TRANSPORTATION AND THE COAST:
A STAFF WORKING PAPER

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January 1977

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Note: This staff working paper is one of a series of Issue and Policy Alternative Papers presenting facts, analyses, and conceptual policy alternatives on coastal resources and coastal land and water uses. The purpose of this draft document is to stimulate discussion and comments that will assist preparation of the management program for the New Jersey coastal zone.
This report was prepared in part with financial assistance from the National Oceanic and Atmospheric Administration under the federal Coastal Zone Management Act, P.L. 92-583.

Comments, criticism, additions, and suggestions are welcome and should be addressed to the New Jersey Office of Coastal Zone Management.

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INTRODUCTION

Transportation exerts a powerful influence on the quality of human interaction with the coastal zone. The pattern of development along the coast has been intimately connected with the transportation system in use at the time. The major areas of concern that must be addressed in order to devise a comprehensive transportation system for the coastal zone include: outside access to the coast, transportation inside the coastal zone, land use patterns, air quality, conservation of energy resources, freight mobility, and financing. All of these issues revolve around a central problem: should New Jersey continue to rely almost completely upon the privately-owned automobile, or should alternative means of transportation be developed?

This paper aims to further public debate on important transportation issues in the potential coastal zone of New Jersey. The focus, however, is only on that portion of the transportation system which impacts directly on the recreational shore area or use of the shore area. Regional reports describe the transportation issues for entire regions. Characteristics and impacts of transportation in other areas of the state may be obtained from the New Jersey Department of Transportation Master Plan.

The first section of this paper presents alternative policies which could be part of the coastal zone management program in New Jersey. Though issues on air quality are presented in this paper, policies may be found in the DEP/OCZM document on air resources.

Section II describes characteristics of the transportation system in New Jersey. The private automobile and other modes of transportation will be discussed.

Section III briefly defines important transportation issues and then presents an analysis of these issues.

Three appendices conclude the paper. First, coastal zone regions are examined individually and transportation problems specific to the region are highlighted. The second appendix contains several maps of New Jersey's transportation system. The final appendix lists the sources used in preparing this paper.

I. POLICY ALTERNATIVES

A. Access to the Coastal Zone

Policies to reduce congestion and facilitate access to and from, and within, the coastal zone should aim to circumvent bottlenecks on secondary roads and to better accommodate heavy fluctuations in load on major transportation arteries. Load fluctuations are efficiently absorbed by rapid transit systems. In order to promote a greater utilization of mass transit within the state, multiple policies must be developedwhich will increase the attractiveness of mass transit to present automobile users. A successful transition to rapid transit would reduce unused capacity in the transportation system, relieve congestion, and result in substantial economies.

1. Rapid, electrified rail transit services could be constructed along key commuting corridors where demand warrants such service. Electric rail service is the cleanest, fastest, and most energy efficient means available for commuter transit. Wherever rail services exist, free parking facilities could be provided to encourage commuters to leave their cars at the stations. Commuter rail service requires efficient public transit at destination points.

2. In those areas where commuting patterns are not sufficiently dense to justify the expense of new rail construction, buses and carpools could be used to help transport people to work. While present service exists along some of these routes,

buses are old, and peak hour headway is often well more than an hour. As with rail service, only if service is upgraded can buses serve as alternatives to the automobile.

Carpooling would effectively serve commuter corridors of all densities, potentially decreasing rush hour auto traffic by as much as 50%. The state could provide a free information service (hooked up to a computerized data bank) to aid potential drivers and riders in finding each other. Information lines could also help commuters get to rail and bus pick-up sites.

3. In corridors where alternate means of transportation are available, auto commuter traffic could be discouraged. Special peak hour tolls on the Parkway and Expressway would be considered. Special rush hour lanes for bus and car pool traffic are another option. Parking facilities could favor carpools, either by reservation of spaces or by discriminatory rates.

4. Where rail lines extend to shore areas, special packages could be offered to promote rail traffic for recreational purposes. Special weekend rates and beach and entertainment discounts could be used as incentives. In order to be effective, present schedules would have to be improved.

5. Special weekend bus service could be provided from urban centers to shore areas. Present bus service often consists of only one trip per day. For the 19% of the state's urban households without cars (for non-white households the figure is 42%), present lack of service effectively precludes

trips to the shore. Special fares and discounts could be offered here also. Passengers could be deposited at proposed park-and-ride facilities.

6. Greater promotional tools could be utilized, both to advertise the availability of service, and to explain the very real needs for reduced automobile traffic. This would be necessary if any proposals designed to divert automobile traffic to alternative modes are to succeed.

7. The key roads connecting the barrier islands and North Shore beaches and their respective Garden State Parkway exits could be dualized if dualization has not already occurred. These dualizations would not be expected to greatly increase the current volume of traffic along these routes. Dualization would ease congestion and increase safety. In the event that park and ride facilities are constructed, dualization would then enable the use of express lanes for buses.

8. Park-and-ride facilities could be constructed near key exits off the Parkway. Buses would then transport beach-goers to the barrier islands and North Shore beaches. Regular commuter buses and school buses not otherwise needed on summer weekends could be used. In addition, these park-and-ride facilities could also serve as endpoints for recreational buses from the rest of the state. Park-and-ride facilities would be especially attractive in Ocean County, where dualized connecting roads already suffer from congestion and further road construction is economically unfeasible. The Wildwoods and Ocean City are other potential targets.

The construction of park-and-ride facilities could be accompanied by the establishment of local bus service on the islands.

9. To encourage the use of park-and-ride facilities and concommitant island bus service, several actions could be taken. Combined fares could cover parking, bus, and beach costs. Buses could operate on express lanes taken from the opposite direction lanes if necessary. Bridge tolls and greater parking fees for island parking could be explored. In addition, the state could discourage construction of additional roadways or parking facilities on the Barrier Islands.

10. To service local traffic needs, limited demand-responsive bus systems could be encouraged, possibly by granting state matching funds to localities wishing to institute such service. Public and private demand responsive systems are presently in use in Cape May and parts of Ocean County, providing elderly citizens with access to shopping and recreational facilities. Demand responsive, as opposed to fixed route systems, are more suited for sparsely populated areas. Bus service should concentrate on linking residential (especially elderly, poor, and densely populated) areas with shopping areas and to a lesser extent with employment and recreational areas.

11. The state could encourage road-building in areas with great local congestion. Congestion contributes heavily to air pollution, excess energy consumption, and accidents.

Road construction should be avoided if it is likely to generate increased traffic volume or if public transit alternatives are feasible.

12. Construction of bicycle, horse, and footpaths in recreational sections of the coastline could be encouraged. The costs involved are relatively modest, and the federal government is making matching funds available. Existing rights-of-way could be used for such modes of travel.

13. The possibility of establishing water-borne passenger transportation for multi-purpose use across Raritan Bay, New York Harbor, Delaware Bay, and among the barrier islands could be studied. Hydrofoil and air-cushion craft have been successfully utilized for coastal service on the U. S. west coast, in Florida, and in Europe.

Land-use policies could aim at discouraging further extensions of sprawl residential development and strip commercial development throughout the coastal zone. More concentrated residential and commercial patterns could emerge around judiciously chosen rapid transit arteries.

B. LAND USE

14. Transportation projects that threaten severe adverse environmental impacts could be prohibited.

15. New right-of-way disruptions could be kept to a minimum. Where necessary, projects could be favored that require either a smaller right-of-way or disrupt fewer property owners. Where possible, new construction could take place along the lines of existing rights-of-way.

16. Those lands that are now devoted to transportation could be kept for transportation purposes. This is especially true for railroad lines threatened with abandonment. This policy would keep future disruptions to a minimum.

17. The state could tax windfall profits deriving from transportation projects. Property values could be limited to a general rate of increase (e.g., 5% year) or to the increase in property value elsewhere in the area not located along a new transportation line, whichever is higher. Any increase above these figures could be subjected to a very high tax rate. Such a policy would have to be carefully reviewed in terms of the taking issue before any steps for implementation are taken.

18. Land development projects in the coastal area could be required to pay greater attention to transportation plans before receiving approval. Certain criteria could be developed to guide developers in coordinating building and transportation planning. In general, those plans that would locate near public transit lines could be encouraged, those that would require more auto traffic could be discouraged, those that would require new road building because of the increased traffic generated could be prohibited. Current and future public transit plans could be considered.

C. Energy

19. The state could offer tax incentives to non-gasoline powered cars. This would encourage development of other sources, as would state research projects.

20. The state's gasoline tax could be raised; proceeds could go for mass transit development and/or alternate energy source research.

D. Freight

21. Rail lines used for freight could be electrified where possible; the state could offer tax benefits to rail companies to electrify their lines.

E. Airport Systems

22. The Office of Coastal Zone Management, through the CAFRA permit process, could coordinate with the Department of Transportation, Bureau of Aviation Planning to insure that airports are protected from incompatible land development. Once identified, potential non-compatible uses adjacent to airports in the CAFRA area would be regulated through the CAFRA permit process. The Department of Environmental Protection would seek to prohibit residential, institutional, and commercial development and any other uses which would concentrate population within the flight paths of an airport.

II. TRANSPORTATION CHARACTERISTICS

New Jersey offers a wide variety of transportation forms within its boundaries, including airports, shipping lines, highways for automotive and truck use, bus routes, and railroads. Of these transportation modes, highway development has probably been the most significant in terms of usage and impacts. The pattern of land use in the state has been largely dependent on the access provided by such highways. This fact is particularly true of the coastal area and the metropolitan suburban communities in the northeastern part of the state.

Transportation is a necessary component in New Jersey since it must accommodate the greatest population density of any state in the country. Rather than being centered in small, individual urban areas, most of this population is spread throughout the broad New York suburban belt, including much or all of Bergen, Essex, Hudson, Union, Passaic, Middlesex, Monmouth, and Ocean counties. Smaller concentrations also exist around Camden and Trenton in the southern half of the state. Much of the northern suburban belt has sprung up within the past few decades, largely in the form of single family residential units. During this period, which extends into the present, the automobile has been the prime mode of transportation. Its predominance has been reflected in the pattern of development.

These new communities are not cities in the traditional sense of the word. Single-family homes are spread over large tracts of land. There are few public buildings (mostly schools) and fewer recognizable town centers.

Commercial establishments servicing these new developments are dispersed along arterial highways that connect the developments with major throughways that lead to the older metropolitan centers. In the most recently developed areas, a process known as leapfrogging has become evident. In these areas, real estate developers skip over land nearest to other developments, and a checkerboard pattern of developed/undeveloped land results.

This pattern of urban sprawl has been superimposed over an older and much denser pattern of urban development. This pattern (examples of which include Newark, Jersey City and Elizabeth) features a great variety of structures and land uses within a relatively compact area. The railroad served an important transportation function for these areas during their thriving years. However, these older urban areas in New Jersey, like their counterparts elsewhere in the country, have deteriorated in the past few decades as the predominance of the automobile has increased.

In sum, New Jersey's transportation network is a composite of two stages. The rail component predates the automobile and was keyed to a more concentrated community-structures urban pattern. The second stage, which is characterized by predominance of the automobile and the residential "flight to suburbia", has since superimposed a more diffuse sprawl pattern of development.

A. Transportation Access to the Coast

The major means of access to the coast is by highway. The Garden State Parkway is the most important coastal road, linking the Atlantic shore from Cape May to Perth Amboy with the North Jersey-

New York metropolitan area. The Atlantic City Expressway is the major east-west access road, linking Philadelphia and Camden with the shore. At present, these are the only controlled-access highways that connect the shore with the rest of the state. A third major route, Interstate 195, already connects Trenton with the north of Ocean County and is slated for completion all the way to Belmar. Another potential major highway link is the Alfred E. Driscoll Expressway, but construction of the route has been stalled due to environmental opposition.

Secondary east-west and north-south roads abound, linking points on the coast with other points in the coastal zone, and with major areas in the rest of the state. Plans for dualization of several of these roads now exist. Route 9, which roughly parallels the Parkway along the coast, has already been dualized in the Monmouth County stretch. Routes 70 and 72 are important east-west roads connecting Philadelphia-Camden to Ocean County. Both have been marked for dualization. Also, Route 18 is expected to be completed in the Manasquan vicinity, which would provide a direct link between the New Brunswick area and the Monmouth shore.

The Delaware Bay region is accessed to the shore primarily by Routes 49, 55, and 47. Dualization has already been completed on much of Route 55 in Cumberland County and Route 49 is being planned for future dualization. Secondary routes from the Delaware River region are 30, 40, and 322.

Rail access to the coast has deteriorated since the Second World War. Very few passenger lines presently serve the shore area.

The New York and Long Branch line, operated by the Central Railroad of New Jersey (CNJ), provides commuter service between the Monmouth coast and Newark and New York. There are presently 14 trains which operate each day. In addition, Conrail provides commuter service between the northern shore area and New York.

In the southern section of the coast, commuter rail service is provided by the Pennsylvania-Reading Seashore Lines. One line connects Ocean City and Cape May City to Lindenwold and the other connects Atlantic City to Lindenwold. At this location, the PATCO High Speed Line, operated by the Delaware River Port Authority, may be taken to Camden and Philadelphia.

Coastal rail service is powered exclusively by diesel engines; electrification stops at Perth Amboy in the north and at Lindenwold in the south. Eventually, DOT plans to electrify the Pennsylvania-Reading Seashore Line in the south. Plans for Monmouth County include electrified service to Red Bank and Freehold, with light rail service connecting Red Bank with Lakewood and down the coast to Asbury Park and Point Pleasant. Possible long range plans include light rail service from Matawan to Atlantic Highlands, and from New Brunswick to Toms River (along the route of the proposed Driscoll Expressway). No construction is taking place at present, and it is not likely that electrification will take place in anything but the distant future.

Bus service is also limited in the coastal zone. Regular intercity service between communities in Monmouth and Ocean counties and between these communities and New York is fairly frequent. Atlantic City has regular bus service to Philadelphia and Camden.

Trenton is connected to the shore only by seasonal bus routes. Intra-city service is extremely limited, with the Atlantic City jitney service being the most efficient service. The trend has been towards abandonment rather than the development of new bus lines.

Interregion air and water traffic (except for pleasure) is practically non-existent in the shore area. Most of the airports serving the shore region are fairly small with limited passenger service. There is, however, some scheduled air service between Atlantic City and the areas of Trenton, Philadelphia, Delaware, and Maryland. Also, the Manahawkin and Ocean City Municipal Airports provide flights during the summer season.

In terms of water travel, steamboat lines once linked Red Bank to New York, but this service was discontinued more than thirty years ago. A ferry system, however, does still operate in the shore area, carrying passengers between Cape May and Lewes, Delaware. In addition, some water travel is proposed from New York and North Jersey to Sandy Hook.

The shore area, like the rest of the state, has thus depended on the automobile as the major means of transportation. At this time, future planning has anticipated no decline in the predominance of the automobile as the standard means of transportation.

B. The Private Automobile or Public Transportation

The private automobile has been the dominant mode of transportation in this country for the past thirty years. It has provided a greater degree of flexibility in travel in terms of both distance

and time than was ever thought possible. At the same time, the automobile has replaced heavy industry as the greatest source of air pollution in the country while becoming the leading consumer of a rapidly dwindling natural resource - oil. Public transportation cannot match the convenience of the automobile, but makes for more efficient use of energy resources and releases far fewer pollutants into the atmosphere.

These are not the only issues that must be addressed in the selection of a transportation system. Public transportation ensures a greater degree of social equity, providing transportation for young, elderly, and poor people who often have no access to private autos. Car traffic is often subject to external congestion; mass transit is subject to internal congestion - it can frequently be overcrowded and uncomfortable. Buses traveling on the same roads as cars can experience external and internal congestion. Public transportation appears to be more expensive than the automobile, but only because the cost of highways and the external costs of pollution are ignored in many calculations. In either case, transportation is a very expensive proposition indeed.

A transportation plan must also consider public values and desires and existing conditions. It may take quite an effort to break this country's reliance upon the automobile. This poses a problem for public transportation advocates: if great expenditures are to be justified, public transit will have to attract a certain level of patronage. Riders may not be forthcoming unless great disincentives are levelled upon automobile traffic (disincentives

would include prohibitive tolls and taxes, the elimination of parking facilities, etc.). The application of disincentives is likely to face legal and political hurdles.

Existing development in the coastal zone seems to favor the automobile, both in terms of physical layout (suburban sprawl and rural) and commercial development. Roadside stands, motels, camp grounds, shopping centers, and many other commercial establishments depend upon automobile traffic to bring in customers. Measures that will decrease car traffic will thus be causing some amount of economic dislocation (it should be pointed out that the shift to cars caused much economic dislocation in urban center city areas). The improvements of public transit systems should be a major goal of New Jersey, but this should not mean that possible improvements inside the automobile-dominated system should be ignored.

The future of mass transit systems in the Coastal Area is certainly cloudy, at best. The decline of rail passenger service over the past twenty years from 349,000 passenger trips a day over 1,100 miles of track to 166,000 passenger trips daily over 467 route-miles statewide, plus austerity cuts in mass transit subsidies, will provide continuing pressure for abandonment of rail lines, rather than improvements in service. Pressure from the Federal level via the ConRail plan has already eliminated subsidies for 194 miles of New Jersey's rail lines.

The picture for bus service, despite the probable continuance of subsidies, is not considerably brighter, as pointed out above. The decline in local service which is apparently taking place will of course hurt the coast in its weakest point, micro-access to the beaches and shore economic areas.

III. ISSUE AND ANALYSIS

A. Access to the Coastal Zone

1. Issue

The coastal zone, especially on the Atlantic shore, provides some of the state's most treasured recreational lands. Easy access from all parts of the state to the Atlantic beaches should be a key goal of a coastal transportation plan. Much of the coast has also been opened recently for year-round living; the suburban overflow from New York and North Jersey has spilled down into Monmouth County and parts of Ocean County, while Atlantic and Cape May Counties have attracted commuters from the Philadelphia-Camden areas. Public transportation could make the coastal areas more desireable and feasible places to live, work or visit.

The major problems are the lack of public transportation and the seasonal congestion on the access roads linking the Garden State Parkway with the barrier islands.

2. Analysis

a. Recreation Access

Recreational traffic to the coast is seasonal in nature, with peak loads occurring on weekends in June, July, and August. Almost 90 percent of all shore recreation users originate outside the four resort counties (see table 1). New York and the urbanized northeastern section of New Jersey represent approximately 40 percent

while Philadelphia and Pennsylvania suburbs represent 31 percent. This first group primarily utilizes Monmouth and Ocean Counties for summer recreation while the latter group travels mostly to Atlantic and Cape May Counties. Another 3 percent originate in Delaware and Maryland and also travel to the two southernmost resort counties.

Upward of 90 percent of all persons using the shore recreational facilities travel by automobile (see table 2). This traffic relies heavily upon the Garden State Parkway, from the north, and the Atlantic City Expressway, from the west. Traffic volume increases as much as tenfold in certain areas during the summer months. Even at higher volumes, congestion levels are generally tolerable on major access roads.

Rail transit for recreational purposes is almost non-existent. There is one train on Saturdays and Sundays connecting Camden and Cape May and Ocean City; there is no weekend service from Camden to Atlantic City. There is greater frequency of service on the New York and Long Branch line, but this service seems to be geared more towards weekend visits to the city than from the city to the beaches. A 1969 survey showed that less than 0.6% of the state's beach goers used rail traffic to get to the shore (the figure for Monmouth was more than twice as high as for any other county). No more current figures are available, but since frequency of train service has decreased, patronage has probably gone down as well.

Bus service was more extensive, but only marginally (3.5% of all beach goers in the 1969 surveys). Most of the bus service was local in nature, especially in the southern counties where patronage was greatest. Bus service from the state's major population centers was sporadic and accounted for few riders. Most long distance traffic to the shore was confined to the automobile.

The reasons for the failure of public transit to capture a larger share of the recreational market are many, including the diversity of origin and destruction of shore traffic, poor public transit inside the coastal area and at the origins of much of the shore traffic, the relatively long length of stay at the shore (see table 3: the 1969 study indicated that most beach goers were not one-day visitors; people are less likely to use public transportation if a long time is to be spent at the destination), and general neglect of public transit. In terms of rail transportation for recreational purposes, the high number of mode changes per trip, the need for transportation to and from terminals and the time and effort required for travel all hinder public demand. As a result of these many factors, there is generally a high degree of public desire to use the automobile for recreational purposes. As public transit systems are less than ideal for carrying large families and bulky recreational equipment (in addition to all of the general reasons that cause drivers to favor the automobile), it may be especially

difficult to convert recreational traffic to public modes of transportation. The high costs of maintaining public transit operations then cause such transit systems to become uneconomical if there is an insufficient number of riders to generate revenues.

Another form of mass transit to the shore region which should be considered is the water-borne variety. To date, very little has been accomplished in this area. Plans presently are being made, however, to expand the limited service which existed this past summer between Manhattan/Hoboken and Sandy Hook, as part of the Gateway National Park system. The so-called "Bicentennial Boat Service", wholly subsidized by the National Parks Service, provided a total of twelve Circle Line trips from north Jersey core cities and New York to Sandy Hook and Brooklyn's Floyd Bennett Field. The transportation was provided primarily for senior citizens, handicapped, and school groups from these areas.

Although a trip by boat to the New Jersey shore offers a pleasurable experience, the costs involved in operations are very high. Nevertheless, water-borne transport by high capacity boats, ferries, and hovercraft are being considered by the National Parks Service and New York City and some operations are expected to begin within one or two years. It is expected that the major benefits of such travel would be the provision of access for "captive riders" to the shore.

A ferry service already exists in south Jersey between Cape May and Lewes, Delaware. Users of this transportation system are primarily tourists. Increased studies of expanding water access to and from New Jersey's recreational shoreline is needed in order to determine the actual demands and feasibilities.

It is the urban poor, the elderly, and the young who are the most affected by inadequate public transportation facilities. These are the so-called "captive riders" who are forced to use mass transit because of income or age levels. Unlike the "choice riders" who may choose to use mass transit instead of their automobiles, depending on convenience and travel times of such transit, many captive riders throughout the state are provided no access to the shore area.

Table 1

BEACH ACCESS

ORIGINS of SHORE VISITORS

% of shore visitors

ORIGIN	MONMOUTH	OCEAN	ATLANTIC	CAPE MAY	TOTAL SHORE
Atlantic	0.1	0.4	12.9	0.4	2.6
Bergen	6.5	10.1	1.1	1.8	5.4
Burlington	0.3	4.0	1.1	1.5	2.0
Camden	0.5	2.3	6.0	6.0	3.7
Cape May	0.0	0.0	0.1	2.3	0.7
Cumberland	0.0	0.0	0.3	1.1	0.4
Essex	14.4	11.7	2.3	1.4	7.6
Gloucester	0.1	0.1	0.7	3.5	1.2
Hudson	6.9	5.8	1.1	0.2	3.5
Hunterdon	0.2	0.3	0.0	0.5	0.3
Mercer	2.0	3.5	1.3	1.0	2.1
Middlesex	5.6	5.0	0.9	0.8	3.2
Monmouth	23.6	1.4	0.5	0.2	5.3
Morris	1.1	7.2	0.3	0.2	2.7
Passaic	3.8	4.9	1.2	1.0	2.9
Salem	0.0	0.0	0.1	1.0	0.3
Somerset	1.4	2.4	0.2	0.6	1.3
Sussex	0.6	0.1	0.3	0.1	0.2
Union	10.6	8.3	2.0	1.1	5.6
Warren	0.4	0.1	0.2	0.5	0.3
Philadelphia	1.3	7.5	30.5	19.0	13.8
Balance of PA	2.2	9.2	17.5	37.9	17.6

ORIGIN	MONMOUTH	OCEAN	ATLANTIC	CAPE MAY	TOTAL SHORE
Baltimore	0.3	0.0	1.8	1.8	0.9
Balance of MD	0.3	0.6	1.0	1.4	0.8
Wilmington	0.0	0.1	0.5	2.6	0.9
Balance of DEL	0.0	0.3	0.4	1.0	0.4
New York City	6.3	3.6	4.0	1.0	3.5
Balance of NY	5.2	4.0	3.4	1.8	3.5
Other Areas	3.7	8.0	8.0	7.7	5.6
Total	100.0	100.0	100.0	100.0	100.0

Source: Sternlieb, 1969.

Table 2

BEACH ACCESS

MEANS OF TRANSPORTATION TO THE SHORE

% of shore visitors

MEANS	MONMOUTH	OCEAN	ATLANTIC	CAPE MAY	TOTAL
Car	91.9	94.4	84.2	92.2	91.4
Public Bus	2.2	1.0	6.9	5.2	3.5
Charter Bus	0.3	0.3	0.6	0.5	0.4
Train	1.4	0.5	0.3	0.4	0.6
Other	4.2	3.8	8.0	1.8	4.1
Total	100.0	100.0	100.0	100.0	100.0

Source: Sternlieb, 1969

Table 3

LENGTH OF STAY AT THE SHORE

% of shore visitors

Time	Monmouth	Ocean	Atlantic	Cape May	Total
One day	41.4	25.1	23.7	8.7	23.3
2-3 days	12.9	9.7	20.0	13.4	13.4
4-weeks	9.3	19.7	14.2	23.7	17.7
1-2 weeks	7.7	21.3	13.9	21.8	17.3
More than 2 wks.	28.6	24.2	28.2	32.3	28.3
Total	100.0	100.0	100.0	100.0	100.0

Source: Sternlieb, 1969

b. Commuter Access

It is estimated that at least one quarter of the daily trips made in this country are work-related. As the importance of the automobile has increased and urban sprawl has accelerated, commuting distances have increased. Commuters have been willing to travel for more than an hour to get to work. This has brought the coastal zone within the reach of both the New York and Philadelphia metropolitan areas (see table 4). There is, however, still very limited commutation from the South Jersey coastal area. The already substantial number of commuters living in the northern coast is likely to increase; commuters from New York have made Ocean County the fastest growing in the state. If local industries remain undeveloped (foreseen for all shore counties) the influx of commuters will very likely determine future growth rates in the area.

Commuting should be an attractive target for public transportation. Both the Philadelphia and the New York metropolitan areas suffer from great rush-hour congestion. They both have good public transit systems (public transit for long distance commuting requires efficient intra-urban public transit at the destination), and both cities attract coastal commuters along densely-traveled corridors. In addition, commuters often have no need for their cars during the day, and may find it both expensive and difficult to park.

Despite the potential attractiveness of public transportation for commuting purposes, most commuters (except those working in Manhattan) drive to work. The road network is well-developed, and peak-hour congestion (outside of the major urban centers) is rare. Public transit in the area is slow, and peak-hour headways (the distance between each transit vehicle) often exceeds 45 minutes.

An examination of the two most frequently traveled corridors helps point out the problems with mass transit in the area. More than 15,000 workers commute to New York City and Manhattan from Monmouth and Ocean Counties; another 17,000 commute to the North Jersey urban areas (Table 5, 1970 figures). Only 9,000 train trips are made from the area, and a good many of these are <u>not</u> commuter trips. Bus traffic has comparable ridership. Buses are often more than twenty years old, while the average railroad car is close to forty years old. It takes more than 1 1/2 hours to complete a trip of 45 miles. Under the circumstances, it comes as no surprise that many workers who might be induced to use mass transit presently drive.

Service from Atlantic City to Philadelphia is even worse. About 1,900 workers commute to Philadelphia-Camden daily from the ring of communities around Atlantic City and another 800 commute from Cape May County. This number is actually fairly small for supporting increased mass transit systems. The Pennsylvania-Reading Seashore line provides limited rush-hour service for as few as 300

commuters. Bus ridership is no greater. Some of the coastal railroads are powered by slow diesel engines, and all of the lines are losing money. The Atlantic City train in particular is in danger of the loss of passenger service. In view of their comfort and speed, however, electric trains would appear to be preferable to buses for commuter transit (see table 6).

If the automobile is to retain its place in providing rush-hour transit, the use of car pools should be adopted to lessen congestion and pollution and save energy. The car pool is especially attractive in that it lessens automobile traffic without incurring any of the hardships (particularly financial and time loss) associated with public transportation. Nationally, one person rides as a passenger to work for every two people who drive. In New Jersey, the most densely populated state, the driver/passenger ratio is 6 to 1. There is great room for improvement here, with little cost to the state.

New Jersey Department of Transportation has already made efforts to encourage carpooling throughout the state. Any interested public agency or private industry is eligible to join the carpooling program. DOT determines, through the use of a computer, suitable carpooling partners based on origins and destinations. The actual contacts, however, must be arranged by each individual.

Whether by car pool, bus, or railroad, the number of cars involved in long distance commuting should be

reduced. In areas of heavy density, railroad service should be provided. Medium and low density areas should concentrate on bus and car pool service. Better service should lessen the amount of government subsidy, but even with a subsidy, the benefits to the state appear to justify fast public transit service.

Table 4

COMMUTING PATTERNS
TO PHILADELPHIA AREA

From	to: Philadelphia	Camden County	Phil. SMSA (Pa)	Total
Atlantic City[1]	784	559	549	1,892
Ocean City[2]	196	52	58	306
Cape May[3]	328	123	57	508

1: Includes Absecon, Atlantic City, Brigantine, Linwood, Long Point, Northfield, Pleasantville, Margate City, Somers Point, and Ventnor City.

2: Includes Sea Isle City, Upper Township, and Ocean City.

3: Includes Avalon, Lower Township, Middle Township, Cape May City, West Cape May, Cape May Point, and the Wildwoods.

Table 5

TO NEW YORK & NORTH JERSEY

From	to: Manhattan	Rest of NYC	Newark	Jersey City SMSA	Essex & Union	Total
Monmouth City	8,984	4,455	4,083	2,499	6,075	26,09
Ocean City	1,073	1,010	1,215	869	2,844	7,01

Table 6

Commutation by Rail Transit

Railroad	Trains per Weekday	Passengers East	Passengers West
New York & Long Branch	14	3,695	4,121
Penn Central	20	6,384	6,132
Pennsylvania-Reading Seashore Lines	8	300	300

Source: Coleman, 1976.

B. Intra-Coastal Access

1. Issue

The present transportation network services people traveling to and from the coast without great congestion. Inside the coastal zone, however, the transportation network is less successful. The major problems are the non-existence of public transportation and the seasonal congestion on the access roads linking the Garden State Parkway with the barrier islands.

2. Analysis

Residents of sparsely populated parts of the coastal zone traditionally rely on the automobile for local shopping and social travel, as well as for travel to and from work. However, the proportion of the shore county populations without cars ranges from 10 percent in Ocean County to almost 28 percent in Atlantic County (see table 7). This problem is made more serious by the large proportion of senior citizens living in the coastal zone. Some areas have special bus service for the elderly, but financial restrictions have limited this service. Local jitney service to shopping areas should be made available so that all people without access to cars have access to shopping areas.

Presently, there is adequate bus service from Red Bank and Asbury Park to other areas of Monmouth County, but unfortunately, all areas of the county are not reached by this service. There is also a jitney service in the Atlantic City area. Ocean County is hoping to acquire a bus system, but funding has not yet been obtained.

The problem of beach access is a difficult one. Most of the access roads to the barrier islands are already dualized highways, yet they still are overloaded by heavy traffic volumes. These "micro-access" roadways are required to handle an enormous volume of traffic, including that which is generated locally and the seasonal recreational traffic to the islands. Many of these roadways are old and obsolete with widening of the roadways made impossible due to existing development.

Congestion is also created by the limited number of bridges which serve each barrier island. New bridge building is made difficult by the wetland nature of the mainland's shoreline, combined with the distance from the mainland to the islands.

On the islands themselves, parking facilities are limited, and traffic along the length of the islands is slow moving. More roads and parking facilities, in view of the valuable recreational nature of the islands, would seem to be inefficient land use. The present congestion significantly adds to the air pollution in the area and often places a strain on vacationers' tempers. Construction of park-and-ride facilities near key exits off the Garden State appears to be a viable solution to the congestion problem on the barrier islands.

Table 7

PERCENTAGE OF HOUSEHOLDS WITHOUT CARS

County	
Atlantic	27.8
Cape May	17.0
Cumberland	14.9
Monmouth	11.4
Ocean	10.2
Salem	11.0
New Jersey	17.9

Intra-coastal access could also be improved by encouraging the use of bicycles and other non-motorized transportation. Special bicycle paths should be designated which either make use of road shoulders or are totally separate from roadways. New Jersey Department of Transportation has recently become actively involved in this bicycle transportation throughout the state. The requests for bicycle paths are initiated at the local level and the state provides funding for the development of such paths. The requests, however, have been so numerous that there are insufficient state funds to meet the demand.

C. Land Use Patterns

1. Issue

The effects of transportation upon land use patterns can be either direct or indirect. Direct effects involve the use of needed rights-of-way, land needed for support facilities (stations and parking), and ecological impacts

(loss and fragmentation of habitat). Indirect effects deal primarily with development patterns and land costs. The indirect effects on development patterns are generally far greater in extent and far more difficult to control than the direct impacts.

2. Analysis

The direct land-use impacts of automobile-oriented systems is somewhat greater than that of public transit systems. Rail systems require smaller rights-of-way than comparable highways, but the difference is minimal. Rail systems require station and parking facilities, while the parking needs generated by highways are solved in an indirect manner. The direct ecological impacts are comparable, although the pulsed nature of rail traffic (rail traffic is sporadic, while car traffic is continuous) allows for a greater degree of animal mobility. In any case, the greatest part of transportation construction is probably in the past.

Indirect benefits and costs are still being felt. The greater mobility of the automobile was largely responsible for bringing private home ownership within reach of millions of Americans, enabling them to live outside of overcrowded areas. Travel mobility has also increased job and economic mobility.

The flight to suburbia has had some visible drawbacks as well. In addition to the worsening of the energy and pollution situation, the automobile-inspired flight to suburbia deserves much of the blame for the current plight of American cities. The development of new land, especially with the leapfrog process occurring simultaneously with the abandonment of already developed land inside the older urban areas, is yet another example of wastefulness that is not in our best interest.

Strip commercial development is another indirect result of automobile usage. Depending upon the nature of the development, congestion and safety can be minimized or worsened. Allowing frequent access to a major road, as is the case along Route 9 on the coast, results in both visual blight and a safety hazard. Limiting highway access and encouraging shopping clusters would be more attractive aesthetically and would be much safer.

One other indirect impact is the escalation of land prices around highway interchange areas. These price increases are caused by the sudden increase in accessibility of the interchange areas. Thus, large commercial developments appear at interchanges where the market area is highest.

Environmental opposition against the construction of the Alfred E. Driscoll Expressway is based on the fear of such negative land use impacts. It is believed by many that the expressway would open up large areas of undeveloped land in Ocean County prematurely. The summer and permanent housing

growth, as well as the commercial development that is expected would thus destroy the existing natural features and open space of the region. In addition, traffic congestion in the area would be expected to worsen as long as the micro-access routes to the shore are not improved.

Public transportation tends to limit urban sprawl. Depending upon the criterion used, this can be either a positive or negative development. Choice placement of public transit routes could possibly control development in the coastal zone, but traditionally public transit has been a response to development. If bolder transit routes are to be attempted, greater public participation (as opposed to private investment) will be needed.

Another indirect effect of transportation is that of windfall profits. After the Lindenwold High-Speed line was constructed, real estate values along the line increased sharply, while values elsewhere in the Camden suburb experienced comparative or real declines. In terms of social equity, some sort of control over windfall profits seems desirable.

Although transportation planning is a valuable tool in land-use planning,, care should be taken. Transportation and land-use planners must work together. Transportation planning should attempt to reduce the level of automobile traffic, but actual system planning must await land-use decisions as to the type of development desired. Once land use strategies are clear, transportation planning can then be used to minimize the impacts of both public and private transportation.

D. Energy

1. Issue

All current modes of transportation require tremendous quantities of energy. At present, fossil fuels and electricity are the major direct sources (electricity is indirectly generated by fossil fuels in most New Jersey generators). The energy crisis of recent years has focused attention on the depletion of energy resources, making public transportation look increasingly attractive.

2. Analysis

Public transportation is a more efficient use of energy than the private automobile. As the fossil fuel situation is not likely to improve in the near future (if ever), conservation measures should be taken as soon as possible. Care should be taken so that any increase in public transit services significantly lessens automobile traffic volume; if overall volume increases (public transit merely augments automobile traffic), the energy situation can only worsen.

There are possible means of conserving energy while staying within the basic framework of the automobile, if for some reason public transit does not seem feasible. Lowering the total number of vehicle miles traveled by instituting car pooling or halting urban sprawl would be one means of conserving energy within the automobile framework. Legislative action could lower speed limits or even ration gasoline.

Changes in automobile production that would result in lower fuel consumption are smaller cars, better engine performances, or (optimally) a switch to more plentiful energy sources (e.g. electric or solar cars). Except for the switch to other sources by auto manufacturers, none of these measures would have the serving effect of a comprehensive public transportation network.

E. Air Quality

1. Issue

Air pollution is both a major health hazard and an aesthetic nuisance. In New Jersey, transportation is the major cause of carbon monoxide, hydrocarbon, and nitrogen oxide (the catalyst for photochemical smog) pollution. Since many parts of the coastal zone are underdeveloped industrially and are likely to remain so, transportation (more specifically, the private automobile) is the major target for coastal air improvement.

2. Analysis

The present ambient air quality within parts of the coastal zone is comparatively good according to Federal standards. It must be pointed out that scientists are still unaware of the exact dangers of air pollution. Federal standards were based upon potential air quality improvements and <u>not</u> upon scientifically-determined safety levels. There does, however, seem to be a causal relationship between pollution and cancer, pulmonary diseases, and lung diseases.

Until more exact cause-and-effect linkages are determined, planning should attempt to eliminate as much air pollution as practicable.

The very steps that would conserve energy would result in air quality improvement. The greatest improvements would occur when the automobile ceases to be the primary means of transportation or when automobiles are powered by non-polluting fuels. Lesser improvements will occur if more effective anti-pollution devices are installed in cars, if congestion is eliminated, or if car pooling or other means limit total vehicle miles traveled in the State. It is probable that these lesser improvements will be the most practical and most easily attained in the coastal area and the state in general during the relatively near future.

F. Freight Mobility

1. Issue

Freight transportation is vital to the economic health of New Jersey's coastal areas. All coastal areas have some freight requirements, but the need is greatest in northeastern New Jersey, along the Delaware River, in the industrial part of Cumberland County and in the densely populated Atlantic shore areas (Atlantic City and much of Monmouth and Ocean Counties).

2. Analysis

Each of the various potential modes of freight transportation has inherent advantages and disadvantages. Air freight is the fastest mode, but also the most expensive. Waterborne freight is the cheapest mode, but also the slowest. Rail and truck freight systems strike a happier median and are the two major freight haulers in New Jersey. Trucks are most efficient at handling pickups and deliveries, and can travel practically anywhere. Rail freight is less polluting and less wasteful of energy. Rail freight is cheaper for bulk and long distance freight, trucks are more cost efficient for smaller and shorter loads. Some combination of the various modes, using railroads for long hauls and trucking for shorter hauls, would seem to be the ideal situation.

Intermodal traffic has, in the past, been costly. A new form of freight transportation called containerization may change this situation. Containerized freight comes in rectangular containers that can be accommodated by ships, truck cabs (the container becomes the van part of the truck), and railroad flat cars. Increased use of containerization could make intermodal traffic more feasible.

G. Financing

1. Issue

All transportation systems are expensive and long-lasting. Highway construction costs can run into millions of dollars per mile while the automobile is one of the most

expensive purchases made by individuals in the private sector, second only to housing. Public transportation requires fares from travellers (as much as $800 per year for some commuters) and the capital investments by public or private transit companies that amount to tens of millions of dollars. Both highways and railbeds require frequent maintenance, but once constructed, they should last for decades.

2. Analysis

The high costs of construction heavily favor already existing systems, in this case, highways. In addition, the willingness of the federal government to support highways in the past at the expense of public transit has tended to make public transit less attractive to states and municipalities. While private companies still found public transportation a profitable venture, governmental neglect was tolerable. Today, however, the many benefits of public transportation cannot be realized without some form of governmental financial help. To those who would argue against governmental intrusion in a field formerly reserved for private companies, it should be pointed out that it was governmental action (highway construction) that resulted in the present state of public transportation. In the first half of this decade, the Federal Government spent $20 billion annually on highways, while all other modes of transportation combined received only $2 billion annually. A re-arrangement of government priorities seems necessary.

In addition to the need for further state and federal financial support for public transportation facilities, certain population densities are pre-requisites to the financial feasibility of such facilities. A study conducted in 1972 by the Tri-State Regional Planning Commission established guidelines relating population densities to ability to support various types of public transit, as shown in Table 8.

Examination of gross densities of year-round residents for the coastal counties in 1970 indicates that in Monmouth, Ocean, and Atlantic Counties only a few of the municipalities reach year-round density categories 3 and 4 on this table. Only one community in the Coastal Area, Asbury Park, could support Category 5 transit. These density estimates, of course, ignore several important characteristics of the population distribution along the coast. They are generally lower than the actual population during the summer season due to the extent of vacation home and hotel development on the coast. They are also not "net" densities, but include undeveloped land within the respective municipalities.

In addition, a strict comparison of the density figures for the Coastal Area and the characteristics in Table 8 does not give sufficient weight to the highly linear pattern of many of the coastal communities, an organization which makes regular route bus service as feasible in these areas as flexible route demand-activated service.

Table 8

Transit Supporting Densities

Density Category	Persons Per Acre	Transit Potential
1.	1.56 or less	Not measurable. May support infrequent special function services.
2.	1.57-4.26	Will support a low level of flexible route demand activated service.
3.	4.27-6.95	Will support a moderate level of flexible route demand activated service.
4.	6.96-14.77	Regular route bus service hourly to half hourly probably supportable.
5.	14.78-30.78	Regular route bus service half hourly to quarter hourly supportable.
6.	30.79 or more	Threshold of support for light rail or rapid transit systems, or should support very frequent regular route bus service.

Source: Greater Bridgeport Regional Planning Agency, 1975.

This does not mean that public transit systems must finance themselves through fare levies. If all people in this state are to enjoy a good degree of travel mobility, some form of public transportation is necessary. High fares tend to drive away potential riders, leaving higher fares for poor and elderly people who have no other travel alternatives. In addition to the social inequity involved, high fares tend to drive people to their cars, reducing the pollution and energy benefits of mass transit. Fares do have a place in financing, but if fares cannot cover the cost of a system, the other benefits of public transportation would appear to justify state and local subsidies.

H. Airport System*

1. Issue

The location of airports has significant implications for land use in the surrounding areas and region. The immediate concern is a function of the noise and hazard conflicts between airports and the surrounding land uses. A more long-range concern is the impact airports may have on growth and development within a region.

2. Analysis

The noise generated from aircraft on take-off and landing, and the potential for aircraft accidents may adversely impact surrounding land uses. The effect of noise in the vicinity of

*This section was prepared by the New Jersey Department of Community Affairs, Division of State and Regional Planning as part of a preliminary document entitled Transportation Systems - Availability and Impact on the CAFRA Region, August 1976.

airports is most pronounced in residential and institutional areas, where the probability for repeat disturbance is greatest. The probability of aircraft accidents is greatest in the direction of and within a half-mile of the end of the runway.[1] Much of the opposition to airports comes from residents who are disturbed by noise generated by aircraft or who perceive a significant hazard. Because of these concerns proper planning is essential to ensure compatible land use development around airports.

In planning for land use around airports, the most important considerations are the relation of the land use to the airport and the determination of how the planned or real use will affect flight patterns and attitudes. While no two airports are exactly alike and no fixed design criteria can be applied for all airports, there are certain land uses which are more compatible than others. With the exception of open air assemblies, residential development and certain institutional facilities, most other land uses are compatible with airport operations from a noise standpoint.[2] Dwellings and other occupied structures can be made acceptable in most noise-affected areas through adequate sound proofing and aircraft noise abatement procedures. From a land use perspective, the location of highways in proximity to approach areas should be avoided since motorists may be distracted by low-flying aircraft. Additionally, generating plants, power lines, gas and oil storage facilities and sanitary landfill

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[1] Transportation Consultants, Inc., Compatible Land Use Planning Around Airports, June 1966, p. 506.

[2] Ibid.

areas can be hazards to aircraft, as can some natural and agricultural uses which may attract birds. High-rise buildings, radio towers, smoke stacks and other such obstructions are uses which can also interfere with airport operations if they are improperly located.

In addition to the more immediate impacts of noise and safety, the presence of airports has long-term land use and development implications. The existence of air transportation facilities is a necessity for the future of local, regional and statewide economic growth, as such facilities attract and generate employment and industry. The location of an airport often acts as a stimulant to growth and development around its periphery. Developers of industrial parks and private industries often seek locations which are accessible to airports. The types of industries which locate near airports because of the availability of fast transportation service include electronics and garment manufacturers, high value agricultural products and other industries producing relatively low-weight high-value products. In addition to air service, such industries need the usual infrastructure of labor supply, ground transportation, utilities and other services to make the location viable.[3]

Airport planners seek locations for airport development in those areas which are relatively flat, undeveloped and with low land prices. The development and construction of airports also requires a substantial investment in infrastructure and public

[3]CLM/Systems, Inc., Airports and their Environment; A Guide to Environmental Planning, Setpember, 1972, p. 157.

utilities. However, the existence of all of these factors makes the land desirable not only for an airport location, but attractive for other kinds of development as well. Because of the potential for such development, the impact from noise on surrounding areas and the prevention of incompatible land uses cannot be guaranteed. Such incompatible development around airports may result in pressures on the airport to curtail or discontinue its operations. Encroaching development on lands which are adjacent to airports may also preclude the potential for expansion of the airport in the future. The location of airports can be a major force which shapes the growth and development of the surrounding region. Proper planning and management are necessary to minimize the airport's impact on adjacent development and to insure continued viability of airport operations.

Population growth and development in the Coastal Zone will undoubtedly result in the increased use and need for expansion of many airports, and the possible need for construction of others. The accompanying table is an inventory of existing airports which serve the Coastal Zone. Also included is the New Jersey Department of Transportation airport classification (based upon runway length), type of ownership, potential for expansion and existence of any incompatible land uses.

Most of the airports which serve the Coastal Area are relatively small in size (see table 9 for a list of those airports serving the coastal zone) and provide limited sche-

duled or charter passenger service. Some airports, such as Manahawkin Airport and Ocean City Municipal Airport provide primarily seasonal service during the tourist season. It is interesting to note that the major airports which serve the Coastal Area, i.e., Monmouth Airport, Lakehurst Naval Air Station, Robert J. Miller Airport, Pomona Airport, Woodbine Airport, Cape May County Airport and Millville Municipal Airport, are located outside the CAFRA Area and thus, not subject to CAFRA jurisdiction.

Two of the major airports which can be examined from a regional land use perspective are the Robert J. Miller Airport in Ocean County and Pomona Airport in Atlantic County. Robert J. Miller Airport, owned and operated by Ocean County, primarily serves the rapidly expanding Toms River area. The airport is located on an ideal site from the standpoint of noise impact and land use compatibility. According to officials at the New Jersey Department of Transportation, this airport has excellent potential for expansion as Central Ocean County develops. In fact, there are presently pressures from the County residents and business community to expand the airport.

The second airport which has significant land use implications is Pomona Airport located northwest of Atlantic City near the Atlantic City Expressway. The Airport is owned by Atlantic City and is leased to the federal government for use as the National Aviation Facilities Experimental Center (NAFEC). The Airport is run by the Federal Aviation Administration and is used to test electronic equipment and operational aircraft.

At the present time, Pomona Airport is uneconomical to operate as a commercial airport. There is not enough air traffic in the region to make the use of this airport feasible and there is an existing airport, closer to Atlantic City which is capable of meeting current needs. Bader Field is located minutes away from downtown Atlantic City and provides commuter service to Philadelphia and Cape May. While this airport is adequate to handle existing needs, its runway lengths are not sufficient to accommodate major aircraft and expansion is impossible. Additionally, Bader Field faces pressure from surrounding residential development. The potential for high-rise residential development along the oceanfront may result in incompatible land uses in the future. The site of the proposed 21-story Seacoast Towers condominium (CAFRA #74-034) for example, is located approximately 3,500 feet from the nearest runway at Bader Field and is situated within a runway approach zone. If constructed, the proposed high-rise may constitute a safety hazard to aircraft using the runway.

Should there be a reversal in the current trend in the economy of the Atlantic City Area, due to casino gambling, OCS oil development, etc., it is likely that the amount of air traffic in this area would increase. Bader Field's present capacity would be inadequate to accommodate major aircraft and increased activity. Should such pressures become a reality, the feasibility of making Pomona Airport operational for commercial aircraft would be explored.

Some of the airports which serve the Coastal Zone are experiencing pressures from surrounding development which may impact their operations. These pressures manifest themselves in the form of incompatible land uses which may present noise and safety problems in the future.

Ocean City Municipal Airport and Manahawkin Airport are presently impacted by nearby incompatible institutional and residential development which make their potential for expansion questionable, at best. Lakewood Airport is currently being impacted by nearby residential development. While presently a private airport, Lakewood Township has proposed the purchase and expansion of the facility; however, local opposition from residents of retirement communities concerned over the impact of noise may make the proposal politically infeasible. Millville Municipal Airport may also be impacted by incompatible land use development in the future because existing zoning permits residential development within one mile of existing runway approach zones.

There are, however, several airports which presently serve the Coastal Zone which have favorable locations and are not impacted by incompatible land uses. These include: Monmouth Airport, Robert J. Miller Airport, Cape May Municipal Airport and Woodbine Airport. Each of these airports is located in relatively rural areas, away from large concentrations of population, which minimizes potential impact from incompatible land uses. Additionally, most of these airports are located in proximity to existing industrial parks.

The New Jersey Department of Transportation, Division of Aeronautics, has the statutory authority to control and license the aviation activities in this State. Most laws are complementary to the federal regulations controlling safety and the operation of air facilities, yet DOT has no authority to control development in the flight path of runways and can only suggest restrictions on development or inform the operator that his facility is not operable because of obstructions in the flight path. The State therefore has no effective regulatory powers over adjacent operations and development.

Airports are a vital part of the transportation system which serves the Coastal Zone. One of the basic objectives of the Coastal Zone Management Program with regard to aviation should be to protect airport approaches and landings from obstructions or hazards to air navigation, and the protection of persons and property located in the vicinity of airports without unnecessary interference with the continued development of aviation.

Table 9

Airports Serving the Coastal Area

	Classification	Ownership	Potential for Expansion	Incompatible Land Uses
*Asbury Park Air Terminal	Basic Utility	Private	Poor	None Present
*Monmouth Airport	Basic Transport	Private	Good-Excellent	None Present
Lakewood Airport	General Utility	Private	Good	Present
*Lakehurst Naval Air Station	Military	U.S. Govt.	?	None Present
*Robert J. Miller Airport	General Utility	Public	Excellent	None Present
Manahawkin Airport	Basic Utility	Private	Poor-Fair	Present
Eagles Nest Airport	Basic Utility	Private	Poor	None Present
Smithville Landing Field	Basic Utility	Private	Good	None Present
*Pomona (NAFEC) Airport	Air Carrier	Public	Excellent	None Present
Bader Field	Basic Utility	Public	Poor	Present
Ocean City Municipal Airport	Basic Utility	Public	Poor	Present
*Woodbine Airport	Basic Utility	Public	Good-Excellent	None Present
*Cape May County Airport	Basic Transport	Public	Good-Excellent	None Present
*Millville Municipal Airport	Basic Transport	Public	Good-Excellent	Potential
Li Calzi Airport	Basic Utility	Private	Poor	None Present
*Salem Airfield	Basic Utility	Private	Poor	Present

*Located outside of CAFRA

Source: N.J. Department of Transportation, Bureau of Aviation planning, New Jersey Airport and Airspace Inventory, and Robert Engle, Division of Comprehensive Transportation Planning, N.J.D.O.T.

APPENDIX A

REGIONAL REPORTS

Hudson River Waterfront and Newark Bay

(Bergen, Hudson, Union, and Essex Counties)

Most of the area is densely urbanized and much of it is devoted to industrial use. The region is very transportation dependent due to the high population density and industrial and service activities. Air pollution - both industrial and automotive - is a major concern throughout the area.

The older urban sections around Newark and Jersey City have become economically depressed as the focus of modern life has shifted to the automobile and out into the suburban ring. Congestion has become a problem, as has economical access to the coastal zone for the urban poor.

Physical Characteristics

The region is well-served by airports, highways, freight shipping lines, and, to a lesser extent, railroads. Newark Airport is a major facility accommodating commercial passenger jet traffic. Other airfields, principally Linden and Teterboro, handle smaller craft. The Newark Bay and lower Hudson port facilities are utilized for loading and unloading ocean freighters. Containerized freight handling has begun to revolutionize this process. The unit-sited containers are stackable and readily transferred between truck, railcar, and freighter. Costs are cut while freight capacity multiplies.

The major road network of divided, limited - access highways (built or under construction) is extensive and effectively covers the entire region. The Garden State Parkway runs down the entire length of the region on its inland side, connecting with the New York State Thruway to the north and the rest of the coastal zone to the south. The New Jersey Turnpike passes by Newark Airport and Newark, then crosses the Hackensack Meadowlands, connecting with Manhattan via the George Washington Bridge. To the south it links the area with Trenton, Philadelphia, Camden, southwest New Jersey, and Delaware. The Palisades Interstate Parkway runs north along the Hudson between George Washington Bridge and New York State. At its southern end it connects with I-95 leading to I-80, which traverses the northern sector in an east-west direction heading for Pennsylvania. Route I-280 links the Parsippany-Troy Hills area with Newark, while I-78, when completed, will transect the southern sector in an east-west direction leading to Pennsylvania. The Staten Island Expressway (I-278) provides access to Long Island, New York from the Turnpike via the Verrazano Narrows Bridge. Other state and interstate superhighways lace the region. Bus service is available to most areas, taking advantage of the extensive road network.

Inflation in labor costs is applying upward pressure on bus fares. Since the urban poor are highly dependent on mass transit, means for stabilizing fares must be found. Attention has recently turned towards electric trolleys, which are less labor-intensive. An additional advantage of trolleys is that they emit no pollutants, and power-plant effluents are more easily controlled.

Rail-freight lines to the port area are well developed, covering waterfront areas around Elizabeth, Newark, Bayonne, Jersey City, and on up the Hudson to Fairview. Truck freight supplements this network, and NJ 169 is to be improved and extended for trucking in Bayonne.

Passenger rail lines are comparatively poorly developed. The only rapid transit lines are the Newark Subway and those of the Port Authority Trans-Hudson Corporation (PATH) connecting Newark with Manhattan. Electrified commuter service is available to Trenton and South Amboy along Penn Central tracks, and to Summit, Gladstone, and Morristown on Erie Lackawanna rails. Diesel commuter service is provided in most other directions.

Analysis

Although the superhighway system is elaborate throughout the region, it is often subject to severe congestion. At the beginning and end of weekends and at rush hours traffic is often bumper-to-bumper, if not altogether stagnant. The weakness is not with the highway system, which is normally underutilized, but with the very nature of the automotive transport system that is intrinsically ill-suited for dramatic fluctuations (particularly peaks) in volume. Besides straining nerves and aggravating the already-severe automotive contribution to air pollution, the paralysis hampers access to and from coastal areas.

Suburban rapid transit rail lines, easily capable of accommodating wide-load fluctuations, do not exist. Few are planned for the foreseeable future. The provision of safe, fast, comfortable, reliable, flexible metropolitan rail transportation has never been - and still is not - a major policy goal in New Jersey.

NORTH SHORE

(Middlesex and Monmouth Counties)

The North Shore area lies within the New York - Newark suburban ring. The CAFRA portion of the coastal zone contains most of the older, denser urban areas - such as Long Branch, Asbury Park, and Red Bank. The inland areas within the potential coastal zone consist of a mixture of farmland and a large and growing proportion of "sprawl" residential housing developments.

Key issues include the inadequacy of existing passenger rail service, automotive air pollution, congestion on main arteries, and the proliferation of sprawl residential development and strip commercial development.

Physical Characteristics

With the notable exception of east-west linkages to the Trenton area and its northern environs, the highway network is comprehensive. The Garden State Parkway parallels the inland border of the CAFRA area, linking all points in the zone to New York City and northern Jersey, and to the Central and South Shores. Further inland, US 9 provides a north-south route between Freehold and the Amboys. NJ 18, when completed, will link New Brunswick with most of Monmouth County. State highways 35 and 36 parallel the Parkway, providing north-south arteries closer to the coastline. I-195, when it is completed, will enable direct access between the Trenton area and the Belmar-Asbury Park area on the coast.

Bus service between the New York area and the North Shore is well-developed. There are also buses through Atlantic City to Philadelhia and Camden. In addition, there are several intra-county lines, such as those originating in Red Bank and Asbury Park.

Rail freight service is available throughout most of the North Shore. The New York and Long Branch Railroad (NYLB) runs all along the coast from South Amboy to Bay Head. At Matawan it intersects the Central Railroad of New Jersey's (CRRNJ) line to Freehold. In Red Bank NYLB meets the CRRNJ line to Farmingdale, Lakewood, and southern New Jersey. Another rail line joins Freehold and Farmingdale.

Passenger rail service is minimal. The NYLB operates through the Amboys, Red Bank, Long Branch, and Asbury Park to Bay Head. Diesel commuter trains travel these tracks to and from New York City. In addition, the Penn Central provides some commuting service to New York.

Analysis

East-west highway connections to the North Shore, particularly from the Trenton area, are presently inadequate. The situation will be much relieved by completion of I-195 in the southern part, though linkage between the Red Bank - Long Branch area and Freehold will still be weak. Better connection between NJ 36, NJ 18, and NJ 33 could remedy the problem. Otherwise the highway system is complete.

Completion of I-195 will permit improved bus service between Trenton, Camden, Philadelphia, and the North Shore.

Rail freight service may be threatened on some of the inland lines under the Rail Reorganization Act of 1973. Any such abandonment would not only adversely affect business using the lines, but would discourage the establishment of new firms in the area. In any event all of the lines have potential value for passenger service.

Monmouth County has the densest population of any CAFRA county (479/sq. mi. in 1970). The population is densest within and along the CAFRA boundary, in the older sections. Recently, development has spread inland. Manalapan, Freehold, Colts Neck, Matawan and Holmdel were the fastest-growing townships in the 1960's. A substantial portion of new residents commute elsewhere to work. In 1970, 30.1% of the labor force travelled outside the county to work, up from 23.0% in 1960. More than four out of five commuters have jobs in New York or north Jersey.

Most commuters travel by car along the Garden State Parkway. Much of this traffic may be due to the inadequacy of rail transport. There is no rapid transit service, and slow, infrequent diesel commuter service is available on but one line. That line - the NYLB - is well-placed for rapid transit linking the dense coastal towns. Current plans call for electrification from South Amboy to Red Bank. A rapid transit network could easily be extended along existing lines to Freehold and Lakewood, as proposed in the New Jersey Department of Transportation (NJDOT) 1972 transportation master plan. Such extensions would effectively tap the regions of new "bedroom" community growth.

The Raritan Bay area to the north offers the possibility of new port facilities for containerized freight, should it become advisable to expand capacity.

CENTRAL SHORE

(Ocean County)

Ocean County is the fastest-growing county in New Jersey. It has long stretches of fine beaches, including Island Beach State Park. Tourism and household consumption arising out of recent residential development dominate the economy.

Issues of prime concern include access to beaches, development of low-impact, high-exposure travel along beaches (foot, bicycle, horse, boat), improved access by public transportation, and the desirability of curbing further extensions of suburban sprawl and strip development.

Physical Characteristics

The highway system is adequate for the existing level of development. The Garden State Parkway runs along the length of the coast, tieing together all substantial communities with points north and south. Divided-highway spurs provide access to the two principal barrier beach islands - Long Beach and Island Beach - from the Parkway. I-195 will soon establish direct, easy linkage between the Point Pleasant area and Trenton. NJ 70 and NJ 72 connect the Central Shore with Philadelphia and Camden.

Bus service is available on a regular basis to the New York and North Shore areas and to Philadelphia - Camden via Atlantic City. The county has also proposed to develop and operate a semi-demand responsive bus system, but funding problems have held up implementation.

The CRRNJ has freight service through Lakewood and Lakehurst going to the North Shore and South Jersey. At Lakehurst a branch leads off to Toms River and terminates at Waretown on the coast.

Rail passenger service is presently only available to Point Pleasant Beach and Bay Head in the northeast corner of the county. Diesel commuter trains travel to New York on the NYLB line.

Analysis

Population growth has been, and continues to be, fast. The rate of growth peaked in the 1960's (91% between 1960 and 1970), but continues to be high (22% between 1970 and 1974). Roughly two-thirds of the population is concentrated in five northern communities - Brick, Dover, Jackson and Lakewood Townships, and Point Pleasant Borough. Most of the growth is also in these northern regions bordering Monmouth County.

Most of the inhabitants of the new residential areas in the north commute outside the county to work in Monmouth County, North Jersey, or New York. Commuters presently rely heavily on the Garden State Parkway. The concentration and distribution of commuter trips would make extension of rapid transit service to Lakewood and Bay Head feasible.

Land use problems resulting from highway development is an important issue in Ocean County. Much of the inland portion of the county is presently undeveloped pinelands region. Such proposals as the Alfred E. Driscoll Expressway threaten these undeveloped areas with development. Future highways that may be built in these areas will also subject them to development.

SOUTH SHORE

(Atlantic, Burlington, and Cape May Counties)

The South Shore is primarily a resort area. Tourism continues to dominate the economy, although there is a good chance that energy (offshore oil and atomic power) will soon play a major role. Atlantic City has suffered a decline in the resort business that is its lifeblood, while Cape May continues to thrive.

Major issues include the need for revitalizing the depressed Atlantic City recreation business, development of low-impact, high-exposure travel along beaches (foot, bicycle, horse, boat) and improved general east-west access and north-south bus and rail access to Cape May.

Physical Characteristics

As elsewhere on the Atlantic coast, the Garden State Parkway skirts the coastline. It links Cape May and Atlantic City to the Central Shore and points north. Near Atlantic City it intersects the Atlantic City Expressway joining Atlantic City with Philadelphia-Camden. NJ 55 (to be completed) joins Camden and Cape May.

Commuter rail service (diesel) is provided on a limited basis to much of the CAFRA part of the coastal zone by the Pennsylvania-Reading Seashore lines. All of the lines originate in the Philadelphia-Camden metropolitan area. One heads straight for Atlantic City, a second branches off near Winslow and goes to Cape May, and a third branches off from the Cape May line at Tuckahoe and terminates in Ocean City. A few additional small spurs are used by freight trains to supplement these lines.

There is regular bus service between Atlantic City and Camden-Philadelphia, and to points north. In addition, a jitney service provides local mass transportation in the Atlantic City area.

Analysis

Access to and from the South Shore is comparatively (relative to other parts of the Atlantic coastline) poor and incomplete. There is no regular bus service nor direct rail service between Atlantic City and Cape May. There is no passenger rail service linking the South Shore to central and northern Jersey. Although this part of the shore is predominantly frequented by vacationers from Pennsylvania and Delaware, direct access from Delaware is limited to the Cape May-Lewes ferry. There are no direct rail or bus connections, and no divided highways.

The urban poor of the Camden and Wilmington areas who depend on inexpensive mass transportation are at a disadvantage concerning access to the shore. Discontinuing rail service altogether would worsen the situation. The depressed Atlantic City economy could well use the boost that could come from improved rail service as part of a program to enhance recreational opportunities in the region (including casino gambling in Atlantic City).

A further stimulus for improved rail service might come from offshore oil installations. Oil car trains would provide an efficient flow to the Philadelphia-Camden area.

A passenger rail link to points north could be established along the existing CRRNJ freight line through Burlington and Ocean Counties to Lakewood.

DELAWARE BAY

(Cumberland and Salem Counties)

Salem and Cumberland Counties are characterized by a mix between agriculture and manufacturing. Salem has the largest proportion of agricultural land of any county in the state, and Cumberland leads the state in market value of all agricultural products sold. Manufacturing is concentrated in a few key areas - around Vineland, Bridgeton, and Millville in Cumberland, and around Penns Grove and Penns Neck in Salem.

Important issues include the need to stimulate the rather depressed economy of the region, improve rail and highway access, and limit industrial air pollution.

Physical Characteristics

The industrial northwest corner of Salem County is traversed by both I-295 and the New Jersey Turnpike, both of which lead past Camden and Trenton to North Jersey. The turnpike crosses the Delaware River near Upper Penns Neck, connecting with Wilmington. NJ 55, when complete, will link the Vineland area to the Philadelphia metropolitan region. Regular bus service is available over all of these corridors. US 40 and NJ 49 provide east-west linkages, while NJ 45, NJ 77, and NJ 47 provide north-south linkages (all undivided).

There is no passenger rail service anywhere in the Delaware Bay region, and non is contemplated. Freight service is fairly extensive. The Pennsylvania-Reading Seashore Lines and CRRNJ together cover twelve of fourteen municipalities in Cumberland

County. Three branches of the Penn-Reading serve Salem County - one along the Delaware River to Deepwater, a second via Woodstown to Salem, and the third through Elmer towards Bridgeton.

Analysis

The undivided highways characteristic of most of the Delaware Bay region suffer from local congestion problems as they pass through small municipalities. With few divided highways and no rail service, passenger access from the large Cumberland municipalities to the Philadelphia and Wilmington areas is meager. Completion of NJ 55 will improve the link with Philadelphia.

Cumberland County is economically depressed relative to the State. With improved access by highway and by rail, it could accommodate some residential, commercial, and perhaps additional industrial development that would stimulate economic conditions.

DELAWARE RIVER WATERFRONT

(Gloucester, Camden, Burlington, and Mercer Counties)

The Delaware River Waterfront is heavily built up in terms of urbanization and industrialization. The Wilmington - Penns Grove - Upper Penns Neck, Philadelphia - Camden, and Trenton metropolitan areas all border the Delaware River. These cities were built around their waterfronts - the river was their transportation lifeline. More recently, the waterfronts have decayed as new transportation networks - rail, highway, and air - displaced them. The river is now primarily used as a location for industry along the banks.

Critical issues include industrial and automotive air pollution, congestion around major urban centers, availability of inexpensive coastal access for the urban poor, and the inadequacy of existing passenger rail service in much of the region.

Physical Characteristics

The New Jersey Turnpike and I-295 run parallel to each other along the Delaware River between the Trenton and Wilmington areas. The Atlantic City Expressway is linked by NJ 42 to Camden and by NJ 73 to northern Philadelphia. US 130 parallels the Turnpike from the Camden area past Trenton to North Jersey. From Trenton, US 1 leads to New York and I-195 to the North and Central Shores. NJ 55 will be extended from Vineland to Camden. Undivided highways connect the region with other locales.

There is regular bus service all along the Delaware River Corridor, with connections to Atlantic City and New York. Trenton and Camden have urban bus services.

Rail freight haulage is available all along the Delaware River. There is a line between Camden and Upper Freehold, with a spur from Mount Holly to Medford. Another line goes from Camden to Glassboro, where it splits for points south. Other lines criss-cross Gloucester County on their way towards Salem and Cumberland Counties. Finally, the Penn-Reading lines carry freight to Atlantic City and Cape May.

Passenger rail lines are few at present. The Port Authority Transit Corporation (PATCO) operates a high-speed semi-automated electric line out of Philadelphia and Camden to Lindenwold. From there on to Atlantic City, Ocean City, and Cape May, diesel commuter service is provided.

Analysis

Bus and rail access to much of the Atlantic coast from the large urban areas along the Delaware River is inadequate to non-existent. There is no regular bus service between Trenton and the North and Central Shores, nor between Wilmington or even Atlantic City and Cape May. Passenger rail lines fare even worse, with only a few slow trains to limited destinations on the South Shore. The burden of this neglect falls heaviest on the urban poor, who are dependent on inexpensive mass transportation.

Extensions of PATCO rapid transit to cover additional areas around Camden are being contemplated. One branch would terminate in Glassboro to the south, while a second would head east to Mount Holly - perhaps with a spur to Burlington from Mount Laurel Junction.

Plans for electrification to Atlantic City have been dropped. It might be advisable to reconsider this option to improve access to Atlantic City, especially in conjunction with a plan to rejuvenate the city's ailing recreation business. Extension of the proposed PATCO Glassboro line to Vineland should be considered.

Appendix B

Maps

Figure 1

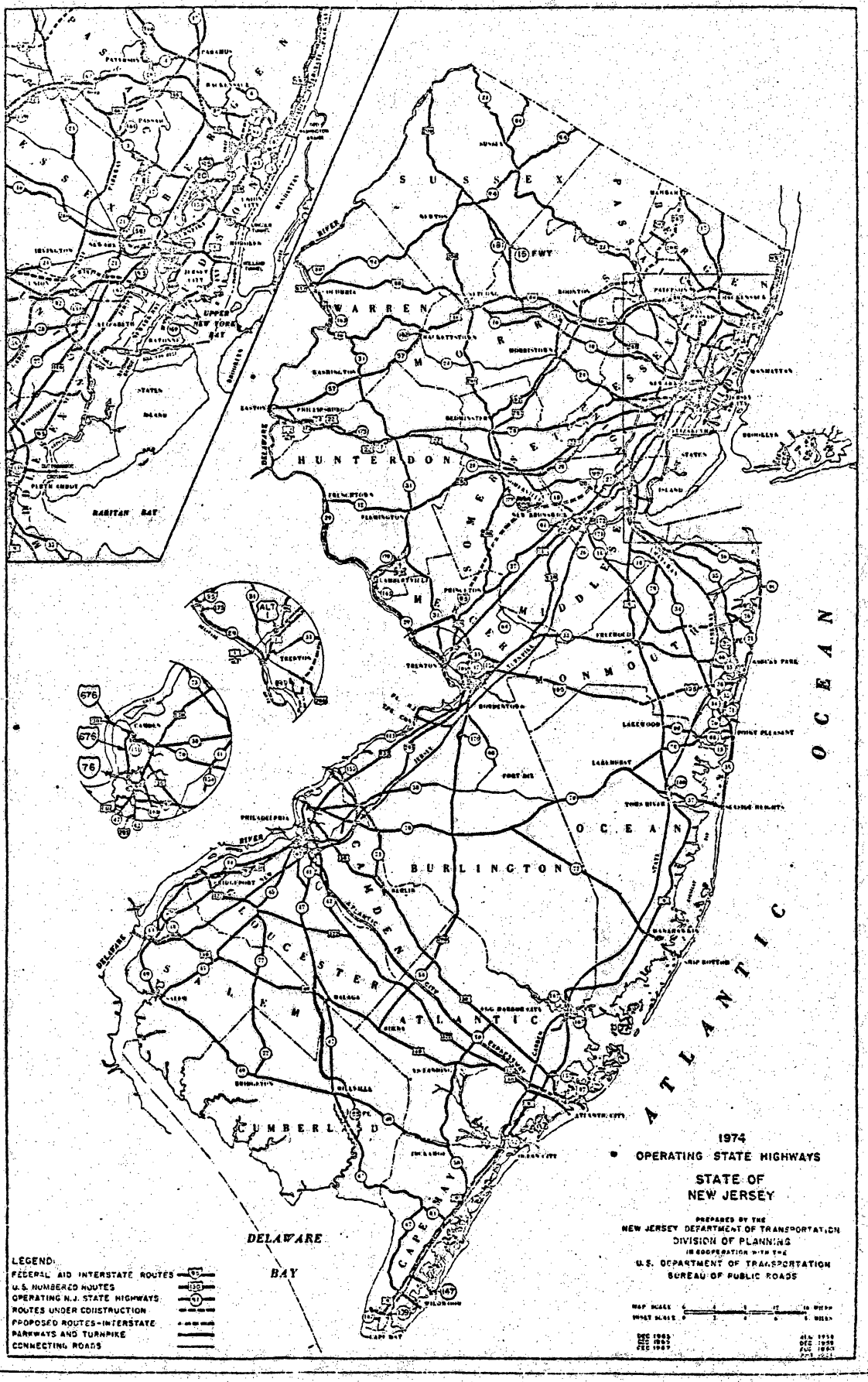

1974
OPERATING STATE HIGHWAYS
STATE OF
NEW JERSEY
PREPARED BY THE
NEW JERSEY DEPARTMENT OF TRANSPORTATION
DIVISION OF PLANNING
IN COOPERATION WITH THE
U.S. DEPARTMENT OF TRANSPORTATION
BUREAU OF PUBLIC ROADS
LEGEND:
FEDERAL AID INTERSTATE ROUTES
U.S. NUMBERED ROUTES
OPERATING N.J. STATE HIGHWAYS
ROUTES UNDER CONSTRUCTION
PROPOSED ROUTES-INTERSTATE
PARKWAYS AND TURNPIKE
CONNECTING ROADS
SUSSEX
WARREN
MORRIS
HUNTERDON
SOMERSET
MIDDLESEX
MONMOUTH
OCEAN
BURLINGTON
CAMDEN
GLOUCESTER
SALEM
ATLANTIC
CUMBERLAND
RARITAN BAY
DELAWARE BAY
ATLANTIC OCEAN
15 FWY
ALT 1
676
675
76

Figure 2

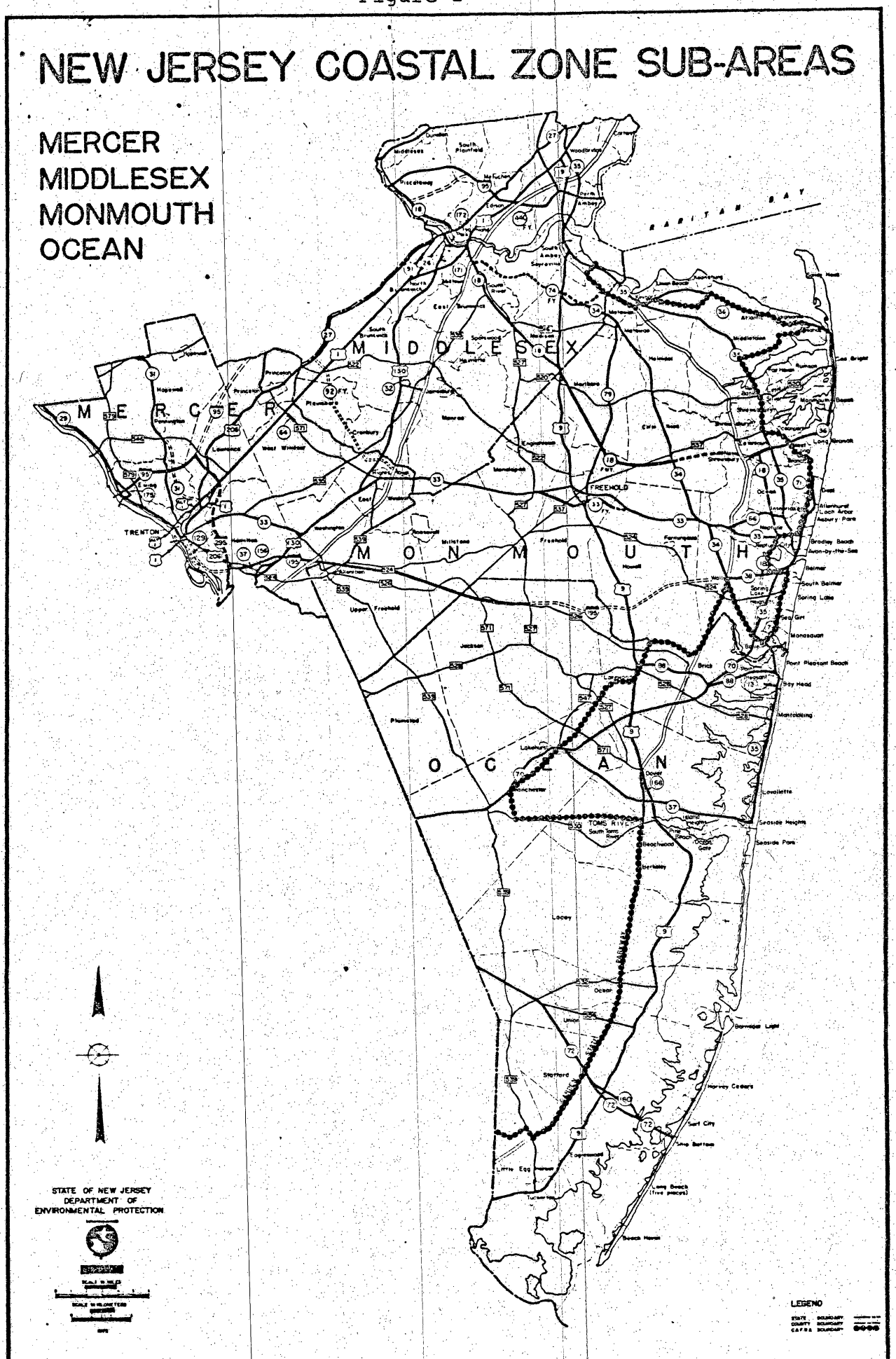

NEW JERSEY COASTAL ZONE SUB-AREAS
MERCER
MIDDLESEX
MONMOUTH
OCEAN
M E R C E R
M I D D L E S E X
M O N M O U T H
O C E A N
RARITAN BAY
TRENTON
FREEHOLD
TOMS RIVER
STATE OF NEW JERSEY
DEPARTMENT OF
ENVIRONMENTAL PROTECTION
LEGEND

Figure 3

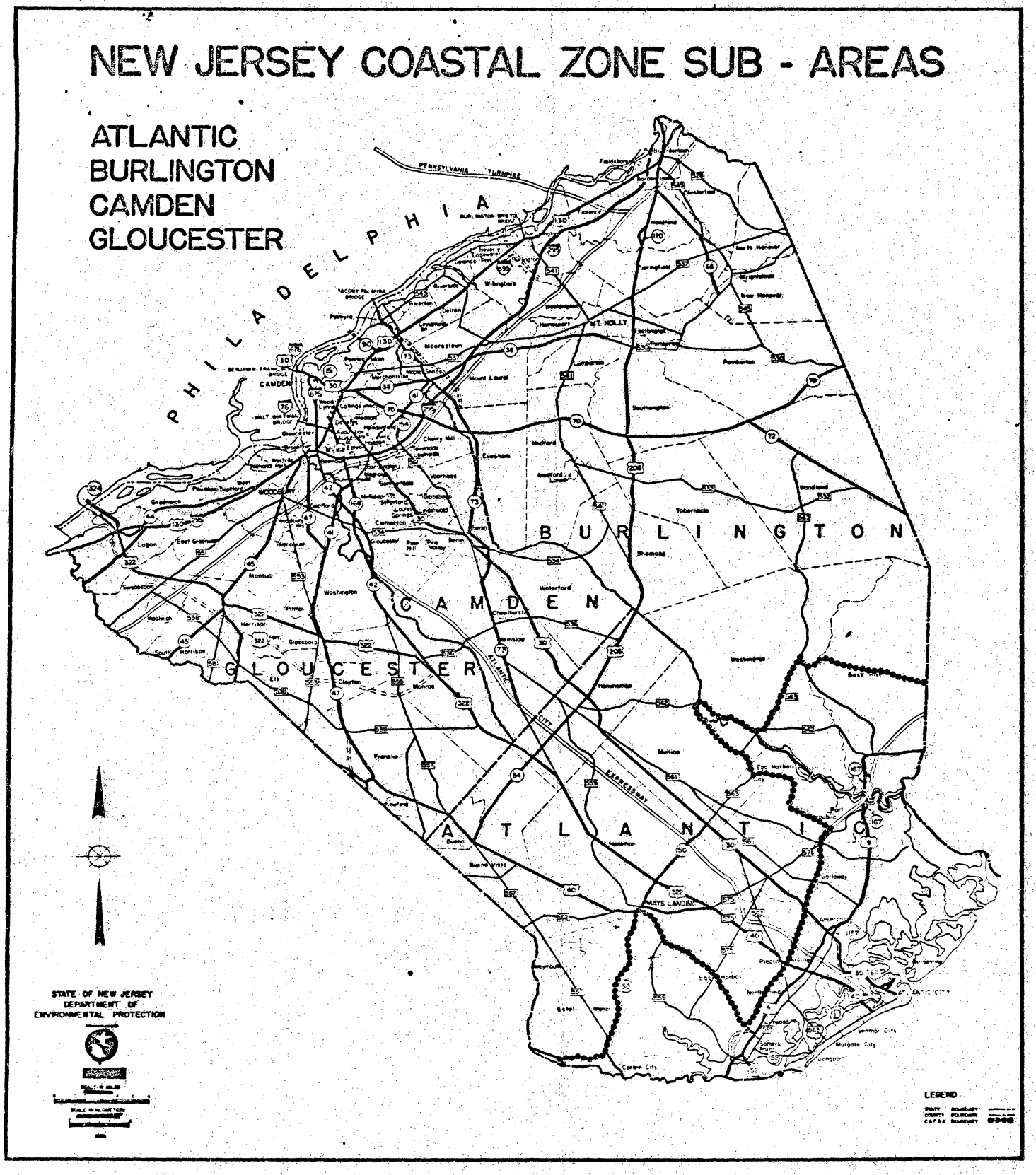

NEW JERSEY COASTAL ZONE SUB - AREAS
ATLANTIC
BURLINGTON
CAMDEN
GLOUCESTER
PHILADELPHIA
PENNSYLVANIA TURNPIKE
BURLINGTON
CAMDEN
GLOUCESTER
ATLANTIC
ATLANTIC CITY EXPRESSWAY
MAYS LANDING
MT. HOLLY
CAMDEN
WOODBURY
STATE OF NEW JERSEY
DEPARTMENT OF
ENVIRONMENTAL PROTECTION
LEGEND

Figure 4

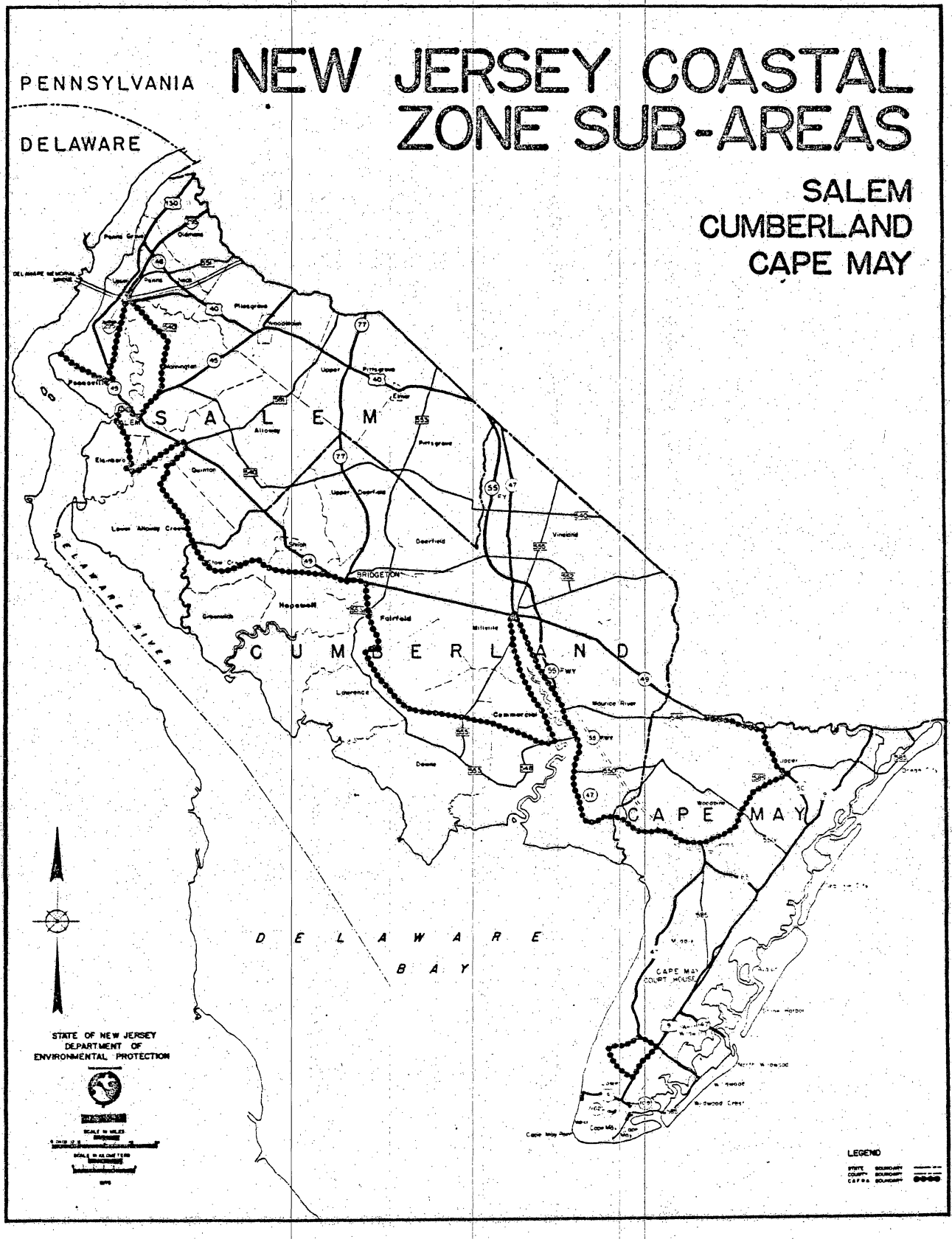

NEW JERSEY COASTAL ZONE SUB-AREAS
SALEM
CUMBERLAND
CAPE MAY
PENNSYLVANIA
DELAWARE
S A L E M
C U M B E R L A N D
C A P E M A Y
DELAWARE RIVER
D E L A W A R E B A Y
BRIDGETON
CAPE MAY COURT HOUSE
STATE OF NEW JERSEY
DEPARTMENT OF
ENVIRONMENTAL PROTECTION
LEGEND

Figure 5

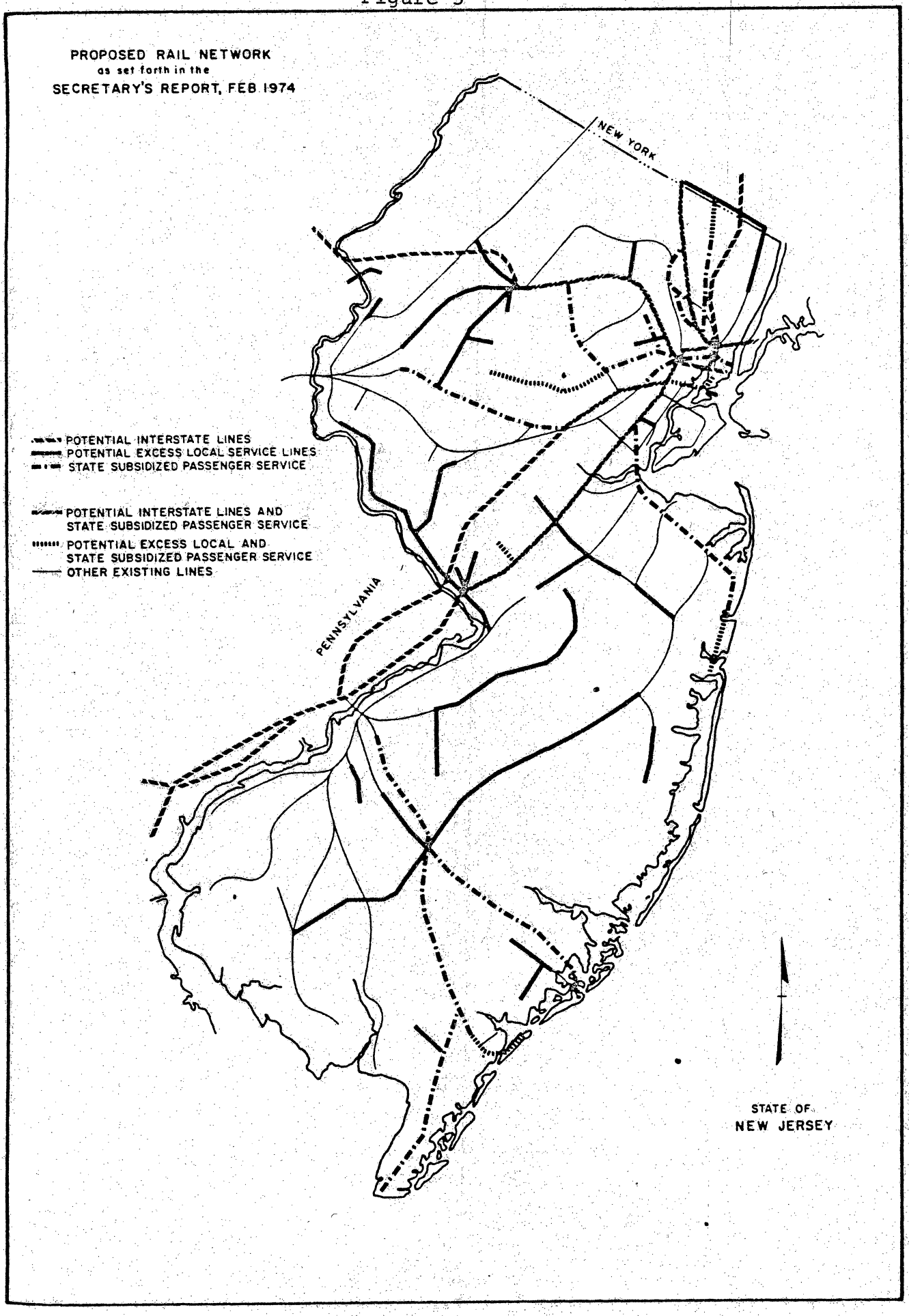

PROPOSED RAIL NETWORK
as set forth in the
SECRETARY'S REPORT, FEB 1974
NEW YORK
POTENTIAL INTERSTATE LINES
POTENTIAL EXCESS LOCAL SERVICE LINES
STATE SUBSIDIZED PASSENGER SERVICE
POTENTIAL INTERSTATE LINES AND STATE SUBSIDIZED PASSENGER SERVICE
POTENTIAL EXCESS LOCAL AND STATE SUBSIDIZED PASSENGER SERVICE
OTHER EXISTING LINES
PENNSYLVANIA
STATE OF NEW JERSEY

Figure 6

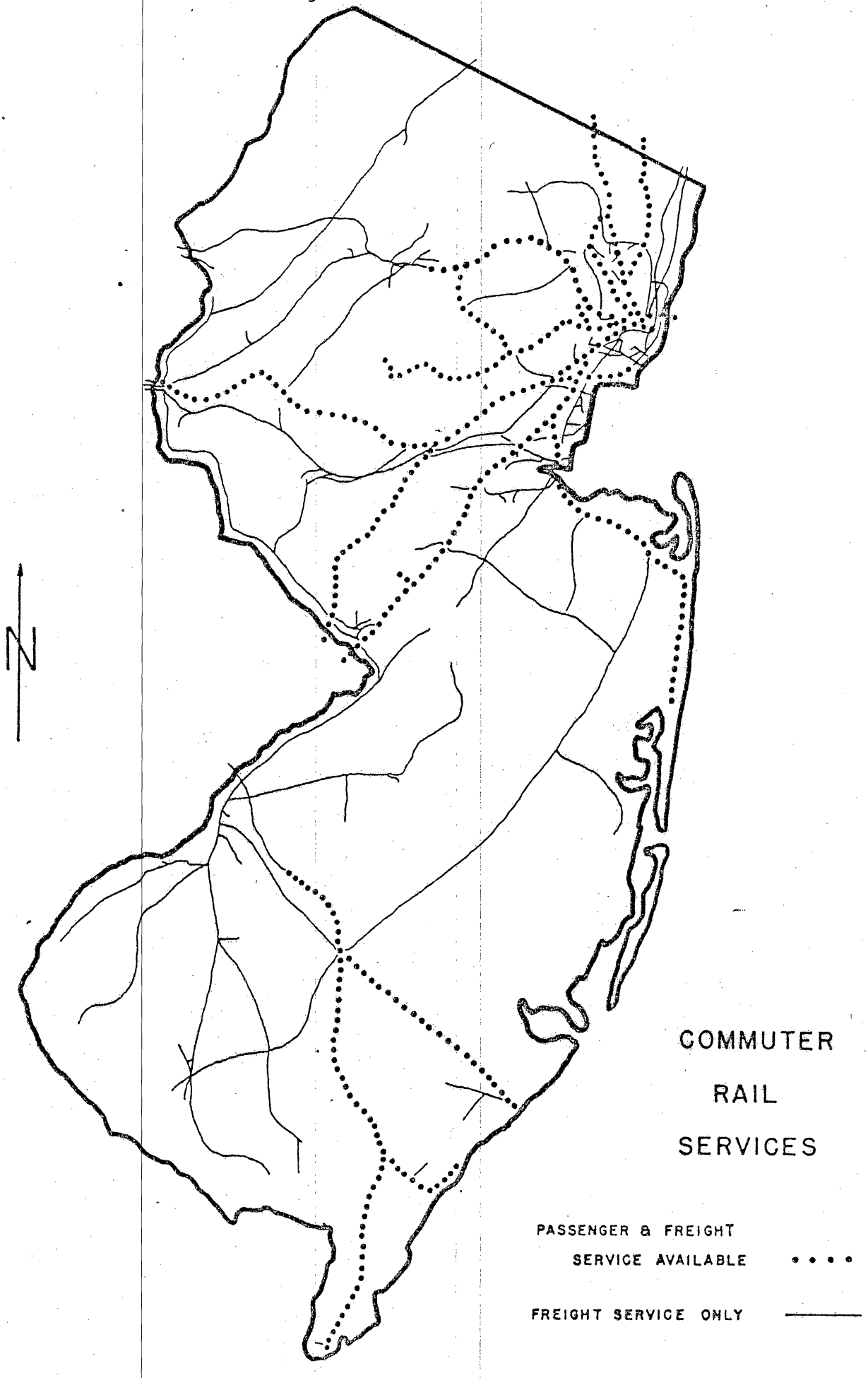

N
COMMUTER
RAIL
SERVICES
PASSENGER & FREIGHT
SERVICE AVAILABLE
FREIGHT SERVICE ONLY

Figure 7

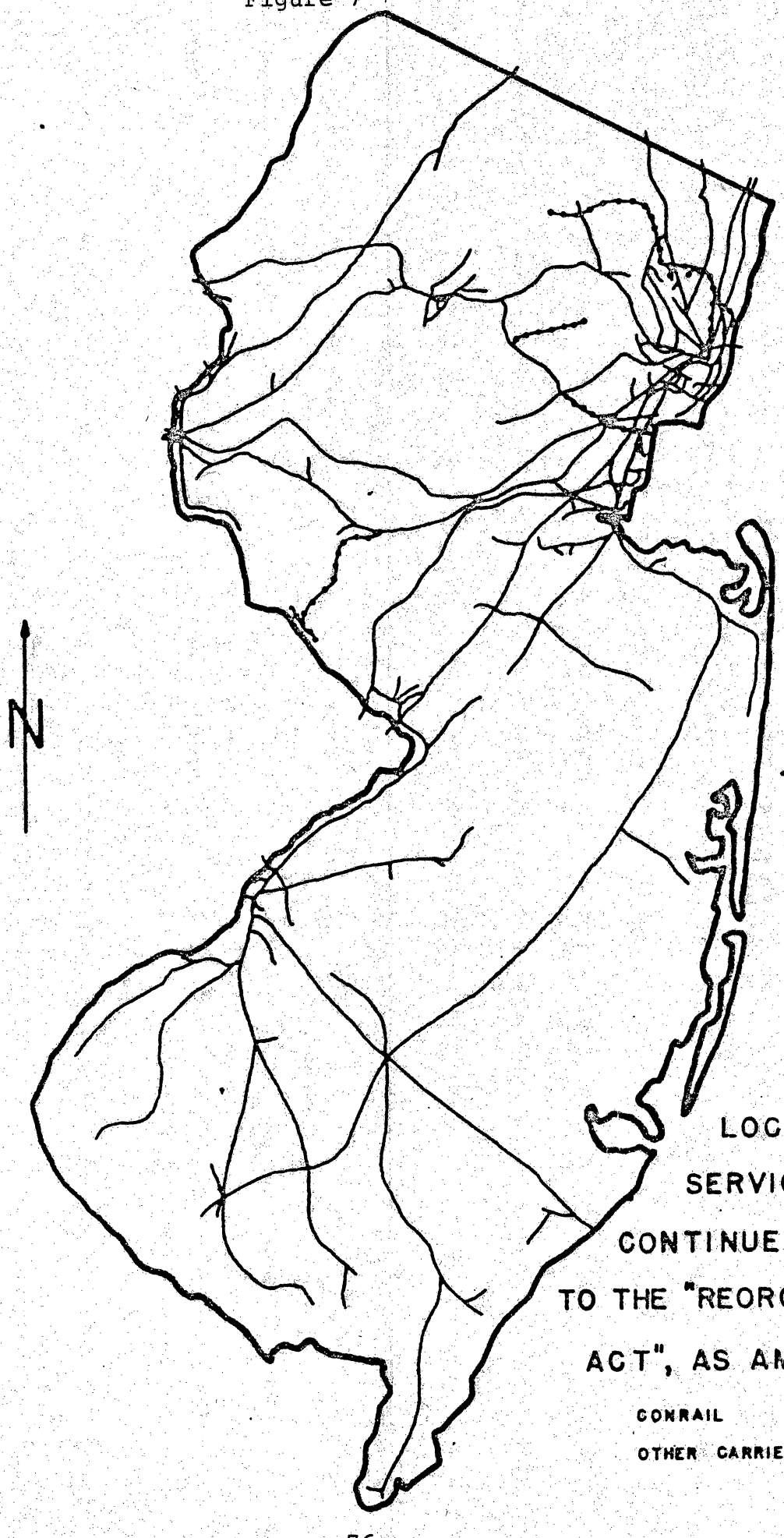
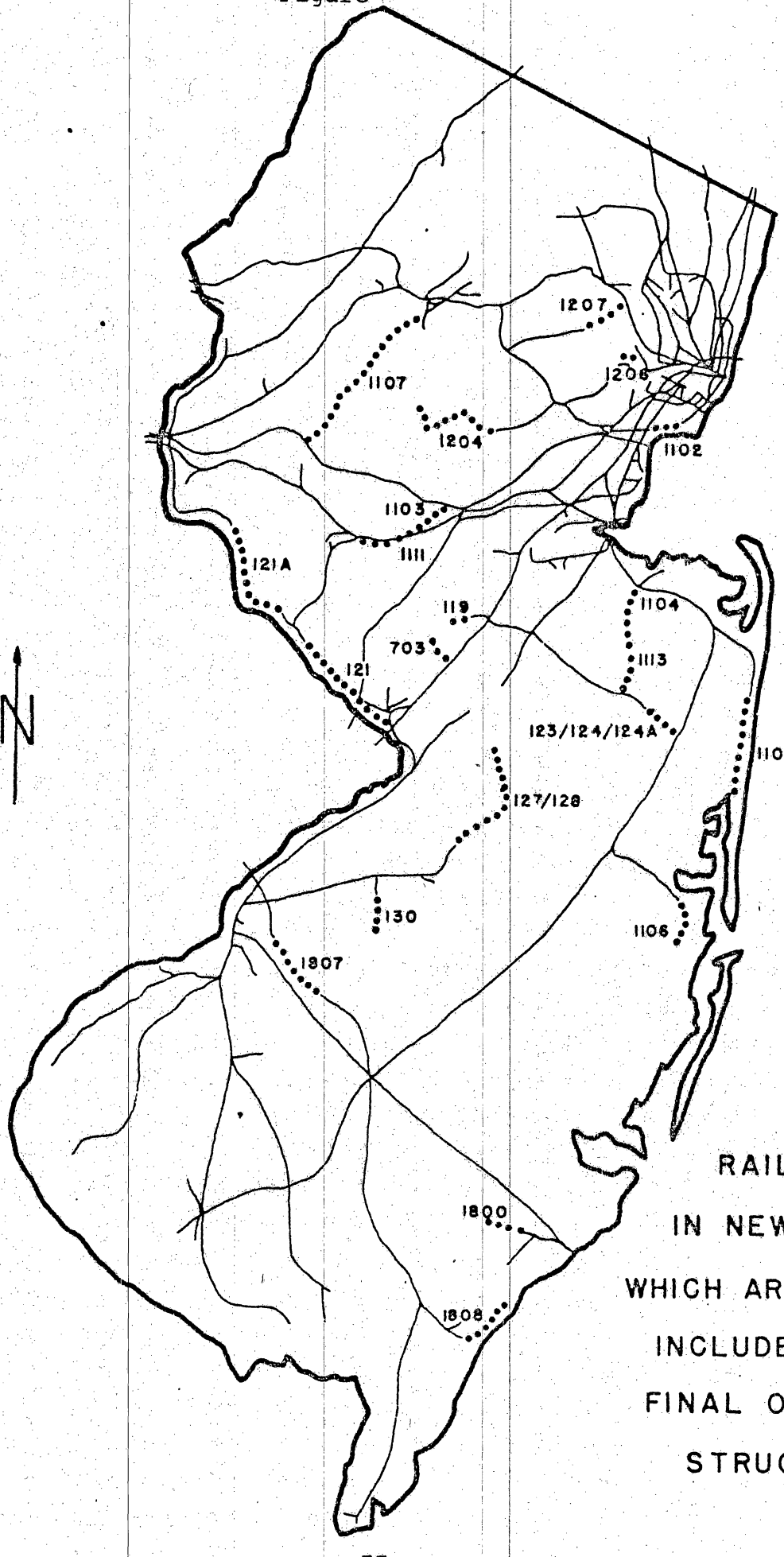
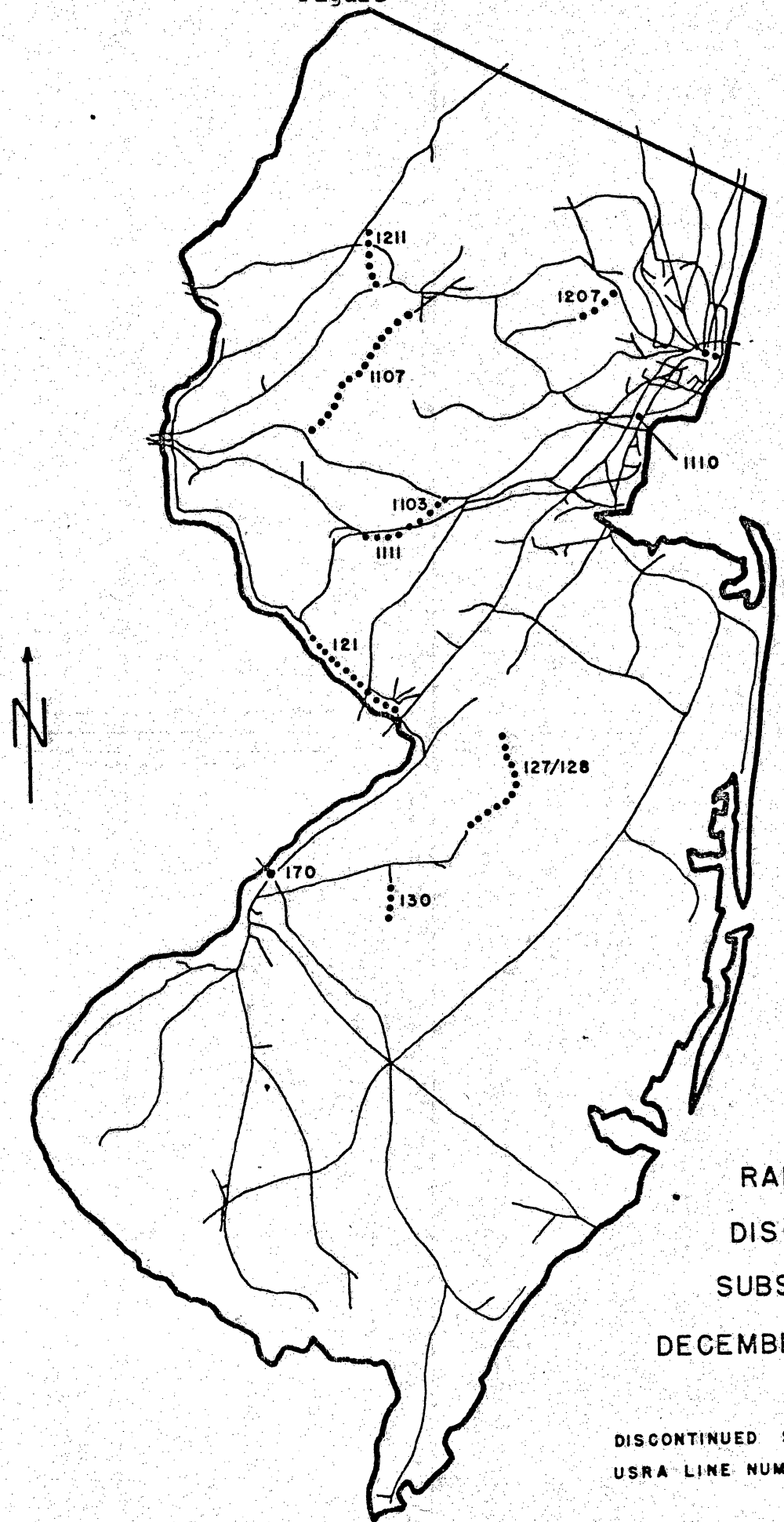

N
LOCAL FREIGHT SERVICE TO BE CONTINUED PURSUANT TO THE "REORGANIZATION ACT", AS AMENDED
CONRAIL
OTHER CARRIERS

Figure 8



RAIL SEGMENTS IN NEW JERSEY WHICH ARE NOT TO BE INCLUDED IN THE FINAL OPERATING STRUCTURE

Figure 9

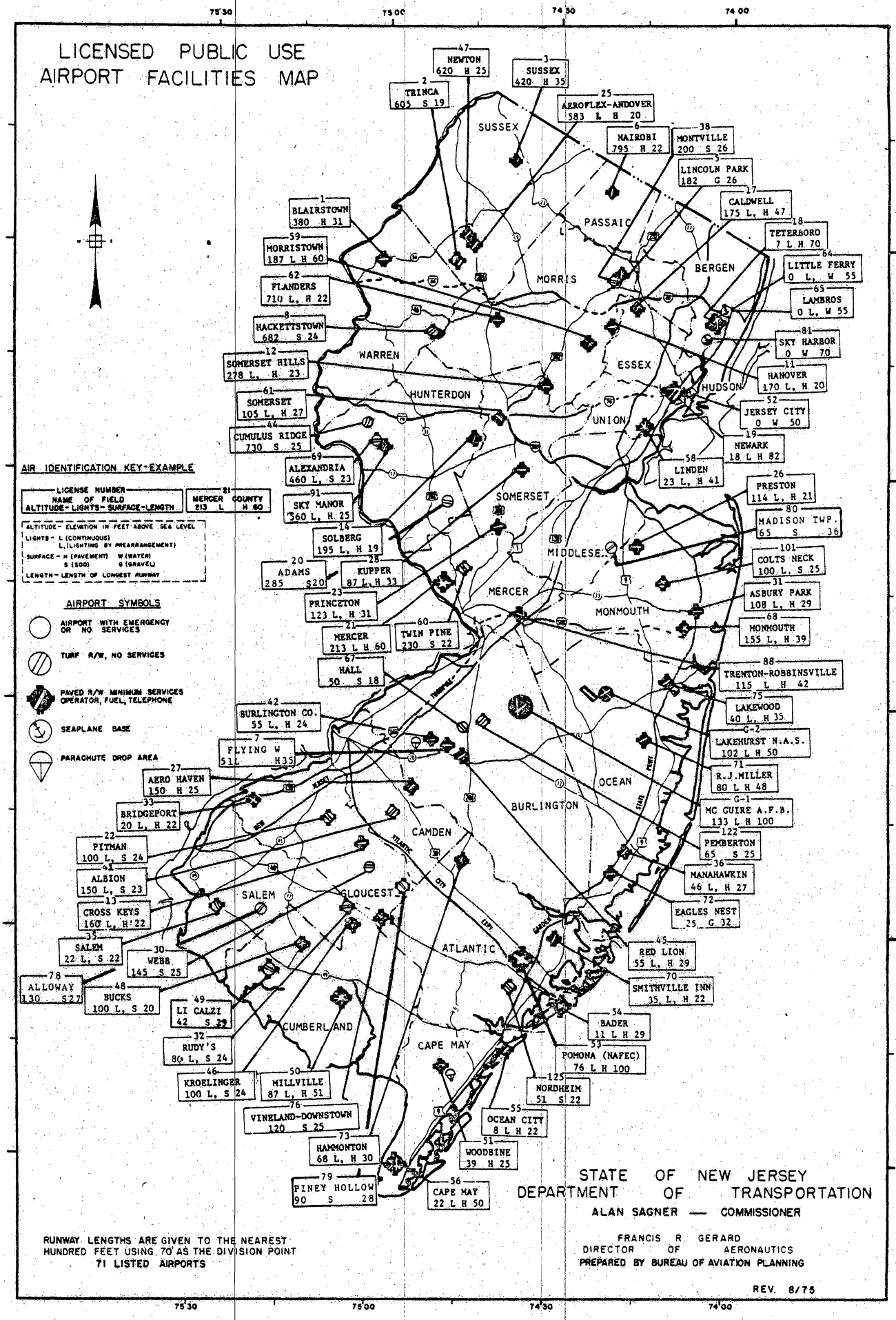


RAIL SERVICE DISCONTINUED SUBSEQUENT TO DECEMBER 9, 1975

DISCONTINUED SEGMENT ••••

USRA LINE NUMBER 703

Figure 10


LICENSED PUBLIC USE
AIRPORT FACILITIES MAP
75 30
75 00
74 30
74 00
41-00
40-30
40-00
39-30
39-00
AIR IDENTIFICATION KEY-EXAMPLE
LICENSE NUMBER
NAME OF FIELD
ALTITUDE- LIGHTS- SURFACE-LENGTH
MERCER COUNTY
213 L H 60
ALTITUDE - ELEVATION IN FEET ABOVE SEA LEVEL
LIGHTS - L (CONTINUOUS)
L (LIGHTING BY PREARRANGEMENT)
SURFACE - H (PAVEMENT) W (WATER)
S (SOD) G (GRAVEL)
LENGTH - LENGTH OF LONGEST RUNWAY
AIRPORT SYMBOLS
AIRPORT WITH EMERGENCY OR NO SERVICES
TURF R/W, NO SERVICES
PAVED R/W MINIMUM SERVICES OPERATOR, FUEL, TELEPHONE
SEAPLANE BASE
PARACHUTE DROP AREA
47 NEWTON 620 H 25
3 SUSSEX 420 H 35
2 TRINCA 605 S 19
25 AEROFLEX-ANDOVER 583 L H 20
6 NAIROBI 795 H 22
38 MONTVILLE 200 S 26
5 LINCOLN PARK 182 G 26
17 CALDWELL 175 L, H 47
1 BLAIRSTOWN 380 H 31
18 TETERBORO 7 L H 70
59 MORRISTOWN 187 L H 60
64 LITTLE FERRY 0 L, W 55
62 FLANDERS 710 L, H 22
65 LAMBROS 0 L, W 55
8 HACKETTSTOWN 682 S 24
81 SKY HARBOR 0 W 70
12 SOMERSET HILLS 278 L, H 23
11 HANOVER 170 L, H 20
61 SOMERSET 105 L, H 27
52 JERSEY CITY 0 W 50
44 CUMULUS RIDGE 730 S 25
19 NEWARK 18 L H 82
69 ALEXANDRIA 460 L, S 23
58 LINDEN 23 L, H 41
26 PRESTON 114 L, H 21
91 SKY MANOR 360 L, H 25
80 MADISON TWP. 65 S 36
14 SOLBERG 195 L, H 19
101 COLTS NECK 100 L, S 25
20 ADAMS 285 S20
28 KUPPER 87 L, H 33
31 ASBURY PARK 108 L, H 29
23 PRINCETON 123 L, H 31
68 MONMOUTH 155 L, H 39
21 MERCER 213 L H 60
60 TWIN PINE 230 S 22
67 HALL 50 S 18
88 TRENTON-ROBBINSVILLE 115 L H 42
42 BURLINGTON CO. 55 L, H 24
75 LAKEWOOD 40 L, H 35
7 FLYING W 51L H35
G-2 LAKEHURST N.A.S. 102 L H 50
27 AERO HAVEN 150 H 25
71 R.J.MILLER 80 L H 48
33 BRIDGEPORT 20 L, H 22
G-1 MC GUIRE A.F.B. 133 L H 100
22 PITMAN 100 L, S 24
122 PEMBERTON 65 S 25
41 ALBION 150 L, S 23
36 MANAHAWKIN 46 L, H 27
13 CROSS KEYS 160 L, H 22
72 EAGLES NEST 25 G 32
35 SALEM 22 L, S 22
45 RED LION 55 L, H 29
30 WEBB 145 S 25
78 ALLOWAY 130 S27
70 SMITHVILLE INN 35, L, H 22
48 BUCKS 100 L, S 20
49 LI CALZI 42 S 29
54 BADER 11 L H 29
32 RUDY'S 80 L, S 24
53 POMONA (NAFEC) 76 L H 100
46 KROELINGER 100 L, S 24
50 MILLVILLE 87 L, H 51
125 NORDHEIM 51 S 22
76 VINELAND-DOWNSTOWN 120 S 25
55 OCEAN CITY 8 L H 22
73 HAMMONTON 68 L, H 30
51 WOODBINE 39 H 25
79 PINEY HOLLOW 90 S 28
56 CAPE MAY 22 L H 50
SUSSEX
PASSAIC
BERGEN
MORRIS
WARREN
ESSEX
HUDSON
HUNTERDON
UNION
SOMERSET
MIDDLESEX
MERCER
MONMOUTH
OCEAN
BURLINGTON
CAMDEN
GLOUCESTER
ATLANTIC
CUMBERLAND
SALEM
CAPE MAY
STATE OF NEW JERSEY
DEPARTMENT OF TRANSPORTATION
ALAN SAGNER — COMMISSIONER
FRANCIS R. GERARD
DIRECTOR OF AERONAUTICS
PREPARED BY BUREAU OF AVIATION PLANNING
REV. 8/75
RUNWAY LENGTHS ARE GIVEN TO THE NEAREST HUNDRED FEET USING 70 AS THE DIVISION POINT
71 LISTED AIRPORTS

Appendix C

Sources

American Physical Society, Efficient Use of Energy: A Physical Perspective, January 1975

Baer, Fred, New York City Planning Department, Interview, November 19, 1976

California Coastal Zone Conservation Commissions, California Coastal Plan, December 1975

Coleman, Valerie, Transportation in New Jersey, Trenton: Bureau of Statewide Planning, February 1976

Commoner, Barry, The Poverty of Power, New York: Alfred A. Knopt, 1976

Government - Industry Task Force on Railroad Electrification, A Review of Factors Influencing Railroad Electrification, February 1974

Hayes, Dennis, Energy: The Case for Conservation, Worldwatch Paper Four, January 1976

Hutchinson, B. G., Principles of Urban Transport Systems Planning, New York: McGraw Hill, Inc., 1974

McHarg, Ian, Design with Nature, Garden City, New York: Natural History Press, 1969

New Jersey Department of Community Affairs, Division of State and Regional Planning, Transportation Systems - Availability and Impact on the CAFRA Region, August 1976

New Jersey Department of Transportation, Atlantic City Urban Area Transportation Study: 1965-1985

New Jersey Department of Transportation: A Master Plan for Transportation, 1972

New Jersey Department of Transportation, New Jersey Public Transportation Study, Phase A: Immediate Action Plan, March 1974

New Jersey Department of Community Affairs, Division of State and Regional Planning, County-by-county Land Use Issues prepared for DEP/OCZM, January 1976

New Jersey Department of Labor and Industry, Division of Planning Research, County-by-county Economic Profiles, December 1975

New Jersey Department of Community Affairs, Division of State and Regional Planning, Transportation Systems - Availability and Impact on the CAFRA Region, August 1976.

Proceedings, The Role of the United States Railroads in Meeting the Nations Energy Requirements, sponsored by U.S.D.O.T., Federal Railroad Administration, and Wisconsin D.O.T., University of Wisconsin, Madison, May 6-8, 1974

Stone, Taber R., Beyond the Automobile: Reshaping the Transportation Environment, Englewood Cliffs, New Jersey, Prentice-Hall, 1971

U.S. Congress Office of Technology Assessment, Energy, The Economic, and Mass Transit, December 1975


LIBERTY AND PROSPERITY
1776