGERS SERVED (THOUSANDS)

	Defined by the Hub System		Grouping In This Report
Hub	Range of Passengers (1976)		
Class.	Enplaned	Total (Est.)	Range of Total Passengers
Large	2153 or more	4306 or more	4000 or more
Medium	538 to 2153	1076 to 4306	1000 to 4000
Small	108 to 538	216 to 1076	300 to 1000
Non	Less than 108	Less than 216	Less than 300

The groupings of general aviation airports as between commuter service, reliever and other as given in the National Airport System Plan 1978-87 was compared to the airport groups of large, medium and small general aviation airports developed in a previous study which provided the sample data base for these airports. It was found that for practical purposes the NASP grouping was the most reasonable, and was used in the final forecast of investment needs.

To determine total investment needs within each of the above groups the NASP was used to provide the amounts of eligible investment during the 1978-82 and 1983-87 periods shown.

Eligible investment includes all items for which matching funds are available under the Airport Development Aid Program. However in most all projects undertaken, there are some items of construction or acquisition that are not eligible.

One example is an airport terminal building for which the Federal Aid is limited to 50% of the cost of public areas only. Consequently the amounts shown in the National Airport System Plan for terminal buildings show only the costs of the public areas portion of the total cost of the building. The public areas in terminal buildings will vary from a low of about 45% to a high of around 55% or an average of about 50% of the total space. Therefore in any terminal building project the total investment needed for the building will be approximately twice the amount indicated in the NASP.

Other examples of ineligible items are

- o Land for or construction of Auto Parking Lots
- o Air Cargo terminals
- o Development of commercial and aviation areas such as:
  - rental car maintenance facilities
  - hotel or motel facilities
  - special facilities for in-flight kitchens
  - taxiways to serve private hangar areas
  - hangars and related non-itinerant storage aprons
  - airport maintenance, storage and other buildings
- o Some utilities relocations and/or extensions
- o Some service and access roads

Our experience in developing airport improvement programs and a review of some of those completed during the last seven years along with a check of current program budgets for seven air carrier airports indicates a relationship in the range of total passenger groups and the amount of public funds expended for items of construction ineligible under the Airport Development Aid Program.

With respect to general aviation airports based on our past experience we find that the public funds expended for items not eligible under the Airport Development Aid Program does not appear to vary consistently with the size groupings. The major reason for this is that most of the ineligible items for these airports are constructed with private funds. Here again we developed a relationship between the eligible and ineligible items for these airports.

Based on the above a series of formulae were developed to establish the ineligible investment for the subgroups of air carrier and general aviation airports as follows:

Airport investment required for items ineligible under the current Airport Development Aid Program:

<u>Airports serving 4 million passengers or more</u>:

- o 100% of eligible terminal building costs, plus
- o 30% of total terminal building costs for other related landside development, plus
- o 10% of all other eligible costs

<u>Airports serving less than 4 million passengers</u>:

- o 100% of eligible terminal building costs, plus
- o 15% of total terminal building costs for other related landside development, plus
- o 5% of all other eligible costs

<u>General Aviation Airports</u>:

- o 10% of total eligible costs

These formulae were applied to selected numbers of airports within the above groups as defined in the "Terminal Area Financial Data Study". The airports selected and the resultant estimates are included as in the Appendix. Where feasible contact with individual airports in each group was made to determine the percent of eligible and ineligible costs in their proposed capital investment budgets. These data are presented in Table 15.

The above analysis established the estimated percentage of ineligible airport investment needs in relation to the total investment. It is our conclusion based on past experience working with detailed budgets from the largest to the smallest airports that the above percentages are within a level of accuracy that could yield results within 15% of total dollars needed for airport development over the 1978 through 1987 period.

B. Investment Projections

The next step in the analysis required the projection of the investment requirements to cover the 1981-1990 period.

The National Airport System Plan 1978-1987 was used as the source for the eligible items of airport investment needs during this period.

The procedure adopted was to reduce the requirements shown for the 1978-82 five year period in relation to the federal funds available during 1978, 1979, and 1980. It was assumed here that the Airport Development Aid Program funds available for 1979 and 1980 would equal the authorized amounts of 575 and 610 million dollars respectively.

To estimate the amount of eligible airport requirements that would be fulfilled for each group of airports by 1981 it was also assumed that discretionary fund uses within the groups would be in the same proportion as enplanement fund apportionments and general aviation airport entitlement apportionments.

The remaining unfulfilled eligible investment needs for 1981-1982 plus those shown for 1983-1987 were taken as the investment needs for eligible items during the 1981-1987 time period. These needs for 1988-1990 time period were estimated by assuming they would continue at the same annual rate as shown in the NASP for the 1983-1987 period.

The total airport development costs were then estimated applying the percentage distributions as between eligible and ineligible items previously defined.

The adjustment of some of the total small hub and non hub investment needs to reflect the desired total passengers served was made based on the percentage of small hubs which had fewer than 300,000 total passengers.

The results of the capital investment needs analyses are given for the 1981-82, 83-87 and 88-89 periods and eligible, ineligible and total investment needs are shown for each segment, as well as totals for the years 1980-89 in Table 16.

TABLE 15

ESTIMATED TOTAL AIRPORT INVESTMENT
NEEDS 1978-87 OF SELECTED SAMPLES
AND 1978-87 NASP

Airport Group	Eligible Under ADAP (1976 $000)	Ineligible Under ADAP (1976 $000)	Total Investment needed (1976 $000)	Remarks
I. AIR CARRIER				
A. Large Hubs				
1. Sample 18 Airports	1,394,780 1/	568,046	1,962,826	10 years
% Total	71	29	100	
2. Check 3 Airports				
Budget	55,437	31,130	86,567	4 year budget
% Total	64	36	100	
Budget	32,891	10,271	43,162	5 year budget
% Total	76	24	100	
Budget	21,960	12,993	34,953	6 year budget
% Total	63	37	100	
3. Percentage Adopted	70	30	100	
B. Medium Hubs				
1. Sample 16 Airports	602,317 1/	159,864	762,182	10 years
% Total	79	21	100	
2. Check 2 Airports				
Budget	67,300	20,700	48,000	5 year budget
% Total	76	24	100	
Budget	580	600	1,180	1-1/2 year budget
% Total	49	51	100	
3. Percentage Adopted	75	25	100	
C. Small Hubs				
1. Sample 23 Airports	321,957 1/	85,567	407,524	10 years
% Total	79	21	100	
2. Check 1 Airport	700	0	700	1 year
% Total	100	0	100	
3. Percentage Adopted	80	20	100	
D. Non Hubs				
1. Sample 25 Airports	100,023 1/	22,163	122,186	10 years
% Total	82	18	100	
2. Check 1 Airport	1,800	225	2,025	1 year
% Total	89	11	100	
3. Percentage Adopted	85	15	100	

1/ From NASP 1978-87

TABLE 15 (Cont'd)
ESTIMATED TOTAL AIRPORT INVESTMENT NEEDS 1978-87 OF SELECTED AMPLES AND 1978-87 NASP

Airport Group	(1976 $000) Eligible Under ADAP	Ineligible Under ADAP	Total Investment needed	Remarks
II. General Avia. Arpts				
A. Large				
1. Sample 15 Airports	1/ 139,083	13,908	152,991	10 years
% Total	91	9	100	
2. Check 2 Airports				
Budget	4,000	4,000	8,000	5 years
% Total	50	50	100	
Budget	1,200	149	1,349	1 to 2 years
% Total	89	11	100	
B. Medium				
1. Sample 29 Airports	1/ 62,940	6,294	69,234	10 years
% Total	91	9	100	
2. Check 1 Airport	676	114	790	1 year
% Total	86	14	100	
C. Small				
1. Sample 35 Airports	1/ 52,500	5,250	57,750	10 years
% Total	91	9	100	
2. No Effective Check	-----	-----	-----	
D. Adopt for All	90	10	100	

1/ From NASP 1978-87

TABLE 16

ESTIMATED AIRPORT DEVELOPMENT COSTS
(1976 DOLLARS, MILLIONS)

Airport Group	FY 81 and 82			FY 83 through 87			FY 88 through 90		
	Eligible 1/	Ineligible	Total	Eligible 1/	Ineligible	Total	Eligible 1/	Ineligible	Total
I. Air Carrier 2/									
A. Large Hubs	913	391	1,304	804	345	1,149	482	207	689
B. Medium Hubs 3/	472	157	629	632	211	843	379	126	505
C. Small Hubs less portion listed under Non Hubs 4/	458	115	573	247	62	309	148	37	185
D. Non Hubs plus portion of Small Hubs 5/	1,052	186	1,238	482	85	567	289	51	340
E. Sub Totals	2,895	849	3,744	2,165	703	2,868	1,298	421	1,719
II. Other									
A. Commuter Service	241	27	268	114	13	127	68	8	76
B. Reliever	625	69	694	229	25	254	137	17	154
C. General Aviation	2,030	226	2,256	661	73	734	397	44	441
D. Sub Totals	2,896	322	3,218	1,004	111	1,115	602	69	671
III. Totals	5,790	1,171	6,962	3,169	814	3,983	1,900	490	2,390

1/ Under the Current ADAP
2/ Total Passengers four million or more
3/ Total passengers less than four million, to one million or more
4/ Total passengers less than one million, to three hundred thousand or more
5/ Total passengers less than three hundred thousand

TABLE 16(Cont'd)
ESTIMATED AIRPORT DEVELOPMENT COSTS (1976 DOLLARS, MILLIONS)

Airport Group	Totals FY 81 through 90 Eligible 1/	Ineligible	Total
I. Air Carrier			
A. Large Hubs 2/	2,199	943	3,142
B. Medium Hubs 3/	1,483	494	1,977
C. Small Hubs less portion listed under Non Hubs 4/	853	214	1,067
D. Non Hubs plus portion of Small Hubs 5/	1,823	322	2,145
E. Sub Totals	6,358	1,973	8,331
II. Other			
A. Commuter Service	423	48	471
B. Reliever	991	111	1,102
C. General Aviation	3,088	343	3,431
D. Sub Totals	4,502	502	5,004
III. Totals	10,860	2,475	13,335

1/ Under the Current ADAP
2/ Total Passengers four million or more
3/ Total Passengers less than four million, to one million or more
4/ Total Passengers less than one million, to three hundred thousand or more
5/ Total Passengers less than three hundred thousand

While the previously discussed analysis of selected airport groups and individual airports indicated some wide variations within the groups we believe the figures presented fall within a level of accuracy of twenty percent of the total airport investment needs over the 10 year period.

A comparison with the 1978-87 National Airport System Plan (NASP) discloses that during the ten year period the Air Carrier airports serving four million passengers or more are expected to accomplish a larger portion of the development contemplated under the NASP than any other group of airports. The first five year period of the current NASP admittedly contains items of development which are carry over items that would normally have been accomplished in prior years. Also we believe that for all except the largest Air Carrier airports the five year planning period is more easily estimated. The groups of the smaller Air Carrier and General Aviation airports are observed to be able to accomplish only short term planning.

The reasons for this are related to the difficulty of municipal financing practices to accommodate a longer range perspective as well as the fact that as groups, these airports require a subsidy for their operation and development either by the utilization of depreciation funds or direct tax income or both. The comparison data are as follows:

TABLE 17 ESTIMATED TOTAL INVESTMENT (1976 $ MILLION)

Airport Group	1978-87	1981-90
I. Air Carrier		
A. Total Passengers 4 Million or More	$ 3,509	$ 3,142
B. Total Passengers Less Than 4 Million But 1 Million or More	1,980	1,977
C. Total Passengers Less Than 1 Million But 300,000 or More	1,002	1,067
D. Total Passengers Less Than 300,000	2,081	2,145
E. Sub Total	8,572	8,331
II. General Aviation	4,588	5,004
III. Totals	$13,160	$13,335

Adjustments to Forecast Total Investment

New Major Airports

The 1968 Report of the Committee on Commerce Identified as Report No. 1355, addressed the question of Airport System Development Requirements in connection with the "Airport and Airways Development Act of 1968".

This report listed eleven new Major Airports and improvements for two other existing airports as adjustments to the then forecast airport needs. The total estimated Investment to be required during the 1974 to 1983 period was placed at between two and three billion dollars. This would be equivalent to between 3.2 and 4.8 billion dollars (1976).

A review of the 1978-87 NASP shows an estimated Investment need for three new airports of 507 million dollars, and an Investment need at 18 existing major airports of 2.2 billion dollars (1976). When added together the total Investment need indicated for the 18 major airports is 2.7 billion dollars (1976).

A review of the Report on "Establishment of New Major Public Airports in the United States" prepared by the Secretary of Transportation pursuant to Section 26 of the Airport and Airway Development Act Ammendments of 1976 (P.L. 94-353) discloses that under any of the scenarios presented, less total funds were shown to be needed for New Major airports than are estimated as Investment needs and included in the 1978-87 NASP for Major Airports.

However, comparing the three sources of estimated New Major airport needs, Boston and New York appeared in the 1968 Commerce Report and in Scenarios 1, 2, and 3 of the above report. The 1978-87 NASP shows substantially less investment needed at the existing airports at these locations than the investment needs indicated by the Committee on Commerce report and the above referenced report.

Also the more recent report shows a need for a new major airport at San Francisco under all four scenarios presented.

A comparison of the Estimated Investment Required for New and Existing Major Airports from the above discussed sources is shown in Table 18.

From our review of these data it appears clear that current planning contemplates improvements at most major airports which also include provision of reliever airports that would offset the need for new airports at most of the locations. However, the most recent study would appear to indicate a potential need for three or four New Major airports by the year 2000. These are; Boston, New York, and San Francisco which appear in all scenarios except Number 4 which assumes not only an Upgraded Third Generation Air Traffic Control improvment but also the peak spreading concept to alleviate airport capacity problems.

On the basis of the above analysis we believe it prudent to assume that three major new airports will be required by the year 2000 and that two thirds of the estimated costs as given in the Secretary's report will be incurred in the 1981 to 1990 period. This would indicate the need to add to "Estimated Airport Investment Needs 1981-1990" an amount of approximately 500 million dollars.

Land Banking

The Airport Land Banking report of the Secretary of Transportation to the United States Congress pursuant to Section 26 of the Airport and Airway Development Act Amendments of 1976 (P.L. 94-353) concisely describes the probable need for and the problems associated with advance acquisition of land for future airport expansion.

The most apparent problem as brought out in the above report and confirmed by our experience in airport development planning, is the difficulty of funding for such purchases considering the demands for funds for other development needs.

TABLE 18

COMPARISON OF THE ESTIMATED AIRPORT INVESTMENT REQUIRED FOR NEW AND EXISTING MAJOR AIRPORTS (1976 $000)

Prospective New Major Airports	1968 Com. on Commerce Rep. 1974-83	1978-87 NASP Selected Major Aprts			Report on Establishment of New Mjaor Public Airports in the United States			
		New	Exist.	Totals	Scenario 1	Scenario 2	Scenario 3	Scenario 4
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Atlanta	-----	199,564	540,594	740,158	208,000	-----	-----	-----
Boston	570,000	-----	41,746	41,746	272,000	272,000	272,000	-----
Chicago	800,000	-----	260,000	260,000	213,000	-----	-----	-----
Cincinnati	Unknown	-----	74,027	74,027	-----	-----	-----	-----
Cleveland	200,000	-----	164,529	164,529	-----	-----	-----	-----
Denver	-----	-----	106,957	106,957	195,000	-----	-----	-----
Los Angeles	Unknown	146,679	237,220	383,899	-----	-----	-----	-----
Miami	Unknown	-----	91,714	91,714	-----	-----	-----	-----
Minneapolis	-----	-----	41,161	41,161	212,000	-----	-----	-----
New Orleans	230,000	-----	35,630	35,630	-----	-----	-----	-----
New York	Unknown	-----	111,233	111,233	347,000	221,000	221,000	-----
Ontario	24,000	-----	38,947	58,947	-----	-----	-----	-----
Orlando	Unknown	-----	82,584	82,584	-----	-----	-----	-----
Palmdale	15,000	-----	-----	0	-----	-----	-----	-----
Philadelphia	-----	-----	81,526	81,526	285,000	285,000	-----	-----
St. Louis	226,000	-----	42,223	42,223	317,000	-----	-----	-----
San Diego	Unknown	160,571	54,221	214,792	-----	-----	-----	-----
San Francisco	-----	-----	36,723	36,723	292,000	244,000	244,000	244,000
Seattle	-----	-----	133,783	133,783	242,000	-----	-----	-----
Totals	2,065,000+	506,814	2,194,818	2,701,632	2,583,000	1,022,000	737,000	244,000

Est 2,000,000 - 3,000,000 ($68)
1.62 = 1976$ 3,240,000
+
4,860,000

The legal questions pointed out in that study are real but are not universal an presumably can be solved.

As discussed in the report land banking is not new and has been undertaken by airports large and small for many years. The problem is as stated that even if eligible under ADAP a sponsor may have to wait many years for reimbursement of the federal share.

The amounts developed in the Airport Land Banking study for optimum purchase time and excluding New Major airports which have been considered separately, would amount to about 440 million dollars (1976), for the 1981-1990 period. This amount includes the amounts shown for the 1978-80 period to include all funds indicated to be needed through 1990, and should be added to the basic estimate of airport investment needs developed earlier.

V. ANALYSIS OF SELF-FINANCING CAPABILITY

A. General Approach

The financial relationships and investment projections developed in Sections III and IV can be used to gain some insight into the capability of certain airport size groups to finance capital development with airport generated net income. The detailed analysis here will concentrate on airports with more than 4 million annual passengers for two reasons:

- Airports in the over 4 million group account for over 30% of the ADAP expenditures and an even larger percentage of the airport investment in the U.S.
- Section III of this report produced estimating equations of better quality for these airports than for others.

A more generalized analysis will be presented for other airport groups.

The findings in Section III were presented in terms of 1976 dollars and the investment projections in Section IV were also presented in 1976 dollars. The dollar figures in this section are therefore in 1976 dollars. We wish to examine the growth in investment needs for airports in relation to the growth in their funds available to pay interest and amortization on new debt issued to finance the needed investment. The primary interest is in the capability to finance estimated investment during the FY 1981-1990 period but as the financial profile in Section III is as of 1976 it will be necessary to estimate 1977-80 investment as well.

The approach for airports in the over four million passengers category will be to trace the change in financial profile for several airport sizes (based on total passengers). This will be done by using the regression equations developed in Section III. This tracing will relate the change in financial profile to traffic growth. Growth rates for passenger traffic to be used are based on official FAA national forecasts averaged and rounded off for purposes here. For 1977-80, 5.5% is used; for 1981-85, 5.0% is used; for 1985-90, 4.5% is used. This comparative static approach will show the profile as of 1976, 1980, 1985 and 1990 and all in 1976 dollars. Elements of the profile for the over four million passengers category to be shown are:

(1) Net Operating Revenue (computed from the operating revenue and operating expense regressions developed in Section III.)
(2) Net Income (from the net income regression developed in Section III.)
(3) Amortization (from the amortization regression developed in Section III.)
(4) Balance (computed from (2) and (3).)

From this profile tracing it can be determined how much additional debt airports would take on as they grow if the regression equations were exact predictors of financial results. This additional debt can then be compared to the investment projections based on the NASP and judgments can be made as to how close the predicted profiles might be to actual results.

In Section III, the predictive usefulness of the net income and amortization regression equations derived was discussed. It will be recalled that the equations for the over four million passengers category were sometimes "good" predictors and sometimes were not. It was also shown (in Table 13C) that when the balance of net income minus amortization computed from the equations was compared to the actual balance shown on the airport's revenue and expense statement the computed balance was in all but one case either less than or not more than 20% of the actual balance. (Of the nine comparisons, four computed balances were underestimates, three were overestimates by 6% and two were overestimates by larger amounts. Thus the chance of overestimating the balance by more than 20% is small.

B. Financial Profile: Airports With Over 4 Million Passengers

Four financial profiles will be traced each beginning in 1976. The profiles will be for imaginary airports which had the following total passengers in the beginning period.

- 4 Million
- 8 Million
- 12 Million
- 16 Million

The tracing is shown in Table 19 below. Net operating revenues are computed from the regression for operating revenues and operating expenses. Net income and amortization are computed from the regression equations for these two items and the balance is net income less amortization (payment of principal on outstanding debt).

TABLE 19

Trace of Financial Profiles

Airport Size 1976	1976 Profile ($000)	1980 Profile ($000)	1985 Profile ($000)	1990 Profile ($000)
4 Million				
Net Operating Revenues	3,700	4,697	6,126	7,752
Net Income	1,868	2,850	4,256	5,856
Amortization	617	970	1,477	2,053
Balance	1,251	1,880	2,779	3,803
8 Million				
Net Operating Revenues	7,876	9,870	12,729	15,799
Net Income	5,981	7,945	10,759	13,960
Amortization	2,097	2,804	3,765	4,905
Balance	3,884	5,141	6,994	9,055
12 Million				
Net Operating Revenues	12,052	15,043	19,331	24,208
Net Income	10,094	13,040	17,262	22,064
Amortization	3,577	4,637	6,157	7,885
Balance	6,517	8,403	11,105	14,179
16 Million				
Net Operating Revenues	16,228	20,217	25,934	32,436
Net Income	14,207	18,136	23,767	30,169
Amortization	5,057	6,470	8,497	10,801
Balance	9,150	11,666	15,270	19,368

1. Financing Capability vs Investment Need, 4 Million Passenger Airport

Taking the airport which started with 4 million annual passengers in the initial time period, this tracing of its financial profile says that it added $8.8 million of new debt between 1976 and 1980 (this assumes a 25-year term on the debt with annual amortization of 1/25 of the total new debt, or $353,000 ($970,000 is its amortization in 1980, $617,000 is its amortization in 1976; the difference between the two is $353,000); with a 7% interest rate the annual interest charges would be approximately $309,000. It is also assumed that annual amortization existing in 1976 continues through all time periods though, undoubtedly, some of the bonds existing in 1976 would have been retired by or before 1990). By 1985 this airport has added another $12.6 million in new debt (amortization has increased $507,000 which, times 25 equals $12.675 million) and by 1990 has added another $14.4 million for a total of $35.8 million for the 1977-90 period in 1976 dollars. The profile suggests that it has done so while still retaining capability for additional financing of up to $10-12 million - if such financing were undertaken in 1985. The profile suggests the possibility for this airport to self finance approximately $45-48 million of new development during the 1977-90 period divided as follows:

1977-80 - $ 8.8 million
1981-85 - $12.6 million
1986-90 - $26.6 million*

*Some of the $26.6 million could be financed in the 1981-85 period

How does this financing capability compare with estimates of investment needed that were made in Section III based on the NASP? To answer this estimates were made of investment needs for the 1977-90 period for the airports in the sample representing the over 4 million annual passengers group (see Table 1 for airports in sample). Phoenix, Tampa, New Orleans and Kansas City each had, in 1976 passenger counts, between 4 and 5 million. These estimated investment needs for the period 1977-90 are:

Phoenix	- $210 million	From Section IV
Tampa	- $ 31 million	
New Orleans	- $ 38 million	
Kansas City	- $ 53 million	

Using these investment projections and assuming these four airports may be considered similar to the 4 million passenger airport profiled in Table 19, then Tampa and New Orleans would appear to have the capability to finance their needed investment, Kansas City could come close and Phoenix would fall short some $160 million.

If only the investment eligible for federal aid is considered the estimated amounts needed at the four airports are:

Phoenix	- $147 million	From Section IV
Tampa	- $ 22 million	
New Orleans	- $ 27 million	
Kansas City	- $ 37 million	

leaving only Phoenix with a shortfall.

2. Financing Capability vs Investment Needs, 8 Million Passenger Airport

Taking the airport which started with 8 million annual passengers in the initial time period, this tracing of its financial profile says that it added $18 million of new debt between 1976 and 1980 (same assumptions as in #1 above). By 1985 another $24 million is added and between 1986 and 1990 another $28 is added for a total of $70 million for the 1977-1990 period in 1976 dollars. The profile suggests that it has done so while retaining capability for additional financing of up to $80 million if such financing were undertaken in 1985. The profile suggests the possibility for this airport to finance approximately $150 million of new development during the 1977-1990 period divided as follows:

1977-80 - $ 18 million
1981-85 - $ 24 million
1986-90 - $108 million*

*Some of the $108 million could be financed in the 1981-85 period

Comparing this with airports from our sample shows the following airports of size similar to our 8 million having estimated investment needs for the 1977-90 period of:

Detroit	- $125 million	From Section IV
St. Louis	- $ 51 million	
Philadelphia	- $110 million	
Pittsburgh	- $ 39 million	

Based on the profile, all four of these airports would have a high capability of self-financing their estimated investment needs.

3. Financing Capability vs Investment Needs, 12 Million Passenger Airport

Profile results for this airport size show new debt added as follows:

1977-80 -	$ 25 million
1981-85 -	$ 38 million
1986-90 -	$ 43 million
Total	$106 million

A large capability for further debt financing remains in each time period. The airport in our sample which has traffic comparable with this airport is Denver. Its estimated investment need for the 1977-1990 period is $137 million, well within its reach if its profile follows that shown here.

4. Financing Capability vs Investment Need, 16 Million Passenger Airport

Profile results for this airport size show new debt added as follows:

1977-80 -	$ 35 million
1981-85 -	$ 50 million
1986-90 -	$ 57 million
Total	$142 million

A large capability for further debt financing remains in each time period. This airport size can finance up to an additional $115 million in 1980 or $160 million in 1985.

San Francisco is the only airport in our sample comparable in size to this size airport. Estimated investment need for San Francisco during the 1977-90 period is $43 million, well within its reach if it follows the profile shown here.

5. General Conclusions

This analysis suggests that with a few exceptions for special circumstances, airports with over 4 million passengers have a strong capability to finance a substantial proportion of their investment needs for 1981-1990 as estimated in this report. This applies to existing facilities only and does not apply to any estimated investment for new airports in this category. It should be noted that if these airports had not received substantial amounts of ADAP funds in the past, their future financing capability would not be as great — net revenue would be pledged to additional interest and amortization. None of the findings and conclusions in this report should be read to mean that airports of this size can finance 100% of their investment needs. Resources, needs and circumstances vary and a general analysis can only pretend to have provided a thoughtful overview. Finally, no statement in this report is intended to present a value judgment as to whether airports of this size should not receive ADAP funds whatever their self-financing capability may be.

Based on the discussion in Section III it is necessary to recall that the regressions used as a basis for the financial profiles are not precise estimates of financial results. From that discussion we can infer that the regressions will underestimate financial capability for about half of the airports in this group; overestimate financing capability by a small amount for about one-third of the airports in this group; and overestimate financing capability by a greater amount for the remainder of the airports in this group. Assume, for example, that the 1976 "Balance" estimated for the 4 million passenger airport is 50% high, that instead of $1.25 million it is $625,000. That balance of $625,000 would be sufficient to support issuance of a 25-year bond of approximately $7.0 million

at 7% annual interest and requiring 1.25 times debt service coverage (1.25 times amortization of $280,000 and interest of $245,000 = 1.25 (525,000) = $656,250). This is very close to the profile traced by the regression equations which shows a $8.6 million debt addition by 1980 for an airport with 4 million passengers in 1976. Because of the large "Balances" remaining in each of the profiles, even if they are 50% high, enough leeway remains to suggest that the development needed could be self-financed in "normal" cases. (We say "normal" because the Phoenix case appears quite unusual; its estimate of new capital required is extremely high when compared to other airports of its size).

Even though the financial profiles contain considerable leeway for errors in the estimates there is still the possibility that some airports in this group would be unable to finance their development with airport-generated funds unless airport management were able to raise its rates and charges further or tap now unusable revenue sources. Airport management has little, if any, unilateral control over its structure and level of rates and charges. Revenues from all major sources are established in leases and contracts for specified periods of time. As leases and contracts expire an opportunity is presented to raise rates and charges. For concession contracts, the extent of the opportunity depends on market forces. Concessionnaires bid on concession contracts and airport management is not in a position to demand any specific level of revenue. Leases and contracts with airlines are negotiated between airport management and airline representatives. Airport management establishes a fee level for airlines below which it would be fiscally imprudent to go and the airlines have in mind a maximum fee level beyond which it would be fiscally imprudent for them to go. At large airports these fee "parameters" are arrived at by both sides more through a thorough examination of financial records and estimates of financial capability then by intuition or any simple sense of "horse-trading".

Despite the constraints on unilateral establishment of fees and charges by airport management, the financial data base used for this report shows all airports in the over 4 million passengers category were, in 1976, earning income over and above their full accounting costs of operation including debt service.

Should circumstances develop that would impede the ability of these airports to continue this record of financial performance within the traditional ways of establishing fees and charges there is another direct revenue source that could be made available: the passenger "head tax". A number of U.S. airports used this revenue source before the U.S. Congress barred its use in 1973. The "head-tax" is widely-used at non-U.S. airports. This report presents no arguments as to whether the ban on use of the head-tax should be lifted. However it is useful to know what effect use of such a charge at various levels might have on the financing capability of large airports. If, for example, airports were permitted to levey a $1.00 head-tax on each enplaning passenger and if the administrative cost of collecting the head-tax was 10%, it would have the following effect on the 1976 "Balance" figures in Table 19:

TABLE 19A

EFFECT OF $1.00 "HEAD-TAX"

Airport Size	1976 "Balance" From Table 19 ($000)	Balance With Head-Tax* ($000)	% Change
4 million total pass.	1,251	3,051	+144
8 million total pass.	3,884	7,484	+ 93
12 million total pass.	6,517	11,917	+ 83
16 million total pass.	9,150	16,350	+ 79

*Computed based on assumption of $0.90 per enplanement flowing direct to "Balance" and enplanements equal one-half of total passengers.

Clearly, a $1.00 "head-tax" vastly expands the financing capability of airports in this category.

C. Airports With 1 Million to 4 Million Passengers

Four financial profiles will be traced with each beginning in 1976. The profiles will be for airports which had the following total passengers in the beginning period:

- 1.0 million
- 1.5 million
- 2.0 million
- 2.5 million

The tracings are limited to the net operating revenue figure as good regressions for the other elements were not obtained.

TABLE 20

Tracing of Financial Profiles
Net Operating Revenue Only

Airport Size 1976	1976 Profile ($000)	1980 Profile ($000)	1985 Profile ($000)	1990 Profile ($000)
1.0 million	331	453	627	826
1.5 million	586	769	1,031	1,328
2.0 million	841	1,085	1,434	1,831
2.5 million	1,096	1,400	1,837	2,333

The regression equations developed for net income and amortization for airports in this group were not reliable enough for definitive analysis against net operating revenue. However, some rough analysis can be undertaken based on a few assumptions about annual interest and amortization. If we assume that there are no non-operating revenues, then the net operating revenue figure is the amount available for interest and amortization. Excluding the apparently unusual cases of Indianapolis and Nashville which showed very high amounts for amortization, the average amortization for the airports remaining in the sample in Section III is $302,000 in 1976 (computed from Table 10 in Section III). Interest payments may be more than or less than amortization in a given year but for rough calculation purposes it would not be unreasonable to assume interest equals amortization. If, for 1976, an average amount of $604,000 for interest and amortization is deducted from net operating revenue it can be seen that an airport in this category must have a passenger volume of about 1.6 million to cover these costs from net operating revenues. This suggests that an airport needed more than 1.6 million passengers in 1976 to have any capability for financing additional development.

Investment needs for the airports in the sample of airports with 1-4 million passengers have been estimated and are shown in the following Table.

TABLE 21

Estimated Investment Needs
13 Sample Airports With
1-4 Million Passengers

	Estimated Investment ($1976)		
Airport	1977-80 ($000)	1981-90 ($000)	Total ($000)
Tucson	37,049	14,485	51,534
West Palm	27,319	3,532	30,851
Indianapolis	65,489	10,473	75,962
Louisville	220,596	11,953	232,549
Balti/Wash Int'l	24,007	14,657	38,664
Omaha	16,419	4,890	21,314
Albuquerque	14,756	4,873	19,629
Reno	58,794	51,332	110,126
Albany (NY)	2,710	2,920	5,630
Rochester	5,436	5,857	11,293
Columbus	228,376	62,410	290,786
Nashville	1,896	5,367	12,263
Salt Lake City	37,014	15,116	52,130
TOTALS	744,861	207,865	952,726

Most of these airports were in the 1-2 million passenger range in 1976. Based on the rough calculations above, none of these airports would have much capability for future financing although in actuality some did and some didn't. The range of estimated investment needs calls for airports in this group to

take on from $5.6 million to $290 million in new development or from $420,000 to $22 million in additional annual interest plus amortization. It is clear that some of these airports will be able to take on this additional financing while others will not.

For the 1981-1990 period, estimated investment needed for the sample airports is:

- Total - $745 million
- ADAP ELIGIBLE - $521 million

It is suggested that this group of airports would have difficulty in financing more than 25% - 30% of the ADAP eligible needs or more than 20% of the total estimated needs. These percentages are low particularly because of the very large investment estimates for Louisville, Reno and Columbus. Thse percentages could rise to better than 50% and 40% if those three airports are not considered.

A "head-tax" of $1.00 per enplanement would have a significant effect on the financial profile for airports in this category. The 1976 net operating revenues in Table 20 would change as follows:

TABLE 21A

Effect of "Head-Tax"
On Financial Profile

Airport Size	Net Op. Rev. From Table 20 ($000)	Net Op. Rev. With Head-Tax* ($000)	% Change
1 million total pass.	331	781	+136
1.5 million total pass.	586	1,261	+115
2.0 million total pass.	841	1,741	+107
2.5 million total pass.	1,096	2,221	+103

*Computed based on assumption that $0.90 of tax flows direct to net operating revenue and that enplanements equal one-half of total passengers.

The addition of a $1.00 head-tax would thus enable airports in this group to have additional financing capability beginning at the one million passenger level.

D. Airports With 300,000 to 1 Million Passengers

Although it might appear from the net income data in Table 11 that airports in this group are in about the same financial condition as those in the 1 to 4 million group, such is not the case. More than half of the airports in this category in the data base show significant net income only because of local taxes received or other cash contributions from local government. Lansing,

for example, shows net income of $1,033,000 in 1976 but it received $1,001,305 in taxes and government cash contributions. Ft. Wayne, Indiana is an even more extreme case showing net income of $37,417 only after receiving $997,423 in tax revenue.

While certain individual airports in this group (especially those with industrial parks) show some small capability for self financing, such capability for the group as a whole appears non-existent.

E. Airports With Less Than 300,000 Passengers

These airports have difficulty earning net operating revenue, especially at passenger traffic volumes of 150,000 or less. As with airports in the 300,000 to 1 million category, net income is usually the result of tax revenue or government cash contributions rather than from operations. There is little, if any, capability for self-financing in this airport group.

F. General Aviation Airports

The analysis of the data base for these airports did not produce insights sufficient to definitively judge their self-financing capability. An examination of average net operating revenue and average net income for these airports suggests that they often do not earn revenue sufficient to cover operating expenses. The self-financing capability of publicly-owned general aviation airports appears insignificant.

It is perhaps at the general aviation airports where the greatest opportunity exists to increase airport revenues. Many general aviation airports do not charge landing fees and have only minimal charges for use of other facilities. Many of these airports, while publicly-owned, are operated and managed by fixed-base operators who charge for their services and remit a portion of their revenues to the airport owner. While landing fees are known to be unpopular among owners of small general aviation aircraft, many general aviation airports would benefit significantly from even a nominal landing fee for itinerant operations. The Table below shows the additional revenue that a 50-cent landing fee for itinerant operations would have produced in 1976 at a small sample of airports in the FAA-provided data base:

TABLE 22

Airport	Revenues From 50-Cent Landing Fee	Percentage by Which Landing Fee Re. Would Increase Operating Rev.
Tulsa Riverside	$36,500	36%
Overland Park, Kansas	20,750	23%
Las Cruces, N.Mex	7,250	50%
Treemont, Ohio	4,000	239%
MCMinnville, Oregon	4,000	11%
Provo, Utah	8,000	40%

G. Conclusions: Investment Needs vs Self-Financing Capability; U.S. Airports

The preceding analysis and discussion presented insights into the financial profiles of airports within various sized groups and categories. The most reliable financial profiles were those presented for airports with over 4 million annual passengers. The analysis of these profiles suggested that airports in that group are capable on their own of financing their capital development thru 1990 with the exception of Phoenix. This conclusion is based on use of the capital investment estimates used in this report which were derived from the NASP. The analysis in this report did not address the issue of investment for new airports or unforeseen investment for existing airports.

The analysis of financial profiles of airports with 1-4 million annual passengers is not as reliable a predictor of financing capability as was found for the larger airports. However, the rough analysis that was undertaken suggested it can be said that airports in this category with more than 1.6 million annual passengers have self-financing capability which then increases with the level of passenger activity. On a case-by-case basis there are some notable exceptions. Anchorage, Alaska, for example, shows 1976 net income of $5.4 million. The airport did not show its amortization for 1976 but it showed $1.9 million for depreciation. Using depreciation as a surrogate for amortization the airport would have about $3.5 million available for financing new capital should it choose to do so. Louisville, Kentucky is another example with 1976 net income of $1.5 million and amortization of $750,000 leaving it $750,000 for new financing should it choose to do so.

For airports in the 1-4 million passenger category a case-by-case analysis would be necessary to determine each airport's financing capability. For airports with less than 1 million passengers there is little self-financing capability overall but a case-by-case examination would uncover a number of exceptions to the general rule (White Plains, New York, for example, has been a financially self-sustaining operation for many years).

Table 23 summarizes estimated capital investment and the percentage of that investment which this report suggests might be self-financed by the airports. The percentages given for air carrier airports below 1 million passengers and the general aviation airports are quite judgmental.

TABLE 23

U.S. Airport Investment Needs
vs
Self-Financing Capability
FY 1981-1990

Airport Group	Estimated Investment Needed ADAP Eligible ($million)	Non-Eligible ($million	Total ($million)	Percentage of Total Financeable By Airport
Over 4 million	2,199	943	3,142	90% or more
1-4 million	1,483	494	1,977	25% or more
Sub-total	3,682	1,437	5,119	65% or more
300,000-1 million	853	214	1,067	15% or more
Less than 300,000	1,823	343	2,145	10%
General Aviation	4,502	502	5,004	10%
Totals	10,860	2,475	13,335	32%

APPENDIX

OMB No. 004-S76031
Expires September 1977

AIRPORT FINANCIAL STATEMENT

This report is authorized by the Federal Aviation Act of 1958, as amended, sections 303 (a)(7), 311, 312(a); and the Airport and Airways Development Act of 1970, as amended, sections 4, 12(a)(c). While you are not required to respond, your cooperation is needed to make the results of this survey comprehensive, accurate and timely.

Airport Name _____ Prepared By _____

Address _____ Phone No. _____

I. INCOME AND EXPENSE STATEMENT

For 12 months ending _____

A. OPERATING REVENUES

1. Airfield Area Revenues

1.1	Air Carrier Landing Fees	$
1.2	Other Landing Fees	
1.3	Fuel and Oil Fees	
1.4	Airline Catering Fees	
1.5	Aircraft Parking Fees	
1.6	Air National Guard Fees	
1.7	Total Airfield Area Revenues (Total 1.1 through 1.6)	$

2. Hangar and Building Area Revenues

2.1	Hangar Rental Revenue	$
2.2	Commercial/Industrial Lease Revenues	
2.3	Ground Site Leases Income	
2.4	Government Leases Revenue	
2.5	Fixed Base Operation Airport Revenues	
2.6	Total Hangar and Building Area Revenues (Total 2.1 through 2.5)	$

3. Terminal Area Revenues

3.1	Airline Rental Revenues	$
3.2	Government Leases Income	
3.3	Miscellaneous Rental Income	
3.4	Total Terminal Area Revenue (Total 3.1 through 3.3)	$

4. Systems and Services Revenues

4.1	Utility Fees Received	$
4.2	Services Received in Lieu	
4.3	Miscellaneous Service Fees	
4.4	Total Systems and Services Revenues (Total 4.1, 4.2, and 4.3)	$

5. Concession Revenues
   - 5.1 Airport Parking Incomes $_____
   - 5.2 Auto Rental Fees _____
   - 5.3 Restaurant and Lounge Fees _____
   - 5.4 Shop Lease Revenues _____
   - 5.5 Advertising Revenues _____
   - 5.6 Ground Transportation Revenues _____
   - 5.7 Flight Insurance Income _____
   - 5.8 Hotel/Motel Revenues _____
   - 5.9 Miscellaneous Revenues _____

   5.10 Total Concession Revenues (Total 5.1 through 5.9) $_____

6. Total Operating Revenues (Total 1.7 + 2.6 + 3.4 + 4.4 + 5.10) $_____

B. OPERATING EXPENSES
1. Airfield Area Operating Expenses $_____
   - 1a. Expenses Due Solely to FAR Part 107 $_____
   - 1b. Expenses Due Solely to FAR Part 139 _____

2. Hangar and Building Area Expenses _____
3. Terminal Area Expenses _____
4. General and Administrative Expenses _____

5. Total Operating Expenses (Total 1 through 4) $_____

C. OPERATING PROFIT (A6 - B5) $_____

D. NON-OPERATING REVENUES
1. Interest Received on Investments $_____
2. Local Taxes Received _____
3. Contributions from Government _____
4. Miscellaneous Revenue _____

5. Total Non-Operating Revenues (Total 1 through 4) $_____

E. NON-OPERATING EXPENSES
1. Interest Paid $_____
2. Contributions to Government _____
3. Miscellaneous Expenses _____

4. Total Non-Operating Expenses (Total 1, 2, and 3) $_____

F. OPERATING INCOME (C + D5 - E4) $_____

G. DEPRECIATION
1. Total Land Assets (at Cost) $_____
   - 2a. Total Buildings/Equipment Assets (Cost) _____
   - 2b. Total Buildings/Equipment Assets (Depreciated) _____

3. Method of Depreciation: ( ) Straight Line, Double Declining Balance, ( ) Sum of Years Digits, ( ) Other _____

4. Depreciation Buildings/Equipment (this accounting period) $_____

H. NET INCOME (F - G4) $_____

II. SOURCES AND USES OF FUNDS STATEMENT

A.	SOURCES OF FUNDS	$_____
1.	Operating Income	_____
2.	Local Taxes	_____
3.	General Fund	_____
4.	Revenue Bond	_____
5.	General Obligation Bond	_____
6.	State Grant-in-Aid	_____
7.	Federal Grant-in-Aid	_____
8.	Working Capital	_____
9.	Miscellaneous	_____
10.	Total Sources of Funds (Total 1 through 9)	$_____
B.	USE OF FUNDS	
1.	Capital Improvements	$_____
2.	Interest	_____
3.	Bond Principal	_____
4.	Miscellaneous	_____
5.	Increase (Decrease) in Working Capital	_____
6.	Total Use of Funds (Total 1 through 5)	$_____

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III. OTHER FINANCIAL DATA

A. TOTAL SHORT TERM DEBT (due next 12 months) $_____

B. TOTAL LONG TERM DEBT $_____
1. Revenue Bond Debt $_____
2. G.O. Bond Debt $_____

C. FEDERAL GRANTS (preceding five fiscal year total) $_____
FY 19__ $_____
FY 19__ $_____
FY 19__ $_____
FY 19__ $_____
FY 19__ $_____

D. STATE GRANTS (preceding five fiscal year total) $_____
FY 19__ $_____
FY 19__ $_____
FY 19__ $_____
FY 19__ $_____
FY 19__ $_____

E. OTHER GRANTS (preceding five fiscal year total) $_____
FY 19__ $_____ Agency(s) _____
FY 19__ $_____ Agency(s) _____
FY 19__ $_____ Agency(s) _____
FY 19__ $_____ Agency(s) _____
FY 19__ $_____ Agency(s) _____

F. INSTITUTIONAL ENVIRONMENT OF AIRPORT OPERATION
1. Type of Agency:
_____State Agency _____Municipal Agency
_____County Agency _____Public Authority
2. Does the operator operate other airports? _____Yes _____No
3. If 2 is Yes, list other airports _____, _____, _____
4. Is the operator responsible for non-airport operations? _____Yes _____No
5. If 4 is Yes, what operations?
_____Highway _____Transit _____Marine
_____Other Transportation _____
_____Other Non-Transportation _____
6. If 2 or 5 is Yes,
a. Total revenues of the agency/authority $_____
b. Total outstanding revenue bond debt $_____

G. AIRPORT ACCOUNTING SYSTEM
1. Does the airport operator maintain a set of accounts for this airport separate from the accounts of the parent jurisdiction? _____Yes _____No
2. If 1 is Yes, are the accounts generally compatible with the data requested in this survey? _____Yes _____No
3. Are depreciation accounts kept for the airport? _____Yes _____No

INVESTMENT NEEDS ($000)

LARGE HUB AIRPORTS	Eligible-Per 1978-87 NASP			Ineligible Estimate			
				Sub-Totals			Total's NASP & Ineligible
Location-Airport	5	10	Sub-Total	5	10	Total	Estimate
Phoenix - Sky Harbor	29,070	72,735	101,805	2,907	17,586	20,493	122,298
Los Angeles - Los Angeles Int'l	166,054	0	166,054	33,480	0	33,480	199,534
San Francisco-San Francisco Int'l	20,074	5,632	25,706	2,007	563	2,570	28,276 1/
Denver-Stapleton Int'l	44,870	30,000	74,870	4,487	33,000	37,487	112,357
Miami - Miami Int'l	43,700	21,500	65,200	5,720	20,150	25,870	91,070
Tampa - Tampa Int'l	11,432	6,239	17,671	1,143	624	1.767	19,438 1/
Atlanta - Hartsfield Int'l	235,605	142,810	378,415	35,561	14,281	49,842	428,257
New Orleans - New Orleans Int'l	24,941	0	24,941	2,494	0	2,494	27,435 1/
Detroit - Detroit Metropolitan - Wayne County	26,275	37,370	63,645	5,628	5,981	11,609	75,254
Kansas City - Kansas City Int'l	11,135	15,705	26,840	1,114	1,571	2,685	29,525 1/
St. Louis - Lambert-St. Louis	21,872	7,684	29,556	3,687	5,981	9,668	39,224
Las Vegas - McCarron Int'l	47,862	0	47,862	30,886	0	30,886	78,748
Cleveland - Cleveland Hopkins	45,500	49,500	95,000	19,550	27,450	47,000	142,000
Philadelphia - Philadelphia Int'l	26,068	31,000	57,068	13,429	16,300	29,729	86,797
Pittsburgh- Greater Pittsburgh	23,604	1,556	25,160	2,360	156	2,516	27,676 1/
Dallas - Dallas/Fort Worth	45,437	8,602	54,039	4,544	860	5,404	59,443 1/
Houston - Houston Int'l	22,200	25,100	47,300	14,220	2,510	16,730	64,030
Seattle - Seattle-Tacoma Int'l	18,545	75,103	93,648	2,100	69,493	71,593	165,241
TOTALS	864,244	530,536	1,394,780	185,317	216,506	401,823	1,796,603
% of Eligible Items	---	---	---	21.4	40.8	28.8	---
1/ Totals	136,623	37,734	174,357	13,662	3,774	17,436	191,793
% Eligible Items	---	---	---	10.0	10.0	10.0	---
Other than 1/ Totals	727,621	492,802	1,220,423	171,655	212,732	384,387	1,604,810
% other than 1/ Eligible Items	---	---	---	23.6	43.2	31.5	---

1/ No Eligible Terminal Building Investment

INVESTMENT NEEDS ($000)

MEDIUM HUB AIRPORTS	Eligible-Per 1978-87 NASP			Ineligible Estimate			
				Sub-Totals			Total's NASP & Ineligible
Location - Airport	5	10	Sub-Total	5	10	Total	Estimate
Anchorage - Anchorage Int'l	49,430	2,268	51,698	10,172	113	10,285	61,983
Tucson - Tucson Int'l	17,013	10,329	27,342	1,165	1,924	3,089	30,431
West Palm - Palm Beach Int'l	4,148	10,518	14,666	1,910	8,030	9,940	24,606
Indianapolis - Indianapolis Int'l	12,300	24,400	36,700	1,365	3,720	5,085	41,785
Louisville - Standiford Field	14,038	91,659	105,697	702	4,583	5,285	110,982 1/
Baltimore - Baltimore-Wash Int'l	17,214	4,554	21,768	5,861	2,728	8,589	30,357
Omaha - Eppley Airfield	5,749	5,196	10,945	287	260	547	11,492 1/
Reno - Reno Int'l	60,289	4,885	65,174	6,764	3,757	10,521	75,693
Albuquerque - Albuquerque Int'l	5,722	4,478	10,200	911	1,474	2,385	12,585
Albany - Albany County	3,430	0	3,430	172	0	172	3,603 1/
Rochester - Rochester-Monroe County	6,880	0	6,880	344	0	344	7,224 1/
Charlotte - Douglas Municipal	48,929	11,471	60,400	37,696	574	38,270	98,670
Columbus - Port Columbus Int'l	73,300	74,580	147,880	28,665	28,729	57,394	205,274
Nashville - Nashville Metropolitan	6,304	838	7,142	315	42	357	7,499 1/
Salt Lake City - Salt Lake City Int'l	17,755	10,057	27,812	888	6,484	7,372	35,184
Roanoke - Roanoke Mun-Woodrun Field	4,223	360	4,583	211	18	229	4,812 1/
TOTALS	346,724	255,593	602,317	97,428	62,436	159,864	762,182
% Eligible Items	---	---	---	28.1	24.4	26.5	---
1/ Totals	40,624	98,053	138,677	2,031	4,903	6,934	145,612
% 1/ Eligible Items	---	---	---	5.0	5.0	5.0	---
Other than 1/ Totals	306,100	157,540	463,640	95,397	57,533	152,930	616,570
% other than 1/ Eligible Items	---	---	---	31.2	36.4	33.0	---

1/ No Eligible Terminal Building Investment

INVESTMENT NEEDS ($000)

SMALL HUB AIRPORTS	Eligible-Per 1978-87 NASP			Ineligible Estimate			
				Sub-Totals			Total's NASP & Ineligible
Location - Airport	5	10	Sub-Total	5	10	Total	Estimate
Montgomery - Dannelly Field	3,335	1,961	5,296	300	219	519	5,815
Little Rock - Little Rock Municipal	11,263	0	11,263	563	0	563	11,826 1/
Fresno - Fresno Air Terminal	9,432	10,574	20,006	6,934	9,799	16,713	36,719
Monterey - Monterey Peninsula	6,174	2,787	8,961	1,444	327	1,771	10,732
Ontario - Ontario Int'l	38,961	2,302	41,263	5,136	2,203	7,339	48,602
*Sacramento - Sacramento Metro	16,117	9,205	25,322	3,731	3,730	7,461	32,783
Colorado Springs - Colorado Spr Mu	20,315	717	21,032	1,016	36	1,052	22,084 1/
Columbus - Columbus Metro	1,656	0	1,656	83	0	83	1,739 1/
Boise - Boise Air Terminal	4,066	4,177	8,243	828	1,459	2,287	10,530
Fort Wayne - Baer Field	23,190	15,000	38,190	1,410	3,875	5,285	43,475
Des Moines - Des Moines Mun.	6,959	0	6,959	348	0	348	7,307 1/
Wichita - Wichita Mid-Continent	14,237	3,643	17,880	1,915	182	2,097	19,977
Baton Rouge - Ryan	8,370	1,333	9,703	3,227	138	3,365	13,068
Portland, Me - Portland Int'l Jetport	2,928	200	3,128	1,146	10	1,156	4,284
Lansing - Capital City Airport	8,025	8,560	16,585	1,151	1,678	2,829	19,414
Jackson - Allen C. Thompson Fld	5,539	5,689	11,228	464	2,159	2,623	13,851
Billings, Billings Logan Int'l	7,298	2,223	9,521	1,365	1,174	2,539	12,060
Great Falls - Great Falls Int'l	4,486	0	4,486	287	0	287	4,773
Toledo - Toledo Express	8,205	6,425	14,630	785	571	1,356	15,986
Eugene - Mahlon Sweet Field	2,705	3,292	5,997	573	790	1,363	7,360
Charleston - Charleston AFB/Int'l	17,760	13,480	31,240	12,138	10,674	22,812	54,052
Sioux Falls - Joe Foss Field	6,031	2,190	8,221	302	1,360	1,662	9,883
Charleston - Kanawah County	1,147	0	1,147	57	0	57	1,204 1/
TOTALS	228,199	93,758	321,957	45,203	40,364	85,567	407,524
% Eligible Items	---	---	---	19.8	43.1	26.6	---
1/ Totals	41,340	717	42,057	2,067	36	2,103	44,160
% Eligible Items	---	---	---	5.0	5.0	5.0	---
Other than 1/ Totals	186,859	93,041	279,900	43,136	40,328	83,464	363,364
% other than 1/ Eligible Items	---	---	---	23.1	43.3	29.8	---

1/ No Eligible Terminal Building Investment

* Medium Hub in NASP

INVESTMENT NEE. . ($000)

NON HUB AIRPORTS	Eligible-Per 1978-87 NASP			Ineligible Estimate			
				Sub-Totals			Total's NASP & Ineligible
Location - Airport	5	10	Sub-Total	5	10	Total	Estimate
Tuscaloosa - Tuscaloosa Municipal	1,599	269	1,868	80	13	93	1,961 1/
Chico - Chico Municipal	1,295	327	1,622	65	16	81	1,703 1/
Modesto - Modesto City-County	1,246	435	1,681	600	22	622	2,303
Visalia - Visalia Municipal	3,626	1,433	5,059	181	72	253	5,312 1/
New Haven - Tweed-New Haven	1,854	2,820	4,674	93	766	859	5,533
Mt. Vernon - Mt. Vernon-Outland	2,650	800	3,450	258	165	423	3,873
Owensboro - Owensboro-Darless County	8,979	660	9,639	449	33	482	10,121 1/
Paducah - Barkley Field	1,629	2,304	3,933	81	115	196	4,129 1/
Hyannis Mass - Barnstable Mun.	615	755	1,370	31	38	69	1,439 1/
Lebanon - Lebanon Regional	2,565	545	3,110	1,164	27	1,191	4,301
Kinston NC - Stallings Field	2,522	174	2,696	126	9	135	2,831 1/
Wilmington NC - New Hanover County	7,519	2,097	9,616	3,001	851	3,852	13,468
Bismark - Bismark Municipal	7,237	8,062	15,299	1,924	403	2,327	17,626
Lawton - Lawton Municipal	3,629	486	4,115	181	88	269	4,384
Ponca City - Ponca City Municipal	670	0	670	34	0	34	704 1/
North Myrtle Beach SC - Myrtle Beach AFB/C.V. Jetport	2,620	857	3,477	1,006	1,043	2,049	5,526
Jackson TN - McKellan Field	5,053	690	5,743	5,878	35	5,913	11,656
*South Burlington - Burlington Int'l	2,379	763	3,142	569	38	607	3,749
Charlottsville VA - Charlottsville-Albermark	1,644	922	2,566	270	46	316	2,882
Pullman - Pullman-Moscow Regional	444	137	581	22	7	29	610 1/
WallaWalla - WallaWalla City-County	347	315	662	17	16	33	695 1/
Yakima - Yakima Air Terminal	2,940	1,409	4,349	147	446	593	4,942
Huntington W.VA - Tri-State Airport	410	2,000	2,410	21	100	121	2,531 1/
Lewisburg W.VA - Greenbrier Valley	5,000	0	5,000	250	0	250	5,250 1/
EauClaire - EauClaire Municipal	1,394	1,897	3,291	709	657	1,366	4,657
TOTALS	69,866	30,159	100,023	17,157	5,006	22,163	122,186
% Eligible Items	---	---	---	24.6	16.6	22.2	---
1/ Totals	27,136	8,374	35,510	1,357	419	1,776	37,286
% 1/ Eligible Items	---	---	---	5.0	5.0	5.0	---
Other than 1/ Totals	42,730	21,785	64,513	15,800	4,587	20,387	84,900
% other than 1/ Totals	---	---	---	37.0	21.1	31.6	---

1/ No Eligible Terminal Building Investment
* Small Hub in NASP

INVESTMENT NEEDS ($000)

LARGE GENERAL AVIATION AIRPORTS	Eligible-Per 1978-87 NASP			Ineligible Estimate			
				Sub-Totals			Total's NASP & Ineligible
Location - Airport	5	10	Sub-Total	5	10	Total	Estimate
Hawthorne - Hawthorne Municipal	16,899	274	17,173				
Hayward - Hayward Air Terminal	6,815	220	7,035				
San Carlos - San Carlos Airport	6,469	307	6,776				
Torrance - Torrance Municipal	906	344	1,250				
Denver - Jeffco	7,054	1,395	8,449				
Denver - Arapahoe County	3,806	4,990	8,796				
Danbury - Danbury Municipal	439	958	1,397				
*Wilmington - Greater Wilmington	1,404	203	1,607				
Olathe - Exectuve Airport - Johnson County	1,859	0	1,859				
Farmingdale - Republic Airport	10,840	1,065	11,905				
Cincinnati - Cincinnati Municipal Lunkem Field	5,116	2,074	7,190				
Cleveland - Cuyahoga County	15,790	17,190	32,980				
Tulsa - Tulsa-Riverside	14,343	289	14,632				
Hillsboro - Portland - Hillsboro	1,975	1,835	3,810				
Dallas - Redbird Airport	145	258	403				
**Houston - Wm. P. Gobby	1,840	1,130	2,970				1/
Seattle - Boeing Field - King Co. Apt	10,201	650	10,851				
TOTALS	105,901	33,182	139,083	10,590	3,318	13,908	152,991
% Eligible Items	---	---	---	10.0	10.0	10.0	---

* Commuter (but not anymore)

** Small Hub in NASP

1/ No Eligible Terminal Building Investment

INVESTMENT NEEDS ($000)

MEDIUM GENERAL AVIATION AIRPORTS	Eligible-Per 1978-87 NASP			Ineligible Estimate			
				Sub-Totals			Total's NASP & Ineligible
Location - Airport	5	10	Sub-Total	5	10	Total	Estimate
Bessemer - Bessemer Municipal	1,101	800	1,901				
Casa Grande - Casa Grande Mun.	226	35	261				
Chandler - Chandler Mun.	369	49	418				
Fresno - Fresno-Chandler-Downtown	1,481	277	1,758				
Napa - Napa County	1,033	675	1,708				
Truckee - Truckee-Tahoe	3,960	984	4,944				
Greeley - Weld County Mun.	1,505	670	2,175				
St. Petersburg - St. Petersburg - Clearwater Int'l	1,596	52	1,648				
Jacksonville - Craig Municipal	359	1,025	1,384				
Orlando - Herndon	1,535	600	2,135				
Augusta - Daniel Field	231	35	266				
Marietta - McCollum	8,545	3,147	11,692				
*Elkhart - Elkhart Municipal	5,950	3,110	9,060				1/
An Arbor - An Arbor Municipal	1,033	1,294	2,327				
*Battle Creek - W.K. Kellog Regional	2,590	175	2,765				1/
Las Cruces - Las Cruces-Cranford Mu.	178	131	309				
Saratoga Srpings - Saratoga County	1,180	1,040	2,220				
Fremont - Progress Field	730	640	1,370				
McMinnville - McMinnville Mun.	346	452	798				
Scappoose - Scappoose Int'l Airpot	780	830	1,610				
*Latrobe - Latrobe	219	486	705				1/
Reading - Gen. Carl A. Spaatz Field	658	1,381	2,039				
Kerryville - Kerryville Municipal	330	175	505				
Ogden - Ogden Municipal	507	0	507				
Provo - Provo Municipal	284	972	1,256				

(Cont'd)

(Cont'd)

INVESTMENT NEEDS ($000)

MEDIUM GENERAL AVIATION AIRPORTS	Eligible-Per 1978-87 NASP			Ineligible Estimate			
				Sub-Totals			Total's NASP & Ineligible
Location - Airport	5	10	Sub-Total	5	10	Total	Estimate
Kelso - Kelso-Longview	699	1,876	2,575				
Renton - Renton Municipal	88	608	696				
Spokane - Felts Field	418	465	883				
West Bend - West Bend Municipal	2,486	539	3,025				
TOTALS	40,417	22,523	62,940	4,042	2,252	6,294	69,234
% Eligible Items	---	---	---	10.0	10.0	10.0	---

* Commuter in NASP

1/ No Eligible Terminal Building Investment

INVESTMENT NEEDS ($000)

SMALL GENERAL AVIATION AIRPORTS	Eligible-Per 1978-87 NASP			Ineligible Estimate			
Location - Airport	5	10	Sub-Total	Sub-Totals 5	Sub-Totals 10	Total	Total's NASP & Ineligible Estimate
Monroeville - Monroe County	529	148					
Scottsboro, Alabama - NEW	1,017	361					
Selma - Selfield	515	80					
Sylacauga - Lee Merkle Field	795	52					
Palmer - Palmer Municipal	1,365	3,195					
Russellville - Russellville Mun.	0	0					
Los Banos - Los Banos Mun.	448	15					
Mojave - Mojave	549	0					
Glenwood, Colo. Springs - NEW	1,077	190					
Covington, GA - NEW	1,505	690					
Craigmont - Craigmont	20	283					
Auburn, Ind - Auburn Dekalo	1,033	819					
Wabash - Wabash Municipal	662	1,194					
Atwood - Atwood-Rawlins County-City CPU	1,009	0					
Bowling Green - Bowling Green - Warren County	282	1,051					
Frankfort - Capital City	389	972					
Springfield - Lebanon Springfield	31	0					
*Bar Harbor - Bar Harbor	1,468	1,315					1/
Albert Lea - Albert Lea Municipal	2,836	89					
Eveleth - Eveleth-Virginia	618	690					
McComb - McComb-Pike County	1,056	0					
Lamar - Lamar Municipal	915	0					
Forsyth - Tillett Field	458	110					
York, Neb. - NEW	2,431	755					
**Ogdensburg - Ogdensburg Int'l	458	180					1/

(Cont'd)

(Cont'd) INVESTMENT NEEDS ($000)

SMALL GENERAL AVIATION AIRPORTS	Eligible-Per 1978-87 NASP			Ineligible Estimate			
				Sub-Totals			Total's NA'' Ineligible
Location - Airport	5	10	Sub-Total	5	10	Total	Estimate
Monroe - Monroe	412	528					
Dickinson - Dickinson Municipal	1,451	464					
Sand Springs - William R. Pogue Mu.	1,026	2,537					
Chambersburg - Chambersburg Mun.	678	433					
Block Island - Block Island State	1,515	716					
Orange - Orange County	285	350					
Sherman/Denison - Grayson County	492	749					
Colville - NEW	150 1/	576					
Martinsburg - Eastern W.VA Regional	1,525	1,406					
Ricelake - NEW	2,419	1,127					
TOTALS	31,419	21,081	52,500	3,142	2,108	5,250	57,750
% Eligible Items	---	---	---	10.0	10.0	10.0	---

* Commuter Replacement in NASP

** Commuter in NASP

1/ No Eligible Terminal Building Investment


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