The Region's Airports Revisited

Towards a policy on Stewart Airport development.

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Regional Plan Association's policy on the development of Stewart Airport was approved by the Board of Directors on November 9, 1973 and is incorporated in the *Mid-Hudson Development Guide*. This more detailed analysis provides the back-up material. Technical work leading up to it was performed principally by Jeffrey M. Zupan, Chief Systems Analyst, under the direction of Boris S. Pushkarev, Vice-President, Research and Planning.

SUMMARY

Regional Plan Association again urged caution in developing a fourth major jetport for the New York Region because much still can be done to increase the capacity of existing fields and the huge projected passenger demand might not materialize.

The conclusions were reached by the Association after analyzing a consultants' report to the Metropolitan Transportation Authority (MTA). The report proposed a staged expansion of Stewart Airport near Newburgh, New York, to enable it to handle almost as many air travellers in 1990 as all three of the Region's major jetports accommodate now.

The Association does support the concept of a landbank for a fourth major airport and has welcomed the acquisition of Stewart. Furthermore, Regional Plan supports the recommended first-phase expansion to assure adequate facilities for general aviation, flights diverted by bad weather from the existing airports, charter flights, freight, and the small number of scheduled airline trips of travellers closer to Stewart than to the three major airports. This expansion includes the development of one long runway, a modest terminal to accommodate the needs of the first phase, and a high speed rail connection to Manhattan—which the Association recommends should run via Paterson, New Jersey.

However, Regional Plan Association listed five reasons why Stewart might not be needed for large-scale overflow from the three close-in airports:

■ Air trips from the Region may not increase as much as the consultants project. Both Port Authority of New York and New Jersey and Regional Plan 1968 projections looking to the end of the century have been revised downward. Those projections, for example, anticipated 59 million air passengers in 1973. Under 43 million passenger trips are being made this year from the Region's three major airports.

■ Average number of passengers per plane could well be higher than the consultants project—if the number of empty seats are reduced during peak-period flights, for example. Fuel shortages already are forcing airlines to consolidate flights on competing routes, thus increasing passengers per plane.

■ General aviation (non-airline passenger trips—mainly private planes and air taxis) need not take up scarce space at the three major jetports during peak periods. Small planes are likely to use other runways or smaller air fields if they are charged the real cost for using the major runways during crowded times.

■ The number of plane movements the existing jetports will be able to handle in 1990 could well be larger than the MTA consultants project. Capacity went up 31 percent between 1959 and 1969; the consultants anticipate only another 13 percent rise in the next two decades.

■ Short Take-Off or Landing (STOL) aircraft, using separate air space, could divert more than enough trips to avoid congestion at the three existing jetports—if a STOL development program is quickly financed by the federal government.

The Association added that convenient rail service to Kennedy and Newark Airports would relieve ground access congestion to the airports, which constrains use.

For these reasons, the Association observed, as in 1969 when the Port Authority of New York and New Jersey proposed immediate construction of a fourth regional airport, evidence is far from conclusive that it will be needed. Similar conclusions were reached in studies since by both the RAND Corporation and the National Academies of Science and Engineering.

The MTA consultants stated that "there will not be an appreciable need for Stewart to handle domestic scheduled passenger operations before 1980." Such is, in fact, the case and any of the eventualities suggested above could preclude the need for a fully developed Stewart Airport to 1990 or beyond. Since the consultants also state that it will take only four years to make Stewart fully operable for a major jetport, the Region still has time to make the three existing airports more efficient by deliberate public policy on general aviation reductions, airline scheduling, and research and development for air traffic control improvements and for STOL aircraft. Meanwhile, the effects of such policies and the MTA consultants' assumptions about population, income, aircraft size, load factors and energy constraints can be continually monitored to determine if and when Stewart is needed as another major jetport.

Lastly, the problem of airport expansion is not unique to the New York Region and the full costs and benefits of alternative means to meet demand should be evaluated on a nationwide basis.

1. THE BACKGROUND

The search for a fourth airport in the New York Region has been underway since the late 1950's, when the Port of New York Authority began to press for the selection and development of a site in addition to Kennedy, LaGuardia and Newark Airports. In 1959, the Port Authority stated that by 1975 "it will be utterly impossible for the existing airports to handle the traffic."[1] However, no buildable site, both accessible to the Region's concentration of activities and environmentally acceptable to its neighbors, could be located. In 1969, when the possibility still existed for Solberg Airport in Hunterdon County, N.J. as the Port Authority's answer to a fourth airport, Regional Plan Association published an analysis of the airport situation in the Region. In "The Region's Airports," questions as to the immediate necessity or wisdom of a fourth airport were raised.[2] A number of general themes ran through that analysis. First, **the present system to accommodate air travel demand in the New York Region could be made more efficient** through a variety of measures: (a) the restriction of general aviation by higher landing fees or direct bans during peak periods, (b) larger plane size and higher load factors to make each airline movement carry more travellers, (c) spread of peak period travel to off-peak periods, (d) schedule consolidation among the airlines or airline mergers to reduce duplication of services, (e) improved air traffic control and navigational aids to enable more flights to use the runways during peak periods, (f) vertical or short take-off and landing aircraft (V/STOL) to divert passengers travelling under 400 miles and (g) high speed ground transportation in the Northeast Corridor for further diversion of passengers.

Second, **the uncertainties of the growth of air travel demand and the future systems to accommodate that growth suggested a cautious and incremental approach to additional airport capacity**—in 1969 projections of passenger traffic by the Port Authority and the Federal Aviation Agency differed by 35 percent for 1980 (only 11 years away) with larger differences projected further into the future.

Third, **the full costs to all involved of the alternative means of meeting aviation demand had not been fully explored,** costs on the ground to the traveller, airline costs for duplication of facilities, and environmental costs to the airport neighbor. Still, even without sophisticated analysis, expanded use of the present airports appeared more beneficial than an entirely new facility far from the Region's core.

Fourth, the difficulties encountered by this Region were not unique to it. The issue of whether or not to build major new airfields was arising in metropolitan areas throughout the country and therefore, **the means of meeting air travel demand should be examined at a national level.**

Soon after Regional Plan's report, RAND, under contract to the Port Authority to study ways of making their three airports more efficient,[3] and the Environmental Studies Board—a joint board of the National Academy of Sciences and National Academy of Engineering—studying the environmental impacts of expanding Kennedy Airport into Jamaica Bay,[4] each issued reports which basically confirmed the RPA analysis—that the need for a fourth airport was not imminent. However, in order not to foreclose future options, the RPA report recommended that a reserve site be purchased "even before it is certain that the site will be needed as an airport." [5]

That RPA recommendation was implemented in August 1971, when the State of New York, through the Metropolitan Transportation Authority (MTA) expanded its recently acquired Stewart airport near Newburgh in Orange county to a total area of 16 square miles.

2. THE MTA STUDY

Soon after the acquisition of the land bank at Stewart, the MTA commissioned a consultant study on the feasibility of its future use as a major airport. The report, *A Study for the Development of Stewart Airport,* in six volumes, prepared by Transplan Inc. and Seelye Stevenson Value & Knecht, was published in January, 1973.

The MTA consultants' report recommends phased development of the Stewart site. The existing 8,000 foot runway, lengthened to 12,000 feet, "would satisfy demand until 1980." Concurrently, rail access, doubling as a commuter service (about one hour scheduled time to Penn Station, Manhattan) would be provided and modest terminal facilities would be built.

Between 1980 and 1990, a huge expansion is recommended with two new runways to the west and an extensive terminal complex with re-aligned rail access and new connections to existing expressways. Alternative configurations of this complex are presented for discussion: their varying noise impact on the surrounding area is a major consideration. Other environmental matters, such as reforestation and sewage disposal, are treated at considerable length.

The basis for the ambitious later-phase development of Stewart is the consultants' projection of air travel demand in the Region, which is anticipated to grow from 43 million passengers in 1973 to 161 million in 1990. Since the existing airports are assumed to be incapable of handling most of this growth beyond 1980, the overflow—36 million passengers by 1990—is assigned to Stewart. When Stewart also runs out of capacity, the need for a fifth airport is anticipated by the consultants.

The air traffic projection is based on a well-structured mathematical model, but many of the assumptions that went into it are open to question. Since the investment proposal for the first stage—before 1980—is about one-tenth of the ultimate $1 billion development, the two development stages are evaluated separately.

3. SHORT-RANGE DEVELOPMENT

Stewart Airport today serves a valid role as a general aviation airport. That role could be enhanced and diversion of general aviation flights from present airports could be encouraged with the proposed fast rail access to Manhattan.

Though the rail access cannot be justified on that basis alone, it could be if commuter and other traffic to Orange County—now mostly by auto or bus—is taken into account.

One should note that the commuter projections in the consultants' report appear exaggerated, and station locations are not well thought out. Also, there are doubts in Orange County about the advisability of a rail terminal at Stewart at an early date: it might encourage premature development of the area, would attract more auto traffic to an inadequate road system, and would not offer large time-savings compared to high-speed rail service on the Hudson division from Beacon. A high-speed rail terminal in the Harriman area has been suggested as an interim solution.

But, since the Stewart airport location represents an accessible node for a transportation center, and since funds for a 4-mile extension of rail service to it from the existing Erie-Lackawanna Graham line have been authorized by the State, support for this public transportation improvement seems appropriate.

Another near-term purpose which Stewart can most usefully serve is to accept long-haul flights to any of the existing three major airports which have to be diverted because of weather or traffic emergencies. It is surely preferable for such flights to land at Stewart than at Bangor, Maine or Niagara Falls. This function cannot be performed effectively without the rail access.

Also, space at Kennedy airport being at a premium, it is likely that, in addition to the training flights which use Stewart now, some charter passenger and freight flights will find it advantageous.

With good expressway access and adjacent to the Maybrook rail junction, Stewart and its vicinity may have the potential for becoming a significant warehousing and freight distribution center for the New York Region. Improved passenger access could also stimulate office and hotel-motel type development in economically depressed Newburgh.

Enabling Stewart airport to perform these functions requires the provision of one 12,000 foot long runway, which will allow aircraft of all sizes to operate from Stewart without weight restrictions and will shift take-offs and landings away from the populated area of Newburgh.

Whether the 12,000 foot runway is provided by extending the existing major runway to the west, as the consultants recommend, or by building a new runway to the west—to minimize noise impact—is a design consideration that is essentially local in scope.

As the population of the seven-county Mid-Hudson area plus Rockland and northern Westchester increases from 1.2 million in 1970 to 1.7 million (or nearly 8 percent of the urban region's total population) by 1985, and as incomes rise, a sub-regional market will develop at Stewart for scheduled airline service to selected destinations. In its statement before an Orange County hearing on Stewart Airport in May 1972 Regional Plan estimated that "by 1985, it could conceivably handle traffic comparable to the present Hartford airport, a modest amount of activity on the regional scale but very significant locally." That scale of traffic could be amply handled by the one long runway discussed above.

In summary, there are valid grounds for supporting limited development of Stewart as a sub-regional airport which will serve primarily the Mid-Hudson area, stimulate the local economy, and provide a stand-by facility for regional travel. On that basis, Regional Plan agrees with the first phase of Stewart development, as proposed by MTA consultants through 1980.

4. LONG-RANGE DEVELOPMENT

An evaluation of the MTA consultants' long-range proposals requires an assessment of their traffic forecast, and related assumptions. The purpose of the MTA consultants' report was to determine the best use of Stewart Airport. Regional Plan Association's position on Stewart, however, must be placed in the framework of the optimum airport utilization plan for the Region, evaluating the full costs and benefits of viable alternatives. The following brief analysis attempts to suggest where alternative assumptions, placed in a regional framework might lead.

a) Air passenger traffic demand

Any determination of the need for large-scale expansion at Stewart hinges on the relative size of demand and capacity at the three existing airports. To the extent that demand exceeds capacity, the overflow could wind up at Stewart.

To project demand, the consultants use a complex cross-sectional model of existing air travel behavior, relating travel demand to the magnitude and distribution of population, income, jobs and the characteristics of the air and ground transportation system in the Region and elsewhere.

On the basis of projections of all these variables, the consultants project an air travel demand in 1990 of 161 million passengers, an increase of almost four times the existing volume in seventeen years. This is keyed to a rapid rise in personal per capita income, which largely accounts for this huge growth averaging 7.8 percent per year, compounded.

In fact, air travel demand in the New York Region has increased only 11 percent in the last 4 years, largely due to the slowdown in the economy.

Without access to the consultants' model, Regional Plan Association has taken a short-cut to projecting air travel demand. Rather than looking at the problem in cross-section, RPA examined the long term history of the relationship between population, income and air travel.

A plot of income per capita vs. air travel per capita in the Region for the 1948 to 1971 period is shown on Chart I. The dots—one for each year—indicate that two distinct periods exist: one is 1948 to 1962—essentially the pre-jet era—and the other is 1963 to 1971—the jet era. The latter period shows a higher rate of growth than the former, suggesting that the widespread introduction of jets accelerated the influence of income in air travel growth. The question is: will the kind of increase experienced in the pre-jet era with its slow improvements of service prevail in the future, or will the experience of the jet era with its large increase in air travel speed continue? The third alternative would be a combination of the two, incorporating the experience of the full 1948-1971 period. Based on Regional Plan's income per capita projection and Regional Plan's population projection for the Region for 1990, the data for each of the lines of best fit and their related 1990

Chart 1
Percapita Air Trips as a Function of Income

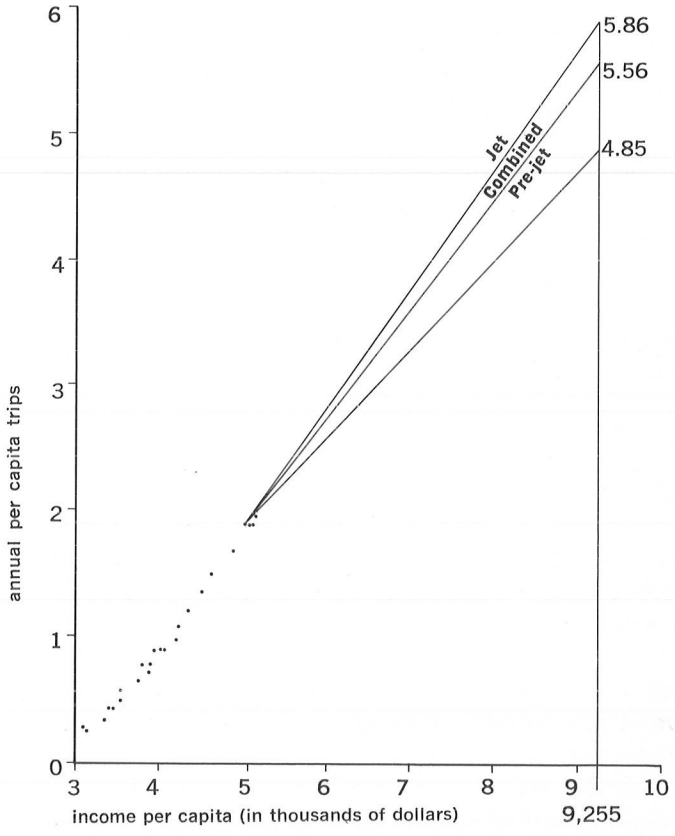


Table I

ALTERNATIVE PROJECTIONS OF AIR TRAVEL DEMAND FOR N.Y. REGION, 1990

	Based on		R^2	Annual Airline Passengers Per Capita, 1990	Annual Passengers (Million)	1972-1990 Annual Growth Rate, %
RPA	Pre-jet	1948-62	0.974	4.85	113	5.7
	Combined	1948-71	0.989	5.52	129	6.5
	Jet	1963-71	0.992	5.86	137	6.8
	Stewart Report	—	—	—	161	7.8

R^2 is the portion of the dependent variable, air travel per capita explained by the independent variable, income per capita. In the cases above, it ranges from 97.4 percent to 99.2 percent.

forecasts are shown in Table I along with the consultants' projection.

Admittedly, this method does not explicitly treat the characteristics of people outside the Region, nor does it separate out pleasure travel from business travel. However, it does have the advantage of dealing in large aggregates and of treating the problem historically, while the MTA consultants' method does not. It would be interesting to see how well the consultants' model could project air travel back to the early 1950's even with known income, population, jobs and transportation systems characteristics.

To demonstrate the uncertainties of projecting air travel, Chart 2 shows the RPA and MTA consultants projection for 1990 along with past traffic. The relatively small differences loom large as projections are made further into the future: 1990 air passenger travel demand could range between 113 and 161 million. For purposes of this analysis, let us use the middle of the three RPA projections, 129 million, as the low projection and the 161 million from the Stewart study for the high. It should also be noted for the record that Regional Plan's 1968 projection of air travel demand of 157 million passengers in 1990 was more in line with the consultants' figure.

b) **Aircraft size and peaking characteristics**

An element to be projected that is just as important as the passengers is the average number of passengers per flight. The Stewart study uses 134 passengers per flight with the largest aircraft in service having 500 seats in 1990, based on a long-term historic trend. The matter is inexorably tied to the average load factor achieved by the airlines, assumed at 55 percent by the consultants. While this assumption is reasonable in a laissez-faire situation with numerous airlines competing for the same market, diluting each other's flights, there are imminent signs of change. The concept of permitting the airlines to reach "capacity agreements" whereby they eliminate duplicate schedules, has already been tested and the Civil Aeronautics Board is adopting it for more widespread use. A further development that would eliminate flight duplication would be mergers among presently competing airlines. Thus it is quite conceivable that the load factor could rise from 55 percent to 65 percent; given the consultants' average plane size, this would raise the number of passengers per flight from 134 to about 160.

A third key element is the percent of the daily traffic occurring in the peak hour. Present experience, as reported by the MTA's consultants, suggests that 7 percent is a suitable estimate and they suggest that this may ultimately be reduced to 5.3 percent, under congested conditions. Both peak hour factors will be used here for illustrative purposes.

Peak hour airline passenger movements can now be calculated for all eight combinations of alternative assumptions: high or low passenger demand, high or low passenger per movement and high or low peak hour percent.

Still to be added are peak hour movements of general aviation and cargo aircraft. The Stewart report assumes that annual general aviation movements are frozen at 183,000 (they were 152,000 in 1971). In an unconstrained situation, this would convert to about 85 peak hour movements. However, the Stewart report assumes that the recent FAA allocation of general aviation in the peak hour will remain at 32 movements in the forecast year.

The Port Authority has estimated the peak hour movements for cargo for 1980 at 5. Extrapolated to 1990 by the increase projected by the Stewart report for the 1980-1990 period yields 9 cargo flights in the peak hour. This figure will be accepted here despite past projections of cargo growth that have been over-optimistic. Air cargo flights from the Port Authority airports have increased a scant 6 percent in the last four years.

c) **Demand-capacity comparisons**

It is now possible to estimate 1990 peak period demand at the three existing airports for the various assumptions. These are shown in Table II.

The figures of future demand under alternative assumptions must be compared with the peak hour capacity of the existing airports. For purposes of testing their computer model, the MTA consultants assumed a present peak hour capacity of the three airports of 197, increasing to 222 by 1990. The consultants suggest that this slow increase in capacity is actually quite generous because of the current difficulties experienced with the

Table II

1990 PEAK HOUR MOVEMENTS—THREE EXISTING AIRPORTS—ALTERNATIVE ASSUMPTIONS

Annual Airline Passengers (million)	Average Passengers per Movement	Peak Hour as Percent of Daily Movement	Peak Hour Movements: Passenger Airline	General Aviation	Cargo	Total	
129.0	160	5.3	141	32	9	182	
129.0	134	5.3	168	32	9	209	
161.4	160	5.3	176	32	9	217	
129.0	160	7.0	186	32	9	227	
161.4	**134**	**5.3**	**210**	**32**	**9**	**251**	**(MTA)**
129.0	134	7.0	222	32	9	263	
161.4	160	7.0	232	32	9	273	
161.4	134	7.0	277	32	9	308	
Peak hour capacity assumed by MTA consultants at existing airports							**222**

wake turbulence of wide-body jets resulting in greater separation between aircraft using the runways. For purposes of comparison, the Federal Aviation Administration currently permits 210 movements plus extra shuttle sections during the peak hour. And, in the past decade, the estimated capacity of the existing airports increased by 31 percent, due to technological and operational improvements. Of course, the FAA 210 movement limit which causes tolerable delays might not be tolerable, without technological innovation, if the peak were stretched over many hours of the day.

A comparison of the last column of Table II with the peak hour capacity of 222 shows how useful the removal of general aviation would be to keep demand below capacity. For example, **even with the MTA consultants' assumptions** of high passenger demand (161.4 million), low passenger per aircraft (134) and a flat peak (5.3 percent), underlined in Table II, **capacity** (222) **is sufficient for the demand** (210 + 9 cargo flights) without general aviation movements. A more likely estimate of demand, passengers per movement and percent peak, shown in line 4 of Table II, would fall well below 222 with general aviation removed. Table II also shows numerous other possibilities where peak hour capacity would be adequate for the demand (three with general aviation left in).

d) **Policies toward general aviation**

Let us examine the general aviation sector more closely. It consists of three major elements. The first segment of general aviation, the one that does not carry the traditional air passenger but miscellaneous business and pleasure flyers is susceptible to landing fee increases so they pay their share of their time on and over the runways. In fact, landing fee increases in the past have been very successful although general aviation's full share related to its cost to the airport has not yet been levied. This true general aviation sector in 1972 accounted for 56 percent of all general aviation flights at the three major Port Authority airports.

The second sector is the air taxi carrying passengers from outlying airports in the Region and from small cities within 100-200 miles of New York that do not have air carrier service.

A third sector of general aviation are schedule commuter flights—so called third level carriers—flying on routes similar to the air taxi. The air taxis and the third level carriers each accounted for about 22 percent of all general aviation flights in 1972. Even though one might surmise that the travel market served by these carriers is an expanding one, in fact air taxis and third level carriers have comprised a stable share of general aviation over the last 7 years—varying between 43 and 48 percent of the total at the three Port Authority airports.

In 1972 the air taxis and third level carriers carried only about 0.9 percent of all air passengers using the three existing airports. In contrast, they account for 8.3 percent of the passenger aircraft movements.

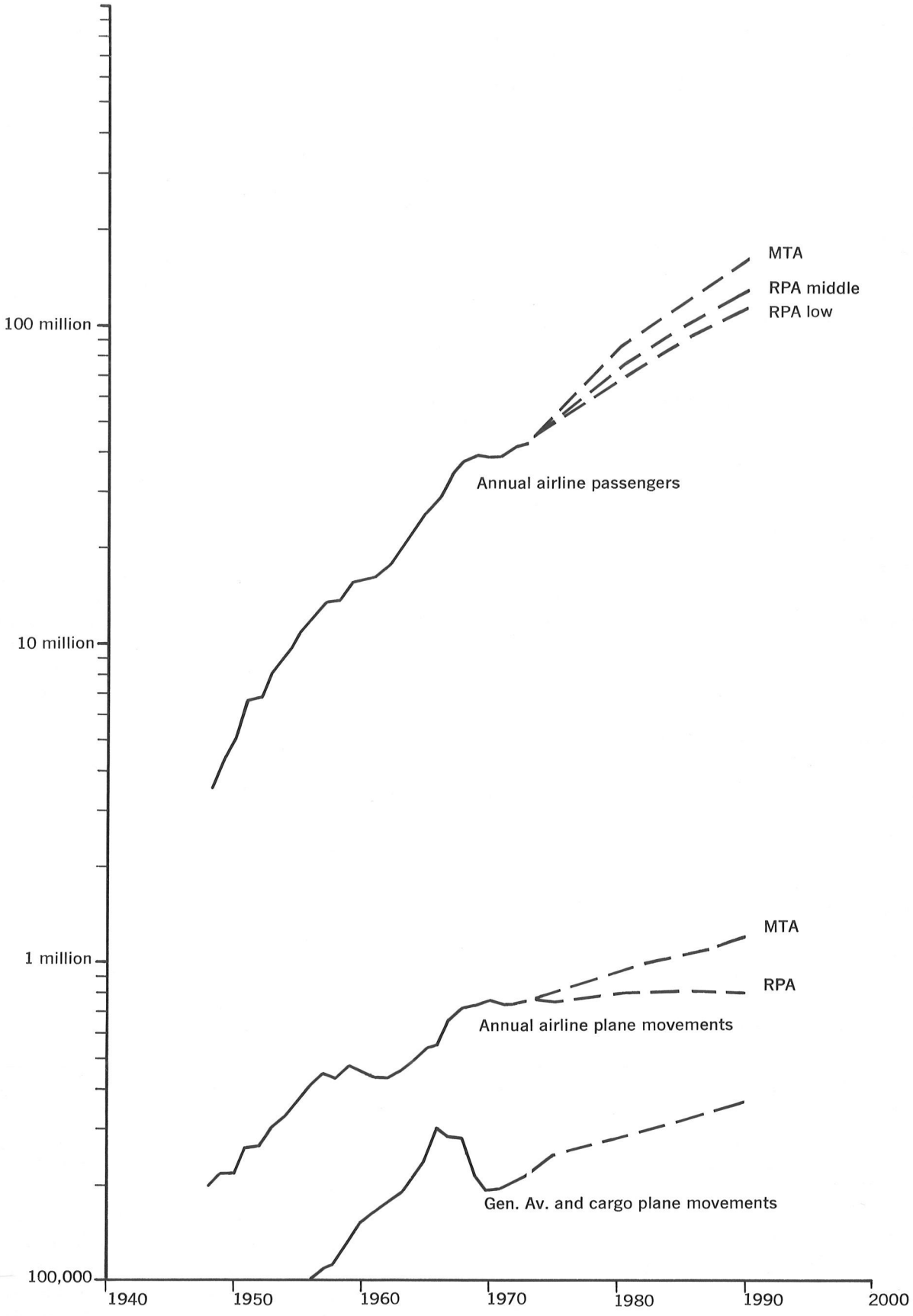
In the future, this segment of general aviation could be accommodated at the existing airports by V/STOL aircraft which would use appropriately set aside areas at the existing airports. Thus it is far from fantasy to envision the day when small aircraft are removed from the main runways of the Region's major airports.

e) **Diversion to STOL and rail**

Another favorable possibility not yet accounted for in these calculations, is the diversion of **airline** travel demand to STOL and to high-speed rail transportation. The MTA consultants assume that the only markets susceptible to STOL diversion are the six under 400 miles from New York that carry one percent or more of passengers originating or destined for New York. These six, Boston, Buffalo, Pittsburgh, Rochester, Syracuse and Washington, account for 12.5 percent of all passengers entering or leaving the New York airports. The consultants assumed 5 of 6 would be divertable, or 10 percent of all trips. However if six more cities, each with 100 or more (two 50 passenger flights) trips each way, each day, (in 1971) were added, and flying by STOL made the only allowable mode, the diversion would be about 15 percent of all passengers. Since planes flying on these routes are smaller than average, the diversion of **planes** and, accordingly, the capacity

Chart 2

Trends and Projections of Air Passengers and Aircraft Movements



made available—would be **close to 25 percent of peak hour flights.** Diversion to high-speed rail is included in this figure, since high-speed rail would compete for a part of the same market that STOL could serve.

The consultants state that while a number of questions regarding STOL remain unanswered "this study does not have as its objective the planning of a STOL system but is only concerned with the impact upon Stewart of a hypothetical STOL system in the 1980's; answers must be assumptions based upon STOL development and research so far accomplished." [6]

One should note, however, that under another contract, the MTA consultants have run a STOL system for the New York Region through a computer model for the Aviation Advisory Commission. That experiment shows that a STOL port system plus high-speed ground transportation would produce an average of 15 minutes less total travel time per person in 1985 and 29 minutes less total travel time in 2000 (of which 21 minutes would be access time) than would Stewart development.

Furthermore, the consultants' report to the President's Aviation Advisory Commission states that these time savings would attract 14 percent more passengers in the year 2000 than the Stewart scenario. The time savings works out to be $2.3 billion capitalized over 40 years at 6 percent. In other words, these tests suggest that STOL may save air travellers substantial travel time and be better for the Region's economy than Stewart.

The reason is that Stewart airport is located considerably further from the population of the Region than the three present major airports. High-speed rail to Stewart will improve its comparative access even when direct rail service to J. F. Kennedy and Newark is in operation, but the population distribution in the Region is relatively fixed. Although the population increment in the Region between now and the end of the century will be away from the center, this increment will not bring the center of the Region's total population significantly closer to the Mid-Hudson area.

5. TESTING THE ASSUMPTIONS

It is clear that the large volume of passengers projected to be using Stewart by 1990 is a function of a number of assumptions, all of which have viable alternatives, each of which could eliminate the bulk of the projected demand at Stewart. The projection of the Region's passenger traffic may be high, the projection of passengers per aircraft may be low, the estimate of load factors may be low; in addition, the unwillingness to assume the removal of general aviation from the three existing airports through pricing, the modest projection of peak hour capacity and the minor role assigned to STOL, all result in 36 million passengers for Stewart.

The MTA consultants recognize the sensitivity of the report's conclusions to these assumptions. In a section on sensitivity testing, the consultants varied a number of the parameters of their computer model, their input data and their assumptions. The conclusions are quoted here.

> "A difference of one percent in either the elasticity or the overall rate of change in per capita income would result in a difference of roughly one percent in overall forecast demand in 1985."[7]

Thus, a 20 percent difference in projected income or in model calibration or both would yield approximately a 20 percent difference in total traffic. A 20 percent drop in total air passenger traffic would yield almost no traffic at Stewart, since the 36 million forecast for it is about 22 percent of total air passengers.

> "Even moderate variations in overall New York traffic volume would have a graphic effect on the scope of operations at Stewart. Since the existing three New York airports would be operating at capacity in 1985 (even if annual traffic growth were one percent below forecast), the brunt of any demand fluctuations would be borne at Stewart. As a result, a modest overall change in New York passenger traffic is translated into a large marginal change in the volume of traffic at Stewart."[8]

The consultants go on to say that in 1985 traffic at Stewart would be about half of that propected if annual traffic growth were one percent less than projected (6.7 percent not 7.7 percent), if all other assumptions remain. Projections of less than 6.7 percent per year were not tested. Quoting further,

> "the model results concerning Stewart are extremely sensitive to overall New York demand levels. However, this sensitivity is not an idiosyncracy of the model; rather it is a very realistic reflection of actual circumstances. Stewart, at least in its early stages, will function as a reliever airport for traffic that cannot be accommodated at the existing three airports. The magnitude of that overflow is very sensitive to the rate of growth in passenger traffic, which is therefore a key factor in determining the appropriate size for the Stewart facility."[9]

Next, an increase of 10 percent in the capacity above that forecast at the three existing airports was assumed. The consultants concluded,

> "if capacities at the three existing airports were to be 10 percent above forecast in 1985, the number of daily departures at Stewart would be cut by almost 50 percent. . . . the capacity limitations at the three existing airports are in fact a key determinant of the amount of 'overflow' traffic that will require service from Stewart."[10]

The increase in seats per departure was then raised to 3.3 percent per year rather than 2.3 percent with an increase in the load factor. Under these assumptions, Stewart traffic again drops by 60 percent. The assumption of 4.3 percent increase in seats per departure or a

substantially higher load factor were not tested. Thus the consultants conclude:

> "We have found that the forecasts for Stewart are particularly sensitive to both the level of regional passenger demand and to the future practical capacity **of other more conveniently located airports (such as Kennedy, Newark and LaGuardia** [our underscoring]). These findings do not represent any weaknesses in the modelling procedures. On the contrary, the model properly reflects the real facts of life. Since Stewart will be primarily a reliever airport in its early history, handling traffic which otherwise would prefer to use one of the three PNYA airports, its level of traffic is sensitive to the amount of regional demand the capacity of the PNYA airports. These two factors together will determine the amount of overflow traffic which will seek accommodation at Stewart. And, to the extent that these factors may be different in the future than estimated herein, there will be a different level of demand and activity at Stewart in any given forecast year."[11]

Not tested were a series of these variations in combination. It is clear from the data presented that had this been shown it would be obvious that many combinations of reasonable assumptions would drop Stewart traffic to near zero.

6. THE RECENT PAST

The difficulties of examining the future are highlighted by numerous developments in the last few years. They have reinforced the theme that planning for aviation facilities is fraught with uncertainties and subject to fast changing conditions and events difficult to predict. Many of these developments suggest that the need for another major airport is less likely. Some of these developments suggest otherwise.

Some background on these developments is instructive here, first those developments that tend to favor a fourth airport.

Lack of progress in STOL development. For many years, airport planners and others viewed first helicopters or VTOL and later STOL aircraft as a panacea for airport congestion. With aircraft operating in separate airspace from short airstrips of less than 2000 feet and close to the downtown, much air travel would be diverted. But development has been held up by the inability of all the necessary actors to respond to the challenge in unison. Unless the airstrips are made available, the airlines are wary of getting into the STOL business and without the airlines prepared to encourage research and development, the aircraft manufacturers are unprepared to respond with suitable vehicles for STOL airline service, namely a 50-plus seat aircraft with a 400-plus mile range able to cruise at 350-plus miles per hour. Progress in this area seems no further along than it was four years ago. Smaller aircraft capable of handling the close-in air taxi markets from existing strips at LaGuardia do exist, however.

No new runways at existing airports. The rejection by the Environmental Studies Board of the extension of Kennedy Airport into Jamaica Bay, and the inclusion of the **entire bay** (up to the present airport shoreline) into the Gateway National Recreation Area eliminates the last practical possibility to add more runways to the existing three Port Authority airports. This could have been a highly efficient mode of expanding the Region's airport capacity.

High cost of high-speed rail. Significant increases in the speed of rail in the Northeast Corridor will be extremely costly. The U.S. Department of Transportation has recently estimated that a reduction of just one-half hour on the New York-Washington run from 2½ to 2 hours would require $700 million and the cost of similar further improvements would be more than $1 billion. In addition, the fact that only 17 percent of New York's air traffic interchanges with Northeast Corridor cities—Washington, Baltimore, Philadelphia, Providence and Boston—and that considerably less than half of these trips are downtown to downtown where rail has a distinct advantage over air, suggests that there is a limit to high-speed rail's usefulness for diverting airport traffic.

Reductions in runway capacity. The introduction of wide-body jets, the 747, DC-10, and L1011 into airline service had produced the wake turbulence phenomenon; these aircraft produced a vortex of turbulent air at their wing-tips which requires following aircraft to keep a distance greater than the present air traffic control procedures allow, thereby reducing the effective landing capacity of a runway. It is impractical to have such aircraft use separate runways. However, research is under way to see if these vortices can be dispersed.

Air travel and income. Related to projections of air travel, a series of questions needs to be answered. How much will the increase in income be? What is the precise sensitivity of air travel to this increase? At what point will the air travel market be saturated? The recent scaling-down of population forecasts implies that, on a per capita basis more money will be available for air travel per person; fewer children suggests more time and money available for travel and more participation by women in the labor force producing more discretionary income.

Those recent developments that tend to mitigate against a fourth airport follow.

Diversion of general aviation. Moderately higher landing fees for general aviation, which make it pay a more equitable share for its use of scarce runway space, were instituted at the three Port Authority airports as urged in 1967 by Regional Plan. The drop in general aviation movements was precipitous, from 271,000 in 1966 to 152,000 in 1970 (with no further fee increases this volume is up to an estimated 176,000 in 1973). Along with the FAA restriction of 42 peak period

general aviation movements (now partially lifted), valuable peak period capacity has been made available for the users that carry the most people, the airlines. The potential for further reductions in general aviation movements exists since this segment of the traffic still doesn't pay its share based on the use of the airports' capacity.

Elimination of duplicate flights. The Civil Aeronautics Board has recognized the need for schedule consolidation among airlines to reduce duplicate services. In early November, 1973, spurred on by Federal rationing of jet fuel, the CAB approved capacity agreements among the airlines which had previously been prevented by CAB policy. This led, nationwide, to the cancellation of over 3 percent of all flights, largely concentrated in the New York market. The concept of the airlines getting together to reduce the number of duplicate flights holds considerable promise if expanded further.

Greater load per plane. Between 1969 and 1973 **there has been an absolute decrease, about 9 percent, in the number of airline movements at the three existing airports.** This has occurred because the increase in passengers, only 11 percent in four years, has been less than the increase in passengers per airline movement.

Slower growth in air travel demand. The growth in air passenger demand at the three airports was slowed by the 1969-1971 recession and by the continued decline of New York's share of the national market. The latter has occurred partly because of the development with rising traffic of direct services between places that formerly required a connection in New York. The net result has been to force a revision of projections by the Port Authority. Their 1980 projection of 91 million air passengers has been significantly scaled down to 78 million (the former projection would have given 58 million in 1973, over-predicting by more than 35 percent the 42.5 million airline passengers that appears likely by this year's end).

Diversion to rail. Last year, ridership on the railroad between New York and Washington increased by 18.6 percent over 1971 while air passengers increased by only 3 percent. This suggests that railroad service is capable, in selected situations, of relieving demand at the airport. It is recognized, however, that the current rail system can have only a limited effect on air traffic.

Energy limitations. In its forthcoming publication, *Regional Energy Consumption,* Regional Plan Association shows that on a per passenger-mile basis air travel is by far the largest consumer of energy for transportation. Should the higher air travel projections for the Region occur, by 1990, **fuel consumption for air travel will approach fuel consumption for automobile travel** in the Region. Such a development might invite further restraints on air travel.

These uncertainties, and the realization that the problems in securing major airport sites was a national problem prompted Regional Plan in concert with members of Metropolitan Association of Non-Profit Corporations (MANC) to call for a high level national commission to deal with the long-range issues of aviation. The Aviation Advisory Commission was appointed by the President, and after two years of study released its findings early this year. However, the central issue, that of the alternative national airport system that could best serve the needs of the nation at least cost to all involved—the airport operator, the airlines and the airport neighbor—was never fully explored although the need was recognized. As a supplemental statement to the Aviation Advisory Commission stated,

> "ideally, the evaluation and choice among such alternatives would be made in terms of projected demand, technology and performance criteria applied by the various system participants, and a determination of the 'optimum' alternative—through cost/benefit analysis—would establish for each region the specific requirements for airports and related system components."[12]

But because of doubts about the certainty of demand and technology forecasting the statement concluded,

> "It is therefore highly important to **keep several key options open.** The basic objective should be to maintain long-range flexibility—permitting the Nation to proceed with any combination of detailed system features that may be required, while working to improve demand and technology forecasting and modelling capability."[13]

7. CONCLUSION

Given the foregoing analysis, the assumptions made, and the uncertainties encountered, Regional Plan Association favors the following six point position:

1. We applaud the acquisition of a land bank for possible future expansion of Stewart Airport.

2. We support the early implementation of the first phase of the proposed development, namely, one long runway, a terminal large enough to accommodate the needs of the first phase only, and a direct rail connection to Manhattan. This high-speed link should stop at Paterson and not Ridgewood to assist the needs of Paterson as outlined by Regional Plan Association in "The Potential of Paterson."

3. We emphasize the priority of increasing the efficiency and capacity of the existing airports by discouraging general aviation further, by schedule consolidation, and by research and development of air traffic control measures and V/STOL aircraft.

4. We support the constant monitoring of the need for any possible future development stages. Factors to be examined include the exploration of the effect different assumptions about future population, income, aircraft size, load factors, general aviation, schedule consolidation, airline mergers and airport capacity.

5. We again call for an examination of the costs and benefits to the Region and the nation of alternative methods of meeting air travel demand.

6. We question the timing of the future stages presently proposed by the MTA's consultants' report. It is not clear that a full scale Stewart airport will be necessary by 1990. All agree, including the consultants, that "there will *not* be an appreciable need for Stewart to handle domestic scheduled passenger operations before 1980." This gives the Region time to carry out items 3, 4 and 5 above.

Thus the four themes raised by the 1969 RPA report, "The Region's Airports": 1) the present system to accommodate air travel demand could and should be made more efficient, 2) future uncertainties suggest a cautious approach, 3) all costs and benefits of alternative solutions to all sectors of the Region must be evaluated and 4) the problem of providing new airport capacity should be examined on a national level, are still valid when evaluating the role of Stewart Airport.

FOOTNOTES

[1] Port of New York Authority, *A new major airport for the New Jersey-New York Metropolitan Area* (New York: Port Authority of New York, 1959) 16.

[2] "The Region's Airports," *RPA News,* 89 (July 1969) 7.

[3] H.S. Campbell and others, *Alternative development strategies for air transportation in the New York Region, 1970-1980.* Prepared for the Port Authority of New York. (Santa Monica: RAND, 1969).

[4] Jamaica Bay Environmental Study Group, *Jamaica Bay and Kennedy Airport; a multidisciplinary environmental study* (2 vols.; National Academy of Sciences, Environmental Studies Board, 1971).

[5] "The Region's Airports," *RPA News,* 89, (July 1969) 7.

[6] Transplan Inc. and Seelye Stevenson Value & Knecht, Inc., *A Study for the development of Stewart Airport; Phase I Report, January 1973* (5 vols. and summary vol.; New York: Transplan, Inc. and Seelye Stevenson Value & Knecht, Inc. for the Metropolitan Transportation Authority, 1973), II, C-2-56.

[7] *Ibid.,* II, D-6-18.

[8] *Ibid.,* II, D-6-20.

[9] *Ibid.,* II, D-6-21.

[10] *Ibid.,* II, D-6-22.

[11] *Ibid.,* II, D-6-27.

[12] Rai Y. Okamoto, *Aviation in a long range planning context.* A supplemental statement by Commissioner Okamoto. (Washington: Aviation Advisory Commission, 1973) 18.

[13] *Ibid.*

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