2422

ANALYSIS NOTES

INTER-AIRPORT SHUTTLE

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TRI-STATE TRANSPORTATION COMMISSION
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This report was prepared by George Haikalis, Research Engineer, with the assistance of S. David Phraner, Transportation Analyst, for Project 2422 - Air Service Systems.

Each day, approximately 70 airline passengers land at Newark Airport, travel by some means of local transportation (mostly by helicopter) to John F. Kennedy Airport and board planes for other points. Why then an Inter-Airport Shuttle for this handful of travelers?

THE CASE FOR AN INTER-AIRPORT SHUTTLE

1. Improved ground transportation between Manhattan and JFK airport has been proposed and discussed for many years, and a commitment for a specific plan seems all but assured. Reactivation of the Ozone Park-Rockaway Branch of the Long Island Rail Road would permit a through rail route from Penn Station, Manhattan, to the airport property line with a minimum of new construction. Extension of this branch into the airport's central terminal area would be an essential element of this ground access improvement.

2. Once in JFK's central terminal area the Manhattan rail link could either terminate in a single station with shuttle devices to each of the eleven individual airline terminals or it could loop past the terminals stopping at each terminal (or at groups of terminals). The loop scheme would seem to be the simplest and most desirable from a passenger's point of view.

3. Some form of comparable ground access improvement is sought for Newark's airport. Only a limited-access highway separates existing Penn Central trackage from the airport boundary. Though one of the most commonly proposed schemes is to extend PATH from Newark to Newark Airport, passenger demand from Manhattan could be better served by a direct rail service from Penn Station. Such a direct rail service would also intercept all of New Jersey's commuter rail routes.

4. At Newark Airport the rail service could be met by the proposed Inter-Terminal Transfer device connecting to each of the three terminal buildings now under construction. Airport passengers would no doubt prefer a single vehicle trip from New York or Newark to the airport. The "I.T.T. device is remarkably similar to a conventional rail system and could be made compatible, so that a single rail train could make the trip from New York, loop past each of the terminals at Newark Airport and return to New York.

5. Given two airport services stubbing end-to-end at Penn Station, N.Y. why not a single through service?

   a. Operational simplicity - no turning of trains, smoother flow of trains through Penn Station,

   b. Two airports - 14 airline terminal buildings unified into a single airport/ground access system,

c. Given this specialized and superior access to the two airports that have greater capacity - JFK: four runways, NWK: three runways - and given the increased use of wide-bodied high capacity aircraft, and given the increased attention focused on airline operating costs and the concept of user taxes to offset publicly provided aviation facilities and services, perhaps the two runwayed LGA could be put into temporary (or permanent) cold storage giving residents of the densely populated neighborhoods of Flushing, Jackson Heights, South Bronx, and Rikers Island a break.

PHYSICAL DESCRIPTION

The route of the Inter-Airport Shuttle is shown in Figure 1. The bulk of the 61.5 mile round trip loop is currently in intensive rail transit operation. The shuttle operation could be superimposed on existing operations with a minimum of disruption. However, the intensive use of the two-track Penn Station Hudson River rail tunnel for airport trains might seem to preclude use of this currently under utilized Manhattan gateway for increased commuter train flow. Not so!-this tunnel should be capable of accommodating at least as many trains as are currently operated through the rapid transit tunnel four miles to the south (PATH's tunnel to Hudson Terminal). The PATH tunnel passes trains every ninety seconds for 45 continuous minutes during the height of the morning and evening rush hours, through 8 mph reverse curves. A 39 train per hour schedule into Penn Station would allow a ten minute Inter-Airport headway, a 20 minute headway on each of ten commuter branches from west of the Hudson, and a 20 minute headway on Amtrak trains from Philadelphia or Washington. This service pattern could accommodate all midtown-bound trans-Hudson transit travel for the immediate future(assuming all bus and uptown PATH riders would even switch to the Penn Station route). The two states are already developing long range plans for adding a new tunnel parallel to the Penn Station tunnel to accommodate future traffic growth.

A sample schedule for the shuttle is shown in Table 1. A 90 minute running time is estimated for this 61.5 mile round trip run assuming high performance equipment comparable to the Long Island Rail Road's. A 10 minute layover would provide a cushion for delay. With a 10 minute headway, four 85' cars per train, and 10% shop margin only 44 cars would be needed for the shuttle. With such a modest fleet size, substantial savings in capital outlay might be realized from on-board power generation as opposed to wayside current collection for the airport extensions.

- JFK Link

Figure 2 suggests a possible shuttle layout at JFK airport. In the Central Terminal Area a single track rail line would follow the right-of-way of the present outer roadway running counter-clockwise past the eleven terminal buildings. The outer roadway would be abandoned, permitting the rail line to operate at grade, stopping at the front door of each terminal. The inner roadway, easily doubled or tripled in width, would provide adequate capacity for auto access. Pedestrian overpasses, an "innovation" for JFK, would ramp auto-bound airline passengers over the rail track and auto lanes, to curb-boarding areas for autos and to the parking lots, chapels, and fountains in the center of the terminal complex. The contemplated expansion of the

existing individual terminals could then take place over the surface rail track and highway lanes. A station at each of the eleven terminal buildings would increase riding time and reduce walking time. Almost certainly the air traveler would prefer the convenience and simplicity of direct front door delivery. The typical minimum interval between stops would be about 700' not too different from limited tramway or street railway stop spacing. A short stretch of trackage would close the loop permitting a single car intra-airport service to be superimposed over the inter-airport service.

The approach to the JFK Central Terminal Area would be via the existing Van Wyck approach road underpass under the taxiway. Two lanes of this eight lane underpass would be converted for rail use. The six remaining lanes plus the six lanes recently added at 150th St. provide ample automobile approach capacity, particularly since plans for completion of Interstate 78 - Clearview Expressway have been indefinitely set aside. The double track railway would use the median lanes of the Van Wyck approach road to Federal Circle, and on surface to Aqueduct. Stops would be near the Pan Am hangar to serve employment concentrations there and at the Outer Parking Lot where auto traffic could be intercepted. Three stops in Queens would permit convenient transfer to subways and the Long Island Rail Road for air travelers bound for Brooklyn, Queens, Nassau and Suffolk.

- Newark Link

A new Newark Airport terminal complex has been under design and construction for several years. Unfortunately, the airport planners could not foresee, a few years ago, the unusally strong public interest in rail access to the airport that apparently has emerged. Since the airport terminal was built from scratch on filled marsh land, a rail right-of-way could have been allowed at grade, and structures and roadways arranged accordingly. The rail line must now be "fitted-in" to the labyrinth of complex highway lanes, ramps, access roads, and parking areas. (The effectiveness of this super-service highway complex must be extraordinarily great to balance the incredible cost per passenger delivered.)

The "Inter-Terminal Transfer Device" provided for in the design of the three individual terminals can be relatively easily modified to accommodate the Inter-Airport Shuttle service, once it crosses the highway lanes. A double track semi-enclosed right-of-way is provided through each terminal building for a vehicle of the approximate size of the Westinghouse Transit Expressway. A single track elevated railway could be accommodated on the outer transit expressway track right-of-way, releasing the inner track for greater platform space than is now planned. At the opposite side of the terminal complex the single track elevated oval could be completed, permitting a single-car Intra-Airport loop service, and providing temporary lay-over storage for Inter-Airport trains. The elevated oval would be connected to the Penn Central trackage to Newark and New York at Waverly Yard.

- Cost

The entire Inter-Airport Shuttle, including rolling stock could be constructed for $75,000,000. Assuming 10 minute headway 24 hours per day, 365 days per year, the incremental operating cost would be about $8.5 million per year if operated as a rapid transit line, or $12 million if operated with commuter rail work rules.

BENEFITS AND CONSEQUENCES

Perhaps the greatest benefit of the shuttle would result from the linking of 14 airline terminal buildings and 7 runways into a single air transportation complex. The large market for air travel to New York permits a great frequency of flights from a great variety of orgin cities. Figures 3 and 4 show this air service for domestic and overseas cities. Yet because this service is divided among three airports, each specializing in its own local tributary area, no one airport is connected by non-stop service to more than 64 of the 100 domestic cities having non-stop service to New York. (Table 2), and two of the three airports have little or no overseas service.

A unified terminal complex would permit airlines to schedule frequent non-stop flights to a greater variety of cities, and would permit greater numbers of passengers per flight to leading cities reducing operating cost. With the shuttle, JFK and Newark Airports would become at least as accessible to Manhattan as LGA is now, and access from Queens and Long Island to Newark Airport and access from New Jersey to JFK airport would be substantially improved. Table 3 shows the current pattern of specialization of the three airports due to ground access time, and concentration of overseas flights at JFK. With the shuttle, Newark and JFK airports would become relatively less specialized and aircraft departures could draw passengers from the entire Tri-State Region. Larger aircraft and more careful regulation of schedules, frequencies, and routes could permit the two airports connected by the shuttle to function as effectively as the three airports do now.

- Patronage

Slightly less than half of the region's locally generated air travelers reach the airport by auto. From Manhattan the non-auto proportion rises to 85%. For travel from origins outside of Manhattan the proportions are nearly reversed and 72% is by auto. The Inter-airport shuttle can be expected to draw the bulk of its patronage from non-auto travelers - those presently using airport bus, taxi, city bus, and helicopter. For this preliminary analysis three-fourths of the non-auto travelers are assumed to be diverted to the shuttle, and one-fourth of the auto travelers. A total patronage of nearly 44,000 trips per day would result. At a flat fare of a $1.00 per trip annual revenue might exceed $16,000,000. Thus revenue might equal operating cost plus recovery of capital.

The estimated diversion potential suggests that special rail services to the two airports from points other than Manhattan would draw very little use. For instance, plans for a tunnel under Forest Park, in Queens and provision of direct rail service from JFK to Jamaica Station might not result in sufficient patronage and benefits to justify the great capital and operating cost involved. New Jersey's plan to extend PATH beyond Newark Airport to Elizabeth and Cranford could almost certainly not be rationalized on an airport access basis. The Inter-Airport shuttle would intercept all New Jersey and Long Island commuter rail lines at various points, with a service frequency that would be difficult to support on the Jamaica or Cranford services.

The shuttle would not intercept existing Westchester and Connecticut commuter rail services. A Penn Station - Grand Central transfer vehicle or system; a new local commuter service from New Haven to Penn Station; or use of Amtrak corridor trains making local stops at New Haven, Bridgeport, Stamford, and New Rochelle only, might be options to a direct rail (or bus) service to JFK for this sector.

LONGER RANGE OUTLOOK

The history of the aviation industry has been one of continuous, rapid, and monotonic growth until now. Fig. 5 shows the drastic change in one measure of this growth industry, New York airline traffic, in 1970. Projections made in 1967 suggested almost indefinite growth. Projections today are much more difficult. The current economic slowdown bears the brunt of the explanation. Yet airline fares are beginning to rise, in constant dollars, after many years of decline. Airlines are being asked to pick up an increasing share of the cost of publicly provided aviation services. As such services as air traffic control, airport planning, aircraft development, and feeder airline subsidies, still provided in part from general revenues, are assigned to users, costs (and fares) can be expected to continue to rise. If residents in noise-impacted areas near airports succeed in legal efforts to obtain compensation for properties "damaged" by aircraft, airline cost could rise astronomically. Immediate retrofitting of the noisiest aircraft, or their early retirement, not unlikely possibilities, would also greatly intensify upward cost pressures.

The outlook for STOL or VTOL aircraft technology is equally ambiguous. Most neiborhoods are better informed and more sensitive to plans for close-in STOL ports. Without these special facilities STOL and VTOL would have to compete with conventional aircraft for traditional airport to airport markets. While from a cost standpoint STOL and VTOL may not offer an advantage; noise, air traffic/capacity and land area considerations at existing airports might give STOL/VTOL an edge. For example, long range, high capacity, VTOL jet aircraft could increase JFK's runway capacity by a factor of ten while greatly reducing the noise nuisance. Perhaps such aircraft might be developed in ten to fifteen years. In the more immediate future, separate STOL runways, fitted into JFK and Newark airports, could release CTOL runway time for wide-bodied longer range aircraft. STOL craft could serve the closer-in cities whose residents travel by air to New York primarily to transfer to the more diverse air service available from New York. (Travel from close-in cities, 150 to 250 miles, to the Manhattan CBD would be most economically served by existing and planned high speed rail services. And travel from these cities to destinations outside the Manhattan CBD would be by auto.)

Never the less the demand for air travel can be expected to continue to grow. Figure 4 shows that two-thirds of the world's population is not connected with non-stop service to New York. As the population in Asia and Africa becomes better educated and more productive, the need for intercommunication will soar. Aircraft development in the next twenty years will almost certainly be directed toward serving this very-long-distance travel market. While the terminal requirements of aircraft yet conceived or developed cannot be predicted caution and prudence dictate that options be kept open, where cost is minimal. Stewart, McGuire, Calverton and Westhampton air bases could provide the reserve airport capacity at little immediate cost.

TABLE 1

INTER-AIRPORT SHUTTLE

SAMPLE SCHEDULE

	Miles	Minutes
Lv. Newark Airport (Terminal A)	0.0	0
Newark, Penn Station	4.1	5
Harrison Transfer	5.1	7
Meadows Center	10.1	12
New York, Penn Station	14.1	17
Woodside	19.2	23
Woodhaven	24.6	28
Aqueduct	26.2	30
Remote Parking Lot	26.9	32
Pan Am Hanger	28.6	35
J.F.K. Airport (Terminal #1 - Eastern)	29.7	37
" " (" #2 - Northwest)	29.8	38
" " (" #3 - Pan Am.)	29.9	39
" " (" #4 - Intl Departure)	30.1	40
" " (" #5 - Intl Arrival)	30.2	41
" " (" #6 - Intl Departure)	30.3	42
" " (" #7 - TWA)	30.4	44
" " (" #8 - National)	30.6	45
" " (" #9 - BOAC)	30.8	46
" " (" #10 - American)	31.1	48
" " (" #11 - United)	31.3	49
Pan Am Hanger	32.4	51
Remote Parking Lot	34.1	54
Aqueduct	34.8	56
Woodhaven	36.4	58
Woodside	41.8	63
New York, Penn Station	46.9	69
Meadows Center	50.9	74
Harrison Transfer	55.9	79
Newark Penn Station	56.9	81
Newark Airport (Terminal C)	60.8	86
Newark Airport (Terminal B)	61.2	88
Newark Airport (Terminal A)	61.5	90

TABLE 2

DAILY NON-STOP FLIGHTS TO THREE NEW YORK AIRPORTS

Domestic and Overseas Origin Cities

	J. F. KENNEDY		LA GUARDIA		NEWARK		THREE AIRPORTS
omestic Origin Cities	Cities Served	Flights	Cities Served	Flights	Cities Served	Flights	Flights
33 Leading Cities	28	158	28	281	25	136	575
67 Other Cities	36	94	32	83	30	72	244
100 Total Domestic Cities	64	252	60	364	55	208	819
verseas Origin Cities							
10 Leading Cities	10	84	0	0	1	4	88
42 Other Cities	42	62	0	0	0	0	61
52 Total Overseas Cities	52	146	0	0	1	4	149
152 Total Origin Cities	116	398	60	364	56	212	968

Source: May, 1971 OAG - Domestic
Aug., 1970 OAG - Overseas

TABLE 3

PASSENGERS DEPARTING FROM THE THREE NEW YORK AIRPORTS

AVERAGE DAY - 1970, DOMESTIC AND OVERSEAS PASSENGERS

		ORIGIN								
		TRI-STATE REGION								
Airport	Mode	Manhattan	Brooklyn, Queens Long Island	Bronx, Westch. Conn.	West of Hudson R.	Total	Beyond Region	Total	Transfer Psgr.	Total
J.F. Kennedy	Auto	1,110	3,840	1,580	1,140	7,670	890	8,560		
	Non-Auto	5,850	1,650	920	760	9,180	900	10,080		
	Total	6,960	5,490	2,500	1,900	16,850	1,790	18,640	7,520	26,160
LaGuardia	Auto	910	2,690	1,550	630	5,780	150	5,930		
	Non-Auto	6,090	1,000	630	230	7,950	350	8,300		
	Total	7,000	3,690	2,180	860	13,730	500	14,230	2,000	16,230
Newark	Auto	360	120	110	3,890	4,480	420	4,900		
	Non-Auto	1,440	80	90	860	2,470	280	2,750		
	Total	1,800	200	200	4,750	6,950	700	7,650	1,200	8,850
3 Airports	Auto	2,380	6,650	3,240	5,660	17,930	1,460	19,390		
	Non-Auto	13,380	2,730	1,640	1,850	19,600	1,530	21,130		
	Total	15,760	9,380	4,880	7,510	37,530	2,990	40,520	10,720	51,240

Source: PNYA, 1967 Domestic Air Psgr. Survey
PNYA, 1963 Overseas Air Psgr. Survey
PNYA, 1968 Trans-Atlantic Air Psgr. Survey
PNYA, 1970 Airport Statistics

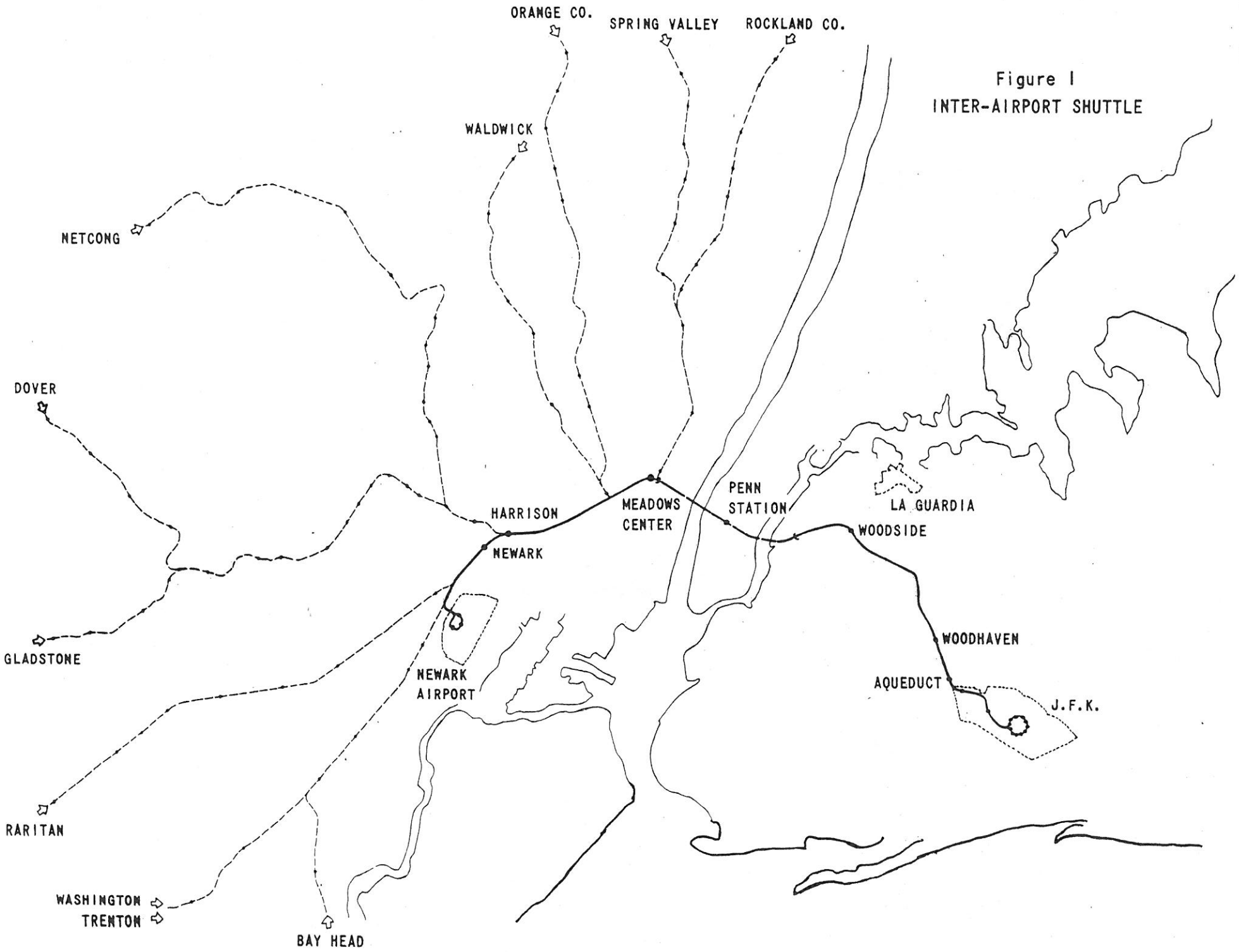
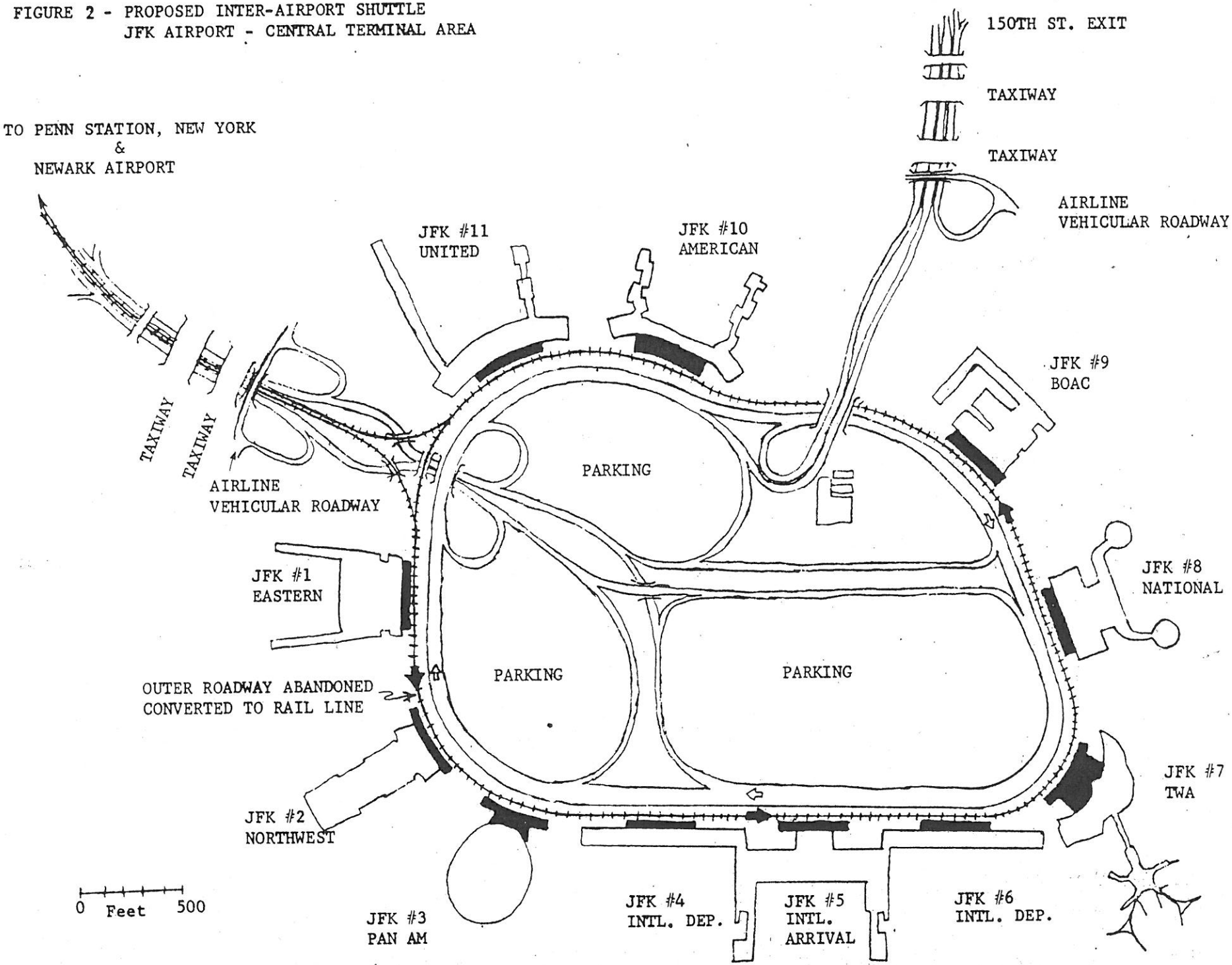


Figure 1
INTER-AIRPORT SHUTTLE

FIGURE 2 - PROPOSED INTER-AIRPORT SHUTTLE
JFK AIRPORT - CENTRAL TERMINAL AREA



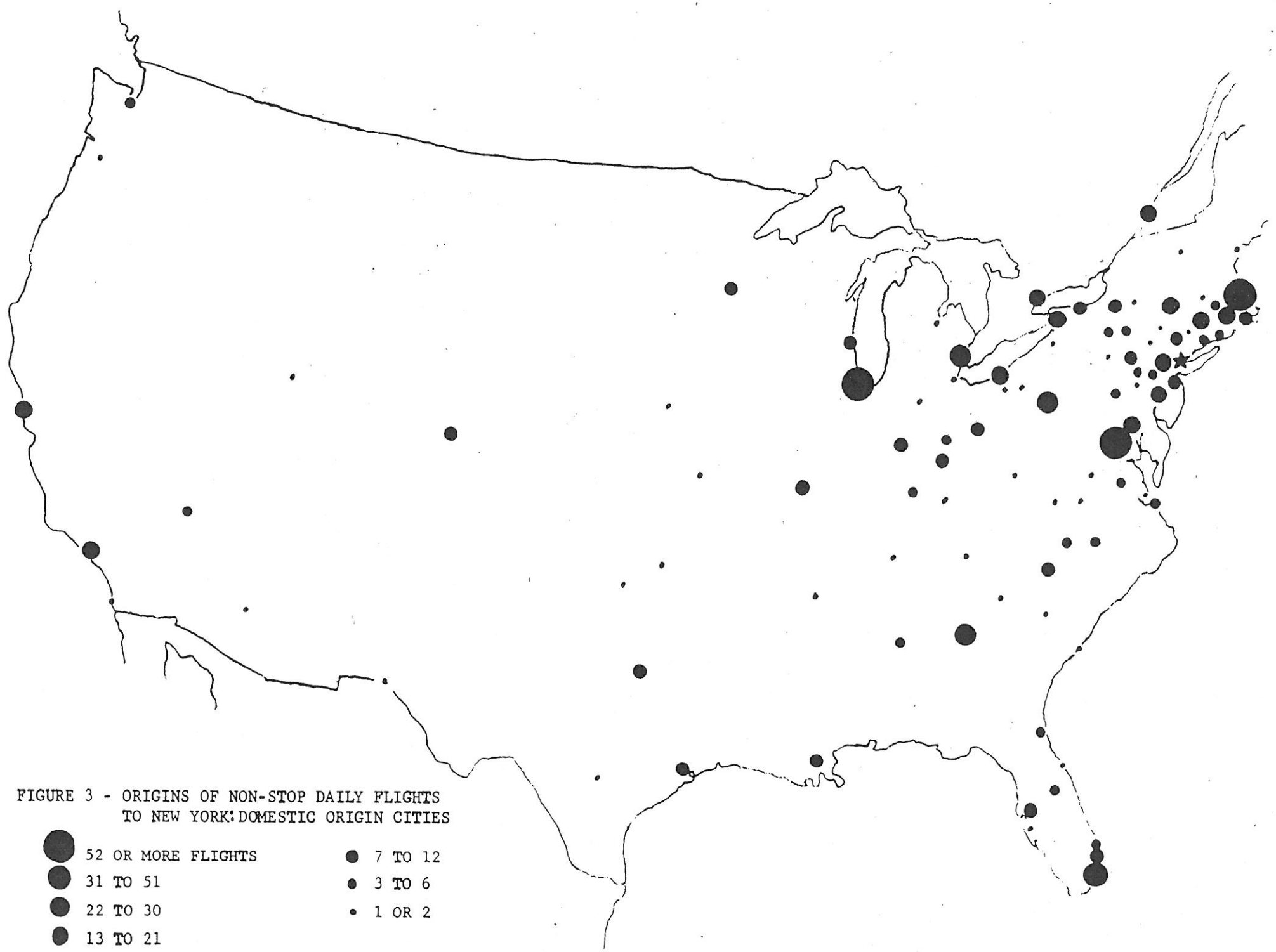


FIGURE 3 - ORIGINS OF NON-STOP DAILY FLIGHTS TO NEW YORK: DOMESTIC ORIGIN CITIES

- 52 OR MORE FLIGHTS
- 31 TO 51
- 22 TO 30
- 13 TO 21
- 7 TO 12
- 3 TO 6
- 1 OR 2

FIGURE 4 - ORIGINS OF NON-STOP DAILY FLIGHTS TO NEW YORK: OVERSEAS ORIGIN CITIES

- 52 OR MORE FLIGHTS
- 31 TO 51
- 22 TO 30
- 13 TO 21
- 7 TO 12
- 3 TO 6
- 1 OR 2

FIG. 5

REVENUE PASSENGER TRAFFIC THREE N.Y. AIRPORTS