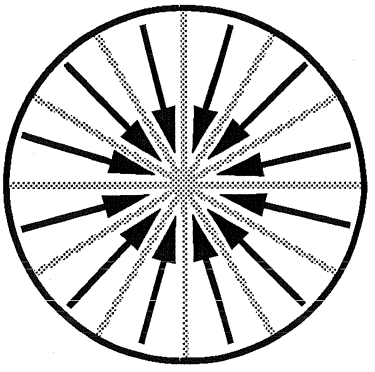
REGIONAL MOBILITY POLICY ANALYSIS



PAST TRAVEL PATTERNS

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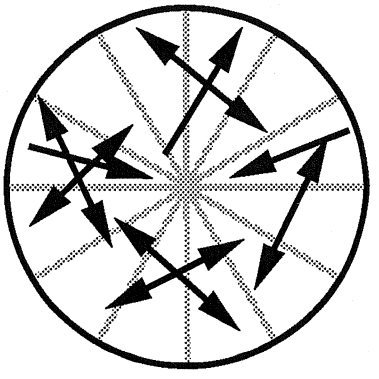

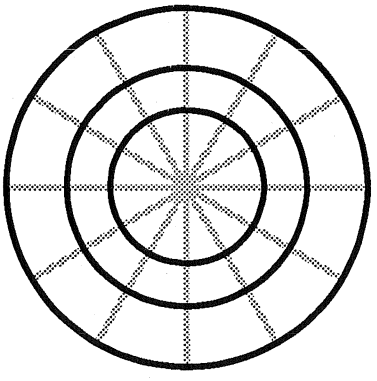

FUTURE TRAVEL PATTERNS

Delaware Valley Regional Planning Commission

January 1990

REGIONAL MOBILITY POLICY ANALYSIS

Prepared by:

DELAWARE VALLEY REGIONAL PLANNING COMMISSION

THE BOURSE BUILDING
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JANUARY 1990

The preparation of this report was funded through federal grants from the U.S. Department of Transportation's Federal Highway Administration (FHWA) and Urban Mass Transportation Administration (UMTA), as well as by DVRPC's member governments. UMTA has provided $16,000 or 40% toward the total project cost.

Created in 1965, DVRPC provides continuing, comprehensive and coordinated planning for the orderly growth and development of the Delaware Valley region. The interstate region includes Bucks, Chester, Delaware and Montgomery counties in Pennsylvania, and the City of Philadelphia; and Burlington, Camden, Gloucester, and Mercer counties in New Jersey. The Commission is an advisory agency which divides its planning and service functions between the Office of the Executive Director, the Office of Public Affairs, and four Divisions: Transportation Planning, Strategic Planning, Regional Information Services Center, and Finance and Administration. DVRPC's mission for the 1980s is to conduct high priority short term strategic studies for member governments and operating agencies, develop a long range comprehensive plan and provide technical assistance, data and services to the public and private sector.

The Delaware Valley Regional Planning Commission (DVRPC) logo is adapted from the official seal of the Commission and is designed as a stylized image of the Delaware Valley. The outer ring symbolizes the region as a whole while the diagonal bar signifies the Delaware River flowing through it. The two adjoining crescents represent the Commonwealth of Pennsylvania and the State of New Jersey. The logo combines these elements to depict the areas served by DVRPC.

DELAWARE VALLEY REGIONAL PLANNING COMMISSION

PUBLICATION ABSTRACT

Title	Date Published: 1990
REGIONAL MOBILITY POLICY ANALYSIS	Publication No. 90001

Geographic Area Covered:

Delaware Valley region: Bucks, Chester, Delaware, Montgomery and Philadelphia counties in Pennsylvania; Burlington, Camden, Gloucester and Mercer counties in New Jersey

Key Words:

Region, decentralization, population, households, employment, development, trends, forecasts, Year 2010 Regional Development Strategy (RDS), centers, vehicle miles traveled (VMT), auto ownership, travel patterns, public transit, highways, congestion, air pollution strategies, issues, solutions

ABSTRACT

This study (1) documents the region's evolving development pattern, including population, household, employment and development trends and forecasts; (2) identifies regional mobility trends and their implications; and (3) frames a set of issues, goals and strategies to be addressed in DVRPC Year 2010 Regional Transportation Plan.

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EXECUTIVE SUMMARY

The Regional Mobility Policy Analysis is intended as the starting point for the development of a Year 2010 Regional Transportation Plan for the nine-county Delaware Valley region. The report is divided into three parts, including background information concerning the region's demographic, developmental and transportation characteristics, as well as issues, goals and strategies to be addressed in future planning activities by the Delaware Valley Regional Planning Commission.

The demographic and development section includes an overview of the region's historical development, as well as population, household, employment and development trends and forecasts to the year 2010. The major conclusion of this section is that the region's growth and development is decentralizing, at an accelerating rate, from Philadelphia to the surrounding suburban counties. At the same time, Center City Philadelphia remains the region's Metropolitan center with the largest concentration of jobs in the region. In addition, the region's changing economy (from manufacturing to services) and its changing household characteristics have modified traditional notions of employment location and travel patterns. The region's multi-centered, sprawling and low density development pattern runs counter to the need for a compact and denser pattern, more conducive to public transit, as an alternative to continued reliance on the automobile.

The transportation characteristics section reviews the region's increasing vehicle miles traveled which is increasing more rapidly than population, household and employment growth. In addition, it highlights the shift in the predominantly radial travel pattern from suburb to city to a greater emphasis on circumferential trips which cut across the counties. This change in travel pattern has put new strains on the region's aging transportation infrastructure; exacerbated the region's air quality problems due to mobile source emissions; and increased regional congestion. It also works against the need to promote and increase transit ridership, which has traditionally been a radially-based system. The gap between supply and demand for transportation facilities is increasing and the funding necessary to help meet the growing needs is not available.

The report concludes with issues, goals and strategies, involving a combination of supply and demand actions, to achieve a more balanced regional transportation system to meet changing travel demands. Concerted public and private sector action will be necessary if solutions to the region's mobility problems are to be achieved.

BACKGROUND/PURPOSE

On October 28, 1988, the Delaware Valley Regional Planning Commission (DVRPC) Board accepted the Year 2010 Regional Development Strategy (RDS) as the Commission's new long-range plan for the future growth and development of the nine-county, Delaware Valley region. The 2010 RDS and its background studies were developed over a two-year period in close cooperation with the two states and the region's city and county planning agencies. The RDS focuses on the location and magnitude of the region's future population and employment growth and its changing development pattern.

The RDS is intended to serve as a policy guide to accomplish several interrelated goals:

- To provide the supporting framework for the preparation of a Year 2010 Transportation Plan.
- To provide a future "vision" of the ongoing development of the region and its future form.
- To highlight the importance of linking sound planning for infrastructure (sewer, water, transportation) restoration and expansion with land use and development to attain a more compact regional development pattern.

Following release of the RDS, the DVRPC Board directed that the agency's Fiscal Year 1990 Work Program include a Regional Mobility Policy Analysis. The present study is intended to complement and build upon the 2010 RDS by: (1) documenting the region's evolving development pattern; (2) identifying regional mobility trends and implications, and (3) framing a statement of issues to be addressed through DVRPC's 2010 Transportation Plan work program and related work. The mobility study is to be completed by January 1990, to provide time for Board consideration of including possible new studies in the Fiscal Year 1991 Work Program.

An overall policy thrust of the Mobility Study is to show the importance of linking continued economic prosperity in the region with the maintenance of enhanced mobility for the region's work force and goods movement. Accomplishing this overall goal in light of the region's decentralized and scattered "metropolitan lifestyle" is a major challenge, requiring an emphasis on innovative planning approaches to meet changing mobility needs.

INTENDED AUDIENCE

As a starting point for the Regional Mobility Policy Analysis, it is important to define the intended audience for the study's end products. Four key "stakeholders" have been identified with an emphasis on communicating the study's outcome to a broader audience than the one reached by a more technical DVRPC report.

The Region's Elected Officials - The state, city and county elected officials, as well as other public decision-makers should be a primary focus of the study's recommendations. If changes to current mobility, development and infrastructure policies are required, particularly in terms of financial support, the informed opinions and agreement of the region's elected leadership will be critical to achieve implementation.

The Business Community - The involvement of the business community in public policy issues has been increasing. Given the study's emphasis on linking continued economic prosperity with enhanced mobility, it is essential to target the study's findings and recommendations to the region's business leadership. The need for private sector financial support to supplement public funding for needed mobility improvements is another key reason to achieve business community support for the study's outcome.

The Media - The broadcast and print media can be helpful allies in communicating the study's outcome to the identified audiences. Their understanding of the purpose of the study, from the beginning, will be important to convey the appropriate message to the general public and to ensure that inappropriate messages are avoided. Achieving this goal may require interim press briefings and sharing of information before the completion of the study, followed by a concerted and targeted public awareness campaign after the study's release.

The General Public - The understanding and support of the general public can provide the foundation for major decisions by the region's policy makers and the private sector. Helping to shape a citizen consensus on the region's mobility needs and goals can be a specific benefit of the study.

Transportation and land use planners and traffic engineers, while important in identifying, analyzing and seeking solutions for mobility issues, are not the principal audience of this study. Instead, the emphasis is on communicating the magnitude of the issues and the consequences of inaction to those who must make the difficult decisions regarding future development patterns and infrastructure investments and who must lend political, financial and public support to achieve the necessary funding for the recommended planning and engineering solutions.

THE SETTING

Any discussion of land development and mobility issues must first identify the context or regional setting for decision-making: What is the "Delaware Valley Region"?; What is the decision-making framework for land use and transportation issues?; and, What is its development history?

A Definition - The Delaware Valley Region can be defined as that area under the jurisdiction of the Delaware Valley Regional Planning Commission, the federally-designated Metropolitan Planning Organization for the Philadelphia and Trenton metropolitan areas **(see Figure 1)**. It encompasses portions of two states, Pennsylvania and New Jersey, and nine counties (Bucks, Chester, Delaware, Montgomery and Philadelphia in Pennsylvania and Burlington, Camden, Gloucester and Mercer in New Jersey).

Within the region's counties are 352 municipalities (townships, boroughs and cities); 238 in Pennsylvania and 114 in New Jersey. There are no unincorporated areas. The individual municipalities reflect great diversity in terms of geographic size, population, land use characteristics and the level of professional and administrative support provided to their citizens.

REGION FACTS
DID YOU KNOW?

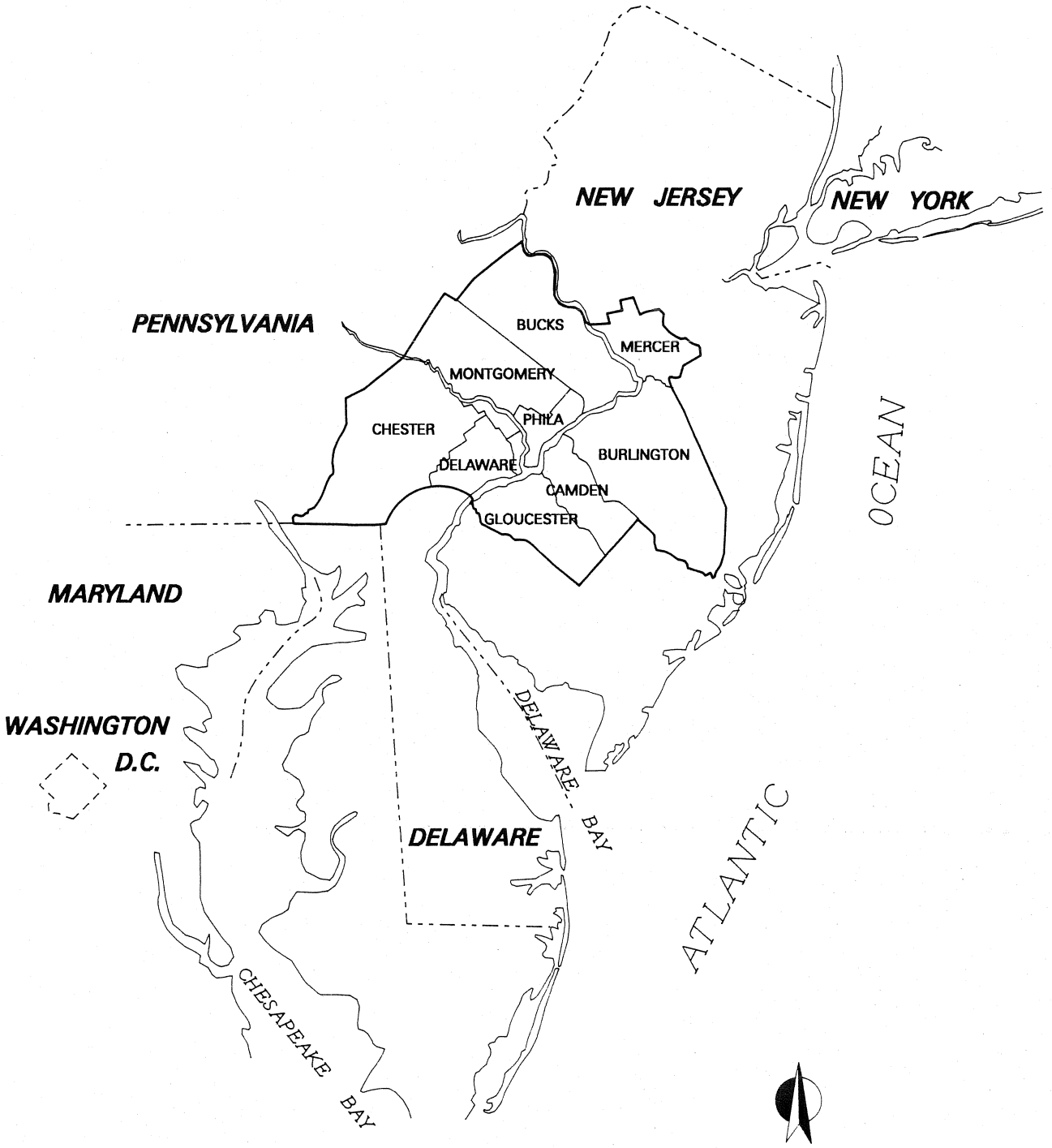
The Delaware Valley Region contains an area of 3,833 square miles. If the Region was a state, it would rank 48th in area - larger than Delaware and Rhode Island. Also, if the Region was a state, its more than 5.2 million people would rank it 15th in Population - between Missouri and Indiana.

Regional Planning in the Delaware Valley - Regional planning in the Delaware Valley had its roots in the government reform movement of the 1920's and coincided with the 1928 Standard City Planning Enabling Act prepared by the U.S. Department of Commerce. A group of civic and business leaders formed the Regional Planning Federation (Pennsylvania, New Jersey and Delaware). In 1931 the Federation published a study and a 1980 Regional Plan for the Philadelphia Metropolitan Area. This early effort collapsed during the Great Depression.

Following World War II, under the guidance of the State Planning Board (which had been established in 1934), the five southeastern Pennsylvania counties tried to form the Southeastern Pennsylvania Regional Planning Commission. After some initial studies in 1952, it failed to survive as a continuing agency. Also in the 1950's, a Southeastern Pennsylvania Public Works Compact was established to pursue sewer and water service agreements.

FIGURE 1

LOCATION OF DELAWARE VALLEY REGION



Delaware Valley
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With the advent of the first Federal Highway Act in 1956, the Penn-Jersey Transportation Study was formed, involving eight counties (excluding Mercer). This was the forerunner of the nine-county DVRPC, which was created in 1965, following protracted negotiations among Pennsylvania, New Jersey and Delaware. Toward the end of the process, Delaware decided to remain separate, which thwarted the creation of a tri-state planning agency.

DVRPC's first regional plan, for 1985, was adopted in 1969 and coincided with the creation of the Southeastern Pennsylvania Transportation Authority (SEPTA). The second DVRPC regional plan had two components: the Year 2000 Regional Development Guide (adopted in 1979); and the Year 2000 Regional Transportation Plan (adopted in 1981).

The third DVRPC regional plan will also involve two components. The Year 2010 Regional Development Strategy was accepted by the Board in 1988. The Year 2010 Regional Transportation Plan is in preparation; the present report represents the first step in its development.

Decision-Making - The planning enabling acts of Pennsylvania and New Jersey delegate basic powers for day-to-day decision-making concerning land use and development issues to local government. Counties are relatively weak, umbrella governments with limited land use powers. Thus, the 352 municipalities in the region traditionally adopt local plans and zoning ordinances and subdivision controls to regulate land use and development within their boundaries, with little regard for the planning goals and objectives of neighboring municipalities, counties and regional agencies. Some movement toward change has begun in New Jersey within the process of establishing a State Development and Redevelopment Plan. However, the concepts of home rule, local autonomy and local prerogatives are often referenced by local officials to defend their right to administer sometimes isolated and freestanding land use decisions in their respective jurisdictions.

While state and federal environmental agencies can affect the extent, location and cost of development through the enforcement of various statutes concerning wetlands, sewage facilities and water supply, for the most part, county plans are advisory only and require voluntary cooperation and coordination by municipalities to attain their recommendations. (New Jersey county planning boards do have approval power for access and highway improvements located along county roads and for storm drainage plans affecting county facilities.) Friendly persuasion and appeals for support to accomplish mutual goals are usually all that can be done to implement multi-municipal, county or regional plans.

This fragile structure for land use and development decision-making can be viewed as a house with the region as the roof, the counties as the walls and the municipalities as the bricks making up the walls. While the house may continue to stand, even if the bricks are out of place, it will not be very stable.

REGION FACTS
DID YOU KNOW?

The largest of the region's municipalities is the City of Philadelphia, (which is both a city and a county). It has an area of about 130 square miles and a population of more than 1.6 million people. In contrast, Green Lane Borough, in Montgomery County, one of the smallest municipalities, is .3 square miles in size and has a population of 542. The smallest municipality in terms of population is Tavistock Borough, in Camden County, which has only nine residents.

The challenge of regional planning, given this multi-jurisdictional and fragmented system for land use controls, is to achieve consensus on a vision of the region's future, emphasizing the consequences of competing, parochial decision-making and fostering a regional context within which local decisions can be productive and cost-effective. Regional planning must seek to minimize counter-productive local decisions which, over time, can undermine the region's competitiveness and work against sustained growth.

A clear future for the region will provide a framework within which individual infrastructure improvement proposals can be advanced and implemented in a coordinated and cooperative manner. The promotion of each proposal can be facilitated by the development of a shared understanding of what each proposal is intended to accomplish, at both the regional and local levels, and by cataloging its benefits. Each proposal must withstand the test of cost-effectiveness in the face of scarce resources and competing needs and must produce greater benefits than "costs" (physical, fiscal and socioeconomic) following close scrutiny by county and municipal officials and the general public.

In addition to the often parochial interests of local governments, project implementation is also confronted by the "NIMBY Syndrome" (Not In My Back Yard). This approach to defeating a proposed facility is based on the premise that the intent of the project is virtuous, but that its location on the selected site is inappropriate. Unfortunately, this plea is often heard no matter which site is chosen.

Last, but not least, is the increasing tendency for projects to be stymied by litigation; filed by organizations or individuals who are dissatisfied by the data, procedures, venue or outcome of the project review and approval process. This increases the time for project approval, adds to project costs and occasionally leads to project cancellations. In effect, these suits may result in the "three D's" - Defer, Delay, Defeat - of an otherwise worthy proposal.

For major transportation projects, the timetable from conception to planning, engineering, construction and completion can stretch for decades. Sometimes the delays can be attributed to insufficient funding, but delays can also occur because of lack of local agreement concerning the location, design or need for a facility. The phenomena of delays, high costs, community disruption and political backlash clashes with rapidly changing local and area needs as well as greater concern for inadequate fiscal resources.

This has resulted in more emphasis on low cost or non-capital improvements to ameliorate congestion, accidents and related mobility concerns.

Historical Development of the Delaware Valley - The region's growth and development history is closely tied to the growth and development of the United States, its economic transformations and the changing technology of transportation. From its rural beginnings in the 17th century through the industrial revolution in the 19th century and the post-war development boom of the 20th century, the Delaware Valley can be viewed as a microcosm of the changes occurring throughout the United States. The location of early settlements, the concentrations of development in cities and the spread of growth to suburban areas were shaped by and helped to shape various travel corridors (canals, railroads, highways). A brief summary of the growth and developmental transformation of the Delaware Valley follows.

1700 - In 1700, 18 years after William Penn's arrival, Philadelphia had a population of 10,000 with an additional 10,000 or so in the surrounding counties. Two principal modes of transportation were used for goods and people movement. Cart roads and bridges were used to handle horse-drawn carriages and farm wagons. The rivers and major streams were traversed by ferries and boats carrying produce and other goods. The development pattern was small-scale and dispersed, reflecting a village and agrarian life style. In most cases, the terrain and natural features dictated the development pattern and settlements were established in the absence of preconceived, surveyed plans.

1700 to 1800 - As the region's first planner, William Penn's intent, aside from the grid iron development pattern of Philadelphia and its squares, was to promote the orderly development of the surrounding townships. His goal was to seek development of agricultural hamlets in each township with farmland surrounding them. Farmers were to commute out to the farms from the hamlets. However, the hamlet pattern never developed as envisioned by Penn, partially due to the preference of the Quaker settlers for individual farmsteads and partially to the desire of other groups to acquire lands farther out from the city. The orderly pattern broke down as the lands farther out were developed first. (Thus, leap-frog development and suburban sprawl are not really so recent phenomena as they are often perceived to be!)

Road building increased, with dirt roads constructed from Philadelphia to surrounding cities and towns like the spokes of a wheel. In the mid-1790's the Turnpike Era began with improvement of Lancaster Road with crushed stone. The first canals were also built to ship goods along the Schuylkill River.

By 1800 the iron, steel, glass and textile industries were just beginning. Country merchants helped to start small towns by providing goods and services for the surrounding farmsteads.

1800 to 1860 - Two major movements - one national and the other international - also affected the Delaware Valley region's population and employment growth: immigration from Europe and the Industrial Revolution. However, the radical changes in the organization and location of work had just begun to be reflected in the physical development pattern. Only 25 percent of the region's one million people resided in urban areas by 1860.

At the same time, there was an infrastructure construction boom with roads, bridges, canals and railroads being built to serve a rapidly expanding industrial base. The city's grid pattern became inefficient from a transportation point of view; wider streets were needed to channel both commuting and goods movement flows. A commercial core developed in Philadelphia with manufacturing clusters nearby. Major towns and cities also had become established in Pottstown, Trenton, Camden, Norristown and Chester.

1860 to 1900 - This period was the key era for industrialization and urbanization. The introduction of communications technology (the telephone and telegraph), as well as the beginnings of public transportation, led to the expansion of residential development away from industrial concentrations. The region's radial development pattern was reinforced by rail and road development. The railroads followed the canals in order to serve them and then supplanted the canals as the principal means of goods movement.

Urbanization of the region was encouraged by various favorable location factors - transportation, natural resources, trade and potential employment. By 1900, 80 percent of the region's two million people resided in urban places; more than reversing the figures only 40 years earlier.

1900 to 1930 - In the beginning of the twentieth century, dispersal of settlement was encouraged by the development of low cost electricity and transmission lines and the extension of electrified commuter rail and trolley lines. Housing, retail and service activities developed around the stations along each route. This was the era of the "trolley car suburbs."

The advent of the automobile was followed by increased road construction which helped to open up the entire region to development. Bridges across the Delaware River supplanted the ferries and encouraged interstate commerce and development around Camden, Woodbury, Haddonfield and Collingswood. The region's population was more than three million by 1930.

1930 to 1970 - The region's decline in population and employment growth during the Great Depression was followed by rapid mobilization to meet the production demands of World War II. Following the War, the returning G.I.'s took advantage of low cost, federally subsidized housing loans, new job opportunities, and the mobility offered by the automobile and the region's commuter rail network to establish the "bedroom suburbs" and a more metropolitan development pattern. This decentralized, multi-centered pattern was reinforced by the development of suburban shopping malls, apartment complexes, large-scale housing developments (like Levittown) and new suburban office and manufacturing parks (like King of Prussia). The region's population exceeded five million by 1970 with Philadelphia's population almost two million.

1970 to the Present - The suburbanization trend has continued and accelerated in the 1980's with further decentralization to the outer fringes of the region, increasing interdependence with adjacent regions (Wilmington, Allentown, Reading, Lancaster, Central New Jersey and Atlantic City) and further development of a hierarchy of suburban centers with different roles.

The economy's shift from a manufacturing to a service base caused major employment disruptions in the seventies and early eighties, leading to out-migration and the first loss in the region's population since the Depression. While this has stabilized to a degree,

further losses in manufacturing are continuing and the knowledge-based, service economy has created new challenges in terms of the skills levels of workers, labor shortages and transportation barriers.

The establishment of major suburban employment centers; the declining importance of Philadelphia as the regional focus for jobs; and the rapid increase of two-earner households and single workers, has resulted in changing commuter patterns (circumferential instead of radial and county to county or intra-county instead of and in addition to the more traditional suburb to city work trip). This commuter pattern has fostered increased congestion on inadequate local roads that were never intended to accommodate commuter traffic. At the same time, the new suburban employment centers have siphoned workers away from public transit and back to their cars, since this is often the only way that these centers can be reached.

The search for affordable housing or housing close to these new suburban employment concentrations has also hastened the development of the region's fringes and even adjacent, exurban counties. Loss of productive farmland has been an unfortunate consequence of this trend and the development of the fringes has also brought new service and capital facility demands to once rural areas.

Figures 2a through 2g show the dramatic changes in the region's urban development pattern from 1700 to 1980. The remainder of this report will focus on the development characteristics, trends and mobility consequences of the Delaware Valley's new metropolitan form and lifestyle and their effects on the development of a Year 2010 Regional Transportation Plan.

FIGURE 2-a

DEVELOPMENT PATTERNS - 1700

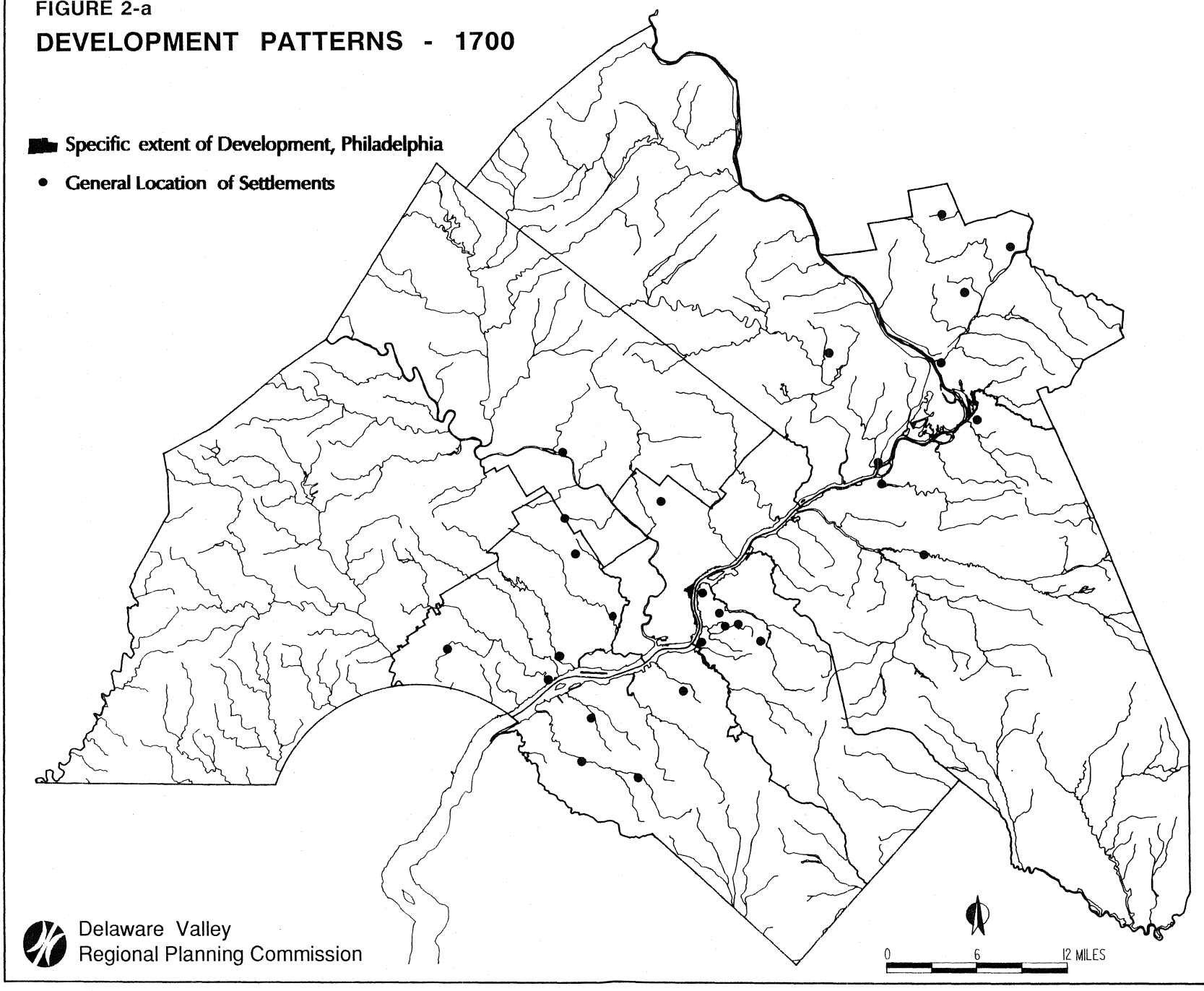

FIGURE 2-b

DEVELOPMENT PATTERNS - 1800

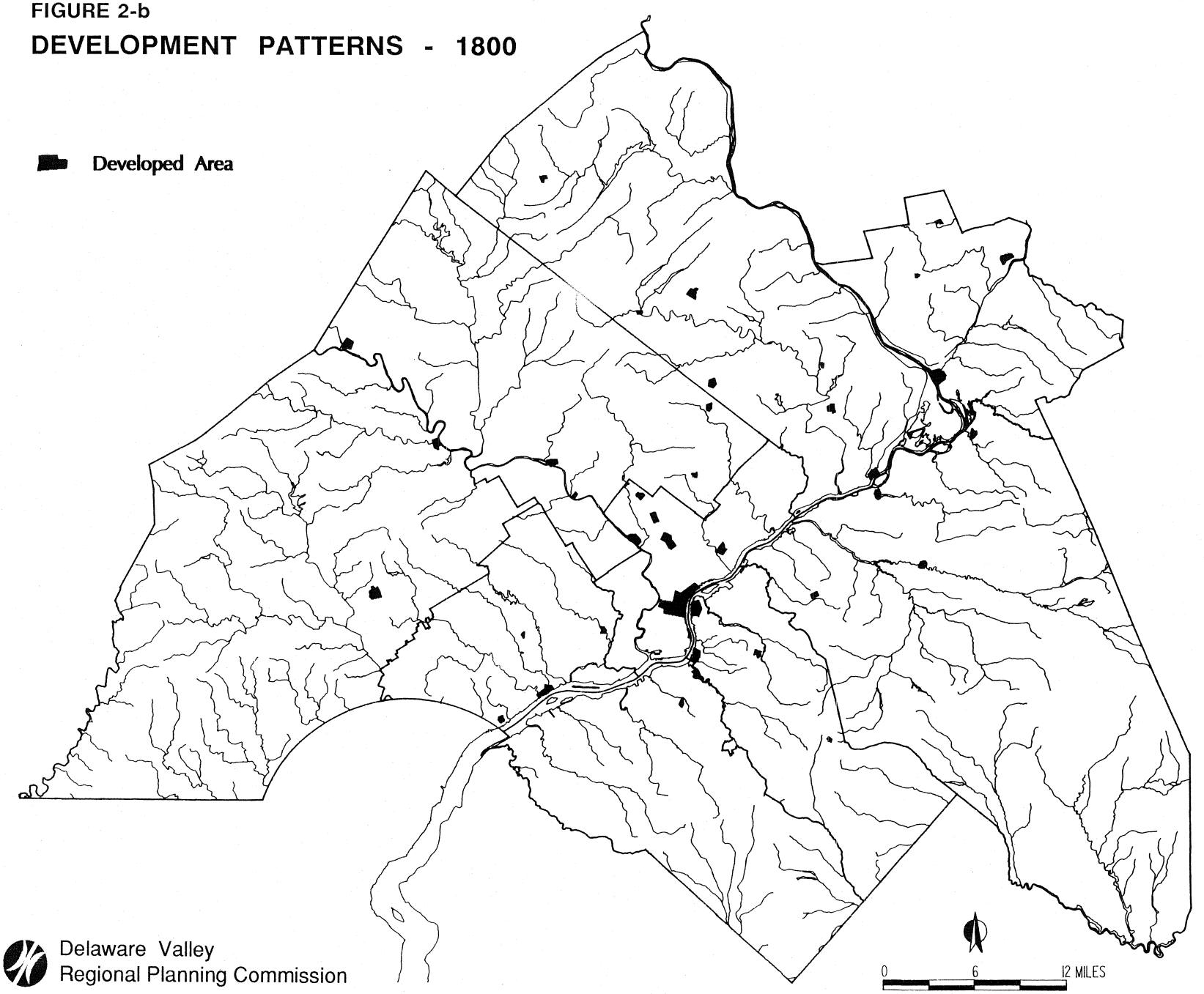

FIGURE 2-c

DEVELOPMENT PATTERNS - 1860

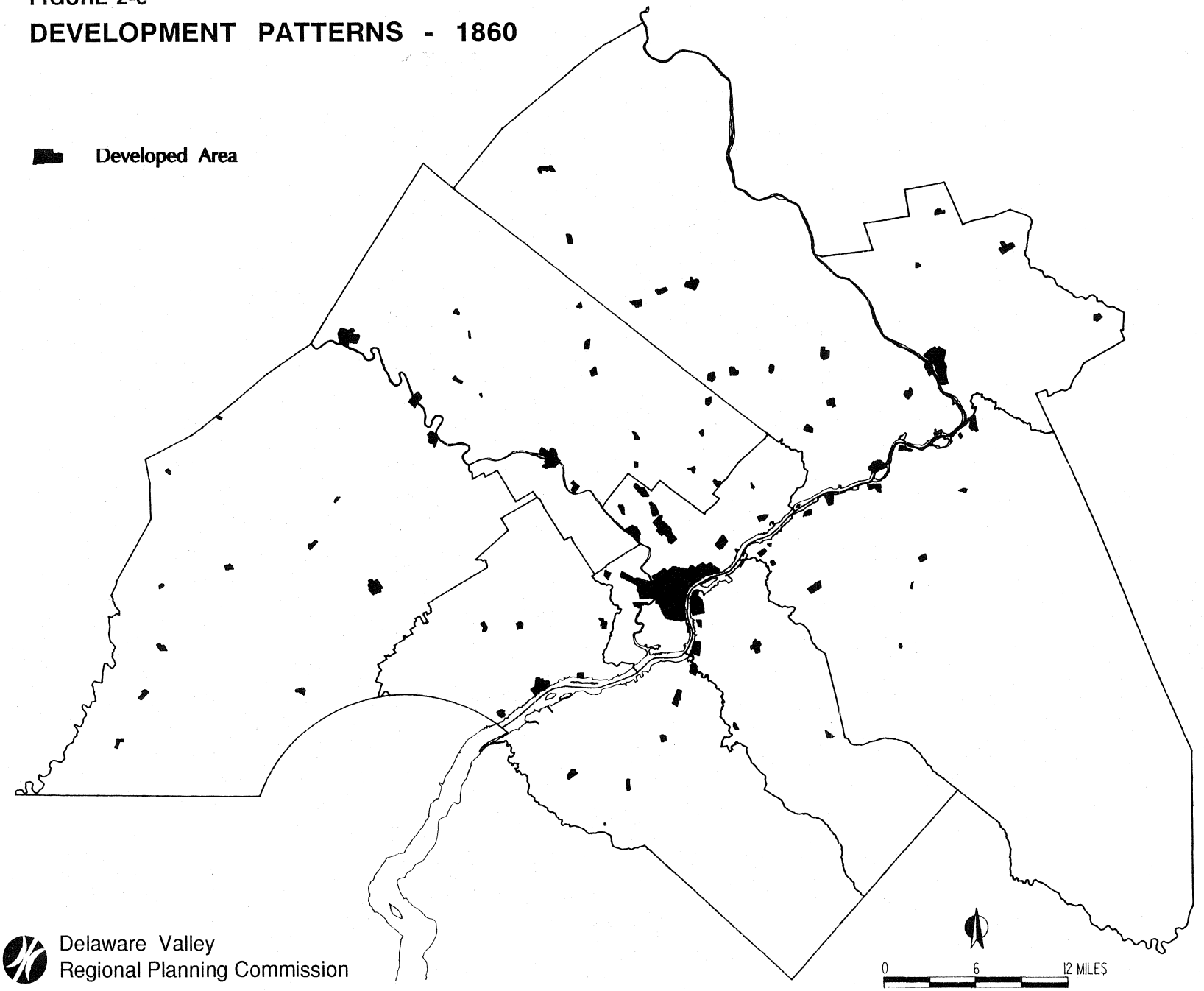

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FIGURE 2-d

DEVELOPMENT PATTERNS - 1900

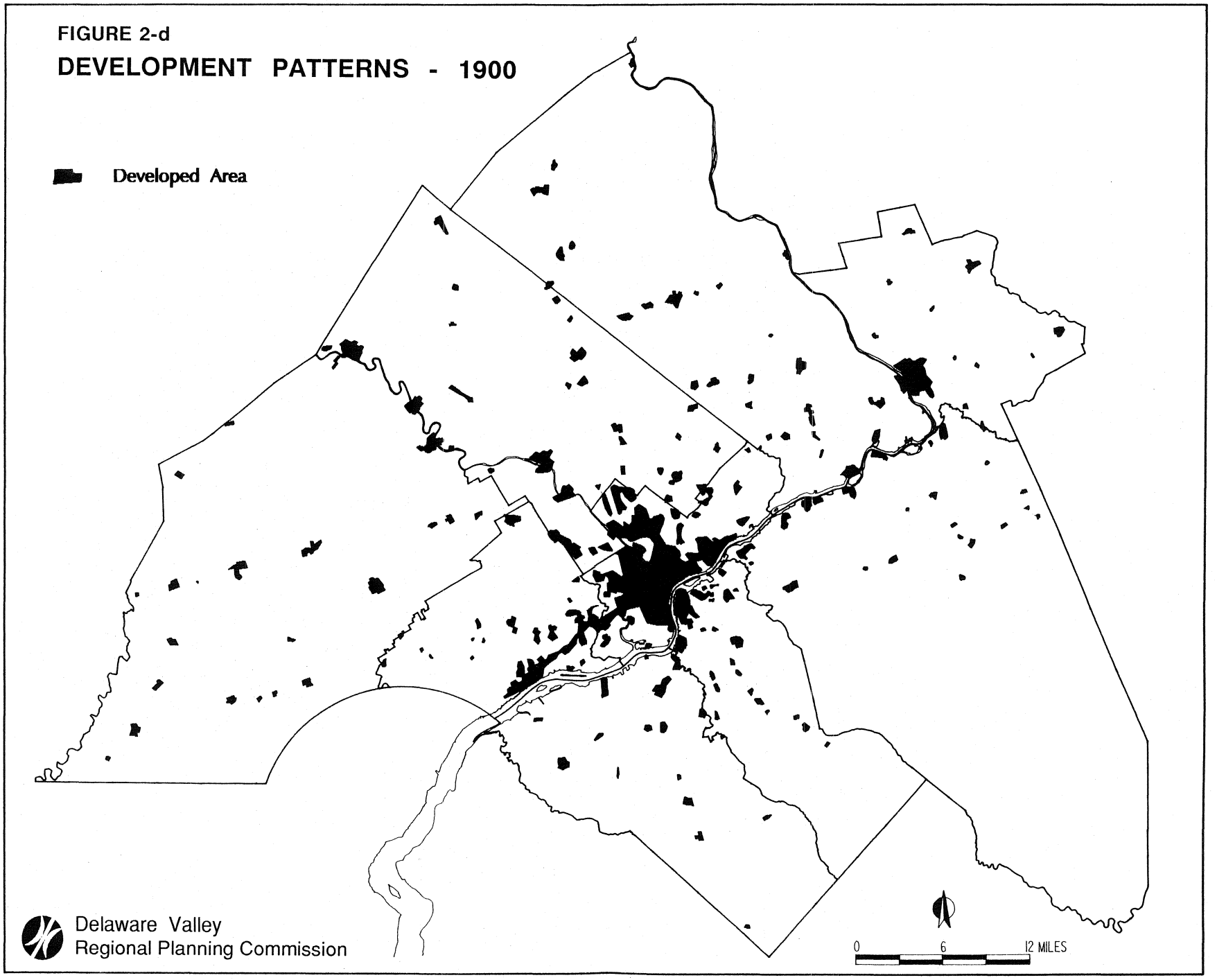


FIGURE 2-e

DEVELOPMENT PATTERNS - 1930

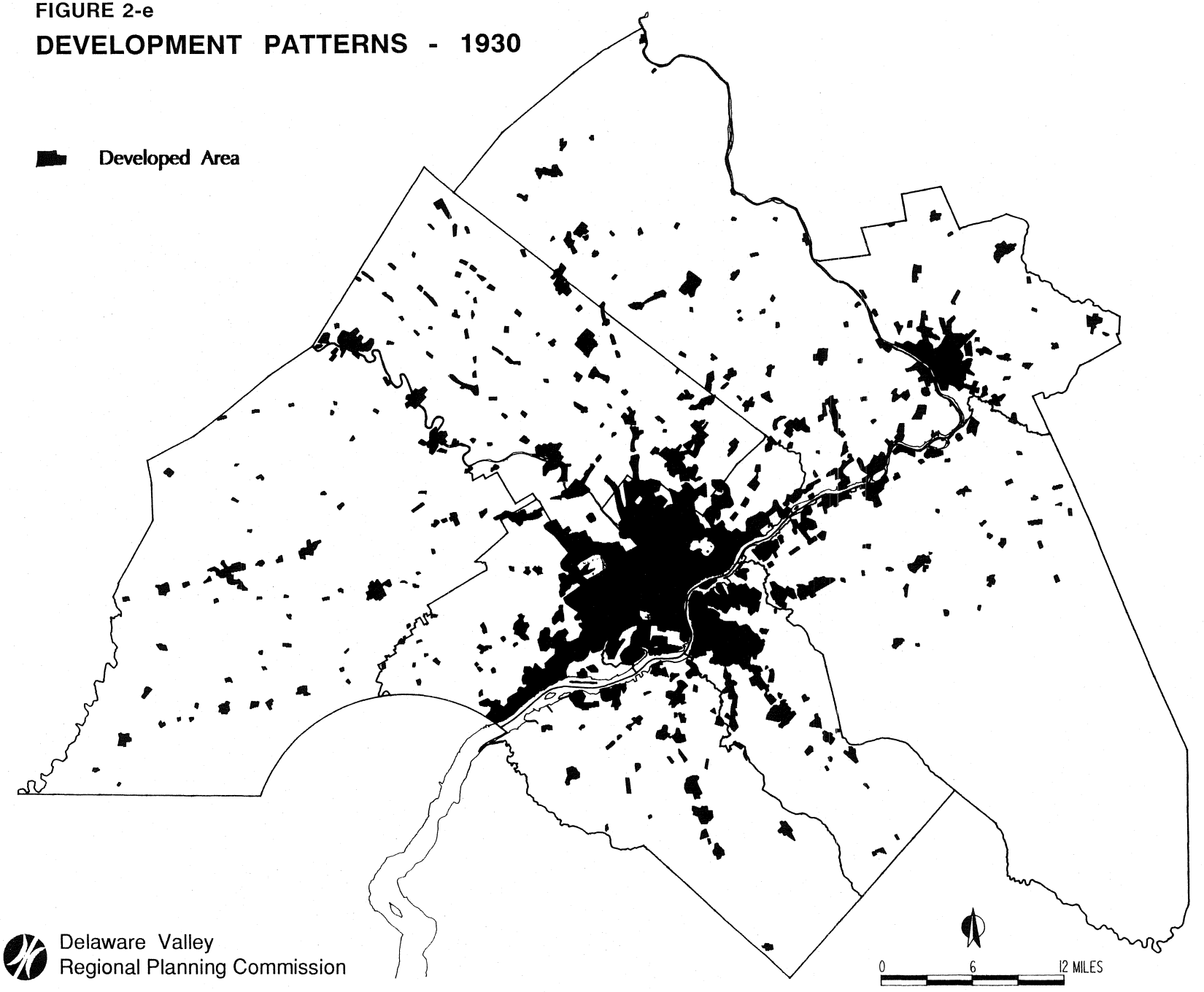


FIGURE 2-f

DEVELOPMENT PATTERNS - 1970

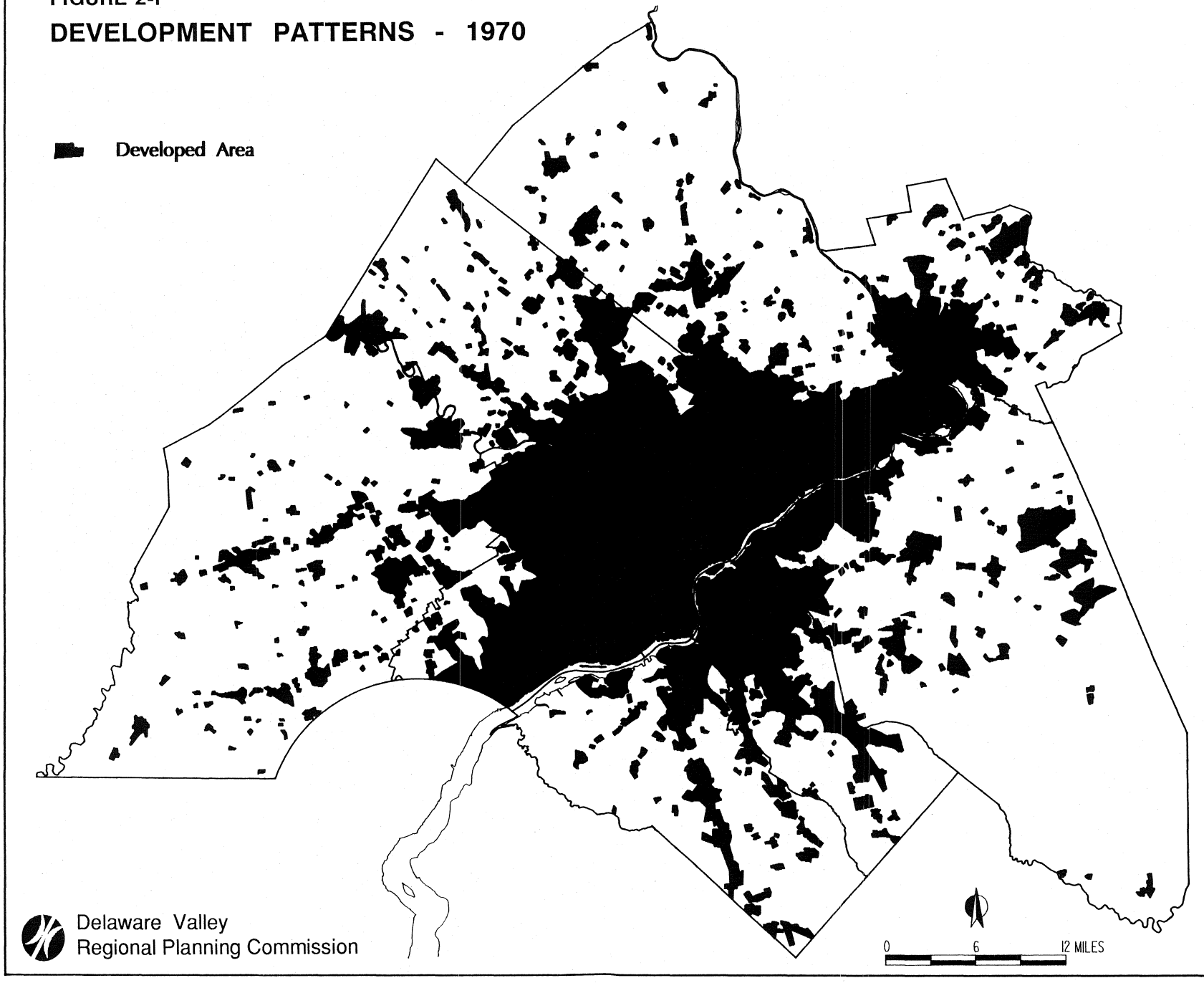
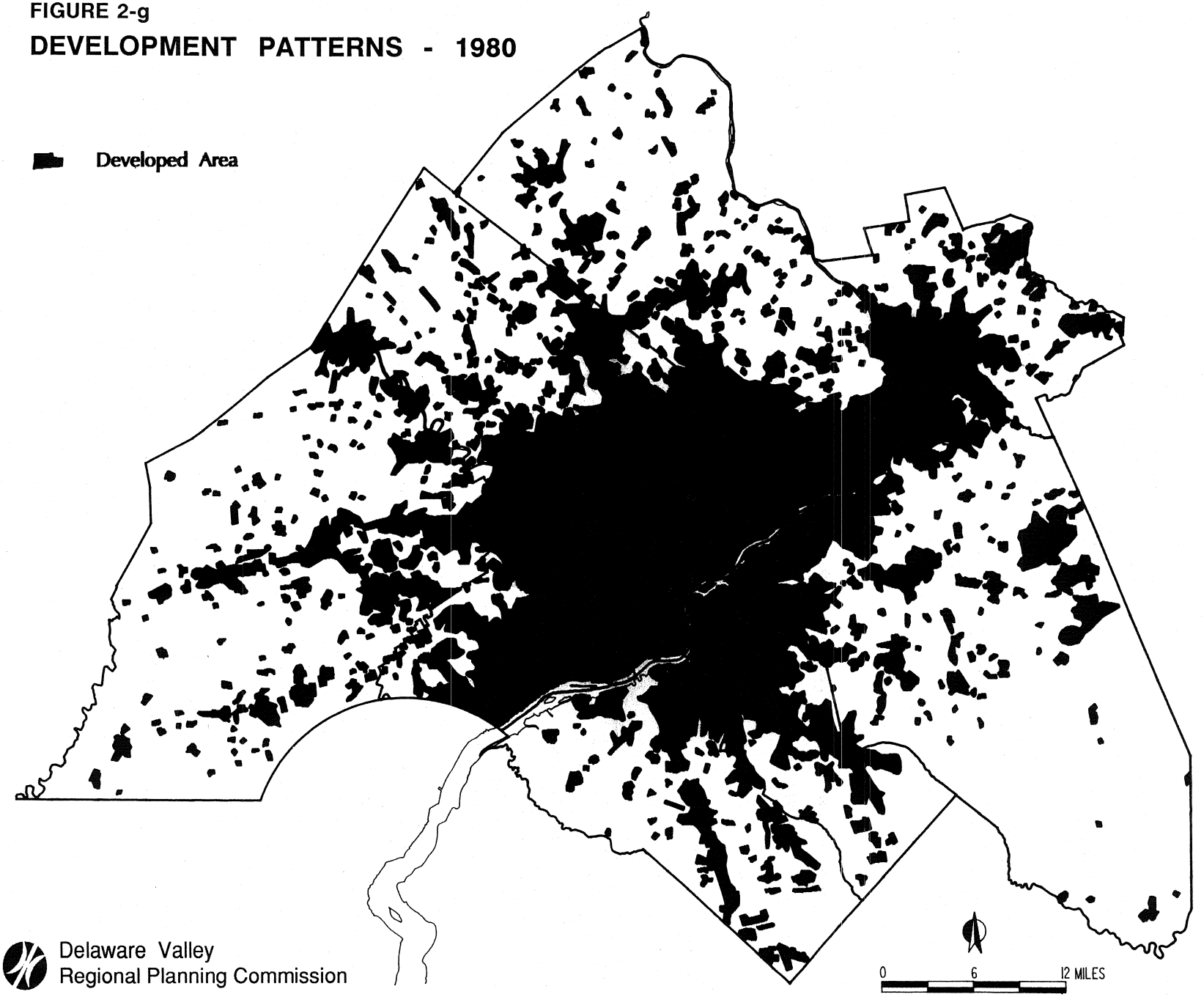


FIGURE 2-g

DEVELOPMENT PATTERNS - 1980



THE DELAWARE VALLEY REGION'S DEVELOPMENT PATTERN, DEMOGRAPHIC CHARACTERISTICS AND TRENDS

The purpose of this section of the Mobility Study is to document and analyze the Delaware Valley's rapidly changing development pattern, demographic characteristics and trends, in order to set the stage for an assessment of the attendant mobility consequences. Key questions to be addressed include: How has the region grown in population and employment during the recent past and what are its growth prospects?; What changes in lifestyle and occupations have occurred and are likely in the future?; and How have changes in the region's economy affected the location of jobs and commuting?

POPULATION

The Delaware Valley's overall population growth rate can be characterized as low to moderate since 1970, although the growth rate within the counties ranges from continuing decline to rapid growth. **Table 1** shows the 1970 and 1980 Census numbers for the nine-county region, as well as the 1988 Census estimates. The Table shows an overall loss for the region between 1970 and 1980 which can be attributed to out-migration caused by the loss of manufacturing jobs, particularly in Pennsylvania.

TABLE 1

POPULATION GROWTH
1970 TO 1988
DELAWARE VALLEY REGION

	U.S. Census 1970	U.S. Census 1980	Percent Change 1970-80	U.S. Census Estimate 1988	Percent Change 1980-88	Percent Change 1970-88
Bucks	415,056	479,211	15.5%	543,564	13.4%	31.0%
Chester	278,311	316,660	13.8%	366,536	15.8%	31.7%
Delaware	600,035	555,007	-7.5%	556,861	0.3%	-7.2%
Montgomery	623,799	643,621	3.2%	687,546	6.8%	10.2%
Philadelphia	1,948,609	1,688,210	-13.4%	1,647,019	-2.4%	-15.5%
PA TOTAL	3,865,810	3,682,709	-4.7%	3,801,526	3.2%	-16.6%
Burlington	323,132	362,542	12.2%	397,600	9.7%	23.0%
Camden	456,291	471,650	3.4%	502,200	6.5%	10.1%
Gloucester	172,681	199,917	15.8%	219,100	9.6%	26.9%
Mercer	303,968	307,863	1.3%	331,000	7.5%	8.9%
NJ TOTAL	1,256,072	1,341,972	+6.8%	1,449,900	8.0%	15.4%
REGIONAL TOTAL	**5,121,882**	**5,024,681**	**-1.9%**	**5,251,426**	**4.5%**	**2.5%**

Delaware Valley Regional Planning Commission, September 1989

Significant population declines occurred in two Pennsylvania counties (Philadelphia and Delaware) which could not be countered by continued population growth in Bucks, Chester and Montgomery counties. Likewise, continued moderate to strong growth in the four New Jersey counties could not counteract the decline in Pennsylvania. The almost two percent population loss for the region represented the first such loss since the Great Depression.

REGION FACTS
DID YOU KNOW?

According to the 1980 U.S. Census, the region experienced a net out-migration of almost 320,000 people from 1970 to 1980. This flight from the region could not be countered by natural increase (births minus deaths) within the region, thus resulting in an overall population decline.

Since 1980, however, the region has rebounded from the recessions and job dislocation caused by an evolving national and local economy. **Table 1** also shows the U.S. Census estimates for county population as of 1988. With the exception of Philadelphia, all the other counties have gained population since 1980. Philadelphia, while still declining, is only doing so at one-fifth the rate of decline during the seventies. Delaware County's slight increase is still very positive given the dramatic loss during the previous decade.

REGION FACTS
DID YOU KNOW?

Philadelphia is the only county that is continuing to lose population. The City's population peaked in 1950 (2,071,605), declined to 2,002,512 in 1960, 1,949,996 in 1970 and 1,688,210 in 1980. The City's 1988 population was estimated to be 1,647,019. This represents a more than 20% loss in 38 years.

The remaining counties exhibit moderate to strong growth, particularly Chester and Bucks in Pennsylvania, while Burlington and Gloucester lead in New Jersey. This strong growth and the decline in the rate of Philadelphia's population loss has resulted in a net gain of more than 225,000 people in the region (4.5%) since 1980 and exceeds the region's 1970 population by almost 130,000 people.

In July 1988, the DVRPC Board accepted 1990, 2000 and 2010 population and employment forecasts for the region's nine counties and 352 municipalities. In general, the Delaware Valley region's current growth and development boom and robust economy

are forecasted to continue through 2010, although at a more moderate rate. This is in contrast to the less optimistic forecasts included in DVRPC's previous long-range plan, the Year 2000 Regional Development Guide, which were made during a recessionary period and during the region's difficult adjustment and transition from a manufacturing to a service-based economy.

The diversity of the region's economic base (rather than being heavily reliant on a single employment sector) and its successful transformation during the mid-1980's, should provide a buffer to minimize the effects of short-term economic disruptions, while reducing the potential for a severe regional recession. An August 14, 1989 Morgan Stanley Economic Perspectives report characterizes the periodic tendency for the sources of economic growth to shift by sector and by geographic region as "rotational shifts."

In spite of this more favorable future economic scenario, the uncertain effects of an increasingly interdependent national and international economy and associated financial markets, resulted in more cautious, moderate employment forecasts to 2010. Within the region, nevertheless, there is tremendous diversity in employment growth, particularly among the local municipalities within each county.

For the population forecasts, major influences were a declining birth rate after 1990 and an increase in the mortality rate after 2000 as the region's population continues to age. These trends are countered in the counties (except Philadelphia) and in some municipalities by in-migration due to new job growth. In other cases, forecasted population decline is reinforced by out-migration caused by the continued loss of manufacturing jobs.

REGION FACTS
DID YOU KNOW?

The region's average number of children per family was 1.86 in 1980 and has declined to 1.82. This is below the Zero Population Growth level of 2.11 children per family.

The net result of these two factors: natural increase (births minus deaths) and net migration (in and out) produces a forecast for population growth, decline or relative stability.

Table 2 shows the 2010 forecast for each county in comparison with the final 1980 Census figure and the 1988 Census estimates. The Table shows strong growth continuing in Bucks and Chester counties in Pennsylvania and in all four New Jersey counties. Only Philadelphia is forecasted to continue to decline but by only 8 percent over a 30-year period compared to its more than 13 percent loss in 10 years during the seventies. **Figures 3 and 4** show percentage and absolute growth ranges for the region from 1980 to 2010.

TABLE 2

POPULATION GROWTH
1980 TO 2010
DELAWARE VALLEY REGION
(THOUSANDS)

County	U.S. Census 1980	Census Estimate 1988	DVRPC Forecast 2010	1980-2010 Growth Absolute	1980-2010 Growth Percent
Bucks	479.2	543.5	701.7	222.5	46%
Chester	316.7	366.5	419.0	102.3	32%
Delaware	555.0	556.9	564.1	9.1	2%
Montgomery	643.6	687.5	746.6	103.0	16%
Philadelphia	1,688.2	1,647.0	1,545.1	-143.1	-8%
PA TOTAL	3,682.7	3,801.5	3,976.5	293.8	8%
Burlington	362.5	397.6	494.0	131.5	36%
Camden	471.7	502.2	589.8	118.1	25%
Gloucester	199.9	219.1	273.1	73.24	37%
Mercer	307.9	331.0	386.0	78.1	25%
NJ TOTAL	1,342.0	1,449.9	1,742.9	400.9	29%
REGIONAL TOTAL	**5,024.7**	**5,251.4**	**5,719.4**	**694.7**	**14%**

Source: Delaware Valley Regional Planning Commission, September 1989

REGION FACTS
DID YOU KNOW?

While the Region's population is forecasted to grow by 14% between 1980 and 2010 (30 years), this moderate growth forecast can be contrasted with the 18% growth rate during the fifties, the 11% growth rate during the sixties and the Region's 2% loss during the seventies.

The key point of all these numbers is that the region's population growth is **decentralizing to the suburban counties away from Philadelphia.** In 1950, Philadelphia had 53% of the region's population. This percentage has declined every decade to 44% in 1960; to 38% in 1970; and to 34% in 1980. Based on the 1988 Census

FIGURES 3 & 4

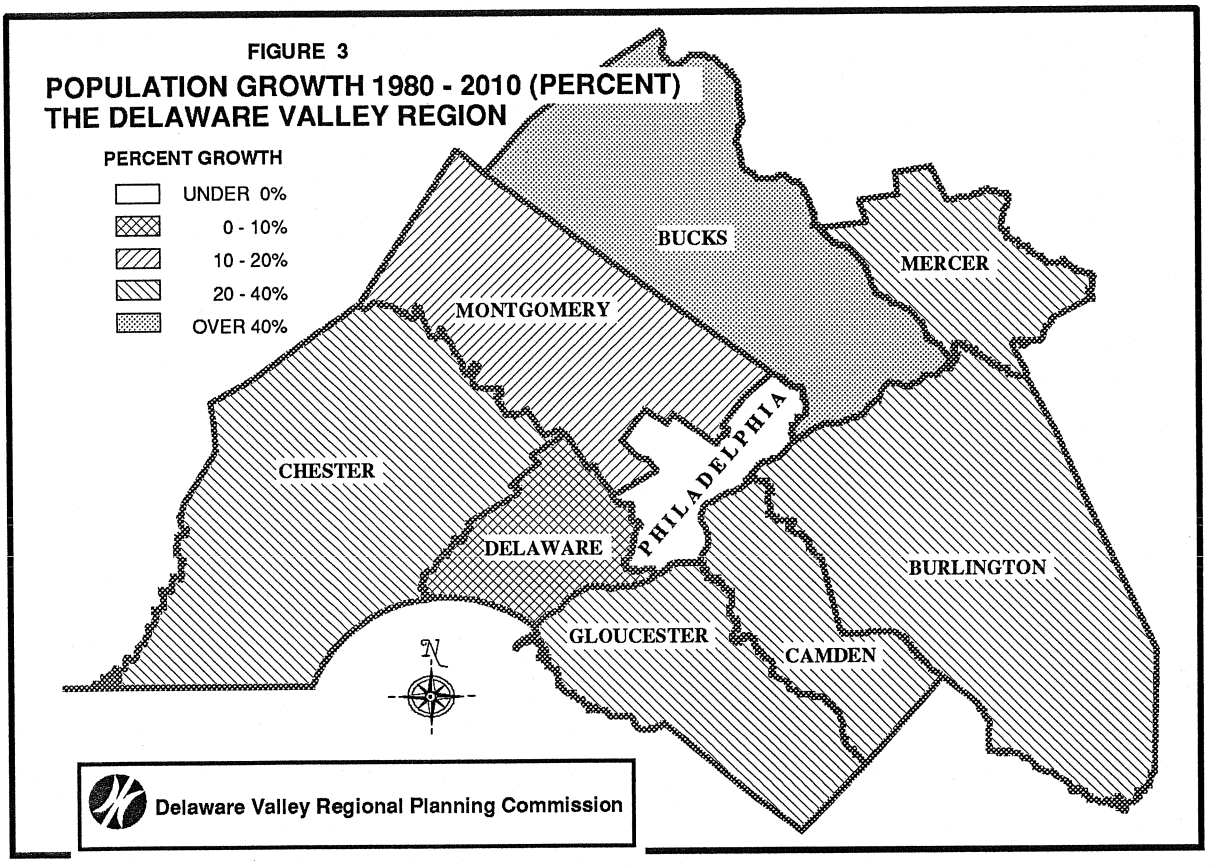


FIGURE 3
POPULATION GROWTH 1980 - 2010 (PERCENT)
THE DELAWARE VALLEY REGION
PERCENT GROWTH
UNDER 0%
0 - 10%
10 - 20%
20 - 40%
OVER 40%
BUCKS
MERCER
MONTGOMERY
PHILADELPHIA
CHESTER
DELAWARE
BURLINGTON
GLOUCESTER
CAMDEN
N
Delaware Valley Regional Planning Commission

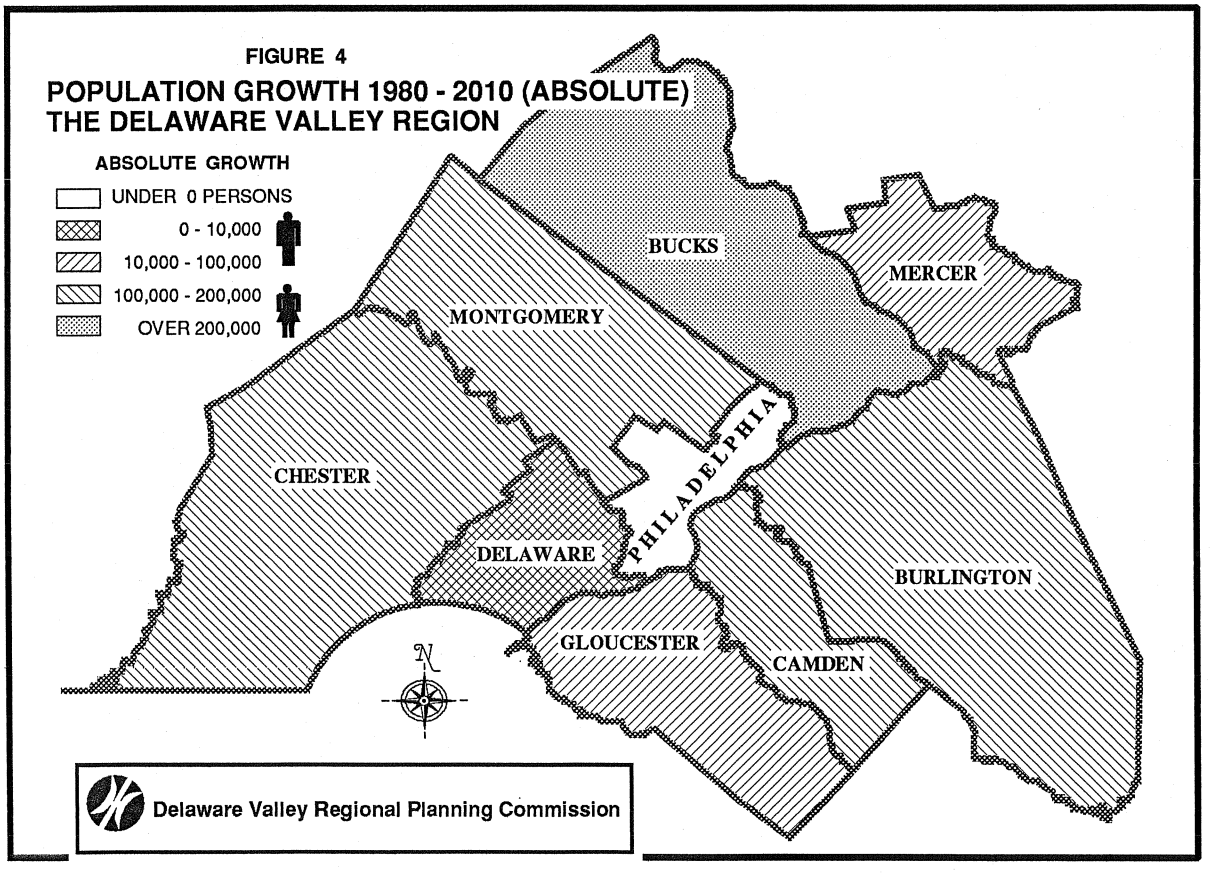


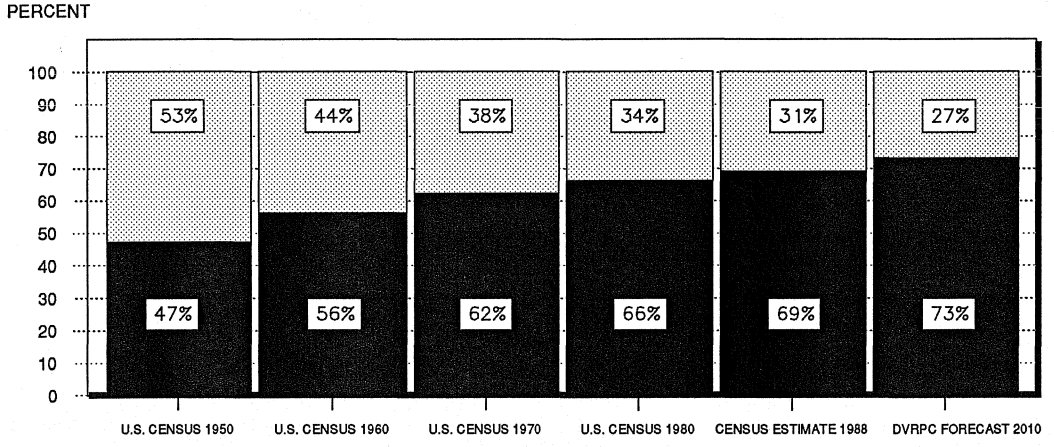
FIGURE 4
POPULATION GROWTH 1980 - 2010 (ABSOLUTE)
THE DELAWARE VALLEY REGION
ABSOLUTE GROWTH
UNDER 0 PERSONS
0 - 10,000
10,000 - 100,000
100,000 - 200,000
OVER 200,000
BUCKS
MERCER
MONTGOMERY
PHILADELPHIA
CHESTER
DELAWARE
BURLINGTON
GLOUCESTER
CAMDEN
N
Delaware Valley Regional Planning Commission

estimates, the City now has only 31% of the region's population. By 2010, if the DVRPC forecasts are attained, the City will only have 27% of the region's total population (almost a 50% decline in 60 years). While this dramatic change in the location of the region's population can be somewhat attributed to continued population decline within Philadelphia, the primary explanation reflects the accelerated growth in the surrounding, suburban counties **(see Figure 5)**.

FIGURE 5

PHILADELPHIA SHARE OF THE REGION'S POPULATION

DELAWARE VALLEY REGION



Source:
Delaware Valley Regional Planning Commission
September 1989

HOUSEHOLDS

Between 1970 and 1980, the number of households in the region increased by 14 percent, even though the region's population declined by two percent. This reflects the fact that the average household size is decreasing, as more persons live alone - especially the elderly and young adults. **Table 3** shows the changes in average household size from the 1980 Census, a DVRPC estimate for 1987 and DVRPC's forecast for 2010. All counties are forecasted household size to decrease and the region, as a whole, is trending toward the City of Philadelphia's figure in 1980.

TABLE 3

AVERAGE HOUSEHOLD SIZE
PERSONS PER HOUSEHOLD
DELAWARE VALLEY REGION
(ROUNDED TO NEAREST TENTH)

COUNTY	U.S. CENSUS 1980	DVRPC ESTIMATE 1987	DVRPC FORECAST 2010
Bucks	3.1	2.9	2.7
Chester	3.0	2.9	2.7
Delaware	2.9	2.8	2.7
Montgomery	2.9	2.8	2.6
Philadelphia	2.7	2.7	2.6
PA TOTAL	2.8	2.8	2.6
Burlington	3.1	3.0	2.8
Camden	2.9	2.8	2.7
Gloucester	3.1	3.0	2.9
Mercer	2.9	2.8	2.8
NJ TOTAL	3.0	2.9	2.8
REGIONAL TOTAL	**2.9**	**2.8**	**2.7**

Source: Delaware Valley Regional Planning Commission, September 1989

REGION FACTS
DID YOU KNOW?

In 1960, average household size was 3.3 persons; in 1970 3.2 and in 1980 2.8. A further decline to 2.7 persons per household is forecasted for 2010.

The reduction in household size has been accompanied by a trend toward two-earner households as more women join the work force. Where children are present, there has been greater need for day care facilities close to major employment centers. In either case, the traditional suburban lifestyle and family pattern involving the "bread-winning" husband, the "housewife" and two or three children is no longer the norm. Increasingly, as well, many families are becoming inter-generational, as elderly grandparents or recently graduated college students stay within the family because of the high cost of apartment rentals and health care cost considerations. All of these changes have implications for

changes in the region's travel and trip-making patterns, which will be discussed later in the report.

Table 4 shows the changes in total households by county and region between 1980 and 2010 and in comparison to the estimated households in 1987. Significant household growth is forecasted in the suburban counties, particularly in Bucks County (more than doubling its 1980 total), while Philadelphia is forecasted to decline by more than 25 percent.

TABLE 4

NUMBER OF HOUSEHOLDS
DELAWARE VALLEY REGION
(THOUSANDS)

County	U.S. Census 1980	Census Estimate 1987	DVRPC Forecast 2010	1980-2010 Growth Absolute	1980-2010 Growth Percent
Bucks	156.4	179.4	259.9	103.5	66%
Chester	105.0	118.8	155.2	50.2	48%
Delaware	191.9	202.0	208.9	17.0	9%
Montgomery	223.7	242.5	287.2	63.5	28%
Philadelphia	620.6	618.6	594.3	-26.3	-4%
PA COUNTIES	1,297.6	1,361.3	1,505.5	207.9	16%
Burlington	115.0	130.0	176.4	61.4	53%
Camden	162.8	177.3	218.4	55.6	34%
Gloucester	65.3	72.0	94.2	28.9	44%
Mercer	105.9	115.9	137.9	32.0	30%
NJ COUNTIES	449.0	495.2	629.9	177.9	40%
REGIONAL TOTAL	**1,746.6**	**1,856.5**	**2,135.4**	**385.8**	**22%**

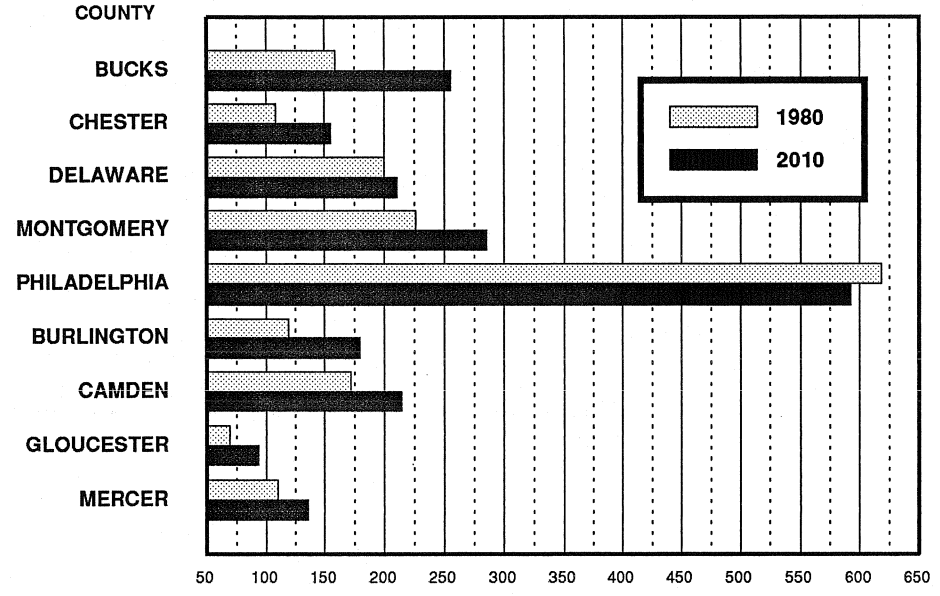
Source: Delaware Valley Regional Planning Commission, September 1989

Figure 6 shows the relative proportions of total households by county and the changes between 1980 and 2010. With the exception of Philadelphia, all the suburban counties show an increase in households. Philadelphia's decline reflects its continued population loss and its already low persons per household figure. Philadelphia's regional share of households is also declining, just like its share of population and employment. **Figure 7** shows the decline in the City's share of households from 45% in 1960 to a forecasted 28% in 2010. Again, **household growth is decentralizing in the region**.

FIGURES 6 & 7

FIGURE 6

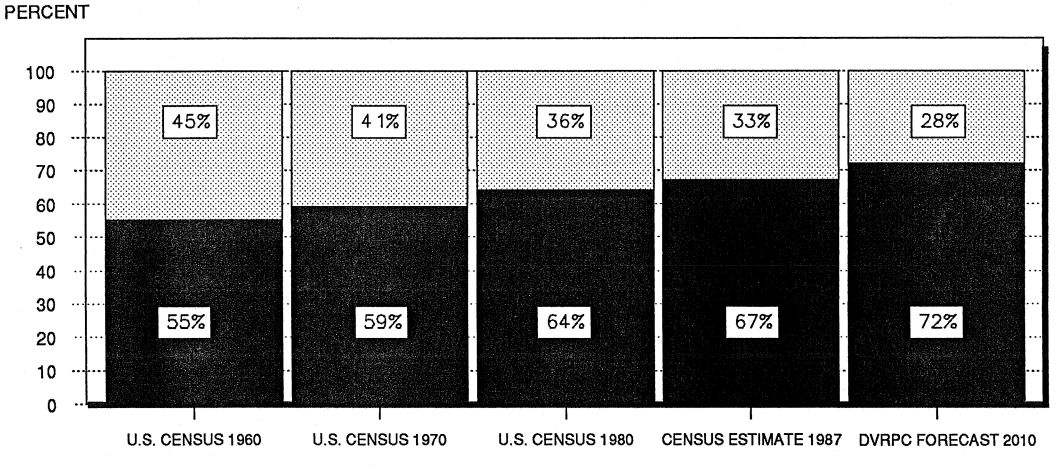
NUMBER OF HOUSEHOLDS IN THE DVRPC REGION (1980 - 2010)



Delaware Valley Regional Planning Commission

FIGURE 7

PHILADELPHIA SHARE OF THE REGION'S HOUSEHOLDS
DELAWARE VALLEY REGION



Source:
Delaware Valley Regional Planning Commission
September 1989

EMPLOYMENT

The Delaware Valley's overall employment growth can be characterized as moderate to strong since 1970, with the exception of Philadelphia. **Table 5** shows the 1970 and 1980 Bureau of Economic Analysis (BEA) numbers for the nine-county region, as well as the 1987 BEA estimates. The Table shows an overall gain for the region and wide variations within the counties.

REGION FACTS
DID YOU KNOW?

Montgomery County is the region's job growth leader with a gain of nearly 90,000 jobs during the seventies. Between 1980 and 2010 the county is forecasted to add an additional 150,000 jobs. Montgomery County has the second highest job total after Philadelphia.

Philadelphia, which was hard hit by the region's economic transition from a manufacturing to a service-based economy, lost more than 155,000 jobs (15%) between 1970 and 1980. At the same time, the suburban counties were adding jobs, ranging from a low of 6% in Burlington County to more than 50% in Bucks County.

Table 5 also shows the BEA Estimates for 1987. Since 1980, the region's economy has strongly recovered and jobs are estimated to have been added at an accelerating rate. The Pennsylvania portion of the region has been growing more than three times faster than in the seventies with **Philadelphia recovering and adding jobs this decade**. The New Jersey counties have continued strong job growth, although shifts have occurred. Burlington County is growing more strongly while Mercer and Gloucester are growing at half the rate of the previous decade. **Overall job growth for the region is twice as strong as in the seventies**.

Table 6 shows forecasted employment growth by county in the region. The region's rapid, estimated job gains through 1987 are already encroaching on the recently prepared DVRPC employment forecasts. (In the case of Delaware County, job growth to 1987 exceeds the 2010 forecast.) The forecasted 25% job growth for the region is almost twice as fast as the 14% forecasted population growth. This has serious implications for the future labor force to fill these new jobs. (Where will the workers come from?; Where will they reside?; How will they get to their jobs?; Will they have the necessary skills?; Will there be enough workers migrating or commuting to fill the jobs; or Will a possible labor force "gap" act as a constraint on economic expansion and growth?) **Figures 8 and 9** show the percentage and absolute ranges for the region from 1980 to 2010.

TABLE 5

EMPLOYMENT GROWTH
1970 TO 1987
DELAWARE VALLEY REGION

County	Bureau of Economic (BEA) Analysis and Others 1970	1980	% Change 1970-1980	Estimate 1987	BEA % Change 1980-1987	% Change 1970-1987
Bucks	130,500	196,000	50.2%	252,441	28.8%	93.4%
Chester	108,100	145,500	34.6%	182,620	25.5%	68.9%
Delaware	181,400	211,900	16.8%	249,563	17.8%	37.6%
Montgomery	303,500	392,400	29.3%	493,569	25.8%	62.6%
Philadelphia	1,013,600	858,400	-15.3%	869,659	1.3%	-14.2%
PA TOTAL	1,737,100	1,804,200	3.9%	2,047,852	13.5%	17.9%
Burlington	130,900	138,200	5.6%	189,385	37.0%	44.7%
Camden	161,400	196,500	21.7%	245,954	25.2%	52.4%
Gloucester	44,100	65,500	48.5%	81,166	23.9%	84.0%
Mercer	154,000	189,500	23.1%	210,922	11.3%	37.0%
NJ TOTAL	490,400	589,700	20.2%	727,427	23.3%	48.3%
REGIONAL TOTAL	**2,227,500**	**2,393,900**	**7.5%**	**2,775,279**	**15.9**	**24.6%**

Source: Delaware Valley Regional Planning Commission, September 1989

TABLE 6

EMPLOYMENT GROWTH
1980 TO 2010
DELAWARE VALLEY REGION
(THOUSANDS)

COUNTY	BEA CENSUS 1980	BEA ESTIMATE 1987	DVRPC FORECAST 2010	1980-2010 GROWTH ABSOLUTE	1980-2010 GROWTH PERCENT
Bucks	196.0	252.4	287.1	91.1	47%
Chester	145.5	182.6	205.7	60.2	41%
Delaware	211.9	249.6	240.3	28.4	13%
Montgomery	392.4	493.6	544.8	152.4	39%
Philadelphia	858.4	869.7	878.0	19.6	2%
PA COUNTIES	1,804.2	2,047.8	2,155.9	351.7	20%
Burlington	138.2	189.4	216.1	77.9	56%
Camden	196.5	246.0	270.0	73.5	37%
Gloucester	65.5	81.2	103.8	38.3	58%
Mercer	189.5	210.9	253.4	63.9	34%
NJ COUNTIES	589.7	727.4	843.3	253.6	43%
REGIONAL TOTAL	**2,393.9**	**2,775.3**	**2,999.2**	**605.3**	**25%**

Source: Delaware Valley Regional Planning Commission, September 1989

The growth of Service Sector jobs, as well as strong growth in the Retail, Wholesale and FIRE (Finance, Insurance and Real Estate) Sectors has changed the locational focus of job growth **(see Table 7)**. The previous manufacturing base was closely tied to locations along railroad and river corridors or in proximity to natural resources. The new Service-oriented economy is more "footloose" with an ability to follow the demands of new labor pools, markets and highway access rather than production requirements. This makes the suburbs with their concentrations of new population growth, higher income levels and new expressways an attractor of non-residential development and employment growth.

Even when companies maintain their headquarters in Philadelphia, many are establishing branch offices in the suburbs to tap new markets and to maintain their competitiveness. This has reinforced the view of the suburbs as independent economic units with fewer and fewer ties to Philadelphia.

FIGURES 8 & 9

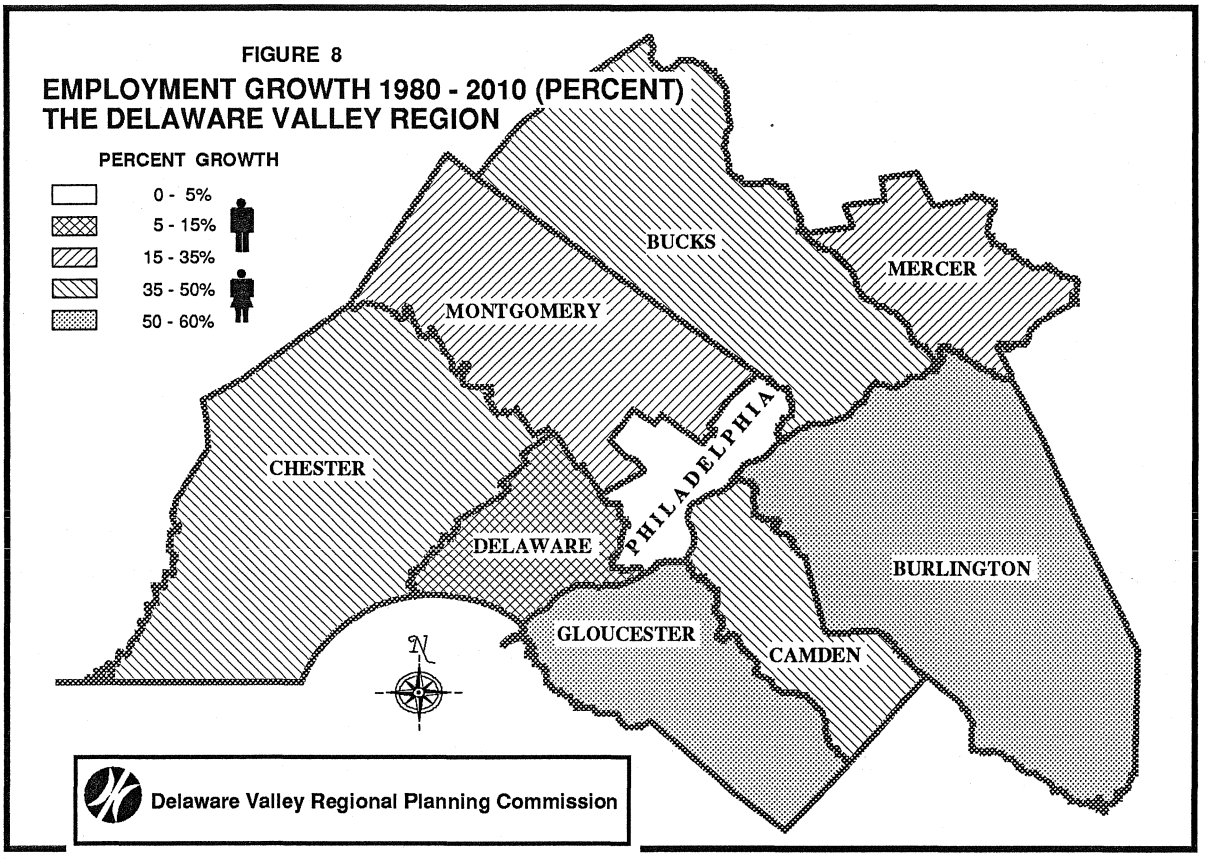


FIGURE 8
EMPLOYMENT GROWTH 1980 - 2010 (PERCENT)
THE DELAWARE VALLEY REGION
PERCENT GROWTH
0 - 5%
5 - 15%
15 - 35%
35 - 50%
50 - 60%
BUCKS
MERCER
MONTGOMERY
CHESTER
PHILADELPHIA
DELAWARE
BURLINGTON
GLOUCESTER
CAMDEN
N
Delaware Valley Regional Planning Commission

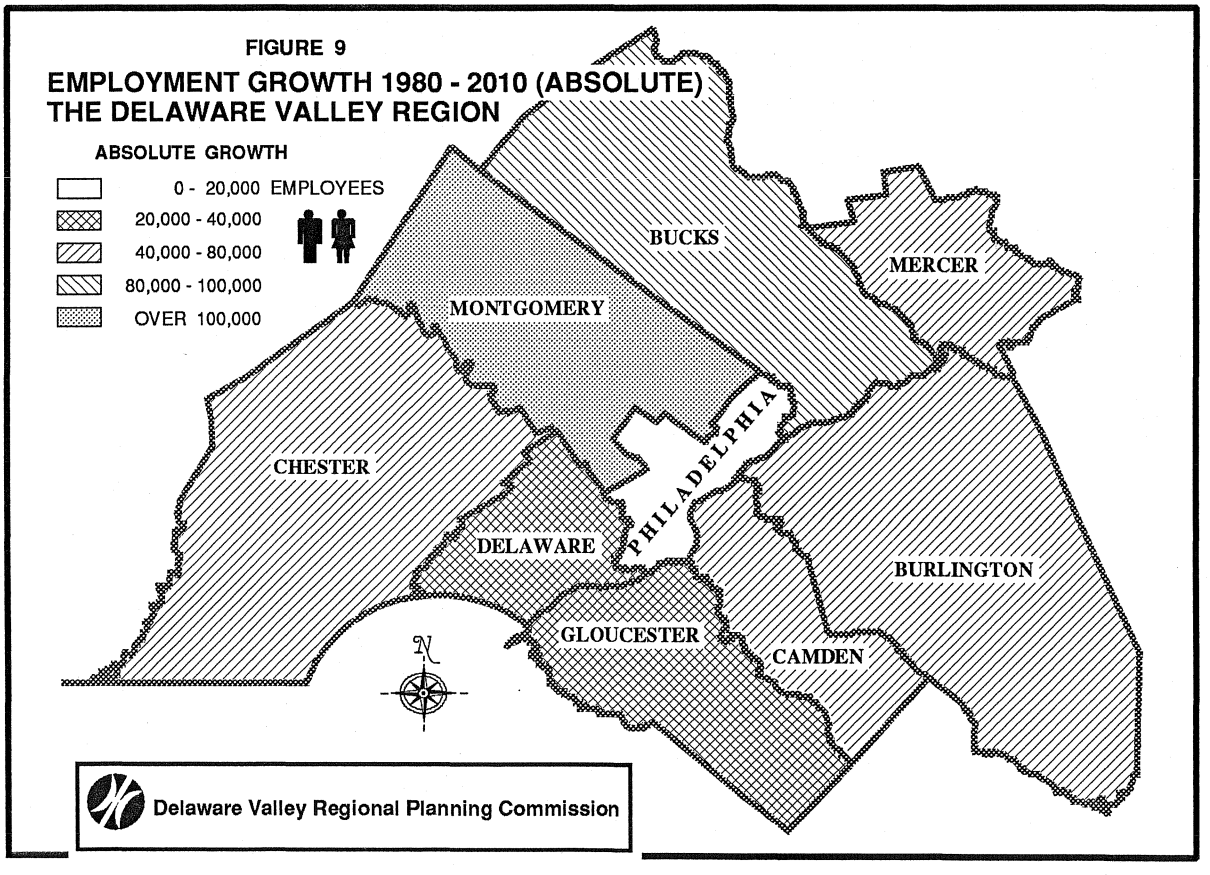


FIGURE 9
EMPLOYMENT GROWTH 1980 - 2010 (ABSOLUTE)
THE DELAWARE VALLEY REGION
ABSOLUTE GROWTH
0 - 20,000 EMPLOYEES
20,000 - 40,000
40,000 - 80,000
80,000 - 100,000
OVER 100,000
BUCKS
MERCER
MONTGOMERY
CHESTER
PHILADELPHIA
DELAWARE
BURLINGTON
GLOUCESTER
CAMDEN
N
Delaware Valley Regional Planning Commission

TABLE 7

DELAWARE VALLEY REGION
SECTORAL EMPLOYMENT GROWTH
(THOUSANDS)

Sector	YEAR 1984	1990	% Change	2000	% Change	2010	% Change	% Change 1984 to 2010
Agricultural and Mining	32.9	30.0	-8.8%	28.5	-5.0%	26.7	-6.3%	-18.8%
Construction	106.4	110.3	3.7%	111.0	.6%	111.8	.7%	5.1%
Manufacturing	435.9	422.5	-3.1%	406.7	-3.7%	390.1	-4.1%	-10.5%
Transportation and Utilities	108.9	113.7	4.4%	114.7	.9%	113.3	-1.2%	4.0%
Wholesale	146.3	157.4	7.6%	170.0	8.0%	178.6	5.1%	22.1%
Retail	403.6	442.7	9.7%	477.2	7.8%	504.2	5.7%	24.9%
FIRE (Finance, Insurance and Real Estate)	187.1	205.2	9.7%	221.1	7.7%	231.1	4.5%	23.5%
Services	715.4	826.3	15.5%	938.4	13.6%	1002.9	6.9%	40.2%
Federal Government	128.6	130.8	1.7%	131.1	.2%	131.2	.1%	2.0%
State and Local Government	266.2	270.5	1.6%	273.9	1.3%	279.3	2.0%	4.9%
TOTAL	**2531.3**	**2709.4**	**7.0%**	**2872.6**	**6.0%**	**2969.2**	**3.4%**	**17.3%**

Source: Bureau of Economic Analysis
Delaware Valley Regional Planning Commission, September 1989

REGION FACTS
DID YOU KNOW?

Between 1967 and 1982 the region lost 162,000 manufacturing jobs. Between 1984 and 2010 the region is expected to gain 287,000 service jobs (24%), while continuing to lose 45,000 manufacturing jobs (11%). Thus, by 2010, the region is forecasted to have more than one million Service Sector and only 390,000 Manufacturing Sector jobs with service jobs accounting for one of every three jobs and manufacturing only one of every ten jobs.

This tremendous job growth has also led to extremely low unemployment rates. **Table 8** shows the May 1989 final unemployment rates for the nine-county region. This "full employment" economy has resulted in labor shortages and job mismatches throughout the suburban counties.

TABLE 8

COUNTY UNEMPLOYMENT RATES
DELAWARE VALLEY REGION
AS OF MAY 1989

PENNSYLVANIA	%	NEW JERSEY	%
Bucks	2.8	Burlington	2.5
Chester	2.3	Camden	3.3
Delaware	3.1	Gloucester	3.2
Montgomery	2.6	Mercer	2.3
Philadelphia	5.1		
Average:	3.2%	Average	2.8%

Regional Average: 3.0%

Source: New Jersey Department of Labor
Pennsylvania Department of Labor and Industry, September 1989

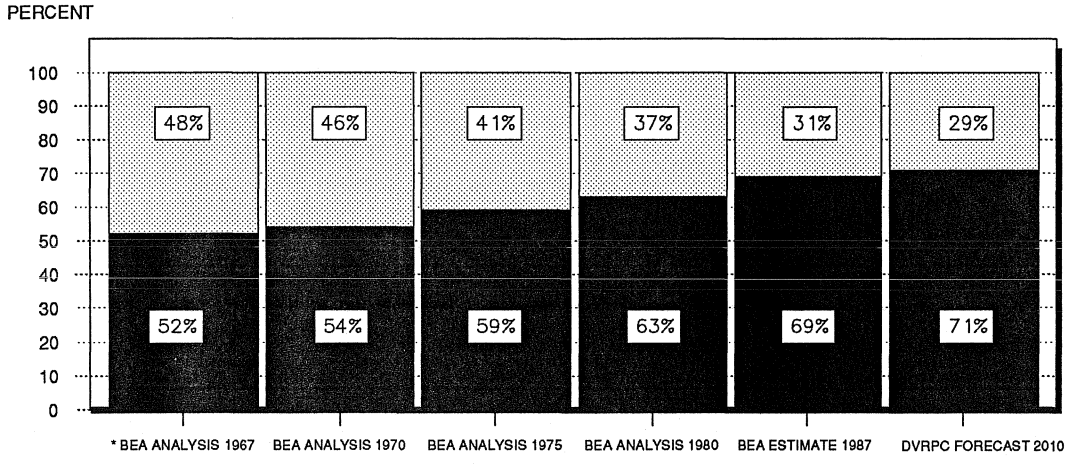
Just as the population figures revealed, the employment figures show the declining importance of Philadelphia as the job hub of the region. While still retaining its lead as the region's number one location of jobs, the City has declined from a 48% share of total

jobs in 1967 to a forecasted 29% in 2010. **Figure 10** shows the **decentralization of job growth** in the region between 1967 and 2010.

FIGURE 10

PHILADELPHIA SHARE OF THE REGION'S EMPLOYMENT

DELAWARE VALLEY REGION



Source:
Delaware Valley Regional Planning Commission
September 1989

* BUREAU OF ECONOMIC ANALYSIS (BEA)

THE LOCATION OF REGIONAL GROWTH - COUNTY SHARES AND DENSITY

While it is clear from the previous analysis that regional growth and development is decentralizing from Philadelphia to the surrounding suburban counties, this does not tell which suburban counties are growing most rapidly and their relative density of population, households and employment. Tables 9 to 14 provide the answers to these questions.

Tables 9, 10 and 11 show the county shares of population, households and employment in 1970, 1980, 1987 (1988 in the case of population) and 2010. Inspection of the tables reveals the steady decline in Delaware County, Philadelphia and southeastern Pennsylvania's share of the regional total as the New Jersey counties and the remaining Pennsylvania counties continue their rapid expansion. Montgomery County in Pennsylvania and Camden County in New Jersey have the largest suburban shares of the three indicators with Bucks County and Burlington County edging closer.

Tables 12, 13 and 14 show the area of each county and the region in square miles, as well as their respective densities of population, households and employment. The tables reveal the region's increasing density, with more dramatic density increases for the New Jersey counties compared to the Pennsylvania counties. Individual counties also show dramatic increases for various indicators: Bucks County more than doubles its household and employment densities; Chester County doubles its household density and almost

TABLE 9
COUNTY SHARES OF POPULATION
DELAWARE VALLEY REGION
(THOUSANDS)

County	1970 U.S. Census	%	1980 U.S. Census	%	1988 Census Estimate	%	2010 DVRPC Forecast	%
Bucks	416.7	8.1	479.2	9.5	543.5	10.3	701.7	12.3
Chester	277.7	5.4	316.7	6.3	366.5	7.0	419.0	7.3
Delaware	603.5	11.8	555.0	11.0	556.9	10.6	564.1	9.9
Montgomery	624.1	12.2	643.6	12.8	687.5	13.1	746.6	13.1
Philadelphia	1,950.0	38.0	1,688.2	33.6	1,647.0	31.4	1,545.1	27.0
PA COUNTIES	3,872.0	75.5	3,682.7	73.3	3,801.5	72.4	3,976.5	69.5
Burlington	323.1	6.3	362.5	7.2	397.6	7.6	494.0	8.6
Camden	456.3	8.9	471.7	9.4	502.2	9.6	589.8	10.3
Gloucester	172.7	3.4	199.9	4.0	219.1	4.2	273.1	4.8
Mercer	304.1	5.9	307.9	6.1	331.0	6.3	386.0	6.7
NJ COUNTIES	1,256.2	24.5	1,342.0	26.7	1,449.9	27.6	1,742.9	30.5
REGIONAL TOTAL	**5,128.2**	**100%**	**5,024.7**	**100%**	**5,251.4**	**100%**	**5,719.4**	**100%**

Source: Delaware Valley Regional Planning Commission, November 1989

TABLE 10

COUNTY SHARES OF HOUSEHOLDS
DELAWARE VALLEY REGION
(THOUSANDS)

County	1970 U.S. Census	%	1980 U.S. Census	%	1987 Census Estimate	%	2010 DVRPC Forecast	%
Bucks	117.6	7.5	156.4	9.0	179.4	9.7	259.9	12.2
Chester	78.4	5.0	105.0	6.0	118.8	6.4	155.2	7.3
Delaware	180.7	11.5	191.9	11.0	202.0	10.9	208.9	9.8
Montgomery	188.5	12.0	223.7	12.8	242.5	13.1	287.2	13.4
Philadelphia	642.1	40.8	620.6	35.5	618.6	33.3	594.3	27.8
PA COUNTIES	1,207.3	76.7	1,297.6	74.3	1,361.3	73.3	1,505.5	70.5
Burlington	84.8	5.4	115.0	6.6	130.0	7.0	176.4	8.3
Camden	138.4	8.8	162.8	9.3	177.3	9.6	218.4	10.2
Gloucester	49.7	3.2	65.3	3.7	72.0	3.9	94.2	4.4
Mercer	93.5	5.9	105.9	6.1	115.9	6.2	137.9	6.5
NJ COUNTIES	366.4	23.3	449.0	25.7	495.2	26.7	629.9	29.5
REGIONAL TOTAL	**1,573.7**	**100%**	**1,746.6**	**100%**	**1,856.5**	**100%**	**2,135.4**	**100%**

Source: Delaware Valley Regional Planning Commission, November 1989

TABLE 11

COUNTY SHARES OF EMPLOYMENT
DELAWARE VALLEY REGION
(THOUSANDS)

County	1970 BEA Census	%	1980 BEA Census	%	1987 BEA Estimate	%	2010 DVRPC Forecast	%
Bucks	130.5	5.9	196.0	8.2	252.4	9.1	287.1	9.6
Chester	108.1	4.9	145.5	6.1	182.6	6.6	205.7	6.9
Delaware	181.3	8.1	211.9	8.9	249.6	9.0	240.3	8.0
Montgomery	303.4	13.6	392.4	16.4	493.6	17.8	544.8	18.2
Philadelphia	1,013.5	45.5	858.4	35.9	869.7	31.3	878.0	29.3
PA COUNTIES	1,736.8	78.0	1,804.2	75.4	2,047.8	73.8	2,155.9	71.9
Burlington	130.9	5.9	138.2	5.8	189.4	6.8	216.1	7.2
Camden	161.1	7.2	196.5	8.2	246.0	8.9	270.0	9.0
Gloucester	44.0	2.0	65.5	2.7	81.2	2.9	103.8	3.5
Mercer	154.2	6.9	189.5	7.9	210.9	7.6	253.4	8.4
NJ COUNTIES	490.2	22.0	589.7	24.6	727.4	26.2	843.3	28.1
TOTAL REGION	**2,227.0**	**100%**	**2,393.9**	**100%**	**2,775.3**	**100%**	**2,999.2**	**100%**

Source: Delaware Valley Regional Planning Commission, November 1989

TABLE 12

COUNTY DENSITY OF POPULATION
(PERSONS PER SQUARE MILE TO NEAREST TEN)
DELAWARE VALLEY REGION

COUNTY	AREA (SQ. MI.)	U.S. CENSUS 1970	U.S. CENSUS 1980	CENSUS ESTIMATE 1988	DVRPC FORECAST 2010
Bucks	625	670	770	870	1,120
Chester	762	360	420	480	550
Delaware	191	3,160	2,910	2,920	2,950
Montgomery	496	1,260	1,300	1,390	1,510
Philadelphia	135	14,440	12,510	12,200	11,450
PA COUNTIES	2,209	1,750	1,170	1,720	1,800
Burlington	830	390	440	480	600
Camden	228	2,000	2,070	2,200	2,590
Gloucester	337	510	590	650	810
Mercer	229	133	134	145	169
NJ COUNTIES	1,624	770	830	890	1,070
REGIONAL TOTAL	**3,833**	**1,340**	**1,310**	**1,370**	**1,490**

Source: Delaware Valley Regional Planning Commission, November 1989

doubles its employment density; Burlington County more than doubles its household density; and Gloucester Co. almost doubles its household density and more than doubles its employment density. In addition, only Philadelphia and Delaware County exhibit a decline for any indicator, with declining population densities between 1970 and 2010.

REGION FACTS
DID YOU KNOW?

Montgomery County's population and household densities most closely reflect those of the region as a whole. However, no county's density of employment reflects the region's employment density. For 2010, the latter is forecasted to be mid-way between the forecasted employment densities of Montgomery County and Bucks County.

TABLE 13
COUNTY DENSITY OF HOUSEHOLDS
(HOUSEHOLDS PER SQUARE MILE TO NEAREST TEN)
DELAWARE VALLEY REGION

COUNTY	AREA (SQ. MI.)	U.S. CENSUS 1970	U.S. CENSUS 1980	CENSUS ESTIMATE 1987	DVRPC FORECAST 2010
Bucks	625	190	250	290	420
Chester	762	100	140	160	200
Delaware	191	950	1,000	1,060	1,090
Montgomery	496	380	450	490	580
Philadelphia	135	4,760	4,600	4,580	4,400
PA COUNTIES	2,209	550	590	620	680
Burlington	830	100	140	160	210
Camden	228	610	710	780	960
Gloucester	337	150	190	210	280
Mercer	229	410	460	510	600
NJ COUNTIES	1,624	230	280	300	390
REGIONAL TOTAL	**3,833**	**410**	**460**	**480**	**560**

Source: Delaware Valley Regional Planning Commission, November 1989

TABLE 14
COUNTY DENSITY OF EMPLOYMENT
(JOBS PER SQUARE MILE TO NEAREST TEN)
DELAWARE VALLEY REGION

COUNTY	AREA (SQ. MI.)	BEA CENSUS 1970	BEA CENSUS 1980	BEA ESTIMATE 1987	DVRPC FORECAST 2010
Bucks	625	210	310	400	460
Chester	762	140	190	240	270
Delaware	191	950	1,110	1,310	1,260
Montgomery	496	610	790	1,000	1,100
Philadelphia	135	7,500	6,360	6,440	6,500
PA COUNTIES	2,209	790	820	930	980
Burlington	830	160	170	230	260
Camden	228	710	860	1,080	1,180
Gloucester	337	130	190	240	310
Mercer	229	670	830	920	1,110
NJ COUNTIES	1,624	300	360	450	520
REGIONAL TOTAL	**3,833**	**580**	**620**	**720**	**780**

Source: Delaware Valley Regional Planning Commission, November 1989

Finally, the tables show the region's overall, low density of population, households and employment. If the persons, households and employment per square mile are converted to acreage figures (by dividing by 640 acres in a square mile), the region's population density in 1988 was only 2.1 persons per acre and is forecasted to increase to 2.3 persons per acre by 2010. Household density in 1988 was only .75 households per acre and is forecasted to increase to .88 households per acre by 2010. Employment density was 1.1 jobs per acre in 1988 and is forecasted to be 1.2 jobs per acre by 2010. These low densities are reinforced by the discussion of regional development in the following section of the report.

REGION FACTS
DID YOU KNOW?

Based on DVRPC's 2010 Forecasts for Population, Households and Employment, Philadelphia's share of the Region's population will be 27%, while its share of households will be 28% and its share of employment will be 29%. In 1970, the City had 46% of the region's jobs, 38% of the region's population and 41% of the region's households.

This reveals the dramatic decentralization of the Philadelphia region, which was reinforced by a recent National League of Cities study which found that the Philadelphia region had decentralized more than 14 other metropolitan areas, including Detroit, Chicago, Baltimore and Cleveland.

DEVELOPMENT

The dispersal and decentralization of population, household and employment growth has been accompanied by the dispersal of the region's development pattern. Commonly called suburban sprawl, this pattern was typical of the initial suburban expansion following World War II and yielded the stereotypical suburbs of the 1950's and 1960's. By 1970, 18% of the region was developed **(see Table 15)**, which had increased to almost 22% by 1980.

The 86,502 acres developed during the seventies were the result of 2,028 land use changes. A total of 57,239 acres (66.2%) were converted to single-family residential use; 7,946 acres (9.2%) to multi-family use; and 21,316 acres to industrial, commercial or institutional uses.

About 63% of the new development occurred in the Pennsylvania portion of the region with 37% in the New Jersey portion. However, almost 70% of the development occurred in just four counties: Bucks, Chester, Montgomery and Burlington.

TABLE 15

DEVELOPED ACREAGE BY CATEGORY
1970 AND 1980
DELAWARE VALLEY REGION

1970	%	DEVELOPMENT CATEGORY	1980	%
272,709	61.5	Single-Family	329,948	62.3
48,225	10.9	Multi-Family (two or more units)	56,171	10.6
122,431	27.6	Non-Residential Including Institutional	143,747	27.1
443,365	(18.1%)	Developed Total	529,867	(21.6%)
2,009,755	(81.9%)	Undeveloped Including Parklands	1,923,523	(78.4%)
2,453,120	(100.0%)	Regional Total (3,833 square miles)	2,453,120	(100.0%)

Source: Delaware Valley Regional Planning Commission, September 1989

While a survey of land development from 1980 to 1990 will not be undertaken for another year, DVRPC did conduct a survey of housing types constructed by county in 1988 **(Table 16)**. The Table reveals the continuing predominance of the single-family detached dwelling in the suburban counties and the relatively few new two-family dwellings in suburban areas. Even when combined with multi-family units, the two or more dwelling unit structures still account for only 18% of the total units added in the region, while single-family detached dwellings account for 82% of the new units. Only in the City of Philadelphia, where less land is available for new single-family detached residential construction, is the multi-family unit the predominant structural type. Thus, it is likely that the region's developed residential acreage in the eighties will mirror the findings of the seventies - a predominance of single-family acreage (requiring more land per unit) and much less for multi-family development.

REGION FACTS
DID YOU KNOW?

Between 1970 and 1980 a total of 86,502 acres of the region were developed (3.5%). This represents an area of 135.2 square miles or slightly larger than the City of Philadelphia (135 square miles). However, rather than being compactly developed, like the City, most development occurred in a continuation of the region's predominant sprawling pattern.

TABLE 16

HOUSING UNITS ADDED BY TYPE
1988
DELAWARE VALLEY REGION

County	Total Housing Units	Single Family	%	Two Family	%	Multi-Family (Three or More)	%
Bucks	3,711	3,460	93.2	16	0.4	235	6.3
Chester	3,714	3,523	94.9	6	0.2	185	4.9
Delaware	1,214	833	68.6	54	4.4	327	26.9
Montgomery	3,348	2,900	86.6	32	1.0	416	12.4
Philadelphia	1,764	732	41.5	128	7.3	904	51.2
PA TOTAL	13,751	11,448	83.3	236	1.7	2,067	15.0
Burlington	2,206	1,565	70.9	8	0.3	633	28.7
Camden	1,867	1,655	88.6	8	0.4	204	10.9
Gloucester	2,482	2,132	85.9	14	0.6	336	13.5
Mercer	1,419	1,060	74.7	0	0.0	359	25.3
NJ TOTAL	7,974	6,412	80.4	30	0.4	1,532	19.2
REGIONAL TOTAL	**21,725**	**17,860**	**82.2%**	**266**	**1.2%**	**3,599**	**16.6%**

Source: Delaware Valley Regional Planning Commission, September 1989

A related factor which can affect the region's internal migration patterns, its overall attractiveness as a residential location, and its economic development climate is the cost of housing. Like many areas in the Northeast, the Delaware Valley's housing stock has experienced dramatic price increases and increased demand. As a result, moderate income families are finding it increasingly difficult to reside close to their place of employment, thus worsening commuting times and congestion on local roads. The escalation in housing costs has also resulted in further sprawl and highway congestion as families look for lower cost residences that are located farther from the region's employment concentrations. This trend works against the goal of a more compact regional development pattern with more concentrated facilities and services. It also works against the goal of providing alternatives to the automobile for commuting trips and increases the need to expand the capacity of the region's highway network.

While comparable non-residential development information for 1988 is not available, DVRPC prepared studies of regional employment centers, business and industrial parks and shopping centers in 1985 and 1986. These studies are summarized in **Figures 11 and 12** which show the identified regional employment centers in the Pennsylvania and New Jersey portions of the region, respectively.

The blobs on each Figure represent the outcome of a county review process which began with Census tracts and ended with the mapped representation of the actual geographic limits of each employment center. A total of 83 were identified on the Pennsylvania side of the Delaware River, while 42 were identified on the New Jersey side. They account for about 80% of the region's jobs (as of 1980) with 1.4 million on the Pennsylvania side and 442,000 on the New Jersey side.

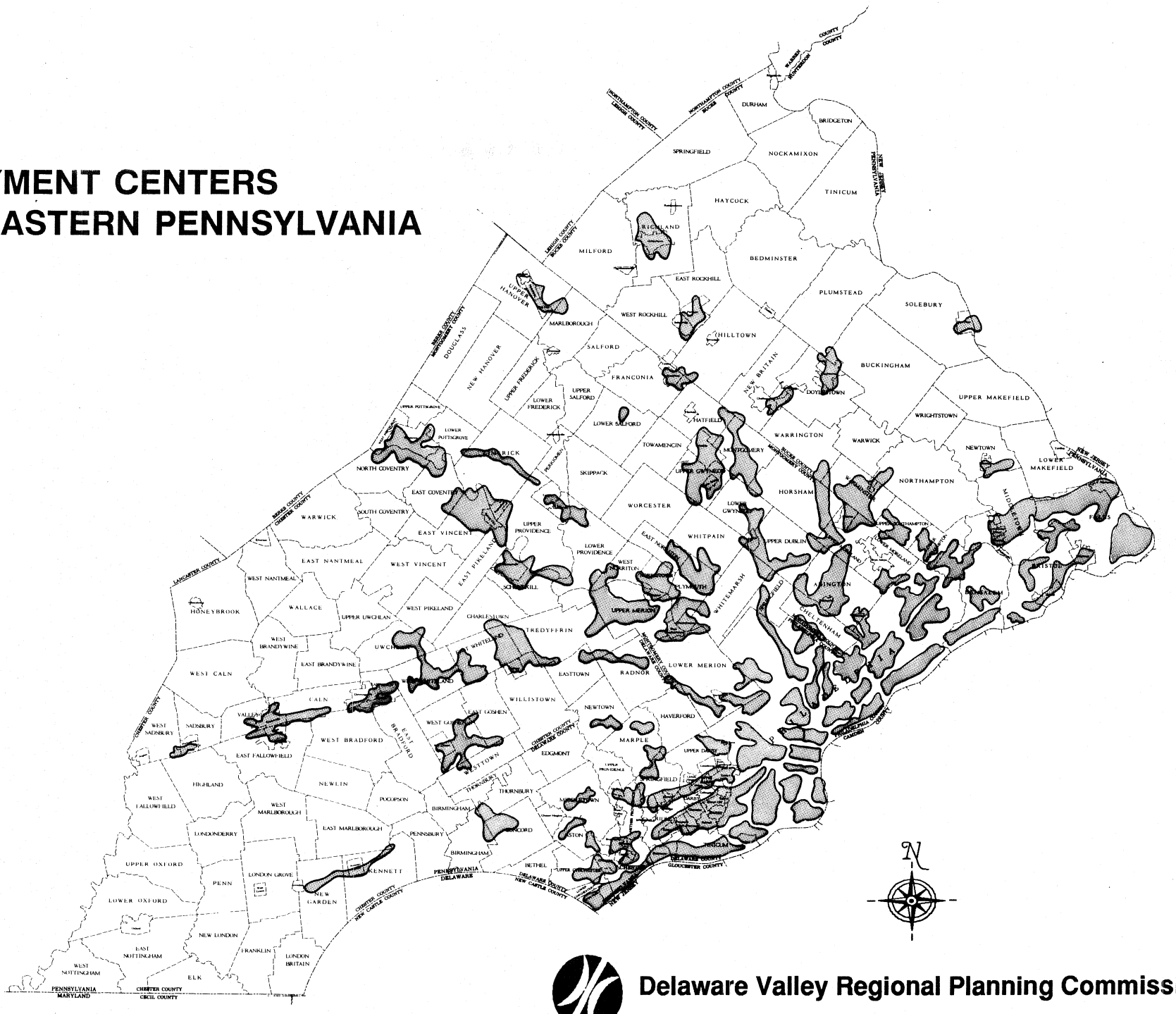
The employment centers contain concentrations of retail, manufacturing, service and related jobs and were categorized by their predominant employment sector. It can readily be seen, from an inspection of Figures 11 and 12, that many employment centers are still concentrated along the Delaware River and around the traditional manufacturing centers of Philadelphia, Trenton, Camden and Chester. However, what can also be seen is the spread of additional employment centers into the suburban counties, following the major highway and rail networks. In many cases, these more recent centers compete with and have supplanted the traditional centers from which they originated.

In October 1988, the DVRPC Board accepted the Year 2010 Regional Development Strategy (RDS) as the new long-range land use and demographic plan for the region. The RDS serves as a framework for the development of the Year 2010 Regional Transportation Plan of which this Mobility Study is a part. It asks two critical questions: How much growth will the region have? and Where should it be located?

In addition to development and infrastructure location policies, the RDS categorizes various levels of "Centers" in the region. The centers are "intended to focus the region's most intensive growth and development within and around a variety of centers consistent with county and local planning policies." Working closely with city and county planning staff, DVRPC identified the following center types:

METROPOLITAN - the three square miles of Center City Philadelphia bounded by the Delaware and Schuylkill rivers from Spring Garden to South streets. It serves the entire region as well as portions of three states.

FIGURE 11
EMPLOYMENT CENTERS
SOUTHEASTERN PENNSYLVANIA

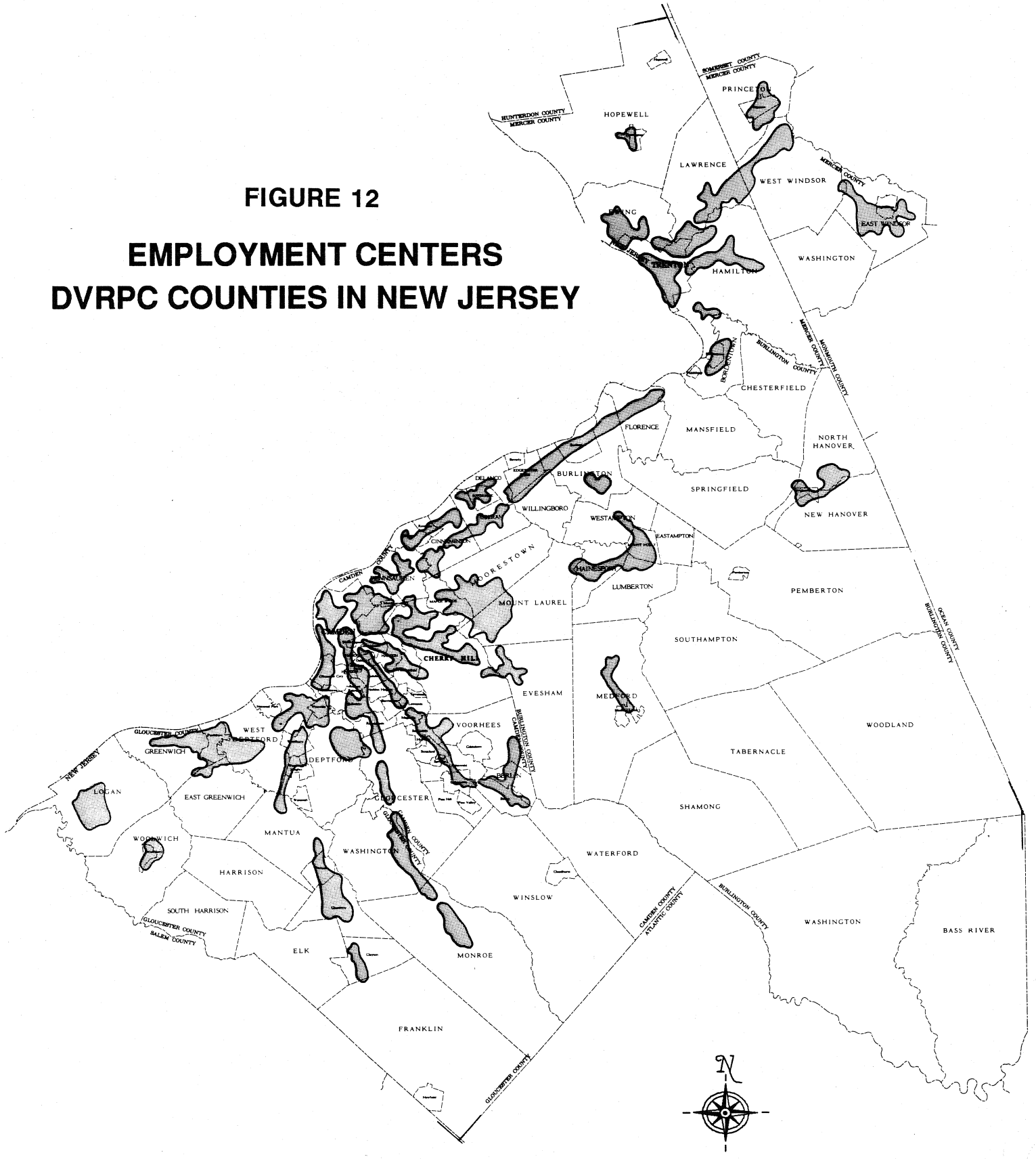


Delaware Valley Regional Planning Commission

September 1989

FIGURE 12

EMPLOYMENT CENTERS
DVRPC COUNTIES IN NEW JERSEY



Delaware Valley Regional Planning Commission

September 1989

METROPOLITAN SUB-CENTERS- these centers have region-wide significance but are smaller (in terms of employment and land use intensity) than the Metropolitan Center. Five such centers were identified in two categories: Mature (the City of Trenton and the City of Camden) and Emerging (King of Prussia, Cherry Hill Area and Route 1 Corridor). The Mature Centers are developed at a higher density and have only recently begun to see signs of revitalization after a long period of decline. The Emerging Centers reflect the new concentrations of office, shopping and housing in suburban settings that now rival the Metropolitan Center as attractors of regional growth. In terms of mobility, the Mature Centers are already well-located with respect to public transportation and have direct access to the regional expressway network. Mobility solutions for these Centers are consequently, somewhat limited. The Emerging Centers, for the most part, are not well served by public transit, which is reinforced by their relatively low density development patterns. While the Emerging Centers are generally well-served by the regional expressway network (which was the primary impetus for their growth and development), the extent of development beyond the expressway network (particularly along the Route 1 Corridor) precludes an easy solution for enhanced mobility. At the same time, the Emerging Centers offer the widest range of options for dealing with their mobility problems.

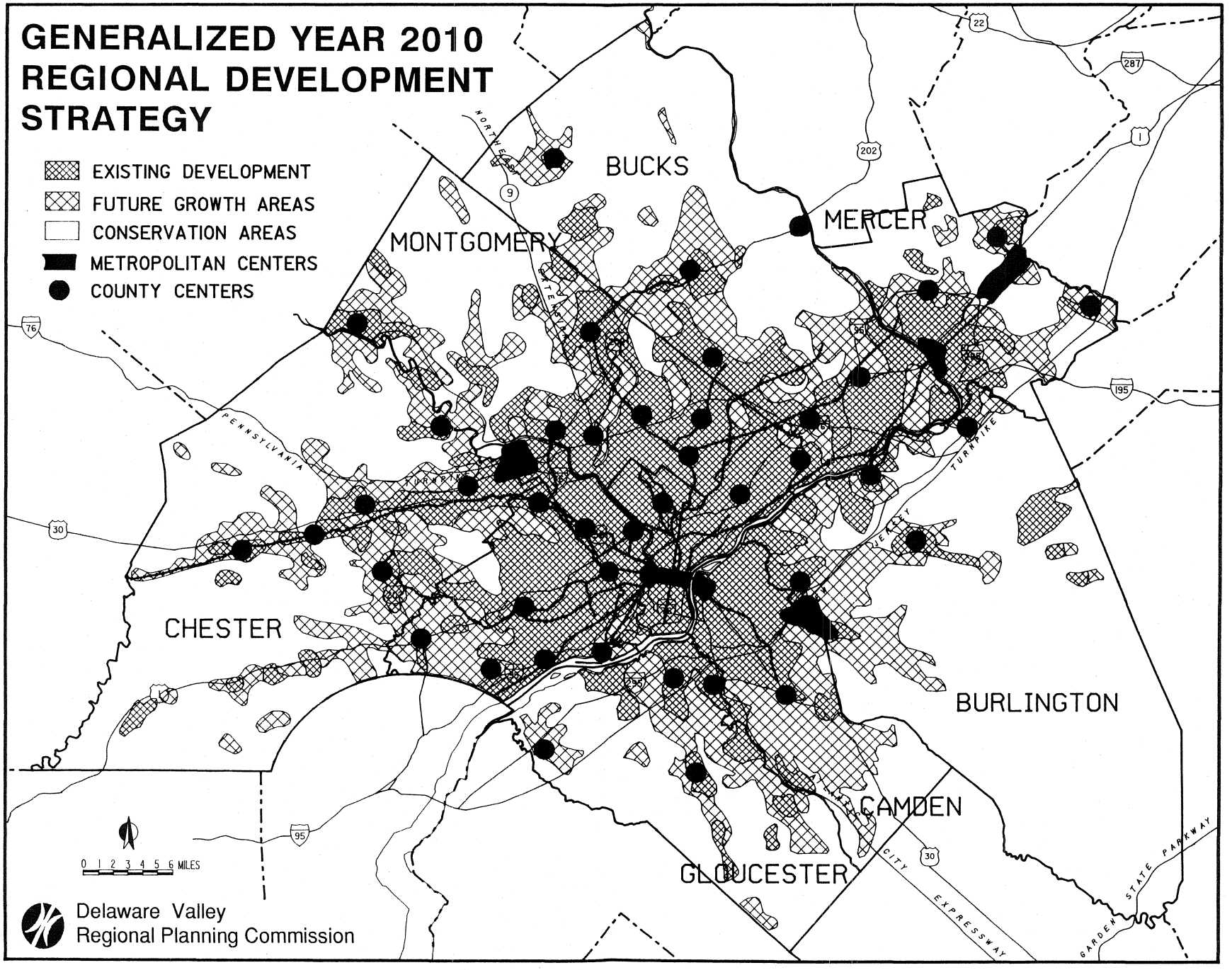
COUNTY CENTERS - These centers reflect a variety of settings, including county government centers, central business districts of older boroughs, city neighborhoods and emerging concentrations of industrial, office and retail facilities in urban and suburban areas. Residential development is also associated with each center; they serve an entire county or a portion of a county. A total of 44 such centers were identified; 12 in New Jersey and 32 in Pennsylvania.

LOCAL OR RURAL SERVICE CENTERS - These 40 smaller centers reflect two types: Local Service Centers are free-standing towns, often within a larger township, which are close to areas of existing or proposed development. Rural Service Centers are similar in function but are located exclusively in the RDS's proposed Agricultural Preservation Areas.

The identification of different types of centers within the region provides a hierarchical framework for the location of major infrastructure systems (sewer and water service and transportation facilities) and more intensive development. Rather than a formless sprawl, the hierarchy of centers is intended to provide a sense of orderliness and "place" where community character and lifestyle can be attained.

A total of 90 centers are identified in the Year 2010 RDS; the previous regional plan, the Year 2000 Regional Development Guide, identified 74 centers through a somewhat different hierarchial scheme. **Figure 13** shows a generalized version of the 2010 RDS and its Centers (the Local or Rural Service Centers are not shown). This reflects the intent of each county to concentrate development around various levels of centers and to discourage more intensive development from locating in areas which are not planned for supporting infrastructure.

FIGURE 13


GENERALIZED YEAR 2010
REGIONAL DEVELOPMENT
STRATEGY
EXISTING DEVELOPMENT
FUTURE GROWTH AREAS
CONSERVATION AREAS
METROPOLITAN CENTERS
COUNTY CENTERS
BUCKS
MONTGOMERY
MERCER
CHESTER
BURLINGTON
CAMDEN
GLOUCESTER
PENNSYLVANIA TURNPIKE
NEW JERSEY TURNPIKE
CITY EXPRESSWAY
GARDEN STATE PARKWAY
0 1 2 3 4 5 6 MILES
Delaware Valley
Regional Planning Commission

REGION FACTS
DID YOU KNOW?

The region's Metropolitan Center (Center City Philadelphia), while only three square miles in size, contains 285,000 jobs (15% of the regional total) and provides a home for 55,000 residents.

CONCLUSION

This overview of the Delaware Valley's population, household, employment and development trends and forecasts to 2010 is a description of a region in continuous change. However, several major conclusions can be reached from the analysis:

- The region's growth in population, households, employment and development is **decentralizing**.
- The region's **decentralization is accelerating** as Philadelphia continues to lose population and households, shows only modest employment gains and has little remaining land area for extensive development.
- Center City Philadelphia is still the region's Metropolitan Center with the largest concentration of jobs in the region. This role is retained and reinforced in the region's long-range plan for the year 2010.
- The region's manufacturing jobs are continuing to decline, while services, wholesale, retail and FIRE jobs continue to increase.
- The region's number of households is increasing, as average family size shrinks, creating new and different housing needs.
- The region's changing economy and its changing household characteristics have modified traditional notions of employment location and travel patterns.
- The region is multi-centered, as well as sprawling, in terms of its land development pattern and form. New suburban centers are increasingly competitors with older urban places for employment, housing and shopping.

The mobility consequences of these conclusions will be documented in the next section of the Regional Mobility Policy Analysis.

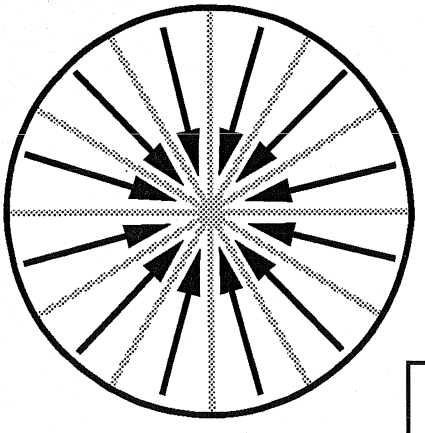
THE REGION'S EMERGING TRAVEL PATTERNS

The analysis of development trends reveals the remarkable changes transforming the basic economic and demographic structure of the Delaware Valley. Economic expansion has created prosperity, growth, and development, but it has often occurred in suburban areas lacking adequate highway, transit, and other facilities. Decentralized land development and the physical expansion of the man-made environment have increased travel demand for work, shopping, and recreation trips.

Demand increases are not the only changes affecting mobility. Basic patterns in daily travel are being altered throughout the Delaware Valley region. For many years, travel patterns in metropolitan areas were radial, and this was especially true in the Delaware Valley. Economic activity was centered in our cities, and the flow of traffic on the region's highways and rail lines was channeled from the outer edges of the region into its central cities.

The regional transportation network grew in response to this demand. A simplified view of the old network of heavily-used roads and train tracks in the region, which remains in place, looks like a bicycle wheel, with all the spokes running from the rim to the hub (**Figure 14**). This transportation infrastructure, with its radial pattern, is a legacy of our past.

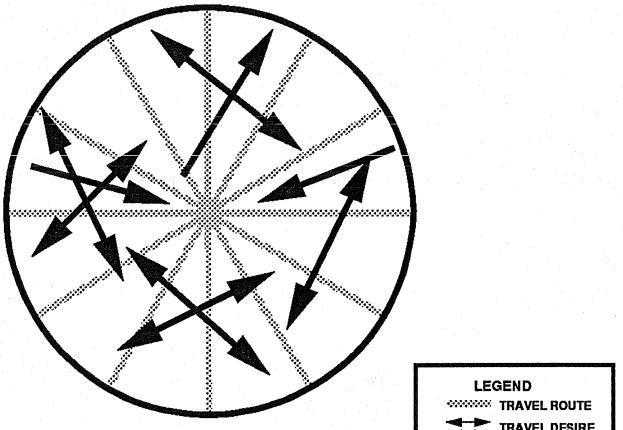
FIGURE 14
REGIONAL TRADITIONAL TRAVEL PATTERN



Older cities in the region were once the travel "hubs" in Figure 14. Now they share that distinction with several other centers of economic activity. King of Prussia, Pa.; Cherry Hill, N.J.; and the Route 1 Corridor in Mercer County, N.J. are three examples of new suburban centers that have joined Philadelphia, Camden, and Trenton as hubs receiving numerous work, shopping, and recreation trips.

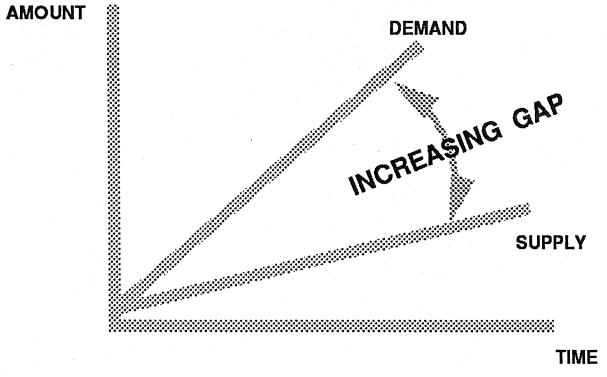
Calling these centers hubs, however, is inaccurate in today's transportation environment. Today, the old and new economic centers are more than mere transportation hubs receiving traffic - they also serve as origination and transfer points for traffic headed in all directions. Many other trips in the region bypass these centers altogether and reach the scattered residential, employment, and shopping locations that now exist throughout the suburbs. The bicycle wheel is no longer an effective representation of the most heavily used portions of the transportation network. The emerging travel patterns in the region are not radial but scattered in many directions (**Figure 15**).

FIGURE 15
REGIONAL EMERGING TRAVEL PATTERN



The imposition of these new travel patterns on the existing infrastructure of highways and public transit routes has created a gap between supply and demand in the Delaware Valley's transportation system. While demand continues to increase throughout the region, system supply does not, and the gap between supply and demand is expected to grow larger in the coming decades (**Figure 16**). Closing this gap is the major mobility challenge the region will face as it enters the next century.

FIGURE 16
OUTLOOK FOR TRANSPORTATION FACILITIES



The universal response to such a challenge was once simple: build a bigger system. Past transportation planning, both in the Delaware Valley and throughout the nation, was supply-oriented. There were ample funds available to meet most of the demand, and societal and environmental attitudes generally supported meeting new demand.

We cannot continue to build new facilities in reaction to new demand, however. Shortages exist in funding for new projects, and travellers are finding public transit inadequate as their travel patterns change. If the old method of constantly building new facilities to meet demand increases was still used, the cost to the region would be enormous. Meeting this cost in today's public economy would require a dramatic change in funding priorities.

If we want to sustain the growth taking place throughout the region, we must investigate new approaches to the planning, implementation, and funding of transportation improvements. The entire region must join this investigation. Many areas which have benefited from the economic boom brought by new development patterns have also suffered from increased highway congestion, which threatens to stifle continued economic growth. A regional consensus must develop among business leaders, public officials, and citizens.

Economic prosperity is not the only thing at stake for the region in solving our transportation problems. If we fail to close the gap between supply and demand and allow our transportation problem to worsen (as currently predicted), it will change our environment and adversely affect the basic quality of life so many of our citizens sought when they chose the decentralized lifestyle.

There will be no single response to this transportation challenge facing the Delaware Valley region. The goal of the region's leaders and citizens must be a comprehensive solution for existing and anticipated problems. In the sections that follow, this report focuses on the factors affecting the attainment of this goal, then discusses how multiple responses are possible in a varied, balanced approach to problem-solving.

IMPLICATIONS

A recent article in The New Yorker noted that the United States, throughout its history, has "put itself through a series of expensive clear-the-decks, we-want-the-whole-place-completely-done-over transportation changes that have no equivalent in any other nation." When the canal network was nearing completion, it was abandoned in favor of railroads. After World War II, the railroads were abandoned for airports and a national freeway system. The history of the Delaware Valley transportation network presents a classic regional example of these changes. According to the article:

> "Each change in the country's transportation system has changed the nature of its construction booms, by changing people's ideas of where it was convenient to have their workplaces (which must be convenient to transportation), where they could live (two or three hours, at the most, from work), and where they could go to get away from it all (something like a five- or six-hour radius from home) ... The nineteen-eighties post-interstate boom suddenly, and for the first time, brought heavy development pressure on all sorts of settings simultaneously - center-city business and residential

districts, older suburbs, shore areas, farmlands, resort communities, faraway deep woods - because, with the interstates in place, a resort town ... can become part of [the] 'commuter shed.'"

We are witnessing the kind of simultaneous development pressure described above right now in the Delaware Valley. The genesis of this in our region, as in the rest of the country, was the interstate highway boom. Traditional bedroom communities have become major white-collar office centers. Older manufacturing towns have become bedroom communities for employees in these new office centers. Communities once exclusively devoted to farming have turned into sites for rapid development of both offices and homes. Yet many of these same communities still retain part of their original function. Their problem is that often only the original community functions can be served by the existing transportation network.

The likelihood that another transportation change could soon come along and lead to an abandonment of our current transportation system, however, seems negligible. Considering the trillions of dollars that have been spent on airports and the interstate system and the current federal budget deficits, the development of an entirely new transportation alternative is unlikely. And any new transportation system would most likely be a strategic system for inter-city and inter-regional travel. It would not solve the problems already besetting the local transportation network.

A set of solutions must therefore be found that take advantage of the multiple local and regional transportation systems already built in the Delaware Valley. These systems are regional assets, assets requiring improvement instead of abandonment. But before this occurs, we must examine the individual implications of our emerging travel patterns for each part of the regional transportation network.

Highways

The implications of the predicted population and employment levels for the region's transportation system are staggering. Traffic congestion, already a problem on several highway corridors, will worsen. Congestion will become more severe and will affect more highway corridors in a broader geographic area.

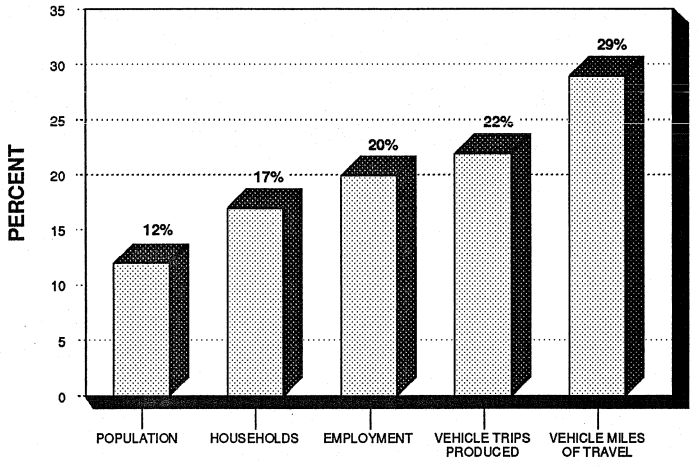
REGION FACTS
DID YOU KNOW?

Forty percent of the Interstate Highway System in the 45 largest U.S. metropolitan areas (including Philadelphia) has volume-to-capacity ratios of 0.8 or greater, according to the U.S. Department of Transportation. This indication of congestion is even worse on some secondary highways. On parts of Route 202 in suburban Pennsylvania the average ratio is 1.0 or higher much of the day.

First, the increase in population and decrease in household size will lead to a 25 percent increase in the number of cars in the region by the year 2015, according to DVRPC forecasts. This will place even more stress on an already overburdened highway network.

Second, several factors will contribute to an even larger increase in the daily vehicle miles travelled in the region. By 2015, DVRPC estimates more than 103 million miles will be covered each day on the region's highways, a 28.9 percent increase over 1987 daily vehicle miles. As housing and employment become more scattered around the region, increasing numbers of vehicles will be making more trips over longer distances for both work and home-related reasons **(Figure 17)**.

FIGURE 17
PROJECTED INCREASES 1987-2015



Most drivers living in the traditional suburban areas know first-hand that the local road network, built long ago to carry primarily agricultural traffic, is already inadequate for the demands of present-day travel. Longer and more frequent trips **(Figure 18)** on this part of the region's highway system simply cannot be absorbed. **(Figure 19)**

FIGURE 18
AUTO TRIPS VERSUS POPULATION

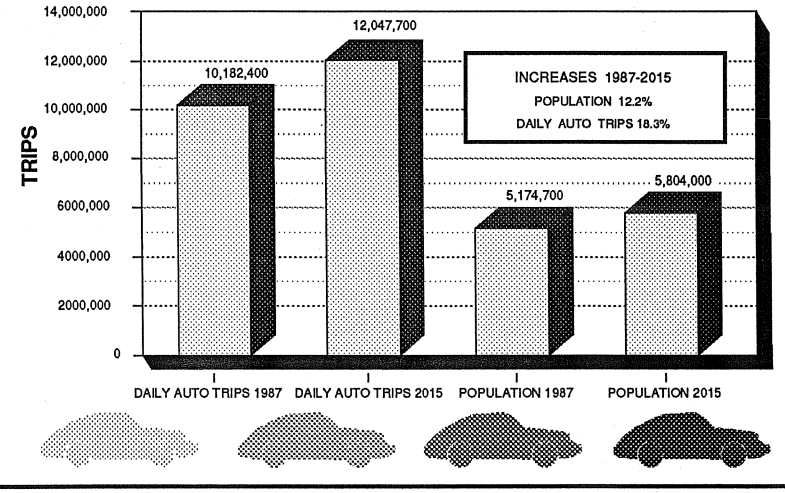
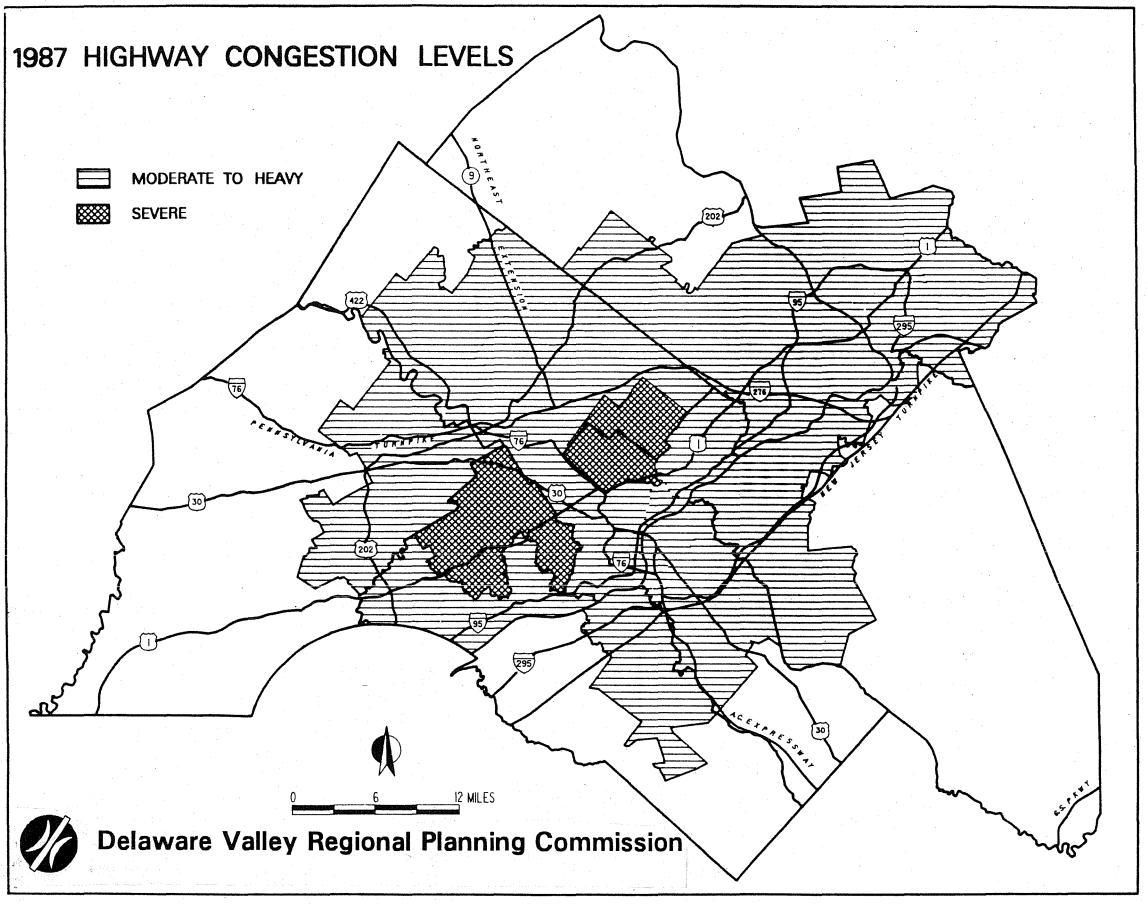
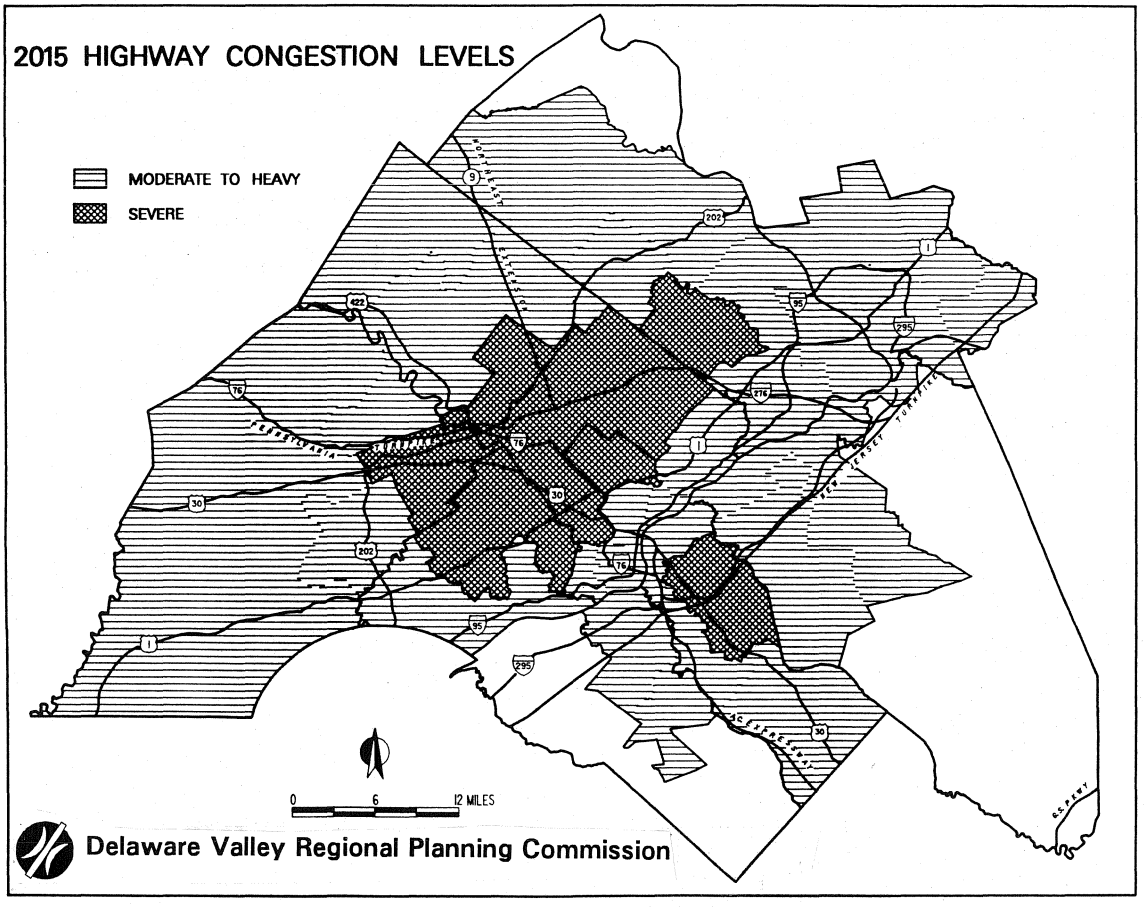


FIGURE 19


1987 HIGHWAY CONGESTION LEVELS
MODERATE TO HEAVY
SEVERE
0 6 12 MILES
Delaware Valley Regional Planning Commission


2015 HIGHWAY CONGESTION LEVELS
MODERATE TO HEAVY
SEVERE
0 6 12 MILES
Delaware Valley Regional Planning Commission

More vehicles travelling more miles will also have an effect on an area of particular concern to the Delaware Valley: air quality. Because of the seriousness of air pollution problems, the federal government is giving public agencies an increasing number of tools to achieve satisfactory air quality standards. Causes of air pollution are complex; its elimination, or substantial reduction, will be equally complex. At least part of the reduction nationwide must come in automobile emissions.

REGION FACTS
DID YOU KNOW?

Average daily vehicle miles in the region will grow from 80 million in 1987 to 103.1 million in 2015, an increase of 29 percent.

Air pollution is therefore one of the serious consequences of growing motor vehicle use in the region. Passenger cars, vans pickups, buses, and other heavy motor and diesel vehicles are still inefficient in their consumption of fuel and produce polluting gases, vapors, and particles. The pollutants produced by motor vehicles (except ozone) are called primary pollutants, meaning they are almost solely attributable to internal combustion engines.

Ozone results from a reaction in the atmosphere among oxides of nitrogen, hydrocarbons, and other pollutants in the presence of sunlight. Transportation sources account for the greatest proportion of carbon monoxide, hydrocarbons, oxides of nitrogen, and lead. The Philadelphia urbanized area, which includes most of the DVRPC region, does not meet current national standards for ozone and carbon monoxide levels in the atmosphere.

The Environmental Protection Agency has proposed a comprehensive post-1987 ozone and carbon monoxide policy for areas not attaining the nation standards. Areas which do not meet the standards (including ours) would be required to submit a revised State Implementation Plan, with minimum reduction targets scheduled each year until standards are met.

REGION FACTS
DID YOU KNOW?

New Jersey officials said that during the summer of 1988, the Garden State had the highest levels of ozone pollution recorded since it began keeping standardized records.

The Philadelphia area is not alone in its need to improve air quality. There has been widespread media coverage in recent months of the draconian control measures planned in southern California. Severe controls on numerous everyday actions will be imposed to combat that area's far more serious pollution problem. Other major metropolitan areas must also submit plans for annual cuts in air pollution until they meet national standards. Drastic action similar to the California plan is not immediately necessary in the Delaware Valley, but dramatic increases in automotive traffic could worsen our already substandard air quality.

Other areas of the country have also found highway controls necessary to combat not only air pollution but severe highway congestion. The Washington, D.C. area, especially suburban Virginia, has been overwhelmed by motor vehicle traffic on key highways. Seattle, Washington is another major metropolitan area suffering from highway congestion. Both region's are spending enormous amounts of money to solve seemingly intractable congestion problems.

Public Transportation

Historically, the Delaware Valley region has enjoyed good public transportation service supported by an extensive and comprehensive network of rail, trolley, and bus lines. But this network must receive significant attention if we want public transportation to grow and be effective into the next century.

Forecasts of public transportation use for 2015 developed by DVRPC in 1988 for the National Strategic Transportation Study predict only a 3.4 percent increase in daily passenger-miles travelled in the region. Forecasts based on current conditions also predict a decrease in transit's share of the total trips taken in the region, from 5.8 percent in 1987 to 5.1 percent in 2015.

REGION FACTS
DID YOU KNOW?

A 1984 DVRPC survey of employee transportation in Center City Philadelphia showed 62 percent of the city's workers commuted by transit.

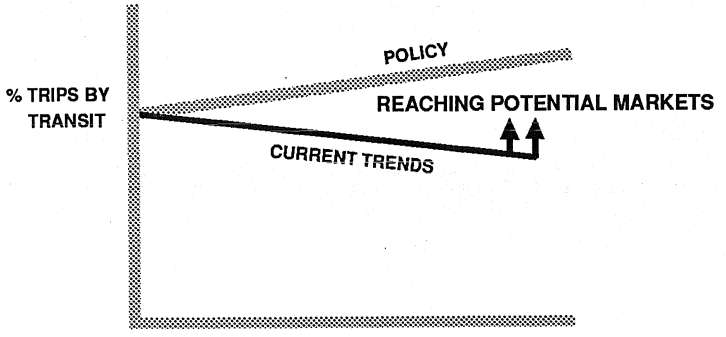
The sprawling development trend in the region will also lengthen the average transit trips at the same time automobile highway trips are lengthening. Total passenger miles will increase by 3.4 percent between 1987 and 2015, higher than the 3.2 percent growth in transit boardings.

Why will public transportation carry a smaller percenage of trips, on average, in 2015? Based on current development patterns, one major reason is that new development has

often occurred in urban and suburban corridors not well served by transit. There is no alternative to the automobile for most trips in these corridors, because decentralized development, which decreases population and employment density, makes traditional transit routes unfeasible. This trend will continue if development continues to de-centralize and commuters find existing transit routes inadequate. The descending line in **Figure 20** shows this trend. The ascending line can only be reached if a combination of innovative and traditional transit options are offered.

FIGURE 20

ENHANCING PUBLIC TRANSPORTATION



Transit operators are trying to accommodate some potential riders in the decentralized suburban areas by introducing several innovative transit options. These include reverse commuting, shuttle services from commuter rail stations to industrial parks, and suburban to suburban bus routes. But it is not economical for operators to provide transit in such low density areas, and any unsubsidized expenses on these routes take limited funds away from other needs.

Meanwhile, in the region's major urban areas, a significant portion of the population will continue to depend on public transit as their sole means of transportation. For example, in Philadelphia alone, 38% of city households do not own a car. Any transportation solutions developed for the region must continue to provide the freedom of movement enjoyed by these transit-dependent residents.

STRENGTHS & RESOURCES

While the previous section details several potential adverse effects on the region's transportation system if its problems are not properly addressed, the region does have several advantages. Our strengths and resources can be used as a base from which to develop a broader and more comprehensive approach to regional transportation.

The Delaware Valley's transportation infrastructure, while insufficient in some areas, has an excellent framework. There is a large network of existing rail lines, and the existing highway network has received significant attention in recent years.

On the Pennsylvania side of the region, there is an integrated, comprehensive public transportation system which provides a good level of service to the developed portions of the region. However, the aging infrastructure requires modernization and maintenance if it is to continue delivering good service. The elements requiring renewal include track and structures, signaling and train control, stations, and maintenance depots.

REGION FACTS
DID YOU KNOW?

SEPTA, the dominant transit operator in the region has over 94 percent of the region's passengers. On the average weekday, there are about 1.2 million trips on the SEPTA system.

In New Jersey, the central Camden corridor is well served by PATCO, until recently the only rail transit line in southern New Jersey (AMTRAK and NJ TRANSIT have now added service on the Atlantic City rail route, providing both express and local trains between Philadelphia and the shore). Bus service is extensive, and plans have been drawn up for route changes to meet new demand, but a budget squeeze has slowed NJ TRANSIT Corporation's implementation of these routes.

REGION FACTS
DID YOU KNOW?

The 14.2 mile PATCO high-speed line carries 47 percent of all New Jersey residents who commute to Center City Philadelphia each day.

Highways in the Pennsylvania counties have advanced significantly, leading toward completion of the regional highway network. The Schuylkill Expressway project has been completed, creating a safer, more efficient commuting route into Center City Philadelphia from the west. By 1991, the Vine Street Expressway will also be completed, creating a fast, limited access crosstown link between I-95 in the east and the Schuylkill Expressway in the west.

Outside the region's central metropolitan area, the completion of the Blue Route between I-95 and the Pennsylvania Turnpike will create an important suburban traffic link that will ease the traffic burden on the local road network in Delaware and Montgomery counties. A group of other highway improvement projects already initiated, although smaller in scope, will together have a significant positive effect.

In southern New Jersey, there are also several highway improvement projects either completed or near completion. Most significant among these are the Route 55 Expressway through Gloucester County and several key corridor improvements in Burlington and Mercer counties.

The Delaware Valley may also benefit from the rapid advancement of telecommunications and the computer age. The ability of workers to communicate without using the transportation system (i.e. "telecommuting") could lessen some of the negative effects in the trend toward scattered development. Satellite offices will increasingly be linked by technology like facsimile machines, computer modems, and fiber optic networks as the service sector of the economy grows in size. But it is still to early to determine what effect this will have on travel patterns, and a trend toward home-based or satellite office work could actually increase the number of trips taken. If scattered, computer-linked employees make more unrelated trips to school, the dry cleaner, or the convenience store, the congestion problem may become worse.

The multiple pockets of economic growth that are driving the regional economy will create a positive force toward transportation improvements. One of the primary reasons for the creation of this document is to develop a consensus among business leaders in these economic pockets that transportation improvements will help lessen costs in increasingly competitive labor and supply markets. Service firms, the fastest-growing portion of the economy, are often highly dependent on transport speed and they are expected to support any time-saving advantages.

REGION FACTS
DID YOU KNOW?

Service employment will increase more than 40 percent between 1984 and 2010, according to DVRPC (see Part I, Figure 16).

Finally, there are already strong links among the region's elected officials through organizations such as the Board of the Delaware Valley Regional Planning Commission and the Greater Philadelphia Economic Development Coalition, and recent cooperation on transportation issues have shown that these links can easily be extended to include the region's business, labor, and civic leadership. For example, the efforts to improve the funding of SEPTA in southeastern Pennsylvania show that alliances of diverse regional interests are willing to work together toward a common, mutually beneficial goal.

Public-private partnerships on issues like transportation management associations, which are springing up in key areas throughout the region, are part of this linkage. For example, the Princeton area has had a TMA for several years, and similar efforts are underway in Valley Forge and Willow Grove. In Fort Washington, private interests have joined with SEPTA to create a feeder bus route to connect an office campus with the regional transit network. The benefits discovered in these local initiatives can contribute to the growth of a wider regional consensus on transportation issues.

DEVELOPING SOLUTIONS

This report has outlined several of the major mobility challenges facing the region in the coming decades. All of them are daunting, and a failure to respond effectively to these challenges could have serious implications for the region's economy and environment. We believe no single response can meet future mobility challenges. Instead, multiple answers to our transportation questions must be developed. Some of these possible answers are detailed below.

Several recommended public policy answers to the mobility challenges have already been described in DVRPC's review of the southern New Jersey/southeastern Pennsylvania region for the National Strategic Transportation Planning Study. The DVRPC review and recommendations are part of a nationwide effort by the U.S. Department of Transportation to identify the country's long-term transportation needs and set goals for the federal government's transportation planning through the year 2015 and beyond. These goals will also affect transportation decisions made regionally. The following recommendations were made for southern New Jersey/southeastern Pennsylvania:

The Highway System

* Develop a strategic highway system of national significance that maintains existing expressways, completes missing links, and improves primary arterial highways in the suburbs
* Improve maintenance and operation
* Implement low-cost Transportation System Management projects
* Improve highway access to major activity areas
* Improve signing

The Public Transportation System

* Improve the existing rail system
* Modernize depots, yards, and shops
* Streamline fare structures and collection procedures
* Restructure bus routes to reflect current markets
* Encourage formation of Transportation Management Associations

The study suggests that approximately $7.5 billion for highway improvements and $6.6 billion for public transportation improvements should be spent in the region over the years until 2015. Beyond these expenses, operating costs for transportation, including maintenance, are estimated at $4.2 billion for highways and $19.2 billion for transit during the same period.

Unfortunately, the anticipated funding currently projected for highway and public transportation facilities does not provide for many necessary projects. An analysis of current spending suggest that funding projections will fall short of what is needed by approximately 40 percent.

The challenge, according to the study, is to develop a funding program to make up for this shortfall. A joint federal, state, and local program is recommended to effectively

address the emerging transportation needs of the region, and the private sector must play a greater role in all future efforts, the study says.

The challenges of the future must be also attacked from several other fronts, with special attention focused on those transportation solutions most likely to provide the largest pay-off.

Investigating Possible Solutions

There are several candidate solutions that must be further articulated, debated and ultimately accepted by the region's leaders and the public they serve. Part of the purpose of this report is to stimulate and focus the debate on possible solutions, because DVRPC's member governments must implement any new solutions developed. Three major themes will guide implementation:

1. Inadequate financial resources exist to meet the identified need for capital improvement, reconstruction/ rehabilitation, and maintenance.

2. Increased reliance will be placed on the private sector for additional financial support of transportation facilities and services.

3. Alternative management structures and transportation options will be increased to meet the region's diverse and changing mobility needs.

Focus of Solutions

Based on the trends described earlier in the development review and in this mobility review, DVRPC recommends a regional focus on a four-part strategic transportation action plan. Proposed solutions to individual mobility problems should adhere to these strategic guidelines.

1. **Strengthen Activity Centers and Connections** Promoting a higher density of activities around these centers and increasing the opportunity for transfer between different types of transportation. Park-and-ride lots and integrated highway and transit links are possibilities.

2. **Increase Capacity on Critical Routes** Strengthening the framework of existing radials and circumferentials to build travel corridors rather than accommodating scattered demand. Techniques such as HOV lanes, widened facilities, and the addition of transit alternatives can increase the numbers of persons each route can carry.

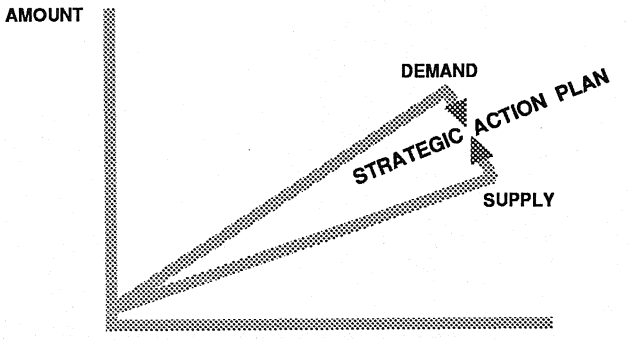
3. **Decrease Need for Travel** Developing a range of housing opportunities near the centers and critical routes, and promoting the use of telecommunications where applicable.

4. **Provide Information** Using advanced technology to detect accidents and congestion and updating communications with variable message signs or other aids.

The action plan and long-range planning activities will attempt to close the widening gap projected between supply and demand in our transportation future **(Figure 21)**.

FIGURE 21

MEETING THE TRANSPORTATION CHALLENGE



A conceptual model of travel routes and connections for the transportation action plan is shown in **Figure 22**. The abstraction (without political boundaries) shows some of the basic infrastructure that can be part of the solution. The planning process must result in the vision for an integrated highway and transit system. The process must decide:

- Is this the correct network of routes and connections that is of strategic importance to the region?

- Which centers and connections should be the focus of increased activity and intermodal transfer opportunity?

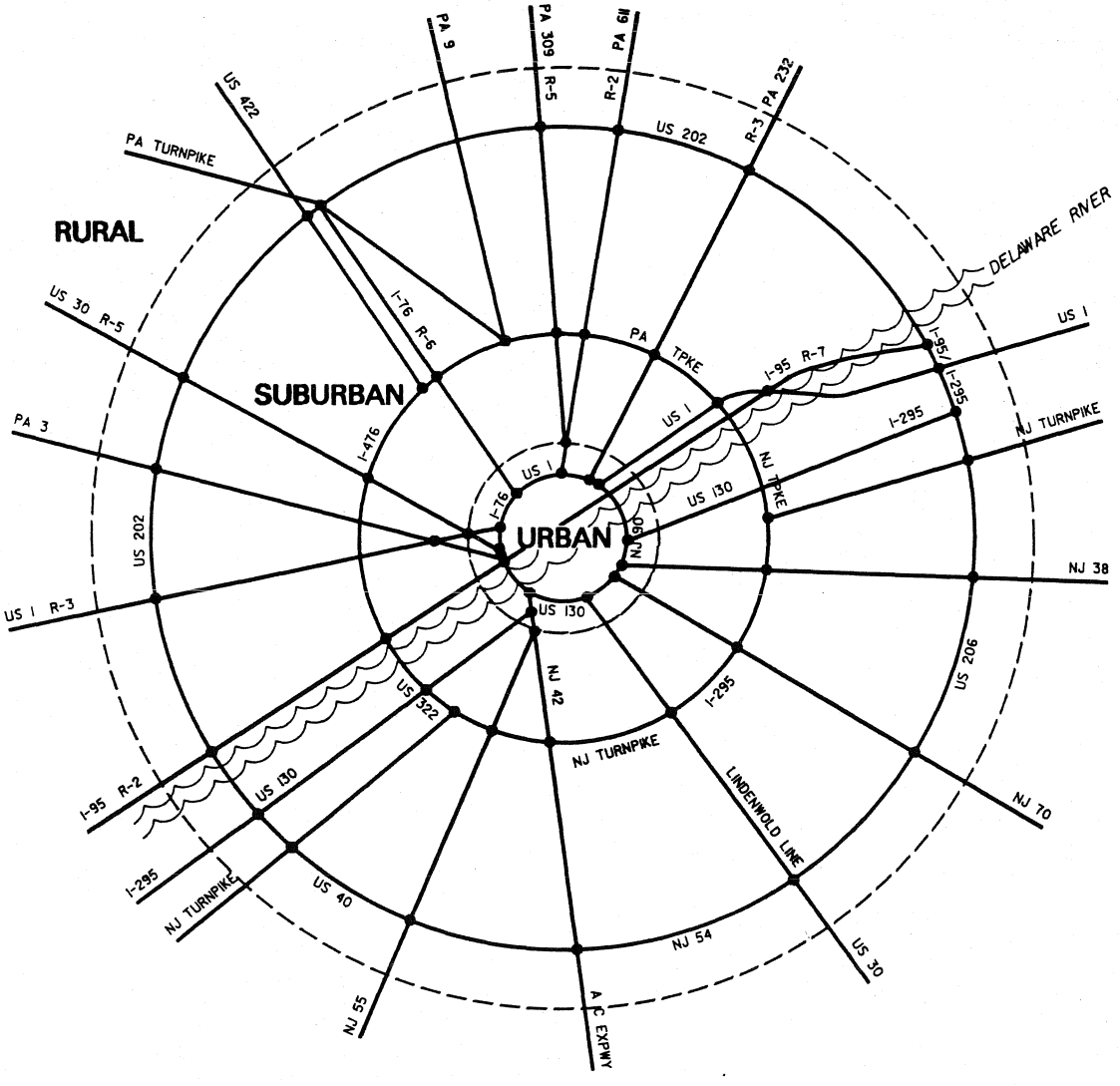
- Which travel routes should be expanded to carry more persons?

If the questions are answered, the conceptual model changes. Certain routes take on a new significance. Certain connections (points where the travel routes intersect) become major or minor activity centers. New, more efficient, transportation options appear.

It is essential that the region make many of these decisions immediately, and act on them in the near future. The economy, environment and public health of the Delaware Valley rest on the safe, efficient mobility of its residents. If we do not act as a region, we endanger more than our individual ability to travel safely and quickly. If we allow deterioration of the infrastructure, dirtying of the air, and distortion of the regional landscape, we endanger the quality of life available to future generations.

FIGURE 22

DELAWARE VALLEY REGION TRANSPORTATION ACTION PLAN



Delaware Valley Regional Planning Commission

CRITICAL MOBILITY ISSUES, GOALS AND STRATEGIES

DEVELOPMENT PROCESS

The following is a summary of significant findings of the regional mobility policy analysis and a list of critical issues, goals and strategies which resulted from the review process. The findings and a list of preliminary issues and strategies were reviewed and revised by the DVRPC Technical Advisory Committee, the Planning Coordinating Committee, the Citizen's Advisory Committee and the Board.

REGIONAL MOBILITY POLICY ANALYSIS - SUMMARY OF SIGNIFICANT FINDINGS

The Critical Issues, Goals and Strategies are a logical consequence of the policy paper on the Delaware Valley region's changing development pattern and the related mobility trends and implications. The report reveals a region in constant change, but also a region with several distinct trends:

A. Development

1. Accelerating decentralization of population, employment and households from Philadelphia to the suburban counties.

2. A strong Center City Philadelphia, which remains the region's Metropolitan Center.

3. A changing economic base (from manufacturing to services) which has altered traditional notions of employment location and region-wide journey-to-work travel patterns.

4. A multi-centered, sprawling and low density regional development pattern and form.

B. Travel

1. Increasing vehicle miles traveled (VMT) on the region's highway network.

2. Increasing number of automobiles among households who own a car, but continued transit dependency among many residents of older urban places.

3. Continuing air pollution problems, in spite of cleaner cars, due to increasing VMT, increasing automobiles and recent weather patterns.

4. Rebounding transit ridership, particularly for reverse commuters, but a long-term trend that shows a small decline in the percent of travel made by transit.

5. Increasing cross-county (circumferential) trips and increasing trips to and from adjacent regions.

6. Increasing need for multi-modal goods movement access and facilities.

C. Implementation

1. Inadequate financial resources to meet the identified needs for new construction, replacement, reconstruction/rehabilitation and maintenance of infrastructure.

2. Increasing reliance on the private sector for additional financial support for transportation facilities and services.

3. Increasing use of alternative management structures and transportation options to meet the region's diverse and changing mobility needs.

Critical Regional Mobility Issues, Goals and Strategies

A. Issues: The most critical issues facing the region involve how, when and who should be charged with achieving the identified goals and strategies. To foster greater understanding of the key mobility challenges facing the region, the DVRPC Board stressed the need for clear and straightforward issues and goals.

1. Regional Mobility and Goods Movement

2. Regional Congestion

3. Regional Air Quality

4. Regional Infrastructure Condition

B. Goals

1. Enhance Regional Mobility and Goods Movement

2. Reduce Regional Congestion

3. Improve Regional Air Quality

4. Improve Regional Infrastructure Condition

C. Strategies: The following strategies were agreed to, organized by their effects on the supply of transportation facilities and services, the demand for such facilities and services and implementation.

D. Demand

1. Integrate land use and transportation planning at the municipal, county and regional levels to achieve a more compact and less segregated development pattern more conducive to varied mobility strategies, such as public transit and ridesharing.

2. Address the growing mismatch between the location of workers and jobs, which is worsened by transportation barriers (access, service and cost) and housing costs.

3. Develop a coordinated land use and transportation approach to reduce mobile source air pollution, while maintaining the region's economic development attractiveness.

E. Supply/Demand

4. Integrate highway and transit facilities to achieve improved inter-modal connections and to reduce vehicle miles traveled.

5. Alleviate congestion in and around the region's major activity centers.

6. Incorporate 21st century technology in highway design (automation and "smart" highways).

F. Supply

7. Address the inadequacy of cross-county and regional circumferential routes to handle growing travel and goods movement demands.

8. Meet the increased demand for public transit and paratransit services in suburban areas, including connections between new employment centers and existing, fixed route transit lines.

9. Provide enhanced multi-modal access to Center City Philadelphia, to the City's waterfront (Penn's Landing and port facilities) and to Philadelphia International Airport.

G. Implementation

10. Provide predictable and sufficient funding for public transit capital improvements, particularly in Pennsylvania.

11. Provide enhanced revenues (through taxes, user fees or other innovative alternatives) to finance highway improvements.

12. Increase the use of public-private partnerships, Transportation Management Associations and similar strategies and technological innovations to finance and manage needed transportation facilities and services.

CONCLUSION

The Critical Regional Mobility Issues, Goals and Strategies were used by the DVRPC Board to shape the agency's Fiscal Year 1991 Work Program and to continue the development of a Year 2010 Regional Transportation Plan. The Regional Mobility Policy Analysis proved to be an important and useful step which increased the Board's awareness of the region's changing development pattern and mobility trends, and which

encouraged greater involvement in the issue-shaping and work program development process. It is hoped that the strategies outlined above will provide a regional agenda that can serve to bring the public and private sectors together to achieve improved mobility in the Delaware Valley region.

REGIONAL MOBILITY POLICY ANALYSIS

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