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Transportation Plan

LONG RANGE PLAN

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ANNE P. CANBY
COMMISSIONER

STATE OF NEW JERSEY
DEPARTMENT OF TRANSPORTATION
1035 PARKWAY AVENUE
TRENTON, N. J. 08625

To the Citizens of New Jersey:

This is the third in a series of documents which are being developed as part of the evolutionary process to develop a revised New Jersey Statewide Transportation Plan. This third document — the Long-Range Plan for Surface Passenger Transportation — builds on two previous volumes: The New Jersey Transportation Plan: Goals, Objectives, and Program Policies; and the Short-Range Plan.

The Long-Range Plan recognizes the future uncertainties which will shape the State's long-range transportation needs and our ability to meet these needs. Accordingly, the Plan examines several conceivable, alternative futures, and defines a course of action which, while aimed at the future judged to be most likely to occur, provides a framework for adjustment if key indicators of future needs being monitored by the Department suggest a changed future. The Plan concludes with a discussion of projects which have been previously proposed for long-range implementation, evaluating each of these projects in terms of long-range desirability in light of the "most likely" future. This evaluation defines the Department's intentions at this time.

The evaluation of these long-range projects is based on a recognition that we are in a period of rapid transition away from the big road building booms of the 1950s, 1960s, and early 1970s, which were marked by low energy costs and extensive growth in new construction. The evaluation also reflects the need to concentrate limited financial resources on the maintenance of the State's valuable existing transportation infrastructure — road, bridge, rail, and bus — rather than on the construction of new roads which will spawn more dispersed development. Such development is contrary to our stated goals and objectives, which are defined in the opening section of the Long-Range Plan.

The ensuing Preface and Table of Contents outline how this document fits in with the development of the total transportation plan. They also identify additional volumes of the Plan slated to follow in the future.

It is my sincere hope that this long-range plan will be as well received and as extensively reviewed as were the first two publications. The transportation infrastructure and how it is developed will be vital to the future development of New Jersey. It is essential that the citizens of the State be a part of that development.

Sincerely,

Anne P. Canby
Commissioner of Transportation

PREFACE

This is the third and final volume of the New Jersey Surface Passenger Transportation Plan. It is a long-range plan, spanning the next twenty years (through the year 2000).

The first volume of the plan describes the goals, objectives, and policies the New Jersey Department of Transportation (NJDOT) has formulated to shape transportation decisions.¹ It was issued in draft form in September 1979 and, following extensive public comment received to date, is being reissued with certain revisions as the opening section of this third volume. The second volume is the short-range plan which describes the surface passenger transportation improvements desired between now and 1988.² It was issued in draft form in March 1981 and received extensive public comment in the intervening nine months. During this same period, significant changes in federal policy have transpired, and plans for improvements between now and 1988 have been influenced accordingly. While the short-range plan is not being reissued as part of this third volume, projects whose status has been changed by developments over the past year are acknowledged.

As with the first two volumes, this volume will undergo extensive review by the various publics prior to its final version. After this review, the three draft volumes will be consolidated into a final working document.

The following outline shows how this volume fits in with the series of volumes that will ultimately be developed. The "Long-Range Plan" presented here is shown in the outline as Section IV. The ensuing volumes in Section V will address transportation needs and programs for goods movement, airborne transportation, and finally, waterborne transportation.

New Jersey Transportation Plan Outline

	(	I.	Introduction	)	
Surface	(			)	Volume I-draft issued
Passenger	(	II.	Guidelines for Decisions)		
Transportation	(	III.	Short-Range Plan	)	Volume II-draft issued
	(	IV.	Long-Range Plan	)	Volume III-this document
		V.	Future Programs		
		VI.	The Process		

¹ New Jersey Transportation Plan, Surface Passenger Transportation Element (draft) Sections I and II, September of 1979.

² New Jersey Transportation Plan, Short-Range Plan, Surface Passenger Transportation (draft) Section III, March of 1981.

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**New
Jersey
Transportation Plan**

**PLAN
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**Surface
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December, 1981

IV. LONG-RANGE PLAN

A. INTRODUCTION

The development of a long-range transportation plan is necessarily based on long-range projections of travel, and while such projections can be made, they are predicated upon a variety of assumptions that are highly conjectural. In the 1950's, 1960's, and early 1970's, long-range plans were formulated assuming that observed travel trends would continue in the future, and thus projections of future travel mirrored these trends. The oil shortages in 1973 and in 1979 made us painfully aware of the fact that our nation is highly dependent upon foreign oil supplies--particularly the transportation sector--and that cutoffs of these supplies profoundly affect us. These shortages also exposed the fallacy of our earlier long-range plans--we cannot safely assume that past travel trends will continue.

Indeed, the realization by petroleum exporting countries that the developed nations of the world are so highly dependent upon oil imports has had far reaching geo-political effects, fundamentally altering the balance of power world-wide. Oil has proven to be a powerful economic weapon, and our nation continues to struggle in dealing with this new reality and its associated effects on our economic well-being as a nation.

With respect to long-range projections of travel, we now realize that foreign oil availability will profoundly affect how much we travel, where we travel, and how we travel in the future. Accordingly, and unlike previous long-range plans produced in New Jersey and elsewhere, we now also realize that our future transportation needs will depend to a substantial degree upon the kind of future that materializes, and that the future cannot be forecast with any certainty.

Thus instead of preparing a "master plan" which defines a set of long-range projects, we have elected to prepare a "policy plan" which: (1) defines alternative futures based on plausible sets of assumptions "bounding" the realm of possibility; (2) identifies, based on present knowledge, which of these futures is "most likely;" (3) advocates that the seven-year capital plans formulated annually be aimed at this most likely future; (4) institutes a monitoring system of key data indicators which will permit continual reappraisal of long-range future prospects and, in the event these indicators signal changes, adjustment of the most likely future so that subsequent seven-year capital plans can be similarly adjusted.

The present seven-year capital plan (presented to the State Legislature's Capital Budgeting Committee in October 1981) defines a set of project aims consistent with the most likely future described here and the goals, objectives, and policies first published by the Department in the fall of 1979 and recently revised in light of this most likely future. Next year's plan will be formulated in light of the present year's plan and attendant commitments, and the new information gathered by the year-long monitoring efforts.

In identifying a most likely future, we have accounted for the fact that this future is to some degree a consequence of the decisions we make in the nearer term. That is, we can influence our own future by the pursuit of goals, objectives, and policies which are perceived to be in the state's interest. The New Jersey Department of Transportation is seeking to exert such influence by pursuing the forementioned goals, objectives, and policies, which are detailed in the opening section of this long-range plan.

While the plan does not define a set of long-range projects, it does provide a basis for reappraising long-range projects proposed in previously prepared long-range, or master plans. In the concluding section of this plan we have done so, identifying whether each of these previously proposed projects still warrants consideration in light of current expectations about future conditions. Many of the proposals contained in previous plans have been judged to be unworthy of retention; these proposals are being proposed for abandonment. Proposals which still warrant consideration will be the subject of further examination following the issuance of this plan, so that those with demonstrated merit can be placed in subsequent seven-year plans for implementation.

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B. GUIDELINES FOR DECISION-MAKING

The goals, objectives, and policies described in Volume 1 and more recently modified in response to comments received will serve as the basis for the Department's decision-making.

In this section, these goals, objectives, and policies are reiterated. At the outset, however, we shall briefly discuss the major issues prompting these goals, objectives, and policies. The reader is also referred to the Appendix for a detailed inventory discussion of the existing surface passenger transportation system in New Jersey. Both the issues and transportation inventory are discussed in more detail in Volume 1.

1. Major Issues

New Jersey has an extensive network of transportation facilities to serve the mobility requirements of its citizens. However, the existing system has serious inadequacies and its development over the years has contributed to other serious problems throughout the state. In addition, issues have surfaced in recent years which will impact the way people and goods are transported in the future.

a. Interdependence of Transportation, Land Use, and Energy

The interdependence of transportation, land use, and energy has generally been understood for some time. Now that our concern about energy availability and consumption has been heightened, this interdependence of transportation, land use, and energy warrants careful consideration.

New Jersey is the most densely populated state in the nation, with an average density of 975 people per square mile. While New Jersey ranks 46th in the nation in total land area, it ranks 9th in population, resulting in 3.3 percent of the nation's population residing in a state having only 0.2 percent of the nation's land area.

While New Jersey is the most urbanized state in the nation, its primary development pattern is suburban. This pattern has not occurred by design. Rather, it is the result of historic forces; initially begun by the suburban commuter rail lines, dramatic increases in accessibility occurred with the emergence of the automobile as a means of travel and a highway system to accommodate it. Although much has been learned about transportation and land development relationships, the effectiveness of accessibility improvements or restrictions in changing the rate and pattern of land development is still largely unknown.

The population increase and low density development around the urban areas has consumed large amounts of land, energy, and natural resources. Since scattered low density urban development is not easily served by public transportation, dispersion of population and employment has increased the dependence on the automobile. This situation might not be as problematic were it not for the present unstable energy situation, increasing petroleum costs, decreasing petroleum reserves and increasing Third World demands for "their" share of energy fuels and other natural resources.

The primary source of energy consumed in the United States comes from petroleum which accounts for about 45 percent of the total energy base. Approximately 40 percent of all petroleum consumed is imported from foreign countries. Although extensive, this reliance on foreign oil has decreased slightly during the past decade as non-domestic oil accounted for 50 percent of total oil consumption during the early 1970's. The transportation sector accounts for about 26 percent of the nationwide gross energy consumption and 51 percent of the nationwide petroleum consumption.

The statistics are even more profound in New Jersey as approximately 60 percent of all energy consumed comes from petroleum products. This figure also represents a decline as the state used petroleum for 70 percent of its energy needs during the 1960's and 1970's.

Comparative statistics for transportation use indicate that about 25 percent of gross energy consumption and over 45 percent of petroleum products consumed in the state during 1980 are related to transportation. The transportation consumption portion of gross energy use actually declined recently as this figure fluctuated between 28 and 29 percent during the 1970's. However, transportation steadily increases its percentage share of gross petroleum consumed in the state as other sectors change to other fuels or reduce their petroleum consumption through conservation efforts.

The private automobile is the greatest user of petroleum in the transportation sector as approximately 60 percent of the energy devoted to transportation in the nation is supplied in the form of gasoline to automobiles and small personal trucks. As indicated in Table 1, the single occupant auto is among the most inefficient of available transportation modes, thus contributing significantly to the high energy consumption of the automobile. Therefore, to reduce transportation related energy consumption, we need to reduce automobile use and place increasing reliance upon public transportation, particularly in urban areas, and ride-sharing in general. While the current fuel shortage may have heightened public awareness of the energy "problem" and whetted the public's interest in such alternate means of travel, the long-term prospects for economical public transportation service will depend upon the pattern of future development.

Major transportation investments will influence the nature and shape of future growth in the state. Therefore, transportation should be recognized as a key tool in an overall growth management strategy for the state. This is especially true since transportation investments affect energy conservation, through the patterns and types of land-use which they foster, i.e., low-density sprawl which precipitates greater amounts of transportation energy consumption, or more compact, energy-efficient land-use arrangements.

There is now significant public support for growth management and rationalized development patterns. A number of laws, regulations, and activities have been promulgated at the national and state levels of government to provide some guidance and control over future land use patterns. These include: CAFRA, Pinelands, Wetlands and the State Development Guide Plan drafted by the New Jersey Department of Community

TABLE 1
DOMESTIC PASSENGER TRANSPORTATION ENERGY INTENSITY
IN THE UNITED STATES, 1977

	Btu/PMT	PMT/Gal. Gasoline or Equivalent
Motorcycles	2,465	51
Passenger Cars	4,704	27
Personal Light Trucks	5,409	23
Buses		
Intercity Buses	980	128
Transit Buses	2,888	43
School Buses	850	147
Rail		
Intercity Rail	3,369	37
Transit Rail	3,015	42
Commuter Rail	2,913	43
Bicycles	71	1,750

Btu = British Thermal Unit
PMT = Person Mile of Travel

Source: Transportation Energy Conservation Data Book, Edition 3 Feb. 79, D.B. Shonka Editor, Oak Ridge National Lab., USDOE; and Dr. David Gordon Wilson, Professor, M.I.T., Mass.

Affairs. While these initiatives have benefited growth management objectives, there are still serious limitations on growth management plaguing the state. There is a need to integrate the planning and control of land use and transportation development. This planning should operate with a coordinated set of policies that address such factors as water supply, sewage, zoning and subdivision regulations, taxation, federal mortgage practices, schools and other elements that shape development patterns.

b. Social Issues

We use this term to encompass matters relating to the welfare and aspirations of the people of a society, on an individual or group basis, and human interrelationships and interactions. With respect to transportation, social issues of major import include: 1) the degree of mobility afforded individuals and groups in the society by transportation services and, 2) the range of choices or opportunities available to the society as a whole. Each of these issues is discussed at greater length below.

Mobility is the degree to which the various elements of a society have access to opportunities. It is a kind of freedom, a freedom highly valued by our society. Accessibility refers to the ease (or difficulty) in reaching a given destination. Most Americans now weigh accessibility

highly in making their employment, residential, recreational, cultural, etc., choices. Because those of us who have access to one or more cars enjoy a high degree of mobility, the range of options is primarily limited by economic resources and personal preferences rather than physical proximity. However, the degree of mobility possessed by all members of society is not uniform, so that the range of options available to some members is far more restricted than others.

Such mobility limitations are most pronounced in certain segments of society, including the elderly, physically disabled, the urban and rural poor, and the young. There are some 1,047,000 persons over 65 years of age or physically handicapped in New Jersey--14.6 percent of the state's population. The young (those under the age of 17, the legal age for a drivers license) constitute 31 percent of the population.

The failure to provide mobility for all of the state's citizens has some serious consequences. Employment opportunities in suburban and exurban locations are beyond the reach of many of the unemployed, who lack autos and reside in the state's urban areas. Likewise, many vocational and higher education institutions, recreational and cultural facilities and services are beyond the reach of persons lacking automobile access. Diversity in housing and neighborhood/community environment options, particularly from the standpoint of racial and economic integration, development styles and characteristics also elude the mobility disadvantaged. Efforts to provide low and moderate-income housing in developing suburban areas, as called for by the New Jersey Supreme Court in the landmark Mount Laurel zoning case, could be facilitated by increasing accessibility of work places from the areas where such housing is to be constructed.

c. The Economic Situation

New Jersey's economy is in transition now, struggling to recover from an industrial decline which was deepened by the worst recession since the Great Depression. Although the state has traditionally enjoyed strong industrial and population growth, its favorable competitive position has been seriously eroded by recent national trends and the economic lull of the 1970's.

Overall, the state has undergone a long-term shift from goods-producing activity to service-producing activity, accelerated by the loss of industrial plants due to the aging of existing investments and a low rate of capital reinvestment compared to the rest of the nation. While in 1940, goods producing jobs accounted for 45 percent of all employment in the state, in 1970, they comprised only 38 percent. The recession of the early 1970's affected New Jersey heavily, causing an acceleration of the industrial exodus from the state, a faster loss of manufacturing jobs, a decline in the state's comparative rate of growth, and widespread unemployment.

The location of jobs is also changing. Jobs which were located in the central cities of New Jersey are shifting outward to suburban or rural areas, placing new demands upon the highway system. Development pressure

and population growth are also occurring in these new open areas, part of an overall trend for development to occur in southern, central, and north-western areas of the state instead of in the already developed northeastern regions. Ironically, these changes are a microcosm of similar "frost belt" to "sun belt" shifts in development occurring at the national level. These general directions of change, in combination with the effects of economic lulls during this decade, have had serious consequences in New Jersey. Economic reasons are not solely responsible for this dislocation. Other quality of life factors including a number of environmentally related ones such as unhealthy air and water, noise, and congestion are also contributing to these shifts.

New Jersey's Competitive Position

Despite the evidence of industrial decline, New Jersey has fared better than most of the Northeastern states and is still in a relatively favorable position to attract new development. Industrial decline is relatively new to the state, having begun only in the 1970's, and so far has basically removed the least productive plants from the roster. The state still retains a better than average share of the nation's industry, on a per state basis and a per capita basis, and remains attractive to corporations both for management and production functions.

The state has a highly-productive, trained labor force, the highest number of scientists and engineers per capita of any state in the nation, and a high level of spending by industry on research and development. Of every \$10 spent in the U.S. on research and development, a dollar is spent in New Jersey. In addition, the state has a highly diversified industrial mix, and enjoys the presence of strong Atlantic Ocean ports. No less importantly, New Jersey is located in the center of the Boston-Washington megalopolis, one of the largest markets in the nation.

Transportation Implications

New Jersey is a state of paradoxes. In spite of New Jersey's high unemployment, its citizens have enjoyed a per capita income which is the second or third highest in the continental US. Although New Jersey is the most urbanized state of the Union, it is "transportation poor" in terms of traffic accommodations. This is especially true in the area of urban public transit, where the service in many areas is poor, due mainly to the existence of antiquated equipment, poor infrastructure, and congestion with other modes on the highway system.

As the economic base of the state changes from a location-dependent goods-producing one to the more varied location-independent "services" orientation, New Jersey will have to contend with the resulting demand for infrastructural support due to suburbanization pressure. The state and local governments must weigh these demands against the loss of firms to other regions of the country.

Economic recovery depends to a large extent on the redevelopment of the country's urban cores--and this is especially true in New Jersey.

Low density suburbanization runs counter to such redevelopment. "A compact development pattern can help to make better use of the existing infrastructure and service systems. With increasing costs of government services, materials, construction, and maintenance, better use of our physical and social infrastructure will be an important factor in the (state's) ability to meet future needs. A compact development pattern created by reinvestment in the urban cores and 'in-filling' of vacant parcels of the urban areas will help insure that those needs are met in a thorough and economical way."¹

d. Air Quality

It is well established that motor vehicles contribute substantially to air pollution in New Jersey's urbanized areas. Indeed, the automobile is the principal source of one major pollutant, carbon monoxide, and is further thought to be responsible for much of the ozone pollution.

Carefully formulated, comprehensive transportation-air quality planning at all levels of government, together with the well-managed execution of resultant plans could certainly contribute to improved air quality. Such plans will call for less automotive use, increased occupancy in automobiles that are used, cleaner engines, and increased use of public transit.

Standards and Trends

In 1970 Congress instructed the United States Environmental Protection Agency to establish nation-wide standards for air quality which would protect and enhance public health and welfare. National Ambient Air Quality Standards were subsequently promulgated for the following five airborne pollutants:

- Particulate matter
- Sulfur dioxide
- Nitrogen dioxide
- Carbon monoxide
- Ozone

Since the early 1970's, New Jersey's overall air quality has shown steady improvement. The state is substantially in compliance with National Ambient Air Quality Standards for three pollutants: particulate matter, sulfur oxides, and nitrogen dioxide. Not as much progress has been made in controlling transportation related carbon monoxide (CO) and ozone, however.

¹ DVRPC Year 2000 Plan

Attainment of Standards

The Federal Clean Air Act called for attainment of air quality standards as expeditiously as possible, but not later than December 31, 1982. However, in the case of carbon monoxide and ozone, the law permitted EPA to grant an extension of the deadline to December 31, 1987. Based on all presently available evidence, and despite plans to implement available control measures, New Jersey has determined that it cannot fully attain standards for these two pollutants by 1982. The state accordingly requested an extension of the attainment deadline for carbon monoxide and ozone to December 31, 1987, and this request was approved by EPA.

The State Implementation Plan

The point of departure for transportation-air quality planning is the Federal Clean Air Act as first written in 1963 and as subsequently and substantially amended in 1970 and 1977. The act requires each state to submit to EPA a State Implementation Plan (SIP) which demonstrates how the state will attain and maintain air quality standards. New Jersey's first SIP submittal to EPA was delivered in December 1978.

The SIP contains a sub-portion known as the Transportation Control Plan (TCP) which demonstrates how the amount of pollutants emanating from the state's transportation system will be reduced. Because of the TCP requirements for automobile travel reduction measures and traffic flow improvement measures, it is this portion of the SIP which has the most profound influence on the New Jersey Transportation Plan.

Since New Jersey was granted an extension of the 1982 attainment deadline by EPA, the state is required to produce an update of the SIP and the TCP explaining how the state will meet air quality standards by 1987. The state is currently working on these submittals which are due to EPA by July 1, 1982.

e. Other Environmental Issues

As New Jersey's population increases and economy expands, more open land is lost to residential, commercial, industrial, and public facility and utility needs/demands each year. This increased development poses significant danger to the quality of our ambient air (discussed in the previous major issue) and water resources. This is true of transportation development, too, as rail, highway, and airport facilities consume large tracts of land and contribute to air and water degradation.

In a state as small and densely populated as New Jersey, open land, sufficient water resources, and clean air are extremely valuable--economically, environmentally, and socially. The issue here is the determination of a balance between the economic development of the state, so important to the vitality of its citizenry, and the loss of open space, cultural and historical heritages, and the general decline in the quality of the environment. Public support for federal, state, and local legislation aimed at securing, preserving, and maintaining environmentally sensitive land and establishing high standards for environmental quality has

grown, and consistent with this sentiment, the New Jersey Department of Transportation has: 1) promoted environmental consideration in the transportation facilities planning stage to enhance the environment when possible, and 2) sought available ways to mitigate any projected adverse impacts. Indeed, federal legislation such as the National Environmental Protection Act (NEPA), Section 106 of the Historic Preservation Act, and Section 4(f) of the 1966 Department of Transportation Act have had significant and far reaching impacts on NJDOT programs and projects.

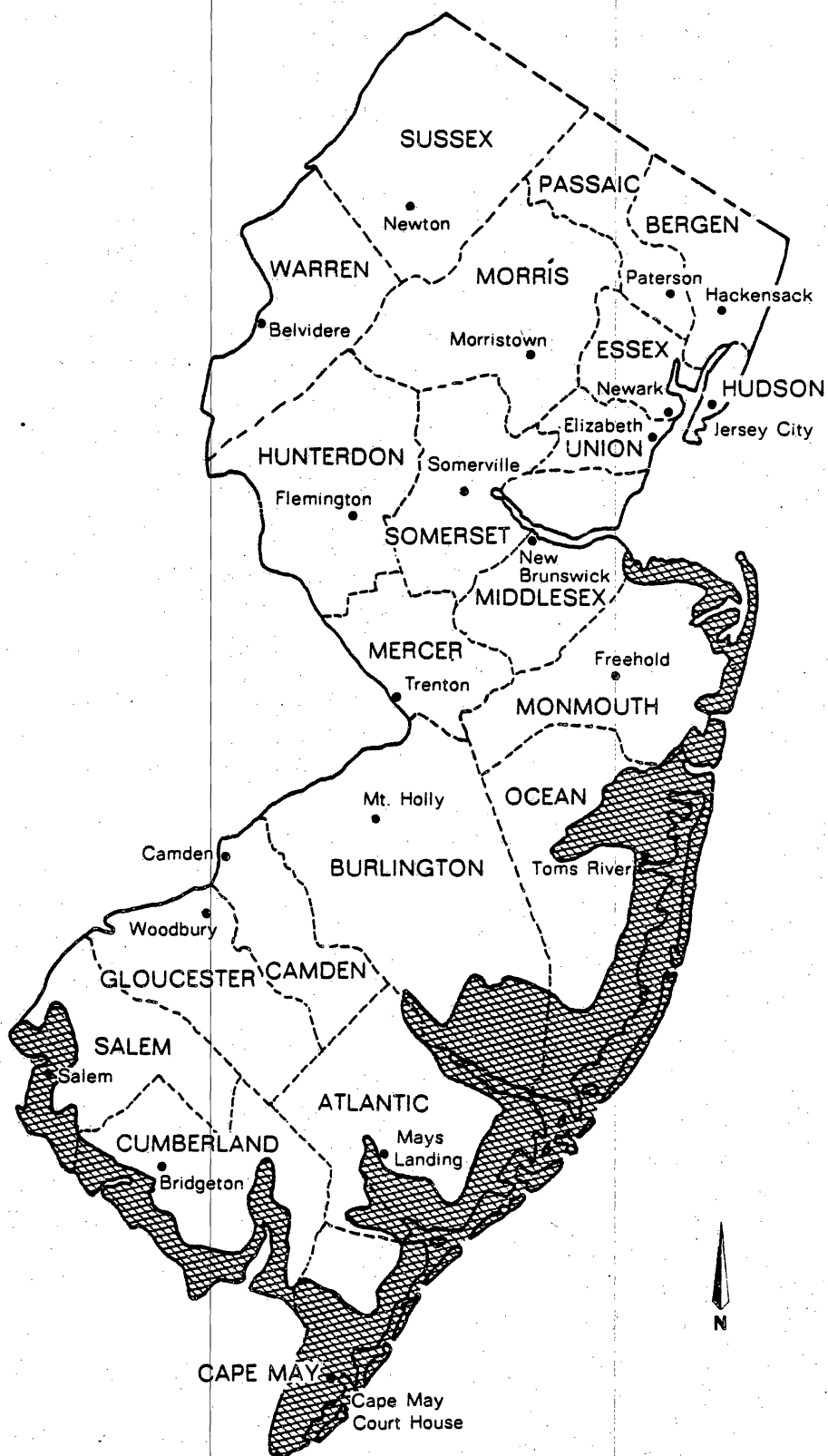
The state boasts a number of environmentally sensitive areas, which have led to protective legislation. For example, the continually growing public awareness of the adverse impacts of "over-development" of the state's coastal area culminated with the passage of the Coastal Area Facilities Review Act of 1973 which authorized the state to prepare a plan for coastal management and to regulate all proposed industrial uses and large scale residential developments (see Figure 1). The purpose is to guide growth, avoiding adverse environmental impacts in an area having one of the most fragile and important ecological systems in the state. This area, so prone to intense summer recreational activity and residential and commercial development, presents complex environmental problems requiring unique solutions from scientists as well as planners.

Other environmentally sensitive areas include recreational areas and wildlife preserves which are so important that they have achieved national recognition and protection. These include:

- . Delaware Water Gap National Recreational Area which includes portions of western Sussex and Warren Counties bordering the Delaware River.
- . Gateway National Recreation Area concentrated in the area of Raritan Bay and Lower New York Bay encompassing Breezy Point, Jamaica Bay, and Floyd Bennett Field in New York State and Sandy Hook in Monmouth County, New Jersey.
- . Great Swamp National Wildlife Refuge in Morris County.
- . Barnegat National Wildlife Refuge in Ocean County.
- . Brigantine National Wildlife Refuge in Atlantic County.
- . Killconook National Wildlife Refuge in Salem County.

Not all environmentally sensitive areas have been designated for absolute preservation. The Hackensack Meadowlands District has been targeted for urban development, notwithstanding the fact that its location and land composition make it ecologically important to the northeastern metropolitan area. The Meadowlands District is composed of about 19,730 acres of largely undeveloped tidal salt meadows and marshes and extends through 14 northern New Jersey municipalities in Bergen and Hudson Counties. To insure the preservation of the Meadowlands and to produce a viable developmental plan, the New Jersey Legislature in 1968 enacted a law creating the Hackensack Meadowlands Development Commission. Possessing

FIGURE 1
MAP OF COASTAL ZONE REGULATED UNDER
COASTAL AREA FACILITY REVIEW ACT



independent administrative, financial, and regulatory powers of broad scope, the commission is responsible for writing and implementing a master plan and corresponding zoning plan. The zoning regulations set the framework for providing balanced development and necessary public services. The Department of Transportation is committed to ensuring that transportation improvements in and around the District are fully compatible with their Master Plan.

Two of the state's great natural areas, the Pine Barrens of southern New Jersey and the Skylands area of Passaic and Sussex Counties, also warrant special care and attention. The Pinelands area is a unique environmental system which is not duplicated anywhere in the United States. The Skylands area is a rugged area which contains heavy forests and steep slopes. In addition to its recreation potential, the rivers, lakes, and reservoirs in this area are the best source of water supply for major portions of the northeastern metropolitan area.

Besides the foregoing environmentally-sensitive land areas, the state contains numerous other state and local parks and forests, recreation areas, and fish and wildlife management areas. Historic landmarks from both the National and State Registers of Historic Places can be found in the countryside and cities of New Jersey, their existence protected by the New Jersey Department of Environmental Protection.

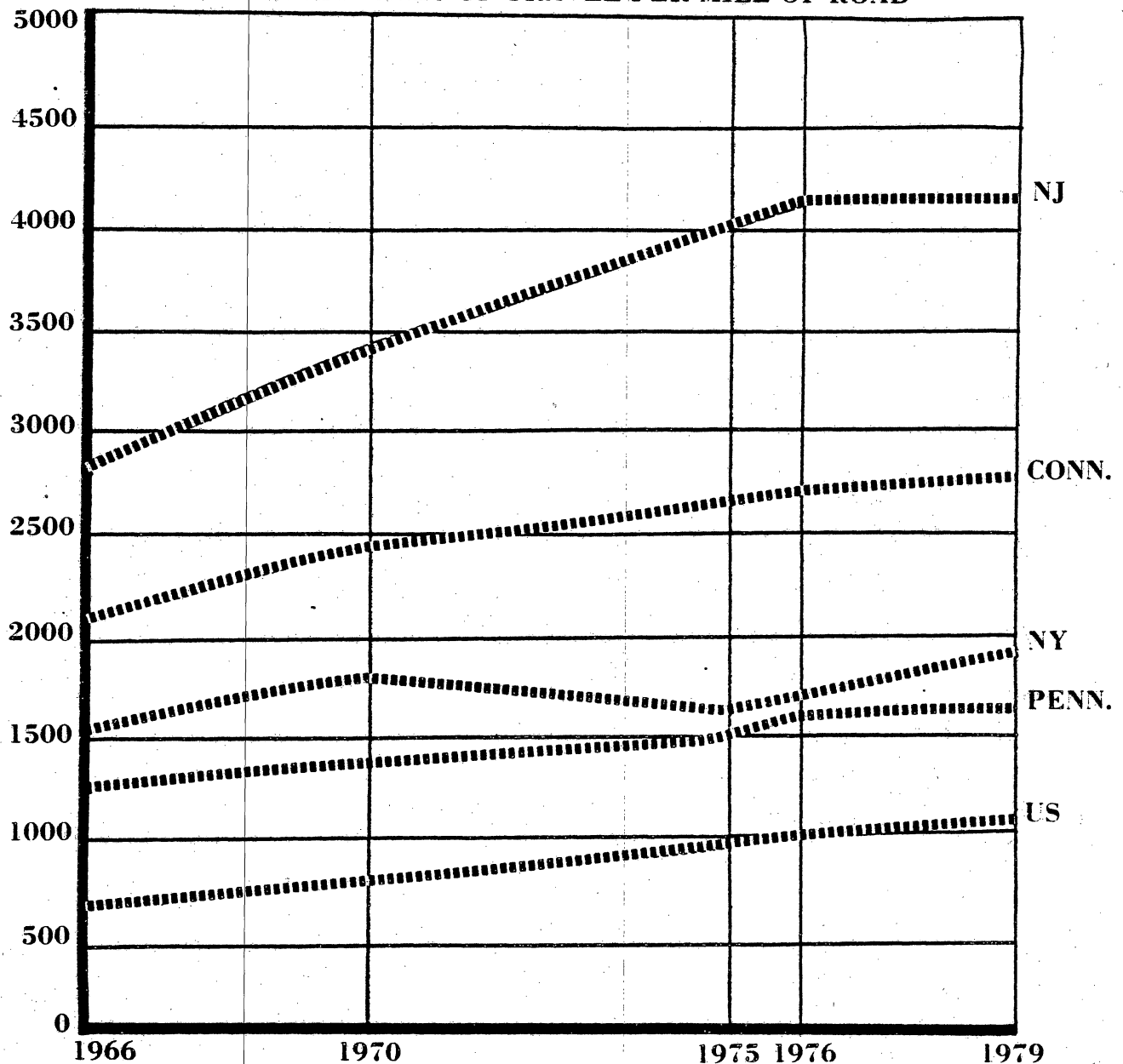
f. Funding Transportation

Perhaps the most critical transportation issue faced by New Jersey is the funding of its transportation systems and services. As the most urbanized and densely populated state in the Union, transportation systems in New Jersey experience greater usage than in other states.

New Jersey ranks first in the nation in traffic intensity, i.e., the number of vehicle miles of travel related to the total mileage of all highway facilities. Figure 2 historically compares New Jersey with other northeast states and the national average. The average daily traffic per mile of highway in the state in 1979 was 4130 vehicle miles of travel, while the national average was approximately 1070.

While the need for transportation facilities and services has grown in the state, the financial resources to meet these needs have not grown accordingly. In 1962, the state's transportation program accounted for approximately 18 percent of the total state budget. For FY 1982, only 6.7 percent of the total state budget was allocated to transportation. While absolute dollars have increased, their buying power has decreased. This situation has had its impact on the state's ability to meet transportation needs as more and more projects have been delayed or reduced in scope due to inadequate funds. Maintenance of state facilities has likewise been impacted over the years as maintenance standards have had to be reduced or, in some instances, some maintenance has had to be deferred altogether.

FIGURE 2
VEHICLE MILES OF TRAVEL PER MILE OF ROAD



Source: Highway Statistics. (various years).
U.S. Department of Transportation. FHWA

Public transit services have also felt the impact of limited funds as transit service has been cut while at the same time transit fares have been increased. Indications from the federal and state governments are that this situation is likely to continue in the near future.

Part of the problem can be related to the almost unique way that transportation is funded in New Jersey. New Jersey is one of only a hand-

ful of states which does not have some form of dedicated funding for transportation. Most other states divert all, or nearly all, of their transportation user revenues back to the transportation sector. However, in New Jersey, transportation user revenues are put in a general state fund and transportation must compete for those funds with other statewide services as part of the state's annual budgetary process.

The New Jersey Department of Transportation has taken some initiatives to advance a stable dedicated transportation funding program for the state. The NJDOT will continue to advance these initiatives in the future.

(1) Defining the Needs

New Jersey's transportation needs through 1988 were discussed in the recently published Short-Range Plan. These needs were modified in NJDOT's latest submittal of its seven-year plan to the New Jersey Commission on Capital Planning and Budgeting. However, in the aggregate, the Short-Range Plan is still representative of the state's short-term transportation needs and is summarized in the following paragraphs.

Capital Needs

As indicated in Table 2, the short-range plan identified capital needs through 1988 for three major categories of improvements which totalled \$5.78 billion.

**TABLE 2
SHORT-RANGE CAPITAL IMPROVEMENT PLAN SUMMARY
FOR SURFACE PASSENGER TRANSPORTATION
FISCAL YEARS 1981-88.**

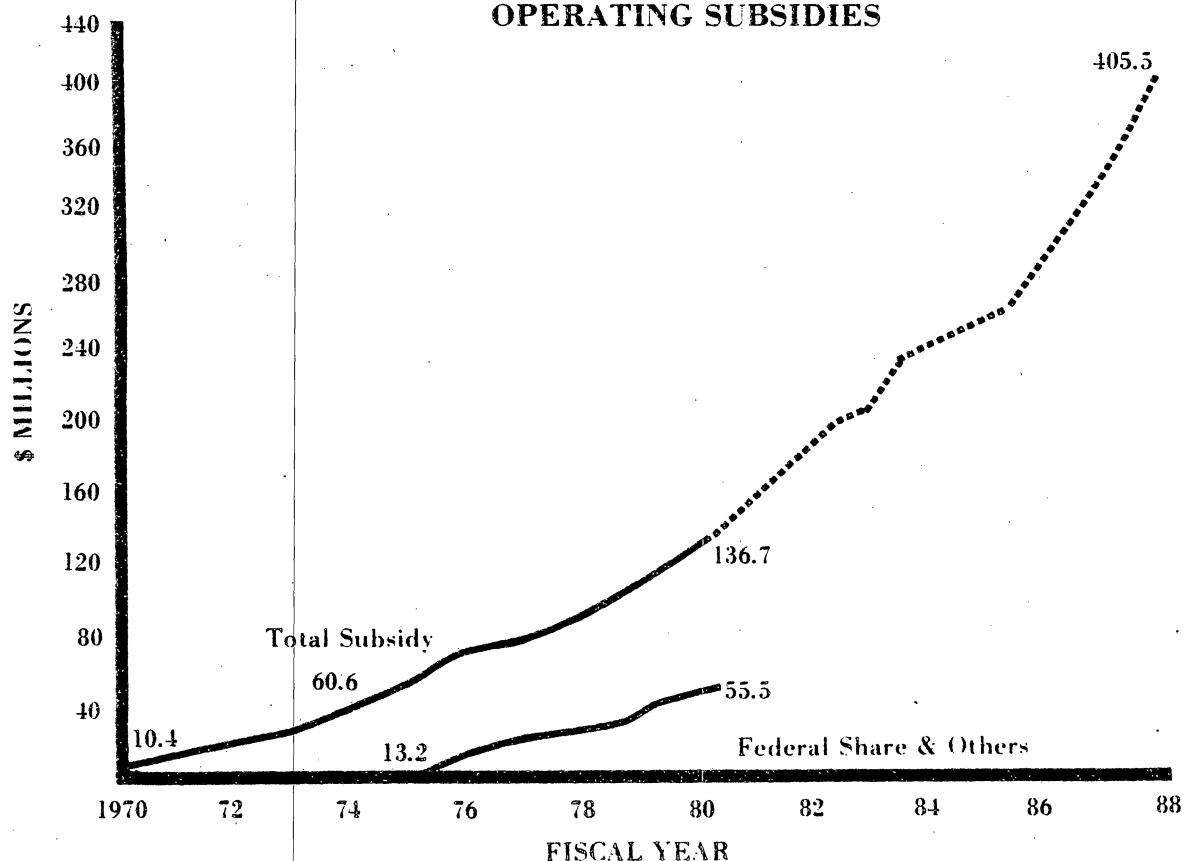
Category	1981	1982	1983	1984	1985-88	Total
Public Transit	389.4	241.1	243.4	303.1	955.5	2,132.5
State Highways	220.0	536.8	506.3	624.4	1,161.0	3,048.5
Local Roads	78.0	100.1	100.3	100.3	220.3	599.0
TOTAL	687.4	878.0	850.0	1,027.8	2,336.8	5,780.0

Note: All amounts in millions of 1980 dollars

Public Transportation Operating Assistance

The Short-Range Plan noted that the amount of operating assistance necessary to keep the state's present mass transit system in operation could grow from the approximate \$137 million reported for fiscal year 1980 to over \$400 million by 1988 (see Figure 3). This would represent an increase of almost 200% over today's needs. It was also noted in the plan that the growth in operating assistance provided from federal funds has not kept pace with the total growth in operating assistance needs. Indeed, federal funds for these purposes are now proposed for outright elimination.

FIGURE 3
RAIL AND BUS
OPERATING SUBSIDIES

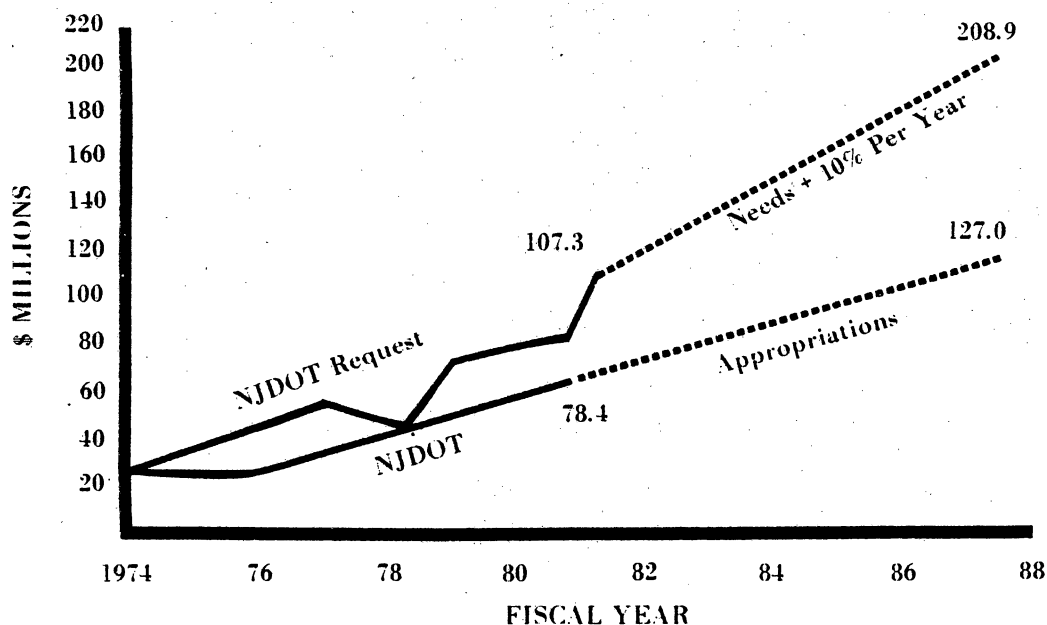


There is no doubt that the amount of operating assistance funds necessary to keep the state's mass transit systems in operation will continue to increase. With the likely cutback in federal funds for these purposes, the burden of meeting operating assistance needs will fall heavily on additional state and local resources, increased fares, and reductions in service. The mix of these factors will result in policy decisions that will evolve over time.

Operation and Maintenance of the State Highway System

State highway maintenance needs could grow to as much as \$209 million by 1988. Historically, funds appropriated to the NJDOT by the State Legislature for maintenance purposes have almost always been less than funds requested by the Department. This has necessitated reduced maintenance standards and the deferral of some maintenance altogether. This trend is likely to continue in the future under current funding policies (see Figure 4).

FIGURE 4
STATE HIGHWAY MAINTENANCE
AND OPERATING FUNDS



State Aid

County and local roads have suffered substantial deterioration over the years. The vast majority of these roads are not eligible for federal aid and county and local budgets have been unable to support an adequate level of maintenance and repair.

The short-range plan identified local road needs through 1988 totaling \$599 million. The lack of a uniform and reliable local fund contribution system for local projects is a major problem for state government.

(2) Short-Term Solutions

In 1979 the NJDOT developed an early action program to help alleviate the state's transportation funding problems. During that time, the Department successfully promoted the Transportation Rehabilitation and Improvement Bond Issue and a unique funding arrangement known as TRANSPAC. Both of these proposals were part of a program which was designed to provide approximately \$2.1 billion for transportation improvements through 1983. However, once these funds are exhausted some time in 1983, and if the state must rely exclusively on traditional sources and levels of funds, severe transportation funding problems will be experienced again.

(3) Long-Range Funding Issues

It is evident that current sources and levels of funding for transportation will not be sufficient to meet the state's continuing transportation needs. On the federal side, continued funding at current levels will be insufficient to address the ever-growing backlog of highway reconstruction, bridge rehabilitation, and other safety improvements which are growing at an alarming rate on the highway system of the state. The problem is equally significant for federal funding of public transit, both capital and operating. State funding has also been in short supply.

The NJDOT is trying to alleviate the funding problem with such initiatives as attempting to maximize the usefulness of interstate transfer funds and seeking the use of surplus revenues from the various authorities and commissions throughout the state. However, these efforts will not obviate the need for an adequate and stable funding source for transportation in the state. New Jersey is the only state in the nation where less than 70 percent of the transportation user revenues are returned to the transportation sector. To keep the State viable and economically competitive with the rest of the nation, the need for an increased and assured state and local transportation funding source must be recognized and provided by the citizens, legislature, and government officials of the state.

2. Future Growth and Development

As the previous discussion on major issues suggests, existing transportation programs affect to a significant degree the size and shape of future economic growth and development. Because transportation comprises a key component of our economic infrastructure, investment decisions, both for businesses and homeowners, are often determined by the availability, quality, and cost of transportation services. Therefore, it is a fundamental responsibility of the New Jersey Department of Transportation to examine the effects that its programs have on either enhancing or hindering economic growth and on molding or modifying the pattern of development. The Department's programs must be designed and planned so that they foster and complement the statewide policies on growth and development established by the Executive Office of the Governor. The interrelationship of this growth with transportation will be discussed in more detail in the "scenario" section.

3. Goals And Objectives

The quality of life of the citizens of the state should be the foremost concern of any plan dealing with an infrastructure as vital to our everyday life as transportation. In fact, quality of life may even be considered the ultimate goal or ideal toward which all other efforts are directed.

Quality of life is defined by the goals which the people establish for the social, economic, and environmental aspects of their society. From a transportation perspective, the important means to achieving these goals are transportation facilities and services, land use, and energy resources. The goals for these important "means" should be secondary to, but supportive of, the quality of life goals.

People live a life style that is mostly described by their degree of social activity, the amount of economic vitality, and the quality of their surrounding environment. Energy and land resources have become more important factors or constraints, not only because our population is growing, but because it is recognized that these resources, like transportation, are no longer unlimited in quality or quantity. And yet, all these elements or goals, primary and secondary, are interrelated. One element affects another, and so on, until the total picture of the quality of society's life appears to change, for better or worse, from the ideal. Transportation goals and objectives must, therefore, reflect or be integrated with goals and objectives from other elements.

Figure 5 illustrates the flow of considerations from the Quality of Life "Ideal" to Transportation Program Policy Statements. Transportation, land use, and energy are shown as interrelated with social, economic, and environmental considerations because none of these elements are mutually exclusive. The direction to be taken by one will affect the direction to be taken by another. In addition, there are certain external influences outside the basic elements of our quality of life which will affect the direction of future transportation development. Although not all-inclusive, some of the major influences include legislative mandates, fiscal considerations, technological advances and public input.

In recent years, there have been a number of planning developments which are affecting our perception of quality of life and the way in which it is achieved. The developments could, in effect, place certain limitations on the direction that future transportation programs will take. Some of the more prominent developments are summarized as follows:

New Jersey State Development Guide Plan

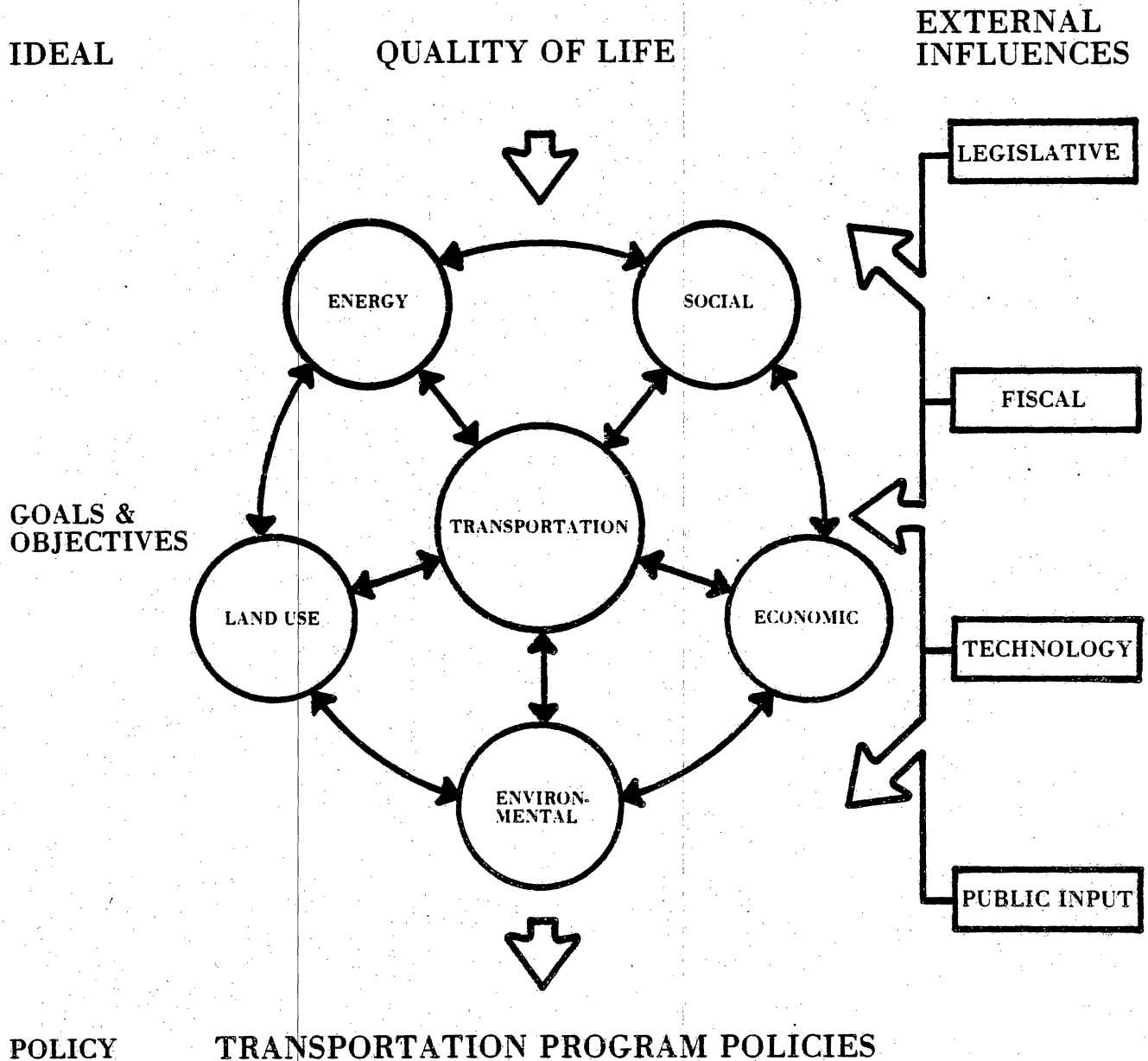
The New Jersey Department of Community Affairs published its State Development Guide Plan (preliminary draft) during September, 1977. This plan was developed to provide a framework plan within which development programs could be viewed for their potential impacts. The plan suggests areas appropriate for future development, as well as areas in which development should be constrained. The plan also establishes a series of guidelines to assist the public and private sectors in relating proposals to fundamental state goals and objectives.

The plan identifies goals for future state development. These goals are summarized as follows:

- . maintain the quality of the environment
- . preserve the open space necessary for an expanding population

FIGURE 5

DEVELOPING TRANSPORTATION PROGRAM POLICIES



- . provide space and services to support continued economic expansion
- . enhance the quality of life in urban areas

New Jersey Energy Master Plan

The New Jersey Department of Energy published a revised New Jersey Energy Master Plan during September, 1981. The publication of this document enabled New Jersey to become the first state to develop a comprehensive guide for statewide energy policy.

The report outlines proposed policy goals and strategies to shape energy-related decision-making in the state for the next ten years. It recognizes the important links between energy and the economic and environmental goals of the state. The plan identifies three long-range energy policy goals which are identified as follows:

- . assure uninterrupted energy supplies to all residential, commercial, utility, and industrial users in New Jersey
- . promote economic growth while safeguarding environmental quality
- . encourage the lowest possible energy cost consistent with the conservation and efficient use of energy

The State Implementation Plan for the Attainment and Maintenance of Air Quality Standards

New Jersey's "State Implementation Plan for the Attainment and Maintenance of Air Quality Standards" (SIP) was formally delivered to the Environmental Protection Agency during December, 1978.

The SIP describes four basic classes of emission controls:

- . regulations for those industrial emissions which contribute to ozone standards contravention
- . the federal "tailpipe" control program to reduce emissions from new motor vehicles (FMVP)
- . New Jersey's motor vehicle emissions inspection and maintenance program (I/M)
- . measures to reduce pollution emissions from the state's transportation system

The State Implementation Plan is currently in the process of being updated. The revised plan must be submitted to the Environmental Protection Agency by July 1, 1982.

Section 504 of the Rehabilitation Act of 1973

Section 504 of the Rehabilitation Act of 1973 prohibits discrimination on the basis of handicap in any program receiving federal assistance. Presidential Executive Order 11914 required the Department of Health, Education and Welfare (HEW) to issue guidelines concerning the responsibilities of each federal agency under Section 504, which reads as follows:

"...no otherwise qualified handicapped individual...shall, solely by reason of his handicap, be excluded from the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance..."

Governor Brendan T. Byrne's Second Inaugural Address

The importance of preserving our state's urban areas was emphasized in Governor Byrne's second inaugural address and has governed the state's actions throughout the administration's last four years.

"Yet, with these exciting new developments to enrich our lives and our image, one great frontier remains: the inner frontier of our own cities. If our cities are not made as healthy and attractive as the rest of New Jersey, I fear that all the other achievements are threatened. But if we take up and win the challenge of the cities, we will not only restore ourselves, but set an example for a whole nation to follow...."

State Expenditures Limitation Act

On August 18, 1976, Governor Brendan T. Byrne signed P.L. 1976, c.67 which created the State Expenditures Limitation Act. This CAP legislation limits the maximum permissible expenditures by the state based on a formula which is tied to the state per capita personal income.

* * *

The preceding activities were given careful consideration in the development of goals and objectives which serve as the basis for the various transportation program policies. Consideration was also given to other state and regional metropolitan planning organization (MPO) reports, as well as staff analysis, to arrive at a consensus for future statewide transportation development programs. The following discussions on goals and objectives are represented from a transportation perspective.

a. Transportation-Social Goal

Establish and maintain as equitable a transportation system as feasible which allows New Jersey's citizens and visitors the opportunities to participate in those social activities which express the varied and acceptable aspects of human life.

Objectives

- . Promote social well-being by enhancing the accessibility of employment, educational, religious, cultural, recreational, medical and other activities and by encouraging expansion of the range of opportunities for such activities.
- . Maintain neighborhood integrity in the development of new facilities.
- . Open accessibility opportunities to those persons with physical or economic handicaps (handicapped, elderly, young, economic disadvantaged, auto-less) such that they may be integrated into the mainstream of social activities.

b. Transportation-Economic Goal

Establish and maintain a transportation system which will assist in the inducement of continued economic growth in New Jersey with minimum environmental damage and social disruption.

Objectives

- . Promote an appropriate relationship between land development and each component of the transportation system to maintain consistency with state economic development and petroleum resource policies.
- . Consider all impacts of new or improved transportation facilities on existing businesses.
- . Provide new and improved facilities which will develop economic opportunities consistent with overall growth objectives.

c. Transportation-Environmental Goal

Establish and maintain a transportation system which complements the state's desire for a clean, healthful and pleasant living environment.

Objectives

- . Plan, design and construct transportation facilities with minimal impact to the environment: noise, air, and water pollution; community disruption; aesthetic degradation.
- . Promote the usage of transportation modes or programs which maximize the attainment of needed mobility but minimize the detrimental impacts of that need on the environment.

d. Transportation-Land Use Goal

Develop an appropriate balance between land development and each component of the transportation system to promote state goals and to enhance the economic development potential of the state. Ensure that trans-

portation plans, projects, and programs are consistent with the following: Department of Community Affairs' State Development Guide Plan; Metropolitan Planning Organizations' Year 2000 Land Use, Housing and Open Space Plans; Regional Development Guides and Transportation Plans.

Objectives

Urban Revitalization

- . Provide transportation facilities which promote urban development consistent with state, regional, and local objectives.
- . Promote transportation modes consistent with existing or desired population densities.
- . Give priority to transportation investments which are vital to the economic development of the older urban communities.
- . Promote a balanced and coordinated transportation system which would reduce congestion and improve travel time within the urban areas.

Suburban and Rural Development

- . Link outlying population clusters with their natural urban central business districts (CBDs) and employment opportunities.
- . Promote new facilities or improvements to existing facilities which encourage the clustering of economic activities.
- . Discourage land development which is inconsistent with the ability of the existing transportation system to serve the additional travel demands.

Preservation

- . Discourage new facilities or improvements to existing ones which would promote development in areas set aside as agricultural, open space, etc.
- . Meet transportation needs through improving existing facilities rather than constructing new ones wherever possible.
- . Manage automobile travel in such a manner so as to increase the people carrying capacity of the system and thus minimize the need for additional lane miles.
- . Consider joint use of rights-of-way or air-rights for maximum benefit to society.
- . Ensure that transportation plans, projects, and programs strive to maintain the preservation of environmentally-sensitive lands and waters defined by the Department of Environmental Protection's Coastal Management Program, Green Acres Program, Parks

and Forests Management Programs, Wetlands, Riparian Lands, and Flood Plains Management Programs, and Stream Encroachment and Water Planning Resources Programs.

Accessibility

- . Minimize interchange locations on freeways and expressways except in those areas where vital to urban revitalization.
- . Discourage land development in areas where such development will severely overtax the capacity of existing transportation systems and where improvements to the existing system are impractical.

e. Transportation-Energy Goal

Promote the concepts of energy conservation by placing more emphasis on public transportation systems and ridesharing programs, by encouraging some measure of trip diversion away from the single-occupant auto, and by encouraging the more efficient use of the highway system through low capital intensive transportation services and facilities that reduce congestion and conserve energy.

Objectives

Conservation

- . Encourage greater use of more energy-efficient modes of transportation such as public transportation, carpooling, vanpooling, bicycling, walking, etc.
- . Encourage more energy-efficient use within each and every mode of transportation used for passenger movements.
- . Encourage greater use and dependence on telecommunications as a beneficial alternative to trip-making where possible.
- . Encourage multiple-purpose trip-making instead of single-purpose auto trip-making.
- . Support the New Jersey Department of Energy's programs and recommended transportation conservation policies.

Equity

- . Support all attempts by the New Jersey Department of Energy to assure that petroleum supplies are available for New Jersey transportation needs during emergency periods, as well as non-emergency periods, based on the most equitable system possible in relation to other state interests, adjoining states and/or regions.

Development

- . Support/promote research and development of new energy forms, existing untapped energy resources, and more energy-efficient transportation vehicles.
- . Encourage the development of a more reliable, more efficient, more accessible public transit system - commuter rail, rapid rail and bus.

Energy Planning

- . In conjunction with the New Jersey Department of Energy, assist in the preparation of contingency plans for petroleum emergencies for the state.
- . Analyze all major projects to determine the energy impact of such projects.
- . In conjunction with the New Jersey Departments of Energy and Labor and Industry, assist in the preparation of a long-range, long-term transportation energy plan-the ultimate aim of which is the most energy-efficient transportation system available.

f. Transportation Program Goals

The basic transportation goal for New Jersey should be the development, coordination, and maintenance of a transportation system that provides the optimum capability for the movement of people and commodities in the most efficient, time-effective, convenient, safe, reliable, and cost-effective manner consistent with the social, economic, and environmental interests of the people. At the same time, emphasis should be placed upon transportation needs within the urban, suburban, and rural areas, and between cities.

Inter-City Transportation Goal

Develop, maintain, and maximize the total utilization, for all potential users, of a balanced transportation system which interconnects major cities and industrial sites with each other, as well as with those of adjoining states, with maximum consideration given to social, economic, and environmental concerns.

Objectives

- . Complete and/or improve the essential links of the intercity surface passenger transportation system.
- . Provide sufficient capacity to maximize the accessibility of major urban centers of the state to each other, as well as those of adjoining states.

Urban Transportation Goal

Promote the development, maintenance, and maximum utilization, for all potential users, of a multi-modal transportation system within the urban areas, which provides the optimum capability for the movement of people in a manner consistent with the social, economic, and environmental interests of the people of each urban area and within a transportation planning process which establishes cooperation among public, private, and citizen interests.

Objectives

- . Provide integrated transportation systems within the urban areas which augment and support the intercity transportation system while at the same time serving the major activity centers within the urban area.
- . Provide sufficient surface transportation capacity to maximize the accessibility of activity centers within the urban areas of the state.
- . Plan transportation system improvements comprehensively, in cooperation with the metropolitan planning organizations, local agencies, elected officials, and interested citizens.

Rural Transportation Goal

Promote the development, maintenance, and maximum utilization of a transportation system which meets the basic mobility needs of the residents of the rural and small urban areas of the state.

Objectives

- . Promote the development of a transportation system which connects the major rural concentrations of population with their natural urban centers.
- . Promote the development of a transportation system which serves the more important intra-county corridors not already served by the intercity surface passenger system.
- . Promote the development of transportation systems and programs which provide the potential users with a modal choice.

4. Program Policy Statements

The previously defined general development goals and objectives for the state must be translated into specific transportation program policy statements in order that a) the attainment of the desired goals may be furthered, and b) the setting for program priorities and direction may be established.

Within the past decade we have seen the range of transportation programs broadened to deal with a greater variety of transportation

problems and needs. Expanded safety, economic development, and rural public transportation programs were added to the traditional legislated programs. At the same time, the assessment of environmental and social goals in program development has intensified in recent years. Transportation dollars purchase less each year due to inflation. The uncertainty of future energy resources, particularly the availability of petroleum products, makes the forecasting of transportation needs difficult. Thus, specific policy statements are appropriate in guiding transportation system development.

The New Jersey Department of Transportation must be sure that it responds to the needs of the citizens. Specific policy statements require a knowledge that such policies will address these needs. In order to determine what transportation programs conceived within the Department would have broad-based support from the public and what policies would be expected in a revised transportation plan, the Department circulated, during February of 1979, questionnaires citing various transportation objectives to various public groups for their response. The results of this survey were useful in the development of draft program goals, objectives, and policy statements.

The draft goals, objectives, and policies portion of the Surface Passenger Transportation Plan, the initial document in the series of documents updating the 1972 Master Plan, was well accepted throughout the state upon its presentation in the fall of 1979 as a redirection of the Department's transportation activities.

Public Meetings and Questionnaires

During November and December of 1979, public meetings and workshops were held throughout the state to solicit recommendations on improving the draft goals, objectives, and policies section of the Surface Passenger Transportation Element. Also, throughout 1980, questionnaires related to the same document were distributed to interested individuals, agencies, and special interest groups for the same purpose. The analysis of comments made at the meetings and recorded on the questionnaires have been useful in amending the draft policy statements.

During May of 1981, public meetings were held throughout the state to present a draft 8-year short-range plan for surface passenger transportation that was developed during 1980. Although those meetings were held primarily to solicit comments on the short-range plan, some comments received had pertinence to the draft policy document, and thus contributed to these revisions.

The overall format of the policy document has been maintained. However, some policy statements have been omitted because they were judged to be vague, and others have been combined with other statements to eliminate fragmented concepts. Some new policies have been added, and many have been reinforced with supporting or clarifying statements.

Transportation Program Policies

Program policies to be promoted by the New Jersey Department of Transportation are categorized into the following programs:

- . Railroad Services
- . Bus Services
- . Paratransit
- . Highways and Streets Programs
- . Ridesharing Programs
- . Bicycle Facilities and Programs
- . Pedestrian Services
- . Railroad Station Facilities
- . Bus Passenger Facilities
- . Park-and-Ride Program

The format for each program policy includes an introduction which discusses the program, and program policy statements which include brief explanatory paragraphs expanding each policy statement.

a. Railroad Services

Introduction

The passenger rail system in New Jersey consists of both commuter rail and rapid rail facilities. The commuter rail system serves 16 of the 21 counties in the state with approximately 500 route miles of track and carries about 168,000 passengers per day. The rapid rail system serves three counties with almost 33 route miles of track and carries about 224,000 passengers per day.

The state's commuter rail system was generally characterized by outdated and worn equipment, unreliable service, and, until the recent energy crisis, declining ridership. This was the result of years of neglect by private owners of their rail assets. By contrast, most of the state's rapid rail facilities, which are owned and operated by public agencies, provide modern, efficient, and reliable service.

Since 1961, the state and federal governments have subsidized commuter rail service in New Jersey. The subsidy program has grown from its initial \$4.1 million investment in 1961 to approximately \$88 million in fiscal 1981. The Newark City Subway is also a participant in the subsidy program.

Passenger rail service will play an integral part in the state's future growth and development. There is an integral relationship between land development, public transportation, and petroleum conservation, and every effort will be made to maintain essential services and expand this service where warranted in the future.

Program Policy Statements

Give High Priority to Preserving and Stabilizing Essential Service

The economic vitality of the state depends on railroads through the service they provide to both commuters and industry. In this era of energy prudence, it is essential that existing rail service be preserved and stabilized, not only to provide the commuter with a viable transportation alternative to the automobile, but also to guide more energy efficient land development in the future.

Maximize System Operational Flexibility and Efficiency

The State's commuter rail system represents the remnants of a system that was built a century ago by private interests. An initially strong and large market for both passenger and freight service resulted in numerous private operators competing for a share of that market. The independent rail systems that emerged were not all compatible, i.e., were not necessarily interconnected and/or used non-compatible power sources in the case of electrified routes. Today's publicly owned passenger rail system largely retains those inherited traits. However, there are opportunities to provide a more efficient service to the public at reduced cost. A number of possible interconnections and operational improvements, most notably a compatible electric power system, will make it possible to restructure rail service, maximize the efficient utilization of rolling stock, and attain a more efficient and responsive operation.

The Department will give high priority to the development of prospective rail system improvements where such improvements are demonstratively cost-effective in reducing operating costs and/or increasing fare revenues.

Rebuild the Physical Plant

The state, through NJ TRANSIT, owns 425 miles of railroad right-of-way, as well as stations and other supporting facilities. Included in the inventory are bridges, viaducts, tunnels, storage yards, structures of all sorts and other tangible assets. Much of the system was neglected by the former bankrupt owners for many years and must be rebuilt to insure reliable, comfortable, and on-time performance.

Replace Obsolete Rolling Stock

The state owns all coaches, electric commuter cars, and locomotives used in its commuter rail service. Through a replacement program, most of the rail cars are less than ten years old. However, many cars needed during peak periods are old, uncomfortable, and unreliable, and need to be replaced.

The state also owns a number of electric and diesel locomotives, some of which are old and unreliable. Their replacement is essential to continued rail service. Replacement equipment is scheduled to be in service within a year.

Maintain a Decent Level of Service

It is essential to the preservation of rail service that a decent level of operations be maintained. Therefore, it is mandatory that trains run on time, heating and air conditioning systems be in working order, seats and floors be clean, train crews be at work, tracks be unobstructed, signals and communication systems be operating, and stations be open to the public and staffed.

The state affirms its intention to see that rail passenger service is maintained at the highest level possible within the confines of financial capability. Any increase in frequency of service must, however, be tempered by cost-effectiveness considerations.

Promote Fare Structures Which Will Serve as an Inducement to Increased Ridership

Inflation and increased energy costs now make rail services more attractive as an alternative to the automobile. It is essential that fare structures be set at a practical level which seeks to maintain existing ridership, as well as induce increased ridership. This policy requires that operating subsidies be continued for all essential rail service.

This policy must also be tempered by financial feasibility restraints, and by demonstration that subsidies are not excessive. Obviously, the cost the state is prepared to bear is a measure of the public benefit the state perceives in maintaining service at certain fares. However, a consistent fare policy must be in place that equitably treats bus and rail riders and covers an acceptable portion of operating costs.

Provide Accessibility for the Elderly and Handicapped

Most of the state's commuter rail system has limited accessibility for the elderly and physically disabled. Without the ability to drive a car and without accessibility to public transit, these individuals have restricted mobility. Improvements which would facilitate access to the system are desirable, e.g., renovating stations and platforms, and will be implemented where appropriate. The benefits which would be derived from such improvements must be gauged against the benefits which would be derived from other alternatives, e.g., paratransit, in order to judge where such improvements are appropriate.

Provide Appropriate Protection at all Rail-Highway Crossings

It is essential to the efficient and safe operation of both the rail and highway systems that all rail/highway crossings be appropriately protected from conflicting movements. Grade separated crossings should be constructed at high volume crossings, while appropriate warning and/or safety devices should be installed at lesser volume at-grade crossings.

Expand Appropriate Rail Service to Developing Areas Where it is Judged to be Cost-effective

As New Jersey's population continues to grow, and more dense corridors develop, railroad services will play a key transportation role in the orderly growth of these developing areas. Because of the energy conservation aspects of rail transit, it is essential that the appropriate commuter or rapid rail facilities be considered as an integral part of the planning for these new growth areas.

The Department will study a developing area's needs on a case-by-case basis, and identify the most cost-effective transit improvement options. This may or may not entail rail service extensions. Sprawl discouragement will be a paramount aim of the Department in assessing these needs.

Retain Discontinued Rail Service Rights-of-Way for Future Use

There are numerous commuter and freight rail lines which have been discontinued and abandoned over the years. These rights-of-way could be a valuable asset to future transportation growth and development and will be retained where feasible for future considerations. The Department will decide on the specific uses of such rights-of-way on a case-by-case analysis.

Encourage Priority Allocation of Energy Supplies to Rail and Bus Systems

By its nature, rail and bus service is more efficient in terms of energy used per passenger mile than the standard one-occupant auto. During emergency energy situations, the Department will encourage a priority allocation of fuel to rail and bus systems.

b. Bus Services

Introduction

Each day over 650,000 riders use buses, and to many it is the only available means of transportation. State and federal funds, provided to private and public carriers, are used to subsidize the costs of bus service. This subsidy affects about 80% of regular-route riders in the state. In fiscal 1981 the operating subsidy amounted to about \$64 million.

Since the state operating assistance program began ten years ago, ridership has decreased by over 40%. The costs to provide service have exceeded the amount of public funds available to pay the private operators, and, as a result, the level of bus service in New Jersey has deteriorated.

To reverse this decline in needed bus service, the state created the New Jersey transit corporation, NJ TRANSIT in 1979. This public agency is authorized to purchase the property and equipment of private bus companies, and to operate transit lines. The agency is charged with the

responsibility of providing an efficient, coordinated, safe, and responsive public transportation service which promotes mobility, serves the needs of the transit-dependent, protects the environment, conserves energy, and promotes sound land use and the revitalization of our urban centers.

Program Policy Statements

Preserve Existing Essential Bus Service

Existing bus service will be maintained during any transition period when NJ TRANSIT acquires bus operators. Operating subsidies will still be available to those bus operators which remain independent, private companies. Private operators willing to meet the state and federal requirements for public assistance will share available funds with NJ TRANSIT.

The largest private operator, Transport of New Jersey, and its subsidiary, Maplewood Equipment Company, which together operate over half the bus service in the state, was acquired by NJ TRANSIT on October 14, 1980. The other 209 private companies, which provide the balance of the service, will have the opportunity to coordinate or consolidate their operations and equipment with NJ TRANSIT. NJ TRANSIT has a built-in consumer orientation. It will strive to provide levels of bus services at the right time of day to those people who need the service the most, reflected in prevailing travel patterns and travel densities. Route modifications, additional service for heavily travelled lines, innovative fare structures, and an aggressive marketing program will all be implemented using bus service improvement recommendations developed by the Department of Transportation and NJ TRANSIT. However, such service improvements must also be tempered by fiscal limitations and fare revenue prospects.

Acquire and Maintain Modern Buses

The state presently owns 1,579 of the 3,605 buses operated in New Jersey. The Department will purchase 1,165 new replacement buses, which will lower the age of the statewide fleet, required to provide peak period service, to under twelve years. These new buses will be air-conditioned, have easy access features for the elderly and handicapped, and be equipped with the most efficient air-pollution controls available. State-owned buses are available to the private operators and NJ TRANSIT, provided that stringent maintenance conditions are met.

One of the more unfortunate aspects of the rapid increase in the costs of operating buses is that periodic maintenance of the equipment is often minimized to cut costs. This frequently results in breakdowns on the street and aggravating schedule disruptions. Equipment has been characterized as too often dirty and unattractive to those potential riders repelled by graffiti, littered floors, and non-transparent windows. Air-conditioning equipment occasionally fails in the summer causing riders to swelter in the buses. However, steps have been taken to clean up the equipment and repair faulty machinery. The adequate maintenance of all publicly-owned buses will be a primary policy of the State. The maintenance shops acquired by NJ TRANSIT will be made more efficient and, as funds become available, new shops will be built as needed.

Promote Progressive Management

Public ownership and operation of buses provide the opportunity to more efficiently manage existing services through the coordination of operations and centralization of management. Where it is determined that improved service can be provided to the public through better coordination of operations, NJ TRANSIT will be able to work directly with the private operators. On the other hand, where public operation is viewed as the best way to improve service, NJ TRANSIT will be able to merge existing routes into its route structure. A significant reduction in overhead expenses can occur. Purchasing, accounting, and other general administrative functions can be run more effectively. Service adjustments will be made where two competing companies run buses on the same route, resulting in more buses available than needed during the rush-hours and few buses running off-hours. Fares charged will be equitable to all, and transfers will be provided between routes. Supervision of buses on the streets, by the utilization of modern communications techniques, will result in closer adherence to schedules and the ability to respond quickly in order to overcome service disruptions.

Further, NJ TRANSIT management will develop adequate and where possible innovative marketing programs and public information systems, especially in regard to fares, maps, and schedules.

Foster the Coordination of Public Transportation Service

In the words of the act which created the Corporation, it is stated that, "it is desirable to encourage to the maximum extent feasible the participation of private enterprise and to avoid destructive competition." In addition to coordinating existing bus schedules and routes in the state, NJ TRANSIT will assist in setting up bus feeder routes to commuter railroad and rapid transit stations. Whenever possible, commuters will be encouraged to leave their cars at home and use public transportation.

Park-and-ride lots will be built along transportation corridors, and buses will be scheduled to serve these parking lots. Many areas of the state without commuter rail service are now provided with commuter bus service to Newark, New York City and Philadelphia. These operations can often be extended to serve developing residential areas, shopping centers, and employment concentrations. When a potential market for bus service occurs, NJ TRANSIT will explore all possibilities of operation either by itself or in cooperation with private bus companies.

c. Paratransit

Introduction

Paratransit generally refers to those forms of passenger transportation that operate on the highway and street system which are "in-between" the private automobile and conventional bus. Included are such services as rental car, taxi, dial-a-ride, jitney, and subscription bus.

Paratransit can play an important role in serving peak hour travel, in meeting low density travel demand (particularly by disadvantaged groups), in providing short access trips to conventional transit terminals, and in serving the demand for internal movement within business and commercial districts. Thus, paratransit might effectively substitute for or complement the private automobile and conventional transit.

Paratransit could become an essential element in a system tailored to meet the diverse needs of an urban area such as New Jersey. It can operate in low density areas not economically served by fixed rail or bus systems, provide feeder service to line haul routes, and provide the backbone of small community and neighborhood transit service.

Paratransit policy has been given impetus by the Governor's recent Executive Order for the Coordination of Specialized Transportation Services in New Jersey.¹ Basically, this order requires the state to continue its efforts in the coordination of paratransit services, especially by assisting the counties in establishing county-wide coordination offices and paratransit coordination plans. Among other requirements, the order directs the state to research and develop sources of funding for local demonstration projects for the coordination of specialized transportation services.

Program Policy Statements

Encourage Local Initiative

Local initiative is this program's basic tenet. The localities should be encouraged to take a larger role in solving local transportation problems. Generally, the county should become the coordinating unit and assist in the identification of local mobility needs and appropriate paratransit solutions.

Promote the Use of Existing Transportation Resources

Encouraging the utilization of existing local transportation resources, such as local private operators and existing public services, will make this program more economical.

Foster Coordination

Efforts will be made to achieve greater coordination of existing paratransit services. This will require greater communication with, and the provision of technical assistance to, local governing bodies. Maximum participation of private operators will also be encouraged so as to benefit from their incomparable expertise in providing these services.

¹ Coordinating Special Transportation Services in New Jersey by the Governor's Task Force on Transportation Service for Elderly and Handicapped Persons - Jan. 1980.

A single recipient for each county should serve as the broker for all state and federal funds flowing into their jurisdictions. NJDOT will be responsible for the fair and equitable distribution of these funds throughout the state.

Integrate Paratransit with Conventional Services

The Department shall encourage the linking of paratransit services to conventional transit wherever feasible. Ideally, the local paratransit network should function as a collector/distributor service for conventional transit in low-density or low-transit demand areas.

d. Highways And Streets Program

Introduction

New Jersey's highway and street system contains about 33,000 miles of facilities and carries approximately 20 million passenger trips each day. The responsibility for constructing, operating, and maintaining these facilities is shared among state, county, and local governing bodies, and several public agencies (highway authorities).

As New Jersey is the most densely populated state in the nation, its highway system has more vehicles per lane-mile than any other state, 125 vehicles compared to the national average of 34. Although most of these are automobiles, the highway system also carries more than 650,000 bus passengers per day.

Much highway construction in the past has no doubt contributed to the suburbanization process, which, in turn, has placed the core cities and larger urban areas in a state of economic and social instability. In addition, automobile usage has become a prime target in efforts to conserve energy and improve air quality. However, there is considerable public and private investment in highways which must be preserved for the movement of people and goods.

Concerns for the social, economic, and environmental impacts of highway construction, plus ever growing funding limitations, have led highway programs into a period of transition. The massive road building that characterized the 1950s and 1960s is being replaced by programs which are geared to preserving and improving the management of the system which already exists.

Highway plans and programs must be prepared carefully to accommodate the needs of a variety of modes (auto, truck, bus, bicyclist and pedestrian), for highways can serve as a positive and efficient infrastructure for future development of the state. However, these plans and programs must be geared to developing a totally integrated transportation system and be accomplished within a framework of coordination and cooperation between state and local governments.

Program Policy Statements

Give High Priority to Constructing Essential Missing Links

There are several segments of the statewide freeway system (both Interstate and Non-Interstate) which are still to be completed. The absence of these essential "missing links" severely curtails the full measure of service that could be provided by the freeway system and places an undue burden on county and local roads which must "bridge the gap" in the interim. This has led to many instances of severe localized congestion and its attendant problems. Completion of these missing links is essential to the circulation and proper functioning of the freeway system, as well as to air quality improvement, energy savings, safety, and national defense.

However, not all missing links are "essential", and those deemed non-essential will have a low priority or other projects will be proposed in their place, e.g., some proposed freeways may be downgraded to limited access facilities, or existing highways may be upgraded instead and complemented by improved public transit and/or ridesharing promotional efforts. Each missing link must be analyzed on its own merits.

Improve Existing Facilities Rather than Construct New Ones

There are numerous links in the statewide highway system which are currently deficient or are expected to be deficient in capacity in the future. In the past, it was in many cases the practice to improve the carrying capacity of a facility by constructing a new parallel facility. This practice was costly, caused extensive environmental damage, contributed to the suburbanization process, and increased auto use. To address current considerations, the Department will focus on improving the carrying capacity of a highway corridor, where appropriate, by improving the existing facility.

In order for the highway system to function properly and in the interest of improved air quality, energy conservation, and safety, it will be necessary to improve the carrying capacity of certain links where no other prudent alternative exists. In these cases, the Department will give highest consideration to the implementation of Transportation System Management (TSM) measures rather than the actual physical expansion of a facility.

In light of the deteriorating condition of local roads and an increased burden on local funding resources, the previous two policies will be advocated by the Department in its dealings with local governments.

Improve Substandard Links in the Highway Network

There are a number of links in the state highway network which are deficient by accepted Department standards. These links are generally significant in length and contribute to hazardous and uncomfortable driving conditions. Such deficiencies include, but are not limited to, extreme horizontal and vertical curves, 3-lane highways, undivided 4-lane sections of highway, and deficient lane or shoulder widths. In the interest of

safety, the Department will maintain an on-going program to identify and improve these deficient sections where appropriate.

Improve Hazardous and Congested Spot Locations

A number of locations exist throughout the state's highway system which are points of severe traffic congestion or are highly hazardous locations. Such spot locations include: Over-capacity intersections; traffic circles, inadequate or unsafe bridges; and hazardous rail/highway crossings. In the interest of safety, air quality, and energy, the Department will maintain an on-going program to locate and improve conditions at such locations.

Integrate the Highway System with Existing and Proposed Public Transit Systems

To promote more extensive use of the state's public transit system, the Department will integrate the highway system with the existing and proposed public transit system to the extent feasible. To facilitate modal change and increase public transit patronage, the highway program will strive to maximize highway access to public transit terminals, stations, and park-and-ride lots. Each new proposal to expand a highway's capacity will first consider park-and-ride lots which could encourage ridesharing.

Encourage the Elimination of On-Street Parking on Major Arterials in Congested Areas

On-street parking, especially during peak periods, deprives moving vehicular traffic of essential highway capacity. Motorists entering and exiting from their vehicles (as well as parking them) can effectively paralyze a center city street. The elimination of on-street parking from major arterials during peak periods in congested areas can do much to improve traffic flow and reduce congestion and in many cases can negate the need for additional capacity improvements. This action can lead to reduced automobile use, increased travel speeds, and significant reductions in auto pollutant emissions and energy use.

Encourage Measures which will Spread the Peak Period

The majority of traffic problems occur during the morning and evening journey-to-work and return trip. During each of these periods, as much as 8% to 10% of the total daily traffic carried by a highway facility can occur. By spreading the peak period, significant reductions in traffic congestion and capacity needs can take place. The Department will encourage public and private agencies, business, and industry to enter into a coordinated program to vary working hours so as to reduce traffic peaking characteristics. Such measures to be considered include the staggering of work hours, flex-time, and the 4-day work week. These efforts, however, will be cognizant of transit service.

Consider Bicycle Traffic in Facilities Design and Construction

The bicycle is a legitimate and viable transportation mode.

According to New Jersey law, the bicycle has essentially the same rights to the road as motor vehicles. Therefore, the transportation infrastructure should be constructed in such a way as to accommodate the shared use by both motor vehicles and bicycles. Further, the bicycle will be encouraged as a viable option for short trips.

Consider Pedestrian Traffic in Facilities Design and Construction

The pedestrian mode is a viable mode for fair weather short trips. Therefore, such movement should be allowed to occur through a separation of vehicular and pedestrian traffic. This will encourage pedestrian movements where such movements were previously unsafe (real or perceived) and allow vehicular traffic to flow with minimum interference and interaction with pedestrian movements. This can have an added advantage of simultaneously promoting public transportation use.

Encourage Enforcement of the 55 MPH Speed Limit

The Emergency Conservation Act of 1973 mandated a nationwide maximum speed of 55 miles per hour. Since that time, evidence indicates that enforcement of the 55 mph limit has resulted in the saving of thousands of lives and millions of dollars in property, reduced injuries, and provided significant savings in energy. The Department of Transportation assists the Division of State Police in the Department of Law and Public Safety in maintaining the speed limit. This cooperative effort and support will continue to be maintained.

Locate Interchanges on Freeways and Expressways Consistent with the State's Urban Redevelopment Objectives

The primary function of freeways and expressways is to interconnect regional activity centers. However, indiscriminate and excessive interchange locations can spur growth in undesirable growth areas as well as generate a significant amount of local traffic on a high-speed facility which was intended for longer distance trips. To negate these effects, interchange locations on such facilities will be minimized except in those areas where such access is vital to desired urban redevelopment. This policy will maintain the integrity of the system as well as serve both the transportation, growth, and development aims of a region.

Control Accessibility to the State Highway System

Accessibility to the state highway system is provided by the Department through a driveway permit request procedure. State law currently permits denial of access only for safety reasons. This practice has led to uncontrolled growth along the state highway system and has contributed significantly to current growth and traffic problems. To rectify this situation, the Department is supportive of changes in the law which would allow the Department to deny such access, should studies indicate that the transportation system is incapable of handling the additional burden generated by new development or such development is in conflict with statewide goals.

However, the Department does acknowledge its responsibility to provide access, while at the same time emphasizing the intent to protect the safety and efficiency of the highway system. This policy statement also acknowledges the Department's intent to seek legislation which will strengthen the Department's authority to deny access where it is absolutely necessary, modify the means of access where appropriate, and provide for necessary improvements to be funded by the private sector.

Give Increased Attention to Energy Implications of Proposed Major Highway Projects in the Conduct of Environmental Impact Studies

Since transportation, and more specifically the automobile, is the biggest user of petroleum, the Department requires that an energy analysis, as part of the environmental impact statement, be prepared for each major highway proposal. To achieve petroleum savings in addition to travel time savings, a given transportation facilities project should conserve energy in both its construction and operation (user) phases. Therefore, a variety of alternative transportation modes, including public transit modes and other ridesharing methodologies, will be included in each major project analysis to determine an energy-efficient solution. This policy is supportive of that proposed in the New Jersey Department of Energy Master Plan.

State regulation now requires that NJDOT provide NJDOE with an energy conformity determination (with the State Energy Master Plan) for such projects. Such determinations may be part of NJDOT's EIS for projects.

Advocate the Use of Energy Efficient Motor Vehicles

In this era of energy consciousness, it is prudent that the Department advocate the use of more energy-efficient motor vehicles on the State's highways. This implies more extensive use of the bus system as well as supporting strategies which encourage the use of smaller, lightweight, more energy-efficient motor vehicles. Such strategies could include motor vehicle registration fees, monetary penalties based on gasoline consumption and parking and toll programs, as well as tax incentives.

Minimize Disruption During Construction

Highway construction could have serious impacts on neighboring communities. Rechannelling or detouring traffic flow during the construction or reconstruction of these facilities can disrupt the day to day activities of commercial and residential districts. These changes can cause serious effects, often detrimental, even to the extent of permanently altering trip characteristics. Therefore, it is imperative that disruption to the community as well as the user be minimized during highway construction.

Construct or Improve Highway Facilities with the Lowest Initial Capital and Maintenance Costs Possible within Accepted Standards

In the present fiscally-constrained funding atmosphere, contracts

for construction of all highway facilities should not only be awarded to the lowest qualified bidder, but also to that design which will necessitate the lowest present and future operating and maintenance expenses.

Utilize the Most Efficient Technologies and Methodologies
Available for Operating and Maintaining the Highway and Street
System

As technological innovations continue to be developed for the operation and maintenance of highway facilities in such areas as highway lighting and signalization, resurfacing, and snow removal, the Department will pursue, investigate, and adopt those innovations which are truly energy efficient and cost saving while minimizing risk to travelers, residents, and the environment.

Negotiate Jurisdictional Responsibilities Consistent with
Functional Classification Concepts where Feasible

Changes in land-use, population density, and highway travel patterns have caused the functional usage of a significant number of highways and streets in the state to change over the years. Consequently, there are instances where state highways are serving "local" travel, and local roads are carrying travel of regional significance. To rectify this situation, the entire statewide system of highways and streets should undergo a jurisdictional realignment so that facilities of similar usage would be administered by those levels of government best suited to their administration. The Department will attempt to negotiate this jurisdictional redistribution with county and local governing bodies, based on the concepts of functional classification.

e. Ridesharing Programs

Introduction

In exploring methods of increasing vehicle occupancy, in order to achieve high levels of petroleum conservation and improvement in air quality, the Department is presently engaged in two ridesharing programs to promote public transit use, carpooling, and vanpooling. Each mode of transportation is a more or less appropriate way of increasing occupancy depending upon the nature of the area served and the related travel patterns.

The computer-assisted carpool matching program is the most actively promoted program presently being employed by this Department. Carpool matching is based on the concept that the major deterrent to the formation and use of carpools is a lack of knowledge relative to the origin, destination, and time-of-travel of other persons making trips between the same places at the same time.

A second program is the Department's Vanpool Program. A vanpool substitutes one high-occupancy vehicle for several low-occupancy vehicles. Vanpools operate like carpools except for the ownership of the vehicle and the greater number of persons in the pool.

Program Policy Statements

Assist both Public and Private Employers and Employees who wish to Establish Carpooling and Vanpooling Programs Where they are Needed and Desired

A concerted effort by the Department, as the lead planning agency, will enable these programs to become firmly established as a viable option within the state's total transportation system. This policy will be carefully exercised so as to avoid competition with public transit.. Further, such a program can provide useful feeder service to and from public transit systems. The Department also will continue to implement ridesharing alternatives where ridership no longer warrants regular transit route service.

Assist Local and Other State Government Departments, and Their Instrumentalities, in Encouraging Ridesharing by Removing Legal and Regulatory Barriers to such Programs, Supporting Existing Carpooling and Vanpooling Programs, and Providing Technical Assistance

Some laws and statutes regulating the insurance industry and inter-governmental transactions, once established for justifiable reasons, have today become archaic and/or regressive. Analysis of these regulations will reveal those laws which can be modified or repealed to allow ridesharing programs to be successful. To that end the Department will initiate the investigation of special insurance programs for those in carpools and vanpools, as well as an investigation of developing tax incentives for companies which provide special insurance programs for those who carpool.

Coordinate the Department's Ridesharing Efforts with the Departments of Environmental Protection and Energy, other affected Departments, Local and County Governments, Metropolitan Planning Organizations, and State Highway Authorities

It is imperative that a unified approach be maintained in New Jersey's ridesharing efforts which are crucial to the state's petroleum conservation efforts. Much of this effort will overlap both jurisdictional and administrative functions; thus success can be achieved only by a concerted effort on the part of all participants involved.

Strengthen the Department's Marketing Program to Promote the Concepts of Ridesharing

An increase of public response to informative promotional campaigns hinges on a well-managed and cogent marketing effort, similar to those employed by private industry.

f. Bicycle Facilities And Programs

Introduction

In an era of energy and environmental conservation awareness, the bicycle is an underutilized, inexpensive, and beneficial form of travel.

Bicycles can be used for short-trip utilitarian purposes such as travel to work, school, shopping, recreation areas, and public transit stations. Further, due to the aforementioned benefits, the bicycle mode is an extremely equitable form of transportation and can enhance the mobility of many sectors of the state's population.

Although current popular interest in bicycling is at an all-time high and bicycling is the number one form of outdoor recreation in New Jersey, greater utilization and integration into the transportation system is inhibited by safety and security problems, both real and perceived. Interaction with the auto mode, especially at roadway intersections, is a prime cause of bicycle accidents. Poor traveling surfaces, curbing, and poorly designed drain grates also contribute to bicycling hardships. With the high cost of many bicycle models and the high theft rate, inadequate and insecure parking facilities for bicycles are a major deterrent to such utilitarian use.

Primarily, the state will seek to establish adequate facilities and road designs which incorporate bicyclists' needs, improve public transit connections, promote increased use of the bicycle for short distance trips, and promote improved education of motorists and bicyclists regarding each other's rights and responsibilities. At the local level, emphasis should be on specific needs of a given municipality, and state assistance and support should be channeled in that direction.

Program Policy Statements

Promotion of Education of Both the Bicyclist and Motorist as the Most Effective Way to Reduce Bicycling Accidents, through Schools and Motor Vehicle Licensing and Registering

Education of both the bicyclist and the motorist is recommended as the most effective way to reduce bicycling accidents and thus promote confident bicycle use. Schools are the logical place to teach children; the automobile licensing and registration system is an easy, quick, and inexpensive way to reach the motorist; the electronic and printed media can reinforce the safety message to most of New Jersey's citizens.

Motorists must learn to understand bicyclists' abilities and problems. Bicycles are legitimate and legal vehicles on the road, a fact of which many motorists remain unaware or tend to overlook. Bicyclists need to learn to ride with the traffic, use lights at night, and observe the rules of the road.

Promotion of Statewide Bicycle Registering Administered at the Local Level to Inhibit Theft

Bicycle theft is a major deterrent to utilitarian bicycle use. Secure bicycle-locking facilities are badly needed, especially in urban business centers and near public transportation centers. A statewide bicycle registration system would help reduce theft by making the reselling of stolen bicycles difficult and would aid the police in returning stolen

bicycles to their owners. Such a registration system would help to enforce safety equipment standards, legitimize the status of the bicycle as a vehicle, aid in the collection of safety statistics and user characteristics, and educate bicyclists on proper bicycling principles.

Facilitate the Use of Federal-Funds on the Local Level for the Costs of Supplementary Facilities such as Shelters, Parking Facilities, Bicycle Storage Facilities and Comfort Stations, Especially at Public Transit Stations and Terminals

The Federal Highway Administration (FHWA) allows the construction of bikeways as an incidental feature of regular highway improvements. FHWA can pay 75% of the cost of these bicycle facilities (90% in interstate construction), just as with any Federal-Aid Highway funds' project, with the state or local government paying the remaining portion. FHWA permits the use of up to \$2.5 million per state per year of highway funds to be spent on independent bicycle facilities. The Department should apply such available resources to obtain maximum benefit for New Jersey's citizens.

Provide Mapping which Identifies:

- . local bikeways and bicycle-safe streets,
- . tourist information such as scenic and historic routes having bikeways, and
- . general biking information.

Bicycle maps showing the best bicycling streets, coupled with safety improvements (spot improvements, operational signing, storm drain replacement, shoulder paving, etc.) are inexpensive and effective alternatives to creating an official bicycle system. Such maps would show bikeways, safe streets and bridges, transit stop information, locking facilities and bicycle repair shops. Maps could also contain safety rules and practices. Maps could be sold at cost to supply money for future reprinting if funds are not available, as they are for other mapping efforts.

Give Priority to Improving Existing Roadways and Ancillary Facilities to Accommodate Bicycles over the Construction of Bikeways

In road construction, the needs of bicyclists must be incorporated into the design where appropriate. This often eliminates the need for separate bikeways. Wide curb lanes or paved shoulders, bicycle-safe drain gates, smooth railroad crossings, and bikeways on highway bridges will be designed into future projects.

The Department, in all future transportation projects and programs, will utilize the planning approach and, where applicable, design criteria contained in the New Jersey Bicycle Planning and Design Guidelines, AASHTO Bicycle Facilities Guidelines, and the proposed Federal Design and Construction Criteria for Bikeway Construction.

Advocate or Promote Concepts Conducive to or Permitting Bike Riding

The Department will advocate or promote the amendment of local zoning and plan review ordinances to require bike parking facilities in all new building construction.

g. Pedestrian Services

Introduction

As New Jersey's citizens become more energy and health conscious, appropriate provisions must exist for improvement and/or construction of pedestrian malls and other means of separating pedestrian and vehicular traffic. With more people realizing the energy-efficiency of walking directly to their destination, assuming close proximity and appropriate weather conditions, efforts must be taken to meet pedestrian needs. In addition, the sport of jogging, as a form of exercise and recreation, depends on a good, well-connected system of pedestrian walkways for the safety and convenience of both the joggers and vehicular traffic.

Even though a portion of most trips involves walking, only minimal attention has been given to pedestrian services outside CBDs and other areas of high pedestrian concentrations. Furthermore, the absence of sidewalks in residential areas requires pedestrians to walk in the street, which is a deterrent to many who wish to utilize bus transit.

Program Policy Statements

Pedestrian Facilities should be made a Prime Element of Public Transportation Systems particularly where they Support Community-centered Public Transportation Services

One of the ways that ridership can be increased on public transportation systems, especially buses, is to make such service more accessible. Ridership could be increased if pedestrian systems could attract more car-less riders as well.

Provide Safe Waiting Areas Adjacent to Highways for School Bus and Mass Transit Patrons

Such a policy will encourage bus ridership and thus aid in the reduction of urban traffic congestion. Furthermore, the increased pedestrian traffic flows that result may increase CBD business volumes.

Provide for Safe, All-weather Walking Space along Highways in Those Areas where Pedestrian Traffic is likely to Occur

Although many highways and expressways near urban areas facilitate vehicular movements, those that lack pedestrian walkways can effectively isolate those areas they traverse. Such walkways are important in maintaining residential and commercial district interaction and cohesion.

Thus, impacts on land use in the proximity of a highway can be significantly lessened.

Provide Pedestrian Overpasses at Locations where such Overpasses are Warranted by Department Guidelines and where At-grade Pedestrian Crossings are not feasible

Pedestrian overpasses can be useful in selected areas as they permit the safe crossing of a highway which would otherwise be impassable or extremely hazardous. Inter-community interactions are also enhanced.

Provide Appropriate Pedestrian Protection at All Highway Intersections

This will facilitate and improve pedestrian circulation and safety. It can be achieved by pedestrian-actuated traffic signals, crosswalks and a uniform system of signing, or pedestrian overpasses, where warranted.

From a pedestrian viewpoint, safety is of great importance. Often, even minor improvements can enhance the appearance of a pedestrian system, which will increase its viability as a mode option.

h. Railroad Station Facilities

Introduction

On September 15, 1978, the State of New Jersey, operating through the Commuter Operating Agency (COA) of the Department of Transportation, exercised its option to take title to most rail properties, used in commuter rail service, which were conveyed to Conrail on April 1, 1976, under the terms of the Regional Rail Reorganization Act of 1973, as amended. As of that date, the COA became the owner of 130 station parcels. All those available station parcels, including associated parking facilities, for which continued commuter operation is expected were acquired. This total number includes most Conrail-owned station parcels on the former Erie Lackawanna, New York and Long Branch, Central Railroad of New Jersey, and Reading and Pennsylvania-Reading Seashore lines. The State of New Jersey has also exercised its option to acquire from Amtrak those station properties on the Northeast Corridor used primarily by NJDOT-Conrail commuters. This acquisition is in addition to the railroad property acquired by the State in April of 1976.

Program Policy Statements

Encourage Local Pride

Historically, railroad station facilities have been located in or adjacent to central business districts of municipalities along the rail lines. The railroad stations have, in the past, served as a spur to development of town centers, as well as residential communities. Because of the prominent position a railroad station usually has in community-anchoring or

as the hub of a town's commercial center, the station should be a source of municipal pride as well as a social and economic asset. For this reason, the state wishes to encourage local community involvement in the upkeep and improvement of station facilities.

Improve the Standard of Maintenance and Security

A local municipality, as opposed to the state or even Conrail, is in a position to notice maintenance problems quickly and to match the level of maintenance and minor improvement functions to the desires of the community, in order to insure clean and safe station operation. Similarly, the necessary level of personal security can more adequately be provided at a local level.

Minimize State and Local Costs

The state will continue to be financially responsible, through the rail service financial assistance program, for the provision of commuter rail service and maintenance of the railroad right-of-way. In an effort to minimize costs of individual stations, consideration should be given to the leasing of railroad stations and related facilities. The additional station operation and maintenance costs can be incorporated into existing municipal budgets at a funding level lower than present costs.

Retain Limited Control to Insure Full Access to the State-owned and Subsidized Commuter Rail System

The state's involvement in station operation is required in a limited manner, because of system-wide commuter rail responsibilities. These responsibilities will include standards for maintenance, parking fees, surveillance, signage and information, supervision of ticketing and commuter fares, and control over station uses which might unduly limit or interfere with commuter operations.

Restore and Improve Rail Station Facilities

With the financial decline of passenger railroad service, station facilities have been neglected and have in many instances deteriorated to an unacceptable condition. Furthermore, certain station facilities are no longer appropriately sized for existing demand and operations. In addition, although station facilities are a prominent feature of most communities, many have not been improved and developed to complement, reinforce and function as a vital part of the surrounding areas.

To address these problems, station facilities shall be restored and improved by the state with reference to the following guidelines:

- . Facilities should be sized for current levels of usage and shall maximize operational efficiency.
- . Facilities should be permanent, durable, resistant to abuse and easy to maintain at minimal costs.

- . Stations should provide an attractive, bright, highly visible, and high quality environment, meeting modern standards of comfort and safety.
- . Facilities should be energy-efficient.
- . Stations must facilitate modal interchange.
- . Station areas should be organized to facilitate pedestrian and vehicular movement.
- . Joint use and multi-purpose development in and around public transit facilities will be encouraged.
- . Extensive system and community information will be provided.
- . Stations must be developed so that they are compatible with community needs and activities.
- . Provision of sufficient parking at stations in outlying communities will be given priority over center city rail-related parking facility improvements.
- . Parking facilities for bicycles will be provided and should be located in close proximity to the station wherever possible.

i. Bus Passenger Facilities

Introduction

New Jersey's bus system includes a large number of passenger facilities and a few terminals. These facilities range from: Unattended and unmaintained roadside parking areas; through reserved sections of shopping center parking lots, where in some cases bus tickets are sold by commercial establishments and which have informal parking arrangements for bus passengers; and finally to major high volume terminals with waiting rooms and attendants.

Program Policy Statements

Improve Existing Facilities

Facilities acquired by NJ TRANSIT will be improved as required to better serve the public. Municipalities will be encouraged to provide bus shelters and waiting rooms at high volume points along bus routes. Federal and state funds will be available for these improvements.

Establish Maintenance Practices

Bus shelters and unattended waiting rooms are prime targets for vandals and graffiti artists. Keeping these facilities clean and safe for use by the public requires the cooperation of the transit operators, owners, police, and most of all the general public. The Department of

Transportation will continue to inspect these facilities and encourage their proper maintenance.

Before public funds are invested in improving existing facilities, standards of maintenance must be assumed by the owner. Community cooperation is necessary to ensure that these facilities are kept clean, safe, and in good repair.

All new bus facilities constructed by NJ TRANSIT will be fully accessible to the handicapped. Information on routes, fares, and schedules will be posted and kept current.

Explore Increasing Intermodal Transfer Opportunities at Bus Facilities

Expanding bus station facilities to include space for carpools, vanpools, and bicycles, and to provide space for future paratransit operations, will increase the utility of the transit system as well as conserve energy and reduce air pollution by reducing single driver auto travel.

j. Park-And-Ride Program

Introduction

The goal of any park-and-ride program is to attract people from a single occupant auto into a higher density passenger vehicle. Traditionally, the thrust of a park-and-ride improvement program has been directed at regular public transportation modes. This is now changing to also accommodate parking for carpools and vanpools. The basis for locating facilities should be traffic, current land use densities, and future development goals.

New Jersey has a number of park-and-ride facilities throughout the state which are served by both commuter rail and bus systems. No specific park-and-ride facilities are now under state jurisdiction although several are operated by state toll road authorities; however, pooling does occur at various locations along state highways and at highway interchanges. Also, it is likely that some pooling occurs at transit park-and-ride locations.

Most formal transit park-and-ride facilities in New Jersey can be termed "successful." Some are so successful that overuse and its attendant problems have occurred. The potential for success at other park-and-ride facilities is diminished by the negative impacts which these problem areas impart to other corridors in the transportation system. Unrestricted access, free parking and good transit service all can contribute to the overuse of a park-and-ride lot, sometimes at the expense of transit services in other corridors. Also, park-and-ride locations in or near a major CBD will attract patrons from transit services in outlying areas to the transit services at the parking facility.

Transit service adjustments during peak, and especially off-peak, times will smooth service demand, aid in attainment of on-time performance standards, and raise comfort and convenience levels. The counterproductive nature of long distance trip making exhibited by those who use park-and-

ride lots located close to CBDs can be avoided as a matter of development policy. Certain aspects of the financial advantages of point-to-point short-haul transit service associated with CBD-proximate park-and-ride lots can be applied to over-the-road commuter type park-and-ride service. The value of removing the maximum number of vehicles from a given traffic flow on heavily congested roadways, an advantage of close-in park-and-ride lots, can be weighed in determining park-and-ride locations with respect to distance from CBD considerations. These questions are important in developing a program which is responsive to the concerns of both consumer and suppliers of park-and-ride services.

Program Policy Statements

Increase Transit Ridership Through the Rational Improvement of the Current System of Bus and Rail Parking Facilities

The main thrust of this policy is to increase current transit ridership trends through improvement of the existing parking facilities. Ridesharing program gains will provide complimentary progress towards the attainment of the state's goals. Within budgetary constraints, the improvement of the current problem in the existing system of transit park-and-ride lots is of high priority. The following guidelines will be utilized:

- Improve existing facilities to an acceptable capacity and operating standard; reallocate excess demand and capacity through transit service adjustments or parking management techniques; improve joint-use arrangements to reduce risk of parking privilege loss.
- Provide preferential parking for carpoolers and vanpoolers and provide bicycle lockers at facilities where feasible.
- Adjust park-and-ride transit service to a maximum achievable transit productivity level.
- Seek early and active community participation in park-and-ride lot expansion or adjustment activities; expand only those facilities which neither inhibit community development goals nor adversely affect adjoining land uses.
- Adjust transit services based on expressed community desires as well as technical requirements.
- Make maximum use of transportation and public works funding sources which may be available at the federal, state, and local levels, and from private sources.
- Seek management and operation agreements that place responsibility at the local level; arrange fair and equitable rates for parking without geographic constraint.

Develop New Park-and-Ride Facilities that Will Successfully
Penetrate the Auto-Driver Travel Market

The development of new park-and-ride lots should concentrate only on those candidate projects which would successfully penetrate the auto-driver travel market. Only those few with the greatest potential should be pursued as a high priority. The technical aspects of the policy relating to facility improvement and new project development are basically the same, and are aimed at equitably addressing questions of land use and development, economics, ownership and operation responsibility. However, additional guidelines to be considered in the development of new facilities are:

- . Active consideration for new locations will be given to those with potential for maximum auto diversions and minimum, unavoidable current transit travel diversions.
- . New facilities will be considered by an area, corridor or system approach, with attention given to staged development alternatives.
- . Early and continuous participation of local and county interests in project development will be required; all decisions concerning location facilities, service, funding, acquisition, construction, and management and operation will be made cooperatively.
- . Carrier participation will be sought; an acceptable level of carrier productivity, balancing manpower, equipment and revenue, will be ensured; the potential competition between carriers and transit sub-modes will be avoided.
- . Maximum reliance will be placed on municipal agencies to manage and operate new park-and-ride lots; subject to demand management and re-allocation techniques, access to park-and-ride lots will not be constrained geographically; parking rates will be set based on operating and maintenance costs.
- . Joint use of existing or proposed parking spaces for other business or commercial purposes will be investigated for transit and paratransit purposes as well.

Establish a Program of Funding, Operating and Maintaining Park-and-Ride Facilities

Generally, the responsibility for the ownership and operation of transit and pool park-and-ride lots is defined on an individual basis. Consequently, park-and-ride lots are owned and operated by a wide range of public and private entities, and almost every facility is unique. Government involvement in park-and-ride facilities should not reduce the current performance capability of a given facility, should improve poor performance, and establish guidelines to ensure proper operation of publicly-owned and newly-acquired facilities. The lack of formal organization and

operating strategy at many park-and-ride facilities leads to problems of congestion, safety and security, and foul-weather inefficiency. Furthermore, certain joint-use park-and-ride lots, located in shopping centers and similar properties, are constantly in jeopardy of being closed. Usually, government is powerless to successfully intervene in such situations. Clear policy and direction concerning ownership and especially operating responsibility for publicly owned park-and-ride facilities will aid in the smooth operation of the whole transportation system, and stimulate uniformly reliable operation of all park-and-ride facilities in New Jersey.

Technically, facilities would be owned by the state as a policy matter; responsibility for management and operation of park-and-ride lots, through a lease agreement, would be at the local municipal level.

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C. FUTURE ENERGY ALTERNATIVES

1. Energy - Why it's an Issue

When developing the transportation system of the future, public officials and planners must look at the existing system and determine what issues, constraints, and impacts are molding that system. Many of these issues were discussed in the preceding section and were instrumental in developing the goals, objectives, and policies for the various transportation programs. Although there were several issues discussed, the issues that have more notably shaped transportation decision-making in the recent past and are expected to account for the majority of changes in the transportation systems of the future are basically limited to two: The high cost and the questionable availability of petroleum fuels (gasoline and diesel fuel).

During the decades preceding the 1970's an inexpensive and apparently limitless energy supply was generally taken for granted. Consequently, energy was never really a factor to be dealt with in the development of transportation systems. The transportation system that evolved in New Jersey and the rest of the nation was supportive of middle-class suburban development that, for a time, contributed to a standard of living and economy that was the envy of much of the remainder of the world. However, the wisdom of this kind of development has been questioned in recent years largely because of the great increase in the price of fuels (also used for home heating and electrical generation) and because of the concern caused by brief but significant shortages of these fuels. This "sword of Damocles" hanging over the nation has made many citizens, political leaders, and planners stop and reevaluate much of the decision-making of the past and many of the activities currently underway to accommodate future growth and development.

The issue of the cost and availability of energy is not limited to the state or the nation alone. Instead, it must be regarded as a worldwide issue. Just as New Jersey must rely on imports of energy fuels from other states and nations, many nations are totally dependent on other nations for energy fuels. The issue of energy is clearly a global issue--and clearly a primary one.

Although estimates vary, there are approximately 650 billion barrels of proven crude oil reserves in the world today. Up until the latter part of the 1970's, petroleum producers were able to augment this supply with new discoveries averaging approximately 24 billion barrels annually. A situation now exists, however, where the world's consumption rate is 42 percent higher than the discovery rate, and the depletion runs on the order of 6 billion barrels per year. Although it will continue to supply a major share of the world's energy requirements for some time, oil is expected to reach its peak production within the next several decades followed by a precipitous decline.¹

Of the 650 billion barrels of oil world-wide, 70 percent is controlled by the Mideast nations of OPEC. In order to stretch revenues from

¹ National Academy of Sciences New Report Vol. XXXI, No. 5, May 1981
"World Energy Needs to Year 2030 Can be Met, but Not Easily"

this fixed reserve, OPEC apparently intends to market what amounts to 400 billion barrels of crude oil over the next 30 years or more. For the Middle East, this basic OPEC policy appears to be a wise investment strategy. For the United States, which controls less than 5 percent of world reserves yet consumes 30 percent of all petroleum world-wide, the prospect of a chronic limitation on oil could spell economic disaster.¹

Some oil experts believe the answer to the energy crisis is to restock the world's reserves by substantially increasing oil exploration. For China, Mexico, and Brazil (which now has the largest offshore operation in the world), big finds have resulted. For the United States, however, the new frontier of offshore drilling on the Outer Continental Shelf, with a few exceptions, has been less than successful, causing many companies to abandon or delay further exploration.¹ Already the United States has been highly explored during the last 100 years, and it appears unlikely that any new major finds will be made.

There is no unanimity on the future of energy supplies in the United States and the world. While some experts argue that technological advances can bridge the gap between petroleum supplies and needs, others feel that petroleum supply-demand problems are here to stay and that problems associated with alternative sources of energy will not make them feasible on a large scale by the year 2000.

During the Johnson Administration an internationally supported and funded non-political research consortium of scientific institutions from 17 nations around the world was established in Schloss Laxenburg, Austria. This consortium--the International Institute for Applied Systems Analysis (IIASA)--was established to study world-wide issues and problems as far in advance as possible in order to ward off global crises. Among the activities undertaken by this group was an examination of the future world-wide energy situation.

During 1981, the Energy Systems Program Group of the Insititue published the results of a massive study they had undertaken to evaluate the supply and demand prospects of energy through the year 2030. The study report - entitled Energy in a Finite World - forecasted a somewhat somber picture for the future of energy in the world through the next 5 decades. Armed with a high degree of international cooperation and very good data and assuming no global disaster, no profound economic change, no technological panacea, and a degree of international cooperation that can only be described as optimistic, the Group determined that the lives of the projected number of 8 billion people could be sustained through the year 2030. However, the report noted that it will not be easy and it will not happen automatically. Strategic action and understanding and political cooperation will be required for this to happen.

The report noted that within 50 years the world population will double and need four times the energy to sustain life as is used today.

¹ National Academy of Sciences New Report Vol. XXXI, No. 5, May 1981
"World Energy Needs to Year 2030 Can be Met, but Not Easily"

The provision of energy demands to the year 2030 and beyond can be met because there are possibilities of unlimited energy supplies. However, the report differed in substance and tone from a great deal of the current energy-policy discussions by finding no promises of easy nuclear power, of harmless solar technology, and of boundless renewables. The projections do show an increasing use of liquid fuels at high cost and the use of breeder reactors, if technological and political problems can be countered, before the world can achieve a transition to energy technologies far more sustainable. The various scenarios of the report show energy conservation as a necessity--not a choice.

Other energy experts believe that alternatives like oil and gas from coal may become cheaper than finding, developing, and producing new oil, and that coal liquification and gasification will undoubtedly be the new wave of the future in energy. However, because of the lack of government funding, guarantees, and tax incentives to support synfuel research, no plant is operating in the United States today and none are expected to produce commercial quantities of oil or gas before the mid-80's. There are also severe environmental and water quality impacts to be dealt with.

Of course, there are other schools of thought concerning energy and petroleum availability in the year 2000 and beyond. One pessimistic viewpoint is that U.S. and world oil supplies are limited, and even with static demand, the U.S. has only a 25 to 30 year supply and the rest of the world little more. This viewpoint is shared by most American petroleum companies, the Arab oil producing countries, several respected American geologists, and several research organizations such as the Rand Corporation. The basic points that support this view are that the U.S. has consumed 75 percent of its known oil reserves and that major new finds are unlikely, the Alaskan North Shore will supply only one and a half years worth of domestic oil, and that economically recoverable coal will last less than a century. The bottom line is that oil supply will steadily drop and that the "petroleum age of the free world may be expected to continue at most for only about 30 more years."¹ An extension of this pessimistic view is that oil will become less important and less depended upon because it will no longer be a cheap energy supply. Oil energy was widely used because it was inexpensive and other factors were optimized, e.g. labor costs, processes and machinery used, levels of maintenance, and economic life of equipment. Hence, with energy becoming expensive the world would use less energy and petroleum products by altering processes away from intense energy consumption or substituting non-petroleum energy supplies.

At the other end of the energy supply spectrum is a much more optimistic view of potential petroleum availability. This view has been succinctly vocalized by the Economic Geography Institute at Erasmus University in Rotterdam, Holland. Basically, this view holds, "...that there are many possibilities for the geographical diversification of oil reserves and production potentials."² Several points support this view:

1. "Energy Self-Sufficiency: I," by Shell Oil Co., July, 1974.
2. "A Personal View of 'Missing Oil'," by Peter R. Odell, Petroleum Economist, January 1980.

- "...the areas with proven reserves that dominate the contemporary picture are a very small part of the total areas of the world with oil and gas potentials;...
- On looking, at the distribution of the world oil industry's exploration and development effort, the contrast between the limited number of areas which have enjoyed a significant effort and the much more extensive areas with little or no activities to date is even more emphatic;...
- even in the industrialized world most regions have enjoyed little petroleum development (well-drilling) compared with the U.S. where, in spite of the long and intensive history of the industry, it is still generally agreed that there are considerable quantities of new oil to be found; and..."
- the rest of the world remains basically unexplored.¹

This view maintains that the pessimistic view held by American oil companies and Arab oil producing countries, and which has predominated world opinion, is a product of its own political, economic, or geological situation, and is not necessarily true world-wide.

While this plan does not maintain the veracity of any one view, it does subscribe to the somewhat "middle of the road" findings of the IIASA study; that although sufficient energy resources exist to support the world's population through the 21st century, a lack of political cooperation and technological research and development may actually inhibit such an attainment.

2. Energy Use in New Jersey

New Jersey is dependent upon other states and nations for its supplies of fuel. Except for some coal deposits in central and western Pennsylvania, there are no fossil fuels in the region. The picture may change slightly with the development of the Outer Continental Shelf, but New Jersey will continue to rely on sources outside the region for its energy supplies.

New Jersey has an exceptionally high dependence on petroleum products and that dependence is continuing to rise. As indicated in Table 3 the state relies more heavily on oil than the national average.

The transportation sector is a primary user of energy in New Jersey. As indicated in Table 4, about 26 percent of gross energy consumption and 43 percent of petroleum products consumed in the state are related to transportation.

Given the uncertainty surrounding future energy supplies and the recognition that transportation consumes an inordinate amount of these resources, this transportation plan considers energy availability a primary consideration in future transportation development.

1. "A Personal View of 'Missing Oil'," by Peter R. Odell, Petroleum Economist, January 1980.

TABLE 3
TOTAL ENERGY CONSUMPTION BY FUEL TYPE
(x 10¹² Btu)

New Jersey	1960	1970	1975	1980
Oil	912.0 72.4%	1,374.8 72.3%	1,222.6 66%	1,158.8 58.5%
Nat. Gas	150.5 11.9%	324.6 17.1%	265.8 14.3%	387.5 19.6%
Coal	198.1 15.7%	158.8 8.4%	136.3 7.4%	157.3 7.9%
Nuclear	0 0%	35.9 1.9%	102.6 5.5%	111.6 5.6%
Purchased Electricity	0 0%	7.3 .4%	126.1 6.8%	164.7 8.3%
Renewable	0 0%	0 0%	0 0%	0 0%
TOTAL	1,260.6 100%	1,901.4 100%	1,853.4 100%	1,979.9 100%
United States				
Oil	19,922.8 45.2%	29,520.7 44.2%	32,730.6 46.3%	34,390.0 44.7%
Nat. Gas	12,385.4 28.1%	21,794.7 32.6%	19,947.3 28.2%	20,880.0 27.1%
Coal	10,119.2 23.0%	12,663.7 19.0%	12,825.0 18.1%	15,750.0 20.5%
Nuclear	6.0 0%	239.3 .4%	1,899.8 2.7%	2,850.0 3.7%
Purchased	1,655.6 3.8%	2,669.2 4.0%	3,291.1 4.7%	3,080.0 4.0%
TOTAL¹	44,083.2 100%	66,827.2 100%	70,707.9 100%	76,960.0 100%

1. Columns do not sum to total because the total energy consumed includes U.S. net imports of coal coke and due to independent rounding by fuel type; reference: Report DOE/EIA-024-(78)

SOURCE: Draft Revisions to the New Jersey Energy Master Plan, September 1981

TABLE 4
1980 ENERGY USE IN NEW JERSEY BY TYPE AND SECTOR
(x 10¹² Btu)

	Coal	Petroleum	Natural Gas	Electricity	Nuclear	Total
Residential	.9 (2%) .6 %	143.1 (29.8%) 12.3 %	148.8 (31.0%) 39.0	187.9 (39.1%) 25.7 %		480.7 (100%) 24.9 %
Commercial	.3 (.1%) .2 %	197.2 (43.2%) 17.0 %	69.0 (15.1%) 18.1 %	189.8 (41.6%) 26.0 %		456.3 (100%) 23.6 %
Industrial	5.5 (1.1%) 3.5 %	229.9 (45.8%) 19.8 %	78.8 (15.8%) 20.7 %	187.3 (37.3%) 25.7 %		501.6 (100%) 25.9 %
Transportation	.0 (0%) .0 %	494.4 (99.96%) 42.7 %	0 (0%) 0 %	.2 (.04%) .03 %		494.6 (100%) 25.6 %
Sub-Totals	6.7 (.3%) 4.3 %	1,064.6 (55.1%) 91.9	296.7 (15.3%) 77.8 %	565.2 (29.2%) 77.4 %		1,933.2 (100%) ¹ 100 %
for Electricity Production	150.6 95.7 %	94.2 8.1 %	85.1 22.0 %	164.7 ² 22.6 %	111.6 100%	³
Other			5.7 .2 %			
TOTALS	157.3 (7.9%) 100%	1,158.8 (58.5%) 100%	387.5 (19.6%) 100%	164.7 (8.3%) 100%	111.6 (5.6%) 100%	1,979.9 (100%) 100%

1. This sub-total is less than total energy by type of energy source, due to losses (electric transmission) and differences in conversion factors.

2. Electricity purchased from out of state producers.

3. Energy for electricity production is not summed horizontally because it is utilized by the four sectors and is accounted for in the electricity column.

NOTE: The percentages in parentheses total horizontally. They represent the percentage of each sector's energy use by fuel type.

The percentage without parentheses total vertically. They represent the percentage of each fuel used by a sector.

SOURCE: NJDOE Draft Revision to the New Jersey Energy Master Plan, September 1981.

3. Energy Scenarios

a. Introduction

Energy, especially petroleum, is a primary consideration in future transportation programs. Since the future outlook for energy supplies is uncertain, this section will discuss the transportation impacts of four energy availability scenarios.

The four scenarios which follow discuss a range of issues and parameters that can be expected to affect transportation in New Jersey over the next 20 years. The scenarios will take shape based on certain assumptions in regard to energy availability, primarily petroleum, and the impact that each scenario is likely to have on these parameters.

The first and fourth scenarios are considered as boundary scenarios which will help to focus directly on the proper range and degree of energy availability and, indirectly, on other parameters. These two boundary scenarios will be extremes of situations and as such are possible although improbable futures.

Scenarios II and III will focus on more likely availabilities of petroleum supplies and will discuss the ramifications of such availabilities on several parameters. These parameters include future population and land use growth and distribution, economic viability and status of the state, environmental impact, cost of travel and social impacts, available transportation technologies, and finally transportation demand.

The following discussions give a brief definition of the four alternative scenarios and some of the characteristics of each scenario which indicate why it is likely or unlikely to occur. Following this introduction, several of the parameters which impact transportation development will be discussed relative to the probable impact of any particular energy scenario on that parameter.

(1) Scenario I--Cheap and Abundant Petroleum

This scenario envisions the return of relatively inexpensive and abundant petroleum fuels during the next two decades, reminiscent of the decades of the '50s and '60s. The hope always remains that a last minute major find of vast petroleum stores may result from geologic exploration which would mean a return to cheap and abundant fuel for Americans. People likewise dream of the development of new, cheap, and abundant portable synthetic fuels similar to gasoline and diesel fuels.

As appealing as this scenario might be, it is highly improbable between now and the end of the century. Because it is improbable, it does not merit the in-depth investigation the more likely scenarios will receive in this analysis. On the other hand, a more cursory investigation of such a scenario is instructive, since it helps us to understand the repercussions of an extremely optimistic future--in essence, bounding the future.

(2) Scenario II--Trend Conditions: Moderate Energy Conservation

This scenario envisions conditions over the next two decades reflecting recent trend conditions, namely, no sustained energy shortfall but an increase in energy costs. Any decline in supply is assumed to be easily absorbed by higher efficiency cars, overall energy conservation, and increases in the energy contribution of coal, nuclear fission, solar, and non-conventional oil.

Scenario II is a possible one under the following set of conditions:

- OPEC has now, and could have, the ability and desire to raise the real price of oil. These price increases would probably result in a steady rise in the price of oil rather than periodic large increases.
- The supply of OPEC oil could remain sufficient, and no major oil shortages could occur. The U.S. would be able to purchase as much oil as is needed.
- Any decline in domestic conventional oil production could be adequately offset by increased energy from nuclear fuels, coal, shale oil, enhanced production oil, solar, or imported oil.
- Technology could improve energy efficiency in all sectors of the economy as auto mileage per gallon increases, synfuels become available, industrial processes become more efficient, and residential heating loads diminish because of insulation and design improvements.

(3) Scenario III--Moderate Energy Shortfall: Stringent Energy Conservation

This scenario assumes that reductions in petroleum supply are anticipated and not disruptive, e.g., sudden embargo. Where such sudden disruptions do occur, it is expected that they will be limited duration inconveniences that can be survived improvisationally without the need for sustained changes in travel behavior.

More specifically, this scenario assumes a moderate reduction of about 35 percent of imported petroleum from 1980 levels, roughly equal to a total cutoff of imported Arab OPEC oil. If equitably spread across the nation, this reduction or short fall would equal about 15 percent of the state's consumption of petroleum. Further, a long term state policy assumption is made, whereby the entire shortfall in petroleum availability would be met through a reduction in petroleum consumption in the transportation sector, a reduction of about 35 percent. This assumption is based on the concept that the future reliance on petroleum fuels of other sectors of the economy are less adaptable to change than the transportation sector.

Scenario III is a likely scenario because of the following reasons:

- . Domestic oil reserves are declining and production is slowly and steadily declining, and these trends could continue to occur.
- . OPEC members logically would desire to make their countries' vast oil reserves last for many decades into the future to optimize their countries' economic growth and insure the highest possible price for their natural resource.
- . Nuclear accidents have slowed the growth of nuclear generation of electric power by introducing many regulatory, political, and economic restrictions.
- . Large-scale increases in coal usage could be difficult due to transportation, environmental, and technical constrictions. Coal liquefaction and high technology extraction of tar sands and shales suitable for fueling automobiles are plagued with difficult problems and may be able to overcome little more than a small percentage of the decrease in domestically produced petroleum.
- . The international oil companies would rather sell less oil at higher prices over a longer period of time.
- . National policy would most likely be to lessen oil imports so as to reduce the financial balance of trade deficit and to lessen the nation's dependency on OPEC and Middle Eastern oil for political and defense purposes.
- . Technological improvements require high oil prices to become cost effective or widely marketable.
- . Technology applied to synfuel production also requires higher oil prices to become profitable and justifiable. As oil supplies decline, expensive replacement fuels will partially fill the shortfall but all prices will rise.

(4) Scenario IV--Severe Energy Shortfall

This scenario envisions a severely reduced petroleum energy availability amounting to a gradual virtual cutoff from Arab OPEC producing nations. This scenario, like Scenario I, is highly improbable and will thus be investigated only cursorily. It forms the second boundary on the future.

It appears that even if such a scenario came to pass synfuel production and coal liquefaction would not be able to adequately compensate for the loss of natural crude production in the years preceding 2000. Such a doomsday scenario cannot be summarily dismissed, however improbable it might be, in light of the present international climate (a local nuclear

confrontation could occur in the Mideast bringing a halt to crude production).

NJDOE Energy Projections

In its recently published draft revision to the State Energy Master Plan, the New Jersey Department of Energy projected energy consumption for the year 2000.¹ The projections contained in that report are policy projections that are aimed at reducing New Jersey's petroleum dependence to a level more in line with the nationwide average.

Although the NJDOE projections were based on assumptions and trends that approximate Scenario II conditions of this report, there is no implied or direct relationship between the two assumed conditions. The NJDOE Master Plan contains policy projections that may or may not come to pass, whereas the projections included in this plan are "what if" scenarios designed to look at a possible range of alternative futures.

b. Transportation Parameters

The following sections discuss the likely impact of each of the four assumed scenarios on the most significant factors which impact the transportation sector. These factors include: (1) land use and demographics; (2) social implications; (3) economic conditions; (4) environmental concerns; (5) technological developments; (6) infrastructure conditions; and (7) funding impacts. Since Scenarios I and IV are assumed to be boundary conditions and unlikely to occur, they will not be discussed in the same detail as Scenarios II and III.

(1) Land Use and Demographics

A strong relationship exists between land use, transportation, and energy. Over the past 125 years, human settlements in the developed parts of the globe have grown spatially from hamlets confined by distances that could be easily traversed by foot or animal powered forms of transportation, to contemporary cities where motorized travel is the norm. Each advance was made possible by man's transportation inventiveness and the associated availability of energy to power his new inventions.

One of man's latest transportation inventions--the automobile and a road system to serve it--has spawned the suburban development patterns so prevalent today. Substantial evidence exists suggesting that suburban development is intrinsically less energy efficient than higher density city or village development. The inefficiency of a suburb is a function of its lower population density requiring more infrastructure to be constructed and maintained to provide basic services like water supply, sewage disposal, electricity, and transportation. To reach any destination, the average suburban resident must drive a car, because: The distance is too great to walk; the population density is too low for public transportation

¹ Draft Revisions To The New Jersey Energy Master Plan, September, 1981, N.J.D.O.E.

to provide high-frequency service; and exclusive zoning places shopping areas away from residential areas. In today's land use practices, suburbs are much less energy efficient than cities, particularly in home heating and transportation.¹ A shortage of oil will fundamentally affect suburban life styles which are predicated on the use of automobiles and cheap fuels.

Analogously, New Jersey is the most densely populated state in the nation and presently uses less energy per capita than the national average, i.e., N.J. uses 240×10^5 BTU/capita/year or 66 percent of the national average of 355×10^6 BTU/capita/year. Further, energy demand per dollar of personal income in the state is 70 percent of the national average. Table 5 provides a historical comparison of per capita energy consumption for New Jersey and selected sunbelt states. New Jersey requires more heating than Florida or Texas but less cooling, and heating is generally efficiently provided where as cooling is not. Therefore, New Jersey's total residential energy demands are less than Florida or Texas. Consequently, it is not more energy efficient to live in the south or southwest, although it is presently cheaper to purchase the energy there.

TABLE 5
PER CAPITA ENERGY CONSUMPTION FOR
NEW JERSEY AND SELECTED SUNBELT STATES
IN BTU $\times 10^6$ /PERSON/YEAR

	Motor Gasoline	All Trans. Energy	Residential Energy	Total Energy
NJ				
1960	43	55	49	216
1970	48	68	65	263
1978	58	78	65	267
Florida				
1960	48	68	30	168
1970	58	88	57	236
1978	69	102	68	280
Georgia				
1960	43	52	35	171
1970	62	86	60	277
1978	75	107	71	331
Texas				
1960	49	83	40	407
1970	66	108	68	540
1978	82	141	77	566

SOURCE: State Energy Data Report. Statistical Tables and Technical Documentation 1960-1978. USDOE April 1981; and Statistical Abstract of the United States 100th Edition. US Department of Commerce

NOTE: Total Energy = Residential + Commercial + Industrial + Transportation

¹ The Costs of Sprawl, by Real Estate Research Corporation, April 1974. (NOTE: Some researchers disagree with the findings of "The Costs of Sprawl" and maintain that cities are not all that more efficient than suburban development. The reader is referred to such works as The Urban Transportation System: Politics and Policy Innovation, by Alan Altshuler, MIT Press. Such debate requires further in-depth analysis on this topic.)

Scenario I

A return to the energy abundance of the post-World War II, pre-embargo period would undoubtedly foster continuation of the suburban development trends that occurred during that period. There would be extreme pressures to develop open space, vacant land and farmland. Any policy in regard to land use control would be based on a philosophy of preservation of open space for future generations, as well as on other existing land use management programs.

Although the population level projected for this scenario may be similar to or somewhat greater than that projected for the other scenarios, the residential density of population would be lower under this scenario. Migration from the central cities in New Jersey and surrounding states would increase at a higher rate toward suburban and rural areas of the state. This migration would exacerbate the problems now faced by the state's central cities. Faced with a reduced tax base, economic downspiral would occur and cities would be hard pressed to provide adequate services to the remaining citizenry.

If a return to an era of cheap and abundant fuel does occur, there is a possibility of higher birthrates directly related to a higher statewide economy "fueled" by low-cost petroleum. Consequently, there could be an increase in the average family size over the next two decades. However, the average household size (all persons who occupy a housing unit, whether related or not) will continue to decline slightly, even though the family size (persons residing together who are related) will increase from the recent historic downward trend (see Figure 6). The general strength of Scenario I's economy will allow many people to live alone, or with few others, in smaller size households. This situation would be similar to that which occurred during the 1950's and 1960's.

Scenario II

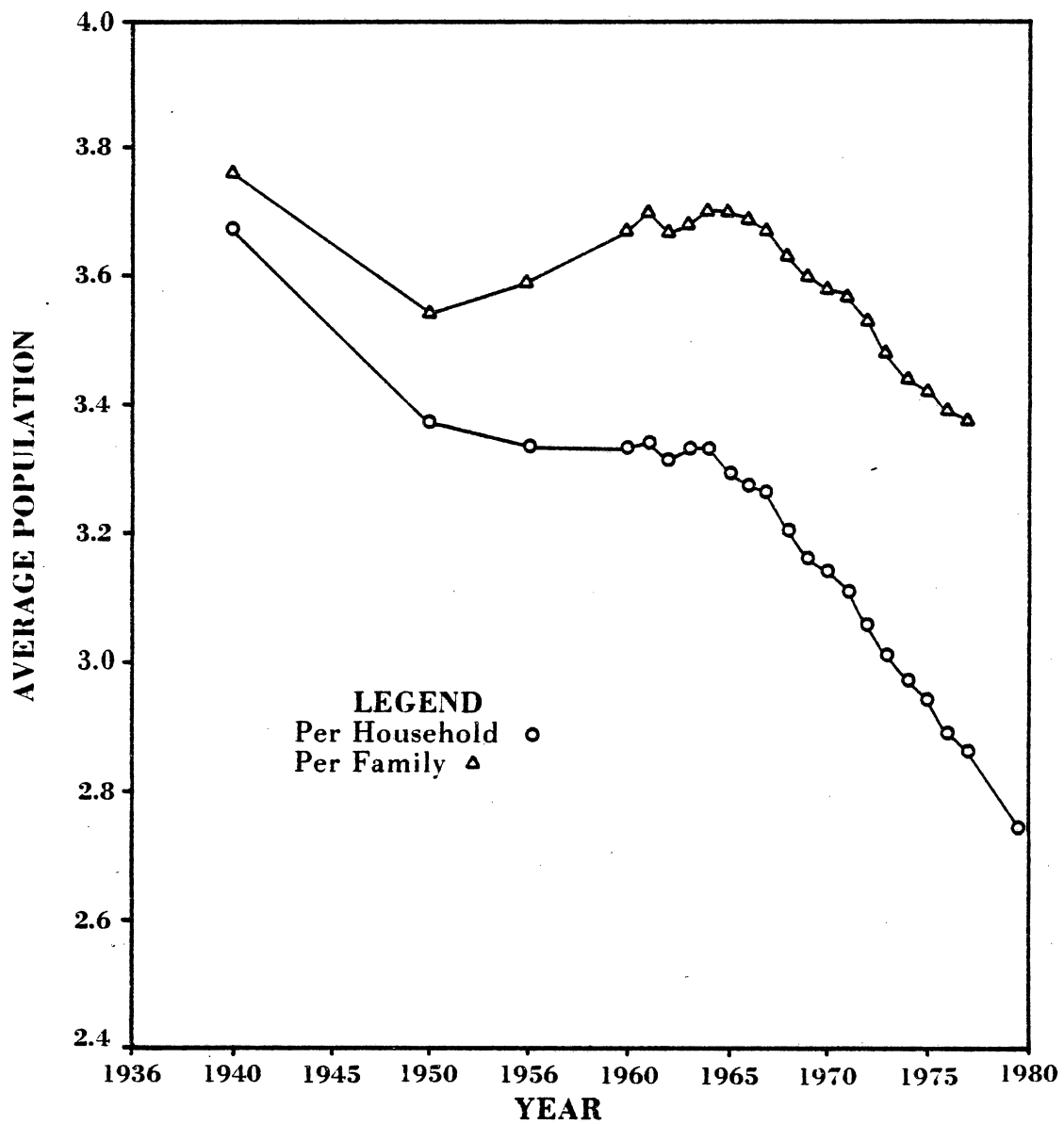
Land Use Characteristics

Under Scenario II conditions, land use patterns will not alter appreciably as the majority of the population will be able to afford higher priced gasoline and cars. Under this scenario, the real price of energy is expected to increase by about a factor of 2.0.¹ Table 6 provides a historical perspective of the price of gasoline. Even with these increased energy

¹ The following references generally assume a future similar to Scenario II and provide estimations generally in the range of two-fold increases in the real price of petroleum.

- a) Gasoline Prices to Year 2000, Data Resources, Inc. 1979;
- b) "Long-Range Forecasts of Transportation Energy Consumption in New York State" by D. Hartgen & N. Erlbaum in Transportation Energy: Data Forecasting Policy and Models, Transportation Research Board, Transportation Research Record 764, March 1981;
- c) Gasoline Price Projections, New Jersey Department of Transportation, March, 1981.

FIGURE 6
AVERAGE POPULATION
PER HOUSEHOLD AND PER FAMILY,
1940 - 1980



Source: U.S. Department of Commerce, Bureau of the Census,
Current Population Reports, Series P-20, No. 313, "Households and
 Families by Type: March 1977 (Advance Report), "Washington, D.C., 1978, p. 4.

TABLE 6
HISTORICAL PRICE OF GASOLINE¹

Year	Current Dollars/Gallon	Constant 1978 Dollars/ Gallon
1950	.262	.711
1955	.287	.700
1960	.311	.688
1965	.334	.635
1970	.357	.594
1973	.390	.559
1974	.528	.689
1975	.562	.671
1976	.587	.667
1977	.626	.672
1978	.639	.639
1979	.865	.797
1980	1.280	1.013

¹Compiled by NJDOT from the following sources:

Transportation Energy Conservation Data Book: Edition 4

G. Kulp. Oak Ridge National Laboratory Sept. 1980. Table 5-4:

Transportation Energy Conservation Data Book: Edition 3

Shonka. Oak Ridge National Laboratory February 1979 Table 3-10:

US Dept. of Labor. Bureau of Labor Statistics. Consumer Price Index:

NJ Energy Profile. May 1980. NJDOE

costs suburban sprawl will continue, even if at a slightly lower rate than in Scenario I. The increase in the price of fuel will encourage some individuals and the business community to become more energy conservation minded. People will purchase more efficient automobiles to save on gasoline costs and insulate homes to cut heating costs. People with low incomes will be burdened by the increase in fuel prices, but those who can afford to buy new energy efficient cars may well experience a decline in the real dollar cost per mile of propulsion energy.

Some rebuilding of cities and villages will occur but more because of the desire for an alternative to suburban living than as a reaction to fuel shortages. Land use zoning and land tax laws will not change much. Developers will continue to build suburbs and little in-filling and cluster development would occur under this scenario.

Farmland

New Jersey contains about one million acres of farm land or 4.8 percent of the total cropland and improved acreage in the Northeastern United States. Pressure for development varies throughout the state, primarily as a function of proximity to major centers of employment.

The average annual loss of farmland in New Jersey during the past decade was 4,500 acres with a 30 year statewide decrease of approximately 770,000 acres.¹ Compounding this problem is the fact that farmers own only 47 percent of the state's farmland, the balance being owned by developers/investors who may be temporarily leasing the land while waiting for a more intensive land use opportunity to develop.² Farmland preservation is an important issue for two reasons: a) food price inflation and b) food supply dislocations. The Northeast region of the U.S. has the third lowest total of prime farmland (the Mountain and Pacific regions were lower) at 13.6 million acres or 3.9 percent of the national total.³ New Jersey has 1 million acres of prime farmland or 7.4 percent of the Northeast region's total. Prime farmland is land with the best combination of physical and chemical characteristics to produce food, feed, forage, fiber, and oil seed crops. Prime farmland has soil quality, growing season, and water supply needed to economically produce sustained high yield crops. As a result of this situation, the Northeast (New Jersey included) must import much of its food. As energy prices increase, the cost of transporting food from other states to New Jersey will also rise causing food prices to rise. Under this scenario, farmland would continue to be taken at a high rate to accommodate continued suburban sprawl.

Demographic Characteristics

The N.J. Department of Labor and Industry's projection of New Jersey's Year 2000 population and county distributions are used in Scenario II. The trend projections were developed using an ODEA (Demographic Economic Linked) Model which considers future employment as well as other demographic parameters. The statewide year 2000 population under this scenario would be 8.32 million, representing a 13 percent increase over 1980 (see Table 7). These future county residential population distributions reflect a continuation of suburban development trends.

With no energy shortfall and a gradual increase in the real price of energy, state government will have a difficult task to realize its objectives of a stabilized urban population, reduced rural and exurban growth and suburban infilling development, assuming, as we do here, that these objectives will still be in the state's best interest in order to conserve energy, promote environmental quality, etc. These objectives and their associated activities, such as priority infrastructure investment in urban areas, stronger statewide land use controls, and adoption of energy

¹ N.J. Profile, Economic Policy Council and Office of Economic Policy, N.J. Dept. of Treasury, 1981; and Farm Numbers, N.J. Crop Reporting Service, U.S. Dept. of Agriculture and N.J. Dept. of Agriculture, January 6, 1981.

² Grassroots: An Agriculture Retention and Development Program for New Jersey, October 1980, N.J. Dept. of Agriculture and NJDEP.

³ Statistical Abstract of the U.S., 101^R Edition, U.S. Dept. of Commerce, Bureau of Census.

TABLE 7
N.J. POPULATION PROJECTIONS BY COUNTY¹ - SCENARIO II

County	L&I Est. 1980 Population	2000 Population Projections	Gain or Loss	% Growth 1980 - 2000
Atlantic	194,600	295,000	100,400	51.6%
Bergen	844,100	896,200	52,100	6.2%
Burlington	363,500	471,300	107,800	29.7%
Camden	472,000	498,200	26,200	5.5%
Cape May	82,800	122,300	39,500	47.7%
Cumberland	133,100	161,700	28,600	21.4%
Essex	848,400	706,200	-142,200	-16.8%
Gloucester	200,600	287,600	87,000	43.4%
Hudson	555,700	443,600	-112,100	-20.2%
Hunterdon	87,800	111,100	23,300	26.6%
Mercer	307,900	354,900	47,000	15.3%
Middlesex	596,200	750,000	153,800	25.8%
Monmouth	504,200	592,700	88,500	17.6%
Morris	408,200	523,500	115,300	28.2%
Ocean	349,400	549,000	199,600	57.1%
Passaic	447,200	460,900	13,700	3.1%
Salem	64,800	69,600	4,800	7.4%
Somerset	203,200	261,200	58,000	28.5%
Sussex	117,100	151,200	34,100	29.2%
Union	503,100	515,300	12,200	2.4%
Warren	84,700	95,700	11,000	13.0%
TOTAL	7,368,800	8,317,300	948,500	12.8%

¹Statewide total and county distributions from Trend ODEA model. NJ Dept. of Labor and Industry.

efficient planning and building codes will receive less support as the energy supply remains ample and much of the population can afford the increased energy costs.

Under this scenario, household characteristics would be different in the year 2000 than today. The average household size would decrease from 2.65 persons/household to about 2.2 persons/household which represents a leveling off of trend from 1965 (see figure 6), resulting in a 36 percent increase in the number of households. A smaller household size means more travel per capita would occur.

People 65 years or older would comprise a larger percentage of the population (about 13.2 percent) in the year 2000 than they do today (11.5 percent). Although older people today generally drive less than the rest of the driving public, the elderly of the future (today's middle aged) can be expected to drive more thus generating additional travel per capita. New Jersey has already become a major retirement state with many elderly people buying single family homes in retirement villages, particularly in Ocean County.

Some return of middle and upper income people would occur in the cities and towns as some of these families begin to move back to the urban areas for cultural, social, and economic reasons. Although this gentrification is not directly a transportation problem, the displacement of the poor and minorities to other sections of cities or suburbs would be a transportation problem, since these people are more public transit dependent and the areas to which they would move are less amenable to cost-effective public transportation services (because of lower residential densities and less centrality.)

With higher energy costs, but no shortages, the out-migration from New Jersey to the South and West will continue, perhaps at a slightly lower rate than is occurring today. The low density and lack of public transportation in the Sunbelt will not deter people from moving as the higher energy costs for heating in the Northeast can be averted in the warmer Sunbelt climate. The out-migration will be slowed somewhat by the increased cost of energy for air-conditioning costs, the lack of water or of inexpensive water and an infrastructure that will be getting older and problematic in the year 2000. In this scenario, the water problem may be acute because synfuel and advanced recovery technique oil supplies are assumed to be in place to make up for the lost conventional crude oil and these processes require enormous supplies of water.

The impetus for companies to migrate to the Sunbelt states could slow as prevailing wage scales begin to rise to equal wages in the Northeast region of the nation. Higher wages would be demanded in southern and western states as unions gain strength, as the standard of living rises, and as taxes and prices increase to pay for boom-inherent costs. These factors would slow job formation in these growth areas.

Scenario III

Land Use Characteristics

Since the transportation sector is almost totally petroleum dependent, a reduction in petroleum supply on the order of 35 percent would have a great affect on transportation, greater than on the residential, industrial, and commercial sectors which have a greater ability to convert to non-liquid fuels. If petroleum were to become more scarce, society would no doubt allocate petroleum to industries and businesses to keep the economy going and people employed, to farmers for food production, and to heat homes to protect the physical well-being of the population. Within the transportation sector, fuel use would also no doubt be rationed with preference being given to emergency vehicles (police, fire, and ambulances), the trucking industry to insure the movement of goods necessary to sustain the economy, and to public transportation. The private automobile would likely be at the very bottom of the petroleum allocation ladder.

The diminishing supply of petroleum would increase the real price of energy by about a factor of 2.5 by the year 2000.¹ This increase in the

1. Petroleum shortages would drive up the price of fuel significantly above that projected for scenario II. Refer to footnote on page 64..

cost of fuel would make individuals and the business community significantly more energy conservation minded. For example, many people would choose to relocate their homes closer to their places of work and to other services to reduce fuel consumption and into housing having lower heating costs (urban areas for instance). Likewise, many employers would move to the city or other dense transportation corridors allowing alternative travel modes for their workers. The economy of the state would continue to change to one based more on service industries than on manufacturing industries.

The propensity to move to rural and low density suburban areas would be diminished, a self-limiting feature of this scenario. However, a certain increase in statewide land use control would be necessary and would be more politically acceptable to insure proper, energy efficient infilling of development to occur rather than inefficient exurban development.

In the year 2000, better integration of new housing, shopping areas, offices, and other worksites would occur as people would have had time to react to the long-term development of energy shortages and increased prices. Developers would begin to build higher-density mixed-use developments because they would sell better than remote single family homes. The public need for smaller housing units and alternatives to automobile travel would help popularize cities, villages, and cluster development where services are closer to the residences.

The state would expand and clarify the State Development Guide Plan, and the state's land use powers would increase as the need for efficient land use infrastructure became more vital to the economic competitiveness of New Jersey. With public, private, and governmental pressures being applied, land use zoning and tax laws would no doubt change from exclusionary zoning and special tax write-offs only for new construction and begin to favor infilling and the rehabilitation of existing areas. Infill development would convert low density areas into higher density areas and make major steps toward integrating housing with shopping and job opportunities. Clusters of newly constructed houses, apartments, shopping centers, offices, and businesses would cut down on the amount of infrastructure needed to serve the population and businesses.

Farmland

As mentioned in Scenario II, farmland is a valuable asset to New Jersey. Containing urban sprawl, in favor of more compact growth, will lessen the pressure on farmland. Retention of farmland in New Jersey is an important issue warranting prompt state action.

Government action in Scenario III could lay the groundwork for a serious and cogent land use policy aimed at the protection of New Jersey's farmland. Since population generally stabilizes in urban areas and does not grow as rapidly as in rural areas, the rate of farmland disappearance should be less than in Scenario II. Certainly any continuation of recent trends in construction of new residential areas will continue to erode New Jersey's capability of food production.

Demographic Characteristics

This scenario uses a slight modification of the N.J. Department of Labor and Industry's ODEA projection of New Jersey's year 2000 population. However, the county-by-county distribution was based on the policy population projections prepared by the Governor's Office of Policy and Planning (see Table 8).

TABLE 8
N.J. POPULATION PROJECTIONS BY COUNTY - SCENARIO III

County	L&I Est. 1980 Population	2000 ¹ Population Projections	Gain or Loss	% Growth 1980 - 2000
Atlantic	194.600	286.100	91.500	47.0%
Bergen	844.100	899.000	54.900	6.5%
Burlington	363.500	422.800	59.300	16.3%
Camden	472.000	577.600	105.600	22.4%
Cape May	82.800	110.100	27.300	33.0%
Cumberland	133.100	158.300	25.200	19.0%
Essex	848.400	848.400	0	0%
Gloucester	200.600	254.100	53.500	26.7%
Hudson	555.700	559.600	3.900	0.7%
Hunterdon	87.800	98.800	11.000	12.5%
Mercer	307.900	376.500	68.600	22.3%
Middlesex	596.200	752.200	156.000	26.2%
Monmouth	504.200	568.800	64.600	12.8%
Morris	408.200	477.000	68.800	16.9%
Ocean	349.400	447.400	98.000	28.0%
Passaic	447.200	477.000	29.800	6.7%
Salem	64.800	66.100	1.300	2.1%
Somerset	203.200	256.900	53.700	26.4%
Sussex	117.100	150.700	33.600	28.7%
Union	503.100	503.100	0	0%
Warren	84.700	91.800	7.100	8.4%
TOTAL	7.368.800	8.382.300	1.013.700	13.8%

¹Statewide total developed from trend projections modified by stabilized population growths for Essex and Union Counties. County distributions based on policy distribution. NJ Dept. of Labor and Industry.

In an energy shortfall situation, the state government, with full regard to energy efficiency concepts, could realize its policies of stabilized urban population, reduced rural and exurban growth, and orderly suburban infilling development through activities such as priority infrastructure investment in urban areas, stronger statewide land use controls, and adoption of energy efficient planning and building codes.

Under this scenario, the average household size would decrease from 2.65 persons/household to about 2.4 persons/household, resulting in a

25 percent increase in the number of households. This average household size is slightly larger than Scenario II's household size because the tight energy situation, with its changes in land use patterns and a slightly weaker national economy, would slow the trend of declining household size which occurs during an era of stronger economic growth and cheap energy. As in Scenario II, people 65 years or older would also comprise a larger percentage of the population under this scenario (also about 13.2 percent) in the year 2000 than they do today (11.5 percent). However, the trend of elderly people buying single family homes in retirement villages would slow in this scenario as single-unit housing would become more expensive due to a severe housing crunch resulting from the increased number of households and potentially high interest rates. To compound the problem, future reductions in Social Security benefits are also possible.

Recent population distribution trends would begin to reverse because people would settle closer to their worksites and other services because of the cost of travel and the problem of not having alternative travel options to the private car during times of tight gasoline. The smaller household size would require smaller housing units. Cities have more apartments and buildings easily converted to small units.

More gentrification would occur in cities and towns under this scenario as more middle and upper-class families move back to urban areas. Consequently, the displacement of more poor and minority citizens would create additional transportation problems.

As noted previously, the suburbs are less energy efficient than cities. Suburban houses tend to require more energy to heat, cool, and maintain than city type housing stock, and suburban development patterns require significantly longer trips to satisfy needs--predominantly by automobile. By some estimates, 80 percent of the housing stock needed in the year 2000 is in place today, thus the suburbs are here to stay, not withstanding their energy inefficiencies. However, the remaining housing stock needed to accommodate the year 2000 population should be located in more energy efficient environs.

Shortages and higher prices of energy could slow the out-migration from New Jersey as the south and west have lower population densities and thus are less prone to utilize public transit. Further, the increased cost of energy for air-conditioning, the lack of water or of inexpensive water, and an infrastructure that will be older and problematic in the year 2000 would likewise stem out-migration from the Northeast. However, some degree of out-migration to the more densely populated areas of New York City and Philadelphia could occur, thus counterbalancing any potential increase in population over Scenario II.

Scenario IV

The tendency toward denser land use would predominate this scenario, chiefly because people and goods can be transported more energy efficiently in denser corridors. Residential, commercial, and industrial land can also be maintained more energy efficiently in denser development patterns. Although there will be this innate tendency, proper planning is

necessary (if there is any development or redevelopment at all) to ensure the proper locationing and/or infilling of such development. Just as it would be difficult to judge the economic base of the state under such a severe scenario, it would likewise be difficult to determine a specific future land use that would be necessary to maintain such a base. Hence, it can only be assumed that a highly dense land use would be necessary in the year 2000 as well as the centralization of land use control such development would require.

It is difficult to determine changes in population during a progressive and somewhat long-term crisis situation. The state's economy would no doubt be directly impacted by such a prolonged reduction in petroleum availability. Chiefly, there would be two occurrences that would result in population changes. First, the nation, and hence New Jersey, would experience a great relocation of businesses, industry, and residences. Businesses not already located near high population areas would either move or fail. Industries would evaluate their locations with respect to the transportation system and move accordingly. Employees of those industries which remain viable would have a tendency to move closer to their places of employment to reduce costs of commuting or to eliminate the need to use an automobile to make the journey to work.

Second, the economy of the state could be depressed to the point that fewer births would occur. The cost of raising a large family would be prohibitive and most couples would opt for delaying the start of their families until the economy improved. For these reasons, it is difficult to project the state's population accurately and the distribution of that population. However, it seems probable that natural population growth would be retarded and population densities would increase in urban areas.

(2) Social Implications

Scenario I

Under this scenario, a continuation of the disparity between the social status of urban and suburban households/families will continue to lead to inequities in mobility and hence to serious social problems within the state and significant demands upon state government for resolution. This disparity would continue to increase over the decades with possible associated social disruptions occurring if the growing disparity is not decreased by government remedial action. Indeed, some government assistance would have to be instituted to allow certain services, such as public transportation, to continue in the urban centers. Revised property taxation, statewide property taxation, or unification of parts of the urban centers with more affluent surrounding suburbs and communities may have to occur, thereby reducing the economic plight that could develop.

Scenario II

The higher real cost of energy will increase the cost of owning and operating an automobile. This will force many poor and lower income

households to become carless, and increase their need for alternative transportation, especially public transit.

Although auto-travel as a whole will increase, the percentage of auto-less people will rise because:

- . Although there will be more elderly people who drive in the future, there will be a higher percentage of elderly in the population who don't drive.
- . Some gentrification of urban areas will occur and these people will have less need for the automobile mode.
- . A larger percentage of the population will not be able to allocate increasing proportions of their disposable incomes to transportation, particularly those who can't afford to purchase new, more efficient cars.

The transportation disadvantaged will become a larger percentage of the population, but they will continue to be basically poor and elderly. These people will need alternative modes of transportation that are inexpensive. Alternative modes such as public transit, carpools, vanpools, bicycling, and walking, along with their appurtenances, will be required. However, if the majority of people still drive cars, there will be little interest or widespread demand for these services.

With a continuation of low density land use development, public transit will be very expensive to provide and the public sentiment for increased subsidies could abate. The issue of modal costs and their subsidies will continue to be debated in the future in the search for lower cost transportation. The degree of debate will depend on the political strengths of those people not capable of utilizing the automobile mode, namely the poor, elderly, and central city dweller.

Scenario III

With tight gasoline supply and the higher costs of owning and operating an automobile, an increasingly large percentage of the population would become carless or second-carless and would have a pressing need for alternate transportation, especially public transit. Transportation may well become a social issue for the middle-class as they begin to experience the same transportation problems that now are mainly confined to the poor and elderly who are the traditional non-car drivers.

The percentage of carless people would also rise for other reasons:

- . The gentrification of urban areas where there is less need for owning an auto and, conversely, where the cost of auto ownership is high, e.g., insurance rates and garaging fees.
- . As the economy slows due to less energy, more households would not be able to allocate increasing amounts of their disposable income to

transportation, particularly the poor who would be hurt by high fuel costs and lack of capital to purchase newer fuel efficient cars. Even the affluent could be inconvenienced by rationing and regulations. Non-car drivers would begin to stress equity in transportation as a political issue. Without a second car, the two working parent family would need alternative modes of transportation to get to work or for other trip purposes.

All of this will lead to a need for greater attention to be given to alternate transportation modes that can serve society but which are less dependent on petroleum fuels. These alternate modes include public transit, carpool and vanpool programs, bicycling, and walking.

Scenario IV

It is difficult to project the social ramifications of a severe energy shortfall. On the one hand, severe energy restrictions would lead to increased unemployment rates and a reduction in personal income growth. On the other hand, the disparity between the economic status of the citizens of the state would diminish as jobs move back into the urban centers allowing the urban poor to compete for them. Also, the full range of opportunities available to all citizens of the state would increase under this scenario as not only employment but also recreation, cultural, and other activities follow the citizens back into the urban areas. As there would be less petroleum fuel to support personal mobility to the degree that exists today, it would fall, no doubt, to state government to institute and maintain adequate public transportation to accommodate as many journey-to-work trips as possible.

(3) Economic Conditions

The projection of the economic status of the state under any energy scenario is a difficult and complex matter since economic trends are affected by many other factors besides energy. Costs of labor, impact of labor unions, tax incentives, and the relative advantages of constructing new industrial infrastructure versus the rehabilitation of outdated existing infrastructure are just a few of the many other factors which can affect the geographical location or relocation of jobs. However, this section will attempt to address the likely impact on the state's economy of differing levels of energy cost and availability.

Scenario I

Under this scenario it can only be surmised that cheap and abundant fuel would be an economic boost for the nation and the state in the period through the year 2000. New Jersey's chemical, drug, and refining industries would be fortified by such conditions. What is difficult to determine is which industries in the state's urban areas would elect to move to the more suburban and rural areas of the state or to the Sunbelt states altogether, driven by cheaper fuels and the desire to function in campus-like settings. This out-migration must be counterbalanced by the in-migration into New Jersey of businesses and industries from the major metropolitan centers of New York City and Philadelphia. The only

constraints to such a suburbanizing trend would be an open land conservation policy advocated by government and endorsed by the citizens. Such a policy would have to be measured against the impacts of such policy on business and industrial relocation.

Scenario II

For many years economic conditions, technological developments, population densities, and life styles combined to place New Jersey among the top states in the nation in terms of economic strength. Prior to the decade of the 1970's, manufacturing industries were primary components of the northeast states' economies. In recent years, however, the South and West have attracted both manufacturing industries and financial resources from these older industrial areas. This industrial migration has helped to retard the economic growth of New Jersey and the rest of the Northeast.

Income Growth

Currently, per capita income in New Jersey is increasing by approximately 1.9 percent per year while the nationwide average is increasing by about 2.6 percent per year.¹ Under Scenario II conditions, it can be expected that these trends and relationships will continue for the next two decades with perhaps the growth rate increasing slightly.

Unemployment

Statewide unemployment reached a post-World War II high in 1975 of 11.4 percent. Since that time, it has declined to just over 7 percent. The high unemployment rate of 1975 can be related to the energy shortage years of 1973-1974 and the recession and inflation that followed, thus portraying the impact of energy cost and supply on employment.

Currently, unemployment in New Jersey is approximately 7.2 percent. This rate is tied into the energy prices which currently exist. Under Scenario II, which envisions moderate increases in energy costs, the unemployment rate in the state can be expected to approximate today's figures or decrease slightly. The potential for reducing unemployment by any sizeable amount is dampened by the fact that employment opportunities which moved from New Jersey in the past are not likely to return by the year 2000.

Cost of Living

While increasing energy costs are not totally responsible for inflation, the gradual increase in energy prices has affected the costs of many other products and services. Rising energy prices have caused increases in all components of the Consumer Price Index (C.P.I.) and have made it harder for New Jersey residents to meet their expenses.

¹ Survey of Current Business, U.S. Dept. of Commerce, Bureau of Economic Analysis, Nov. 1980, pg. 49

From 1960 to 1970 the C.P.I. for all items rose 27.6 points; from 1970 to 1980 the same component of the C.P.I. increased 130.5 points. Other components of the C.P.I. also show the effects of inflation. From the base year, 1967, when all parts of the C.P.I. were set equal to 100 points, to 1980, the following components of the C.P.I. showed increases: Food up 148 percent; apparel and upkeep up 78.4 percent; housing up 163.3 percent; rental housing up 91.6 percent; transportation up 149.7 percent. These cost increases have meant increasing hardship for many New Jersey residents. Table 9 provides a historical comparison of consumer price indices for all items and for transportation only.

TABLE 9
CONSUMER PRICE INDICES
(1967 = 100)

Year	All Items	Transportation
1950	72.1	68.2
1955	80.2	77.4
1960	88.7	89.6
1965	94.5	95.9
1967	100.0	100.0
1968	104.2	103.2
1969	109.8	107.2
1970	116.3	112.7
1971	121.3	118.6
1972	125.3	119.9
1973	133.1	123.8
1974	147.7	137.7
1975	161.2	150.6
1976	170.5	165.5
1977	181.5	177.2
1978	195.4	185.5
1979	217.4	212.0
1980	246.8	249.7
1981 ¹	264.8	301.7

¹August, 1981 figures are for all Urban Consumers in New York-Northeastern New Jersey.

SOURCE: Handbook of Basic Economic Statistics, May, 1981, pp. 99-101
and U.S. Department of Labor, Consumer Price Index 9/24/81

Currently, overall inflation is running about 10 percent per year for all items. Under the conditions of this scenario, the inflation rate can be expected to continue at about the same rate.

Scenario III

Approximately 8 years have passed since the first domestic oil shortage occurred. The economic conditions brought on by an energy shortfall as perceived in this scenario conceivably could be considered similar to but not as severe as the situation that existed in the shortage years of

1973-1974 and to the years of recession and inflation that immediately followed. The state is now in a better position to address energy problems than it was in the early 1970's. Also, the more energy intensive industries, such as primary and fabricated metals, electrical machinery, and some stone-clay-glass manufacturing, have already left the state.

It would be incorrect to assume that there would be little or no impact to businesses and industries due to reductions in petroleum fuel availability. Indeed, the large price increase alone would have a negative influence on the growth of the economy, employment and the cost of living. Other states will experience somewhat similar impacts, and thus, nationally there will be less consumer and business spending and increased unemployment.

As these effects would take place over a 20-year period, the marginally energy inefficient businesses and industries would have left the scene. If the U.S. allocates its domestic energy fairly, New Jersey would appear to be in a competitive position nationally due to its high population density, proximity to major markets, good public transit infrastructure, relatively mild climate, and diversified employment base.

Income Growth

As petroleum becomes scarce, total production in New Jersey could decrease and the output of goods and services could decline. Particularly vulnerable is the state's petrochemical-plastic industry which represents a large aspect of the state's economy. This industry accounts for approximately one third of the state's value of total manufactured shipments and 20 percent of the manufacturing sector's employment.

Under this scenario, New Jersey's annual growth rate of per capita income through the year 2000 would be less than that of Scenario II and less than today's growth. It is likely that this measure of the state's economy will experience a decrease on the order of 1 to 2 percent from today's annual growth rate of 1.9 per cent. Income growth effectively becomes nominal under this scenario.

Unemployment

During the next 20 years, the unemployment rate in New Jersey would follow current trends but at an accelerated rate. Manufacturing employment would decline during this period. However, jobs in the state's service industries would increase modestly as would jobs in finance, insurance, and real estate. The state's average unemployment rate could exceed 10 percent under this scenario, with even higher unemployment rates experienced in certain key industries.

Cost of Living

Inflation under this scenario would increase to slightly higher levels than Scenario II as the scarcity of energy and high fuel prices further increase all components of the consumer price index. The rise in inflation, coupled with the anticipated decline in personal and per capita

income, would result in some fundamental changes in the life styles of the citizens of the state. The continued increase in the cost of home ownership, for example, would continue to spur changes in home purchase patterns. A continuation of recent trends of purchasing cheaper homes in the inner cities or the purchase of condominiums will have important implications for land use and transportation planning.

Scenario IV

A severe energy shortfall could initially have a catastrophic impact on New Jersey's economy. As noted in the preceding scenario, the petro-chemical-plastic industry accounts for approximately 20 percent of the manufacturing sector's employment. Also, many of the state's workers are employed in jobs that are directly tied to transportation, i.e., gasoline refining, automobile and other transport equipment manufacturing, and public transit operation.

Additionally, most New Jerseyans rely on the automobile to get to work. A severe energy shortfall would play havoc during the short term with the citizen's desire to travel from home to work.

Over the long term, however, the inherent energy efficiencies of the Northeast and existing infrastructure could make New Jersey even more attractive to industrial and manufacturing development compared to many other states. Also, New Jersey is the base for much scientific and technological research. Therefore, synthetic fuel research, development, and production could increase significantly under these conditions.

Urban living and cluster developments along major transportation arterials and transit lines would take on added impetus. Small industries located within the urban area or part of the cluster development would emerge. Even the concept of "cottage industry" might reemerge in the future. No doubt, public transit would enjoy a renaissance in terms of reinstitution of service, new construction, and use.

(4) Environmental Concerns

Scenario I

There are principally two main impacts of such an energy situation in New Jersey. First, due to abundant fuel, the suburbanization process would continue, leading to greater conversion of open space and farmland to other developed land use--residential, commercial, and industrial.

Second, a greater use of the automobile with lower occupancy rates could have a detrimental effect on the quality of air within the state. This could be especially severe if technological research and development in pollution abatement slackens, as it would in the area of engine efficiency.

A return to an era of cheap and abundant fuel could encourage a return to the use of larger and heavier automobiles, thereby increasing the use of other natural resources, i.e., chrome, aluminum, copper, steel, etc.

Scenario II

Environmental damage under this scenario would be less than in Scenario I. This scenario assumes that the reduction in energy supplies from certain fuels, e.g. petroleum, which are expected to be more scarce in the future, will be offset by conservation efforts and significant increases in alternative fuel supplies.

The development of alternative fuels to replace conventional oil has a great potential for environmental damage. Coal development has severe land reclamation, air pollution, water pollution, and transportation consequences. Nuclear power development has unsolved radioactive waste disposal problems, requires large amounts of water, and the operational safety of these plants is questioned by many. Advanced oil recovery techniques can cause water pollution and disturb wildlife and the natural environment. Synfuel production requires vast amounts of coal and water.

The suburbanization process would continue under this scenario although slightly less than under Scenario I. Increases in auto use would lead to increases in air pollution; however, the lesser degree of suburbanization and the conservation efforts associated with this scenario would generate less air pollution than Scenario I.

Finally, continued road building efforts of a significant scale would be required under this scenario leading to continued adverse impacts on the state's environment, especially in urban areas.

Scenario III

Pending the results of any further oil exploration attempts off the coast of New Jersey, one of the few benefits of being an energy poor state is the reduced environmental damage that can occur from the mining and processing of coal, oil, gas, and nuclear bearing ores. The impacts of these activities will clearly impact the environment of the southern and western states. Thus, New Jersey could be impacted by acid rains and polluted air from western areas of the country.

The development of new energy forms necessitated by this scenario would entail many environmental decisions and may bring diminishing returns energy-wise. In the long run, it may be cheaper and easier, or as easy, to eliminate the need for a barrel of oil or a ton of coal by never using it at all (by increasing energy efficiency) than it is to find, process, and consume energy and clean up afterwards.

Environmental awareness is deeply engrained in large segments of the population, and should the environmental status quo drastically worsen, technological fixes and conservation would be demanded by large segments of the population. A high standard of environmental quality can be compatible with a high standard of living, but not with a wasteful standard of living. The extra cost of environmental mitigation would make conservation a more cost effective and preferable route. Some of the major environmental problems to be faced are: Open space reduction from energy exploration and

extraction; acid rain, water and rain pollution, water scarcity, noise, social disruption, and land reclamation problems from coal utilization; radioactive waste disposal, water supply problems, and the danger of a power plant accident from nuclear electric power; and air and water pollution problems from oil utilization.

Because this scenario assumes less petroleum consumption than Scenario II, it can be assumed that the environmental impacts would be less from that energy source, only to be countered by increased utilization of other fuels, primarily the increased burning of coal for electrical generation. It is conceivable that, in an energy rationed future, the concerns of certain industries and some segments of the public over the reduced energy supply could convince federal and state governments to lower environmental protection standards. Air pollution standards, open space preservation, and pollution abatement in general, often seen as preventing efficient recovery and usage of energy supplies, could be jeopardized.

Scenario IV

It is expected that the environmental damage would be minimal under this scenario. However, this assumption would depend to a great extent on the degree of offshore drilling, pumping, and transportation of petroleum crude along the coast of New Jersey, and the production and refining of petroleum products within the state. Preliminary information has indicated that the reserves off the coast of New Jersey will yield limited petroleum reserves. Actually, many of the western states' environments will be jeopardized as the country would be forced to increase the mining of coal, nuclear materials, and oil bearing sands and shales.

Further, such a scenario would mean a curtailment of new infrastructure construction in rural and undeveloped areas of the state. The suburbanization process would be halted; if any construction did occur infilling would take place in the state's urban areas and at intersections of main transportation corridors. This land use development would mean the greater preservation of open space, farmland, and other environmentally sensitive land.

(5) Technological Developments

Technological advances will temper the effects of the different energy scenarios. However, it is difficult to estimate the rates of progress under various energy shortfalls. A major shortage of fuel and associated high prices would provide a greater impetus for advanced energy efficient technology and, assuming our technological research and development efforts are fruitful, less energy would be needed for the same quality of life. If prices rose slowly and energy became more plentiful, there would be little demand for new energy efficient products and more energy would be used.

Scenario I

Undoubtedly, this energy scenario would curtail the consumer demand for energy efficient motor vehicles. The citizens, industry, and

government would probably be satisfied with energy efficiencies presently attained. However, even with substantial improvements being made in recent years and anticipated through 1982, additional research would likely occur to reduce automobile pollution further, if mandated. Research into synthetic fuels, electric vehicles, and improved public transit vehicles and systems would probably be foregone due to cost/benefits of such research and development.

Scenario II

Energy production technology will advance in Scenario II. Better advanced oil recovery, coal mining, synfuel, and solar techniques will evolve. These will make adequate energy available at a real price of approximately double today's price.

How widespread advancements in transportation technology will become, hinges on the fuel supply. If sufficient fuel is available, there will be less need for electric cars, telecommunications, and appropriate technology.

If there is some fuel supply constraint, advances in transportation technology will augment gasoline powered travel by electric vehicles, useful telecommunications, and the deployment of appropriate technology.

Scenario III

Under this scenario, the energy shortfall would begin to be apparent long before the year 2000 and that information would spur research and development of more energy efficient vehicles and equipment in all sectors of the economy. As the real price of fuel increases and its availability decreases, more research and development would take place and the public and industry would be willing to expend more amounts of capital to purchase energy efficient automobiles and equipment.

With the shortfall depicted in this scenario, 35-40 mpg auto and light truck fleet consumption rates would seem reasonably possible. The car of the future would no doubt be small, low powered (by today's standards), have computer monitored carburetion, and have an improved or infinitely variable transmission. The truck fleet efficiency would improve by about 1.5 times as better power plants, transmissions, tires, and some aerodynamic streamlining takes place. However, since trucks would continue to carry large and heavy freight, weight reductions would be less feasible.

Electric powered cars would have some utility under this scenario because they can be powered with non-petroleum fuels. However, they would probably have a small market penetration, on the order of 2 percent, since they are not much more energy efficient than internal combustion engine autos and would have limited range performance characteristics.

Substitute fuels for automobiles would not be a panacea for replacing the diminishing supply of domestic oil production. The synfuel programs are plagued with environmental, capital, political, and cost-effectiveness problems. Fuels from biomass raise an equity problem from a

world-wide perspective. New Jersey is part of a world community which has much concern for starvation and malnourishment, and making fuels using agricultural resources could raise a moral controversy.

Telecommunications would become more important in the future as it eliminates the need to make certain trips, or alters the trip-making activity. Two-way interactive coaxial cable systems linking computers would become ubiquitous. Long distance travel would grow at a slower rate than it has with improved telecommunications. Urban/suburban trip making would be altered and could even diminish the negative impacts of forced reductions in discretionary trip making. The viability of the CBD could be hurt as telecommunications help increase the energy efficiency of low density suburban development. The most promising telecommunications advances would be aimed at remote worksites, teleconferencing, improved traffic control, ridesharing information distribution, and shop-at-home services. High energy and travel costs would spur research and development in the telecommunications field.

Appropriate technology is not so much sophisticated advances in gadgetry but using the correct technology to perform the specific task. Better utilization of efficient motorized and non-motorized (bicycle) vehicles, improvements in delivery service, solar heat, gardens, and some life-style changes all are appropriate answers to the energy problem. Innovative and simple systems are often just as effective as high-technology solutions.

Scenario IV

Technological advances would be most critical under this scenario for they would determine the quality of life that would exist in the year 2000 under dire conditions. Indeed, as adverse economic conditions developed, they would compel diverse and intense research and development in all areas impacted by serious energy shortages. It would be most difficult to ascertain the degree of success of such attempts. However, from a transportation point of view it can be assumed that not only will there be research in improving vehicular energy efficiencies but the efficiencies of entire transportation systems as well.

A great deal of research would have to be exerted in finding new and cheap fuels that could be used until the year 2030 when it is expected that the benefits of fusion power would become possible. Alternatives to trip making would also have to be explored and would result in improved high-speed telecommunications which would take the place of business meetings, shopping trips, educational trips, and many work trips.

(6) Existing Infrastructure Conditions

When planning for one infrastructure, such as transportation, it is important to look at the impact of such plans on the total infrastructure. Therefore, this section is presented to examine the scope of the infrastructure that will have to be improved or added to depending upon which scenario should eventually evolve.

Transportation

New Jersey's transportation system is extensive for a state so small in size. The system consists of approximately 33,000 miles of highways and streets, 500 route miles of commuter rail track, a rapid rail system consisting of 33 route miles of track and approximately 3,600 buses.

Although extensive, the state's transportation system is relatively small when compared to some other states. For example, New Jersey has 4.6 center line miles of highway per 1,000 residents. This compares to 10.0/1,000 for Pennsylvania, 6.2/1,000 for New York State and 17.8/1,000 for the nation as a whole. On the other hand, New Jersey's highway system is extensively traveled as its average daily travel per mile of highway is 4,134. This compares to 1,639 for Pennsylvania, 1,951 for New York State, and a nationwide average of 1,069.

Because of this extensive use and historical funding insufficiencies, New Jersey's transportation system has begun to wear out, and extensive rehabilitation efforts must be undertaken regardless of which energy scenario and development patterns should eventually come to pass. This rehabilitation effort is necessary if substandard roads, bridges, and public transit systems, that result in increased vehicle operating maintenance costs, energy consumption, pollutant emissions, accidents, and congestion, are to be averted.

Based on a recently compiled analysis of future transportation infrastructure conditions, it has been determined that if current levels of funding are not increased beyond present levels, there will be an estimated 19,000 miles of state and local roads in need of pavement rehabilitation and over 800 state and local impassable bridges by the year 2000.

The statewide public transit system would experience problems of a different sort. Currently, a massive public transit modernization program is in progress, so the problems public transit will face in the future (if no substantial amounts of additional transit funding are forthcoming) is keeping the fleet of buses and trains well maintained and operating, with replacements forthcoming when rail cars and buses reach retirement age. Indeed, the services now provided at current funding levels cannot be sustained, even if fares were increased to keep pace with inflation.

Moreover, if current funding levels are not increased, transit service cutbacks would be necessary to avert deficits. These cutbacks, in turn, would prompt a loss of existing ridership--as some transit dependents are left without service and some transit riders with travel choices available are dissuaded from using transit--and forfeiture of anticipated ridership growth. Some of these "lost" riders would be transit dependents left without transit, who would then be forced to forego the trips they formerly made, thus reducing their mobility. The remaining "lost" riders would be people diverting to cars, placing further strains on the state's already congested road system. This added traffic would increase travel times on the state's principal commuter arteries and would also translate into increased energy consumption and air pollution as well.

Simply raising fares in lieu of service cutbacks would not solve the problem. Besides further burdening transit dependents, this strategy would in itself lead to decreased ridership. A general relationship of fare increases to patronage loss is that each 1 percent increase in fare results in a 0.3 percent ridership decrease, e.g., if fares are raised 30 percent, a patronage drop of 9 percent could be expected.¹ Relative ridership losses could be significantly higher given large and/or frequent fare increases and especially if coupled with service cutbacks.

Housing

Residential development consumes more land in New Jersey than any other use. It is established that more than 50 percent of all lands presently developed in the state are occupied by residential uses. Until recently, the consumption of land by residences had been accelerated by the outward movement to the suburbs which had characterized New Jersey's growth during the past several decades.

During the past decade, the growth in housing stock increased at a greater rate than the population. These trend relationships were caused by decreases in the average household size, a population that is growing older, and the need to replace units lost through obsolescence, deterioration, and destruction. During the period 1970-1980, population in New Jersey grew by 2.3 percent while housing stock for the same period increased by more than 16 percent. The nature of the growth in housing stock during this period reflects the statewide trend toward suburbanization. Between 1970 and 1980, the four leading counties in terms of housing stock increases were Ocean with an increase of over 62,000 units, Monmouth with more than 41,000 units, Burlington with more than 32,000 units, and Middlesex with an increase of almost 32,000 additional housing units. The majority of these new units were of the high-cost single-family unit type.

Projections included in the New Jersey State Development Guide Plan call for an annual production rate of 65,000 units to satisfy New Jersey's housing requirements through the year 2000. Although this figure would no doubt fluctuate depending on which energy scenario and development patterns should eventually come to pass, the construction of housing units will have to accelerate under any scenario as building permits during the recent past have averaged slightly more than one-half the projected rate necessary to meet demand. A major challenge in the years to come will be to provide a variety of housing opportunities in appropriate locations for New Jersey's increasing population.

Utilities

The provision of utilities including water supply, sewage disposal, gas, electricity, and telephone are essential to the future well-being of the state's developed areas. Although utility services have for the most part adequately met the needs of the state's growing population, it

¹ Traffic Quarterly, Vol. 35, No. 1, January 1981, 117-142. "Transit Ridership Responsiveness to Fare Changes."

appears that two of the most important services, i.e., water supply and sewage disposal, are falling behind in their ability to meet growing needs.

As the state develops over the next two decades, the demands to be placed on utility services will vary under the various energy scenarios. The ability to meet those needs could be limiting factors on the land use that will eventually emerge.

Water Supply

New Jersey has more than 500 public and private purveyors (entities which provide water to the public) that operate in the state. The sources of water for these various purveyors takes many forms: Reservoirs; river intakes; well systems; purchases from others; and various combinations of these.

Demand for purveyor-supplied water in 1980 approximated 1,080 million gallons per day. Projections for water demand in the year 2000 in New Jersey show an increase of 255 million gallons per day.¹

A comparison of resources and demands indicates that the state is not uniformly capable of meeting projected water supply needs. While some areas of the state are in the enviable position of having sufficient water resources both for the present and near-term future, other areas are now in, or are rapidly approaching, critical shortage conditions. For example, in the coastal communities of central and southern New Jersey, summer vacationers inflate normal populations tenfold in some cases and much of the apparent surplus supplies in those areas are committed to meet these seasonal demands. Some surplus is desirable within a system as a back-up supply in the event of an emergency or drought.

The recent drought situation indicates the precarious and fragile water supply system that exists in New Jersey. As demands increase in the future, the need to develop additional supplies will intensify. The number of people that locate in the state, under the various energy scenarios, and their geographical locations will have much to do with the extent of that demand and how it is satisfied.

Water quality has a significant impact on water supply efforts. Pollutants from various sources can have a significant negative impact on the quality of the state's drinking water thus reducing the amount available for potable purposes.

The effects of uncoordinated land use can also lead to deteriorated water quality conditions. The introduction of incompatible human activities into areas serving as sources of potable water supply or the introduction of development in watershed areas which provide water to a distant service area can significantly impact water supplies and distributions.

¹ The New Jersey Statewide Water Supply Master Plan - Draft NJDEP, June 1981

State plans call for the construction of several projects through 1985.¹ These projects are needed to provide adequate water supply and distribution systems for the state. Once the immediate Action Plan is under way, the state and purveyors will be in a better position to consider and respond to needs that will occur after 1985. However, development of new sources of supply will remain the principal means of satisfying needs in the post 1985 period. The way the state develops, i.e., urbanization or suburban sprawl will certainly impact those needs.

Sewage Disposal

In addition to water supply systems, sewage disposal systems are essential to residential, industrial, and commercial development. There are over 250 different organizations, both local and regional, that own and operate the various waste water facilities throughout the state. The state has some 650 waste water treatment plants that are the responsibility of 156 of these organizations, three of which are privately owned.

The state has identified several categories of waste water treatment needs through the year 2000. These categories of treatment facilities include: Secondary treatment; advanced secondary treatment; advanced waste treatment; correction of infiltration/inflow; major rehabilitation of sewers; new collector sewers; new interceptor sewers; and control of combined sewer overflow.

Sewage systems and improvements require major investments. Until recently, the construction of these kinds of projects have been heavily funded by the federal government under the Clean Water Act. Present indications from Washington are that federal funding will be cut for certain categories of projects, only earmarking available funds for treatment facilities of demonstrated benefit.

New Jersey will probably be able to meet its more critical waste water treatment needs during the next decades. New strategies like shifting waste water responsibilities to the localities rather than the federal government will have to be investigated in light of planned federal budget cuts. Additionally, new waste water treatment demands will have to be reassessed due to a decreased amount of federal monies. The extent of these needs will depend on the way the state develops in the future. However, it cannot be over emphasized that the presence of these facilities is essential to the state's future growth and development.

Electricity

Electricity in New Jersey is provided by three primary utilities: Public Service Electric and Gas, Jersey Central Power and Light, and Atlantic City Electric. The respective coverage area for each utility company is: PSE&G - from Bergen County South to Camden (including Trenton); ACE-from the Delaware River, South of Camden to Atlantic City and Cape May County; and JCP&L - all remaining areas.

¹ The New Jersey Statewide Water Supply Master Plan - Draft NJDEP, June 1981.

JCP&L and ACE basically serve the developing counties in New Jersey while PSE&G serves the established urban areas. In conjunction with this service, JCP&L and ACE are projecting an annual growth rate in electrical use through the year 2000 of 2-3 percent while PSE&G projects a growth rate of slightly more than 1 percent. This indicates that the utilities expect a trend of continued suburbanization.

With the exception of PSE&G, the utility companies have very small reserve capacities. Therefore, increased demand for electricity will have to be met through expanded facilities. The energy scenario and land use patterns which ultimately develop in the year 2000 will determine the extent and cost of these additional service needs.

Natural Gas

New Jersey is currently a non-producing state for natural gas and, as such, must rely on other regions of the nation for its natural gas supply. Natural gas is supplied to New Jersey via a vast network of pipelines which primarily originates in the Gulf states. The main pipeline serving New Jersey is the Trans-continental pipeline.

There are four companies which provide natural gas to the state. In order of size, they include Public Service Electric and Gas, Elizabethtown Gas, New Jersey Natural Gas, and South Jersey Gas. During 1980, the amount of natural gas supplied by these companies to New Jersey residents was 387.5 billion cubic feet.

The use of natural gas in New Jersey peaked in 1972, declined thereafter due to supply problems, and peaked again in 1980 when consumption exceeded the 1972 figure. Growth in natural gas consumption during the next 20 years is expected to increase by about 2 percent per year.¹

Increased consumption of natural gas will require the construction of a number of new facilities. These include both liquefied natural gas (LNG) import facilities and natural gas pipelines. The siting of LNG facilities has become a controversial issue and may affect the location and use of these facilities. The location and construction of natural gas pipelines do not appear to be as controversial.

Overall, the outlook for natural gas supplies in New Jersey is generally considered to be favorable, especially in light of the recent finds off the coast of the Eastern Seaboard. However, the land use patterns that exist in the year 2000 will certainly impact the distribution system necessary to accommodate consumption needs.

Educational Facilities

New Jersey is experiencing a change in its demand for educational facilities. While the state's population is increasing, its public elemen-

1. Draft revisions to the New Jersey Energy Master Plan, September 1981, by NJDOE.

tary and secondary school enrollment is decreasing. However, at the same time the number of New Jersey students attending institutions of higher learning is increasing significantly. These trends are indicative of both the declining birth rate in the state and the demands being placed on the citizens' educational experiences by an advancing technology.

During the past five years, approximately 50 primary schools have been built in New Jersey (mostly in rural areas). During the same time period, about 35-40 schools per year have been closed (mostly in urban areas). These data are a reflection of the state's changing population shifts and declining enrollments in urban areas.

To meet the need of providing public schooling beyond the level of high school, many junior colleges have been built to take some of the increasing burden off of the colleges and universities in the state. These facilities will continue to play an increasingly important role in the future of higher education in New Jersey.

The future demand for educational facilities in New Jersey will quite naturally depend somewhat on the impacts of the emerging energy scenario. However, under any scenario, it is essential that educational facilities be available to the citizens of the State if New Jersey is to be an "intelligent" state ready to meet the challenges of future growth and development.

Effects of Population Density

An examination of some of the relative impacts of different concentrations of development give an indication of the price that society may have to pay to support continued growth and development. Although the following data support the thesis that urban development patterns are more energy efficient and cost effective than suburban sprawl, not all "experts" agree with this contention. However, the majority do subscribe to this view.

Table 10 indicates the costs of public services associated with three types of community development patterns, i.e., low density sprawl, combination mix (infilling) and high density development (cluster); Table 11 indicates air pollution; Table 12 indicates water pollution; and Table 13 indicates energy consumption for the same categories of development.

(7) Financial Impacts, Resources and Strategies

The preceding section noted that New Jersey has an extensive infrastructure which will have to be considered in the state's future growth and development plans. The discussion attempted to provide some sense of the size of the system, as well as its condition and the extent of rehabilitation that is already necessary.

This section will discuss, in some measure, the costs related to maintaining and improving the transportation portion of the state's infrastructure as well as the potential to meet those needs. For financial

TABLE 10

**COSTS OF PUBLIC SERVICES BY TYPE OF DEVELOPMENT
(10,000 UNITS)**

COMMUNITY DEVELOPMENT PATTERN

Public Services	Low Density Sprawl	Combination Mix	High Density Planned
Neighborhood streets capital costs; arterial, collector, minor	\$22,200,560	\$15,792,800	\$12,080,664
Operating & maintenance, all sts., all costs	395,841	259,577	209,362
Police service, operating & maintenance costs	710,096	603,593	532,572
Water Supply capital costs	27,236,468	15,788,923	9,607,274
Electricity capital costs	1,706,713	1,139,850	885,787
Electricity, operating	2,361,816	1,760,374	1,418,012

SOURCE: Real Estate Research Corporation: The Costs of Sprawl: Detailed Cost Analysis, pp. 113-126:

TABLE 11

**AIR POLLUTION GENERATED BY
COMMUNITY DEVELOPMENT PATTERNS
(10,000 UNITS)**

POUNDS GENERATED INTO AIR PER DAY

Type of Development Pattern	CO	HC	NO_x
Low Density Sprawl	4,040	487	475
Combination Mix	3,043	367	358
High-Density Plan	2,031	245	239

CO = carbon monoxide
HC = hydro carbons
NO_x = nitrogen oxide

SOURCE: Costs of Sprawl, p. 134

TABLE 12
WATER POLLUTION BY DEVELOPMENT PATTERNS
(10,000 UNITS)

Type of Development Pattern	Average Annual Sediment Volume During Development Period (tons per year)	Pollutants From Run-Off Total Volume (liters)
Low Density Sprawl	6,170.39	9,176,756,160
Combination Mix	4,450.31	7,807,494,880
High-Density	3,636.40	7,141,284,480

SOURCE: Costs of Sprawl, p. 137

TABLE 13
ENERGY CONSUMPTION BY COMMUNITY DEVELOPMENT PATTERN
(10,000 UNITS)

Type of Energy	Low Density Sprawl	Combination Mix	High Density Planned
Natural gas (Therms per year)	13,470,900	9,994,180	7,951,770
Electricity (KWH per year)	295,227,080	220,046,750	177,251,577
Gasoline ¹ (Gallons per year)	13,115,667	9,879,330	6,594,333

¹Assumes 15 miles per gallon as average auto consumption rate

SOURCE: The Costs of Sprawl, pp. 13, 146, 147

needs related to the remaining infrastructure, the reader is referred to the annual report of the New Jersey Commission on Capital Planning and Budgeting or to those agencies responsible for the remaining elements.¹

Financial Needs

As indicated previously, a recently compiled analysis of New Jersey's transportation infrastructure indicates that an extensive backlog of needed improvements exists.

In addition to the funding necessary to attend to this backlog, there is a recurring need for funding to address infrastructure problems which will arise through the passage of time. Roads, bridges, and public transportation facilities have limited lives, and a certain level of funding is necessary to continue to maintain this infrastructure in serviceable condition. Moreover, as new travel demands arise, certain capacity increases and new roadway construction will be necessary.

Estimates of the annual funding levels needed for each of these purposes are depicted below:

<u>Purpose</u>	<u>Annual Cost</u> <u>(million \$, 1981)</u>
1. Highways and Bridges	
Reconstruction and Rehabilitation	95
Operations and Maintenance	172
Completion of the Interstate System	24
Necessary Capacity Increases	32
2. Transit	
Reconstruction and Rehabilitation	80
Operations and Maintenance	150
3. Transit Extensions and New Highway Alignments	30
4. Debt Service from Bonds	75
5. Local Aid to Counties and Municipalities	<u>100</u>
	758

Future Funding Potential

There are three principal sources of transportation funds at the state level. First, funds are provided by appropriations by the State Legislature. Second, federal aid for highways and transit is admin-

¹ State of New Jersey Annual Capital Improvement Plan, New Jersey Commission on Capital Budgeting and Planning.

istered by various federal agencies. Bond financing is the third major source of funds, but it is not a recurring funding source over the years. Since 1968, the voters of New Jersey passed two bond referendums for transportation, one in 1968 and a second in 1979. However, during the intervening years, other proposals were rejected.

Most transportation funds for state projects and programs in New Jersey come from state appropriations from a general fund. The state is almost unique in that respect as most other states have some form of dedicated transportation funding program whereby nearly all of the transportation revenues collected are returned to transportation uses.

New Jersey finances its transportation system through annual appropriations by the legislature from the general funds of the state treasury and through the monies received from federal apportionments and grants. A state statute requires that all expenditures be made by legislative appropriation and that appropriations shall not be made unless revenue on hand and anticipated for the fiscal period is sufficient to cover the appropriation.

This type of funding arrangement has created a situation whereby New Jersey is the only state in the nation where less than 70 percent of the transportation revenue is returned to the transportation sector. The long-term outlook for meeting transportation needs under this funding arrangement is not encouraging. In 1962, transportation was appropriated 18.2 percent of the total state budget. That relationship has continually decreased to where in FY 1982 the portion of the total state budget devoted to transportation was only 6.7 percent.

If New Jersey is to meet its long-term obligation of fulfilling the mobility needs of its citizens, then it will have to explore alternative ways to fund the transportation system in the future. The following discusses some of the possible ways that additional revenue can be generated for transportation purposes. The applicability of each proposal to the four energy scenarios is also presented. However, no attempt is made in this discussion to recommend a possible course of action. That analysis is currently being undertaken by the state outside the scope of this effort.

Dedicated Transportation Funding

As noted above, New Jersey is one of a handful of states which does not have some form of dedicated funding for transportation. Currently, about 30 percent of the approximate \$550 million annual revenue collected in transportation user revenues is diverted to other non-transportation uses. On a cumulative basis over the last 20 years, about \$3 billion of transportation user revenues has been diverted away from the transportation sector.

Registration Revenues

Revenues from motor vehicle registration fees and related taxes are classified as motor-user tax revenues. These revenues include collec-

tions of motor vehicle registration fees, duplicate certificates, transfers, certificates of ownership, vehicle inspection fees, motor carrier road taxes, and other miscellaneous charges.

On a per vehicle basis, gross registration revenues in New Jersey average about \$38.64 per registered vehicle, not including motorcycles. Table 14 compares registration revenues of other highly populated urban states with New Jersey.

Table 14
1979 Comparative Registration Revenues for
Highly Populated Urban States (not including motorcycles)

<u>State</u>	<u>Gross Reg. Revenues¹</u> (Thousands)	<u>Registered Vehicles²</u>	<u>Reg. Revenues per Reg. Vehicle</u>
Michigan	\$216,770	6,340,761	\$34.19
California	937,648	16,261,297	57.66
Illinois	341,634	8,746,775	39.06
New York	243,985	8,004,179	30.48
Connecticut	55,045	2,206,202	25.41
Pennsylvania	232,283	6,756,484	34.38
Massachusetts	53,282	3,721,687	14.32
New Jersey	182,144	4,714,490	38.64

1. Highway Statistics, 1979, p.62.

2. Highway Statistics, 1979, p.15.

Motor Fuel Tax Rates

At the present time, the state's motor fuel tax is 8 cents per gallon. Thirty three states in the nation have gasoline taxes higher than New Jersey. The following table gives some comparative statistics for the same states as included in the preceeding table.

Table 15
Comparative Gasoline Taxes For
Highly Populated Urban States

<u>State</u>	<u>Costs per Gallon-Motor Fuel Tax</u>	<u>General Sales Tax on Motor Fuel</u>	<u>Combined Cents per Gallon Equivalent (Approx. \$1.20/Gal.)</u>
Michigan	11¢	4%	15.5
California	7¢	6%	14.0
Illinois	7.5¢	4%	13.0
New York	8¢	4%	12.5
Connecticut	11¢	Exempt	11.0
Pennsylvania	11¢	Exempt	11.0
Massachusetts	0¢	10%	10.0
New Jersey	8¢	Exempt	8.0

Based on current gasoline usage in New Jersey, each 1 cent increment of tax could yield approximately \$35 million annually. However, one problem associated with a fixed rate tax on usage is that gasoline consumption in the state has been decreasing recently. To counter the projected decline in tax revenue under this system, several other taxing proposals have been suggested. One such proposal is an ad valorem tax on gasoline. Under an ad valorem system a fixed percentage rate is uniformly applied to the variable base, i.e., the price. An inherent benefit of this tax plan is that it includes an automatic growth feature; the tax increases directly with rising fuel prices.

Sales Tax

As indicated in Table 15, motor fuel is exempt from the sales tax in New Jersey. However, nine states throughout the nation do impose a sales tax on this commodity. In addition to those states shown in Table 15, Indiana, Mississippi, Georgia and Hawaii also impose a sales tax on motor fuel. Some claim that the sales tax is an extremely regressive form of taxation. This may be one reason why recent efforts to add or increase sales taxes on motor fuels have failed in ten states, i.e., Arkansas, Florida, Maryland, Mississippi, Nebraska, Ohio, Nevada, Tennessee, Wisconsin, and Wyoming.

Some areas of the country have diverted portions of their total retail sales tax revenue to transportation. Atlanta, Cleveland, Denver, and other cities have used sales tax revenues to finance mass transit projects.

Recently, a special type of sales tax has been proposed in several states. The proposal levies a percentage charge on the gross receipts of oil companies doing business in a state. Several states are considering various forms of this tax. Such a tax would have merit in New Jersey, however, it may lead to oil company threats to move elsewhere.

Bond Financing

As noted previously, bond financing has not been a major factor in financing transportation in New Jersey. Although bond issues were approved by the state's voters in 1968 and 1979, other attempts at passing bond issues in the past have proven to be unpopular and failed. Also, the bond proposals in New Jersey have generally been for capital construction and do not address operating and maintenance needs.

Real Estate Taxes - The Value Capture System

These measures, sometimes called value capture devices, are widely advocated by tax experts as they place a tax on owners of property whose value increases as a result of public improvements. The central question that needs to be examined before such taxes are imposed, however, is the extent to which transportation improvements actually increase real estate values. It is difficult to relate land values to transportation improvements in already built-up areas. Moreover, transit improvements in central cities tend to create nodes of development around the improvement. These

areas, however, usually represent a relocation of land values from other points in the metropolitan area rather than a true increase in overall values.

A value capture tax could apply to one of three areas of value increment: a. land values; b. land plus standing improvements; c. land plus all improvements, including capital gains attributable to new construction. The base from which increments are measured would be the value on a pre-improvement date, plus the cost of new construction and improvements. Value capture may represent a potential funding source for transportation programs in New Jersey.

Real Estate Taxes - Special Transit Districts

Several areas in the United States have set up special transit districts which are served by transit. The districts levy taxes within the district with proceeds specifically earmarked for transportation purposes. Some cities, like Miami and Boston, use property taxes within these districts to support transit services.

One advantage of property taxes is that since they are levied for general public purposes there is typically no requirement that the taxed property receive services or benefits in proportion to the tax levy. However, property taxes are highly visible and have a poor public image.

Income Tax

A percentage tax imposed on earned income has often been proposed as a means of transportation financing. An earned income tax applies to wages, commissions, fees, tips, and earned income of unincorporated businesses. This tax is paid in the first instance by employees and must be distinguished from a payroll tax on employers.

A recent Pennsylvania proposal calls for a 0.52 percent surcharge on the Pennsylvania Income Tax. The money collected from the surcharge would be used to finance a public transit fund to aid the state's transit systems. Aid from this tax would be based on the number of riders on a given component of the system. This plan could also contain a low income rider subsidy, perhaps in the form of coupons, that could be redeemed for transit tokens. A similar small percentage increase in New Jersey's income tax dedicated to transportation would generate a significant amount of income to meet New Jersey's transportation needs. However, a tax of this sort is highly politically sensitive.

Toll Facilities and Transportation Authorities

There are ten independent agencies that construct, maintain, and operate transportation facilities in New Jersey. With one exception, (the Palisades Interstate Park Commission), these agencies obtain their funds through tolls charged to the user of their respective transportation facilities. The ten agencies include the Port Authority of New York and New Jersey (PANY&NJ), the Delaware River Port Authority (DRPA), the New Jersey Turnpike Authority, the New Jersey Highway Authority, the New Jersey

Expressway Authority, the Delaware River Joint Toll Bridge Commission, the Delaware River and Bay Authority, the Palisades Interstate Park Commission, the Burlington County Bridge Commission, and the Cape May County Bridge Commission.

Since these agencies generally operate facilities in major transportation corridors, there is little likelihood that additional authorities or commissions will be established in the future. However, in recent years there has been an attempt to encourage these agencies to contribute to other transportation improvements.

During 1979, the PANY&NJ dedicated \$120 million from bridge and tunnel tolls as part of a \$600 million program to improve the state's mass transit system. The NJDOT is now negotiating with other agencies to secure their financial assistance in funding other transportation improvements.

Other Funding Sources

There are numerous other tax forms which could be tapped as potential sources for funding the state's transportation system. However, the potential yields from these sources are thought to be insignificant and therefore have not been addressed in this discussion.

Applicability of Funding Alternatives

The preceding section discussed several alternatives that could be considered to fund transportation improvements in the future. Depending upon which energy scenario should eventually evolve, not all of these proposals would be effective. For example, under an extreme energy shortfall, such as Scenario IV, an addition to the gasoline tax would not be appropriate. Under this scenario, gasoline consumption would substantially decrease making the gasoline tax less reliable as an added transportation funding source.

The following matrix is presented to show which funding proposals are likely to have effective applicability under each of the four scenarios.

<u>Funding Proposals</u>	<u>Scenarios</u>			
	<u>I</u>	<u>II</u>	<u>III</u>	<u>IV</u>
Dedicated Funding	X	X	X	X
Motor Vehicle Registration Revenues	X	X		
Motor Fuel Tax (fixed)	X	X	X	
Motor Fuel Tax (ad valorem)	X	X	X	
Sales Tax	X	X	X	X
Bond Financing	X			
Value Capture (Real Estate Tax)			X	X
Transit Districts (Real Estate Tax)			X	X
Income Tax	X	X	X	X
Transportation Authorities (excess revenues)	X	X		

c. Transportation Demand/Impacts

This section will look at the propensity to travel in the year 2000 under the various energy scenarios. The ramifications of such demand relative to energy availability and the potential to meet these demands will also be discussed.

While Scenarios I and IV will be addressed in more qualitative and general statewide terms, Scenarios II and III will be discussed quantitatively in terms of specific transportation corridors and areas based on travel patterns and population densities. These corridors/areas will also be referred to in section "d". The corridors/areas consist of the Suburban Northeast Corridor, the Northeast Corridor, the Central Corridor, the Shore Corridor, the Atlantic City-Philadelphia Corridor, the Rural Northwest Area, and the Rural Southern Area (see Figure 7).

Corridor Definitions

The Suburban Northeast Corridor includes Bergen and Passaic counties. This corridor exhibits the highest overall population density of all the corridors while also exhibiting a rather homogeneous spread of residential development. The corridor exhibits numerous intra-corridor trip patterns as well as established travel desires to Newark and all sectors of Manhattan. The Meadowlands development complex is emerging as a dominant traffic generator in the southern portion of the corridor.

Highways in the corridor include Routes I-80, U.S. 46, N.J. 3, 4, 17, 20, and 208. Rail service is provided on the Bergen/Main Lines and the Pascack Valley Line. Extensive bus service is also available.

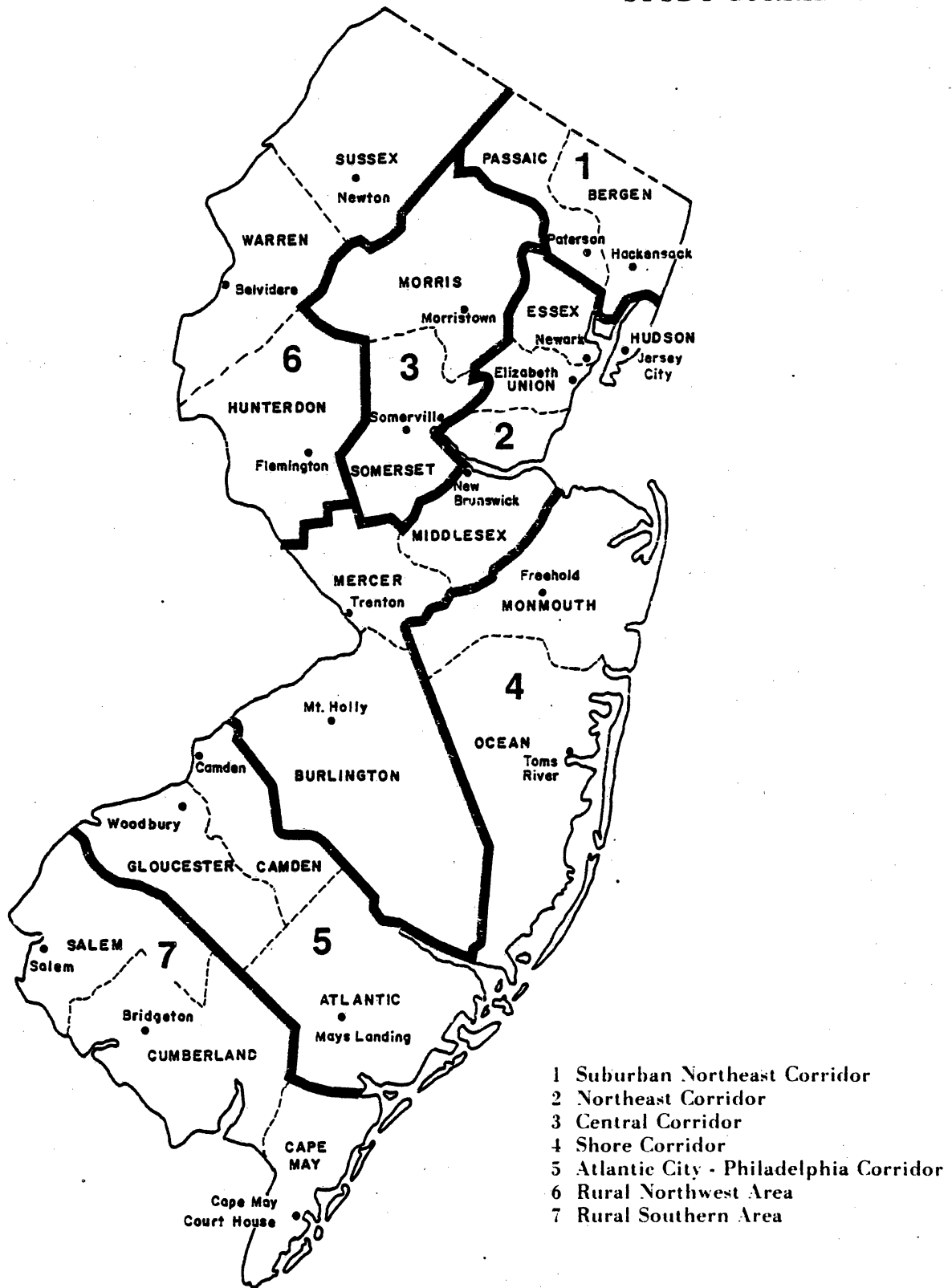
The Northeast Corridor contains the counties between Philadelphia and New York City including Essex, Hudson, Middlesex, Union, Burlington, and Mercer. This corridor accounts by far for the greatest percentage of person trips in the state due to its large size and attendant high overall population. The corridor consists of two distinct major travel segments: The Philadelphia/Trenton-Newark/NYC subcorridor; and the Trenton-Camden/Philadelphia subcorridor, with the most concentrated travel demand in this subcorridor being between Camden/Philadelphia and the developed areas of Burlington County.

The very high rail ridership in the corridor is due to PATH ridership in Essex County being included with commuter rail. Development in the Northeast Corridor has not been homogeneous. Population densities range from low in the rural areas to high in the dense older cities mainly located along Amtrak's NEC rail line. Development patterns range from compact cities and strip development along major highways, to suburbs, exurbs, and, more recently, planned cluster development.

Major highway routes are the New Jersey Turnpike, Interstate Routes 95 and 295, and U.S. Routes 1 and 130. The major rail lines include the Northeast Corridor, the West Trenton Line, Monclair Branch, PATH, and the Newark Subway. Several bus carriers serve this regional corridor.

The Central Corridor includes Morris and Somerset counties. With the exception of the Morristown and Raritan to Newark/NYC subcorridors,

**FIGURE 7
STUDY CORRIDORS**



this corridor exhibits low population densities and non-homogeneous development patterns that are similar to the Northwestern and Southern rural areas. However, the two aforementioned subcorridors collectively produce a substantial number of long-haul commuter trips by both commuter rail and bus.

Highway routes include Interstate Routes 78, 80, and 280; U.S. Route 22, and N.J. Routes 24, 28, and 10. Rail service is provided on the Raritan Valley Line, the Morris and Essex Line and the Boonton Line. Numerous bus carriers operate in this corridor.

The Shore Corridor includes Monmouth and Ocean counties. This corridor is composed of two distinguishable segments. The segment from Northern Ocean County through Monmouth County is characterized by a high number of linear external journey-to-work trips oriented toward Newark/NYC. In Monmouth County the existing development patterns consist of shore communities along the coast, strip development along the Route 9 subcorridor, and suburban to rural development elsewhere with the exception of a few inland communities. Northern Ocean County has grown dramatically in recent years, due in part to the development of numerous retirement communities. Development in general has been at low density with the exceptions of Toms River and Lakewood. By contrast, central and southern Ocean County are basically rural in nature with the exception of the immediate vicinity of Route 9 and adjacent shore communities.

Major highway routes in this corridor include Interstate Route 195, the Garden State Parkway, U.S. Route 9, and New Jersey Routes 33 and 35. Rail service is provided on the North Jersey Coast Line and extensive bus service is provided via the Route 9 Corridor.

The Atlantic City-Philadelphia Corridor contains Atlantic, Camden, and Gloucester counties. This corridor is comprised of two principal travel subcorridors: Atlantic City-Camden/Philadelphia and Gloucester County-Camden/Philadelphia. In the Camden area, existing residential development consists of the central city urban core surrounded by a ring of relatively homogeneous suburban development, interspersed with denser strip development along major radial access routes to the urban core from Camden and Gloucester counties. The dominant work trip generator in the area is Camden City/Philadelphia.

In the Atlantic City Area, development consists of the central city bordered by a few moderate density mature municipalities. The remaining land area between the Camden/ Gloucester urban core suburbs and the Atlantic City area, accounting for a high percentage of the corridor, is predominantly rural and low density development.

Atlantic City proper and municipalities in its vicinity will experience dramatic growth, as a result of the casino industry, under all scenarios except the severest energy shortage. Growth immediately adjacent to Atlantic City will occur primarily as infilling within existing residential areas. Development slightly further out will consist of closely spaced clustered planned developments. This growth pattern is largely dictated by the limited availability of land suitable for residential use in

the vicinity of Atlantic City, i.e., Pinelands, Wetlands, and the Coastal Area.

Major highway routes include the Garden State Parkway, the Atlantic City Expressway, Route 30, Route 42, and Route 322. Public transportation is provided by NJ TRANSIT, PATCO, and several bus carriers. A through-trip between Atlantic City and Philadelphia would be about 60 miles.

The Rural Northwest and Rural Southern Areas exhibit the same basic characteristics and therefore will be treated together. The Rural Northwest Area is made up of Hunterdon, Sussex, and Warren counties. The Rural Southern Area consists of Cape May, Cumberland, and Salem counties. Both are characterized by a dominant rural status interspersed with small towns and diffuse residential development. Each also contains a few "small urban" characteristic areas. Travel patterns are likewise fragmented but do contain a degree of linear long-haul commuter trips.

Highways in the Rural Northwest Corridor include Interstate Routes 78 and 80, U.S. Route 46, and N.J. Routes 12, 23, 31, 57, 94, 202, and 206. The Rural Southern Area includes the Garden State Parkway and state highway routes 40, 45, 47, 49, 50, and 55. Both areas have bus service but not substantial rail service.

Year 2000 Travel Demand

In attempting to determine the year 2000 travel demand for Scenarios II and III, projections were based on various assumptions for those factors which impact travel demand, i.e., population and employment numbers and geographical distribution, energy costs, auto occupancy rates, trip length, etc. Assumptions for these factors were based on a most likely or normal change that would occur over the years in response to the evolution of the conditions of the respective scenarios. Travel projections were not totally restrained at this point by the projected availability of petroleum in the scenarios and, as such, should be considered as a "propensity to travel."

Travel projections were then measured against the anticipated amount of petroleum expected to be available in the scenarios. The "propensity to travel" projections could then in fact be evaluated to see if normal trends in energy conservation efforts would suffice or if more stringent programs would be necessary to enable travel demands to fall within the boundaries of energy availability.

It should be noted that the travel projections were based on historical data which has not as yet been entirely corroborated by the recent 1980 Census. Consequently, the preliminary estimates contained in this section will be re-examined when the 1980 Census data becomes available. Particular regard will be given to journey-to-work and other travel and transportation statistics.

Table 16 summarizes the projected statewide travel demands that can be expected to occur under Scenarios II and III. The ensuing

discussions address the likelihood of these travel demands or "propensity to travel" demands materializing given the level of petroleum assumed to be available under each scenario.

TABLE 16
SUMMARY OF TRAVEL PROJECTIONS BY MODE

	1980		2000 Scenario II		2000 Scenario III Unconstrained		2000 Scenario III Constrained	
Rail Ridership ¹	391	1.8%	640	1.8%	571	1.9%	571	1.9%
Bus Ridership ¹	673	3.1%	1,030	2.9%	968	3.2%	1300	4.3%
Auto Person Trips ¹	19,578	89.4%	31,024	88.8%	28,861	88.5%	25,539	84.1%
Other (Walk, Bicycle, etc.)	1,256	5.7%	2,245	6.4%	1,955	6.4%	2,391	7.9%
"Untrips"							554	1.8%
TOTAL	21,896	100%	34,939	100%	30,356	100%	30,355	100%
Auto Vehicle Trips ^{1 3}	16,054		23,862		19,898		19,017	
Auto VMT ^{2 3}	145,625		219,330		189,320		181,234	
Total VMT ²	167,383		252,103		217,609		209,523	

1. Average Weekday Trips x 10³
2. Average weekday VMT x 10³
3. Includes Vans and Light Trucks

It is interesting to note that, on a statewide basis, travel does not vary significantly among scenarios by mode. However, on a corridor basis, some of the variations are significant.

Scenario I

Under this scenario, there would be a notable increase in highway demand which would be more evenly dispersed throughout the state. Such a demand would be a consequence of continued suburbanization at a rate equal to that which occurred during the decades of the 1950's and 1960's.

As indicated in previous sections, the population of the state would seek to locate in lower density areas as migration from the central cities would continue. Such development would rely heavily on auto travel with significant increases in statewide VMT expected by the year 2000.

Public transit would have a substantially lower market share of all person trips in the year 2000 under this scenario. At best, transit ridership would remain at today's levels as transit service would still be necessary to avert excessive auto congestion in urban areas. However, without the high densities necessary to support additional transit service, it is likely that any major additional reductions in congestion would come from carpools/vanpools.

Major improvements to the transportation infrastructure would be in the form of major highway expansions in the suburban and rural areas. Although there is unused capacity on much of this system at the present time, it would become overloaded under the conditions of this scenario.

The transit system would likely consist of the system that is currently in place. Since the state is currently in the process of overhauling much of the existing system, the transit program through the year 2000 would be one of continued maintenance and replacement of aging rolling stock. However, since the urban centers would be economically depressed under this scenario, the federal/state governments would have to take a larger financial role in supporting transit service.

Scenario II

The propensity to travel would increase in the future under this scenario. As noted in previous sections, land use patterns would not be altered drastically from Scenario I as there would be continued suburban sprawl. However, because the real price of energy is assumed to increase by a factor of 2.0, suburban sprawl would not be as extensive as in Scenario I.

There would be some rebuilding of villages and cities as people and jobs move back into the urban areas to a moderate degree. Also, out-migration from the state would be slightly less than it is today.

The average household size would decrease from today's figure of 2.65 persons/household to 2.2 persons/household. This reduction in household size would be accompanied by an increase in the number of households, thus resulting in more travel. However, there would be more auto-less people in the future under this scenario than today because of the high cost of energy and car ownership, more elderly who would not drive, and some gentrification of citizens who are more inclined to use public transit. Overall, there would be increases in travel in the future because of a higher statewide population. However, this demand would not be as high as in Scenario I because of fewer auto drivers, shorter trip lengths, higher auto occupancy rates, and more trips that would not be made.

Year 2000 Travel Demand (Unconstrained)

Table 17 compares today's population and number of person trips with projections of similar data for the year 2000. As indicated, total person trips are projected to increase to 34.9 million person trips per day, representing a 59.6% increase over today's travel.

Table 18 compares person travel by mode for today and projections for the year 2000. Table 19 shows auto trips and daily and annual vehicle miles traveled and compares year 2000 projections with 1980 data.

Year 2000 Travel by Mode (Constrained)

The main assumption behind Scenario II is that there would be no energy shortfall in the year 2000. Consequently, energy availability would

TABLE 17
1980 AND YEAR 2000 PERSON-TRIPS-SCENARIO II

Corridor	Population ¹		Work Person-Trips ²		Other Person-Trips ²		Total Person-Trips ²	
	1980	2000	1980	2000	1980	2000	1980	2000
Suburban Northeast	1291	1357	1592	2284	2122	2796	3712	5085
Northeast	3175	3241	3905	5543	4619	5913	8548	11526
Central	611	784	952	1693	1296	1923	2251	3634
Shore	854	1142	1094	2759	1509	2361	2603	5132
Atlantic City-Phil.	867	1031	1221	2867	1665	2426	2885	5314
Rural Northwest	290	358	401	1347	598	858	998	2205
Rural Southern	281	354	363	1254	538	786	901	2044
STATEWIDE TOTAL	7,369	8,317	9,528	17,748	12,347	17,063	21,898	34,940

¹Population x 10³

²Average Weekday Person-Trips x 10³

TABLE 18
1980 AND YEAR 2000 PERSON-TRIPS BY MODE - SCENARIO II

Corridor	Auto-Person Trips ¹		Rail-Person Trips ¹		Bus-Person Trips ¹		Other Mode Person Trips ¹		Total-Person Trips ¹	
	1980	2000	1980	2000	1980	2000	1980	2000	1980	2000
Suburban Northeast	3314	4508	27.6	37.3	138.7	198.0	232	341	3712	5084
Northeast	7338	9801	233.4	329.3	446.7	630.5	530	765	8548	11526
Central	2063	3311	55.4	98.4	18.3	32.5	114	192	2251	3634
Shore	2423	4663	30.9	75.1	17.4	42.2	132	351	2603	5131
Atlantic City-Phila.	2650	4752	43.8	99.4	43.9	99.4	147	363	2885	5314
Rural Northwest	945	2083	.	.	0.4	1.4	53	121	998	2205
Rural Southern	845	1906	.	.	7.6	26.1	48	112	901	2044
STATEWIDE TOTAL	19,578	31,024	391.1	639.5	673.0	1030.1	1,256	2,245	21,898	34,939

¹Average Weekday Person-Trips x 10³

TABLE 19
1980 AND YEAR 2000 AUTOMOBILE TRAVEL - SCENARIO II

Corridor	Daily Auto Trips ¹		Daily Auto VMT ²		Annual Auto VMT ³	
	1980	2000	1980	2000	1980	2000
Suburban Northeast	2746	3469	25019	31596	7701	9725
Northeast	6145	7538	58963	72340	17940	22010
Central	1652	2546	14274	22010	4421	6820
Shore	1941	3587	16767	33530	5193	8346
Atlantic City-Phila.	2123	3655	18339	34170	5680	8507
Rural Northwest	764	1602	6471	13410	2040	3029
Rural Southern	683	1466	5789	12270	1825	2763
STATEWIDE TOTAL	16,054	23,862	145,623	219,330	44,800	61,200

¹Average Weekday Auto Trips x 10³

²Average Weekday VMT x 10³

³Annual VMT x 10⁶

NOTE: Auto includes vans and light trucks

not be a constraining factor in the travel projections cited in this section. However, the increase in the real price of energy would have a restraining effect on auto travel habits, especially of lower income households in the various corridors and rural areas of the state.

Estimating the reduction in travel caused by a doubling of the real price of gasoline is difficult to quantify due to the large array of interdependent variables, i.e., percentage and location of low income households, availability and cost of public transit, relation of price increases to long term travel habits and other needs, strength of economy, unemployment, etc. Utilizing extensive national personal transportation statistics relating household income to travel per household, an estimated 5 to 10 percent reduction in the propensity for auto travel might occur statewide from a 200 percent increase in petroleum prices over 1980 prices.

Scenario III

The propensity to travel would also grow under this scenario. However, because of the reduction in petroleum availability and its high cost assumed in this scenario, total travel demands would be less than projected in Scenario II. Many citizens and jobs would move to the cities or other high density corridors as the desire to move to suburban and rural areas would diminish. The trend would be toward cluster development and infilling of urban fringe areas.

The average household size would be smaller than today but slightly higher than under Scenario II. Also, there would be many more households, each with a need to fulfill normal household functions which include travel for work, shopping, recreation, church, and so on. Smaller households travel more per capita than large households. The increase of two-worker households would generally mean that no matter where the household is located, someone must commute. People who are over 65 years of age in the year 2000 may, more so than today's elderly, retain the strong car travel propensity that they were accustomed to during their entire adult life.

There would also be influences moderating travel demand in the future. People who are accustomed to driving an automobile may alter their habits as the prices increase for cars, gasoline, insurance, and parking. Indirect costs of driving may also increase because governments and businesses may reduce expenditures which subsidize the automobile system, such as for traffic control, free parking, and road maintenance.

The "un-trip" (the trip that is not made) would become much more common due to a variety of reasons. "Trip-chaining", which is the combining of several destinations during an outing, such as doing the shopping and other errands on the way home from work, would increase as people get more conscious of the cost of transportation. Telecommunications would reduce travel by allowing teleconferencing, remote job work sites, shopping at home via interactive TV/computer systems, home delivered goods, and improved ride sharing information systems.

Overall, the propensity to travel would increase as each person travels more due to smaller household size, increased length of trips due

to suburbanization of homes, shops, and employers, more licensed drivers, and older people driving more than they do today since they would be very accustomed to a driving lifestyle.

Year 2000 Travel Demands (Unconstrained)

Table 20 compares population and person trips by purpose for 1980 and the year 2000. As indicated, total person trip demand is expected to increase by 38.6 percent in the year 2000.

Table 21 compares current and projected person travel by mode for the year 2000. Finally, Table 22 shows year 2000 auto-trips and daily and annual vehicle miles of travel. This data is compared for 1980 and the year 2000.

TABLE 20
1980 AND YEAR 2000 PERSON-TRIPS BY PURPOSE - SCENARIO III (UNCONSTRAINED)

Corridor	Population ¹		Work Person-Trips ²		Other Person-Trips ²		Total Person-Trips ²	
	1980	2000	1980	2000	1980	2000	1980	2000
Suburban Northeast	1291	1376	1592	2212	2122	2708	3712	4925
Northeast	3175	3463	3905	5653	4619	6031	8548	11754
Central	611	734	952	1512	1296	1724	2251	3246
Shore	854	1016	1094	1589	1509	1799	2603	3391
Atlantic City-Phila.	867	1118	1221	1919	1665	2397	2885	4317
Rural Northeast	290	341	401	641	598	782	998	1424
Rural Southern	281	335	363	588	538	711	901	1299
STATEWIDE TOTAL	7,369	8,382	9,528	14,114	12,347	16,150	21,898	30,356

¹Population x 10³

²Average Weekday Person-Trips x 10³

TABLE 21
1980 AND YEAR 2000 PERSON-TRIPS BY MODE - SCENARIO III (UNCONSTRAINED)

Corridor	Auto Person-Trip ¹		Rail Person-Trips ¹		Bus Person-Trips ¹		Other Mode Person-Trips ¹		Total Person-Trips ¹	
	1980	2000	1980	2000	1980	2000	1980	2000	1980	2000
Suburban Northeast	3314	4364	27.6	38.1	138.7	191.7	232	331	3712	4925
Northeast	7338	9995	233.4	335.8	446.7	643.0	530	780	8548	11754
Central	2063	2957	55.4	87.9	18.3	29.0	114	171	2251	3246
Shore	2423	3095	30.9	43.3	17.4	24.3	132	229	2603	3391
Atlantic City-Phila.	2650	3894	43.8	66.6	43.9	66.6	147	290	2885	4317
Rural Northwest	945	1342	.	.	0.4	0.7	53	81	998	1424
Rural Southern	845	1214	.	.	7.6	12.3	48	73	901	1299
STATEWIDE TOTAL	19,578	26,861	391.1	571.7	673.0	967.6	1,256	1,955	21,898	30,356

¹Average Weekday Person-Trips x 10³

TABLE 22
1980 AND YEAR 2000 AUTOMOBILE TRAVEL - SCENARIO III (UNCONSTRAINED)

Corridor	Daily Auto Trips ¹		Daily Auto VMT ²		Annual Auto VMT ³	
	1980	2000	1980	2000	1980	2000
Suburban Northeast	2746	3233	25019	29449	7701	9064
Northeast	6145	7404	58963	71037	17940	21614
Central	1652	2191	14274	18927	4421	5862
Shore	1941	2293	16767	22188	5193	6829
Atlantic City-Phila.	2123	2884	18339	26274	5680	8087
Rural Northwest	764	994	6471	8425	2040	2656
Rural Southern	683	899	5789	7620	1825	2403
STATEWIDE TOTAL	16,054	19,898	145,623	189,320	44,800	56,515

¹Average Weekday Auto Trips x 10³

²Average Weekday VMT x 10³

³Annual VMT x 10⁶

NOTE: Auto includes vans and light trucks

Statewide Year 2000 Travel by Mode (Constrained)

The main assumption behind Scenario III is that a petroleum availability shortfall would occur by the year 2000 that would necessitate some reduction in travel or switching among modes. The assumption is made that in an energy shortfall situation public transit, commercial aircraft, and heavy trucks would retain their energy supplies. The private automobile would, therefore, have to bear the brunt of reduced transportation energy supplies. While it can be expected that an energy shortfall of this magnitude would initiate some response from the public and private sector in terms of stepped up domestic production, development of alternative fuels, and conservation efforts, these efforts are not assumed to be sufficient to offset the assumed shortages of petroleum.

In this scenario, the year 2000 petroleum available for transportation use is assumed to be 35 percent less than 1980 levels (3.96 billion gallons), or approximately 2.6 billion gallons. Discounting fuel required by public transit, commercial aircraft, and heavy truck use would leave approximately 1.2 billion gallons of fuel to be allocated to cars and light trucks.

Approximately 13 percent of the year 2000 annual total VMT would be attributable to diesel and heavy duty trucks, leaving approximately 56.5 billion annual VMT to be driven by cars and light trucks. To meet this demand with the available petroleum assumed under this scenario would require an average auto fleet consumption rate of approximately 47 miles/gallon. Since this scenario envisions an average fleet efficiency of approximately 40 miles/gallon, an average annual shortfall of about 2.5 billion VMT would occur which would have to divert to other modes or not be made at all. This unfulfilled auto VMT is equivalent to approximately 1.3 million daily person trips.

The treatment of the unfulfilled auto-person trips is the subject of the next section, "Transportation Policies and Programs."

Scenario IV

Under this scenario, there would be a notable decrease in highway demand and a resultant increase in demand for public transit services. Also, it is likely that, in total, fewer trips would be made as there would be more "untrips" than in the preceding scenarios.

As indicated in previous discussions, there would be a tendency toward denser land use under this scenario as people and jobs tend to move closer together in the more dense urban areas or along the more dense corridors served by public transit. Also, the adverse economic conditions expected for the state under this scenario would cut back on trip-making potential.

In all likelihood, the energy constrained automobile VMT would be significantly less than the previous scenarios and many of the potential auto trips would have to divert to other forms of transit or not be made at all. This would further compound the increased demand for public transit facilities already expected under scenarios II and III.

d. Transportation Policies and Programs

General

The purpose of this section is to describe the general course of action and areas of emphasis that would be required to meet transportation demands while maintaining consistency with the state's transportation goals and objectives under the four energy scenarios.

The primary basis for this analysis is the travel demand projections discussed in the preceding section. As with the preceding sections, Scenarios I and IV are treated on a statewide "broad brush" basis only. Scenarios II and III will be treated in significantly more detail and will be treated on a statewide and corridor/area specific basis.

Energy Availability Scenario Impacts on Public Transit

Based on the current outlook for energy availability and pricing in the future, it appears that the most likely future for the year 2000 is likely to fall between Scenarios II and III, i.e., trend and a moderate energy shortfall. Also, because of the increasing cost in the real price of energy associated with Scenario II and the reduced availability of liquid fuels and even higher cost associated with Scenario III, public transportation will assume an even more important role in our future transportation plans and programs.

As was discussed in the first volume of this plan, residential densities are a primary determinant of public transit demand for particular transit modes, as is distance from non-residential, e.g., work place, concentrations, the size of such concentrations, and their character, e.g., a

downtown vs. a shopping mall.¹ Stated somewhat differently, only certain modes can be supported by a given residential and non-residential density at an acceptable revenue-cost ratio. It should be noted that these basic relationships are overly simplified in that there are several other significant factors that must be taken into consideration in their actual application. However, they are adequate and useful in discussing modal implications in generalized terms. Table 23 shows residential density thresholds for the various modes while figure 8 indicates transit modes suited to varying downtown sizes. It is clear from these relationships that as residential density and downtown size decreases, the capital intensity of transit modes that can be viably supported likewise decreases. Likewise, the frequency of service that can be supported diminishes.

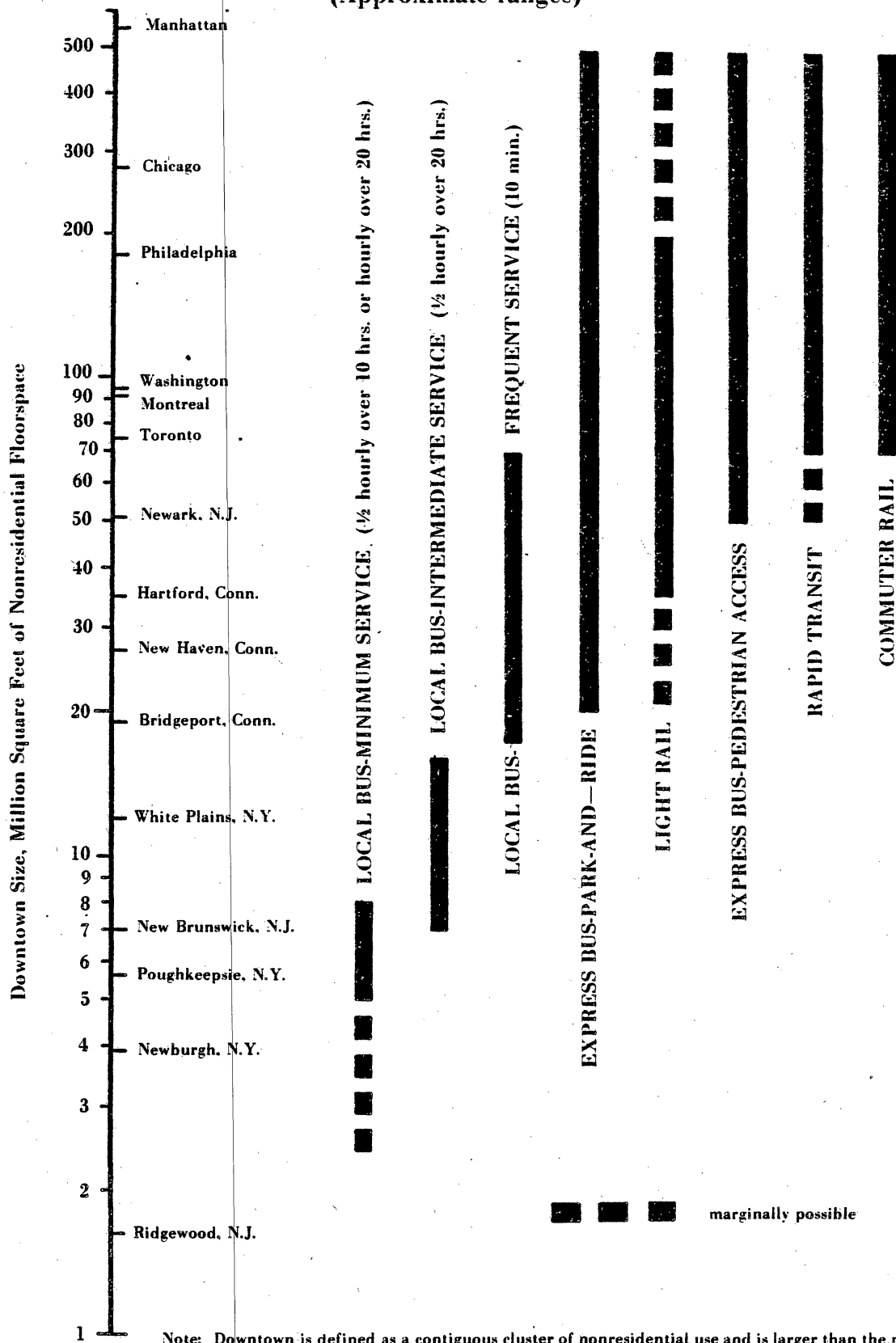
¹ "Urban Densities for Public Transportation," Regional Plan Association, May 1976.

TABLE 23
TRANSIT MODES RELATED TO RESIDENTIAL DENSITY

Mode	Service	Minimum Necessary Residential Density dwelling units per acre	Remarks
Dial-a-bus	Many origins to many destinations	6	Only if labor costs are not more than twice those of taxis
Dial-a-bus	Fixed destination or subscription service	3.5 to 5	Lower figure if labor costs twice those of taxis; higher if thrice those of taxis
Local bus	"Minimum." ½ mile route spacing. 20 buses per day	4	
Local bus	"Intermediate." ½ mile route spacing. 40 buses per day	7	Average, varies as a function of downtown size and distance from residential area to downtown
Local bus	"Frequent." ½ mile route spacing. 120 buses per day	15	
Express bus -reached on foot	Five buses during two hour peak period	15 Average density over two square mile tributary area	From 10 to 15 miles away to largest downtowns only
Express bus -reached by auto	Five to ten buses during two hour peak period	3 Average density over 20 square mile tributary area	From 10 to 20 miles away to downtowns larger than 20 million square feet of non-residential floorspace
Light rail	Five minute headways or better during peak hour	9 Average density for a corridor of 25 to 100 square miles	To downtowns of 20 to 50 million square feet of non-residential floorspace
Rapid Transit	Five minute headways or better during peak hour	12 Average density for a corridor of 100 to 150 square miles	To downtowns larger than 50 million square feet of non-residential floorspace
Commuter rail	Twenty trains a day	1 to 2	Only to largest downtowns, if rail line exists

Source: Regional Plan News, August, 1976, No. 99, Page 4.

FIGURE 8
TRANSIT MODES SUITED TO DOWNTOWN SIZE
 (Approximate ranges)



Note: Downtown is defined as a contiguous cluster of nonresidential use and is larger than the more narrowly defined Central Business District

Source: Regional Plan News, August, 1976, No. 99, Page 3.

Ultimately a point is reached where practically no transit service can be cost effective. Considering that the range of energy scenarios would directly and profoundly influence land use development, they would correspondingly impact the viability of different forms of public transit. At the one end of the spectrum even the existing transit system would inevitably decline. At the other extreme the problem, at least theoretically, would be in being able to provide enough transit service, although in this case transit "attractiveness" would be overshadowed by captive ridership, i.e., no alternative due to no fuel. In the mid-ground of a moderate energy shortfall, ridership demand would also be expected to increase in somewhat greater proportion than density and downtown size alone would indicate, due to the aspect of some additional captive ridership brought about by the energy shortfall. The preceding principals were qualitatively considered in the development of the ensuing statewide/corridor/area scenario discussions.

Scenario I

Under the energy implications of this scenario, public transportation would have a substantially lower market share of all person trips by the year 2000. Indeed, current ridership figures would decline in spite of the significant increased demand for travel.

In the case of suburban commuter rail and bus services to major employment centers, i.e., large cities such as Newark, New York, and Philadelphia, abundant and low cost fuel would probably not directly impact ridership. These modes, especially rail, have been the most viable since the alternative is highly congested, slow, and costly auto access. If reliable and well maintained, they would continue to be considered a preferred premium service. In fact, continued residential out-migration to the suburbs/exurbs from those cities, expected under this scenario, would at first seem to tend to favor these transit modes. However, employers would also be expected to relocate outside of the cities. The result would likely be little line-haul transit growth at best or a decline at worst depending on the actual future's specifics.

With respect to more localized services, e.g., intra-county, the continued and escalated suburban sprawl of both residences and places of employment, through relocations and new growth, would continue to make public transportation less and less effective and financially feasible other than for line-haul service. The multitude of diffuse origins as well as destinations would defeat its strengths, i.e., economy and efficiency through satisfying many trip demands between geographically concentrated origins and destinations. Not only would new service be impractical in emerging developments, but existing services would decline or could become non-viable through further diffusion of their service areas.

The continued out-migration from the central cities to the suburbs would lower urban local trip public transit demand. On a strictly economic basis, this would result in proportional reductions of services provided, i.e., less frequent service and/or termination of sparsely used routes. However, this would adversely impact the mobility opportunities of those transit dependent residents remaining in the cities. Considering that the

economy of the state as a whole, but not the cities, would be expected to be at least reasonably prosperous under this scenario, it would be anticipated that at least minimally acceptable levels of service would be retained for the social good.

Under this scenario, no additional rail infrastructure would be expected. Service provided could remain relatively stable. The line-haul commuter bus fleet size and frequency of service could remain relatively stable or decline somewhat. The remainder of the bus fleet, along with services provided, would decline substantially.

A return to cheap fuel could cause serious problems in regard to automobile-highway impacts as the economic advantages of conservation strategies would disappear. The greatest impact would occur on those highways and in those corridors that would experience increased growth due to suburbanization of places of employment and residence. Those facilities and corridors serving major employment centers, i.e., central cities and urban cores, would not necessarily be impacted adversely because of limited parking and limited local street networks to handle great increases in auto traffic in the central cities.

The degree of response from state, county, and local government toward meeting increased demand could only be gauged against increases in the level of highway user revenues and funds from other sources to implement major capital improvements. Indeed, many cities would once again, and in heightened fashion, be faced with a loss of tax base as residents and businesses moved to suburban locations.

However, resistance from special interest groups towards a continued highway expansion program may be sufficiently formidable to thwart an expanded highway system. Such a stance does have merit when one considers the degree of open space and farm acreage that is constantly lost to development in the state. However, sufficient and powerful demand for improved highway facilities can be expected from the pressure of suburban expansion.

Also, under this scenario, the populace would have less of a tendency to utilize slower, non-motorized modes of traveling, such as walking and bicycling, and less of a tendency to utilize telecommunications, preferring to travel to conduct business.

Scenario II

General Statewide Policy Implications

Public transit would continue to play an important role within the state's transportation system under this scenario. Given comparable conditions today with respect to congestion and the percentage of expendable income devoted to transportation, public transit would be expected to at least maintain its current market share of total trips made. Considering the increased travel demand projected for the year 2000, this actually translates into a public transit ridership growth of approximately 57 percent, or an annual average growth rate of approximately 2.3 percent.

As previously noted, future fuel efficient autos may mitigate the impact of the projected real-cost increase of gasoline and diesel fuel. However, the real cost of petroleum used for heating, petro-chemical products and power generation will also increase. Likewise, this would be true for energy sources in general, e.g., natural gas and nuclear power generation. Costs would be passed on to consumers as is currently the case. The result would be to reduce the percent of expendable income for other purposes, including transportation; thereby increasing the propensity to use public transit beyond its current market share. This increase could be small or significant depending on the extent of mitigating factors such as increased efficiencies and the use of lower cost substitute materials. Due to the complexity of factors involved, an estimation is beyond the scope of this plan. The monitoring/feedback process will be used to account for actual impacts in the plan development/update process.

Thus public transit would continue to remain a high priority for the year 2000 under this scenario, based on the state's adopted transportation policies, goals, and objectives. Service increases within the basic rail, commuter bus, and local bus system as well as potential fixed guideway additions to the system are conceivable under this scenario, although funds permitting fixed guideway additions are likely to be confined to low cost extensions and connecting links designed to enhance operating performance. Existing commuter rail and bus service would increase as warranted by demand. This would likewise be the case for local transit within urbanized areas and cities. However, localized service in lower density areas could very well prove financially infeasible under this scenario. It should also be noted that services provided under this scenario would not be overly cost effective on a per passenger carried basis, in that off-peak utilization would remain very low, thereby inhibiting high overall daily vehicle and labor productivity. Higher anticipated off-peak use to be discussed under Scenario III would improve productivity somewhat.

The prime difference in the public transit systems expected to emerge under Scenarios II and III is a matter of degree rather than direction. Therefore, in order to avoid redundancy, corridor specific public transportation is discussed only briefly in this scenario with more detailed discussions contained in Scenario III. Also, it is felt that it is easier to conceptualize scaling down from a bolder set of initiatives (under Scenario III) to a more modest set of initiatives (under scenario II).

As in the case with public transit, the degree to which the state will be able to respond to needed highway improvements in the future would depend mostly on the financial capabilities of the state at that time. Indeed, the cost of maintaining the highway system in the future will be quite formidable and should funding in the future reflect historical levels of resources and expenses, the state would be hard-pressed to adequately maintain the existing highway infrastructure, let alone initiate new facilities or greatly expand or extend existing facilities.

Scenario II, however, does envision a future with an annual state-wide automobile VMT of 61.2 billion, an increase of 37 percent over 1980. Faced with limited resources, the state would be forced to limit capital

expenditures to those few projects that provide the maximum benefit to the traveling public. For most of the system, however, the principles of Transportation System Management would be applied to reduce congestion, air pollution, energy consumption, and travel time. Capital programs would be limited to improvements necessary for safe operation of the system and reconstruction of existing facilities in selected areas to improve the capacity of the system. In all cases, regional/ corridor analyses would be conducted to determine what capacity improvements, if any, would be initiated commensurate with the financial capabilities of the state or other implementing agency. It should be noted that this rationale generally applies to longer range proposals. The assumption is made here that the capital program presented in the 1988 Short-Range Plan will for the most part be "in place" by the year 2000.

Under this scenario, it is desirable to carry out all highway improvements and maintenance in a manner consistent with the needs of pedestrians and bicyclists. In anticipation of (and to promote) increased use of bicycles, the state's roadways should be capable of accommodating shared use by motor vehicles and bicycles. Bike parking should be provided at rail stations, places of employment, and other typical destinations; and selected improvements to benefit bicycle access could be carried out where warranted.

Should the financial capability of the state remain relatively limited and unpredictable in the long-term future, Transportation Systems Management strategies would be the vanguard of state policies with much emphasis given toward promoting carpooling and vanpooling and the construction of carpool and vanpool park-and-ride facilities along many of the state's arterials and freeways.

Corridor and Area Discussions

Table 24 presents a summary, by corridor/area, of the various non-auto driver travel modes that would be expected to experience increased demand under this scenario. The potential for additions to the existing rail system, i.e., commuter, rapid and light rail, is also indicated. It is intended only as a relative and general guide and not intended to indicate absolutes. Major new highway construction, beyond currently programmed projects, may not be fundable under this scenario.

Suburban Northeast Corridor

This corridor would retain its rather homogeneous spread of residential development. Due to the homogeneity of development, emphasis would remain on existing line-haul commuter rail and commuter bus services. Increased service for both modes would be expected. Also, emergence of the Meadowlands as a major employment and residential center would require considerable new public transit service, as will be discussed under Scenario III.

The dense, homogeneous development of this corridor makes major reconstruction of existing highway facilities to increase capacity very difficult. Such state highway facilities as Routes U.S. 1 & 9 and 46 and

TABLE 24
SCENARIO II
DEMAND FOR NON-AUTO DRIVER TRAVEL MODES
AND THE POTENTIAL FOR RAIL SYSTEM EXPANSION

Increase in Higher Density* Growth Patterns												
Corridor/Area	Cluster	Infill	Existing Cities	Increased** Ride Sharing	Increased** Rail Demand		Increased** Bus Demand			Potential for Rail System Expansion		
					Commuter	Rapid	Commuter	Feeder	Local	Commuter	Rapid	Light
Suburban N.E. Corridor		Maybe	Maybe	Maybe	Yes	n.a.	Yes	Maybe	Maybe	Maybe	Maybe	Maybe
Northeast Corridor		Maybe	Maybe	Maybe	Yes	Yes	Yes	Maybe	Maybe	No	Maybe	Maybe
Central Corridor	Maybe		Maybe	Maybe	Yes	n.a.	Yes	Maybe	Maybe	No	No	No
Shore Corridor	Maybe			Maybe	Yes	n.a.	Yes	Maybe	Maybe	Maybe	No	No
Atlantic City-Phila. Corridor	Maybe	Maybe	Maybe	Maybe	Maybe	Yes	Yes	Maybe	Maybe	Maybe	Maybe	Maybe
Rural N.W. Area	Maybe			Maybe	No	n.a.	No	No	No	No	No	No
Rural South Area	Maybe			Maybe	No	n.a.	No	No	No	No	No	No

* Shortens various desired trips, thereby reducing auto dependence and implying increased potential for bike, walk, electric car, etc. trips and shorter auto trips. A blank entry for "Cluster" or "Infill" indicates that, based on existing development patterns, it does not appear that the category would be conducive to effective higher density growth. A blank entry for "Existing Cities" indicates that, although a degree of in-migration could occur, corridor-wide impact would not be expected to be significant.

** A "Maybe" entry denotes that it is not certain whether or not potential demand increases would be significant from a corridor-wide travel perspective.

N.J. 3 and 17 would exhibit increased demand and congestion and require analysis to determine the best solutions. Within the next two decades, Route I-80 could require additional resurfacing and/or rehabilitation.

The Hackensack Meadowlands is the one area that could require substantially new highway and roadway infrastructure development. Such development analysis would have to consider the entire spectrum of transportation alternatives, including carpooling, vanpooling, and associate park-and-ride lots, and non-motorized travel to include bicycle and pedestrian needs.

Northeast Corridor

The Northeast Corridor would continue to exhibit growth patterns similar to today's, except that exurban and very low density suburban development would not likely be as prevalent under this scenario as under scenario I. Also, some of the larger cities should experience a moderate net in-migration.

Public transit service increases would primarily be expected in the areas of existing commuter rail, commuter bus, and local transit in urban areas. The potential for new fixed guideway service along dense linear travel routes could exist.

The primary concern in this corridor would be the increase in highway usage along the principal highway facilities, i.e., Routes I-295 and U.S. 130 in the southern counties, and Routes U.S. 1, 1 & 9, 22 and N.J. 27 in the northern counties. Trips that would fall linearly north and south in the corridor could most likely be served by the commuter rail system and the existing highway network, with localized improvements where necessary. Increased "cross corridor" trip activity would be best served by TSM strategies and improved ridesharing programs. Park-and-ride lots established at key points along such highways as Routes N.J. 18, 92, I-287, I-78, U.S. 9, and the Garden State Parkway would ease traffic congestion and provide a base for improved bus services.

One of the primary factors that would constrain the ability to improve highway capacity through reconstruction of the existing facilities within the Northeast Corridor would be the lack of ROW, or at least cheap ROW, resulting from dense development along the facilities. Route U.S. 1 & 9 is a prime example of this condition.

Central Corridor

Development would continue at present low densities and in non-homogeneous patterns. Both commuter rail and commuter bus service would show moderate service increases under this scenario. Likewise, intra-corridor localized bus service to major work-trip generators would increase somewhat.

The Central Corridor contains several important Interstate routes, i.e., Routes I-78, 80, and 287. Indeed over the next two decades these

high-use facilities would require resurfacing and rehabilitation. Further, routes I-78 and I-80 would, no doubt, exhibit capacity problems and studies would have to be undertaken to determine the best solutions to handle the increased demand.

Other major state highways that would exhibit capacity restraints under this scenario include Routes U.S. 22 and 206 and N.J. 24 west of Morristown. Any capacity improvements considered for these facilities would have to be weighed against future improvements to the Morris and Essex rail lines and other public transit services in addition to TSM strategies such as carpooling and new park and ride lots.

Shore Corridor

Development patterns would continue basically as at present, i.e., high growth at moderate to low densities within northern Ocean County and low density growth elsewhere.

In Monmouth and northern Ocean Counties, public transit would continue to be most effective in serving linear corridor commuter trips, requiring increased commuter rail and commuter bus service. The potential for increased commuter rail coverage in this corridor would be applicable to this scenario. Increased public transit service in central and southern Ocean County would continue to be oriented toward line-haul commuter bus due to the rural nature of the area.

Although travel patterns are rather diverse in this corridor, two basic travel flows are present, i.e., north/south and east/west. Under Scenario II, substantial increases in highway travel could be anticipated in these corridors. Those facilities in the north/south subcorridor that face capacity restrictions include Routes U.S. 9, and N.J. 34, 35, and 36. Those facilities that lie basically in the east/west subcorridor that face possible capacity problems include Routes N.J. 33, 37, and 70. In addition, Route I-295 could be in need of resurfacing or rehabilitation by the year 2000.

Atlantic City-Philadelphia Corridor

The existing relatively homogeneous ring of suburban development radiating outward from the Camden/Philadelphia urban core would continue to expand at densities comparable to existing development. The City of Camden itself could be expected to experience a moderate net in-migration, through gentrification, assuming that urban revitalization efforts in the city continue. However, potential growth would not be comparable with that to be expected under Scenario III. Atlantic City and its environs would experience dramatically higher density growth as discussed in section "c". The remainder of the corridor would continue to develop at existing low densities.

In the case of Philadelphia/Camden oriented trips, public transit emphasis and service increases would be in the area of commuter bus and the existing PATCO rapid rail line, including feeder bus service. There would also be potential for new fixed guideway service. Growth in Atlantic City

and its environs would require substantial short-haul commuter bus and local bus service and intercept parking. The potential for direct Philadelphia to Atlantic City rail service would apply to this scenario as well.

This corridor would be faced with two to three major traffic problems. One major problem would be the local traffic conditions in the suburban ring in New Jersey east of the Philadelphia/Camden urban core. The subcorridor routes leading into the core would experience increased traffic congestion especially in the peak periods. Of special note are Routes U.S. 30 and N.J. 42, 73, and 168 which provide access to Philadelphia from New Jersey suburbs and which presently exhibit varying levels of congestion during peak periods. The somewhat homogeneous nature of development in the suburban ring restricts the possibility of constructing new, parallel limited access highway facilities. Consequently, limited improvements to and reconstruction of the existing facilities represents a maximum level of highway capital improvements.

Another problem that would be experienced in this corridor under this scenario would be improved recreational access to Atlantic City for those trips from the southern counties and for those southern and western trips that enter the state via the Delaware Memorial Bridge. The cost of any new limited access highway facility from the bridges to Atlantic City could be prohibitive and in any case not in conformance with desirable state development plans. However, Routes U.S. 322 and N.J. 40 and 49 do present capacity improvement options but are not without localized problems, requiring major spot improvements and reconstruction. This corridor should be closely monitored in the future to determine the characteristics and degree of travel so that the best solutions can be applied in improving access to Atlantic City.

A third major problem would be facilitating increased access to Atlantic City from the suburban ring surrounding the city and from points directly north and south of the city. It would be desirable, from the state's perspective, that major capacity improvements necessary to improve access be satisfied by improvements to the Garden State Parkway and the Atlantic City Expressway where possible. TSM strategies would be employed to ease congestion on other arterials and local highways.

Rural Northwest and Rural Southern Areas

These areas would continue to exhibit their dominant rural nature with diffuse residential development. Local trip desires within and between existing towns and small urban areas could require modest increases in localized bus transit service in specific cases. Likewise, long-haul transit commuter trips to large employment centers could be expected to increase somewhat.

Under Scenario II, the rural northwest and rural southern areas would be more susceptible to suburbanization trends than Scenarios III and IV. Hence, it can be expected that rural arterials and freeways will reach capacity levels, especially at localized areas and during peak periods. The rural northwest contains portions of Interstate Route 78 and 80 and

State Highways 46 and 57. Capacity improvements would have to be considered for these facilities as well as general resurfacing and rehabilitation.

Earlier master plans of the department called for an extensive freeway network in the rural northwest to serve recreational demand created by the Delaware Water Gap National Recreation Area. However, the reduced level of development now projected for this area and the cost for such a system makes these proposals prohibitive and unwarranted. Consequently, TSM strategies and spot improvements would have to be relied upon to solve localized congestion problems expected under this scenario.

The rural southern area also exhibits a recreational demand, as well as agricultural-transportation requirements. Current expectations of future development patterns in this corridor are such that the freeway proposals contained in earlier master plan documents are no longer warranted. Consequently, capacity improvements will have to be made and TSM strategies utilized to solve congestion and delays on routes U.S. 9 and 40, and N.J. 45, 47, 49, 50, and 77.

Scenario III

General Statewide Policy Implications

As noted in section "c", some 1.3 million daily statewide trips that would normally occur in the private auto must be either accommodated by other means or would not occur at all because of petroleum supply limitations expected under this scenario. Our premise in analyzing these trips is that other means should be available to accommodate them, i.e., public transit and other ridesharing techniques and an increased emphasis on non-motorized travel, including bicycling and walking. The following discusses the potential of these other means to address these trips.

Defining the role of public transit in accommodating this increased future demand is difficult since transit, most notably passenger rail service, runs nearly at capacity during peak (journey-to-work) periods throughout weekdays in New Jersey. Although substantial capacity increases could be achieved operationally by increasing the number of trains or the length of trains, great increases in ridership (and thus trips) could only take place if off-peak service were utilized or if the infrastructure, i.e., rolling stock and trackage, is increased dramatically. For the former to occur, not only must massive changes in the habits and schedules of people and businesses occur, but there must be a guarantee of sorts that public transit will serve adequately the diverse distribution of origins and destinations that will exist in the future. For the latter to occur, there must exist the commitment by the state to a very substantial capital program to increase the coverage of the system.

Individual suburban commuter rail lines, by their nature, can effectively link a limited number of residential locations with work and non-work destinations. Therefore, potential ridership is limited by the number of persons desiring to reach a destination served by the line and by those who can reasonably access an origin station. The existing system

already serves corridors with relatively high potential. Therefore, to increase system ridership beyond normal growth, it would be necessary for infrastructure coverage to be increased at least proportional to the growth desired. An additional small increment beyond normal growth could be expected on the existing system under this energy shortfall scenario due primarily to residential infilling, but not a significant amount. Both system coverage and ridership in the 1950's were roughly twice what they are today. Therefore, it would not be unreasonable to assume that this level of coverage and ridership would represent an upper limit of transit ridership demand by the year 2000. In any case, doubling the passenger rail infrastructure, including possible new rapid and light rail service, would be exceedingly expensive, costing several billions of dollars.

Buses, however, with their inherent advantages of flexibility and lower capital costs, hold the greatest potential for significant increases in ridership through expanded service. Because a capital program for acquiring buses would be significantly less expensive than improvements to the rail infrastructure, the state and the citizenry may be more inclined to follow a course of action with more emphasis on increased bus service than increased rail service.

Bus ridership could conceivably be roughly doubled over 1979-1980 figures by the year 2000 if bus services were progressively expanded to keep pace with increased demand. This doubling would be indicative of a return to ridership experienced in the mid-1950's. That period was characterized by moderately less suburban development and lower auto ownership rates than today, a situation analogous to the conditions of this scenario. Therefore, it is assumed that approximately 332,000 daily trips over and above the year 2000 ridership estimated in the unconstrained situation, i.e., normal growth, could occur.

It is recognized that a certain amount of rail infrastructure expansion will likely take place by the year 2000. However, no candidate projects have been fully analyzed or final recommendations made. Therefore, it is considered prudent to deal only with the existing system rather than assuming specific additional rail services at this time. On that basis, as previously discussed, rail ridership would be expected to increase only slightly beyond the natural increase that would occur in the unconstrained situation. Under these assumptions, total public transit usage (rail and bus) could exhibit an overall growth of approximately 76% to the year 2000, or an annual growth rate of approximately 2.9%. The preceding is not an unreasonable approach since total demand for public transit, under an energy shortfall scenario, would not be expected to be dependent on the specific mix of transit modes provided, i.e., modal appeal would not be a significant factor. Persons who, today, would use a rail service but would drive rather than take a bus, for the same trip, would most likely use the bus in this scenario. Therefore, added rail patronage resulting from potential infrastructure expansion would be in lieu of a portion of the aforementioned doubled bus ridership, not through additional auto diversions. In Table 25, this total additional rail and bus ridership has been distributed among the corridors and areas proportional to current transit ridership distributions. It is recognized that the actual year

2000 distribution may vary from this distribution due to shifts in growth patterns.

TABLE 25
DISTRIBUTION OF DAILY TRIPS TO BE MADE BY SUBSTITUTE MODES - SCENARIO III

Corridor	Yearly 2000. Policy Pop. Densities (Pop./S.M.)	Daily Trips to be made by modes other than auto	Increased Public Transit Service	Short, Local Trips by Bike, Walk, & Trip Chaining	Trips Substituted by Telecom- munications	Trips by Electric Car	"Untrips"
Suburban Northeast	3,230	213,200	65,770	31,800	33,920	4,240	77,470
Northeast	2,113	488,300	220,630	75,820	80,880	10,110	100,860
Central	947	144,500	9,950	20,570	21,940	2,740	89,300
Shore	909	160,600	8,340	23,960	25,550	3,190	99,560
Atlantic City-Phila.	999	190,200	22,850	28,370	30,260	3,780	104,940
Rural Northwest	260	65,600	240	9,320	9,940	1,240	44,860
Rural Southern	296	59,300	4,220	8,430	8,990	1,120	36,540
STATEWIDE TOTAL		1,321,700	332,000	198,270	211,480	26,420	553,530

The constrained scenario III's assumption of reduced vehicle miles of travel is based on a reduced availability of petroleum fuels. However, the normal growth in auto travel could also be accommodated for by an increase in average automobile occupancy rate (from approximately 1.2 to 1.5) that is the result of successful ridesharing inducement/promotion programs. Although daily auto-oriented person trips are expected to increase by 37 percent in the year 2000 under this scenario, this translates to only an 18 percent increase in vehicular trips due to the increase in the average auto occupancy rate. This averages out to approximately a 1 percent increase per year over the next two decades. Such an increase in vehicular traffic would not warrant a program of substantially increased highway construction. Clearly, a program of highway maintenance, reconstruction of existing highway facilities, and capacity improvements of some existing major arterials and spot locations may be necessary. However, it is unlikely that any significant amount of new limited access facilities would be warranted under this scenario.

It is relevant to note that over 60 percent of all purpose vehicle trips are 5 miles or less in length; however, these trips only account for about 17 percent of all vehicle miles of travel¹. It is also important to note that the auto is least efficient when it is operated for short distance trips due to low engine operating temperatures. Thus, a decrease in short trip VMT would provide significant energy savings. It is conceivable that a reduction in auto trip making (and thus in VMT and energy consumption) could occur using other modes, specifically, trip chaining, bicycling, and walking, considering the short travel distances made. Although historical data exists indicating the various types of modes and degree used in making work-type trips, the same information for all-purpose

¹ 1977 Nationwide Personal Transportation Study, U.S.D.O.T., Report No. 3, pg. 85.

trips is lacking, as well as data on the degree of trip chaining in short distance trip-making. Historically, the bicycle has been used for about 1 percent of all work trips and walking has been utilized for about 5 percent of work trips. However, overall percentages for walking and bicycling for all trip purposes would be expected to be higher than for work alone, since average trip distances are much lower for shopping, personal business, civic, educational, and religious purposes than for work. Combined with the effects of trip chaining an auto trip reduction of 15 percent is not unreasonable. Thus reduction in auto trip making is likewise proportionally distributed in Table 25.

Technology, too, as discussed earlier, could play an important part in the future in reducing the need to travel long distances by auto. Improved telecommunications could reduce the need to travel for business and government personnel when meetings and conferences are necessary. Also many short-distance local trips may be substituted using advanced telecommunications technology. Although discretion must be used when estimating the reduction in travel made possible by telecommunication, a review of many studies indicates that approximately 16 percent of travel could be made using the telecommunications mode. Therefore, a year 2000 reduction of 16 percent in trips made previously by the automobile has also been proportionally distributed in the corridors and areas of the state.

Other technology developments in vehicular design and propulsion could also contribute to the necessary reduction in travel by internal combustion powered vehicles. It has been previously mentioned that a market potential of 2 percent has been projected for the number of electrically propelled vehicles that will exist in the year 2000. Correspondingly, a 2 percent reduction in trips otherwise made by internal combustion automobiles is reflected in Table 25, i.e., approximately 26,000.

The accumulative effect of increasing public transit services and the use of other modes and technologies would be to provide for nearly 770,000 of the trips that normally would have been made by the automobile. As can be seen in Table 25, a projected one-half million daily trips would not be able to be made in the year 2000 under the parameters of this scenario. This number reflects a reasonable order of magnitude estimate to guide the direction of future Department policies and programs.

In this scenario, emphasis is placed on increasing auto occupancy as a way of maintaining most essential trip making (such as work trips) and greatly reducing energy consumption. Programs to encourage carpooling and vanpooling should be a firm policy of the state. Programs such as carpool and vanpool matching services are essential building blocks in achieving higher vehicle occupancy rates. Further, policies employing incentives for ridesharing and disincentives for single-occupant driving should be established and utilized by responsible state and local agencies. Such incentives could include preferential parking for ridesharing vehicles, reduced tolls and parking fees for ridesharing groups and special insurance rates for carpoolers and vanpoolers to name only a few. Such disincentives as the abolishment of free parking, increased tolls and higher parking fees, and higher registration fees should be thoroughly investigated and if feasible considered for institution against the single occupant driver as a means of reducing single occupant driving.

Further, due to accelerating construction and maintenance costs as well as reduced petroleum availability, the State should review and dispose of those highway proposals that would extend the highway system into rural and low density developed areas. The state should improve portions of the existing highway system, where possible, rather than develop new parallel facilities. The state should also adhere to Transportation System Management philosophies and strategies in regard to improving the energy efficiency of the highway system and advocate such strategies as providing high-occupancy-vehicle lanes on the highway system where feasible and developing park-ride lots in outlying areas to facilitate carpooling, vanpooling, buspooling, and, ultimately, facilitate the development of public transit routes. Where appropriate, highway redesign should take into consideration the requirements of non-motorized vehicles such as bicycles as well as pedestrian needs.

Considering the great capital expense involved in developing new rail passenger systems in relation to expanding bus passenger service and facilities, the state should emphasize increased use of bus service to meet increased demands in existing and developing areas of the state not already served by a rail passenger system. This does not mean that the state would abandon rail service as a viable means of transporting people. The state would continue to maintain the existing rail passenger system, promote its increased use, and consider the extension of rail service in areas where warranted by detailed cost-benefit analysis.

Paratransit, because of economies of scale, is not seen as contributing directly to increasing the capacity of the transportation system per se, but in conjunction with other modes would indirectly allow the future capacity of the system to increase by basically acting as a feeder service to public transit. Paratransit's greatest utility would be in providing an efficient, parallel transit system for elderly and handicapped segments of the population.

Inasmuch as over 60 percent of all trips are of a local nature, i.e., five miles or less in length, the state would continue to recognize the importance of non-motorized travel modes such as bicycling and walking. The state would continue to develop and maintain programs aimed at promoting an increased use of bicycling, walking, and other similar modes.

Under this scenario, it would be imperative that all roadway projects be constructed in accordance with pedestrian and bicyclist needs. To provide for the increased use of these modes, all roadways should be capable of accommodating the shared use of motorized and non-motorized modes. Secure bike parking at typical destinations and intermodal transfer points should be provided. Improvements to the roadway system to facilitate bicycle access should be carried out in selected locations.

Corridor and Area Discussions

Although table 25 presented substitute trip making by orders of magnitude, individual corridors may have a greater or lesser potential to utilize certain substitute modes than that shown depending upon specific circumstances.

Table 26 presents a summary, by corridor, of the various non-auto driver travel modes that would be expected to experience increased demand under this scenario. The potential for additions to the existing rail system, i.e., commuter, rapid and light rail, is also indicated. It is intended only as a relative and general guide and not intended to indicate absolutes. As previously noted, major new highway construction, beyond currently programmed projects, may not be required under this scenario.

Many modal substitutes are beyond the purview of the State. Improved standard vehicle technology, electric vehicle technology and telecommunications development cannot be accelerated by the State; however, their development can be encouraged, and once developed, their usage advocated by the State.

The following corridor specific discussions concentrate on public transit and ride-sharing solutions. The discussions are not intended to be all inclusive or highly specific with respect to particular mobility solutions. Rather they are intended to serve as a general guide, broadly indicating where emphasis should be placed. Specific modal/geographic choices will emerge through monitoring/feedback and detailed alternatives analysis as the future unfolds.

Suburban Northeast Corridor

Although growth would have a tendency to infill and cluster under this scenario, the existing residential pattern is so widespread and firmly established that the overall situation in the year 2000 will not be appreciably changed from today. Given this condition, it will take a concerted effort on all fronts to satisfy the large number of desired trips projected for the corridor. Major transit components would include the following:

- . A substantial number of uptown Manhattan workers, currently using private auto for access, would need to be accommodated by expanded commuter bus service, with attendant park-and-ride facilities.
- . Commuter rail and bus services oriented to Newark and mid and lower Manhattan would require increased service.
- . The myriad of intra-corridor work, and to a lesser degree high potential non-work trip attractors, would require an expanded "local" bus transit network.
- . The development of the Meadowlands as a major employment and residential center will result in the need for substantial public transportation services for both residents of the Suburban Northeast Corridor and adjoining corridors. It is likely that implementation of specific service improvements will be more evolutionary than revolutionary, growing with demand, due to the potential magnitude of ultimate development and attendant required services. The entire question of transit services to, from, and within the Meadowlands, including modal mix, will be the subject of detailed analysis.

TABLE 26
SCENARIO III

DEMAND FOR NON-AUTO DRIVER TRAVEL MODES
AND THE POTENTIAL FOR RAIL SYSTEM EXPANSION

Corridor/Area	Increase in Higher Density* Growth Patterns			Increased** Ride Sharing	Increased Rail Demand**		Increased Bus Demand**			Potential for Rail System Expansion		
	Cluster	Infill	Existing Cities		Commuter	Rapid	Commuter	Feeder	Local	Commuter	Rapid	Light
Suburban N.E. Corridor		Yes	Yes	Yes	Yes	n.a.	Yes	Yes	Yes	Maybe	Maybe	Maybe
Northeast Corridor		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Maybe	Maybe
Central Corridor	Yes		Yes	Yes	Yes	n.a.	Yes	Yes	Yes	No	No	No
Shore Corridor	Yes			Yes	Yes	n.a.	Yes	Yes	Yes	Maybe	No	No
Atlantic City-Phila. Corridor	Yes	Yes	Yes	Yes	Maybe	Yes	Yes	Yes	Yes	Maybe	Maybe	Maybe
Rural N.W. Area	Yes			Yes	Maybe	n.a.	Maybe	Maybe	Maybe	No	No	No
Rural South Area	Yes			Yes	Maybe	n.a.	Maybe	Maybe	Maybe	No	No	No

* Shortens various desired trips, thereby reducing auto dependence and implying increased potential for bike, walk, electric car, etc. trips and shorter auto trips. A blank entry for "Cluster" or "Infill" indicates that, based on existing development patterns, it does not appear that the category would be conducive to effective higher density growth. A blank entry for "Existing Cities" indicates that, although a degree of in-migration could occur, corridor-wide impact would not be expected to be significant.

** A "Maybe" entry denotes that it is not certain whether or not potential demand increases would be significant from a corridor-wide travel perspective.

In addition to the need for substantial additional public transit usage, emphasis would also have to be placed on increased auto and van ridesharing. This strategy should be successful within the corridor due to a reasonably high number of common desired destinations coupled with sufficiently high residential densities to supply ride-share market pools at the origin end of the trips.

Northeast Corridor

Growth would occur predominantly in the form of infilling along major travel routes and repopulation of the older cities. To a lesser degree, infilling of suburban clusters in the vicinity of high trip generating urban cores, e.g., Newark/NYC and Camden City/Philadelphia, will occur. Little if any new low density development would be expected. The resulting population pattern would indicate that the following public transit solutions to the energy shortfall are appropriate:

- . Emphasis on linear oriented commuter trips via increased existing commuter rail service and increased/ expanded commuter bus service with attendant increased rail parking and bus park-and-rides. The densest emerging linear travel routes, currently served only by surface bus, could be considered for fixed guideway service, i.e., rapid/light rail or busways. Detailed cost/benefit analysis would be required, however, to define the most cost effective solutions.
- . The reemergence of the cities would require additional local transit service for both work and non-work trips. Likewise, there would be an increased demand for non-work intercity trips that would require additional off-peak rail and bus service.

Lower density areas within the corridor would remain relatively dependent on the auto, especially for non-work trips. This would require an emphasis to be placed on auto and van ridesharing.

Central Corridor

Growth would occur, under this scenario, primarily as clustered growth and infilling along existing major east-west travel routes and to a lesser extent along north-south routes. Growth would also occur within existing cities and to a lesser extent as clusters in lower density areas having access to existing transit facilities. This pattern of growth indicates that public transit solutions to an energy shortfall should concentrate in the following areas:

- . Increased commuter rail service over existing lines.
- . Increased intra-corridor localized bus service to major work and non-work trip generators from areas of sufficient residential densities.
- . Increased commuter bus service and attendant park-and-ride facilities in "non-rail territory" subcorridors serving major traffic generators.

As is the case for practically all other corridors, significant emphasis will also have to be placed on increased ride sharing under this scenario.

Shore Corridor

Growth would occur predominantly in Monmouth and northern Ocean counties as infilling, including population growth in the shore communities, and as clustered development. As in the case of the Northeast Corridor, public transit would be most effective in satisfying linear corridor commuter trips, thereby requiring increased commuter rail and bus services. There could be a potential for expanded commuter rail coverage in this corridor, terminating at Lakewood. Such an extension would affect the required bus/rail mix to service the corridor. The use of rail and bus linear commuter routes to satisfy non-work trips would be more limited than in the Northeast Corridor due to greater dispersion of, and smaller, traffic generators along those routes. For this reason and for work trips to and from scattered low density areas, increased ridesharing is also an important goal for the corridor.

Central Ocean County is expected to retain its basic rural nature. With growth in Atlantic City employment, the southern end of the county would be expected to show the highest concentrated population increase, mitigated by Pinelands and Wetlands considerations, due to its proximity to Atlantic City. This could indicate that combined northbound and southbound Route 9 subcorridor travel demand would require increased commuter bus service. Other work and most non-work trips would continue to depend on the auto due to low densities coupled with diverse origins-destinations. Ride-sharing should be encouraged but results cannot be expected to be dramatic, again due to low densities and trip diversity.

Atlantic City-Philadelphia Corridor

The existing relatively homogeneous ring of suburban development radiating outward from the Camden/Philadelphia urban core would continue to expand somewhat but at a higher overall density. The denser development would occur as infilling in areas close to Camden City and along radial access routes, and as clustering in more outlying areas. Camden City itself would also experience renewed growth. From the standpoint of public transit solutions to an energy shortfall, as well as to avoid congestion and pollution, this indicates the appropriateness and need for increased rapid transit service on the existing PATCO rapid rail line from Lindenwold to Philadelphia with complementary feeder bus services and supplementary commuter bus service, as necessary, for the Camden County area. For Gloucester County, increased commuter bus service and/or the potential for a new fixed guideway facility, e.g., light rail or busway, with attendant feeder bus service is indicated. The fixed guideway concept would require detailed cost/benefit analysis. Expanded local bus service is also indicated for the denser Camden area developments.

Growth in and around Atlantic City would require considerable short-haul commuter bus service to avoid severe congestion, pollution, and parking shortages in Atlantic City regardless of the energy shortfall.

Further, urban development would require improved locally oriented transit services.

The remainder of the Atlantic City-Philadelphia corridor would continue to remain at relatively low densities, interspersed with moderate infilling of existing residential clusters and the formation of a few new residential clusters. To satisfy mobility demand under this scenario would require an emphasis on increased auto occupancy rates through the ride sharing practices of car/vanpooling. There would also exist the potential for increased bus services connecting clustered development with the urban cores of Camden/Philadelphia and Atlantic City and park-and-ride/interceptor parking facilities, geared toward those urban areas, to serve lower density residences.

Finally, due to the reemergence of Atlantic City as a major regional recreational trip generator, reinstitution of direct rail service from Philadelphia has promise. Although such service would predominantly be geared toward interstate trips, with few stops between the principal cities, commuter and recreational service within New Jersey would be an adjunct. The service would possibly best be provided through the private sector because of the corridor's projected high recreation orientation.

Rural Northwest and Southern Areas

These areas would continue to exhibit similar residential patterns under this scenario. They would retain their overall rural status with growth occurring within existing small urban areas and towns and as new clustered development in a few instances. Although public transportation can be expected to play a relatively greater role in certain instances, the dominant rural setting would continue to preclude the viability of significant transit investment as a means of satisfying mobility needs. The auto would continue to be the prime travel mode. Therefore, emphasis in these areas would be on increased ride-sharing, although results cannot be expected to be as significant as in corridors with more common origins and destinations.

Public transit would continue to be most effective in the satisfaction of long-haul commuter trips to large employment centers, i.e., Newark/NYC area for the Northwest and Camden/Philadelphia and Atlantic City for the South. To that end a moderate increase in commuter bus service could be expected in both areas, along with park-and-ride facilities. In the Northwest, existing commuter rail service could also experience a moderate growth sufficient to warrant additional service. In the South, the existing Camden/ Philadelphia oriented commuter rail service would not be expected to show appreciable gains from a commuter standpoint due to limited marketable trips in the service area. However heavier utilization for seashore recreational trips by Camden/Philadelphia residents during the summer months could be expected.

Local trip desires within and between closely spaced towns and small urban areas could also require moderate increases in localized bus transit service.

Scenario IV

As has been previously stated, this scenario is difficult to assess due to the enormity and unpredictability of the socioeconomic impacts. If the full shortfall came suddenly, the short term impact on public transit would obviously be chaotic. Demand would be enormous while rolling stock and manpower would be sufficient to satisfy only a fraction of the demand. The best that could be done would be to provide for as many work and other essential trips as possible, on an equitable basis. If the full shortage developed more gradually, and was recognized and planned for at an early stage, short term catastrophic impacts would at least be somewhat mitigated.

For the long term, assuming economic stability/regrowth, the picture would not be as grim. Repopulation and return of businesses to the cities and denser urbanized areas would re-instate public transit as a highly effective and efficient travel mode in those areas. Likewise, population concentrations surrounding rail stations, including established cities, would cause a resurgence of rail ridership for both commuting and non-work trips. Long-haul commuter bus would likely decline in that it currently serves low density areas which, to a large degree, would decline in population. Those who remained in rural and low density areas, other than for agrarian purposes, due to their financial inability to relocate, might or might not be severely impacted depending on the specific and actual course of the scenario. Public transit levels of service infrastructure would grow significantly under this scenario but in a basically compact manner.

Clearly, no new highway construction would be warranted. The major problem would be to determine which segments of the system should be maintained at a high level as opposed to little or no maintenance at all. This problem would emerge from reduced highway user fees and reduced government allocations of tax revenues. It is conceivable that little used segments of the system, especially structures, that have fallen into an unsafe condition may have to be abandoned or restricted from use.

It can also be assumed that, out of necessity, greater use of non-motorized travel would occur, i.e., bicycling and walking, and greater use of telecommunications as a travel substitute would occur.

D. PLANNING FOR THE FUTURE

Monitoring

On Friday, October 29, 1981, OPEC members announced new price increases for crude petroleum that reportedly will raise the price of a gallon of gasoline an average three cents for the American motorist during 1982. Political tensions in the Middle East at the time of this writing are at a disquieting level. Although the state appears to be heading toward a future somewhere between Scenarios II and III, conditions similar to the aforementioned could direct state development substantially toward one rather than the other.

As we noted in the introduction to this plan, the future is to some degree what we make it. Our sense of what we believe to be in the state's interest--defined by the goals, objectives, and program policies discussed in the opening section of the plan--and our efforts to pursue these goals, objectives, and policies will influence the future of the state, and will determine how well prepared we are to respond to future conditions beyond our ability to control.

The pursuit of these goals, objectives, and policies is more or less difficult depending upon the popular support they enjoy. As we have described earlier, energy conservation and fiscal restraint concerns have a major bearing on these goals, objectives, and policies. There is ample evidence that the citizens of the state are being similarly influenced and are thus sympathetic to such state aims. New Jerseyans have taken upon themselves a strong conservation minded role. In the transportation sector, increases in the cost of travel have prompted many to purchase more fuel efficient vehicles and to adopt more judicious driving habits. The cost of travel is becoming an important determinant in housing and employment location decisions, as is proximity to public transit.

Our plans for transportation improvements must be formulated accordingly. We need to establish what we expect in terms of long-term future conditions, and what influence we believe we can and should wield in shaping these conditions. Then we need to proceed with shorter term, i.e., seven-year, project plans which are designed to bring these longer-range conditions about. No less importantly, we need to monitor conditions so that long-range expectations can be continually reappraised and adjustments in shorter term plans can be made, as necessary, to account for observed changes.

In the preceding sections of the plan, our expectations about future conditions have been described, and a most likely future based on current knowledge has been defined. Consistent with this and the goals, objectives, and policies described earlier, the New Jersey Department of Transportation has recently transmitted to the State Legislature's Committee on Capital Budgeting and Planning, the Fiscal Year 1983 to 1989 Seven-Year Capital Plan. To formulate next year's seven-year capital plan, it is imperative that we carefully monitor conditions likely to have an important bearing on the future and public behavior in response to these conditions.

The following is a list of relevant data that must be collected and monitored for statistical trends within specified categories. Much of the data having global significance is generally already being compiled by several organizations, notably by the federal government or through its auspices.

Energy

- Domestic and world oil production
- Domestic and world oil reserves
- Domestic and world oil consumption
- New Jersey motor fuel demand
- National automotive energy efficiency
- Price of gasoline
- Synfuel production

Transportation

- Highway travel demand
- Rail ridership
- Bus ridership
- Average automobile occupancy rates
- Highway maintenance requirements
- Rail vehicle and facility maintenance and replacement requirements
- Bus vehicle and facility maintenance and replacement requirements

Financial

- Automobile operating costs
- Highway user revenues
- Public transit fares
- Public transit revenues
- Public transit operating assistance
- Federal transportation assistance
- State general fund transportation expenditures
- Disposable family income spent on transportation

Demographics/Economics

- Statewide Population and County Distribution
- Age of Population
- Employed, Unemployed, Workforce
- Per Capita Income
- Elderly and Handicapped
- Households, households below poverty level

Land Use

Developed land use acreage

Land use regulations in force

Development densities in transportation corridors/areas, sub-
areas

Environmental

Air Quality

Water Quality

Degree of Open Space

Technology

Engine efficiency technology

New vehicle technology

Alternative energy source development
(e.g., Solar, wind, synfuel, etc.)

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E. ANALYZING TRANSPORTATION NEEDS AND SOLUTIONS

As mentioned previously, this long-range plan is the last volume of the series of draft documents which together make up the Statewide Surface Passenger Transportation Plan. This document builds on the goals, objectives, and policies included in this Plan and the projects and programs contained in the Short-Range Plan for Surface Passenger Transportation.

It is not the intent of this long-range plan to present a list of new project proposals that should be pursued to meet some projected year 2000 travel demand. Instead, this long-range plan was developed to provide a rational basis on which to judge the merits of existing or new transportation project proposals and programs.

As a first step in that process, past transportation project proposals are reexamined in this section of the Plan. The determination will be made as to which transportation proposals previously identified should continue to be pursued and which should be eliminated from further consideration. As new proposals are brought forward, they also will be evaluated against current planning considerations.

Past transportation project proposals are those identified in the Short-Range Plan, 1972 Master Plan, or the Transpac report. While there are other proposals which may have been "legislated" at one time or another, such proposals do not have the same currency and thus are not addressed here. Proposals provided for in the capital improvement section of the Short-Range Plan will be listed but not discussed here, unless some modification in their scope is expected. Past proposals have been classified in one of the following three categories:

Category I:

Those projects appearing in the Short-Range Plan unless identified in Categories II or III below. Subject to the availability of funding these are projects which are definitely slated for implementation, i.e., "committed".

For a more complete discussion of these projects, the reader is referred to pages 7 through 35 of the Short-Range Plan for Surface Passenger Transportation, March 1981.

Category II:

Those projects proposed in response to a perceived transportation need but whose merit has not yet been clearly established. Further analysis is required to confirm whether those projects, or alternative lesser cost projects, are merited and at what point in time. In some cases, projects appearing in this listing have undergone modification or more significant changes of scope relative to the originally conceived proposals. Projects marked with an asterisk (*) appeared in the capital improvement section of the Short-Range Plan but are no longer committed.

This category also includes projects and needs listed on pages 50 through 52 ("current studies") and pages 72 through 79 ("additional unmet needs") of the Short-Range Plan unless identified in category III below.

Category III:

Those proposals which represent a previously anticipated need that has not developed or is inconsistent with overall state policies. These proposals are being dropped from any further consideration. Projects marked with an asterisk (*) appeared in the capital improvement section of the Short-Range Plan. Projects marked with a double asterisk (**) appeared in the Short-Range Plan either as "Current Studies" or as "Additional Unmet Needs."

Disposition of Project Proposals

The following pages discuss the disposition of current project proposals in the context of the above defined project categories. The reader is also referred to figures 9 and 10 for project identification. Project numbers in the text correspond with the project numbers on the figures.

Category I

Short-Range Plan - Public Transit Projects (1981-1988)

Project
Identification
Number, Figure 9

Description

Rail Projects

T-1	M&E Re-electrification North Jersey Coast Line
T-2	Electrification, Matawan-Long Br. Diesel Equipment Purchase (not mapped) Newark Subway Improvements
T-3	Phase I (fixed facilities/ROW Imp./stations) Raritan Valley Upgrade
T-4	Phase I (diesel equipment purchase/stations)
T-4	Phase II-A (stations)
T-4	Phase II-B (track/signals) NEC/NJCL MU Equipment Arrow I & II Rehabilitation (not mapped) Hoboken Division Equipment Arrow III Staging (25 kv) (not mapped) Overhaul Push-Pull Fleet (not mapped) U34CH Locomotive Overhaul (not mapped) U34CH Locomotive Replacement (not mapped) Fixed Facility/ROW Improvements Rail Station Restoration (not mapped) Systemwide Track Rehabilitation (not mapped)

Category I (continued)

Project
Identification
Number, Figure 9

Description

Rail Projects

	Rail Fixed Facility and Equipment Upgrade (not mapped)
	Hoboken Power Plant/Switch Heaters (not mapped)
	Pollution Control at Fueling Sites (not mapped)
	Silicone Transformers (MU cars) (not mapped)
	Repair/Replace R.R. Bridges/Culverts (not mapped)
	PATCO Improvements (for improved operations) (not mapped)
T-5	NEC Improvements (Trenton, Metropark, Newark, N.Y.C.)
T-6	Raritan River Bridge (repair/replace)
T-7	Pascack Valley Line Improvements
	Systemwide Signal Improvements (not mapped)
	Rail Maintenance Facilities Upgrade
T-8	Major Repair Shop, Design/Land
T-8	Major Repair Shop, Construction

Bus Projects

Bus Purchase (not mapped)

Bus Rehabilitation (not mapped)

Bus Fixed Facility Upgrade (not mapped)

Bus Exact Fare Boxes (not mapped)

Bus Support Vehicles (not mapped)

Bus Radios (not mapped)

Category I (continued)

Project
Identification
Number, Figure 9

Description

Support Projects

T-9	Camden Transportation Center
T-10	Hoboken Terminal Improvements
	Bus Shelter (not mapped)
	Bus & Rail Park-n-Rides (not mapped)
	Marketing Program (not mapped)
	Bus Stop Signs (not mapped)
	E&H Vehicles & Rural Transit (not mapped)
	R.R. Station Paging System (not mapped)
	Joint Development/Urban Initiatives (not mapped)
	Bus Wheelchair Retrofit (not mapped)

Category I (continued)

Short-Range Plan - State Highway Projects (1981-1988)

Project
Identification
Number, Figure 10

Route

Description

County

Completion of Interstate System

H-1	76	Walt Whitman Bridge Ramps	Camden
H-2	78	Plainfield Ave. to Springfield Ave.	Union
H-3	78	Delaware River to Route 22	Warren
H-4	195	Routes 29 & I-295 to Broad St.	Mercer
H-5	287	Route 202 to NYS Line	Passaic, Bergen, Morris
H-6	295	Route 130 to Delaware St.	Gloucester
H-7	295	Route 130 to Kuster Road	Burlington, Mercer

Other Major Construction on New Alignment

H-8	18	Garden State Pkwy. to Deal Road	Monmouth
H-9	18	Interchange at River Road	Middlesex
H-10	20	I-80 to Inner Loop	Passaic
H-11	24	Brooklake Rd. to Rt. I-287	Morris
H-12	29	Route 29/129 to 195/295 Interchange	Mercer
H-13	129	Route 1 to Route 29F	Mercer

Category I (continued)

<u>Project Identification Number, Figure 10</u>	<u>Route</u>	<u>Description</u>	<u>County</u>
<u>Other Major Construction Of New Alignment</u>			
H-14	40	Woodstown By-Pass	Salem
H-15	55	Route 40 to Route 42	Gloucester
H-16	81	Route 1 to NJ Tpke. Interchange 13A Connection	Union
H-17	90	Haddonfield Road to Route 73	Camden Burlington
H-18	92	Route 206 to Route 33	Mercer
H-19	169	JFK Blvd. to Route 185	Hudson
H-20	185	Route 169 to Caven Point Road	Hudson
<u>Major Reconstruction Of Existing Facilities</u>			
H-21	1	Pierson Ave. to East Scott Ave. including Green St. Circle Widening	Union Middlesex
H-22	1&9	Bridge over Waverly Yards and South St. Structure Rehabili- tation	Essex
H-23	1&9	Overpass at North & South end of Skyway Bridge Rehabilitation	Essex Hudson
H-24	1&9	Bridge over Conrail, Avenel; Bridge Replacement	Middlesex

Category I (continued)

Project
Identification
Number, Figure 10

Route

Description

County

Major Reconstruction Of Existing Facilities

H-25	4	Vicinity of Saddle River to Rt. 95; Widening	Bergen
H-26	4	Overpeck Creek Bridge; Bridge Rehabilitation	Bergen
H-27	7	Over Hackensack River; Bridge Rehabilitation	Hudson
H-28	9	Garden State Pkwy. to Rt. 34: Widening, Resurf.	Middlesex
H-29	9	Rt. 526 to West Farms Rd.: Dualization	Ocean Monmouth
H-30	10	Intersection Improvement at Littleton Rd. (Rt. 202)	Morris
H-31	17	Terrace Ave. - Polifly Rd. to New York State Line: Resurfacing, Barrier Curb Safety Improvements	Bergen
H-32	22	Bridge Over Waverly Yards; Rehabilitation	Essex
H-33	23	Rt. I-80 to New Street Dualization	Passaic
H-34	23	New York Ave. to Maple Lake Rd.: Dualization	Passaic Morris
H-35	31	Flemington Circle to Rt. I-78	Hunterdon
H-36	33	Corlies Ave. - Rt. 35 to Rt. 71; Widening	Monmouth
H-37	33	Ward Ave. to Robbinsville Widening	Mercer

Category I (continued)

<u>Project Identification Number, Figure 10</u>	<u>Route</u>	<u>Description</u>	<u>County</u>
<u>Major Reconstruction Of Existing Facilities</u>			
H-38	35	Maple Place to Prospect Ave.; Bridge Replacement over Matawan Creek	Monmouth
H-39	38	NJ Tpke. to Pemberton Rd.; Dualization, Jughandles	Burlington
H-40	41	Evesham to Woodbury - Almonesson Rd.; Dualization, Jughandles	Gloucester
H-41	41	Rt. 70 to Rt. 38; Widening 2 to 4 lanes	Camden
H-42	42&295	Rt. 42 to Rt. I-295 Connector	Camden
H-43	46	Structure over Rockaway River, Rockaway Twp. Rehabilitation	Morris
H-44	82	Replace Rahway River Bridge	Union
H-45	88	Beaver Dam Rd. to Memorial Drive; Bridge Replacement	Ocean
H-46	95	Scudders Falls to Scotch Rd.; Widening	Mercer
H-47	130	Rancocas Creek Bridge, Relocation	Burlington
H-48	130	Assicunk Creek to Rt. 206 Widening & Resurfacing	Burlington
H-49	147	Rt. 9 to New Jersey Ave.: Widening	Cape May

Category I (continued)

<u>Project Identification Number, Figure 10</u>	<u>Route</u>	<u>Description</u>	<u>County</u>
<u>Major Reconstruction Of Existing Facilities</u>			
H-50	152	Somers Point to Longport Bridge; Replacement	Atlantic
H-51	206	Rt. 27 to Rt. I-287; Dualization	Mercer Somerset
H-52	280	Connector Ramp to Rt. 21	Essex
H-53	295	Delaware St. to Repaupo Rd.: Widening	Gloucester
H-54	322	Mechanics St. to Rt. I-295: Widening	Gloucester
H-55	444	Wood Ave. & Rt. 444 Interchange Metro- park Stage II	Middlesex
H-56	444	GSP Interchange 8 to 12S Rehabilitation & Widening	Cape May
(not mapped)		Newark Airport & I-78 Surveillance System	Essex Union
(not mapped)		Route Guide System	N.E. Counties
<u>Minor Reconstruction and Safety Improvements</u>			
H-57	1	Bakers Basin Inspection Station; Jughandles	Mercer
H-58	1	Justice Complex Ramps	Mercer
H-59	1	Rt. 9 to Conrail; Resurfacing	Middlesex

Category I (continued)

<u>Project Identification Number, Figure 10</u>	<u>Route</u>	<u>Description</u>	<u>County</u>
<u>Minor Reconstruction and Safety Improvements</u>			
H-60	1&9	Bayway Circle Cut-through	Union
H-61	1&9	Bridges over St. Charles Place, CNJ, Roanoke Ave., Foundry St. Delany St. LVRR, Wilson Ave., Niagara St., Magazine St. Rehabilitation	Essex
H-62	1&9	Bridge over Rt. 35; Rehabilitation	Middlesex
H-63	1&9	East Grand St. to Bond St. Lower Rt. 1&9 under CRRNJ	Union
H-64	1&9T	Passaic River to Rt. 440 Safety Improvements	Hudson
H-65	1&9T	Structure Rehabilitation over St. Pauls Ave.	Hudson
H-66	1&9T	Pulaski Skyway to Passaic River Bridge Intersection Revision	Essex
H-67	3	Passaic River to Rt. 1&9: Safety Improvements	Bergen Hudson
H-68	3	Rt. 46 to Bergen County Line: Safety Improvements	Passaic
H-69	4	New Ramps west of Rt. 17	Bergen
H-70	7	Bridge over ELRR, Rehabilitation	Hudson
H-71	9	GSP to Rt. 1: Barrier Curb Minor Widening Resurfacing	Middlesex

Category I (continued)

<u>Project Identification Number, Figure 10</u>	<u>Route</u>	<u>Description</u>	<u>County</u>
<u>Minor Reconstruction and Safety Improvements</u>			
H-72	9	Southbound lanes at King George Post Rd.: Ramps at West Pond Rd. Resurfacing & Safety	Middlesex
H-73	9W	Walker Hollow, Boro of Alpine, Horiz & Vert. Alignment	Bergen
H-74	10	Ledgewood Circle to Livingston Circle: Jughandle Intersections Safety Improvements including deck rehab. over Rt. 53	Morris
H-75	17	Williams St. to Essex St.: Resurfacing	Bergen
H-76	17	Paramus Rd. to South Lake St.: Resurfacing	Bergen
H-77	18	NJ Tpke. to vicinity of Main St.: Resurfacing	Middlesex
H-78	22	Clinton to Somerset County Line; Safety Improvements & Jughandles	Hunterdon
H-79	22	East of Chimney Rock Rd. to Wilson Ave.; Resurfac- ing and Guide Rail	Somerset
H-80	23	Vicinity of Steenykill Lake to NYS Line;	Sussex
H-81	30&130	Collingswood Circle to Airport Circle; Minor Widening, Resurfacing	Camden
H-82	31	Marshalls Corner - Woodsville Rd. to East Amwell-Hopewell Line: Widening, Resurfacing	Mercer

Category I (continued)

<u>Project Identification Number, Figure 10</u>	<u>Route</u>	<u>Description</u>	<u>County</u>
<u>Minor Reconstruction and Safety Improvements</u>			
H-83	37	GSP to Dover Twp. Line: Highway & Intersection Improvements	Ocean
H-84	38	Madison Ave. to Pine St.: Resurfacing, Drainage	Burlington
H-85	42&322	Rt. 168 to Main St.; Minor Widening, Resurfacing & Jughandles	Gloucester
H-86	46	Bridge over Passaic River Rehabilitation	Passaic Bergen
H-87	46	Branch of Mine Brook to Naughtright Rd.: Resurfacing	Morris
H-88	46	Elimination of Little Ferry Traffic Circle	Bergen
H-89	46	Structure over Rockaway River, D&WRR & Blackwell St.: Deck Rehabilitation	Morris
H-90	46	Intersection Improvement at Two Bridges Road	Essex
H-91	46	Passaic River to Rt. 17 Barrier Curb	Bergen
H-92	46	Bridge over Passaic River and Riverview Rd.; Rehabilitation	Passaic
H-93	46	Riverview Dr. to Paulison Ave.: Interchange Improvements & Safety Improvements	Passaic
H-94	47	Chestnut St. to Rt. 55F Drainage, Resurfacing	Cumberland
H-95	49	Quinton to Shiloh; Resurfacing	Salem Cumberland

Category I (continued)

<u>Project Identification Number, Figure 10</u>	<u>Route</u>	<u>Description</u>	<u>County</u>
<u>Minor Reconstruction and Safety Improvements</u>			
H-96	57	Bridge Replacement over Pohatcong Creek near Brass Castle Rd.	Warren
H-97	63	Lafayette Ave. to Brinkerhoff Ave. at Rt. 5; Resurfacing Inter- section Improvement, Structure Rehabilitation	Bergen
H-98	73	Rt. 38 to NJ Tpke.; Minor Widening & Barrier Curb	Burlington
H-99	77	Shirley Rd. to Rt. 40 Circle Resurfacing and Minor Widening	Salem
H-100	78	Allerton Rd. to Plain- field Ave.: Safety & Reconstruction	Somerset Hunterdon
H-101	78	Interchange Improvement at Rattlesnake Rd. and Rt. 31	Somerset Hunterdon
H-102	80	Rt. 94 to Cherry Hill Rd. Median Shoulder Improve- ments, Resurfacing, Major Deck Repair	Warren Morris Sussex
H-103	95	Rt. 46 to Fletcher Ave. Safety Improvements	Bergen
H-104	130	Wood St. to south of Rising Sun Rd.; Resurfacing	Burlington
H-105	130	East of PRSL to River Drive; Drainage and Deck Rehabilitation over Big Timber Creek	Camden Gloucester
H-106	130	Rt. 47 to Collingswood Circle; Barrier Curb	Camden

Category I (continued)

<u>Project Identification Number, Figure 10</u>	<u>Route</u>	<u>Description</u>	<u>County</u>
<u>Minor Reconstruction and Safety Improvements</u>			
H-107	159	Bridge over Passaic River Reconstruction	Essex Morris
H-108	166	Bridge Replacement over Jake's Branch of Toms River	Ocean
H-109	183	Rt. 46 to Rt. 206; Highway Improvements to Relieve Congestion	Morris Sussex
H-110	202	Rt. 31 to Somerset County Line: Left Turn Revision and Safety Improvements	Hunterdon
H-111	206	Somerset County Line to Rt. I-80 Improvements & Resurfacing	Morris
H-112	208	Viaduct over ELRR Deck Replacement & Resurfacing	Bergen
H-113	280	Ramp at Highland Broad Sts.: Part of Newark Feasibility Study	Essex
H-114	287	Viaduct Rehabilitation over Raritan River & Easton Avenue	Somerset
H-115	287	Viaduct Rehabilitation over LVRR, Reading RR, Raritan River and D&R Canal	Somerset
H-116	495	Bridge Rehabilitation over JFK Blvd.	Hudson

Category II

Public Transit Projects

T-11* Kearny Connection:

This project was called for in the 1972 Master Plan. It entailed the construction of a rail connection between the Hoboken Division's Morris and Essex Line and the Northeast Corridor at Kearny to provide direct access to Penn Station, N.Y.C. It included modification to tracks, signals and traction power system on the corridor and at Penn Station, N.Y.C., in order to expand peak hour capacity to 26 trains. An engineering study is required to define the specific requirements, scope, design, and cost of the project, including actual Penn Station capacity requirements.

T-12* Hackensack Meadowlands Transit:

This project was cited as requiring development in the Transpac report. Non-project specific funds were included in the 1979 Transportation Bond. The scope of this project requires definition. Further analysis is needed to determine the most effective mix of Meadowlands related transit improvements, including modal alternatives. The 1972 Master Plan proposed a Newark-Meadowlands rapid rail service. More recently, several commuter rail access proposals have been advanced.

T-13* Montclair Connection:

This project, providing Boonton Line riders with direct access to the Newark CBD, was called for in the 1972 Master Plan. Due to the pros and cons of the project, NJ TRANSIT has undertaken a reexamination of the project to determine whether, on balance, the project should still be pursued. This determination is expected shortly.

* Hoboken Division Push-Pull Fleet Reseating (not mapped):

This project was recommended in the Transpac report. It called for the reseating of 150 cars from a 2-2 to a 3-2 configuration. The purpose was to increase capacity to accommodate anticipated short-term growth based on trends at that time. Required capacities, method(s) for their achievement, and timing need to be reassessed using current trends and projections.

Notes

* Listed in the capital improvement section of the Short-Range Plan

T-x: Project identification number, figure 9

Category II (continued)

T-14* Newark Subway Improvements, Phases II and III:

These phases of the Newark Subway improvement program were initially addressed in the Recommendations for the Transpac Program (Transpac) report. Phase II is basically the purchase of new light rail vehicles and related items. It was recommended for Transpac. Phase III is the construction of high level platforms and the installation of automatic fare collection equipment. It was deferred from Transpac due to funding constraints but included in the 1979 Bond. Vehicle design requirements for reliability, utility and compatability with the existing system require engineering study. High level platforms will require analysis as to feasibility considering compatability with rolling stock and system physical restrictions as well as need. Automatic fare collection requires needs analysis.

T-15* Raritan Valley Upgrade, Phase III:

This phase of the Raritan Valley Upgrade was identified in the 1979 Transportation Bond Issue as a discrete project. It called for the installation of new signals and the construction of high level platforms and gantlet tracks at Westfield, Fanwood, Netherwood, and Plainfield stations. Design practicality and appropriateness requires analysis. Also, the potential project is more properly viewed as being within the context of the statewide Rail Passenger Facilities program rather than as an independent proposal.

* Arrow IV Purchase (not mapped):

This project was recommended within the Transpac report. It called for the purchase of approximately 25 Jersey Arrow type multiple unit rail cars. The purpose was to provide an adequate number of fleet spares and provide for anticipated growth on the NEC and NJCL, based on data available at that time. Actual future fleet requirements, including the timing of new purchases, considering the state's overall existing Arrow I, II, and III fleet needs to be addressed using current trends and projections.

T-16* PATCO Extension to Berlin:

This extension was implicitly called for in the 1972 Master Plan as part of the proposed PATCO extension to Atlantic City. It is currently in the process of undergoing alternative's analysis, including specific terminus and consideration of lower cost transit options.

Notes

* Listed in the capital improvement section of the Short-Range Plan

T-x: Project identification number, figure 9

Category II (continued)

T-17 Orange Street Newark Subway Transfer:

This project, the construction of a transfer facility between the Newark Subway and the Hoboken Division Morristown Line at the existing Orange Street subway station was addressed in the appendix¹ to the Transpac report as requiring development. The project still requires engineering feasibility/design and benefit analysis.

T-18 Newark City to Newark Airport Transit:

This proposal is a spinoff of the "Newark to Raritan via Newark Airport" PATH extension project called for in the 1972 Master Plan (see Category III). It is recognized that improved public transit service between the city and airport is desirable. However, alternative modal analysis is required to define project scope.

T-19 Hoboken Division Pascack Valley/Main Line Connection:

This project was cited in the appendix to the Transpac report as being in the conceptual stage. The proposal was to connect the lines in Rockland County, N.Y., via a rehabilitation of the Piermont Branch, to permit additional peak period Pascack Valley service. The proposal requires analysis with respect to operational effectiveness, cost/benefit, and alternative solutions.

T-20 Secaucus Connection/Transfer:

The Secaucus Connection, to permit direct access to N.Y.C. for Hoboken Division non-Morris and Essex line trains, was called for in the 1968 and 1972 Master Plans. The benefit of the project has come under serious question as a result of more recent investigations conducted for NJDOT/NJ TRANSIT by the Tri-State Regional Planning Commission. It should also be noted that the original proposal assumed electrification of the lines in question which is no longer the case (see Category III listing). Therefore, the project would also be contingent on the potential availability of reliable high-performance dual-mode locomotives. The connection must be reexamined in light of the preceding as well as related improvement proposals for the Meadowlands. As part of this reexamination, lesssr cost improvements, such as a Hoboken Division-Northeast Corridor transfer station, will be considered.

Notes

¹ Projects cited in the appendix to the Transpac report were included as information items only. They were not evaluated or considered for recommendation due to lack of development.

T-x: Project identification number, figure 9

Category II (continued)

T-21 West Shore Corridor Transit:

This project was cited in the appendix of the Transpac report as requiring development. Recent examination of various service improvement options for the West Shore Corridor indicates that rail service reinstitution does not appear to be a cost-effective option. However, lesser cost options, e.g., busway, appear to merit more serious further consideration.

T-22 Bayonne Light Rail Transit:

This project is a more modest varent of the "Hudson County Subway, Bayonne to Fairview" proposal in the 1972 Master Plan (see Category III). The current proposal is for light rail transit service from Jersey City through Bayonne. Community objections to an alignment along a central thoroughfare diminishes the attractiveness of a prospective light rail investment, since the only alternative alignment is a railroad right-of-way on the eastern edge of the peninsula--poorly situated in relation to trip generating land uses. This right of way is not entirely without merit, however, since the portion of it from the Turnpike north traverses undeveloped waterfront which could be developed and therefore enhanced by a transit connection to PATH.

T-23 NJCL Lakewood Extension (Diesel):

This project is a non-electrified variant of the electrified proposal contained in the 1972 Master Plan (see Category III). More recently, electrified Lakewood service was considered for Transpac but not recommended due to cost. It was noted that diesel options would be evaluated. Routing to Lakewood could be either from Red Bank or from Matawan via Freehold. The most recent study of prospective rail service to Lakewood is a study undertaken by Ocean County, which recommended reinstitution of diesel service between Red Bank and Lakewood. Although there is an apparent need for transit service improvements in both the Freehold and Lakewood corridors, further study will be necessary to define: 1) most appropriate improvements in light of state and local development and transportation objectives; and 2) a realistic implementation plan: Improvements warranting consideration include bus and diesel rail service options.

T-24 PATCO Extension to Glassboro:

This extension was called for in the 1972 Master Plan and more recently by the Delaware River Port Authority (DRPA) as a result of a DRPA commissioned feasibility study. Current plans by NJDOT and DRPA call for a reanalysis of this proposal and lesser cost alternatives in light of changed demographic and financial circumstances, and in light of implementation prospects for Route 55, a proposed state highway which would occupy the same right of way as the transit facility for part of the overall distance.

Notes

T-x: Project identification number, figure 9

Category II (continued)

T-25 PATCO Extension to Mount Laurel:

This extension was also called for in the 1972 Master Plan and the more recent DRPA commissioned study. It is also slated for reanalysis in light of changed financial and demographic circumstances. Lesser cost transit alternatives will also be considered.

T-26 Atlantic City Transportation Center

This project was cited in the appendix to the Transpac report as being in the conceptual stage. Since that time, a consultant report prepared for Atlantic City was completed. Its recommended long-range transportation solution is a very high cost, extensive, downtown elevated people mover (DPM) at a 1979 cost of \$460 million and a joint-development transportation center integrated with the Seashore Division Rail Line, bus services and the DPM. The transportation center was estimated at an additional \$138 million in 1979 dollars. Needs were predicated on 26 operational casinos by 1990. The report suggested bond financing through a to-be-created Atlantic City Transportation Authority (an Atlantic County Transit Authority has been formed). The scope and timing for an actual staged long-term transportation improvement program for Atlantic City, considering current estimates of expected casino growth to 1990 and beyond and financing capabilities, still needs to be developed.

Rail, Bus and Intermodal Passenger Facility Improvements (Statewide-not mapped)

The 1972 Master Plan recommended numerous improvements to the state's major commuter rail lines, including: track upgrade; new rolling stock; parking expansions; automatic fare collection and; high level platforms. High density service improvements, e.g., automatic fare collection, were largely predicated on large patronage increases generated by a new Hudson River transit tunnel. However, such improvements could possibly be warranted in the future in specific cases due to factors other than a new tunnel. Many of the recommended improvements have been, or are in the process of being, implemented, especially in the areas of rolling stock renewal and track improvements. All of these type projects will continue to receive attention within NJ TRANSIT's ongoing statewide rail facilities' program development effort. Likewise, the appendix to the Transpac report alluded to potential bus terminal and intermodal facility improvements. These too will be considered within the NJ TRANSIT program development process.

Notes

T-x: Project identification number, figure 9

Category II (continued)

T-27 - 32 Longer-Range Projects for Future Consideration:

The following projects were all called for in the 1972 Master Plan. All require considerable scope development and/or detailed alternatives and cost benefit analysis. Due to the extremely high order of magnitude cost that would be associated with them, it is not anticipated that they could receive consideration prior to the year 2000. However, they are indicated within Category II in that they represent those currently identified conceptual projects that exhibit the greatest apparent potential of being high benefit "future generation" projects. They are as follows:

T-27 Newark Subway Extension to the Ironbound District

T-28 Newark Subway Extension to Irvington Center

T-29 New Hudson River Tunnel - Four tube tunnel to serve both commuter and rapid rail transit to midtown Manhattan. As noted in the 1972 Master Plan, the tunnel is the key for the subsequent projects that follow.

T-30 Great Notch to New Hudson River Tunnel Rapid Rail Transit

T-31 Emerson to New Hudson River Tunnel, Via West Shore ROW, Rapid Rail Transit

T-32 Hackensack to New Hudson River Tunnel, Via Link with West Shore Rapid Rail Transit

Notes

T-x: Project identification number, figure 9

Category II (continued)

State Highway Projects

Proposed Freeways

H-117 Route 17F, Bergen County:

The 1972 Master Plan called for the construction of Route 17F southerly from the Route 3 intersection with existing Route 17 to the vicinity of Route I-280, thus extending high capacity access to the Hackensack Meadowlands, Newark and those communities along the I-280 corridor. Construction through wetlands may make a freeway link prohibitive. Further, HMDC has proposed a land service facility to provide access points for planned development. Specific improvements will be determined after further review, however, something less than a freeway is anticipated.

H-118 Route 18F, Middlesex County (River Road to Route I-287):

Both plans called for extension of Route 18 as a freeway. Originally the extension was to go to Route 22, in the later plan only to Route I-287. A recent feasibility study conducted by NJDOT has confirmed that improvements and extensions of the existing road network would provide the necessary access with less impact and disruption than constructing a freeway on new alignment through Piscataway. The Short-Range Plan proposes the scaled down proposal.

H-119 Route 21F; Passaic County:

Both the 1968 and 1972 plans recognized the need for and recommended the continuation of Route 21F northward to Route I-80 to allow an unimpeded highway connection between the Newark and Paterson areas. Because of the degree of development that exists in this corridor and the presence of the Passaic River, the proper terminus is in question. This project will remain active pending further study.

H-120 Route 29F; Mercer County:

Both the 1968 and 1972 plans called for the continuation of Route 29F south from Route U.S. 1 (near Ferry Street) to the Routes I-195-295 interchange to provide direct access to the Capital from points east and south. The proposed construction of Route 129 between the Route I-195-295 interchange and Route U.S. 1 (near Market Street) will influence the need for this facility and thus, further study is necessary to define the final improvement.

Notes

H-x: Project identification number, figure 10

Category II (continued)

Proposed Dualizations

H-121 Route 9, Atlantic County:

The proposed dualization from Smithville to the Mullica River assumed construction of a Route 9 freeway to the south. Although the proposed freeway will be dropped from further consideration, the growth of Atlantic County spurred by the casino industry may make improvements to Route 9 necessary. This proposal will be examined as part of a study that is currently underway to evaluate access roads into the Atlantic City area. The Route will be monitored and, if traffic warrants, an improvement program developed.

H-122 Route 9, Ocean County:

Dualization of Route 9 through Lakewood is generally considered impracticable. As part of the long term program, improvements on new alignment will be investigated.

H-123 Route 9W, Bergen County:

The 1972 Master Plan called for the dualization of Route 9W from Route I-95, north, to the New York state line. The section from Route I-95 to E. Clinton Ave. has been improved. The remaining section, to the north, is listed as a "Current Study" in the Short-Range Plan.

H-124 Route 33, Monmouth County:

The Route 33 Freehold bypass and dualization of the existing roadway, east, to Route 34 were contained in both the 1968 and 1972 Master Plans. The portion of the Freehold bypass west of Route 79 has been completed and is open to traffic. The remaining section of the bypass, east of Route 79, and the dualization of Route 33, to Route 34, are both listed in the Short-Range Plan under "Current Studies" and "Additional Unmet Needs".

H-125 Route 34, Monmouth County:

The 1972 Master Plan called for the dualization of Route 34 from Route 9 south to Route 33. While demand does not justify the dualization of Route 34 entirely, the portion between Route 18F and Route 33 has taken on heightened importance since Route 18F will not be completed between Route 38 and Brielle Circle. The entire section between Routes 9 and 33 will be studied to determine the scope of necessary improvements. (See H-22)

Notes

H-x: Project identification number, figure 10

Category II (continued)

H-126 Route 37, Ocean County:

Serving the coastal resort areas, this highway may require improvement during the time of this plan. The nature of these improvements are dependent on decisions made for improving Route 70 (see item H-10).

H-127 Route 40 and 322, Atlantic County:

The 1972 Master Plan called for the dualization of this four lane facility from South Main Street to Brenta Avenue in Egg Harbor Township. Further analysis is required to determine what improvements are necessary. This proposal will be examined as part of the Atlantic City access roads study.

*H-128 Route 66, Monmouth County:

This dualization project, called for in the 1968 and 1972 Master Plans and 1981 Short-Range Plan, will be evaluated in terms of travel demand and land use changes to determine if the improvement should be a priority.

*H-129 Route 70, Burlington and Ocean Counties:

This proposed dualization will be reviewed to determine the level of improvement required, consistent with the location through the Pinelands. However, two portions of Route 70 east of Route 9 have been recommended for dualization in the 1981 Short-Range Plan.

H-130 Route 206, Atlantic and Burlington Counties:

Originally proposed as a dualization in the 1968 and 1972 master plans, this project will be reevaluated in light of State growth policies. Improvements must be consistent with overall land use and traffic needs.

Proposed Widenings

H-131 Route 15, Morris County:

The widening of Route 15 between Routes 46 and I-80 should be studied. This is a two-lane section of highway which is presently operating at capacity.

Notes

* Listed in the capital improvement section of the Short-Range Plan

H-x: Project identification number, figure 10

Category II (continued)

*H-132 Route 18, Middlesex County:

The 1972 Master Plan called for the widening of Route 18 between Route 1 and Route 9. The widening of this facility from County Route 527 to Route 1 is included in the Short-Range Plan. The widening of the remaining section from County Route 527 to Route 9 should be studied.

H-133 Route 27, Somerset and Middlesex Counties:

Improvements to Route 27 between Princeton and New Brunswick are listed as "Additional Unmet Needs" in the Short-Range Plan. Any study to determine the magnitude of improvements necessary on this highway should be expanded in scope to include the section between New Brunswick and Rahway as was shown in the 1972 Master Plan.

H-134 Route 30, Atlantic County:

The improvement of Route 30 from Delilah Road to the Inland Waterway will be studied as part of the overall needs analysis that is currently underway to assess the transportation needs in the Atlantic City area.

H-135 Route 40, Salem, Gloucester and Atlantic Counties:

The widening of this facility was included in both the 1968 and 1972 master plans. A proposed bypass of this route around Woodstown is included in the Short-Range Plan. Improvements to the remaining sections of this highway should be studied in terms of the capacity required to serve the Atlantic City and surrounding shore areas.

H-136 Route 46, Bergen County:

The widening of Route 46 between Route 17 and the New Jersey Turnpike was proposed. This improvement may be necessary to accommodate traffic generated by the development of the Hackensack Meadowlands and should be studied.

Notes

*Listed in the capital improvement section of the Short-Range Plan

H-x: Project identification number, figure 10

Category III

Public Transit Projects

T-33 - 37 Commuter Rail Line Electrification Projects:

The 1972 Master Plan called for the electrification of practically all of the state's non-electrified lines. Considering the extremely high capital vs. potential benefits, it has been judged to be unwarranted for consideration within the plan time frame and will not be pursued. Service improvements to the year 2000 will focus on the existing diesel services. Initial improvements are defined within the 1981 draft Short-Range Plan. Additional improvements may be added as needs are identified. The 1972 Master Plan identified the following lines for electrification:

T-33 Bergen County/Main Line

T-34 Pascack Valley Line

T-35 Boonton Line (** including Dover to Netcong)

T-36 North Jersey Coast Line (Long Branch to Bay Head)

T-37 NJCL Extensions-Matawan to Freehold and Red Bank to Lakewood
(See Category II)

T-38 Newark to Raritan (Raritan Valley Line) via Newark Airport:

The 1972 Master Plan called for either an extension of PATH to Raritan via Raritan Valley Line ROW or electrification of the Raritan Valley Line from Raritan to Newark with subsequent access to N.Y.C. via the Northeast Corridor. It was also noted that the desirability of integrating corridor service with Newark Airport access would be explored. It was subsequently decided, in light of financial restraints and projected passenger density, only to upgrade the existing Raritan Valley Line diesel service between Raritan and Newark rather than either extending PATH or electrifying the line. The diesel upgrade is currently underway. Additional improvements may be added as future needs are identified.

T-39 Ridgewood to Newark Rapid Rail Transit:

This project was called for in the 1972 Master Plan. Considering its extremely high anticipated capital cost and in that other proposed projects would parallel the general service area, the project does not appear feasible for the foreseeable future.

Notes

** Listed as an additional unmet need in the Short-Range Plan

T-x: Project identification number, figure 9

Category III (continued)

T-40 Newark CBD People Mover:

Called for in the 1972 Master Plan. The deployment of people movers in urban settings has come under serious question, most recently evidenced by decisions in several U.S. cities to abandon plans for federally sponsored people mover demonstration projects. There is considerable doubt as to the cost-effectiveness of such projects, and equipment reliability in an urban setting is untested. Accordingly, plans for the Newark project have been abandoned. Lesser cost bus improvements to facilitate downtown traffic circulation will be explored.

T-41 Hudson County Subway, Bayonne to Fairview:

This project was called for in the 1972 Master Plan. Considering its extremely high anticipated capital cost, the project does not appear feasible for the foreseeable future.

T-42* Improvements to Sunnyside Yard Maintenance Facilities:

This project was recommended in the Transpac report and subsequently included in the draft March 1981 Short-Range Plan. Since that time, NJ TRANSIT has determined that the improvements will not be required, primarily due to the programmed major repair/rebuild and inspection/service shops and other minor maintenance facility improvements.

T-43 I-295 Northeast Corridor Rail Park-and-Ride:

This proposal, located in Hamilton Township was evaluated in the Transpac report. It was not included in the recommended program due to outstanding issues, including potential parking expansions at Trenton and Princeton Junction. Expansion at Princeton Junction is in progress and parking expansion at Trenton is included in the draft Short-Range Plan. Therefore, the I-295 proposal will not be pursued.

T-44 PATCO Extension to Atlantic City:

Called for in the 1972 Master Plan, this project is judged to be highly unlikely because of its prohibitive capital cost. Lesser cost alternatives are being pursued, namely the reinstitution of commuter rail services between Philadelphia and Atlantic City over existing rail right-of-way. The state is seeking to attract a private sector party to provide this service. A shorter PATCO extension is under consideration (to West Berlin or Atco), however, along with lesser cost service improvements, to alleviate traffic and parking problems at Lindenwold and to help shape future corridor development in a more energy efficient manner. (see Category II).

Notes

*Listed in the capital improvement section of the Short-Range Plan

T-x: Project identification number, figure 9

Category III (continued)

T-45 PATCO Extensions from Mount Laurel to Mount Holly and to Burlington City:

These extensions were called for in the 1972 Master Plan. Since these projects would entail substantial capital cost and considering that they are of lesser merit than the proposed PATCO extensions to Mount Laurel and Glassboro, it is highly unlikely that they could be considered within the long-range plan time frame.

Notes

T-x: Project identification number, figure 9

Category III (continued)

State Highway Projects

Proposed Freeways

H-137 Route 1 and 9F, Hudson and Bergen Counties:

Both the 1968 and 1972 plans recognized the congestion on Tonnelie Avenue as being significant and recommended a freeway solution. Studies have indicated that such a roadway is unbuildable for technical, environmental, and cost difficulties. Efforts should be made to improve traffic flow on the existing system in this corridor.

H-138 Route 9F, Atlantic County:

This project was in both earlier plans. Given the environmental sensitivity of the region, it appears more prudent to correct problem locations along Route 9 and to encourage through traffic to use the parallel Garden State Parkway. Therefore this freeway is no longer recommended. Alternate improvements will come from the Atlantic City access roads study.

H-139 Route 9F, Middlesex County:

The 1972 plan called for a new freeway that would have avoided the congested link of Route 9 between Routes 34 and 35. An improvement to Route 9 is now underway and more extensive projects have been proposed to correct the more congested points. Further studies are expected to indicate the improvements to the existing route that will serve travel demands through the year 2000.

*H-140 Route 18F, Monmouth County:

The 1968 and 1972 Master Plans and the 1981 Short-Range Transportation Plan called for the development of Route 18F between the Brielle Circle and the Garden State Parkway. A recent analysis has indicated that the lower portion between the Brielle Circle and Route 38 is not justified and that future traffic demands can be met by improving existing highway facilities in the corridor.

H-141 Route 21F, Essex County:

The proposal to upgrade Route 21 in Newark to a freeway has been found infeasible. Rather, the Newark Access Study calls for a widening of the existing Route 21 and complete interchanges with Routes I-78 and I-280. Therefore, the freeway concept is dropped for a more feasible alternative.

Notes

* Listed in the capital improvement section of the Short-Range Plan

H-x: Project identification number, figure 10

Category III (continued)

H-142 Route 24F, Morris County (Route I-287 to Route 206):

Originally proposed to extend to Phillipsburg, Route 24 was cut back to Route 206 in 1972. Subsequent studies determined that extension of a freeway beyond Route I-287 was not warranted. Studies to complete the highway from Brooklake Road to Route I-287 are underway.

H-143 Route 29F, Hunterdon County:

The Lambertville bypass was proposed as a way to relieve traffic through that community. With the completion of the Route 202 bypass, however, much of the remaining traffic tends to have a local orientation. Existing and anticipated traffic demands no longer appear to warrant such a bypass.

H-144 Route 31F, Mercer County:

This freeway was proposed as part of the loop road system around Trenton from the Pennington Circle to Route I-195. This freeway proposal has now been rejected because of the physical disruption it would entail on the eastern leg. Some of the land previously acquired may be used to correct congestion at dangerous locations on the existing system.

H-145 Route 35F, Monmouth County:

Developed as a relief of Route 35 this project assumed completion of Route 74F (a category 3 item). Parallel to the Garden State Parkway, current concepts call for directing through traffic to the toll facility. Therefore completion of this freeway is not warranted.

H-146 Route 38F, Burlington and Monmouth Counties:

This proposal would have extended a new freeway from Route 73 north to Route 18, connecting the Camden area with northeastern Monmouth County. Originally, a portion of what is now Route I-195 was included in this concept. The highway would extend across the Pinelands. Since the completion of Route I-195 provides an alternate routing, and since the alignment for the proposed 38 traverses the Pinelands, this project does not warrant implementation.

H-147 Route 50F, Atlantic and Cape May Counties:

This route was intended to provide a stimulus for development of central Atlantic County, an area now protected as part of the Pinelands district. Thus this route is now rejected since it is contrary to state development policy.

Notes

H-x: Project identification number, figure 10

Category III (continued)

H-148 Route 54F, Cumberland and Atlantic Counties:

The proposal to extend Route 54 as a freeway south into Vineland was viewed as serving travel between that city and Trenton. The proposal anticipated the dualization of Route 206 (see item H-12). Together, these improvements would have provided a continuous high level route. The freeway proposal is no longer contemplated. Service in this area appears to be adequately provided through local roads, especially county Route 655. Therefore, any future improvements should concentrate on upgrading the existing system.

H-149 Route 55F, Cumberland and Cape May Counties:

The southern extension of Route 55F was proposed to relieve Route 47. Past NJDOT investigations have determined that a freeway extension is not justified in this area and improvements to Route 47 have been recommended.

H-150 Route 60F, Salem, Cumberland, and Atlantic Counties:

This major east-west freeway would have connected Atlantic City and Vineland with the Delaware Memorial Bridge, providing an alternate to Route 40. The travel demand has not developed to justify a freeway. Attention will be paid to casino-generated travel and some lesser improvements in this corridor may be necessary prior to the year 2000.

H-151 Route 72F, Burlington County:

This route was proposed in both master plans to connect the proposed Route I-895 to Route 70/72. Since Route I-895 has been dedesignated and removed from the system, this freeway is superfluous.

H-152 Route 74F, Middlesex County:

This east-west corridor was proposed to support the expanding suburban development in eastern Middlesex County. It would have connected with Routes 9 and 34 and the proposed Route 35F. The freeway connector is no longer considered feasible because of environmental impacts, which would make the costs of such a facility prohibitive.

H-153 Route 90F, Burlington County (Rt. 73 to Rt. 73):

The 1968 and 1972 Master Plans called for the continuation of Route 90F from Route 130 to Church Road in Mount Laurel Township. While the section connecting the Betsy Ross Bridge to Route 73 is included in the Short-Range Plan, the degree of development along the Route 73 Corridor severely constrains the development of the remaining portion of this freeway; hence ways of increasing the capacity of Route 73 through TSM measures or other minor construction must be explored.

Notes

H-x: Project identification number, figure 10

Category III (continued)

H-154 Route 178F, Morris County:

This proposed route would have connected Route 24F (west of Route I-287) with Route I-80. The decision not to extend Route 24F to this point alters the terminus and diminishes the need for Route 178F. However, the congestion and physical characteristics of Route 53 may require some type of facility in this corridor.

H-155 Route 206F, Atlantic County (Hammonton Bypass):

This route was proposed to relieve congestion through the town of Hammonton. The freeway design would require a full dualization of Route 206 north, a proposal that is now inconsistent with plans for preservation of the Pinelands. Therefore, the Route 206F is now being dropped, however, lesser improvements in the area may be warranted.

H-156 Route 208F, Passaic County:

Earlier proposals for a freeway through this region are inconsistent with the preservation of the Skylands area of Passaic County. Further, the location of Route I-287 in the Route 208 corridor will provide improved access for the municipalities in this area. Therefore, the Route 208F has been dropped from all plans.

H-157 Route 322F, Gloucester and Camden Counties:

Route 322F, called for in the 1968 and 1972 plans is inconsistent with the State's growth policies. Traffic and roadway conditions in this corridor will be monitored as Atlantic City travel demands increase. This will identify needed TSM improvements.

H-158 Route 440F, Hudson County:

This proposed freeway had significant environmental impacts and would require substantial relocations. Parallel to Route 169, the road was contemplated as serving traffic from Staten Island. Today the service to be provided by Route 169 is considered adequate and Route 440F has been dropped.

H-159 Alfred E. Driscoll Expressway, Ocean, Monmouth and Middlesex Counties:

Originally proposed as Route 821F in the 1968 plan, this freeway was modified and identified as the Alfred E. Driscoll Expressway in the 1972 plan. As a result of studies prepared by the New Jersey Turnpike Authority, this proposal has been dropped as unnecessary and infeasible.

Notes

H-x: Project identification number, figure 10

Category III (continued)

Proposed Dualizations

H-160 Route 9, Burlington and Ocean Counties:

The use of the Garden State Parkway by through traffic and trucks eliminates the need for this dualization from New Gretna, north, to Toms River. Some lesser improvements to facilitate local travel may be necessary.

H-161 Route 29, Mercer and Hunterdon Counties:

The 1972 Master Plan called for the dualization of Route 29 between I-95 and Lambertville. Although, some improvements in this corridor may be necessary, environmental and physical constraints would make this project unfeasible.

H-162 Route 30, Atlantic and Camden Counties:

The dualization of this four lane roadway may become necessary in the future for safety reasons. However, until a way is found to properly circulate traffic in Atlantic County there are no plans to significantly increase the capacity of Route 30.

H-163 Route 31, Mercer and Hunterdon Counties:

Dualization of this section between Pennington and Flemington is contrary to desirable growth patterns reflected in the State Development Guide Plan. The project is recommended for deletion. Lesser, alignment related, spot improvements may be necessary.

*H-164 Route 31, Hunterdon and Warren Counties:

Dualization was proposed for the entire section of this route from Route 202 north to Route 46. A current feasibility study has found that the section north of Route I-78 is not justified. Lesser, alignment related, spot improvements may be necessary. The remainder of that route continues under development.

**H-165 Route 35, Monmouth County:

Four sections of this roadway were proposed for dualization in the 1972 Master Plan. These improvements were considered necessary to serve the local and regional traffic. Due to the developed character of this area, it will be necessary to make a lesser improvement. This corridor will be reviewed for both interim and long term improvements.

Notes

* Listed in the capital improvement section of the Short-Range Plan

** Listed as additional unmet needs in the Short-Range Plan

H-x: Project identification number, figure 10

Category III (continued)

H-166 Route 36, Monmouth County:

The dualization of this roadway between Long Branch and Highland Beach would involve extensive construction along the coast. This would not be consistent with coastal area policies implicit in past CAFRA determinations. Therefore this route will be reviewed for lesser type improvements.

H-167 Route 45, Gloucester and Salem Counties:

The 1968 plan called for the widening of this highway and the 1972 plan called for its dualization south of the NJ Turnpike to Route 49. Although anticipated demand no longer warrants a dualization, certain TSM improvements may be necessary.

H-168 Route 46, Morris County:

The 1972 Master Plan called for the dualization of Route 46 from Route 10 in Ledgewood to Route I-80 in Denville. The completion of Route 80 diverted traffic from Route 46. Therefore, the dualization is not considered necessary.

H-169 Route 49, Salem and Cumberland Counties:

Growth experienced in this area does not necessitate the full dualization of this route. A lesser level of improvement, however, must be examined. Some cross-section improvements have already been made to Route 49 between Bridgeton and Millville which will probably typify future improvements.

H-170 Route 51, Camden County:

The Camden Industrial Highway was to have been a dualized land service route on new location. The development of Route I-676 and recent plans for the Camden Gateway have eliminated the need for this route.

H-171 Route 54, Atlantic County:

This dualization was tied to development of the Route 54 freeway. As with the freeway, traffic demands do not warrant such an improvement.

H-172 Route 57, Warren County:

Although recommended in the 1972 Master Plan, recent growth trends indicate lesser type improvements will serve this corridor.

Notes

H-x: Project identification number, figure 10

Category III (continued)

H-173 Route 68, Burlington County:

The dualization of this highway in the Fort Dix/Wrightstown area is not warranted based upon current traffic expectations. Should there be significant changes in the character of the military installations, this proposal would be reviewed.

H-174 Route 72, Burlington and Ocean Counties:

Dualization of this route through the Pinelands is not justified in the light of current policies to protect that area. However, improvements of a reduced scale should be studied.

H-175 Route 77, Camden and Salem Counties:

This project was proposed in anticipation of development in Salem County. Although anticipated demand no longer warrants a dualization, certain TSM improvements may be necessary.

**H-176 Route 206, Somerset and Morris Counties:

The 1968 and 1972 Master Plans called for the dualization of Route 206 generally from Route 202 to Route 46. This highway passes through an area where the State Development Guide Plan discourages dramatic development. The 1981 Short-Range Plan does recommend, however, a 12.2 mile safety project from the Somerset County Line north to Route I-80 which includes repaving the highway and upgrading the shoulders.

H-177 Route 322, Atlantic County:

The need for the dualization of Route 322 between Route 50F and Route 50 as recommended in the 1972 plan is not justified due to the abandonment of the Route 50F proposal.

H-178 Burlington-Camden Expressway:

This dualized route on new alignment has been dropped from further consideration due to strong local opposition. Other improvements in the area are yet to be determined.

Notes

** Listed as an additional unmet need in the Short-Range Plan

H-x: Project identification number, figure 10

Category III (continued)

Proposed Widening

H-179 Route 3, Bergen and Passaic Counties:

Physical limitations make it impractical to widen Route 3 between Route 46 and Route 21. However, because of the need to improve traffic flow on this facility, some lesser type improvements should be studied.

H-180 Route 9, Ocean County:

The widening of Route 9 in Toms River was tied into the proposed construction of the Alfred E. Driscoll Expressway. Since this facility will not be constructed, the widening of Route 9 between Routes 37 and 166 is no longer justified.

H-181 Route 22, Somerset and Union Counties:

The completion of Route I-78 in Union County is included in the Short-Range Plan. The proposed widening of Route 22 between Somerville and the Garden State Parkway should be deferred until the full impact of the completion of Route I-78 can be evaluated. In the interim, low cost safety improvements may be necessary to improve the riding characteristics of this roadway.

H-182 Route 35, Ocean County:

The widening of Route 35 from Mantoloking to Point Pleasant is not feasible because of the concentrated development which exists in this corridor.

H-183 Route 46, Morris, Essex and Passaic Counties:

Because of intense roadside development, the addition of lanes to Route 46 between Denville and the Garden State Parkway is not practical. However, lesser type TSM improvements should be examined for feasibility of implementation.

H-184 Route 88, Ocean County:

The widening of Route 88 between Route 9 and Route 35 in Point Pleasant is impractical due to excessive roadside development. This facility should be restudied to evaluate TSM type improvements.

Notes

H-x: Project identification number, figure 10

Category III (continued)

Interstate Substitutions

Federal regulations passed in 1976 and further modified by the surface Transportation Act of 1978 allowed the states to modify their Interstate systems by withdrawing unwanted Interstate mileage and substituting other transportation projects in their place. The following summarizes New Jersey's efforts in withdrawing interstate mileage.

H-185 Route I-95, Mercer and Somerset Counties

This project was intended to complete the missing segment of Interstate Route 95 between Interstate Routes 295 and 287. On January 19, 1981, FHWA and UMTA approved the withdrawal of the unbuilt portion of this route between Interstate Routes 695 and 287. The state is pursuing the withdrawal of the remaining section between Interstate Routes 295 and 695.

H-186 Route I-495, Hudson County

FHWA and UMTA approved the withdrawal of this route during September, 1979.

H-187 Route I-695, Somerset County

The state is currently pursuing the withdrawal of this proposed route from the Interstate System.

H-188 Route I-895, Burlington County

FHWA and UMTA approved the withdrawal of this proposed route on September 30, 1980.

Accessibility to the Delaware Water Gap National Recreation Area

There were several proposals included in the 1972 Master Plan that were developed to satisfy the anticipated need for access to the Delaware Water Gap National Recreation Area. At that time, park development plans anticipated 10.5 million visitors per year. This high degree of visitation was expected to severely overtax the existing highway system in Sussex and Warren Counties, thus leading to the extensive highway improvement program indicated in the 1972 Plan.

Notes

H-x: Project identification number, figure 10

Category III (continued)

Current plans for the Delaware Water Gap National Recreation Area call for significant reductions in the degree of development. Consequently, the entire access problem in this area should be restudied. However, because of the reduced scale of development, environmental concerns and finally funding considerations, the extensive highway expansion program identified in the 1972 Master Plan is being eliminated from further consideration. It is likely that highway access problems in this area will be addressed through selected widenings of the existing highway system and through TSM improvements.

The specific proposals that are in this category are:

****H-189** Route 15F, Sussex County:

Woodruff's Gap to Raise Corner

****H-190** Route 23F, Sussex County:

Stockholm to Port Jervis

****H-191** Route 23A F, Sussex County:

Proposed Route 206F to the proposed Route 23F

****H-192** Route 31F, Warren County:

Route 31 at Oxford to the proposed Foothills Freeway

****H-193** Route 94F, Sussex & Warren Counties:

Route I-80 to the New York State line

****H-194** Route 94A F, Sussex County:

Proposed Foothills Freeway to the proposed Route 94

****H-195** Route 206F, Sussex County:

Route 46 to the Pennsylvania State line

****H-196** Foothills Freeway, Sussex & Warren Counties:

Route I-80 to the New York State line

****H-197** Route 46, dualization, Warren County:

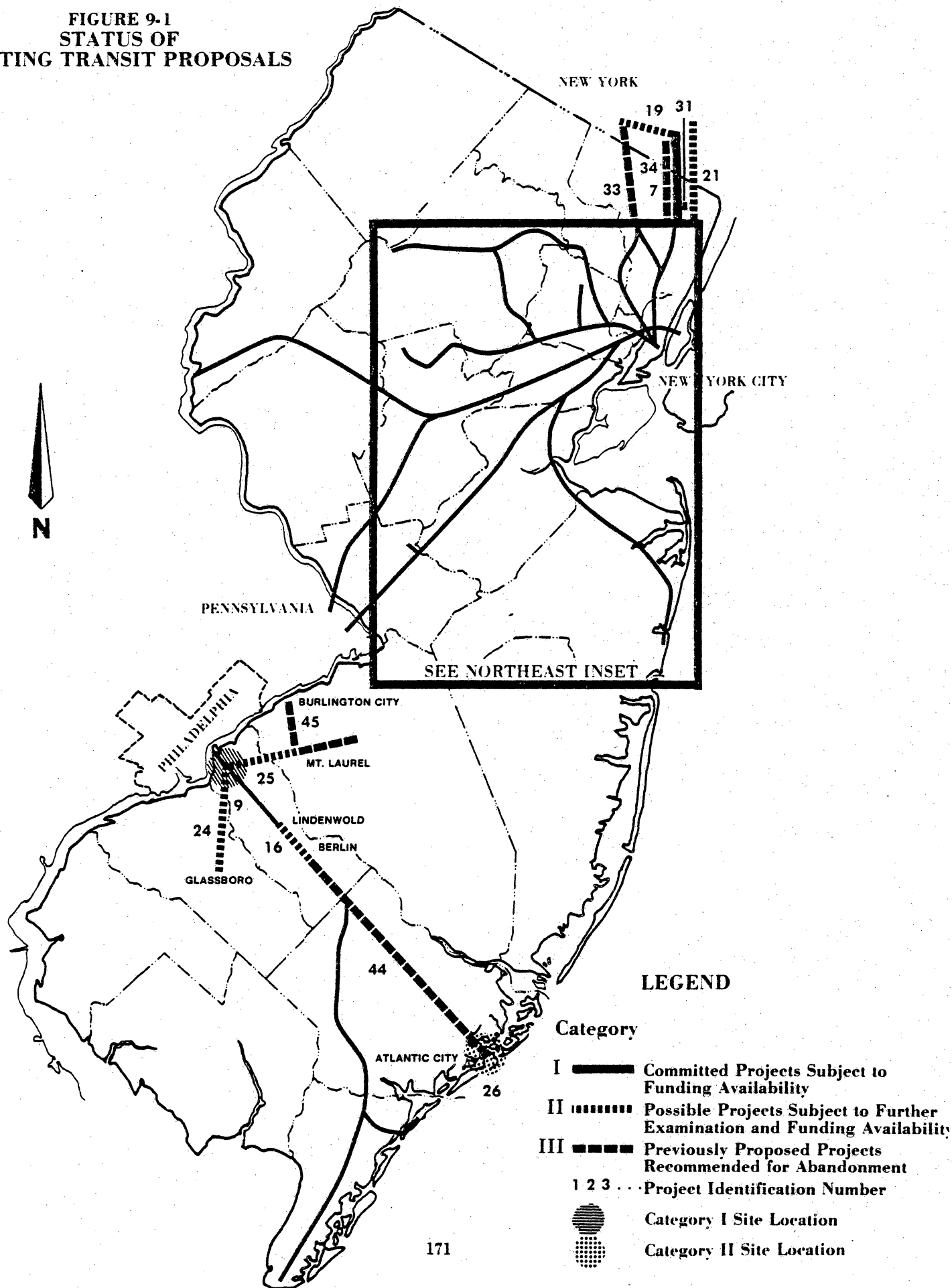
Route 31 to Route I-80

Notes

******Listed as additional unmet needs in the Short-Range Plan

H-x: Project identification number, figure 10

**FIGURE 9-1
STATUS OF
EXISTING TRANSIT PROPOSALS**



**FIGURE 9-2
STATUS OF EXISTING TRANSIT PROPOSALS**

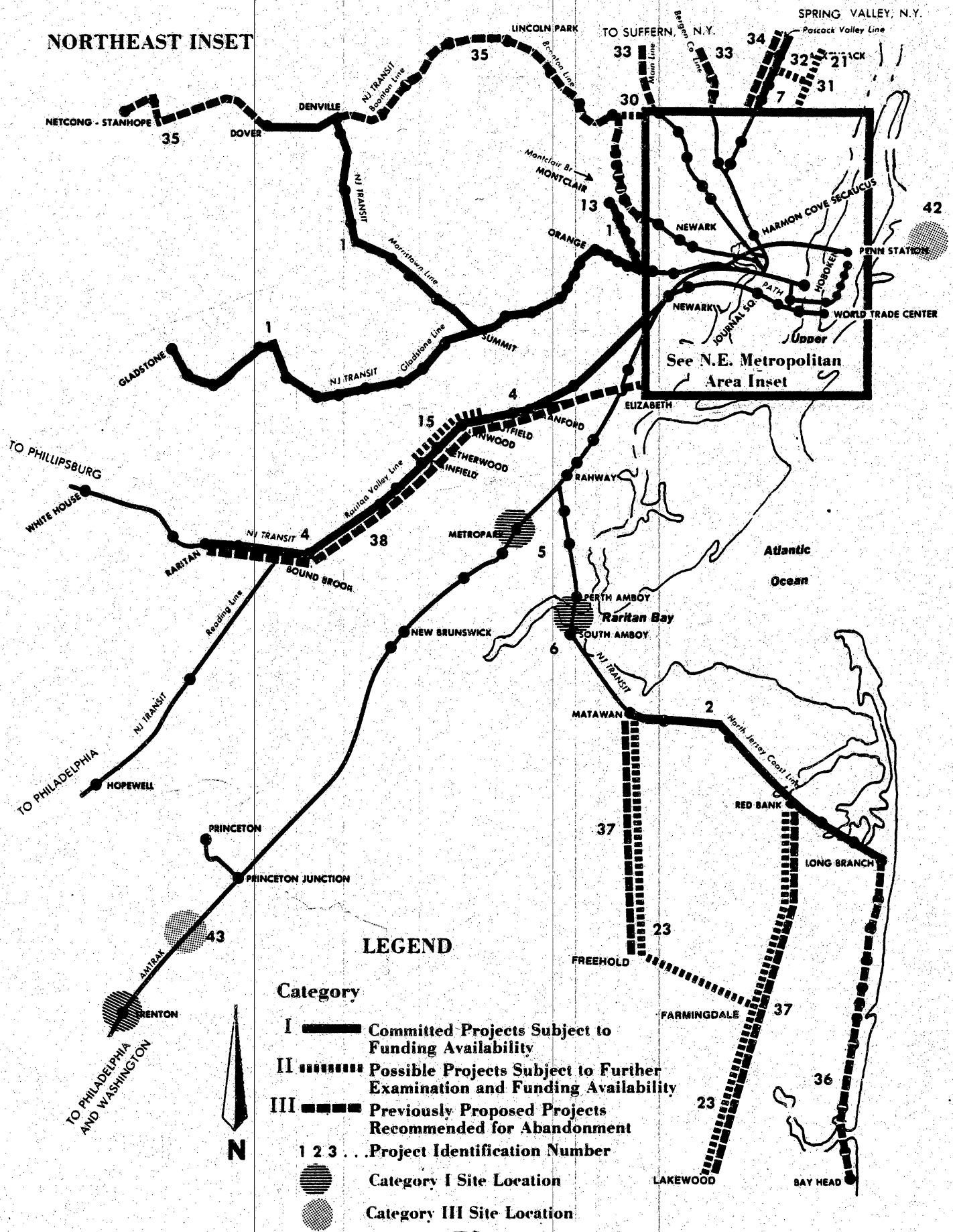
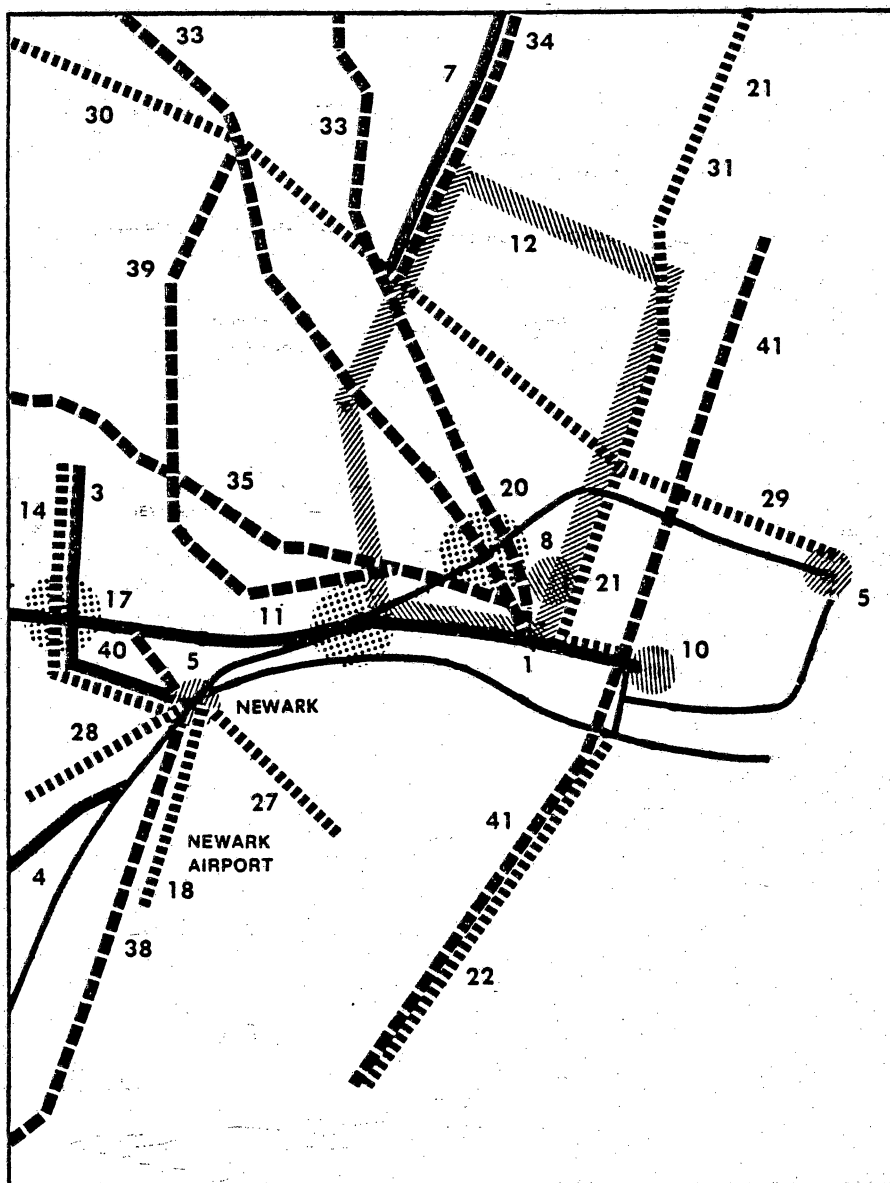


FIGURE 9-3
STATUS OF EXISTING TRANSIT PROPOSALS
NORTHEASTERN METROPOLITAN AREA INSET

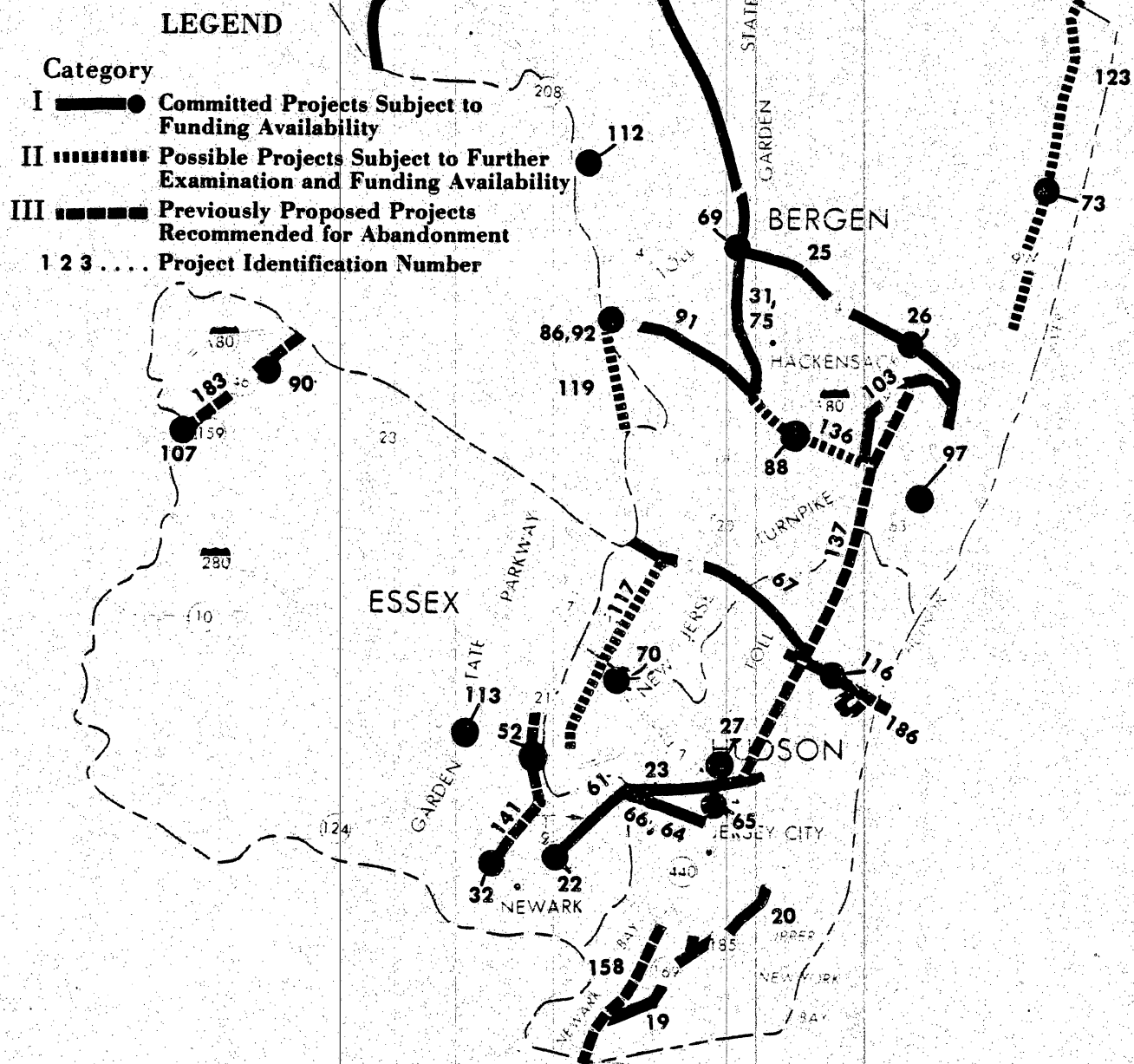


LEGEND

Category

- I**  Committed Projects Subject to Funding Availability
- II**  Possible Projects Subject to Further Examination and Funding Availability
- III**  Previously Proposed Projects Recommended for Abandonment
- 1 2 3 . . .** Project Identification Number
-  Category I Site Location
-  Category II Site Location

**FIGURE 10-1
STATUS OF
EXISTING HIGHWAY PROPOSALS
BERGEN, ESSEX AND HUDSON**



[illegible]

**FIGURE 10-3
STATUS OF
EXISTING HIGHWAY PROPOSALS
MIDDLESEX AND UNION COUNTIES**

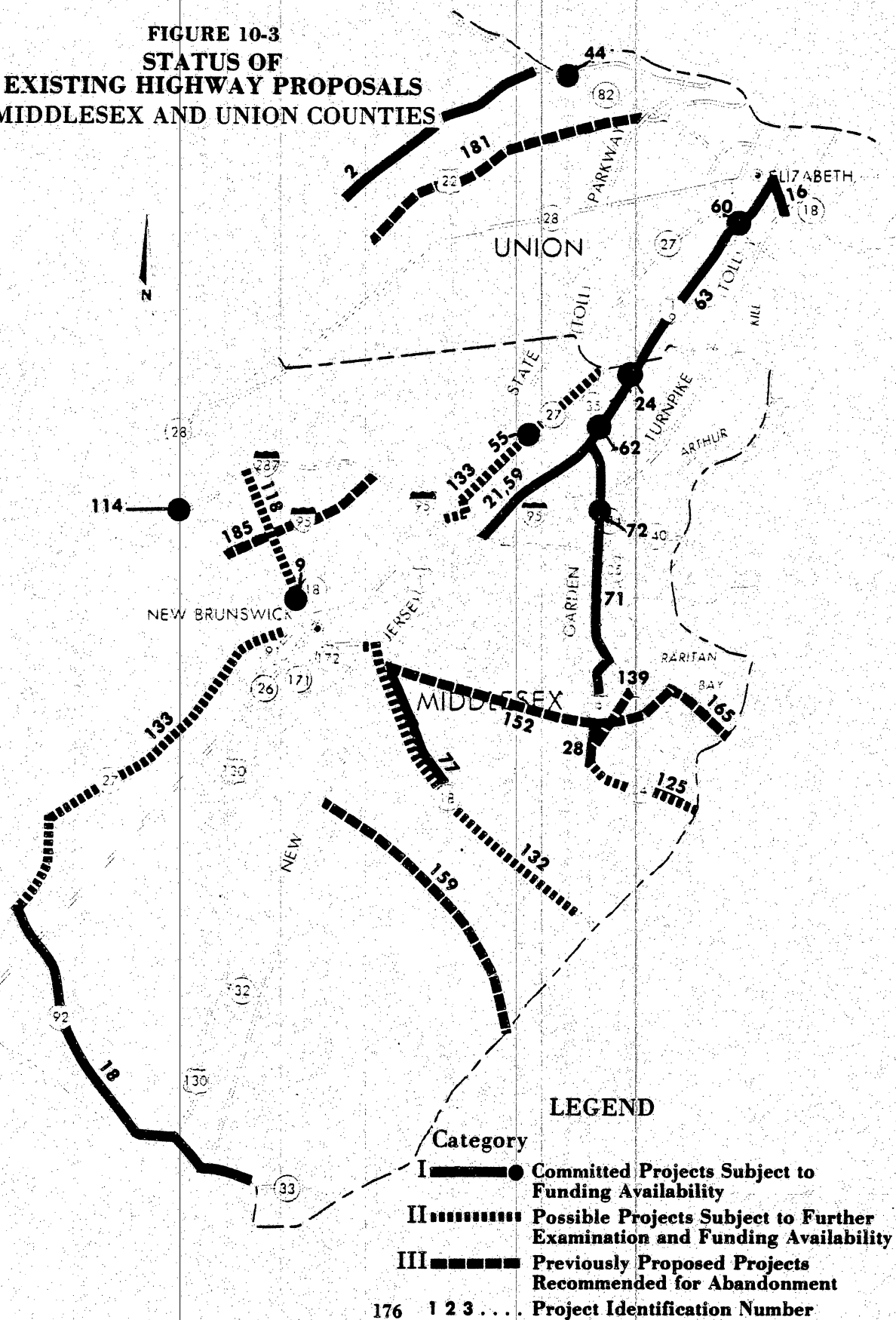
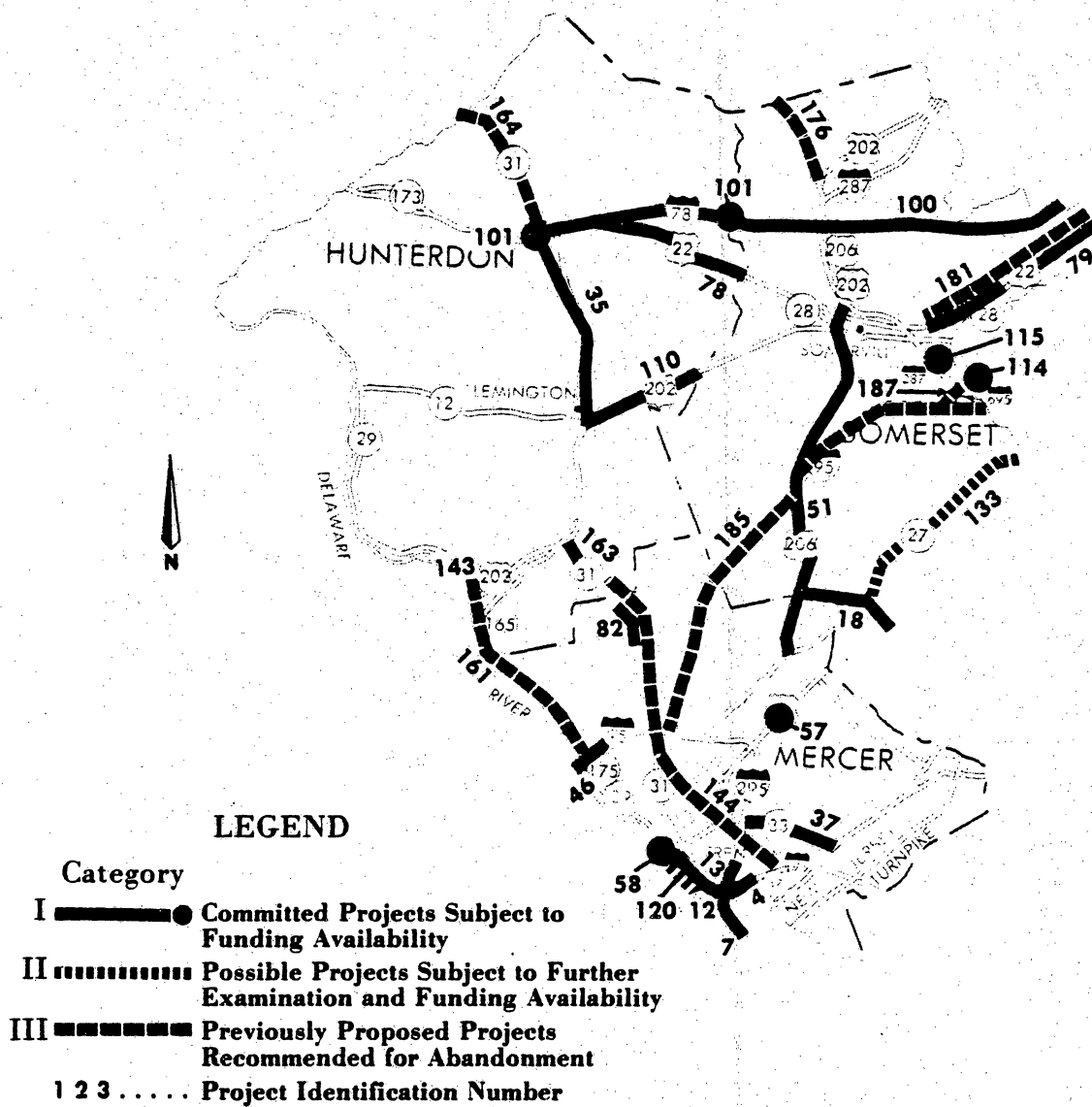


FIGURE 10-4 STATUS OF EXISTING HIGHWAY PROPOSALS HUNTERDON, MERCER AND SOMERSET



**FIGURE 10-5
STATUS OF
EXISTING HIGHWAY PROPOSALS
MONMOUTH AND OCEAN COUNTIES**

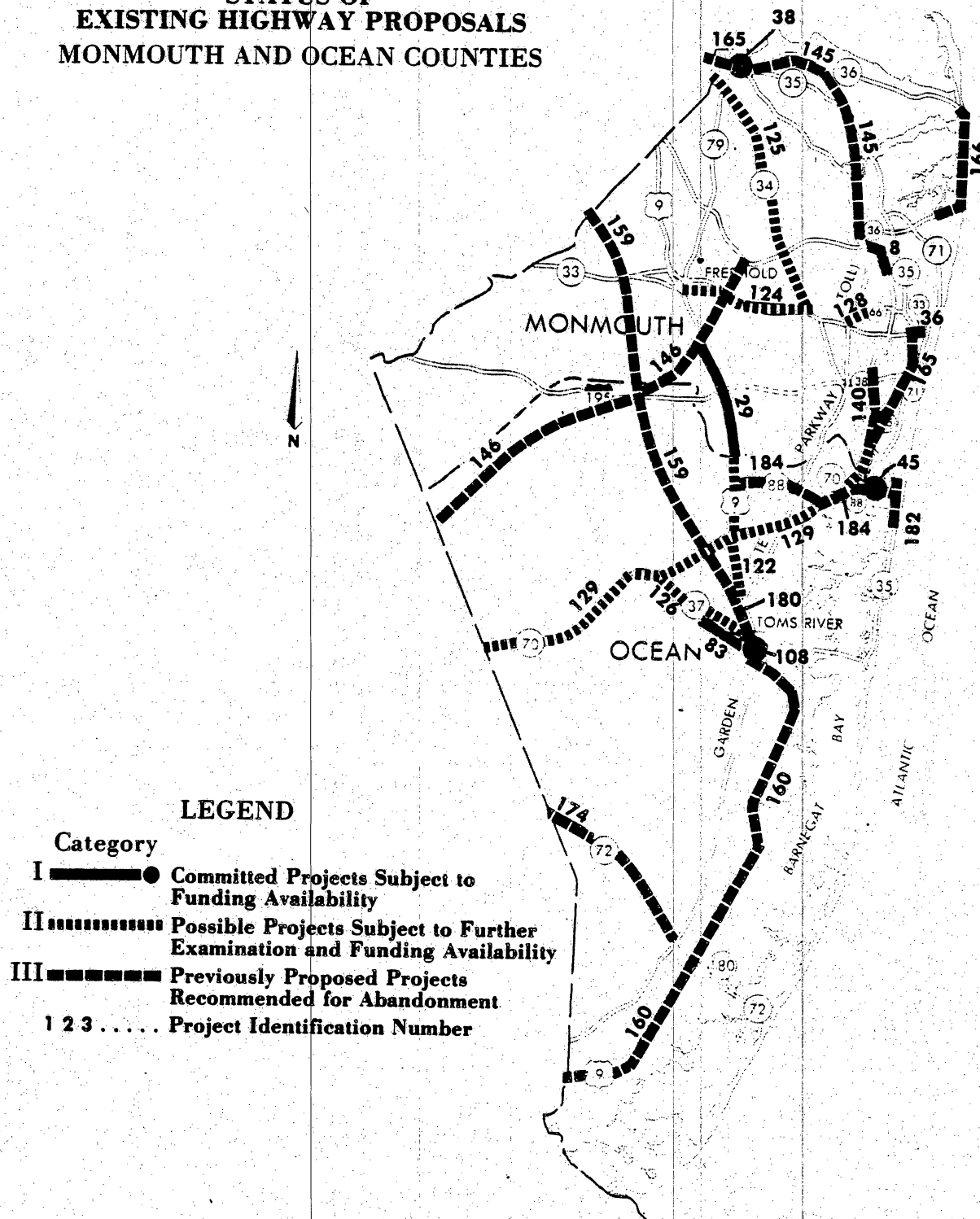
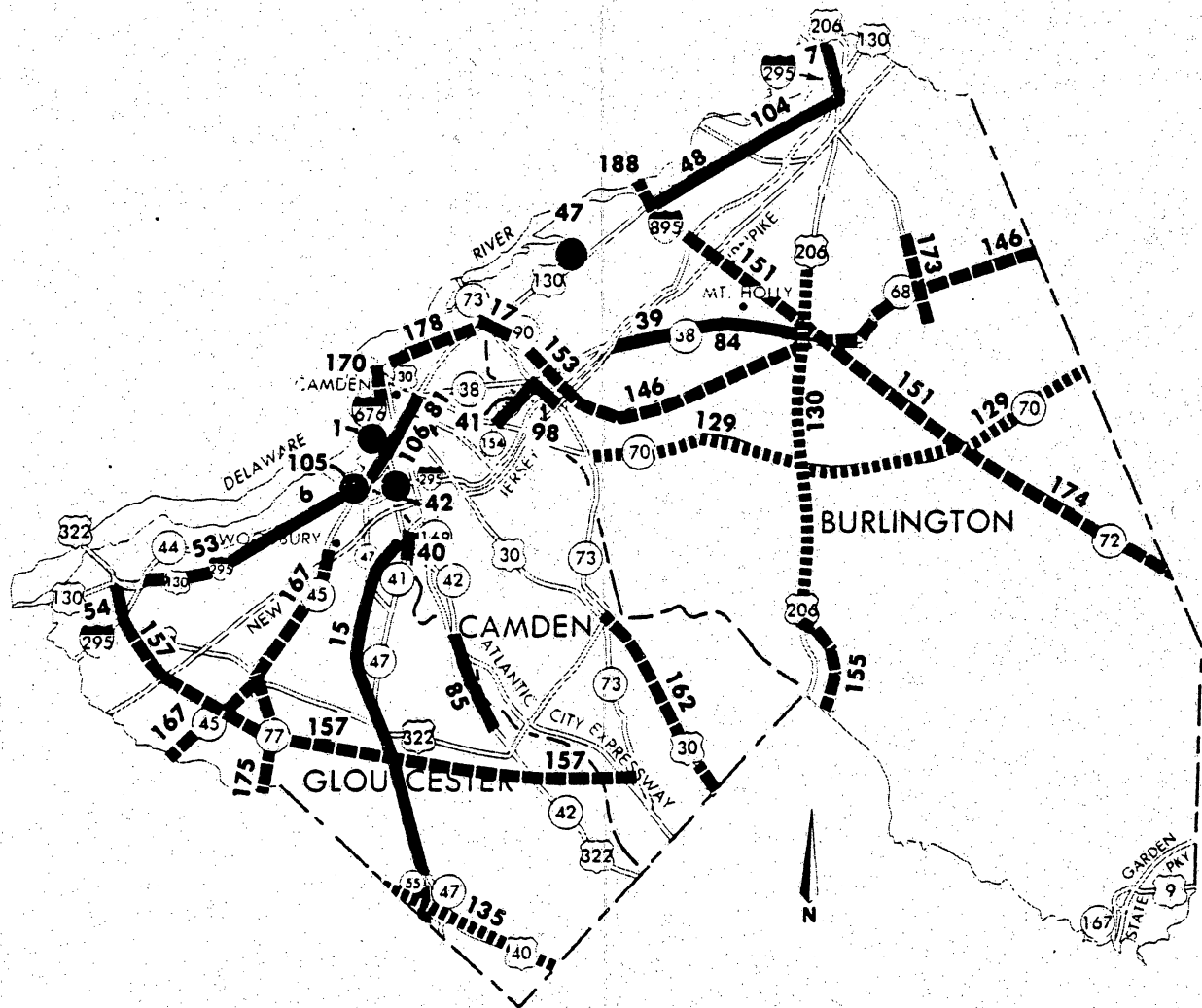


FIGURE 10-6
STATUS OF
EXISTING HIGHWAY PROPOSALS

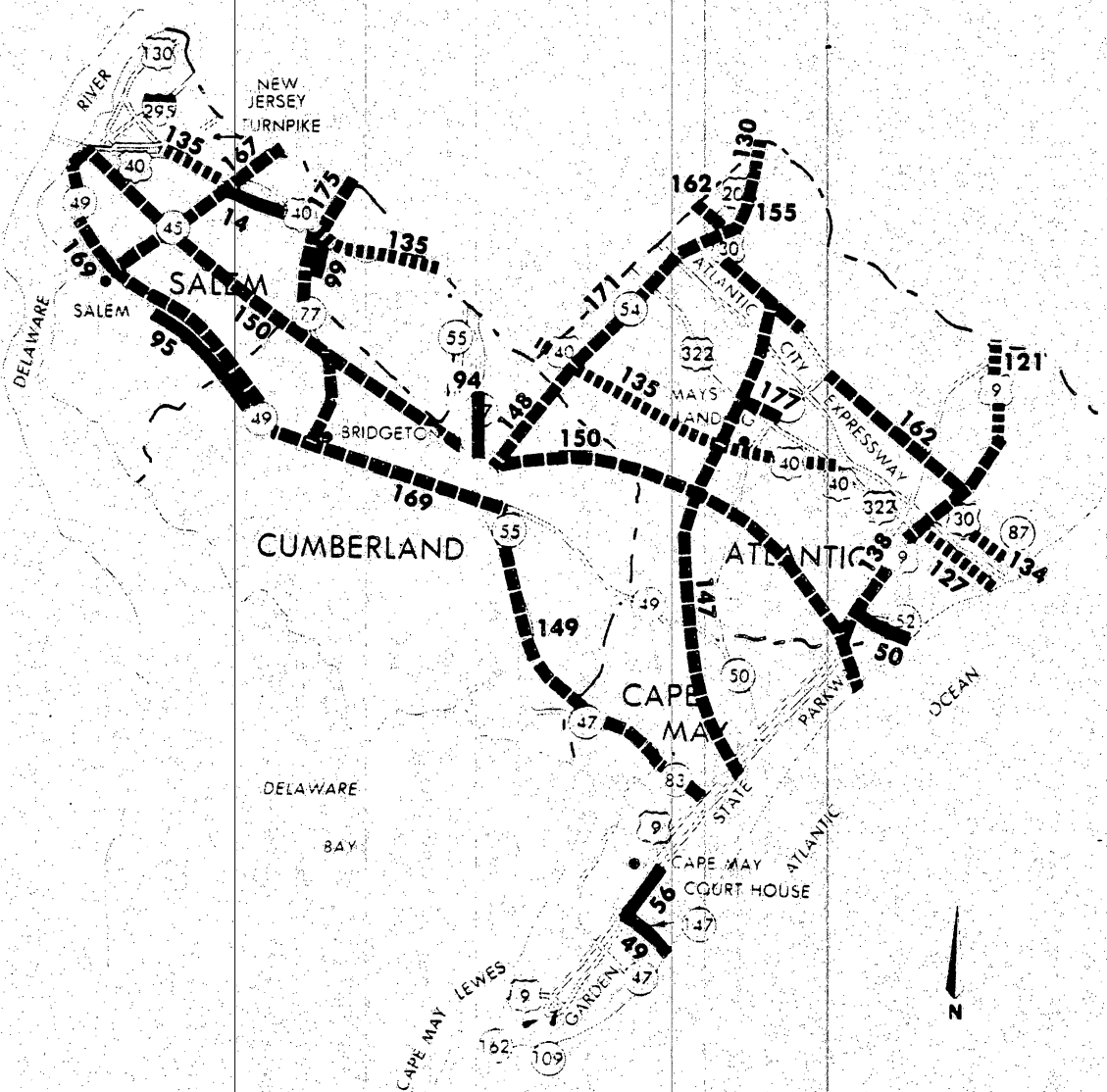
BURLINGTON, CAMDEN, AND GLOUCESTER COUNTIES



LEGEND

- | Category | |
|------------------------|--|
| I | Committed Projects Subject to Funding Availability |
| II | Possible Projects Subject to Further Examination and Funding Availability |
| III | Previously Proposed Projects Recommended for Abandonment |
| 1 2 3 | Project Identification Number |

**FIGURE 10-7
STATUS OF
EXISTING HIGHWAY PROPOSALS
ATLANTIC, CAPE MAY, CUMBERLAND AND SALEM COUNTIES**



LEGEND

- Category**
- I** **Committed Projects Subject to Funding Availability**
 - II** **Possible Projects Subject to Further Examination and Funding Availability**
 - III** **Previously Proposed Projects Recommended for Abandonment**
- 1 2 3 Project Identification Number**

F. APPENDIX

Transportation Inventory

New Jersey has an extensive and complex network of both highways and public transit systems. Its population density, industrial activity, recreation opportunities, and proximity to large metropolitan areas place great importance and demand on all of its transport modes. Consequently, the state of the state is closely related to the state of the transportation system.

Highways

The highway system in New Jersey grew to a reported total in 1979 of 33,136 miles. This network is divided into several general administrative groups: The state highway system, county roads, municipal streets, toll roads and bridges; state forest, park and institutional roads; and finally national park roads. Table 1 details New Jersey's total road and street system by jurisdictional responsibility as well as county distribution. Figure 1 shows those highway facilities under state jurisdiction.

Although extensive, New Jersey's highway and street system is relatively small when compared to other states. Table 2 provides a facilities density comparison between New Jersey and other selected states, as well as with the nationwide average. The indication is that New Jersey has significantly less miles per capita than is available to highway users in many other states and only one quarter of the nationwide average.

The intensity of use of New Jersey's system, however, is another matter. For the same comparisons, Table 3 indicates that the density of daily highway travel in the state is significantly higher than other states and approximately four times the nationwide average. In short, New Jersey has the most intensely utilized highway system in the nation. This, of course, is not to be unexpected in a state which is the most densely populated in the nation, has relatively low miles per capita, has approximately 93 percent of all person-trips occurring by the automobile and has the ninth-highest number of automobile registrations in the nation.

Passenger Rail

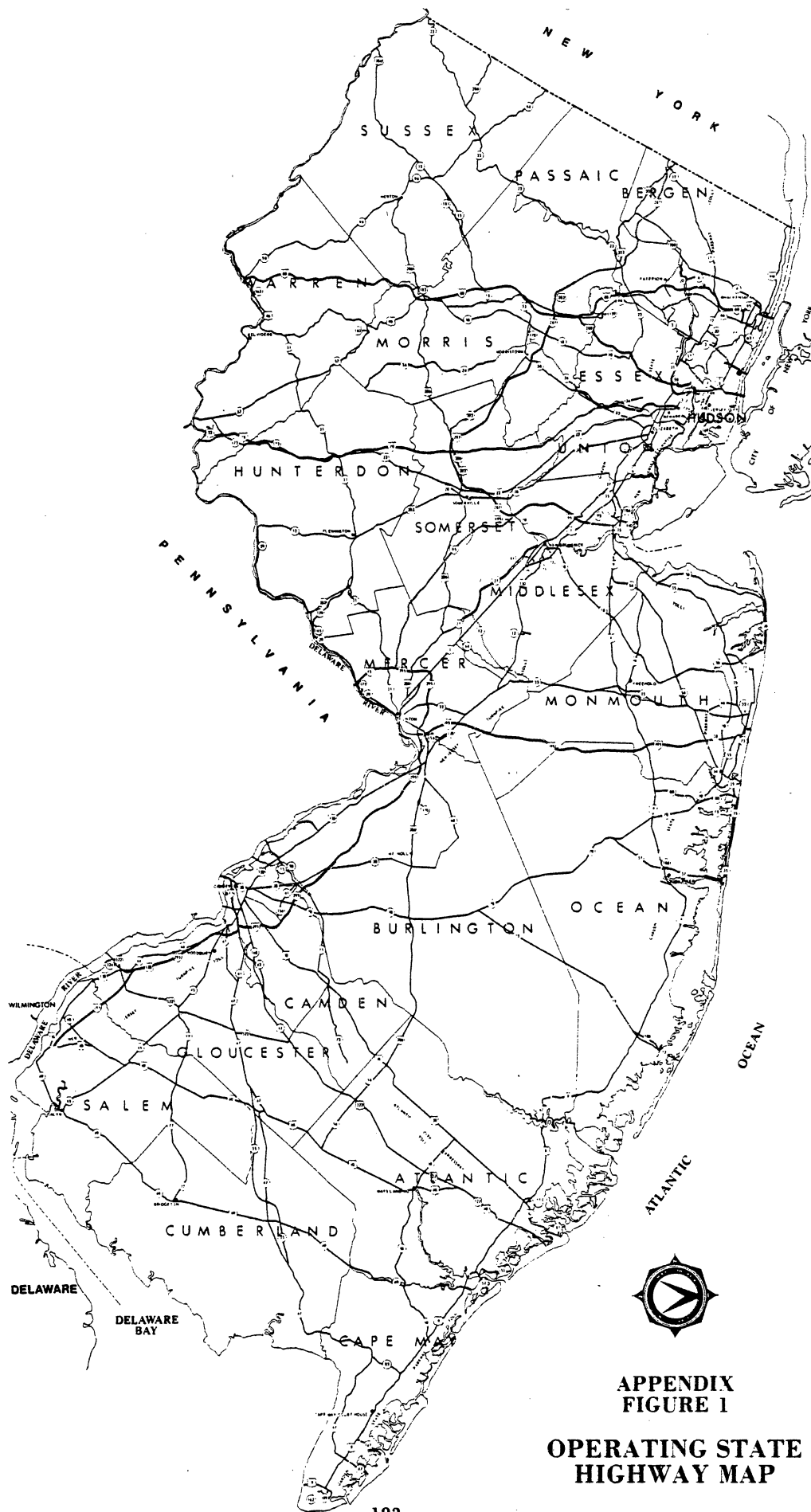
In contrast to the growth in highways, passenger rail service in New Jersey has shown a steady decline in both facilities and service.

**APPENDIX TABLE 1
NEW JERSEY HIGHWAY MILEAGE BY SYSTEM¹
JANUARY 1, 1981**

County	State Hwys. Legislated	State Hwys. Operating	County Roads	Municipal Roads	N.J. TPK	Garden State Pkwy.	AC Expwy.	Toll & Others	Total Operating Roads
Atlantic	226	146	368	1354	0	20	29	5	1922
Bergen	175	102	445	2232	2	14	0	19	2814
Burlington	222	153	499	1412	30	6	0	1	2101
Camden	130	100	375	1237	9	0	14	3	1738
Cape May	121	78	190	612	0	24	0	7	911
Cumberland	84	84	551	585	0	0	0	0	1220
Essex	115	59	225	1337	6	10	0	0	1637
Gloucester	174	132	401	744	17	0	1	2	1297
Hudson	70	28	120	437	14	0	0	4	603
Hunterdon	114	114	262	805	0	0	0	0	1181
Mercer	159	104	175	930	12	0	0	1	1222
Middlesex	205	136	312	1625	27	8	0	1	2109
Monmouth	260	190	350	2065	0	29	0	0	2634
Morris	202	148	308	1717	0	0	0	0	2173
Ocean	229	135	620	1565	0	36	0	0	2356
Passaic	66	47	234	936	0	7	0	2	1226
Salem	97	83	355	411	8	0	0	1	858
Somerset	111	111	233	957	0	0	0	0	1301
Sussex	118	111	301	850	0	0	0	1	1263
Union	102	65	181	1152	7	2	0	1	1408
Warren	103	103	253	602	0	0	0	3	961
TOTAL	3083	2229	6758	23565	132	156	44	51	32935
State Forest, Parks, Institutional Roads									490
National Parks									13
TOTAL									33438

¹In Center-Line Miles

SOURCE: NJDOT Transportation Planning & Research, Bureau of Data Resources



APPENDIX
FIGURE 1

OPERATING STATE
HIGHWAY MAP

**APPENDIX TABLE 2
COMPARISON OF HIGHWAY SYSTEMS
SELECTED STATES
1979**

State	Total Center Line Miles	Center Line Miles Per 1000 Residents
Florida	96,281	10.9
Illinois	134,243	12.0
NEW JERSEY	33,396	4.6
New York	109,277	6.2
Pennsylvania	117,480	10.0
South Carolina	62,086	21.2
United States	3,917,819	17.8

SOURCE: Highway Statistics 1979, FHWA Table M-1, Pg. 100

**APPENDIX TABLE 3
COMPARISON OF HIGHWAY TRAVEL DENSITY
SELECTED STATES
1979**

State	Center Line Miles	Total Daily Avg. Travel	Daily Travel Per Mile
Florida	96,281	204,523,287	2124
Illinois	134,243	177,877,671	1325
NEW JERSEY	33,396	138,073,972	4134
New York	109,277	213,178,082	1951
Pennsylvania	117,480	192,564,383	1639
South Carolina	62,086	65,956,164	1062
United States	3,917,819	4,189,405,479	1069

SOURCE: Highway Statistics, 1979 Tables VM-2, Pg. 319; M-1, Pg. 100

The extent to which passenger rail service has deteriorated in the state since its peak years is indicated in figure 2. In 1950, all but one of New Jersey's 21 counties had rail service on a system totalling approximately 1,100 route miles of track. The system has since been reduced to serve only 16 counties with a total of less than 500 route miles of track.

Currently, the system consists of 495.9 route miles of commuter rail service, carrying approximately 168,000 passengers per day and almost 33 route miles of rapid transit service which carries approximately 224,000 passengers per day.

Commuter Rail

Most commuter rail service in New Jersey is provided by NJ TRANSIT through contract with Conrail. Additional service is provided on the Northeast Corridor line by Amtrak. With the exception of the Northeast Corridor line which is owned by Amtrak, all passenger rail equipment and stations are owned by NJ TRANSIT.

Commuter rail service in New Jersey operates on fourteen lines which are shown on figure 3 and identified as follows:

Hoboken Division (This Division is comprised of the following former Erie Lackawanna (EL) Railroad Lines):

- Pascack Valley Line
- Bergen County Line
- Main Line
- Boonton Line
- Morristown Line
- Montclair Branch
- Gladstone Branch

Raritan Valley Line

North Jersey Coast Line

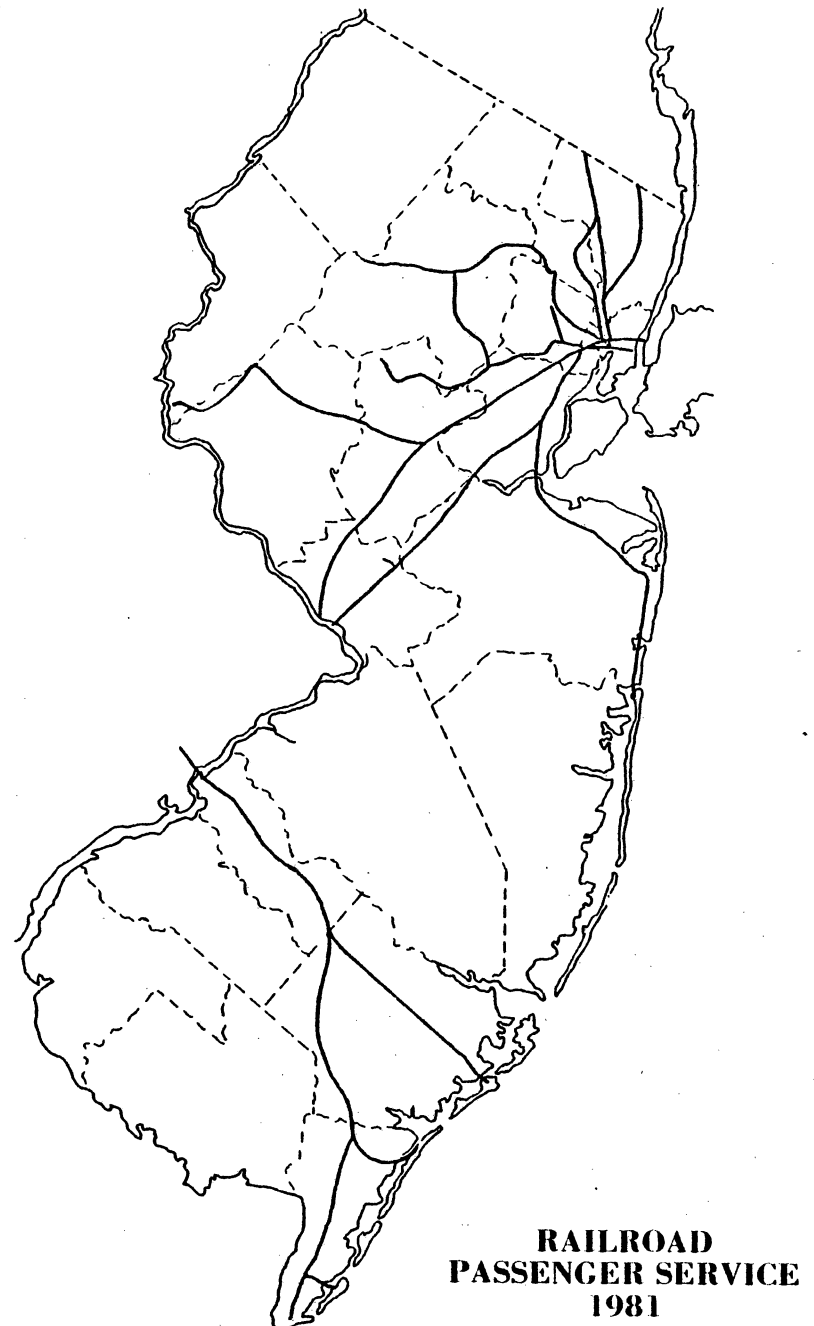
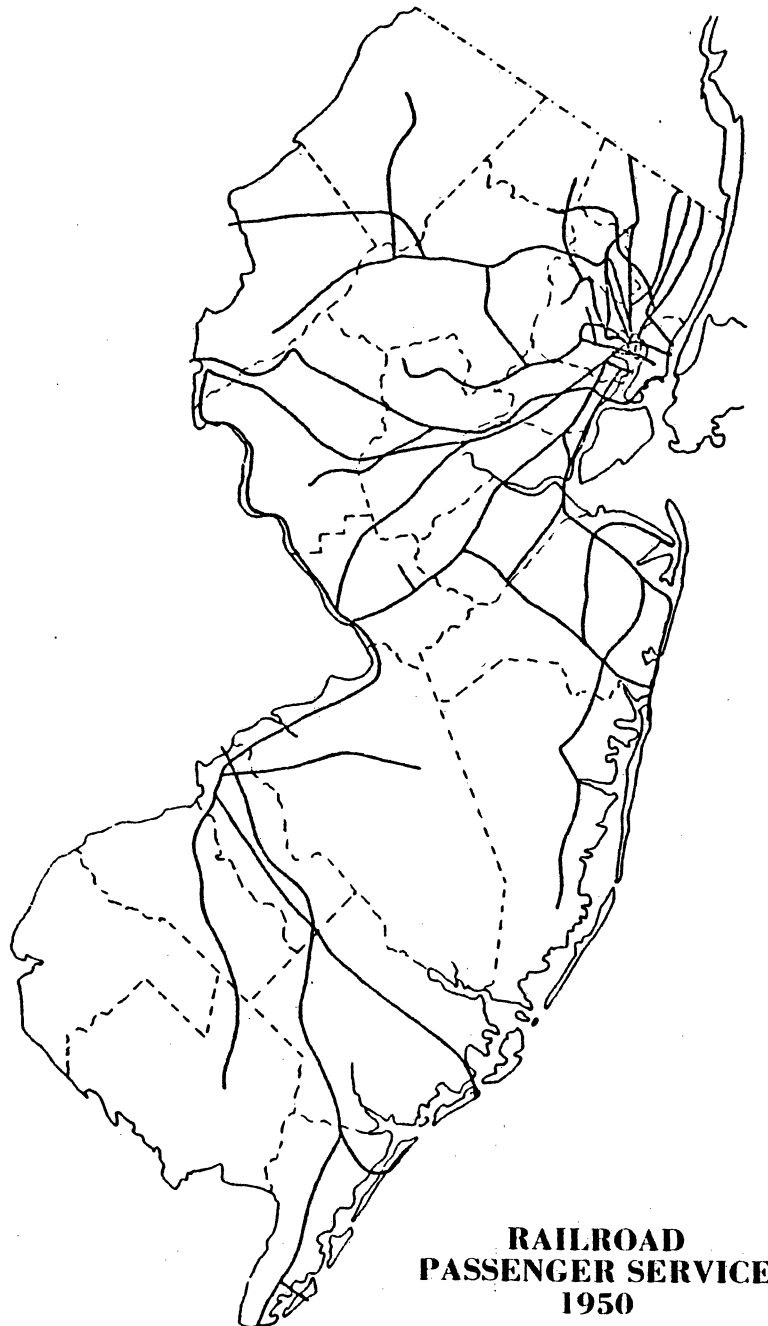
Northeast Corridor Line

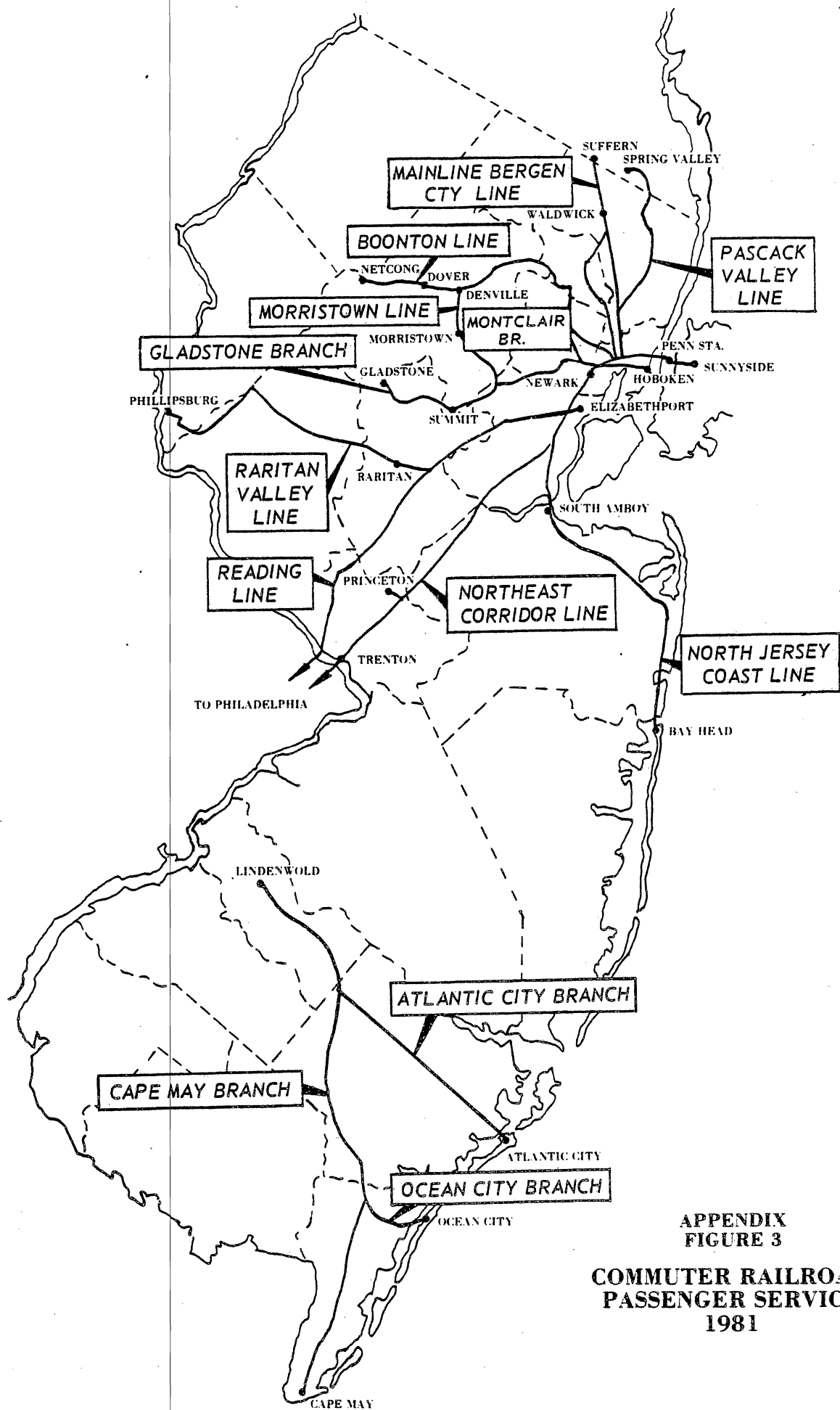
Seashore Line

- Atlantic City Line
- Ocean City Branch
- Cape May Branch

West Trenton Line

**APPENDIX
FIGURE 2**





APPENDIX
FIGURE 3

COMMUTER RAILROAD
PASSENGER SERVICE
1981

Until recently, the state's commuter rail system was generally characterized by outdated and worn out equipment, unreliable service, and until the recent energy crisis, declining ridership. This was the result of years of neglect by private owners of their rail assets. However, with the creation of NJ TRANSIT in 1979, this situation has begun to be reversed as the corporation is ambitiously improving equipment and service which will hopefully reverse the trend of decreasing ridership.

Rapid Transit

Rapid transit service in New Jersey is provided by three public agencies. This service exists in 3 of New Jersey's 21 counties and carries approximately 224,000 passengers per day.

The Port Authority Trans-Hudson System (PATH) is a rapid transit line which operates in the New York-New Jersey metropolitan area. The Philadelphia-Lindenwold line is a rapid transit line which operates in the Philadelphia-Camden metropolitan area. The Newark City Subway is a vital link in the transportation system serving the Newark metropolitan area. These systems are identified respectively in figures 4, 5, and 6.

In contrast to the commuter rail system, the state's rapid rail facilities generally provide modern, efficient, and reliable service. The major exception is the Newark City Subway system which has steadily deteriorated since the system began operations in the 1930's. However, NJ TRANSIT is actively pursuing a program which will see the modernization of this system.

Bus

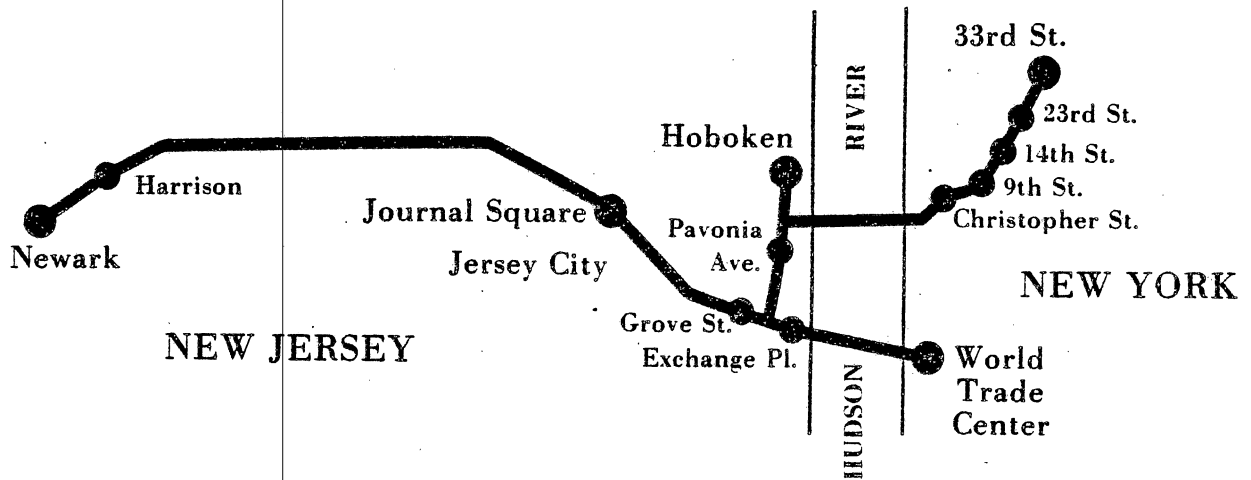
Like its commuter rail counterpart, bus transportation in New Jersey has declined significantly since its peak years. Current ridership is only one-third of that immediately after World War II.

The statewide bus network is comprised of over 200 companies which provide service on approximately 270 routes with a total of about 3,605 buses. Each day, over 670,000 trips are made by bus, and for many users it is the only available means of transportation. Recently, NJ TRANSIT acquired the two largest bus companies in the state, i.e., TNJ and its subsidiary, Maplewood Bus Company.

The major focus of New Jersey's bus improvement program is to reduce the statewide bus fleet age and to rationalize bus routes into a more effective and efficient system. Motor buses in New Jersey vary widely in age and type. Figure 7 summarizes the comparative age of the statewide bus fleet.

APPENDIX
FIGURE 4

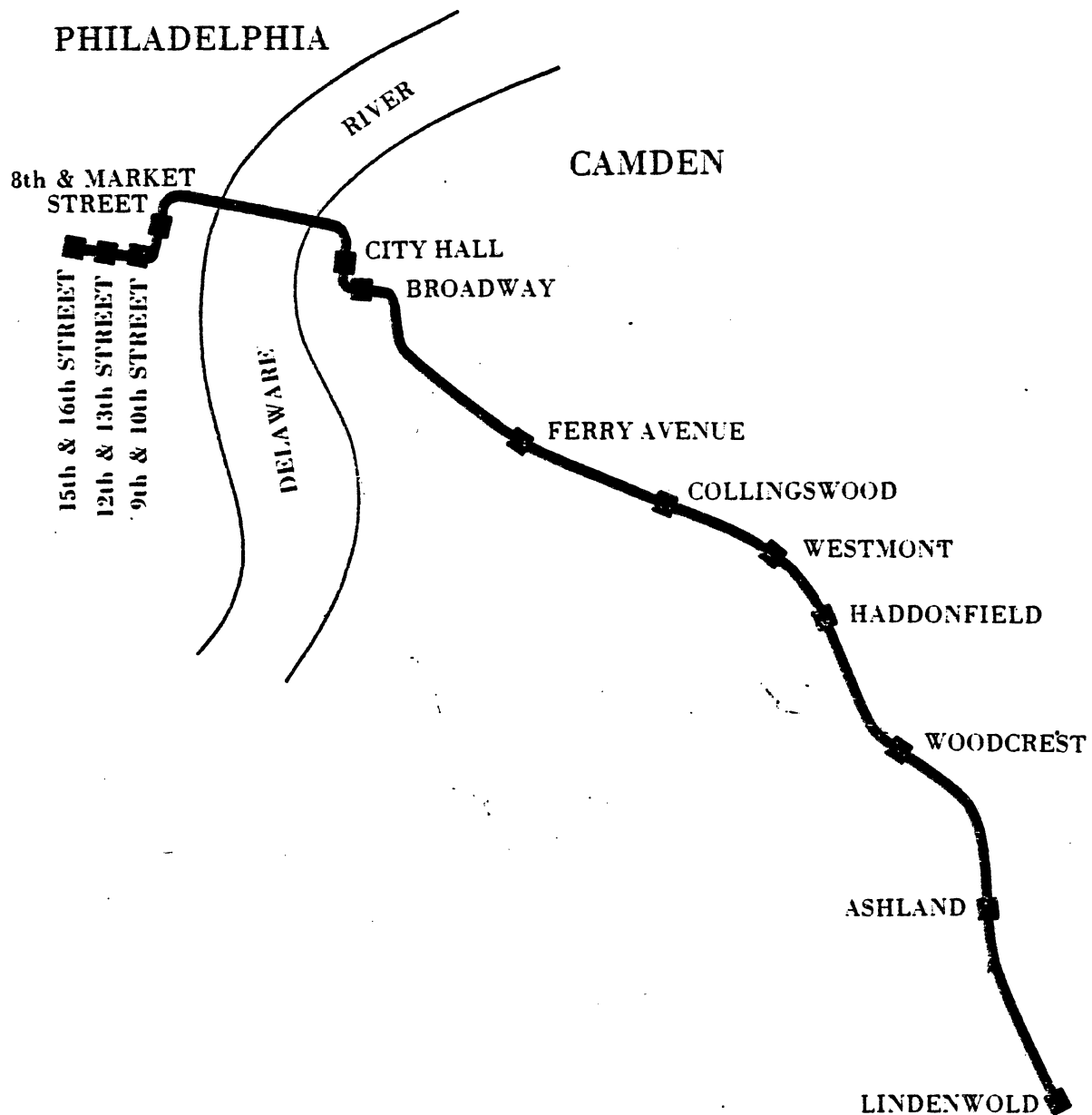
PORT AUTHORITY TRANS-HUDSON
An Interstate Rail Rapid Transit System



A service of The Port Authority of New York and New Jersey

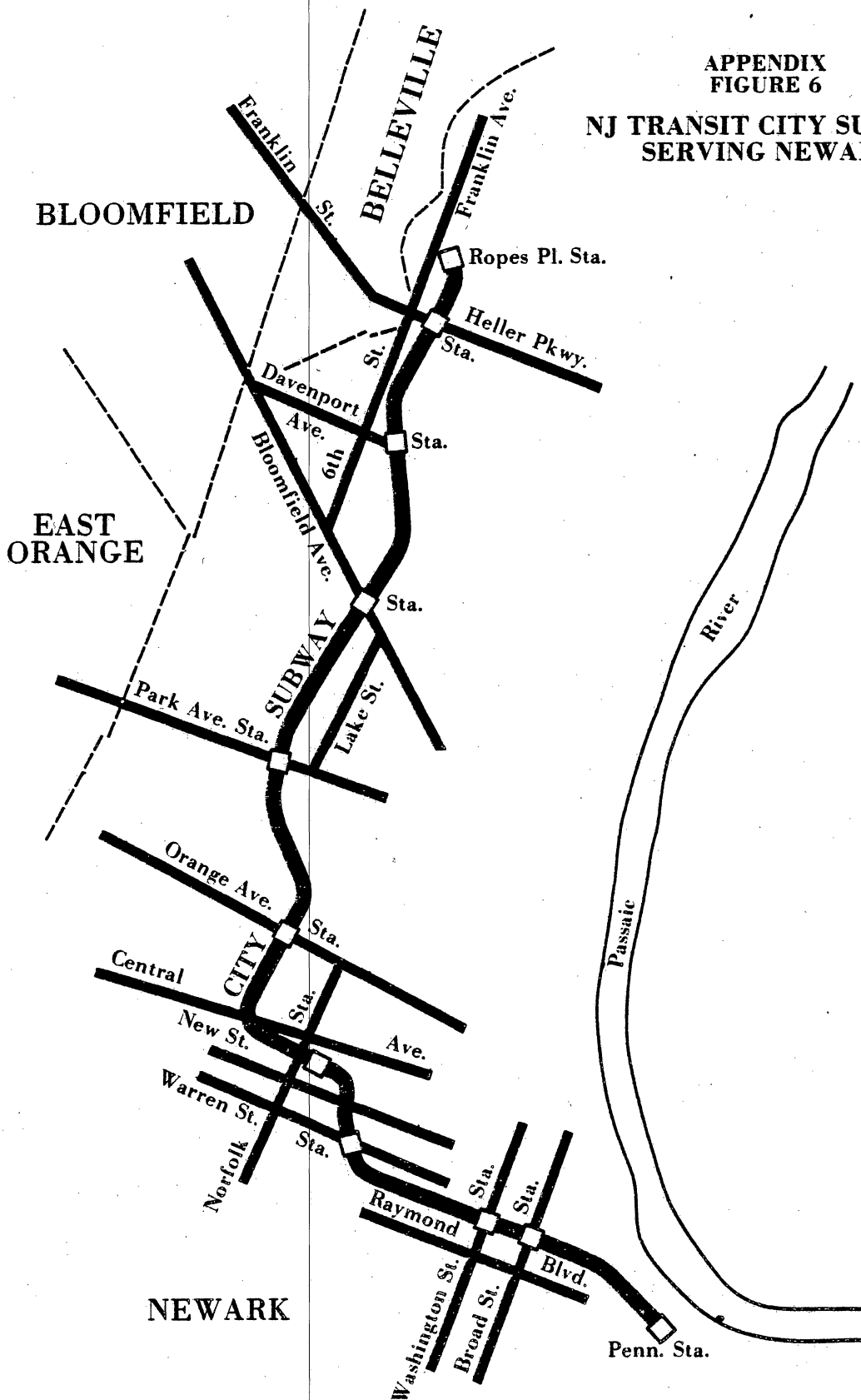
APPENDIX
FIGURE 5

PORT AUTHORITY TRANSIT CORPORATION
of Pennsylvania and New Jersey
An Interstate Rail Rapid Transit System



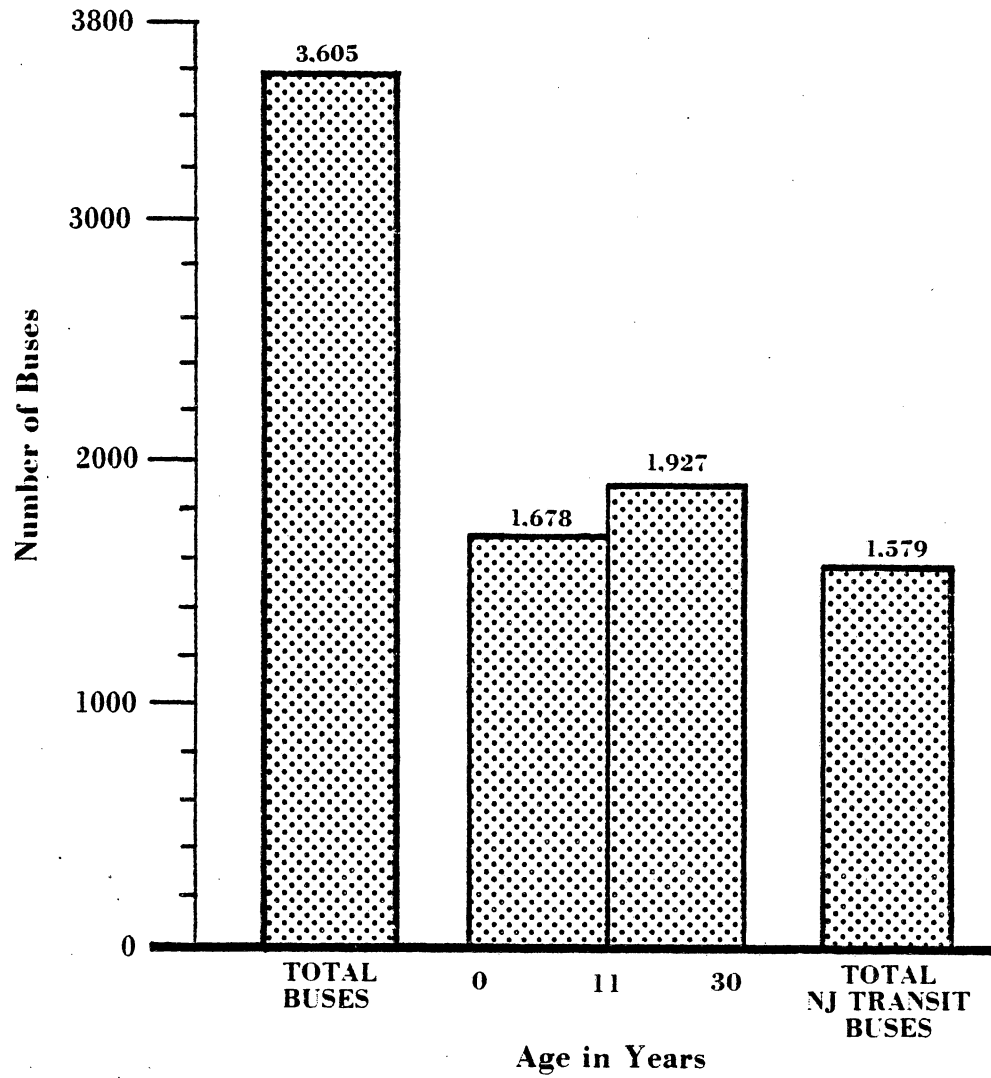
A service of the Delaware River Port Authority

APPENDIX
FIGURE 6
NJ TRANSIT CITY SUBWAY
SERVING NEWARK

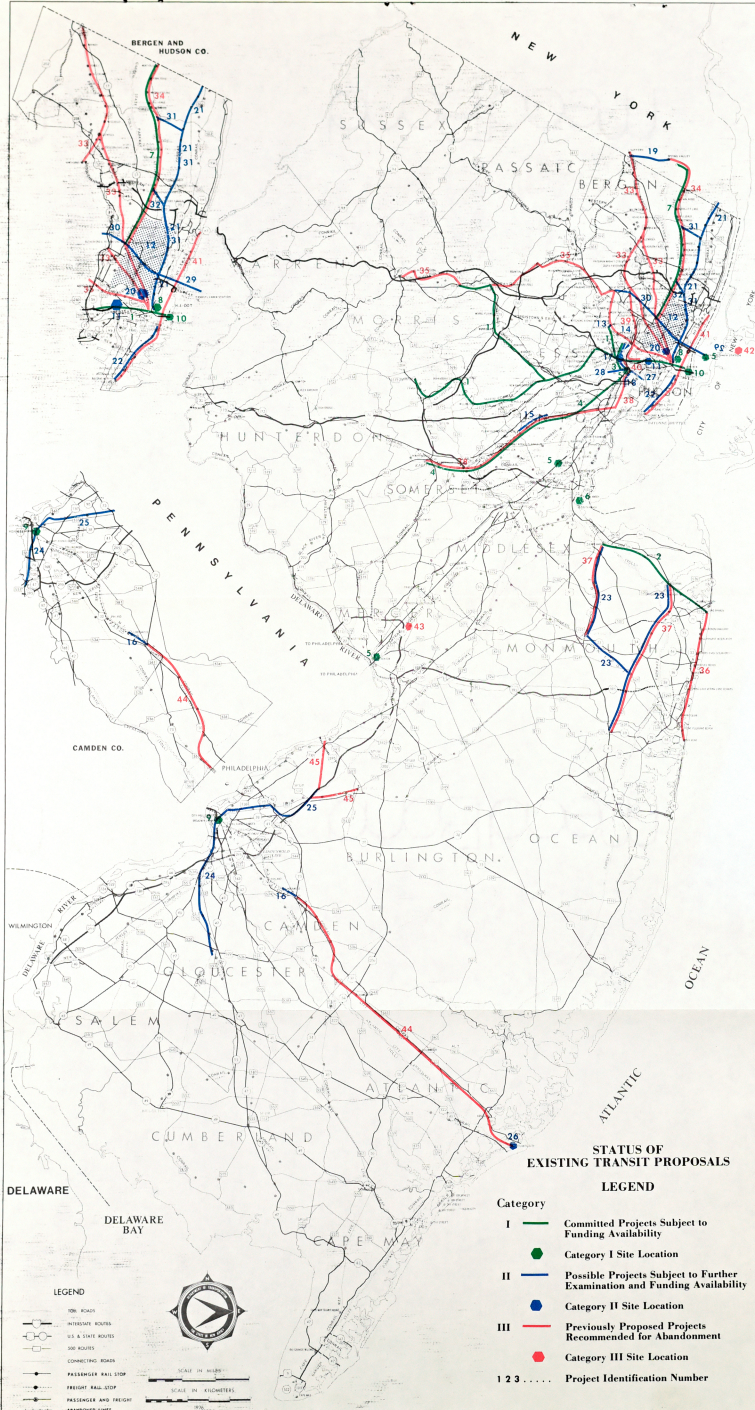


APPENDIX
FIGURE 7

REGULAR ROUTE BUS FLEET AGE DISTRIBUTION



SOURCE: NJ Transit Data Book Aug. 1981

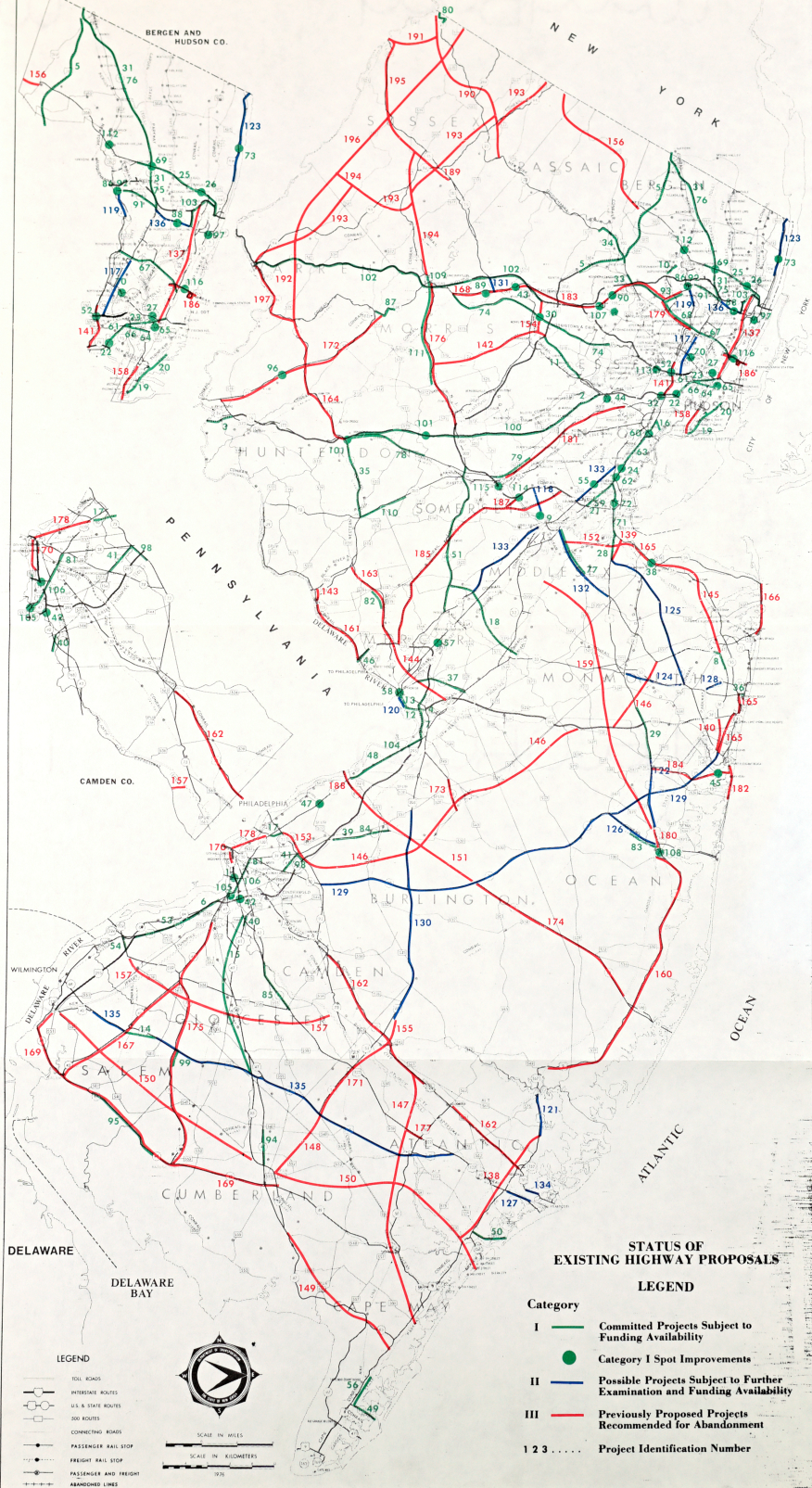


**STATUS OF
EXISTING TRANSIT PROPOSALS**

LEGEND

Category

- I** — Committed Projects Subject to Funding Availability
- Category I Site Location
- II** — Possible Projects Subject to Further Examination and Funding Availability
- Category II Site Location
- III** — Previously Proposed Projects Recommended for Abandonment
- Category III Site Location
- 1 2 3** Project Identification Number



STATUS OF
EXISTING HIGHWAY PROPOSALS

LEGEND

- Category
- I — Committed Projects Subject to Funding Availability
 - Category I Spot Improvements
 - II — Possible Projects Subject to Further Examination and Funding Availability
 - III — Previously Proposed Projects Recommended for Abandonment
- 1 2 3 Project Identification Number

LEGEND

- TOLL ROADS
- INTERSTATE ROUTES
- U.S. & STATE ROUTES
- DD ROUTES
- CONNECTING ROADS
- PASSENGER RAIL STOP
- PASSENGER RAIL STOP
- PASSENGER AND FREIGHT
- ABANDONED LINES



SCALE IN MILES

SCALE IN KILOMETERS

