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Infrastructure Needs Assessment, Vol. II: Transportation

January 1988

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State
Development
AND
Redevelopment
Plan

Introduction

This document has been prepared as supporting reference mfprlnS for the New Jersey State Development Redevelopment Plan. Blis ~~i^juil~~ focuses on the transportation system in New Jersey and is organized into four sections; historical background, demographics and transportation statistics, financial needs and conclusions. The first section, Historical Background, covers the development of the transportation system and major federal and state ~~prujidib~~ and regulations which have influenced the system. Major programs such as the Interstate Highway and the National Environmental Policy Act are Hienioco^ the second section, Demographics and Transportation Statistics, describes the population and employment growth patterns in the State from the 1940's. The relationship between the emerging Interstate Highway System and land use patterns is also detailed. Key transportation statistics including demand indicators and volume capacity ratios are presented. One third section, Financial Needs, presents the maintenance and improvement needs of the State and local highway network and NT Transit's public transportation system. The system's needs are presented as current need, the future needs are identified in the Technical Reference Document, "Infrastructure Needs Assessment", 5/8/87, prepared by Hammer, Siler and George Associates. Finally, the report concludes by detailing the influence of land development patterns in New Jersey on its transportation system.

Transportation

I. Historical Background

The transportation network and system that exists in New Jersey has evolved over time. Through the mid- nineteenth century turnpikes, canals and railroads were the major components of New Jersey's transportation system. Railroads and canals carried the greatest volumes of large, heavy and long distance movement. By the late nineteenth century travelers were demanding improved road conditions. In response to their demands, New Jersey, in 1891, was the first state to grant aid for the construction of public roads.

During the post World War I era the State Legislature directed the state highway commission to establish a "comprehensive scheme of roads to be known as the state highway system".² In 1917 fifteen routes identified in figure 1, were designated as the state highway system.

Figure 1. The State Highway System 1917

"ROUTE NO. 1 From Elizabeth to Trenton by way of Rahway, Metuchen, New Brunswick and Hightstown.

ROUTE NO. 2 From Trenton to Camden, by way of Bordentown, Fieldsboro, Roebling and Burlington.

ROUTE NO. 3 From Camden to Absecon, by way of Berlin and Hammonton.

ROUTE NO. 4 From a point on Route No. 1 in or near Rahway to Absecon, by way of Perth Amboy, Keyport, Middletown, Red Bank, Long Branch, Asbury Park, Point Pleasant, Lakewood, Toms River, Tuckerton and New Gretna.

ROUTE NO. 5 From Newark to the bridge crossing the Delaware River about ten miles above Delaware, by way of Morristown, Dover, Netcong, Budd's lake, Hackettstown, Buttsville and Delaware.

ROUTE NO. 6 From Camden to Bridgeton and Salem, by way of Woodbury, Mullica Hill, Woodstown and Pole Tavern.

ROCJEE NO. 7 From Hi^istown to Asbury Park, by way of freehold,
 Jerseyville and Hamilton.
 ROUTE NO. 8 From Montclair to State Lone a Unionville, by way of
 Singac, Wayne, Pompton Plains, Butler, N<=w Foundland, Stoddiolm,
 Franklin Furnace, and Sussex.
 ROUTE NO. 9 Fran Elizabeth to Phillipsburg, by way of ffestfield,
 Plainfield, Bound Brook, Somerville, White House, Clinton, West
 Portal and Bloomsbury.
 ROUTE NO. 10 From Paterson to Fort Ferry, by way of Dundee lake and
 Hackensack.
 ROUTE NO. 11 From Newark to Paterson, by way of Belleville,
 Bloomfield, Nutley and Passaic.
 RCUIE NO. 12 Paterson to Phillipsburg, by way of Little Falls, Fine
 Brook, Parsippany, Denville thence over Route No. 5 to Budd's lake,
 thence to Washington and Broadway
 ROUTE NO. 13 New Brunswick to Trenton, by way of Kingston, Princeton
 and Lawrenceville.
 RCCJEE NO. 14 Prom Egg Harbor City to Cape May City, fcy way of Mays
 landing, Tuckahoe and Cape May Court House.
 ROUTE NO. 14 From Egg Harbor City to Cape May City, by way of Mays
 landing, Tuckahoe and Cape May Court House.
 RCUTE NO. 15 From Bridgeton to Cape May Court House, or such other
 point on Route No. 14 as may be determined by the State Highway
 Commission."

Source: New Jersey State Highway Department, DeveloCTnent of the State
 Highway System.

During this period and until the post World War II era. Trass
 transportation was provided by private carriers, mostly railroads, with
 buses rrwing of age as technology developed. The land use pattern in New
 Jersey was a combination of contact cities and towns based on pedestrian
 mobility, with highly concentrated areas containing both housing and
 employment, and vast open areas where agriculture was prevalent. There
 was limited automobile availability, which combined with the compact
 development patterns, supported the patronage of private MBR
 transportation systems.

In 1916, the federal government first authorized the expenditure of funds for the improvement of rural highways on a matching basis. By 1921, the federal government required that each state designate a connected system of inter and intra state routes not exceeding 7% of the total rural mileage. The Federal- Aid Highway Act of 1921 required that federal funds be spent on this designated system. Furthermore, the responsibility for the maintenance of this system was placed in state hands. During the economic prosperity of the 1920's combined with available federal funds and increasing auto ownership, many roads were improved and new roads constructed in the state. In addition to the new improved roadways built during this period many Hudson and Delaware River crossings were also constructed. The following facilities which still serve significant travel were opened to traffic in the late 1920's and 1930's.

Delaware River Bridge (Ben Franklin) 1926

Holland Tunnel 1927 Outerbridge Crossing 1928

George Washington Bridge 1931 Lincoln Tunnel

1937

The four Hudson River Crossings are owned and operated by the Port Authority of New York and New Jersey. The Port Authority was created under a bi-state compact between New York and New Jersey in 1921 and

includes all or part of nitre comities in Northeastern New Jersey. The Port Authority is responsible to "operate any t-grm-inai or transportation facility within said district" and "to promote the commerce of the port".³

These river crossings have reinforced New Jersey's role as a vital link on a transportation, development corridor which in colonial times linked New York with Philadelphia, but is now recognized as the northeast corridor extending from Boston, Ifessachusetts to Washington DC along the Atlantic Coast. An example of the dramatic impact of the river bridges is evidenced by early Hudson River crossing statistics. In 1926 13,680,000 vehicles were ferried across the river, by 1932 the total vehicle crossings had more than doubled to 28,500,000.⁴

After a highway construction lull which surrounded World War U, the National System of Interstate and Defense Highways was designated in the Federal-Aid Highway Act of 1944. The interstate system was planned in the late 1930's. However, construction funding was not provided in earnest until 1956. During this period, 1944-1956, the New Jersey Legislature established the New Jersey Turnpike Authority and charged the Authority to construct a roadway which would carry North-South travel through the state. The New Jersey Turnpike opened to traffic in 1952, serving travel between the George Washington Bridge in Bergen County and the Delaware Memorial Bridge in Salem County. The New Jersey Highway Authority was

created in 1952 to complete the construction of what is now known as the Garden State Parkway, connecting Paramus in Bergen County to Cape May in Southern New Jersey. Map 1 depicts the state highway system that was in place and open to traffic by 1956.

From the post World War II highway interstate era through the present development in New Jersey has been occurring at low overall densities away from the urban centers. This new development came at the expense of the urban areas, as the cities have declined dramatically during this period. The new development and urban decline has had a negative impact on the public transportation system in the state. The new suburban areas do not have the density to support public transportation service and the ridership base in the cities is eroding. Public transportation systems decline has not been unique to New Jersey. In response to a national trend of public transportation decline the federal government established the Comprehensive, Cooperative and Continuing (3c) transportation planning process in the Federal-Aid Highway Act of 1962. The 3c process required the consideration of public transportation systems in transportation planning programs. The Highway Act was followed closely by the Urban Mass Transportation Act of 1964, which created the Urban Mass Transportation Administration and authorized the expenditure of over a billion dollars for the financing of public transportation capital programs.

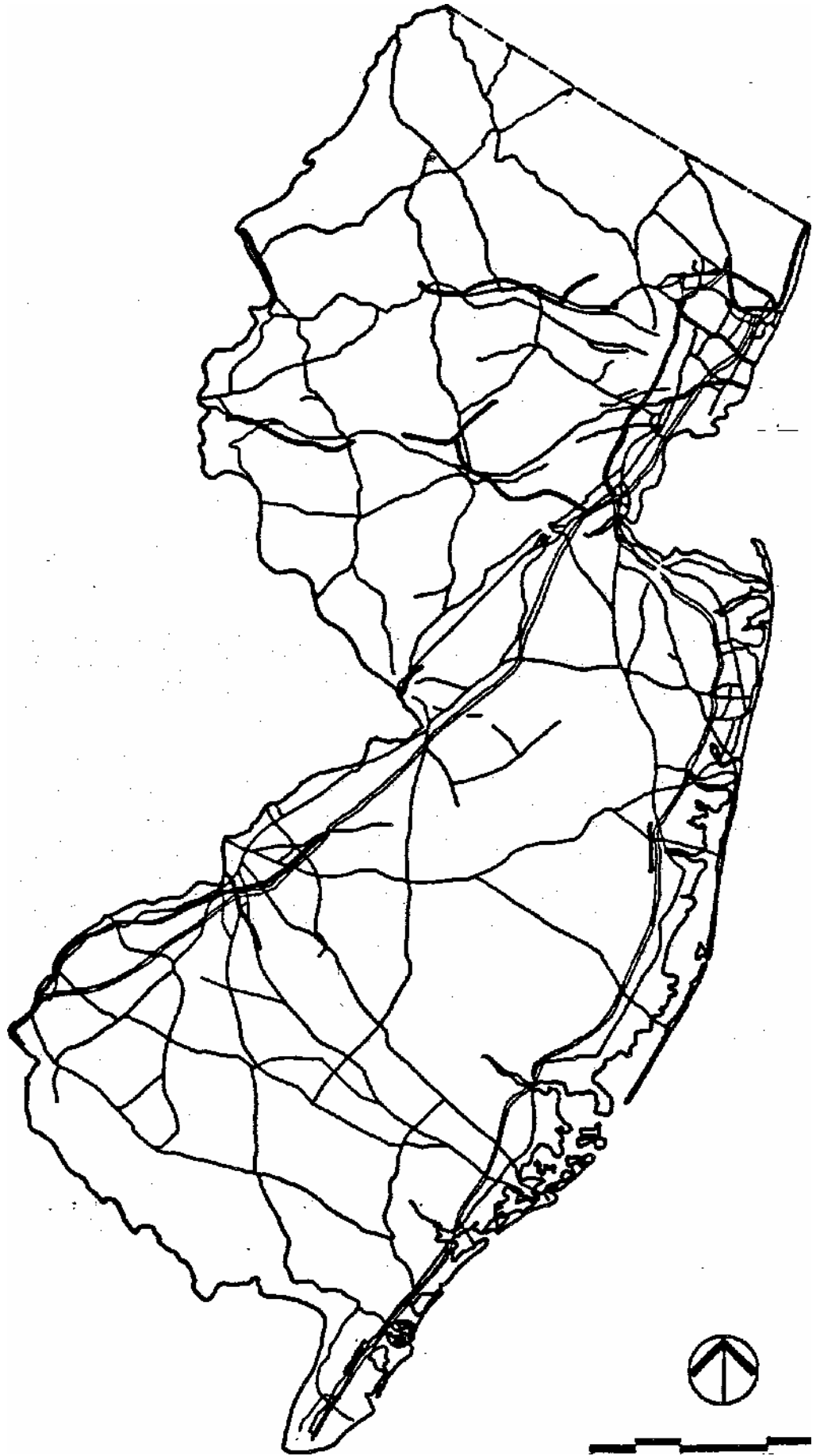
Map 1

New Jersey Highway System

1956

New
Jersey State
Planning
Commission

1988



The next major federal initiative with major duplications for transportation systems was the National Environmental Policy Act of 1969 (NEPA). This federal act requires an environmental review for all major federally funded projects. The environmental review process includes the preparation of an Environmental Impact Statement, when warranted, to identify and evaluate alternatives in order to mitigate the adverse environmental impacts of a project. In addition to the preparation of an environmental impact statement NEPA established the public participation process for public participation and review of proposed projects. The preparation of an environmental impact statement was now necessary for most major transportation construction projects. This additional layer of review and approval, although protecting the environment, has resulted in lengthy delays and has increased the cost of implementing transportation projects.

From the late 1960 's until 1987 several federal transportation acts were signed authorizing the expenditure of federal funding for construction and improvement of transportation systems. Significant legislation includes: the National Mass Transportation Act of 1974 which allowed the use of federal funds for public transportation operating expenses, and the Federal-Aid Highway Act of 1976 which authorized the expenditure of Federal funds for resurfacing, restoration and rehabilitation of Interstate Highways. Authorization for expenditures to

reconstruct the interstates was added in 1981 to adcfopss the aging of parts of the system constructed in the late 1950's. Federal funding was recognized as necessary to reverse the trend of highway decay.

One State of New Jersey also enacted several major transportation acts since the mid 1960's. The acts ranged from the creation of New Jersey Department of Transportation (lODCO?) and KT Transit to voter approved bond financing for funding programs. The New Jersey Department of Transportation was formed in 1966 to "establish the means whereby the full resources of the State can be used and applied in a coordinated and integrated matter (sic) to solve or assist in the solution of the problems of all modes of transportation; to promote an efficient, fully integrated and balanced transportation system for the State; to prepare and implement comprehensive plans and programs for an modes of transportation activities of State agencies, State created public authorities, and other public agencies with transportation responsibilities within the State. "⁵ In 1979, the New Jersey Transit Corporation was formed in order to unify and rationalize New Jersey's public transportation system and reverse the decline in transit service. Hie transit agency purchased Transport of New Jersey, the major private bus carrier in the state, in October of 1980. NT Transit also assmnpd operations of the u-minitTer rail system in 1983, when the U.S. Congress required Conrail to concentrate on its freight operations. According to N.J. Transit's recent plan, "Meeting New Jersey's Growth Challenge" the agency's focus for the period from 1979 to 1987 was on upgrading and rehabilitating the deteriorated bus and rail system it acquired.

New Jersey's residents assisted with the effort to maintain and expand the transportation system by passing bond programs in 1968, 1979, 1983 and authorizing the creation of the Transportation Trust Fund in 1984. More recently, the Transportation Trust Fund was reauthorized with a 2.5 cent per gallon increase in the State's motor fuel tax, to 10.5 cents per gallon for gasoline and 13.5 cents per gallon for diesel fuel. This act dedicates an additional 4.5 cents per gallon from the motor fuel tax to the Transportation Trust Fund for implementation of transportation projects. All totaled the new act provides for a 5.7 billion dollar construction program over a seven year period. This will enable the State and its residents to continue to meet their obligation in matching available federal funding and providing adequate transportation facilities and services.

H. Demographic Trends

A. Population and Employment

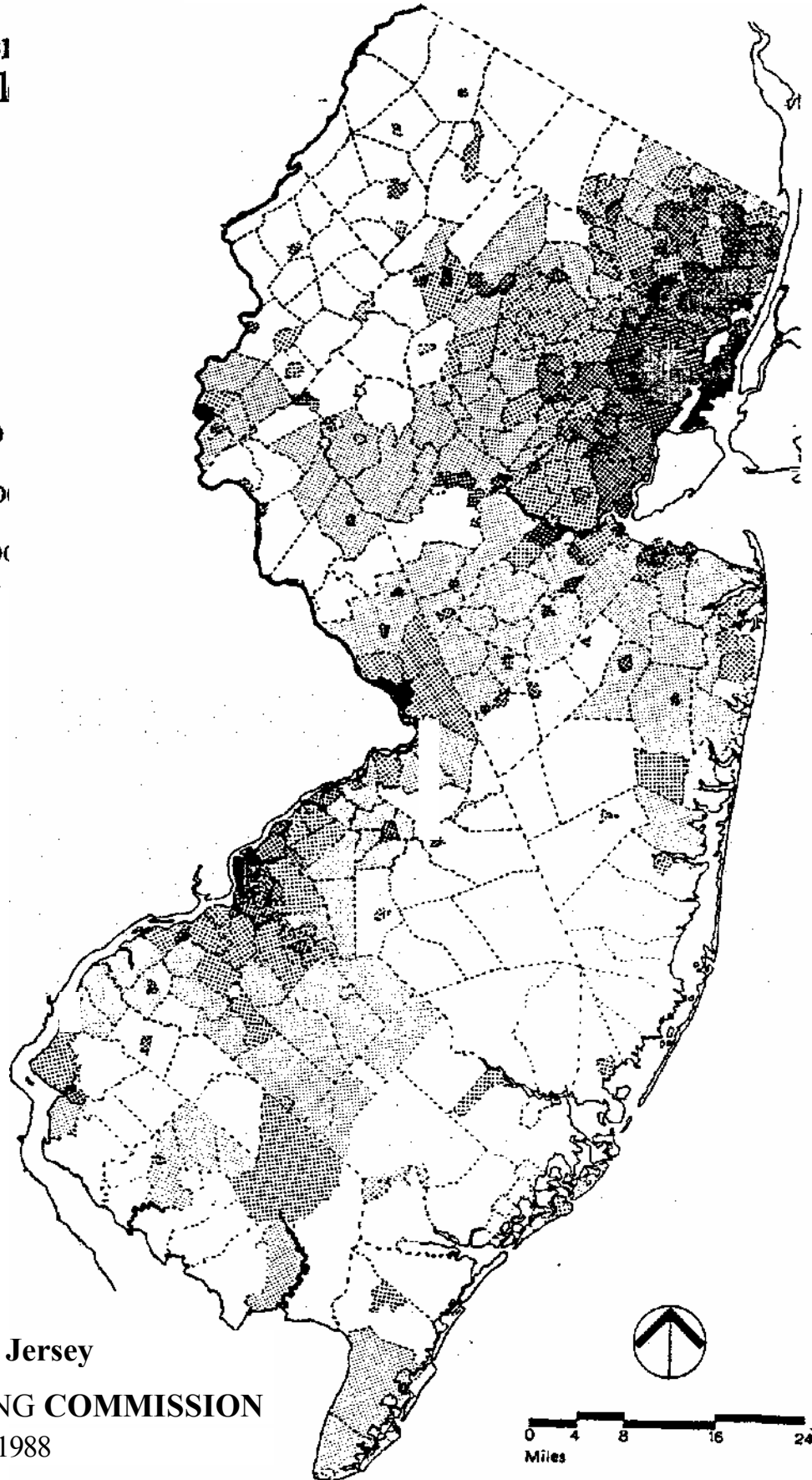
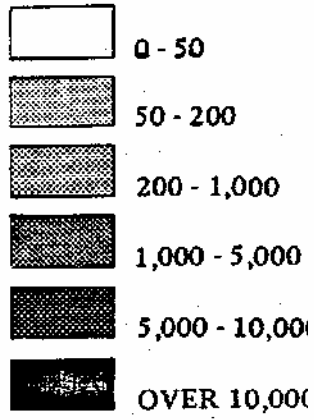
New Jersey has been experiencing significant growth in population and employment since the end of WWII. New Jersey's population has grown from 4,160,000 in 1940⁷ to 7,562,000 in 1985,⁸ a rate of 1.8% per year. Employment growth in the state has been more dramatic, from 1.4 million employees in 1948* to 2.7 million in 1985^{AW} or 2.5% per year. As the population and employment in the state is increasing, the distribution of the growth is also shifting.

New Jersey's population has been migrating from the densely developed major metropolitan areas, Philadelphia-Camden, New York-Newark, Elizabeth and Trenton into the surrounding counties of Bergen, Harris, Mercer, Middlesex and Gloucester. This migration has been fueled by the development of the post WWH highway system, the Federal Housing Administration loan Insurance Program and the Veterans Administration loan Guarantee Program. The mortgage guarantee program made 90%, 25 year mortgage loans available to large numbers of returning veterans. At the same time the newly created highway system enhanced access to previously rural areas. Exhibits 2, 3 & 4 illustrate the population density per square mile by municipality for 1940, 1970 and 1985. Closer inspection of this series of maps not only indicates the increase in density in suburban areas but also clearly documents the decline in the density of the older urban areas, particularly in the southern portion of the State, in Camden and Atlantic City. The demand for housing within the Manhattan corridor has blunted this trend and maintained the population density of the urban areas in northeastern New Jersey.

the older free-standing boroughs, like Newton in Sussex County, Somerville and Paritan in Somerset County and Medford faVeg in Burlington County are also holding their own in terms of population density. Dramatic growth has occurred in large portions of Morris, Somerset, Burlington and Atlantic Counties that had densities of fewer than 50 persons per square mile in 1940 and had densities well in excess of 1000 persons per square mile by 1985.

Figure 2

Population Density Per Square Mile



New Jersey

STATE PLANNING COMMISSION

1988

Figure 1

Figure 3
Population Density
Per Square Mile

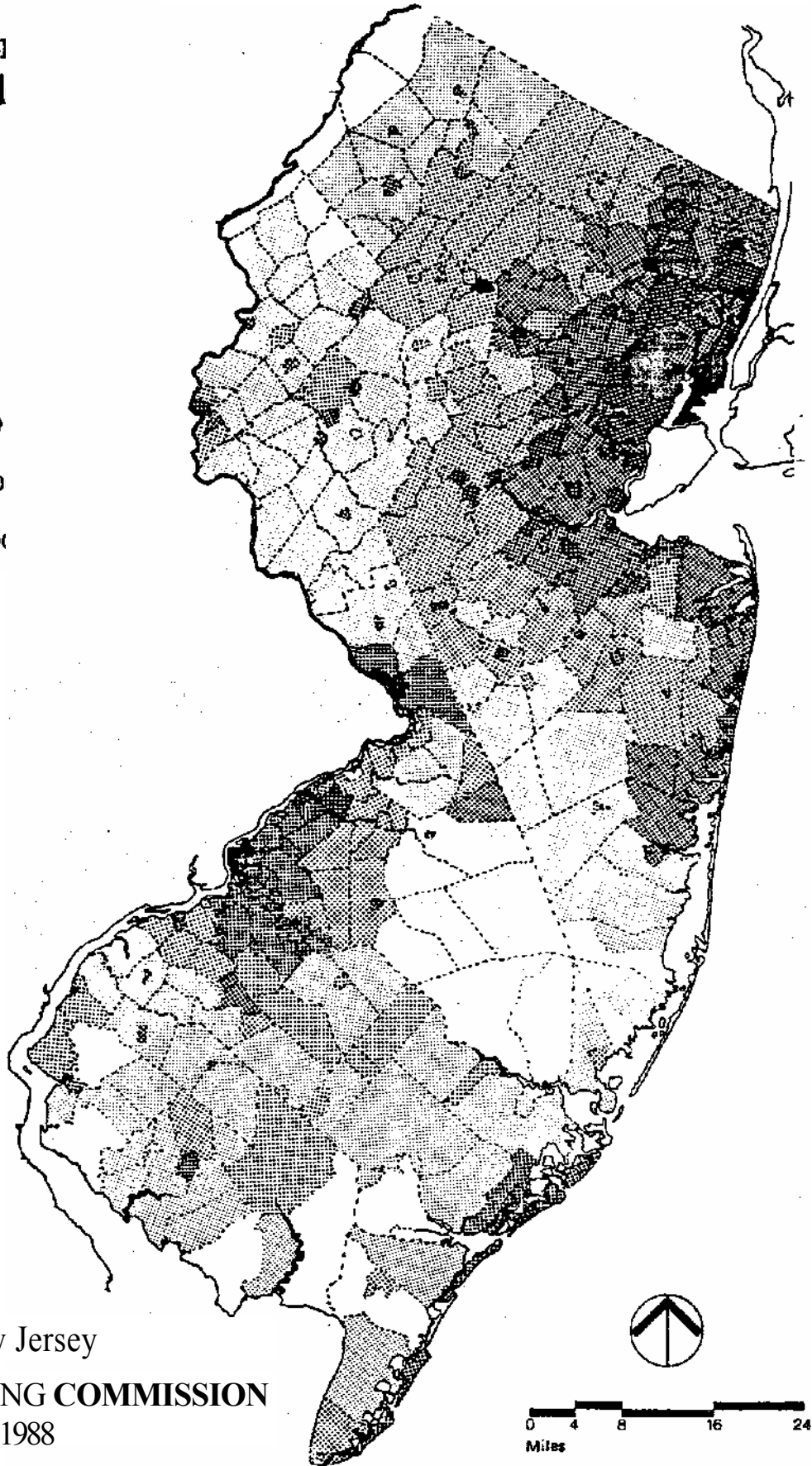
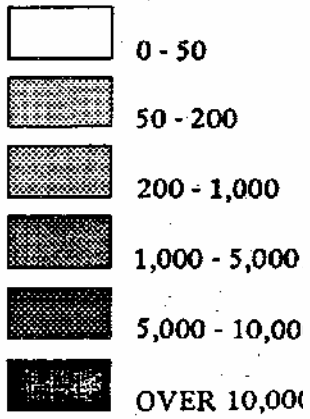
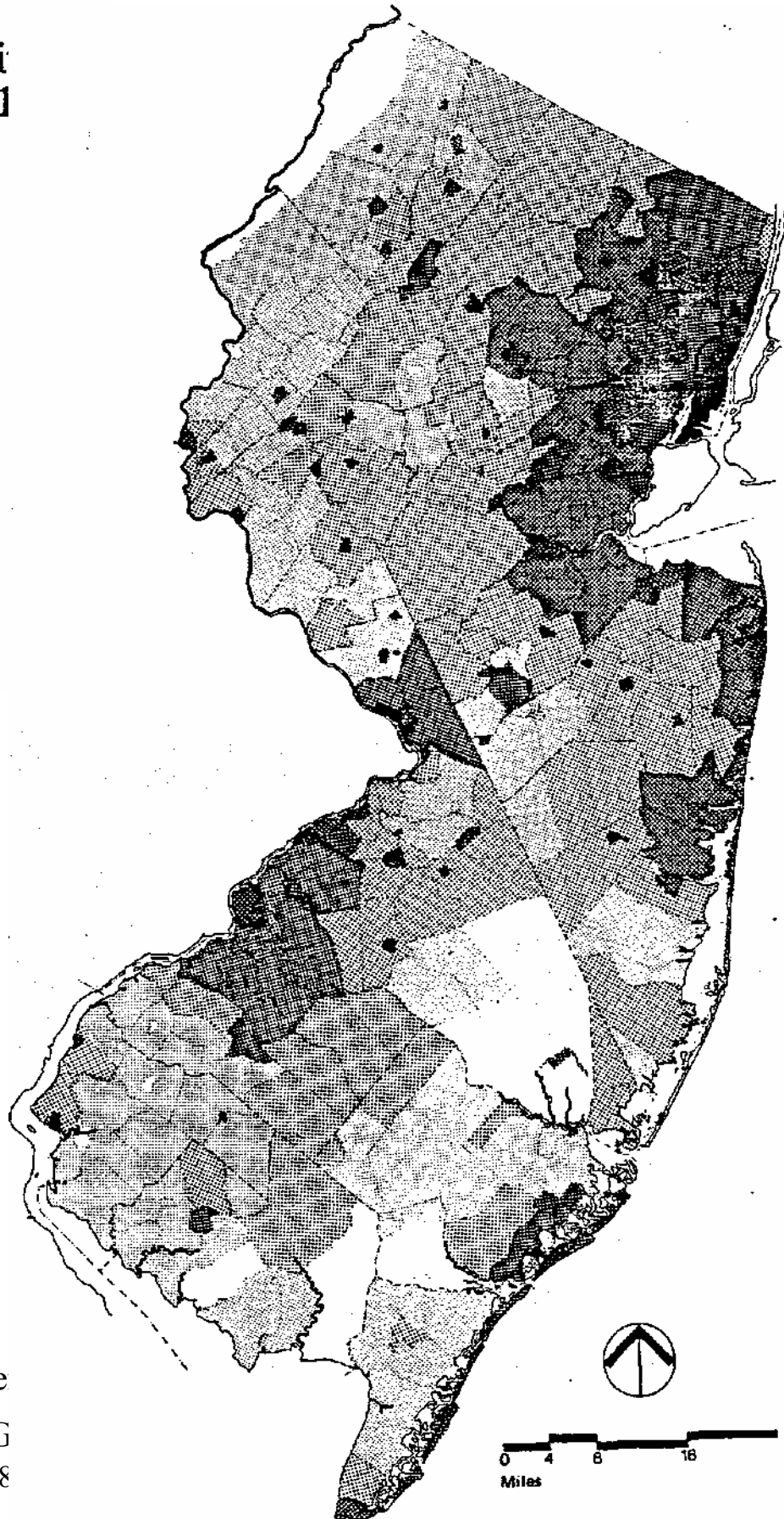
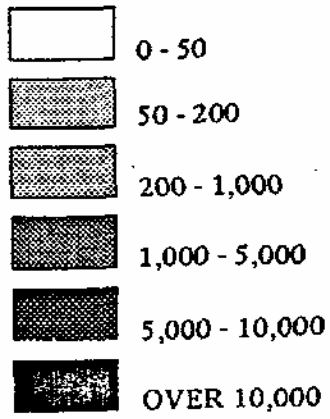


Figure 2

Figure 4

Population Density Per Square Mile 1



As the population sprawled out from the urban areas, employment followed closely behind. According to "Gaamiting in America, A National Report on Commuting Patterns and Trends"¹¹, suburbanization of jobs can be looked at as an isolated event or as a stage in the evolution of a process begun in the forties, when people began moving to the suburbs in great numbers, followed by retail services and, later, major employment shifts to suburban locations. The growth patterns in New Jersey confirm the latter, with employment growth following behind population growth in suburban areas. Figures 5, 6, 7, 8, and 9 illustrate the employment density per square mile by county for 1948, 1956, 1966, 1976 and 1984. •The pattern is similar to the population sprawl from the major metropolitan areas which accelerated in the forties.

As seen in Figures 5 and 6, the most significant employment growth from 1948 to 1956 was occurring in Bergen County. Employment in Bergen County doubled during this period, from 83,000 to 166,000. Union, Middlesex and Essex Counties' employment also grew by 45,000 (41%), 26,000 (34%) and 19,000 (6%) respectively. As the adjacent counties were growing Hudson County's employment declined 9%. This suburban growth and urban decline was due in part to the enhanced access provided to the suburban communities with the opening of the New Jersey Turnpike. /¹³

By 1966, Figure 7, with the construction of the interstate system, underway, employment growth in the suburban regions accelerated. The

Figure 5

Empl
Per S
1948

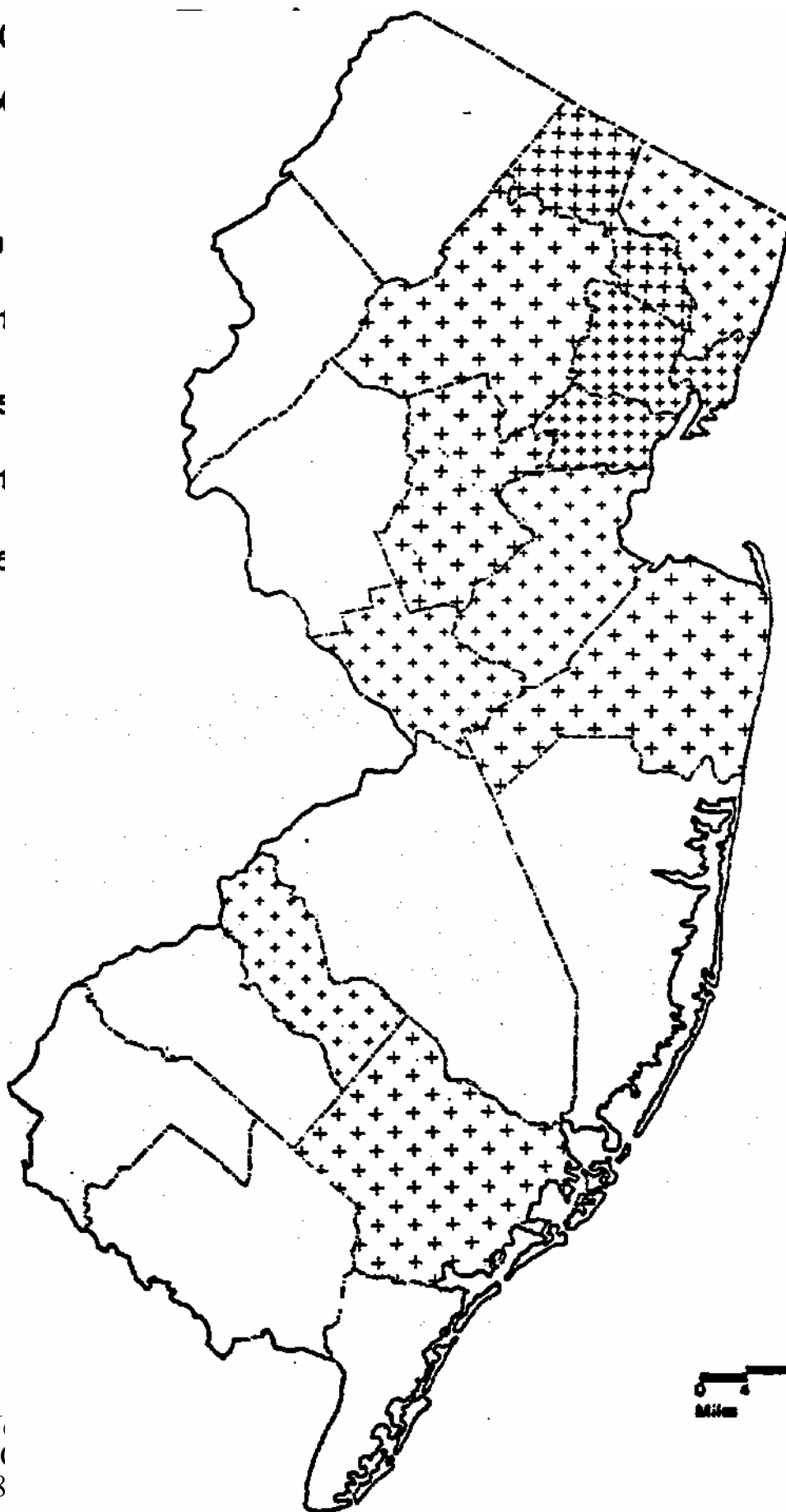
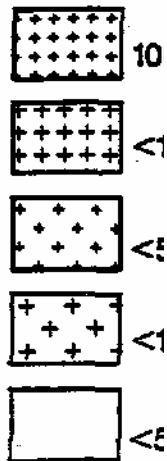


Figure 6

Emplo Per Sc 1956

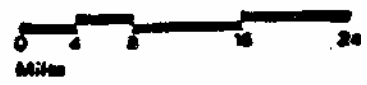
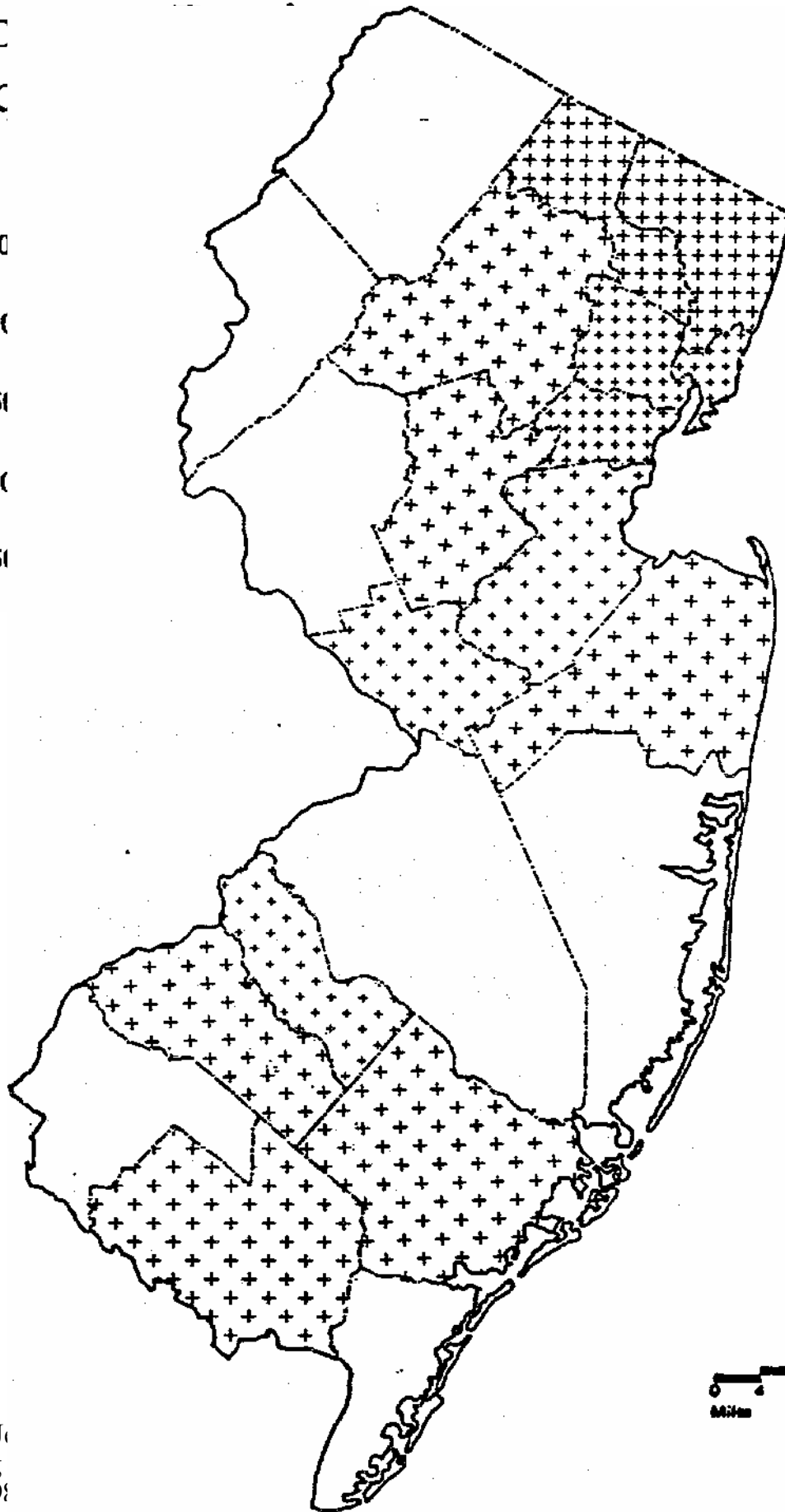
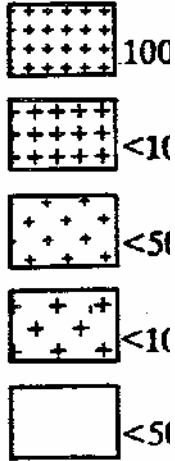


Figure 7

Empl
Per Sq
1966

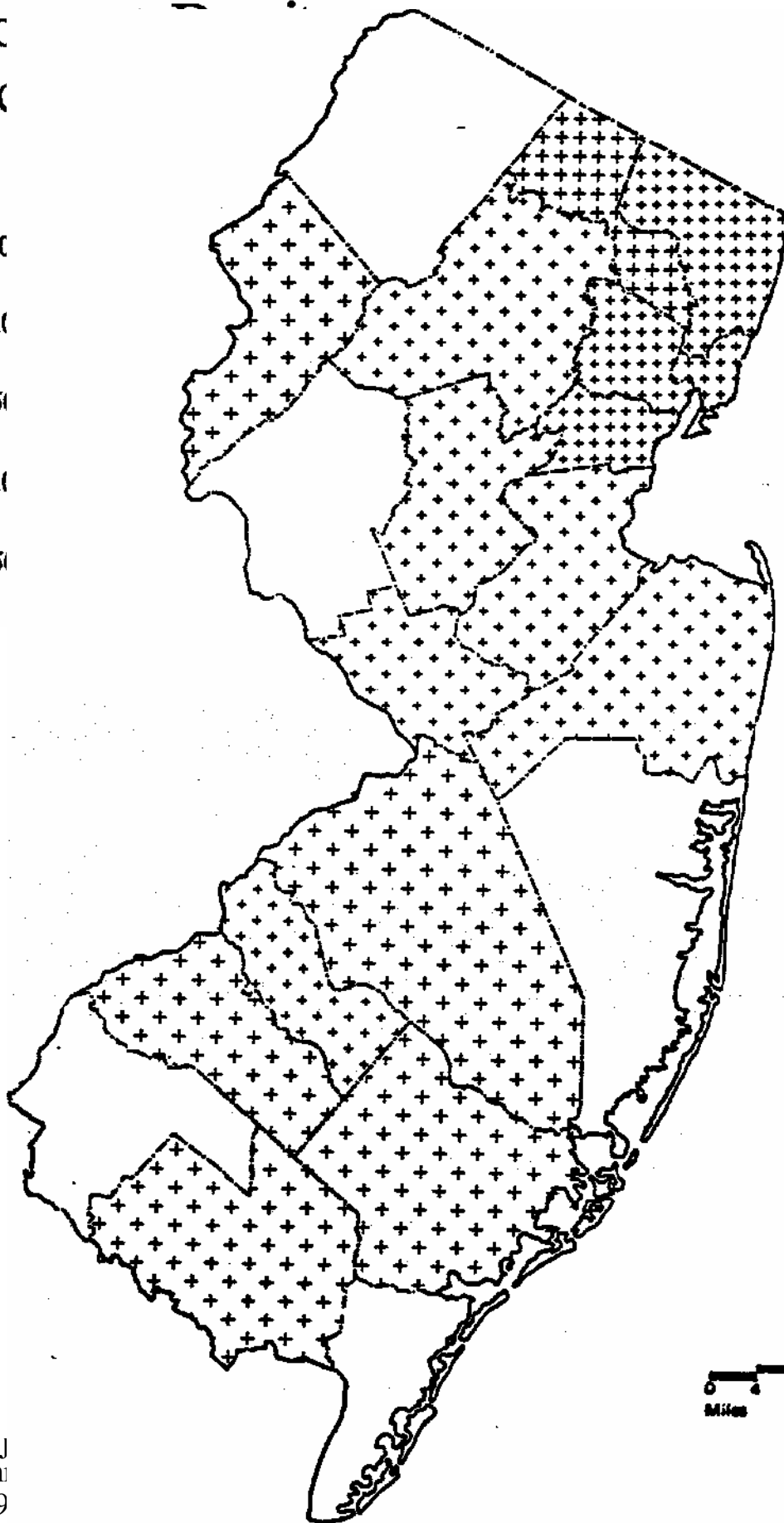
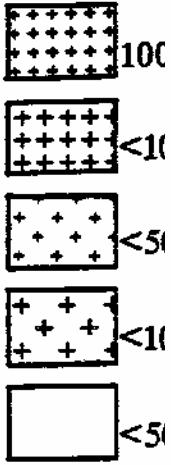


Figure 8

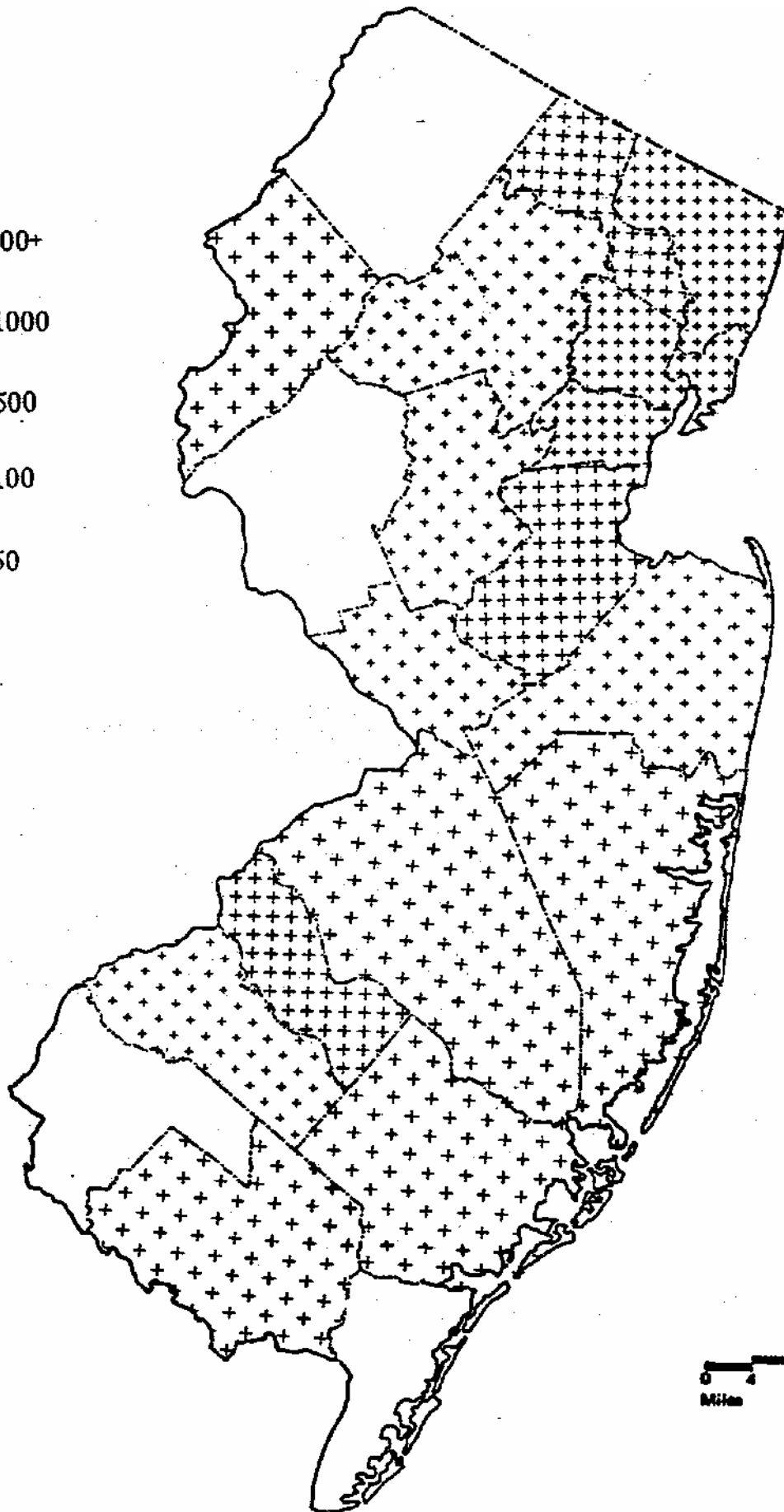
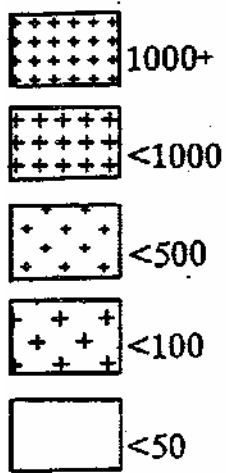
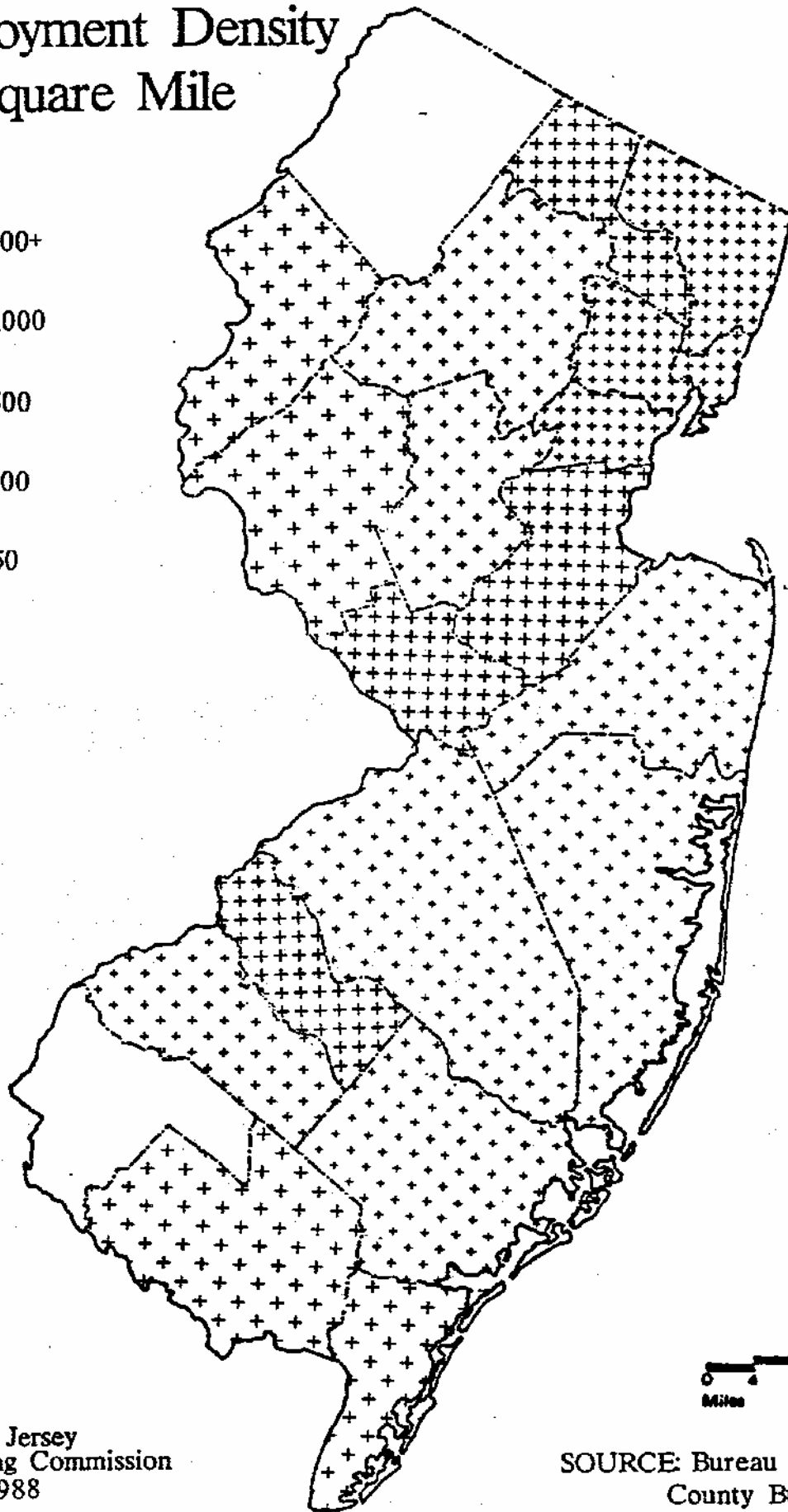
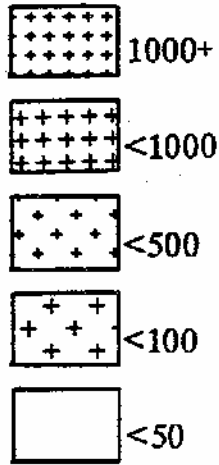
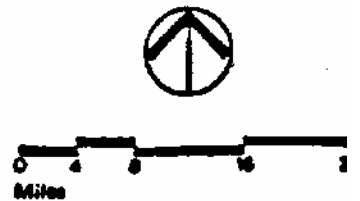


Figure 9

Employment Density Per Square Mile 1984



New Jersey
State Planning Commission
1988



SOURCE: Bureau Of The Census
County Business Patterns
Office Of State Planning

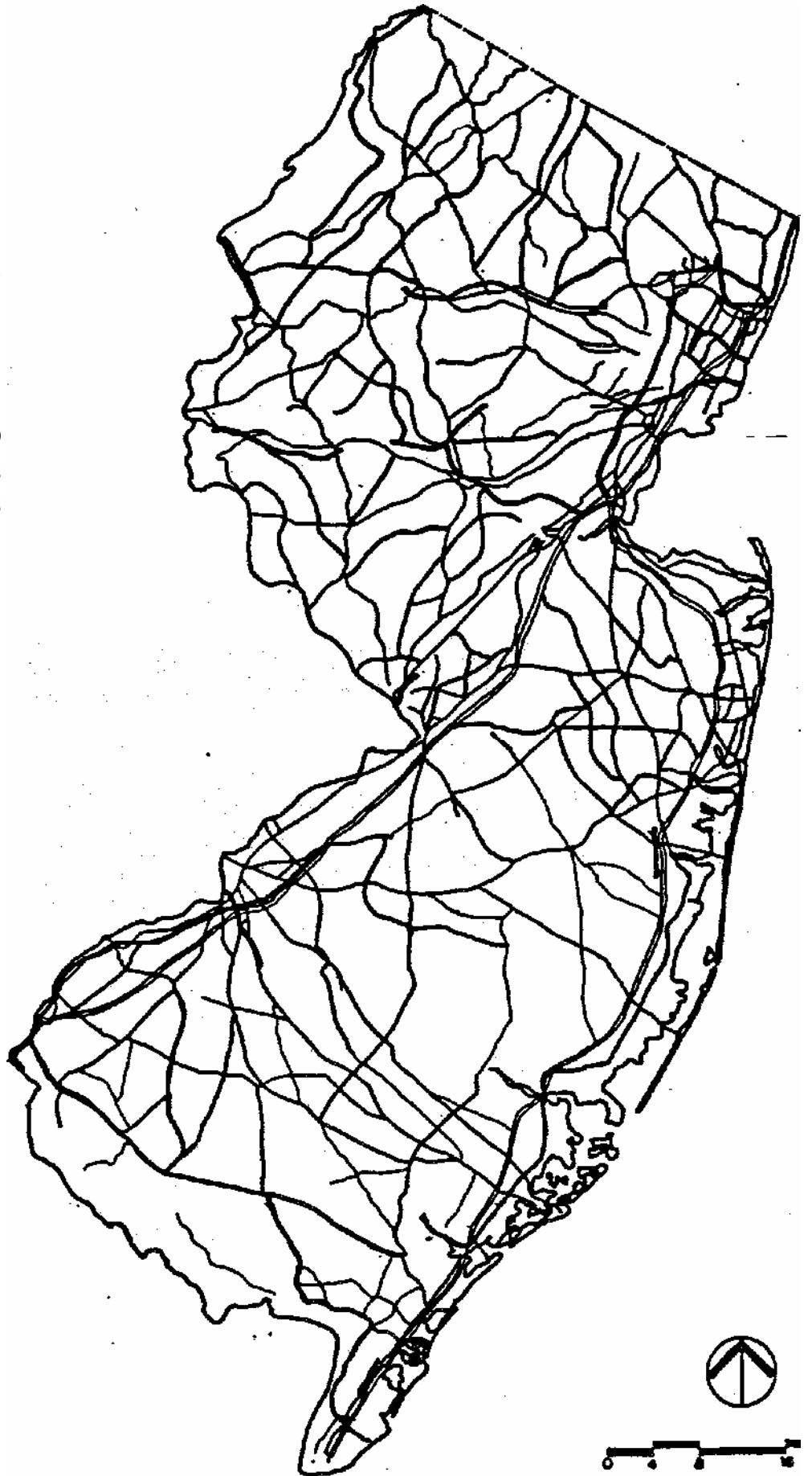
Map 2

New Jersey Highway System

1967

New
Jersey State
Planning
Commission

1
9
8
8



suburban counties in northern New Jersey as well as Burlington and Camden Counties in the southern part of the state experienced the majority of the employment growth. This growth occurred while urban areas continued losing employment. The Interstate system within the State that was open to traffic in 1967 is exhibited on Map 2, the 1967 N.J. State Highway Map.

For the ten year period ending in 1976, see Figure 8. Ocean and Somerset Counties were experiencing the fastest rate of growth, 88% and 61% respectively. Bergen and Middlesex Counties also continued to gain substantial employment and by this time contained 23% of the state's total employment. As suburban growth continued, Hudson and Essex Counties were still losing employment and the Northern United States became recognized as the "Bustbelt".¹⁴

By 1984, as depicted in Figure 9, Atlantic County, with the onset of legalized gambling in Atlantic City experienced the most dramatic increase in employment. It grew 78% from 48,000 employees in 1976 to 86,000 employees in 1984. However, Morris, Bergen and Middlesex Counties continued to lead the state, with growth of 82,000, 76,000 and 63,000 employees respectively. Significant suburban employment growth was also occurring around Philadelphia in the Southern part of the state as Burlington, Camden and Gloucester grew by 46%, 22% and 35% respectively. This dramatic growth was attributed to the service orientation of the new employment as the Northeast shed its image of being the "Rustbelt". Table 1, illustrates the employment changes by county for the periods represented in Figures 5-9. ^

Table 1 Employment by County, 1948, 1956, 1966,
1976, 1984

Summarizing the employment patterns, in 1948 the urban counties of Hudson, Essex, Passaic and Union Counties contained 56% of the State's employment. By 1985, these same four counties contained only 33.2% of the employment. Although these counties still hold a significant percentage of the State's total employment, the suburban counties with convenient access to the major metropolitan areas of New York and Philadelphia have grown most dramatically. For example, Bergen County, a suburb of New York has experienced an increase in employment density from 352 employees per square "mile in 1948 to 1671 employees per square wile in 1985. The counties of Bergen, Essex, Middlesex and Union, are now ranked 1, 2, 3, 4, respectively, and account for 44% of the State's total employment. The State's employment base is now spread over a much larger area with the suburban centers containing a larger portion than in the past.

This population and employment growth has not been haphazard. The majority of the State's population and employment is located in the Northeast, and is well served by the post WWU highway system including, Interstates 78, 80, 95, 287, the Garden State Parkway, the New Jersey Turnpike and the Port Authority crossings as shown on Map 3. This system allows for convenient access to the major markets along the Northeast Corridor.

Similar to the growth in the northern part of the state and its proximity to New York; Camden, Burlington and Gloucester Counties have experienced growth due to their proximity to the Philadelphia-Camden market and also to the highway system which includes the New Jersey Turnpike, Interstate 295 and US 130. Growth in Atlantic County is primarily occurring in and around Atlantic City and is based on the casino industry located there. Access to the city has been enhanced with the construction of the Atlantic City Expressway, which was completed in 1965 and improvements to the Garden State Parkway.

B. Transportation Statistics

Licensed Drivers

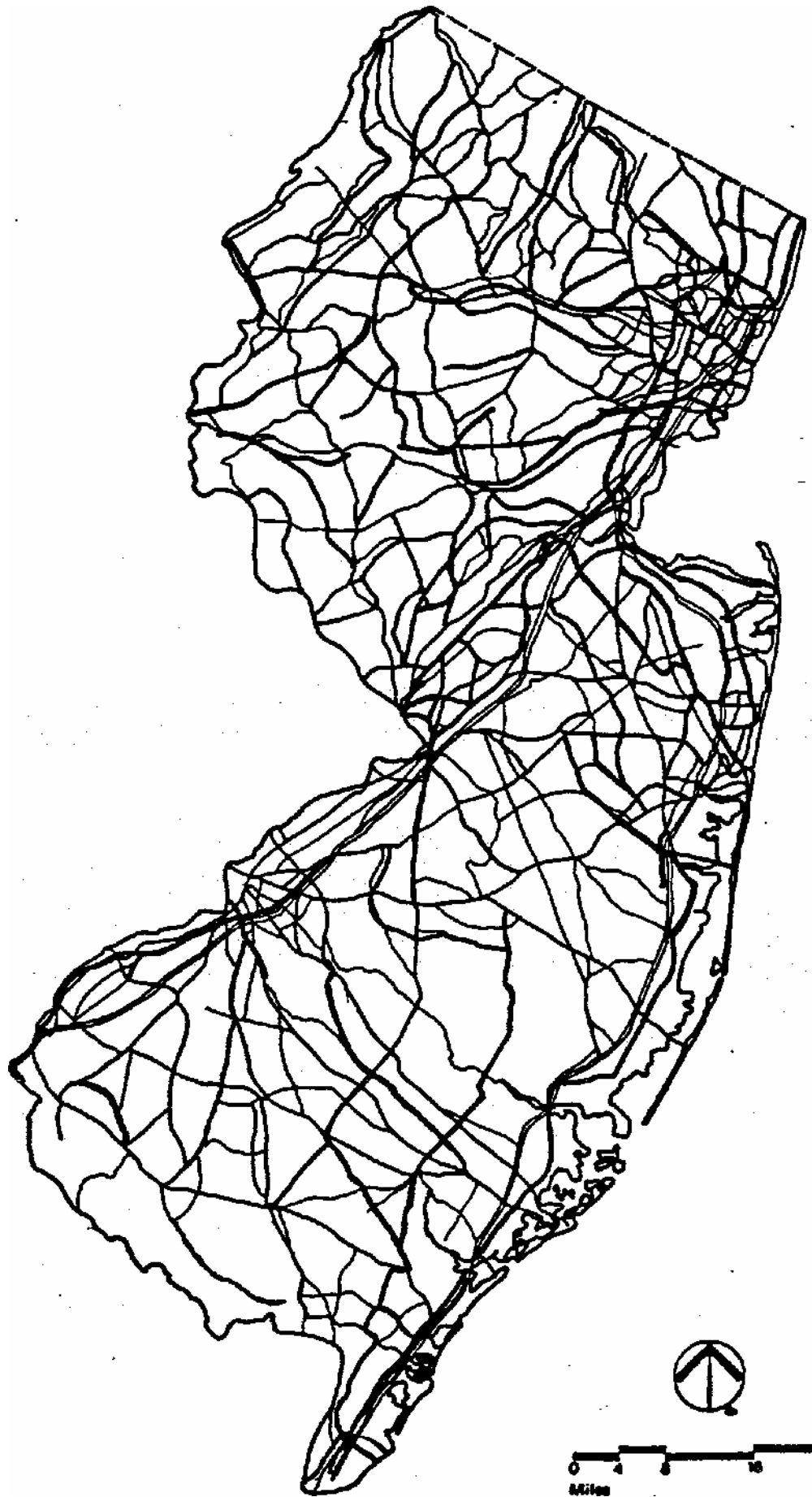
The following discussion will highlight several transportation related statistics that document the relationship between the post WW II growth and the condition of the highway system. The first statistic presented is the number of licensed drivers in the state. The number of

Map 3

New Jersey Highway System

1985

New
Jersey State
Planning
Commission
1988



licensed drivers *in* the state has grown steadily and is rapidly approaching the point where the entire adult population, age 16 and over, will possess a drivers license. In 1985 there were 5,280,000 licensed drivers in the State.¹⁶ Figure 10, depicts the growth in the ratio of licensed drivers to the population and to the population eligible for licenses from 1950 to 1985. New Jersey's rate of 975+ licensed drivers per 1000 driving age population is the highest in the nation and is well above the national average of 857+ per 1000.¹⁷ Table 2 illustrates the ratio of licensed drivers to the population for selected states.

Table 2 1985 1985 Patio of Licensed Drivers to Driving Age Population, Selected States

State	Licensed Drivers Per 1000 Driving fige Peculation
New York	705*
New Jersey	975**
Conn.	919
Pennsylvania	809
California	861
Delaware	925
Texas	895
National Avg.	857

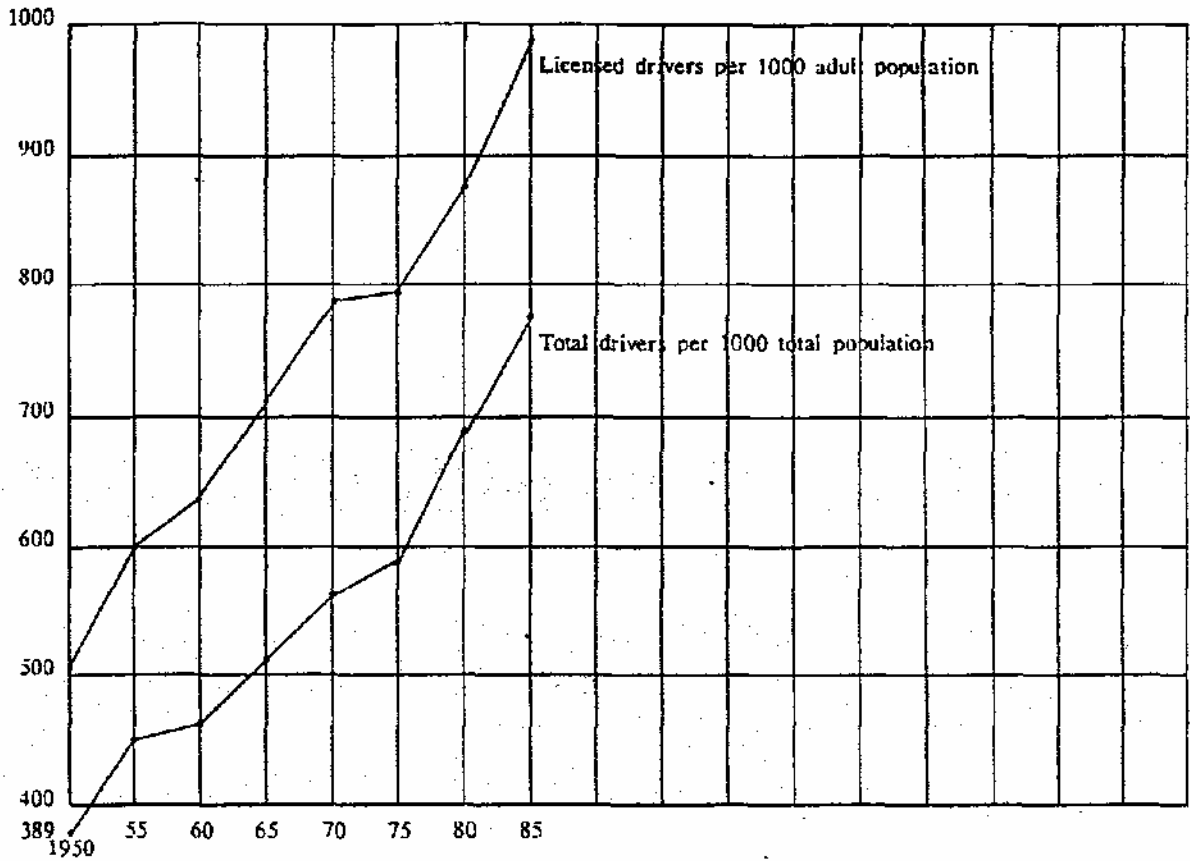
*Lowest

**Highest

Source: U.S. Department of Transportation 1985 Highway Statistics. Table

State of New Jersey Ratio of Licensed Drivers to Population 1950-1985

Figure 10



Source: US DOT, FHWA, Highway Statistics Summary to 1975
US DOT, FHWA, Highway Statistics Summary to 1985

Vehicle Ownership Patterns

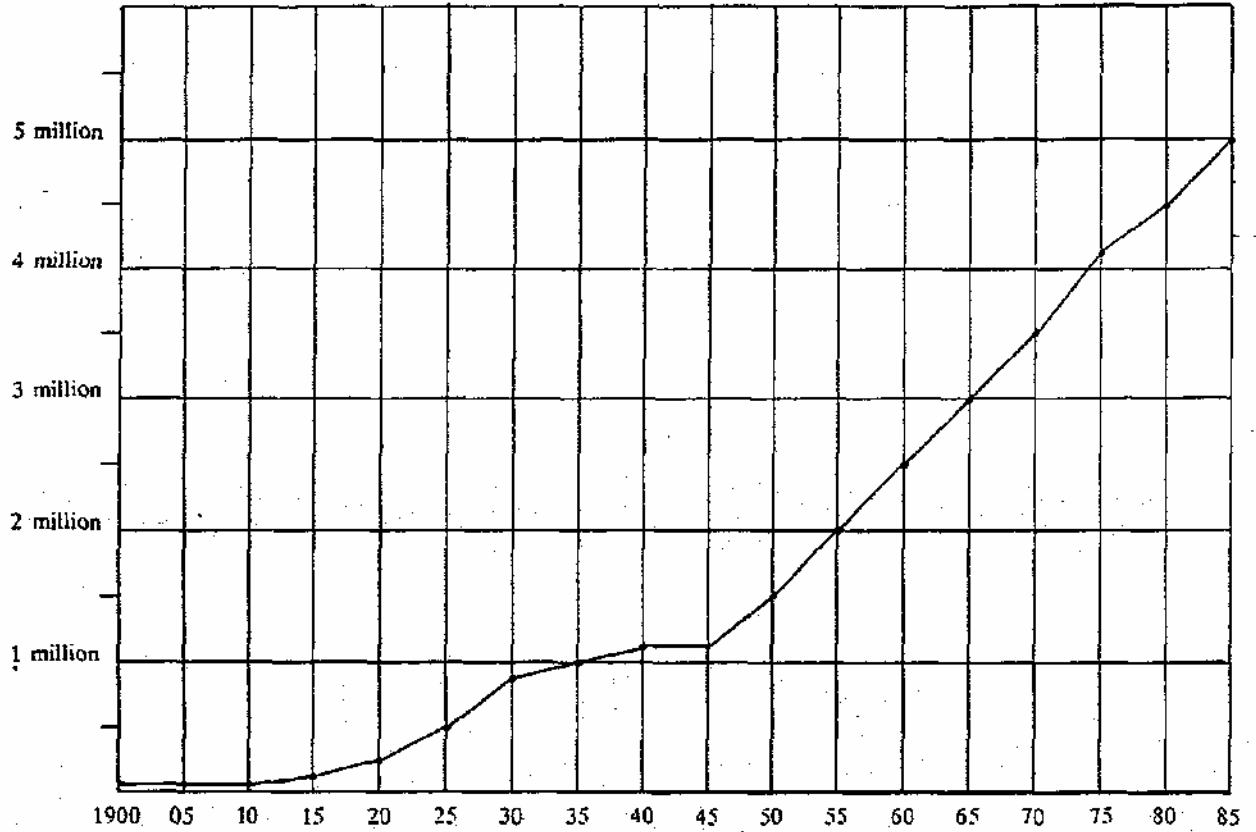
The motor vehicle ownership pattern closely parallels the pattern of increase in the number of licensed drivers. In 1900 there were only 300 motor vehicles registered in the state.¹⁸ In 1985, motor vehicle registration climbed to approximately 5 million.¹⁹ Figure 11 illustrates motor vehicle registrations in the state. The chart shows rapid increases in vehicle registration during the 1920's. The rate of increase leveled off in the period surrounding WW II and has grown consistently and dramatically from the mid-1940's.

Vehicle Utilization

Motor vehicle registration statistics can be related to the increase of vehicle miles traveled. Figure 12, depicts the vehicle miles traveled (VMT) from 1935 to 1985. VMT declined in the early 1940's due to the gasoline rationing during WW II. After the war, VMT continued to grow unabated until the 1970's. In the 1970's there were two periods of fuel shortages, which reduced the increase in VMT. For example, in 1973 total VMT was 48,167 million, this VMT decreased to 47,244 million in 1974 but VMT climbed to 48,445 million in 1975.²⁰ Overall VMT has continued its steady growth and was at an all time high of 53,108 million VMT in 1985.²¹

Figure 11

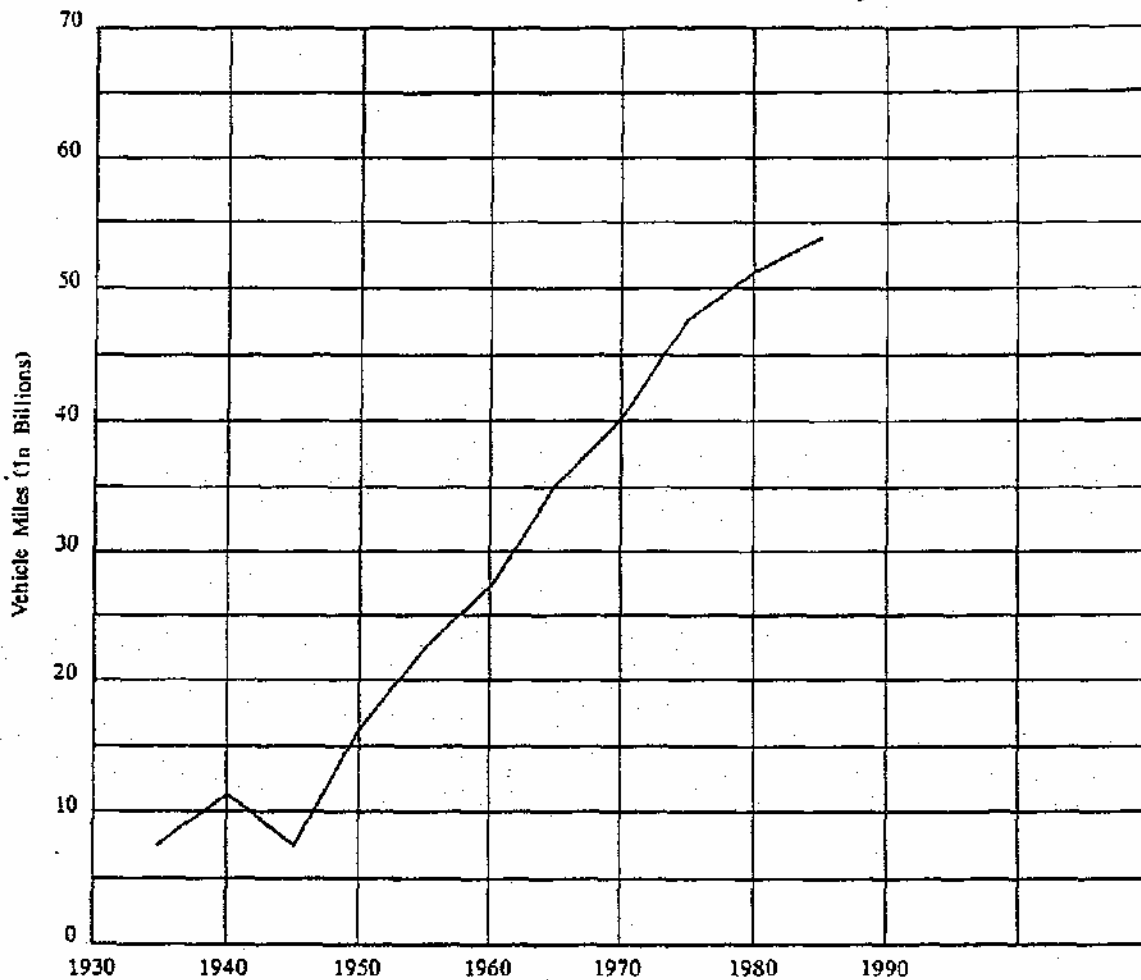
State of New Jersey Motor Vehicle Registrations 1900-1985



Sources: US DOT, FHWA, Highway Statistics Summary to 1975
US DOT, FHWA, Highway Statistics 1985

Figure 12

Annual Motor Vehicle Travel New Jersey 1935-1985



SOURCES: US DOT, FHWA, Highway Statistics Summary to 1975 US DOT, FHWA, Highway Statistics 1985

Highway System Classification

The growth in the ownership and operation of motor vehicles in the state has had measurable impacts on the highway network. The highway system has been divided into functional classification systems by State and local officials as requested by the Federal-Aid Highway Act of 1970. This system includes roadways defined as arterial collectors on local roads. Simply defined, arterial roadways serve long distance travel between and through developed areas. One primary purpose of an arterial is to connect developed areas. Examples of arterials are Route 206, Route 55 and Route 1. Collector roadway serve to collect and distribute traffic from the local land access road system to and from the arterial system. Examples of collector roads are Peaville Road, Clarksville Road and Cooperstown Road. The local road system has been primarily developed and designed to provide access to the highway network from individual properties. For the purposes of this report the Interstate system, although arterial in function, is listed separately. Currently there are 33,883 total miles of roadway in the state; 385 are designated interstate, 7461 arterial, 4914 collector and 23,208 local roadways.²² The interstate system although accounting for 1.1 percent of the highway system carries 16 percent of the total VMT in the State. Similarly the arterial system which accounts for 15.8 percent of the highway system carries 51 percent of the VKP statewide. Combined, the interstate and arterial system, 17 percent of the total road network, carries over 67 percent of the vehicle miles traveled in the State.

Volume Capacity Ratios

As more vehicles compete for the available capacity on the states road network, congestion bprnmre more prevalent. This is especially significant during periods of peak demand in urban areas where the density of population and employment is highest. This is also where the network cannot be readily expanded to accommodate the increasing demand because of physical, economic, environmental and social constraints*

Table 3 indicates the peak hour volume capacity (V/C) ratio for the New Jersey road system in 1981 and 1985 as defined by the Highway Performance Monitoring System used by the United States Department of Transportation (HJNA). A peak hour V/C ratio of greater than .85 is an indicator of unstable traffic flow or congestion.²³

Table 3
Volume Capacity Ratio Mileage by
Functional Classification

Rural Urban

Interstate	1981	1985	1981	1985
.31-. 40	35	24	8	19
.41-.70	28	50	72	66

Table 3 Volume
capacity Ratio (continued)

.71-.95	5	18	61	60
.95f-	-r	_8	54	95f
Total Mileage	115	129	224	256

Arterials

<u>.31-.40</u>	242	196	470	457
.41-.70	254	412	875	1713
.71-.95	122	148	867	728
.95+	<u>100</u>	33	<u>978</u>	<u>564</u>
Total Mileage	<u>1004</u>	926	<u>4179</u>	4454

Collectors

.31-.40	531	198	123	239
.41-.70	391	475	395	493
.71-.95	25	86	167	67
.95f	49	26	<u>137</u>	5
Total mileage	3342	3007	1848	<u>1903</u>

Note: .85 yields congested or unstable conditions.

Source: U.S. DOT, Hi^iway Statistics 1985, 1981

It is important to note, that significant improvement has occurred on the urban arterials where miles of roadway near or already experiencing congestion has decreased by over 550 miles. This is due in large part to the accelerated construction program implemented with funding from the N. J. Transportation Trust Fund. It is the urban interstate roadways which are near or already experiencing congestion that have increased by 40 miles despite the enhanced funding provided by the Transportation Trust Fund. All totaled, 1654 miles, or approximately 30 percent of the arterial roadways, which carry over 2/3 of the vehicle travel in the State are near or already experiencing peak hour congestion. More significant is the problem on the urban interstates where 155 miles, 60% of the road mileage is near or already experiencing peak hour congestion.

Access Management

In addition to the congestion on the highway system due to traffic volume which exceeds roadway capacity, the multiplicity of access points has also compromised the ability of the highway system to safely and efficiently fulfill its intended purpose in New Jersey. The effects of the lack of access controls in the state is felt most critically on arterials. One is where inefficient design, location and number of curb cuts along a facility results in a roadway that can not serve its intended purpose. Disruptions to traffic are caused as vehicles accelerate and decelerate in through traffic lanes and when vehicles cross traffic streams. These movements cause traffic to slow and introduce less than desirable conditions to a facility. Figure 13 illustrates that as

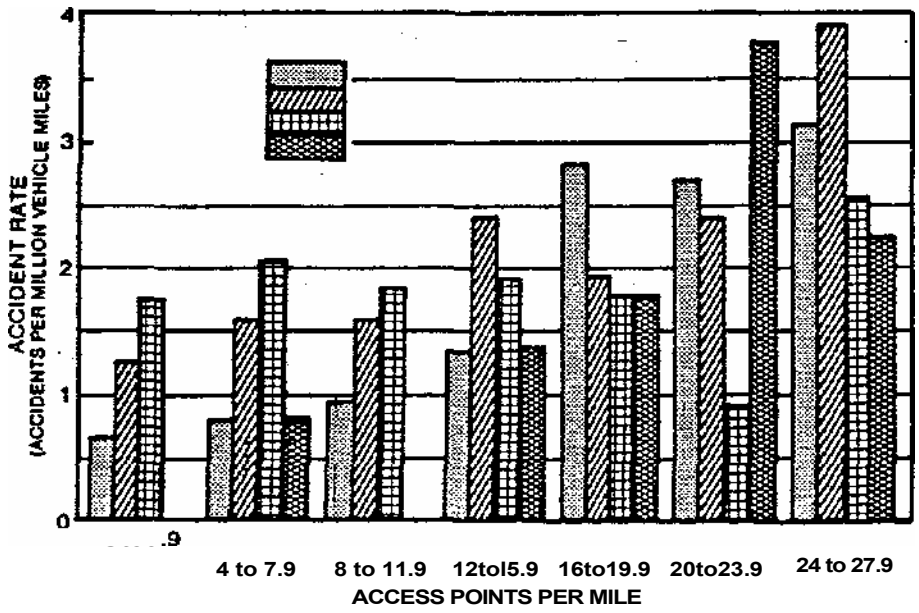


Figure 13 Accident Rates for Road Sections With Different Traffic Volumes and Access Point Frequencies

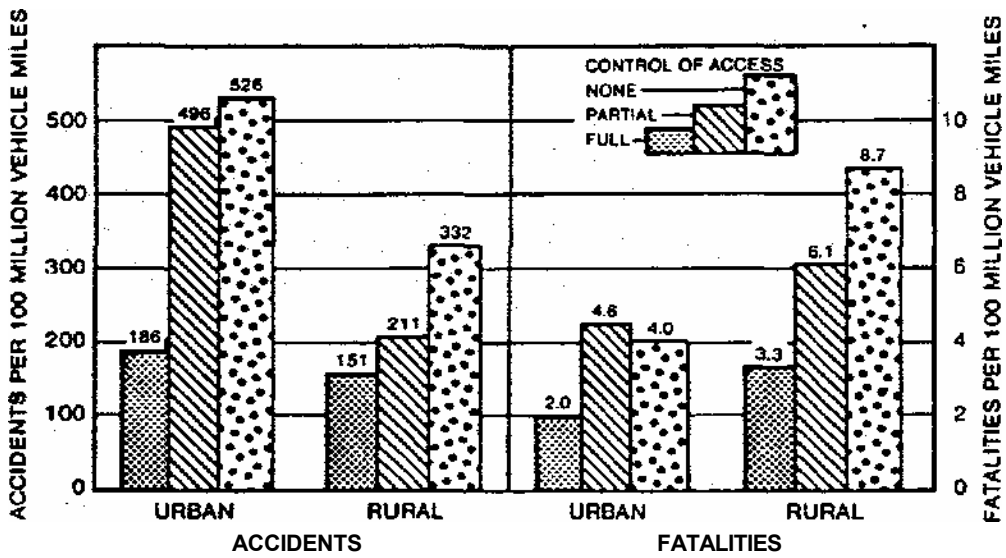


Figure 14 Effect of Control of Access on Accidents and Fatalities In Urban and Rural Areas

the number of access points per mile increases, so does the rate of accidents. Figure 14 clearly depicts that roadways with no access controls have significantly higher accident and fatality rate than roads with full access controls.

One combination of heavy traffic volumes without a systematic access control program has resulted in unduly poor conditions on the arterial system throughout the state.

Mode Split

The increased reliance on the automobile/highway system is also evidenced by changes in the mode-of-travel for journey-to-work statistics. In 1960 the automobile served 64.4 percent of the journey to work travel with conventional public transportation serving approximately 20% in New Jersey. By 1980 82.7% of all journey-to-work travel was imdr by automobile. Public transportation share of journey-to-work travel declined to 9.1 percent.²⁴

The shift from 20% of journey-to-work travel satisfied by public transportation in 1960 to less than 10% in 1980 has had deleterious effects on the public transportation system in the state. Conventional public transportation can be most effective when it serves areas of concentrated trip origins (residences, in the journey-to-work trip) and trip destinations (employment centers). The system can also operate with high density in either component, origins or destinations. However, the emerging land use pattern in New Jersey has low density in both

residential and employment centers and has resulted in an environment where conventional public transportation systems can not operate effectively. The following discussion details the decline in the public transportation system and its usage in New Jersey. The commuter rail system which contained 1,100 route miles and carried 349,000 passenger trips a day in 1950 has declined to 467 route miles carrying 166,000 passenger trips a day in 1972.²⁵ The system is currently serving only 150,000 passenger trips a day. More dramatic 380 route miles and decline is apparent on the bus system where in 1972 the system carried 313 million passengers²⁷ and now carries less than 100-million passengers per year. It is important to note, that with increased highway congestion and parking difficulties in Manhattan combined with improved transit service and reliability provided by NJ Transit has enabled bus and rail ridership to increase 10 and 29 percent respectively from 1983 to 1987." This indicates a reversal in the long-term decline in the utilization of the public transportation system in the State. However, it is premature to say that this is the beginning of a new era for increased public transportation utilization.

TTT. Transportation Assessment of Current Needs

Transportation needs within the State are not defined by any single agency. Although the State's Department of Transportation has the legislative responsibility to develop and maintain the statewide

transportation system plan, they do not provide or serve all of the transportation needs in the state. NJDCT has primary responsibility for its highway system and provides secondary support for county and local highway and statewide public transportation services by administering state and federal funding. The following discussion consolidates the previous expressions of current financial need identified by the County and Municipal Government Study Commission (CGSC), The Governor's Management Improvement Program (OOP) and various operating agencies¹ reports. An estimate of needs and revenues to the year ,2010 can be found in Technical Reference Document, "Infrastructure Needs Assessment", 5/8/87, prepared by the firm of Hammer, Siler, and George Associates.

The needs identified in this report are not expressions of need that if met would restore the transportation system to 100% acceptable condition with all systems having the capacity to serve all dprnanrfo. In assessing the need of the transportation system it is important to recognize that the highway system will continue to experience peak period congestion in urban and suburban regions. This is due to the magnitude of the demand on the system and the feasibility or lack thereof of expanding the system to accommodate that demand. Many urban arterials and interstates are already congested during peak periods and there is insufficient space available to improve or widen these facilities. In many instances the land use generating the traffic causing the problem, would have to be demolished for the road to be widened to accommodate current or projected demand. Therefore, this transportation needs

assessment, although it aHflrpnagg the condition of a substantial resource, would not solve the peak hour highway congestion problem.

Another important point worth ercfhasizing is that most of the needs which are identified in this report are based on anticipated revenue and do not reflect total need. The needs <1ismsspd here are based on published reports, which do not include new projects with their additional costs.

The inadequacy of information available to identify the transportation needs in the State is evident from the following excerpts. They appear in texts of reports which are the best sources of information on this issue. "Only 27% of the municipalities responding to the Commission's questionnaire indicated that they have a capital needs plan for roads."³⁰ "The low comparative needs estimates in urban municipalities may well be based on engineer experience in operating within a limited or constrained local fiscal environment."¹¹³³- "It should be noted that the capacity improvements estimate of 425 mill ion dollars continues to increase as new projects are identified and studied."³² The reccsnmendation for transit improvements described in this report conclude this phase of the planning program which focused on northern New Jersey's transit needs.,... Planning efforts, however, will next be

•5*3

launched in South Jersey. "•" The approaches used in the document from which the aforementioned quotes have been taken, yield an impressive listing of needs. However, as the quotes suggest the approaches do not identify the full need. A specific example is the recent study of the Route 1 corridor completed by NJDOT. The estimated cost for improvements

to this single facility range from 200-750 million dollars.³⁴ Currently only 75 million dollars is available for the improvements along this facility, therefore, the Route One study quantified a measurable change in the overall recognized need for the State.

Mobility within the state depends upon the transportation systems ability to satisfy the needs of its people and businesses. There are three major transportation systems which serve mobility in the state. The pedestrian system, the auto/highway system and the public transportation system. Hie systems are not exclusive. All trips begin and end with a pedestrian trip. Buses and automobiles share the available highway capacity. Public transportation moves large numbers of people in urban environments freeing road capacity for those who must rely on the automobile.

A. Pedestrian System

Pedestrian mobility is often overlooked as a mode of travel as it is universally available and usually taken for granted. Pedestrians can overcome many obstacles easily, therefore, the pedestrian system has not been subject to detailed needs assessments. The construction and maintenance of sidewalks, the primary component of the pedestrian system, depends on factors outside of need caused by deterioration due to usage. This holds true even for the most heavily utilized systems in urban areas, such as Newark, Camden and Trenton. The pedestrian system in New Jersey has excess capacity in all environments, it has limited capital needs and provides mobility for large numbers of people. The pedestrian system is

predominantly owned by local government and the private sector. The scope of the system >«« not been quantified, but it serves all land uses either with exclusive rights-of-way (sidewalks) or shared rights of way.

B. Automobile/Highway System

One next system in travel density is the automobile/highway system. One major focus for mobility in the state during recent years has been the auto/highway system. The road system in New Jersey is owned by state, county and local governments. Table 4 identifies the center line road mileage and number of bridges by jurisdiction in the state.

Table 4

Components of Highway System

	<u>Miles</u>	<u>Bridges</u>
Federal	39(1)	
State	3175	2192(2)
County	7015	2971(3)
Local	<u>23654</u>	
Total	33883	

1. Inside federal parks, not part of the state and local systems.
2. GMIP Report
3. 1978 CMGSC

The needs of the auto/highway system can be separated into two categories, improvements and maintenance, improvement needs are the identified costs necessary to complete the construction of the highway system and to expand the capacity of the system to meet the increasing volumes of traffic. Maintenance needs are those costs which should be spent annually to maintain the existing system. I- ftnprpyements

The state highway improvement need has been quantified in the G-HP report. The report was condnctrpd in response to Governor Kean's executive order No. 13, August 13, 1982, "There shall be a study and analysis of every department in state government through a process which integrates the experience of state managers and private-sector executives in order to ascertain the most efficient and economical manner to perfbm services by the State of New Jersey for its citizens." The stud/ completed in 1984 reported a state highway improvement need of 1.625 billion dollars.³⁵ Table 5, Improvements to Highway System, illustrates the components of the state

highway improvement need.

Table 5 New Jersey Improvements to Highway
System

(Mil lions)

Capacity Improvements \$425

Non-Interstate Freeway Gaps 600

Interstate Gaps 600

TDEftL \$1,625

Source: (3HP

2.

The maintenance need has two components »• highway maintenance and bridge rehabilitation. The condition of the pavement on the State highway & system is evaluated using a combination of objective and subjective criteria. Bridges are evaluated by bridge inspection engineers and the results are reported as a sufficiency rating.

Historically, the New Jersey D.O.T. relied upon a subjective process for identifying pavement in need of reinforcing or rehabilitation. The department is in the process of developing a more "formalized, quantitative procedure for assessing pavement condition".⁶ The Pavement Serviceability Index (PSI) is a mechanism used in the OOP report by which pavement conditions are reported. The PSI system presents pavement conditions on a scale from 0-5. The scale is identified in Table 6.

Table 6

Pavement Serviceability Index and Improvement Needs

<u>PSI Rating</u>	<u>Conditions</u>	<u>Improvement Need</u>
0-1.9	Very Poor	75% Reconstruction 25% Resurfacing
2.0-2.9	Poor	50% Reconstruction 50% Resurfacing
3.0-3.9	Fair	0% Reconstruction 100% Resurfacing
3.9-4.9	Good	
5.0	Very Good	

Source: GMP

According to the GMEP Report approximately 50% of the roads classified as poor require rebuilding, this increases to 75% for roads classified as very poor. The roads rated as fair and the remainder of those poor to very poor should be resurfaced.³⁷ Bridges are classified using a sufficiency rating which ranges from 0-100. Sufficiency ratings incorporate engineering and other related indicators about the condition of the structure. Bridges with a sufficiency rating of less than 50 are rated poor, 50 through 69 fair and 70-79 good, and 80-100 very good.³⁸

One (MIP's comprehensive report about the condition of New Jersey's highway system stated that the total cost of maintenance necessary to repair the existing State road and bridge system was 1.5 billion dollars in 1983,³⁹ The report indicated that over 80% of the State's highway system and roughly 15% of the bridges were rated fair or worse. New Jersey D.O.T. 's 1984 Transportation Plan identified the expenditure of \$1.153 billion dollars for reconstruction and resurfacing for the period 1985-1988.⁴⁰ This level of expenditure for maintenance related construction identifies the level of expenditure necessary to reduce and stabilize the maintenance backlog. Despite the expenditure of over 1.1 billion dollars for maintenance projects during this period the magnitude of the backlog was projected to increase to 2.4 billion in 1983 dollars. This increase is due to decay dynamics which are not linear, since road conditions worsen faster as a roadway ages. Therefore, the maintenance backlog is projected to be 2.6 billion in 1987 dollars. Combined, the current improvement and maintenance need for the state highway and bridge program is 4.2 billion dollars.

The condition of the county and local transportation system has been quantified by the State of New Jersey County and Municipal Government Study Commission (OGSC). Their latest report, New Jersey's local
Transportation; An Assessment of Needs, published in September 1984 relied upon county and municipal engineers to complete in depth questionnaires using their "professional judgment" to assess the condition and needs of the infrastructure under their jurisdiction in terms of infrastructure maintenance and improvement need. The report concluded that, "19 percent, or 4600 miles of New Jersey's municipal streets and 10 percent or 600 miles, of New Jersey's county roads are in poor or very poor condition and in need of immediate resurfacing or reconstruction."⁴² One-fourth of the county bridges in the state are rated as being in poor or very poor condition and in need of "major reconstruction and replacement" with 6.5 percent being in such poor condition that they represent a serious safety threat and "are closed or should be closed".⁴³ The report stated, "Together, the combined unmet capital investment needs for local roads and bridges total 110 million dollars each year."⁴⁴ Furthermore and more significant the CM3SC report states, "The Commission's need projections are also based on the assumption that previous capital investment levels by local government will be an accurate predictor of future levels of capital investment for that system. Because the deterioration of capital facilities is not necessarily a linear process, the level of needed capital investment may increase significantly as many facilities reach the end of their useful service lines."⁴⁵

The expression of need in the OGSC report for the local system has resulted in an incremental enhancement to the revenue available to local government from state resources through the Transportation Trust Fund.

However, the report is based on a highly subjective interpretation of need and acknowledges that the needs expressed do not recognize decay dynamics, a major consideration defining the long-term needs of the highway and bridge system. In order to more fully recognize the influence of decay dynamics on the local system, this report will reevaluate the local systems needs.

The reevaluation approach will be the methodology used by the OOP for quantifying the maintenance backlog. This methodology evaluates the subjective roadway conditions, recognizing the dynamics of the decay process. The procedure recognizes the percentage of roadways rated very poor, poor and fair and identifies the percentage of these roads in need of simple rehabilitation or complete reconstruction based on historical percentages. This is done to determine the magnitude of the present county and municipal maintenance backlog. Table Identifies county and local road mileage as classified by CM3SC.

Table 7

County and Municipal Road Conditions

	County	Municipal	Total
Very Poor	119	1357	1476
Boor	567	3189	3756
Fair	1754	7617	9371

Source: County and Municipal Study Commission.

historical percentages of need for reconstruction and resurfacing have been presented in Table 6.

By combining Table 6 and Table 7 the total local mileage in need of reconstruction and resurfacing can be determined. The mileage and costs associated with the maintenance activities are presented in Table 8.

Table 8
Local Road Needs

<u>Condition</u>	<u>Miles</u>	<u>Cost per mile(000) (In thousands)</u>		
Very	1107 x	1,230	=	1,361,610
Poor	369 x	220	=	81,180
Poor	1878 x	1,110	=	2,084,580
	1878 x	220	=	413,160
Fair	0	x		0
	9371 x	200	=	<u>1,874,200</u>
			TOTAL	5,814,730

Source: CM3SC, QHP, OSP

The current maintenance backlog of local roadways, evaluated considering the condition of the system as reported by local engineers and OOP methodology recognizing decay dynamics yields a current need of 5.8

billion dollars. The validity of this methodology is based on the assumption that the engineers judgment and historical reconstruction needs are consistent with the judgment and pattern of decay dynamics noted by the CHIP. It is critical to recognize that even if the assumptions are invalid the magnitude of the need significantly exceeds that which has previously been recognized as the local system needs for maintenance of roadways.

Using the OOP bridge condition methodology to reevaluate the local bridge need results in a comity bridge need of \$1.1 billion. This estimate compares favorably with ItJDCT's Division of Bridges and Structures 1987 estimate of need for county bridges of approximately 1 billion dollars.⁴⁶ Both estimates exceed the CM3SC report's unmet need of 38.9 million dollars a year. The CM3SC unmet need, would result in a level of expenditure of 50 million dollars a year. At this rate the backlog of approximately 1 billion dollars would take 20 years to address and it incorrectly assumes that no further decay occurs during the 20 year period.

Since the CM3SC report consolidates the improvement and maintenance expenditure it is impossible to determine the proportion of this cost which is directed at capacity enhancements. This is compounded by the fact that the overwhelming majority of municipalities do not have capital plans for highways. Further research is necessary to determine the need for capacity enhancements to the county and local systems to ensure that the total local road or bridge need of 6.9 billion dollars is comprehensive.

The total need, considering State, county and local roads and bridges, of the auto/highway system in the State of New Jersey is the sum of the state and local needs. Using the recalculation of county and municipal needs developed above, yields an estimate of 11.1 billion dollars. This figure can be compared to the \$8.9 billion estimated total need for roads and bridges estimated in the 5/8/87 Technical Reference Document, "Infrastructure Needs Assessment" prepared by Hammer, Siler, George Associates (p.8). The HSG figure was an estimate based on the GM3SC report. The recalculation above would increase the Roads and Bridges total needs in the HSG Technical Reference Document by approximately \$2 billion.

This amount, if expended, would return the system to good condition in terms of pavement quality and bridge sufficiency. The recognized maintenance needs, capacity improvements and completion of the interstate system are only small components of the total improvement need. If congestion on the auto/highway system is to be addressed much new research will need to be conducted. Congestion will continue to exist and worsen on the roadways which have not yet been studied in the detail necessary to fully document the capacity enhancements necessary to accommodate current and projected traffic volumes.

3. Public Transportation System

The third major component of the transportation system in the State is the public transportation system. New Jersey Transit (NJT) is the public corporation created by the State Legislature in 1979. The corporation is charged with coordinating and improving bus and rail

services throughout the state. The capital needs of the public transportation system can be broken down into three components: The maintenance and upgrade of existing facilities; rolling stock; and new initiatives that represent projects which would expand or enhance the existing system. One NTT Fiscal Year 1988-1991 Capital Program includes 404.96 million dollars for basic infrastructure improvements. This funding includes improvements to railroad track, bridges, tunnels, passenger facilities, bus maintenance and passenger facilities as well as support equipment. The Capital Plan identifies 162.71 million dollars for acquisition and overhaul of rolling stock for the rail and bus system. Finally the NJT Capital Program includes 646.33 million for new initiatives. These initiatives are listed below and are discussed in detail in the NTT Report "Meeting New Jersey's Growth Challenge."

N.J. Transit - New Initiatives Program

South Busway

Perm Station New York Access Improvements

Secaucus Transfer .

West Shore Rail Line

Kearny Connection

Waterfront Connection

Hunter Connection

Jfantclair Connection at Bay Street

Northeast Corridor & North Jersey Coast Line Service
Expansion

MooKxrt^Ocean/Eastern Middlesex Pail Improvements

Increasing the Parking Supply Source: N.J.

Transit, Meeting New Jersey's Growth Challenge.

The N3T report focuses on the needs of the public transportation system in Northern New Jersey. The needs in the remainder of the state are currently being studied. The findings of the studies will be used to document the needs for other areas and new projects will be considered for funding when the needs have been thoroughly documented.

In addition to the needs identified by NJDOT, NJT and the CM3SC, the following Authorities and Commissions provide transportation sendees within the State: Other Agencies

- The New Jersey Turnpike Authority
- The New Jersey Highway Authority
- The New Jersey Expressway Authority
- The Palisades Interstate Park Commission
- The Delaware River Joint Toll Bridge Commission
- Ihe Burlington County Bridge Commission
- The Cape May County Bridge Commission
- The Delaware River and Bay Authority
- The Port Authority of New York and New Jersey
- The Delaware River Port Authority

The capital needs of these agencies are significant, for example, the New Jersey Turnpike Authority is in the process of implementing a 2 billion dollar widening program. However, the needs of the majority of these agencies are covered by revenue generated, the exceptions being the

Palisades Interstate Park Commission (PIP) and the Delaware River Joint Toll Bridge Commission. The FTP capital needs related to its 25 mile Parkway transportation system are 2.03 million dollars for 1988 and 1989.⁴⁷ The EKPTBC operates 13 free bridges and 6 toll facilities. The toll proceeds are used to retire the revenue bonds which funded the construction of the bridges. The appropriation for FY 1986 covering the maintenance of the free bridges was 1.943 million dollars and the projection for FY 1988 is 2.202 million dollars. New Jersey is reimbursed for 50% of the appropriation by the Commonwealth of Pennsylvania.⁴⁸

The transportation system in its broadest definition also includes the movement of freight by rail and aviation facilities. NJDCT maintains a program to insure the maintenance of essential rail service in areas where service has been abandoned by OCNRAIL. Between 1983-1986 an average of 2.8 million federal, state and local funds were spent annually on rail projects throughout the state. The 1985 NJLXT State Rail Plan identified a 2.0 million dollar a year state commitment to continue funding this program.⁴⁹

Finally, the NJDOT, Division of Aeronautics, is responsible for promoting "the orderly and progressive development of the airport system to meet growing air traffic needs" as well as improving the quality of aeronautical facilities and promoting flight safety and air transportation. One statewide aviation needs are assessed by the use of a combination of mail surveys and on-site inspections. The 1988-1991 need listed in the Capital Program is projected to be 39.1 million dollars.⁵⁰

The needs expressed for the individual transportation systems should not be totaled. Each of the systems are funded differently with revenues coming from Federal, State, local governments, user fees and private contributions. The percentage of funding from each source varies by system and project. One intent of this report is to report the need for each system as it is known today. The introductory comments identified a number of caveats with the identified needs. It is important to recognize that although the need for each system is large, the systems serve the majority of the current transportation demand safely and efficiently. The increased demand which will occur from projected growth will need to be accommodated. Revenue enhancement by both private and public resources will be necessary to meet the needs of future growth.

IV. Conclusion

The transportation system in New Jersey developed as a result of the State's desire to provide adequate mobility for its constituents. Located along the Northeast Corridor between New York City and Philadelphia, New Jersey was the first state to recognize the importance of a transportation system by becoming the first state in the nation to grant aid for the construction of public roads in 1891. From that point on, technological advances in automobile technology and governmental programs have fueled the development of a land use pattern which has resulted in an increasing reliance on the automobile. The transportation system in New Jersey is able to satisfy travel demands in all but peak periods. The peak problem

has worsened as new development is increasing demand on a system which cannot readily expand. The period of peak demand has spread over a greater period and now exceeds six hours a day in some parts of the state. Highway congestion has become so critical that it has been identified by most New Jersey residents as a concern. In the past the solutions to the congestion problem included new road construction, road widening, public transportation systems, and the implementation of transportation systems management programs. New Jersey has reached a limit as most of the transportation system which could be readily expanded already has been.

This report has documented the peak period problem is worsening despite the combined efforts of NJDOT, NJ Transit and local governments. It is now obvious that the peak demand cannot be arfnmmndatpd by increasing system capacity alone. The nature of the demand must be altered. The fundamental problem appears to be the land development pattern which has emerged since the end of World War II. The location and timing of growth in New Jersey's suburban counties has been related to the construction of the interstate highway system. Enhanced access afforded to these areas has spawned development. The pattern of this development, low density with physical separation of different land use categories, requires the utilization of an automobile to satisfy the most basic travel needs. The automobile now serves over 80% of the journey-to-work travel in the State and an even higher percentage of non-work travel.

The sprawling pattern of development has resulted in the demise of private mass transportation and pedestrian travel. Mass transportation

has become ^{1f}"public transportation" requiring annual subsidies from the federal and state governments to provide the most basic service. This is a result of declining ridership caused by changing land use and travel patterns and reduction of the overall density of urban areas. The public transportation system in New Jersey could be more effective in meeting the needs of the state if transportation planning and implementation was coordinated with local land use decision making. The current system of ad hoc, disjointed transportation and land use planning has resulted in small areas of high density development which cannot support public transportation services yet generates traffic which overwhelms the highway system. This gap between transportation facilities and land use is also illustrated in areas of low density development that possess major fixed capital facilities. This lack of coordination also results in conflicts, for example, NJ Transit seeks to expand parking facilities trying to serve additional ridership, and local land use policies prevent the expansion of these desperately needed facilities.

Pedestrian movement has also been reduced to a small percentage of total travel in the state. New Jersey's urban areas where pedestrian travel can be an acceptable alternative, have declined significantly and the suburban population only walks from their homes to their automobiles rather than to a destination. New Jersey's future depends on a more balanced, integrated land use and transportation system which maximizes people and vehicle movement, fully utilizing the available capacity of all transportation systems.

The cost of maintaining the transportation system is another major issue. There is currently a 11.1 billion dollar highway and bridge need and over 1 billion dollar transit need in the state, This 12 billion plus dollars would maintain the existing systems and better acrnmmndate current demand. Projected growth will further strain the existing system requiring additional highway mileage and transit facilities.

Despite the recent passage of the Trust Fund Renewal, the current levels of funding appear to be inadequate as the maintenance and improvement needs are large and growing. New needs are being identified continuously as NJDOT and NJ Transit complete ongoing studies. Another significant inadequacy with current programs is that the non-state transportation system's needs are poorly defined. This is due to a lack of planning resources and results in an unknown liability which appears to be large. Continuation of the Transportation Trust Fund is warranted, at an increased level of funding. This will enable the State to continue ensuring mobility, m addition to an enhanced state resource base dedicated to transportation, a true partnership is necessary to provide capacity to support new growth. local transportation problems are best addressed with minimal state involvement. Transportation development districts comprising the affected areas with contributions from both public and private sources should be used to address local problems. This will allow the state to direct its resources at solving problems that are regional or statewide in nature.

The protection of the existing networks safety and capacity is also needed. Ityriad uncoordinated curb cuts and intersections with local streets are compromising the integrity of the arterial systems. NJDOT is awaiting legislation that will allow them to prepare access standards for the state highway system. Access control standards if applied to the highway system could help prevent unnecessary deterioration of the highway capacity and protect travel safety by minimizing disruptions to traffic flow and eliminating uncontrolled vehicle conflict areas.

The predominant pattern of development in New Jersey, suburban sprawl, is inefficient in -terms of transportation. The growing highway congestion and public transportation subsidy requirements are testaments to that. The pattern of motor vehicle registration and Vehicle Miles Traveled show increases which exceed previous projections. The bond between growth in the state and the transportation system has been clearly documented. If New Jersey's growth is going to continue, the state will have to ensure that mobility to, from and within the state is protected and enhanced. Ifctoility, however, does not only equal highways There are genuine opportunities to concentrate development in a manner that will allow individuals freedom to chose their mode of travel. Currently, almost all travel in the state is satisfied by the automobile because the pattern of development requires it. Euclidean zoning has separated land uses too well, as residential areas are segregated from non-residential areas and in most instances by great distances. These areas now bear little or no relationship to one another. Even Planned Unit Developments, the most progressive development pattern, are designed to serve the automobile, with secondary consideration given to pedestrian access.

time has arrived to focus land development, so that it facilitates mobility. Travel congestion is only a symptom, land development patterns that dictate node choices rather than allowing for flexibility are the problem. New Jersey has already recognized that it can not build the road system necessary to accommodate 100% automobile travel. It is possible to alter travel demand to reduce the reliance on auto travel by focusing growth into existing urban areas and new centers. These are the areas where localized and regional public transportation systems can capture a larger percentage of total travel. Employment centers within walking distance or closer to residential areas can reduce or eliminate auto vehicle miles traveled for many travelers. The State of New Jersey with its local governments has the opportunity to shape land development patterns through the state planning and cross acceptance processes. This process must recognize the errors of the past and should be able to accommodate the projected growth through a balanced, integrated and coordinated land use and transportation planning process.

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47. New Jersey Department of Transportation, 1984 Plan, p. 103.
48. Kean, IJthomas H., New Jersey Budget. 1988. p. D-348.
49. Hammer, Siler, George Associates, Infrastructure Memorandum, p. 29.
50. Ibid., p. 28.