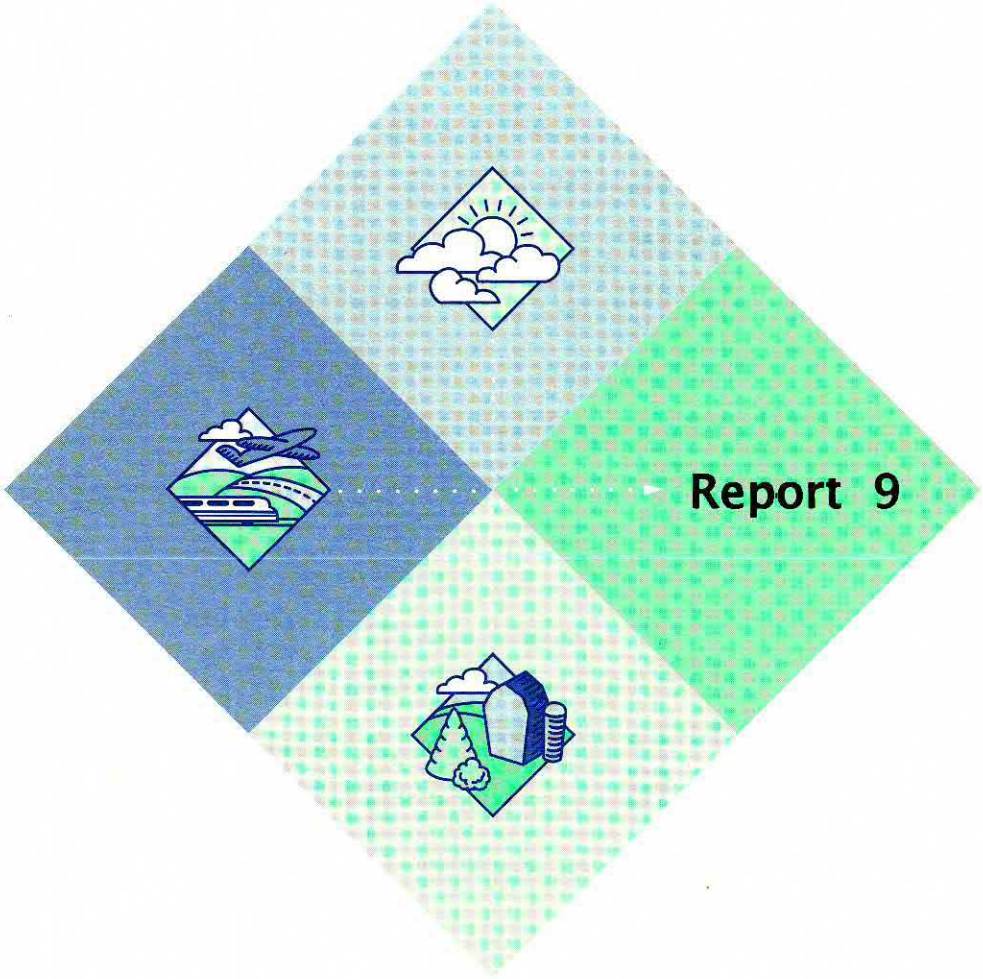


Report 9

Transportation Issues and Goals for the Long Range Plan

A DOCUMENT FOR PUBLIC DISCUSSION

DIRECTION 2020

A Region on the Rise

DELAWARE VALLEY REGIONAL PLANNING COMMISSION

DIRECTION 2020

TRANSPORTATION ISSUES
AND GOALS FOR THE LONG RANGE PLAN

A DOCUMENT FOR PUBLIC DISCUSSION

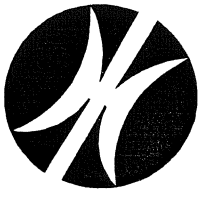
REPORT # 9

AUGUST 1993

DELAWARE VALLEY REGIONAL PLANNING COMMISSION
THE BOURSE BUILDING
21 SOUTH 5TH STREET
PHILADELPHIA, PA 19106

This report, prepared by the Transportation Planning Division of the Delaware Valley Regional Planning Commission, was financed by the Federal Highway Administration and the Federal Transit Administration of the U. S. Department of Transportation. The authors, however, are solely responsible for its finding and conclusions, which may not represent the official views or policies of the funding agencies.

Created in 1965, the Delaware Valley Regional Planning Commission (DVRPC) is an interstate, intercounty and intercity agency which provides continuing, comprehensive and coordinated planning for the orderly growth and development of the Delaware Valley region. The region includes Bucks, Chester, Delaware, and Montgomery counties as well as the City of Philadelphia in Pennsylvania and Burlington, Camden, Gloucester, and Mercer counties in New Jersey. The Commission is an advisory agency which divides its planning and service functions among the Office of the Executive Director, the Office of Public Affairs, and three line Divisions: Transportation Planning, Regional Planning and Information Services Center, and Finance and Administration. DVRPC's mission for the 1990s is to emphasize technical assistance and services and to conduct high priority studies for member state and local governments, while determining and meeting the needs of the private sector.



The 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: 1993
DIRECTION 2020 TRANSPORTATION ISSUES AND GOALS FOR THE LONG RANGE PLAN	Publication No. 93005

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ABSTRACT

This document represents the first step in the long-range planning process. Issues facing all aspects of the transportation industry in the Delaware Valley region, including public transportation, highway, goods movement, and air passenger modes, are discussed. A series of ten regional long-range planning goals is also presented.

Appendices include examinations of the existing conditions of these systems.

For more information contact:

Delaware Valley Regional Planning Commission
Regional Information Services Center
The Bourse Building
21 South 5th Street
Philadelphia, PA 19106
(215) 592-1800

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INTRODUCTION

The Delaware Valley's transportation systems are among the most comprehensive of any area in the nation. From the beginning, sailing ships, followed by barge traffic, railroads, highways, and, finally, airports, have given the region a legacy of extensive transportation systems, and make it ideal for economic development. Virtually all types of transportation, both public and private, are currently represented within the nine-county DVRPC area, including highways, transit, trucking, ports, rail, air freight, and air passenger systems. Operations of these systems, however, are separate from one another.

The relationship among land use, transportation, and air quality is the basis of planning for the future. The need for transportation can be impacted by land use, indicating future land use plans must recognize the relationship between land use and congestion. Levels of congestion can be impacted by improvements to transportation facilities and highway capacity, thereby reducing pollution through effective transportation plans. Coordination of land use and transportation planning is of critical importance to the region into the year 2020. The challenge for the future is how to integrate these systems in order to achieve the optimum benefit for the region. Environmental and legislative concerns also need to be addressed. The planning process for the 21st century will examine ways to focus plans for individual systems within a framework of common goals for the region.

The planning process now underway is different than previous efforts. The DVRPC Long-Range Transportation Plans for 1985 (produced in 1969) and 2000 (produced in 1982) both utilized the traditional approach of viewing transportation as a separate element in the regional planning process. The emphasis was on how to expand the system to meet the needs of the future. For the year 2020, planning efforts include ways to balance the mobility requirements of the region with an understanding of the economic, environmental, and social climates which will shape the systems into the 21st century.

The purpose of this report is to present the issues facing today's transportation systems, and goals for the future of those systems, in an educational format. These goals are presented at the conclusion of this report. The information provided here is intended for use by planners - both citizens and professionals - as the basis for the decisions which will shape the programs of the long-range transportation plan.

Historical Perspective

The transportation systems which exist in the region today are what remain of decades of decentralization and competition. Prior to World War II, development in the region was primarily in central cities and towns. There were several competing transit companies which served central Philadelphia, the major regional employment center, and residential communities were established along spoke-like transportation corridors radiating out from Philadelphia.

In recent times, the escalating rate of auto ownership and the attractions of the suburbs have encouraged extensive development of employment sites outside Center City Philadelphia. In turn,

this has lessened the effectiveness of the public transportation system and created the need for more infrastructure, to the point where suburban transportation demand far outpaces the ability of the systems to expand.

As recently as the late 1980's, which saw explosive residential and commercial development throughout the entire region, development was undertaken with little or no concern for how traffic generated would affect the overall roadway system. Traditionally, developers have only been required to mitigate problems within the immediate impact of their site. Often, residents of once rural communities found their roads overwhelmed with traffic generated by new, large scale, residential developments. Traffic congestion is the chief complaint of most suburban businesses, municipalities, and citizens in the Delaware Valley.

Environmental Concerns

Compounding congestion problems is the environmental impact of motor vehicle exhaust. It has long been shown that as the number of vehicles increases along a roadway, travel time slows. Traffic congestion, and the associated idling time for vehicles, is a primary source of excessive emissions. Peak periods of travel coincide directly with periods of reduced air quality in the Delaware Valley.

The geographical and atmospheric conditions of the region are deceptive in that the air does not seem to be particularly polluted. Nevertheless, the Delaware Valley has long been identified by the Environmental Protection Agency (EPA) as an area with excessive levels of a number of pollutants, including ozone and carbon monoxide. While there are several types of sources of these pollutants, transportation emissions are the main source of air pollution in this region.

Several gases, vapors, and types of particles are identified as air pollutants. Carbon monoxide, hydrocarbons, oxides of nitrogen, smoke and particulate matter, lead, and photochemical smog or ozone are the most important. With the exception of ozone, all of these pollutants are called primary pollutants; they are the products emitted by internal combustion engines.

Ozone results from a reaction in the atmosphere among oxides of nitrogen, hydrocarbons, and other pollutants in the presence of sunlight. Ozone in the atmosphere is undesirable; it is unlike stratospheric ozone which affords protection from the sun's harmful ultraviolet rays. Atmospheric ozone is unique in that it may not be formed until the precursor emissions have drifted far from where they occurred.

The causes of air pollution are complex and its elimination, or substantial reduction, is equally complicated. All air pollution issues, from acid rain to airborne toxic substances, possess many nuances and require effective planning for their resolution.The most serious air quality problem in the region results from hydrocarbon (HC) and nitrogen oxide (NO_x) emissions chemically reacting with heat in the atmosphere to produce oxidant pollutants exceeding the Environmental Protection Agency's (EPA) one-hour air quality standard (0.12 ppm). The conditions which permit the complex chemical reactions necessary to produce these pollutants depend upon many factors, such as prevailing meteorological conditions and the topographic, land use, and

industrial characteristics of an area.

Transportation sources are the primary source of hydrocarbon and nitrogen oxide emissions. The National Acid Precipitation Assessment Program (NAPAP) estimates for 1980 showed that transportation accounted for 44 percent of all emissions of NO_x and 38 percent of volatile organic compound emissions in the United States. In the Philadelphia region, transportation sources probably contribute even greater shares of total hydrocarbon and nitrogen oxide emissions.The Philadelphia urbanized area currently does not meet National Ambient Air Quality Standards (NAAQS) for ozone and carbon monoxide. Ozone in particular continues to present a serious problem in the Delaware Valley region.

An additional environmental consideration is fuel and energy conservation, and it's relationship with cleaner air. Although each new model year brings more fuel-efficient vehicles, there has been no effect on the national average level of fuel consumption due to the considerably higher daily mileage that suburban motorists travel. Thus, programs encouraging fuel conservation behavior would provide an additional benefit of reduced levels of pollution.

Relevant Legislation

Two pieces of federal legislation which greatly impact transportation policy and plans have been passed in the last two years. These are the Clean Air Act Amendments (CAAA) of 1990 and the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991. While these acts are complex with many ramifications, the first fundamentally restricts adding highway capacity in areas that fail to meet air quality standards, and the second provides flexibility in shifting funds between highway and transit projects, as well as equalizing the state/local match required for financing projects.

The CAAA also requires large employers to raise the average vehicle occupancy rate for their employees to 25 percent above the average rate for the region, and to use various transportation control measures to reduce the vehicle miles traveled in the region. ISTEA authorizes a total expenditure of $155 billion for surface transportation over the six fiscal years between FY92 and FY95, and requires the maintenance of a long-range plan with a twenty-year horizon and a transportation improvement program with a financially viable, prioritized list of projects to be undertaken within the next three years. The net effect is to strengthen the role of metropolitan planning organizations (MPOs), such as DVRPC, and allow the treatment of surface transportation as a unified whole, instead of placing projects into separate highway and transit categories.

The Clean Air Act Amendments of 1990. A growing national awareness of the seriousness of air pollution was reflected over the past two decades in a series of legislative and administrative actions designed to give public agencies the tools necessary to achieve satisfactory air quality standards. With the passage of the Clean Air Act of 1970 by the U.S. Congress, a comprehensive national program was initiated to improve air quality, particularly in urban areas. The Environmental Protection Agency established air quality standards and undertook programs to reduce vehicle-related air pollutants through vehicle emission standards, emission controls, and

inspection/maintenance programs; and to implement transportation policies, regulations, and projects further reducing transportation-related emissions.

The CAAA is the most comprehensive federal air quality law ever enacted. It divides urban regions into six categories depending upon the severity of the violations of the federal air quality standards. The Philadelphia region is classified as a severe ozone nonattainment area, the second worst designation, and a moderate carbon monoxide nonattainment area. The region is centered around the City of Philadelphia and includes 14 counties in four states: Delaware, Maryland, New Jersey, and Pennsylvania.

Because of its nonattainment designations, the EPA has required the Philadelphia region to institute a series of air quality initiatives and comply with a timetable to assure attainment of federal air quality standards. Affected states must submit adequate plans to attain standards to the EPA or face the risk of penalties and sanctions. The Philadelphia region has until the year 2005 to attain the federal ozone standard.

In accordance with the Clean Air Act Amendments of 1990, state, regional, and local agencies, as well as the EPA, must develop implementation plans for those urban areas which do not meet air quality standards. The plans must include several major provisions for reducing travel-related emissions and meeting air quality standards in urban areas. The law authorizes the EPA to penalize offenders by imposing construction bans or withholding federal funds for clean air planning, highways, and sewage treatment plants.

The plan to attain air quality standards required by the CAAA is called the State Implementation Plan, or SIP. The Act requires various revisions to this plan to be prepared on the anniversary dates of CAAA enactment. The revisions are therefore due on November 15th of 1992, 1993 and 1994. In 1992, the states must submit conformity procedures, supply an emissions inventory, and detail an employer trip reduction program. By 1993, the states must adopt measures, some of which may be transportation-related, to reduce emissions by 15% by 1996. By November 15, 1994, additional measures must be adopted to reduce emissions by an average of 3% per year until attainment.

Conformity Procedures. Conformity procedures assure that transportation plans, programs and projects conform to the purpose of the SIP, which is to attain standards by the deadline, and to maintain them thereafter. Conformity requires that transportation planning support this purpose. Interim EPA guidance mandates that any plan or program show a measurable decrease in emissions when compared to the no-build alternative. Final guidance is anticipated to require that plans and programs demonstrate achievement of target emission reductions. In order for the region to achieve conformity, the majority of transportation plans and programs, such as transit improvements, will be those which have a demonstrably beneficial impact on air quality. Projects with negative air quality impacts, or even no impacts, may be postponed.

In 1991, DVRPC completed an analysis of the regional transportation plan in order to determine the impacts for the attainment year 2005. Compared to a scenario in which none of the projects are built, vehicle miles of travel decrease only slightly. The major effect of building the projects

is a 4% increase in average speeds. This speed increase causes carbon monoxide emissions to decrease by about the same percentage. Non-methane hydrocarbons, which are primarily responsible for the ozone violations decrease about 3%, and oxides of nitrogen decrease about 1%.

Non-methane hydrocarbon emissions are highly correlated to the speed of vehicle operation. Vehicles operate less efficiently and produce more emissions as speeds decrease. In southeastern Pennsylvania, running emissions are minimal, about 3 grams per mile for non-methane hydrocarbons, at 48 MPH. At 17 MPH, the average speed of vehicles on arterial roadways in the region, emissions double to 6 grams per mile. One reasonable approach to reducing emissions is to reduce the amount of travel occurring at very low speeds. The countervailing effect is that reduced congestion makes it easier to travel, and the tendency is for people to make longer or more frequent trips by automobile. Another approach is to divert trips to other modes.

Emissions Inventory. The same techniques of demonstrating conformity are used to inventory highway sources of emissions. The CAAA requires that an emissions inventory be completed for 1990. This will be the baseline from which future emission reductions will be measured. There are several types of emissions sources: mobile sources, made up of transportation and other motorized vehicles; stationary sources , which include point sources, such as factories or refineries, whose location can be pinpointed; and area sources — small, diffuse sources such as lawn mowers, oil-based paints, barbecues and neighborhood dry cleaners. Finally, plants emit reactive hydrocarbons and constitute biogenic sources.

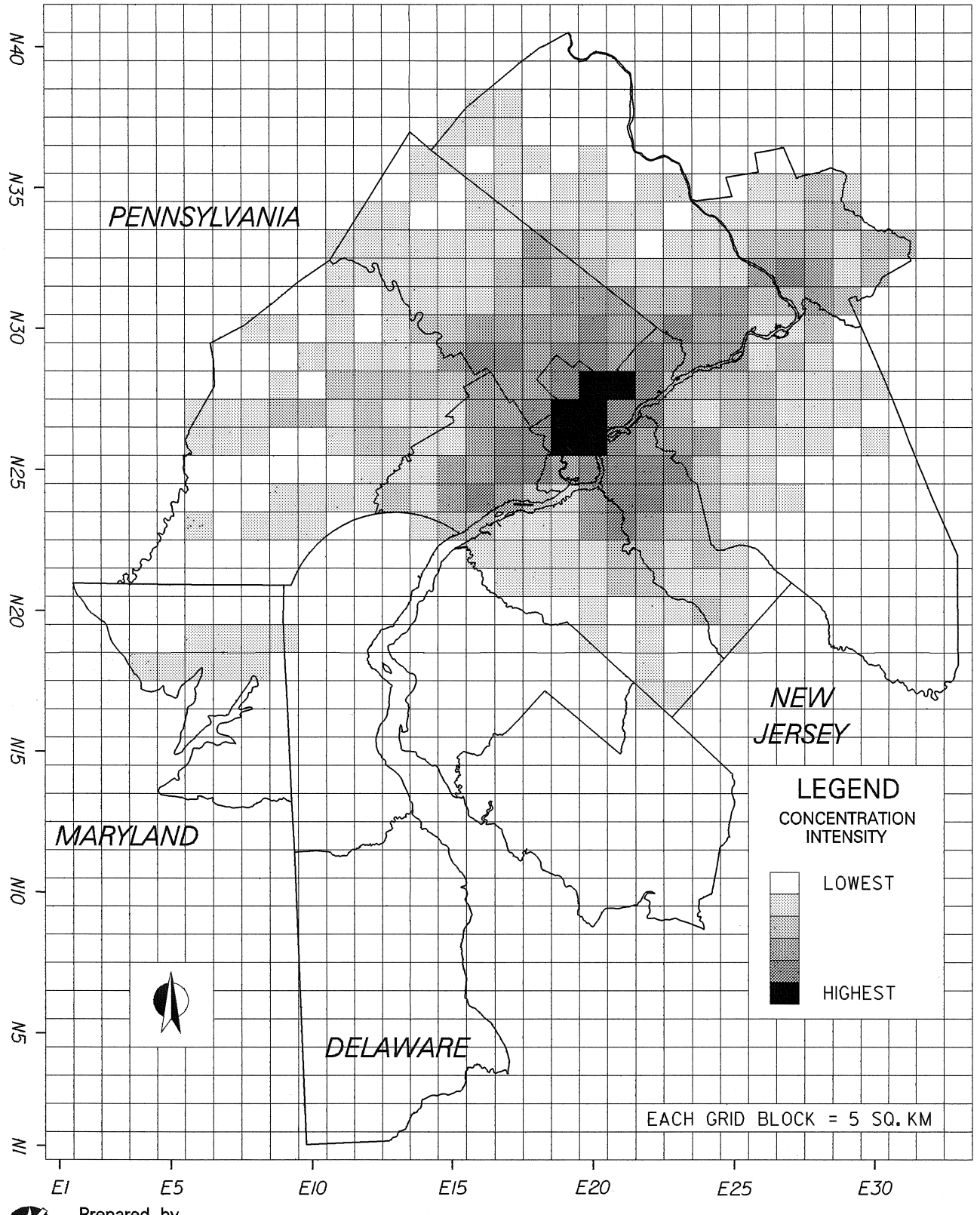
Light-duty gasoline vehicles (basically cars) account for about 50% of highway sources. Two classes of light-duty gasoline trucks account for approximately 30%. Thus, 80% of highway source emissions are attributable to light-duty gasoline vehicles. These vehicles, then, should be the focus of efforts to reduce highway source emissions.

A 1988 inventory allocated the highway source emissions to 5×5 kilometer grid cells overlaid on a map of the region (Figure 1). The geographic representation of the inventory shows that the greatest density of emissions still occurs in the older urbanized portions of the region, where the street network is dense and travel occurs at very low speeds. This phenomenon suggests that the most effective location for emission reduction strategies may be in the urban core. However, suburban congestion is beginning to make its mark. Although most of the cells of the second densest category are immediately adjacent to the most dense, two outlying grid cells are seen in the King of Prussia-Norristown area.

Emissions Reduction. Emissions from highway vehicles can be reduced by several means. The greatest benefits come from technological controls — making cars and trucks emit less pollutants — rather than reducing travel or increasing speeds. These controls, required by the CAAA, include: recovering vapors displaced while refueling vehicles; reducing the volatility of gasoline sold in the summertime, when ozone violations occur; and oxygenating fuels in the wintertime, when localized accumulations of carbon monoxide can occur. An enhanced program of inspection and maintenance is in the planning stage, and controls during the manufacturing process produce cleaner burning auto and bus engines. The CAAA also recommends that the

FIGURE 1

DISTRIBUTION OF 1988 HIGHWAY SOURCE NON–METHANE HYDROCARBON EMISSIONS



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use of alternative fuel sources be explored.

Transportation Control Measures. In addition to these technological controls, the CAAA require that transportation control measures be used to further reduce emissions. One means of reducing emissions, as indicated earlier, is to increase speeds. Traffic flow improvements, such as sophisticated signal systems, are one means of increasing speeds. Another important tool to reduce emissions is to reduce the number of vehicle miles of travel (VMT). Trips can be shortened, for example, by placing jobs and residences closer together. This is, however, a long-term approach to reducing VMT.

More practical in the short term is making alternate modes of travel more appealing. Public transit improvements, and to a lesser extent new facilities for bicyclists and pedestrians, provide an alternative to driving. Some trips might be eliminated altogether through telecommuting or short work weeks. Increasing vehicle occupancy can also result in lower VMT. Park-and-ride lots and highway lanes reserved for vehicles with 2 or more persons encourage ridesharing. Finally, some non-technological means of limiting emissions can be promoted, such as reducing the emissions associated with excessive idling, starting an engine when it is cold, and retirement of vehicles manufactured before 1980, when catalytic converter system technology became mandatory on all cars.

The feasibility and effectiveness of employing some of these measures in the Philadelphia region are currently being examined. If some are found to be efficient, they may be employed to help reach emission reduction targets. Transportation projects demonstrating these properties will begin to appear in DVRPC's transportation plans and programs.

Employer Trip Reduction Program. One of the aspects of the CAAA requires that states establish employer trip reduction (ETR) programs for certain nonattainment areas. ETR programs, also known as Employee Commute Options programs (ECOs), focus on commuting trips, particularly those which occur during the morning rush hour. It is travel during this morning period which often results in ozone formation later in the day.

An examination of travel patterns in 1985 and 1990 at a number of roads along the western Chester County line demonstrates how dramatically travel in the region is increasing, especially during commuting hours. From 7 to 8 AM traffic volumes increased from 7,500 in 1985 to 11,000 in 1980, a 45% increase. And whereas this hour represented 6.0% of 24-hour total in 1985, it represented 7.1% in 1980. It is, therefore, clear why these trips are targeted for reduction.

In severe nonattainment areas, such as Philadelphia, Baltimore, and New York (and the extreme nonattainment area of Los Angeles), the Act requires that a plan for an employer trip reduction program be submitted to EPA by November 15, 1992. The program requires any organization which employs 100 or more persons at one location to increase the occupancy of commuting vehicles to a level which is 25% above the average level for all such trips within the region.

Average passenger occupancy (APO) is determined by dividing the number of the firm's employees arriving between 6 and 10 AM by the number of vehicles used. Average vehicle occupancy (AVO) is the same ratio, but is the term used to refer to all employers in the region, regardless of size. The ETR program requires companies to increase their APO to 25% above the AVO. By November 15, 1994, affected employers must submit a compliance plan demonstrating how the target will be achieved by November 15, 1996.

Affected firms can include a variety of elements in their compliance plans. In suburban locations, incentives and assistance to form carpools and vanpools are the most practical types of plans. Subsidizing transit use, constitute another easily implemented program. In the Commuter Benefit Program administered by DVRPC, for example, employers purchase transit vouchers that can be redeemed for tokens, passes, or tickets from participating transit operators. Subsidies to the operating agencies to provide connecting service to rail lines may also be a part of an ETR.

Parking fees on single occupancy vehicles are another potential measure. Usually, the employer provides an unrelated benefit of an equal value to the cost of parking. In this way, solo drivers are no worse off. Those who rideshare and transit users receive the benefit, however, without incurring the cost of parking, thereby making these options more attractive. Telecommuting and compressed work week are two other options. The state program, depending upon how it is written, could provide credit to firms where drivers use vehicles with fuels which are cleaner than gasoline.

The Intermodal Surface Transportation Efficiency Act of 1991. ISTEA is an extensive piece of legislation designed to guide transportation planning into the next century. Unlike previous surface transportation acts, which provided funding to states in a manner which preserved the status quo, this act redefines the relationships between the federal government, the state governments, and the private sector. It is a result of a completely new policy regarding the future of transportation.

There are four major areas addressed by ISTEA. Included are:

- Provisions for a National Highway System (NHS), made up of interstate routes and some roads on the primary system, to target improvements to roads which are important to commerce, interstate travel, and national defense;

- State and local government flexibility in the use of federal transportation funds, permitting states to allocate funding amongst a variety of projects which enhance mobility and promote cleaner air;

- Involvement of the private sector in funding of transportation improvements; and

- Separate funds for enhancing the environment, such as wetlands conservation, bicycle and pedestrian facilities, highway beautification, and historic preservation, as well as to provide for safety-related improvements.

In addition, ISTEA has changed the local match requirements for projects to 20% for both highway and transit projects.

Highway Programs. The act authorizes $121 billion for highway projects in a way much different than past highway legislation, including different funding distribution formulas and program eligibility reqiurements. The National Highway System, funded at $21 million over the six years of ISTEA includes 155,000 miles of limited access and arterial highways across the United States. Projects will be selected by the states, but up to 50% of the funding for these projects may be transferred to the Surface Transportation Program initiative.

Although part of the National Highway System, the Interstate System is considered as a separate funding category. Between FY 1992-97, $7.2 billion has been allocated for construction of new interstate highways, and $17 billion is available for restoration, rehabilitation, and resurfacing of existing highways. Reconstruction or projects to expand capacity of existing highways is not permitted under this program unless the project includes provision of High-Occupancy Vehicle (HOV) lanes.

There are three other programs in this category. The Surface Transportation Program (STP) is a block grant program which allows the states to use the funds for categories of roads not on the NHS. These funds may also be used for transit capital projects. Currently, $23.9 billion is allocated over a six-year period, but ISTEA has a provision whereby additional funds may be transferred from other programs. The Congestion Mitigation and Air Quality Improvement Program is allocated $6 billion for transportation projects which will help urbanized areas achieve the provisions set forth in the CAAA.

The Bridge Replacement and Rehabilitation Program remains from previous legislation, recognizing the nation's need for infrastructure maintenance. ISTEA allocates $16.1 billion for bridge projects on any public road. In addition to these four programs, ISTEA lists 539 projects, covering a variety of topics, which have been mandated by Congress.

Transit Programs. The Federal Transit Administration (FTA), formerly the Urban Mass Transportation Administration, or UMTA, is overseeing the $31.5 billion allocated for transit programs in ISTEA. The Section 9 transit grant program makes $16.1 billion of these funds available, based on a formula, to all urbanized areas of the country. Transit authorities may apply for operating assistance under this program, as they have been permitted to do in the past.

Section 3 is a Discretionary and Formula capital program to help fund new starts (40% of funds), rail modernization projects (40%), and bus acquisition, including those in non-urbanized areas, and other types of capital projects (20%). There is currently $12.4 billion allocated over the next six years for these projects, of which roughly $60 million is allocated to the DVRPC region. The local match for funding any transit program remains at 20%.

Research and Development. Over the next six years, a total of $944 million is allocated for programs which focus on innovation in transportation planning. Collaboration between the public and private sector is encouraged, with federal funding available for 50% of the costs. A new

International Highway Transportation Outreach Program will promote American technology abroad, and will work to introduce the best foreign technological advances into US highway and transit planning. A Bureau of Transportation Statistics will be created as part of the US Department of Transportation to facilitate transportation data gathering, analysis, and dissemination, thus making the most efficient use of transportation monitoring.

Five additional university transportation centers will be added to the University Transportation Research Program, bringing the total to 15 institutions. Federal matching funds will be made available for private consortia researching innovative vehicle and manufacturing processes. Approximately $660 million is allocated for promotion of Intelligent Vehicle-Highway Systems, with the goal of a fully automated highway prototype in operation by the end of 1997.

Funding. Highway-related user taxes, which were scheduled to expire in 1995, will continue to 1999 due to the extension of the Highway Trust Fund. Mass transportation funding will receive 1.5 cents per gallon of motor fuel taxes, with the rest allocated to highway projects. Motor-fuel tax is scheduled to be reduced by 2.5 cents per gallon in 1996. ISTEA also established a new National Recreational Trails program which will receive 0.3% of the Highway Trust Fund receipts for the first year, and will thereafter be funded by taxes on fuels for recreational equipment.

The Role of the MPO. ISTEA provides MPOs with an enhanced role in regional transportation planning. All funds allocated under ISTEA in a region served by an MPO must be administered by that MPO. Thus, in this region, DVRPC will play a significant role in programming transportation projects.

The MPO is given the responsibility to insure that all projects applying for federal funding conform to the MPO-adopted standards set forth in regional long-range transportation plan, as well as the State Implementation Plan and other statewide plans. In addition, it must be shown that all projects in the long-range plan are financially viable. All planning functions of ISTEA projects must be coordinated through the MPO, including highway, transit, and air quality projects. The metropolitan planning function is funded by 1% of the ISTEA highway program allocation plus 1.35% of the total transit program funds.

TRANSPORTATION ISSUES

Each transportation system in the Delaware Valley region operates independently. Funding, planning, maintenance and administration for each are under the jurisdiction of distinct individual authorities. Often there is little, if any coordination among these groups, and little effort has been made to adopt common regional goals as part of their business plans. However, several new DVRPC task forces have been formed recently at DVRPC in an effort to foster greater understanding and cooperation in the advancement of the regional agenda, and New Jersey has formed a Transportation Executive Council for transportation agencies throughout the state.

In some cases, such as highways, transit, and port operations, there is more than one authority

operating that mode. For example, in this region, the state highway departments of Pennsylvania and New Jersey administer their state and federally owned roads, while the Turnpike Authorities administer the turnpikes, and counties and municipalities maintain local roads. There are three public transportation providers operating in downtown Philadelphia. The port operations of the Pennsylvania side and New Jersey side of the Delaware River are administered by two completely separate organizations, which must deal with two separate longshoremen's unions. Another independent organization controls all river crossings.

Legislatively, the region is moving toward a more unified concept of transportation. Integration of systems, commonly referred to as "intermodal" transportation use, is assigned high priority in future state and local transportation plans. However, issues pertaining to individual transportation systems remain unique, and can be best understood when discussed separately. In addition to the issues facing specific transportation systems, the following issues will have bearing on all aspects of transportation in the Delaware Valley. They include:

New Technology

Soon, the highways in the Delaware Valley region will show the influences of advances in paving materials, communications systems, law enforcement techniques, and vehicles. For example, PennDOT is currently investing in a traffic incident management system (TIMS) for I-476 and I-95 which consists of numerous components to assist in responses to accidents and incidents, monitor volumes, and control flow on these highways. Equipment in this system includes in-pavement speed and weight measurement devices, and surveillance cameras. Other measures include variable message signs, emergency access, and other design features for flexibility under a variety of circumstances. Technology is also available for communications between vehicles and highways, entitled Intelligent-Vehicle Highway Systems (IVHS), whereby on-board equipment allows all types of vehicles to receive real-time navigational, traffic volume, and incident location information.

Technological innovations in transit allow operators to take advantage of advances in vehicle design, new materials, and other ways to make the system more efficient. A regular program of equipment replacement can often mean a reduction in fuel and maintenance costs. In addition, new motor and engine technology allows transit vehicles to operate with much less air and noise pollution than older models, thus making new transit equipment more environmentally sound. New systems also provide a good image for the operator, which is useful when marketing service.

Intermodal Transportation

ISTEA defines the intermodal transportation system as one which includes "all forms of transportation in a unified, connected manner." On a smaller scale, the term "intermodal" has different meanings within individual modes. It primarily means a transportation trip between an origin and a destination which occurs via two or more modes. Therefore, for individual trips, the term can mean an auto-transit trip or a two modes of transit commuter trip or a truck-rail, truck-ship, or rail-ship trip for goods movement. At the regional level, it means the relationship

between the modes is such that they interact with one another.
In transit, intermodal transfers allow operators to serve a greater segment of the population. For freight, shippers can take advantage of the economies of each mode to achieve the most cost-effective and timiliest deliveries of their goods. As a system, the transit, freight, and highway modes permit the most efficient transportation movements. There are many examples of intermodal activity throughout the Delaware Valley Region. SEPTA operates many transportation centers where passengers may transfer between bus and rail systems, or may park their cars and ride (see Public Transportation discussion below). The Port of Philadelphia is served by three railroads, and there are numerous rail-truck intermodal yards in this region. In addition, the highway system provides access to transit and freight operations.

PUBLIC TRANSPORTATION ISSUES

The Delaware Valley is served by an extensive network of rail, trolley, and bus lines. The Southeastern Pennsylvania Transportation Authority (SEPTA) is the principal carrier operating on the Pennsylvania side of the region, serving both the City of Philadelphia and its suburbs. Service in New Jersey is provided by the Port Authority Transit Corporation (PATCO), which operates a rail transit line between Lindenwold and Philadelphia via the Ben Franklin Bridge, and NJ TRANSIT, which operates the local bus service in South Jersey, as well as bus service to Philadelphia and to seashore points, and train service between Atlantic City, NJ and Philadelphia's 30th Street station. Mercer County in New Jersey has its own bus service focused on Trenton and operated semi-autonomously by NJ TRANSIT Mercer, and southwestern Montgomery County, Pennsylvania is served by Pottstown Urban Transit (PUT).

There are three major rail corridors in Philadelphia: Amtrak's Northeast Corridor, which runs between Boston, Mass. and Washington, D.C.; Amtrak's Main Line, running west to Harrisburg and Pittsburgh; and the Atlantic City Line, running east to Atlantic City. Both SEPTA and NJ TRANSIT operate local rail service on the Northeast Corridor. NJ TRANSIT operates local trains to Atlantic City along Amtrak's trackage, and SEPTA operates local trains along the along the Main Line tracks as far west as Parkesburg. Stations are leased from Amtrak, and, in several cases, are shared with Amtrak.

Intercity bus service is offered in this region by Greyhound/Trailways and Bieber Tourways. These carriers also connect intra-regional points, such as Reading, Pottstown, and Fort Dix, with the City of Philadelphia. Philadelphia International Airport handles the region's commercial passenger air traffic. A description of the region's public transportation system is located in Appendix A.

Issue: Ridership

While the market for transit within and into Philadelphia remains strong, the recent economic slowdown and a shift of jobs away from the central hubs traditionally served by transit has manifested in declining ridership on all routes. Suburb-to-suburb commutes are generally not served by transit, as employment sites and residential locations are so disparate that there is no clear market for routes.

Fare increases, a protracted strike, or massive construction projects which reduce service over an extended period also divert ridership away from transit. For example, SEPTA's Regional Rail Division has been unable to restore ridership to 1980 levels after a 6-month strike in 1983 (coinciding with SEPTA's takeover of the system from Conrail). The 1992 and 1993 Railworks projects, which interrupted service to the northern suburbs for more than 6 months and 4 months, respectively, for significant reconstruction of those lines, has also caused a sharp decline in Regional Rail ridership.

NJ TRANSIT's ridership has largely stabilized after suffering steep declines in the mid to late 80s. Small continuing losses on the local commuter routes have been balanced by increases in ridership on the seashore routes and local Camden County routes. Though demographics and the economy certainly influence the statistics, fare increases seem to be the principal reason for the earlier decline.

Transit users often cite convenience of use as a primary reason for commuting by train or bus. The costs of commuting by auto, as well as the stress of driving on congested roads, often makes transit an attractive alternative for the work trip. Outside of peak-hour travel, however, using the system is more time-consuming.

There is currently no South Jersey system map available, although one is under preparation and should be available before the end of this year. The highly schematic route maps currently shown on timetables are difficult for new riders to understand. Although many popular destinations, such as the sporting arenas, the airport, and the seashore are easily accessible by transit, a transfer of mode is required to access these points. In these cases, commuters feel that transit is too confusing or inconvenient, and auto travel is faster and more direct.

Issue: Revenue

Operating Revenue. Neither SEPTA nor NJ Transit, like public transportation systems everywhere, recovers full operating expenses from the farebox, and both rely heavily on federal, state, and (in PA only) local revenue support. Pennsylvania uses the proceeds from state lottery funds to reimburse transit operators for the free carriage of senior citizens during off-peak hours. In 1992, SEPTA recieved $57.8 million, or approximately 11% of their operating budget, from PA lottery funds.

While this is an important source of revenue for operators, it distorts fare structures and rider demographics. Because the reimbursement is constructed from the base fare paid by cash riders, operators across the state set high base fares. Some operators, including SEPTA, sell multi-token packets and weekly and monthly passes at a deep discount for regular riders. PATCO is relatively successful compared to other transit systems or suburban railroad lines, with most of its operating expenses covered from farebox revenues.

Fares. For SEPTA service other than Regional Rail, the base fare is $1.50, among the highest in the nation. PATCO and Regional Rail tickets are both distance and time sensitive: it costs more to travel during the peak hours, with higher ticket prices for stations further from Center

City Philadelphia. Both SEPTA and NJ Transit offer discounts on multi-ride tickets.

There is little interstate coordination of service and fares between operators. While SEPTA trains serve Wilmington, Delaware, and New Jersey destinations at Trenton and West Trenton, and NJ Transit buses and trains serve Center City Philadelphia, passengers making interline transfers must pay a separate fare. PATCO makes discounted SEPTA transfer tickets available for Pennsylvania-bound commuters, but the tickets are only sold at PATCO stations in New Jersey. SEPTA does not reciprocate for New Jersey-bound Pennsylvania commuters, making public transportation an expensive option for this growing group of commuters.

Rising costs maintain upward pressure on the fare structures of all transit operators. In view of the limited governmental financial resources, operators are forced to look elsewhere for revenue. Within the past 5 years, with increasing suburban congestion, private sector employers have offered subsidies to SEPTA to provide transit service to their locations. Oftentimes, operators attempt to recover a greater portion of expenses from the farebox.

Labor. Wages and salaries for NJ TRANSIT employees are set by statewide labor contracts and salary scales. Since these are driven by the higher cost of living in North Jersey, labor costs in the Southern Division are higher than those of PATCO and SEPTA. Since SEPTA was formed from several smaller transportation companies, employees are represented by any one of several unions, depending on their job description and the division in which they work. All negotiate different contracts at different times, and each group tries to get at least as much as the others. This effects total labor costs which must be accounted for in the budgeting process.

Issue: Safety and Security

With respect to public transportation, two largely separate issues emerge when discussing safety. The first, reducing the accident rate to a minimum, compares to similar concerns expressed about highway safety. The second issue involves maintaining security at stations and aboard vehicles.

As with any other vehicle, buses are subject to highway accidents. The main influences on a transit operator are driver training programs and line management's emphasis on safe driving. Generally, the record of local operators is good and the risk to passengers is less than if they were driving their own cars. Both SEPTA and NJ Transit operate relatively new bus fleets that are well maintained, thus reducing the chances of accidents due to mechanical failure.

With rail vehicles, safety problems relate to signaling and control. Signaling fulfills two functions in rail operations: dispatching and collision avoidance. The two are related in that the ability to keep trains separated allows the operator to schedule short headways and to operate safely in traffic that mixes locals, expresses, and freight. In addition, regional rail grade crossings have the potential for accidents with pedestrians or vehicle drivers who ignore closed warning gates.

Amtrak owns and controls the dispatching on three of the Regional Rail lines, and additional

lines pass through or touch Amtrak territory. This means that SEPTA's trains must be equipped with signaling and train control systems compatible with that used by Amtrak. SEPTA is directly responsible for the signaling on the remaining ten non-Amtrak lines.

There have been severe accidents on the Market-Frankford Elevated and the Norristown High Speed lines directly attributable to equipment failure. As a consequence of federal investigations into these accidents, several safety-related changes were made. New rolling stock, strengthened maintenance and inspection requirements and installation of new emergency braking systems will help prevent similar accidents from occurring in the future.

To insure the personal safety of passengers, SEPTA police are armed, and in 1991, a K-9 force was added to patrol subway stations in Center City. Foot patrols are on duty at Center City stations of SEPTA and PATCO. Outlying stations on both SEPTA and PATCO are equipped with call boxes directly linking them to local police stations. NJ Transit relies on local police for security at bus stops.

Issue: Capital Improvements

As the infrastructure of the region continues to age, transit systems need to invest in system improvements to be responsive to the region's transportation requirements. Since the farebox contributes only toward the operating expenses of a given system, capital improvements are funded through special legislative appropriations at the state and federal levels, as well as matching funds from the City of Philadelphia and the four suburban counties. Act 26, a dedicated transit tax levied on periodicals, leased or rented autos, tire sales, and public utilities' real estate, provides capital funding and maintenace assistance, however the level of funds fluctuates from year to year according to the marketplace. Projects may be planned many years in advance of actual need to insure adequate funding, or serious needs may go unmet for lack of financing.

The latter is the case in many aspects of SEPTA's Regional Rail Division. At the time of SEPTA's takeover much of the railroad plant was in a deteriorated condition, the result of years of deferred maintenance by the predecessor railroads. The Regional Rail system is still suffering from an inadequately maintained physical plant because of the lack of capital resources.

The FY92 capital budget identifies $204 million worth of projects that deal with signaling and communications on Regional Rail and rail transit lines. Major projects include modernization of the signal systems on the Broad Street Subway and the Norristown and West Trenton branches of the Regional Rail system.

In the City Division, bus maintenance facilities are in great need of modernization or replacement. One new garage was built recently, but modernization of the older depots would improve the efficiency of SEPTA's vehicle maintenance procedures and extend the useful life of the facilities. Most of the projects listed in SEPTA's 1992 Capital Program involve system rehabilitation/ replacement rather than service restoration or system expansion.

For the New Jersey side of the region several large-scale capital projects were completed in the past five years, including the Camden Transportation Center, the new Washington Township bus maintenance facility, and the reconstructed Newton Avenue bus maintenance facility. Currently, only one capital project is programmed: the addition of a second track to the Lindenwold-Atlantic City line. PATCO has no major capital improvement projects at this time.

Issue: Service

Service Changes. Both SEPTA and NJ Transit make changes in routes and scheduling from time to time. Routes are added, combined, or cancelled according to a number of factors, including ridership levels, economics, geography, productivity, network integrity, and logical, simple service patterns. Changes in service frequency are also made according to passenger requests.

Potential Service Expansion Scenarios. As mentioned above, SEPTA is concentrating primarily on restoration of the existing system. New service scenarios consist mostly of line extensions, such as extending various rapid transit lines. There is, however, one proposed new service scenario which will have a major impact on regional transportation. An inter-suburban line between western Chester County and eastern Bucks County, called "Cross-County Metro," is under discussion in Pennsylvania (Figure 2).

In New Jersey, a long-range plan was completed in 1989 that called for studying the feasibility of re-establishing transit corridors on existing rights-of-way in Burlington and Gloucester counties. These corridors had earlier been considered as possible PATCO extensions, but the study has now been broadened to include light rail and busways. This service expansion is under serious consideration.

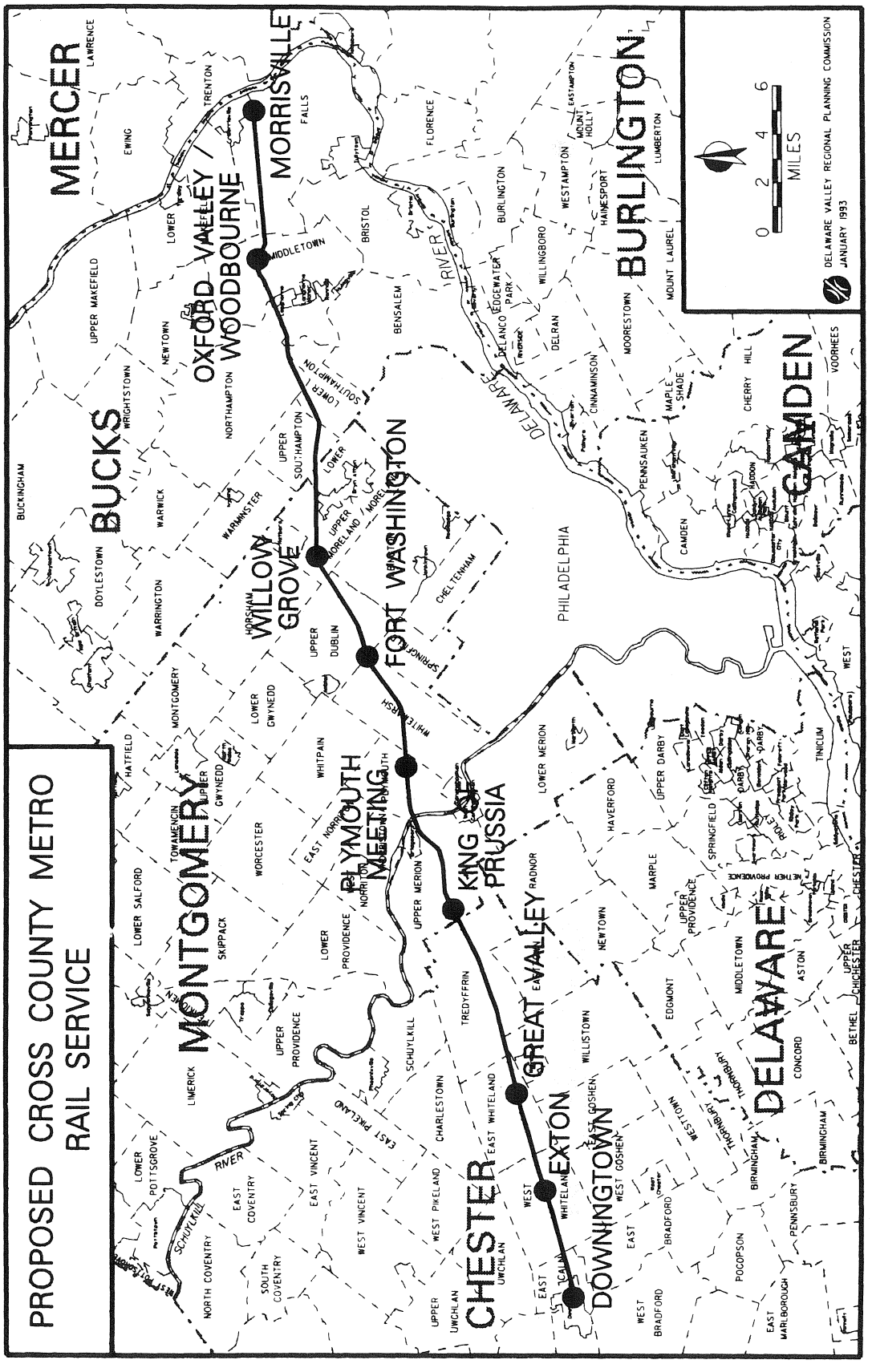
The amount of commercial growth now occurring in Burlington, Camden, and Gloucester counties also restrains interstate commuter ridership in this area. Several companies have migrated from Philadelphia to the suburban areas of South Jersey, reducing the number of commuters into Philadelphia and creating the possibility of capturing a reverse commute market.

Responsiveness to the Business Community. Routes are sometimes added to serve major suburban employment and shopping centers at the request of the business community or elected officials. There are several transportation management associations (TMAs) actively encouraging employer-subsidized transportation expansion as a means of reducing congestion in the DVRPC region. Partnerships of this nature are becoming fairly common, although SEPTA's 200 series of routes, which connect Regional Rail passengers with selected employment centers throughout the region, has met with mixed success.

Other Issues

Privatization. In some areas of the country, day-to-day operations of transit systems are handled by private operators. In this region, the City of Pottstown owns the vehicles and administers PUT, while a private contractor provides all maintenance and operations service. To date, neither SEPTA, NJ Transit, nor PATCO have privatized any of their routes. SEPTA, however,

FIGURE 2


PROPOSED CROSS COUNTY METRO RAIL SERVICE
MERCER
BUCKS
MONTGOMERY
CHESTER
DELAWARE
CAMDEN
BURLINGTON
OXFORD VALLEY / WOODBOURNE
MORRISVILLE
WILLOW GROVE
FORT WASHINGTON
PLYMOUTH MEETING
KING OF PRUSSIA
GREAT VALLEY
EXTON
DOWNINGTOWN
PHILADELPHIA
DELAWARE RIVER
SCHUYLKILL RIVER
0 2 4 6
MILES
DELAWARE VALLEY REGIONAL PLANNING COMMISSION
JANUARY 1993

has privatized other services, including snow removal and regional rail ticket sales.

Rights-of-Way Preservation. With the abandonment of numerous freight rail lines throughout the region, there has been some pressure to remove the track and allow the land to be used for other purposes. Also, SEPTA's regional rail service to West Chester, in Chester county and Newtown in Bucks county has been suspended. While removal prevents the possibility of transit re-use, maintenance of the tracks and catenary systems can be prohibitively expensive. In many cases, there is opposition to transportation or transit re-use of these rights of way.

Transit-Friendly Design. Many reasons for commuter reluctance to use transit to suburban office sites center on the "inconvenience" of transit. Often, suburban office campuses are sited such that building entrances are some distance from transit stops. And, if a bus route had to serve building entrances at numerous office parks, the route could become so circuitous as to discourage ridership. Building entrances which are close to the street, or clustered in one area, facilitate transit use. Other design measures include integrating transit facilities into site development plans and siting employment centers to take advantage of existing transit routes.

Transportation Centers. Census data from 1970, 1980, and 1990 shows a definite trend toward increasing suburb-to-suburb commuting patterns. While there may be transit service to either the home address or work address, it is unusual to find service from one to the other. Transportation centers are transit facilities integrated into an area in such a way that passengers can move easily between transit and surrounding land uses. In the Delaware Valley region outside of the Center City area where all three regional rail stations serve as transportation centers, there are transportation centers currently located in Camden and Trenton, NJ, and Norristown, 69th Street Terminal, Frankford Terminal, Olney Terminal, and Chester City, Pennsylvania.

Park and Ride. Expansion of parking facilities at transit stations is seen in this region as a way to increase ridership, especially of the regional rail system. Along the PATCO line, recently expanded parking facilites are often filled to capacity. However, financial constraints and community opposition, for a variety of reasons, have in many cases prevented SEPTA from expanding parking facilities in southeastern Pennsylvania to meet commuter demand. Nevertheless, SEPTA has added 880 new parking spaces in the last two fiscal years, and plans to construct another 1600 spaces in upcoming years. There are currently 14 transit park-and-ride expansions being planned in the region.

ADA Compliance. Transit operators throughout the country are now obligated, through the Americans with Disabilities Act, to make transit accessible to disabled persons. Many buses "kneel" or have lifts to accomodate wheelchair-bound riders, and other modfications to the vehicles are usually simple to do and not costly. Modifications to stations, however, are draining capital resources earmarked for other purposes. Large scale redesign and reconstruction of facilities are often the only way to ensure compliance with the law.

HIGHWAY ISSUES

The Delaware Valley highway system consists of an 8,000-mile network of limited access facilities, arterial highways, secondary collector roads, and local streets which provides access to virtually every developed land parcel in the region. Generally, highway issues have been given the highest priority in state transportation funding budgets, to the extent that expansion of the system to meet the needs of regional growth was taken for granted. And, much like transit, smaller municipal and state budgets mean less support for the system. A complete description of the region's highway system is located in Appendix B.

Issue: Highway Travel Demand

The dominant mode of travel in the DVRPC region is the private automobile. According to 1990 US Census data, about 68 percent of the region's employed persons drove to work alone and 12 percent used a carpool or vanpool. When considered together, this statistic shows that fully 80 percent of employed persons in this region use private means of transportation to get to work. 12 percent use various modes of public transportation, and 8 percent use other means of transportation, such as bicycles and walking, or work at home. The share of all work trips by public transportation (regional rail, subway-elevated, bus, and trolley) has declined steadily since 1960. Although this is primarily due to the growth in travel in areas difficult to serve by transit, there are other factors which influence mode choice, including cost and convenience of transit.

The regional highway system carries approximately 92.5 million vehicle-miles of travel (VMT) on an average day, based on the most recent DVRPC traffic simulation. Of all trips in the region, 92 percent are now made on the highway system. A comparison with recent traffic volumes with those recorded in 1980 (66.9 million miles) on the highways of the Delaware Valley region shows significant growth.

Issue: Highway Congestion

Rapid suburbanization of jobs and housing throughout the region over the past 30 years has resulted in highly diffused trip-making patterns. In addition, the growth in employment and increased household trip generation resulting from more and more women in the workforce has added significantly to regional VMT. Congestion is a major consequence of this type of demand. New travel patterns to suburban offices and commercial areas place a severe strain on street and highway facilities which were designed for much lower levels of traffic. Many of these roads now serve both through and local trips. Citizen concern over traffic congestion is at an all-time high.

Whereas traffic congestion was once limited to the region's core areas, many towns in the suburbs are experiencing traffic levels similar to those of the cities. Due to recent trends in suburban commercial and industrial development, congestion in the suburbs occurs not only during peak hours, as was the case in the past, but throughout the entire day. Municipalities with the fastest population and employment growth correspond to those with the highest

percentage of traffic volume increases. Locations lacking adequate highway facilities and transit services currently face the worst congestion.

DVRPC monitors highway traffic volumes on a continuous basis in the growing travel corridors throughout the Delaware Valley region, thus providing a data base from which the impact of land use changes on traffic levels can be determined. For each major highway within a corridor, the average volume-to-capacity ratio (V/C) is calculated. This quantity, together with the average speed, provides a measure of the quality, or level-of-service, for each facility, and describes the operational conditions from the perspective of motorists in terms of speed and travel time, traffic interruptions, freedom to maneuver, comfort, and convenience[1]. A DVRPC analysis examined congestion levels, as determined by V/C and speed, for all highways in the region. The results showed that most of the congested areas are located in urban or growing suburban areas.

Issue: Highway Safety

In order to assure the safe and efficient use of the highways, the system is required to accommodate vehicles of different sizes and weights, serving different purposes. Accidents and dangerous conditions contribute significantly to congestion and delay on the roadways. Safety and security of the highway system are extremely important considerations in planning for highway improvements.

Traffic accidents occur when there is a failure in the interaction of driver, vehicle, roadway, traffic conditions, and weather. Accidents may be described in terms of the numbers of accidents per person, per vehicle registration, or per vehicle-mile of travel. The number of accidents per vehicle-mile of travel is the most commonly used index for evaluating the relative safety of highway or street sections.

A comparison of highway fatalities and total accidents in the Delaware Valley region over the past fourteen years shows that fatalities decreased from 1976 to 1990[2]. In Pennsylvania the highway fatality rate declined from 2.92 per 100 million vehicle-miles in 1976 to 1.92 in 1990. This long-term trend reflects expanded highway safety efforts, including enforcement of the 55-mph speed limit. It should be noted that this mortality decrease occurred despite an increase in vehicle miles.

Improvements in highway and vehicle design have also played a role in enhanced highway safety. Newer expressways have wider lanes, improved sight distances, and better traffic separation, and thus generally experience lower accident rates than do older arterials. Improved handling characteristics and better braking systems have helped newer cars avoid accidents. Federal legislation requiring supplemental restraint systems (e.g. air-bags) on all post-1992 vehicles, as well as state legislation requiring the use of seat belts for all front-seat passengers, have reduced the seriousness of injuries when accidents do occur.

Pedestrian accidents, however, have been increasing in recent years. Right-turn-on-red and other traffic regulations designed to increase trip efficiency and reduce congestion often lead to

motorist failure to monitor pedestrian traffic, as well as other vehicles. Pedestrian and bicyclist actions can also contribute to this type of accident in an urban setting. In suburban locations where vehicular speeds are higher and sidewalks are often non-existent, pedestrian-motorist conflicts occur regularly.

Crashes and fatalities involving heavy vehicles are of concern to traffic safety officials, as they represent a serious hazard to all highway users. Lighter vehicles fare poorly in collisions with heavier vehicles, and truck accidents can seriously disrupt the regional flow of traffic for extended periods of time. It is not unusual for a major expressway to be closed for several hours following an accident.

Human error has been identified as one of the primary causes of accidents involving heavy trucks in the Delaware Valley region. The chief actions include speeding and making unsafe lane changes, with driver fatigue a major contributing factor. Excessive hours at the wheel, irregular scheduling, and variations in daily sleep patterns have been connected with driver fatigue.

Issue: Construction/Improvements

With the completion of the Vine Street Expressway (I-676), New Jersey Route 55, and the Mid-County Expressway (The "Blue Route," I-476), there are few new highways planned for this region. Although there are several new roads under discussion, including a relocated US 202 in Bucks and Montgomery Counties, only the Exton Bypass (US 30) in Chester County and the "Trenton Complex" (NJ 29 and I-295) in Mercer County are receiving serious consideration at this time.

Instead, the concentration is on making cost-effective choices for improvements which will reduce congestion without detrimental impact on the environment. To this end, PennDOT plans to improve I-95 in Pennsylvania, adding many technologically advanced congestion management features. There are also plans to construct an interchange between I-95 and the Pennsylvania Turnpike, and to build numerous park-and-ride facilities adjacent to highways throughout the region as both transit and carpool facilities.

Issue: Bridges

Many of the highway bridges in the region, built to accommodate the expanding development in this century, are nearing the end of their useful life. In many cases municipalities are fiscally unable to make all necessary repairs, resulting in bridge postings which lower the economic viability of that roadway. Occasionally, depending on safety considerations and the level of deterioration, bridges are closed completely.

New Jersey bridge improvements are programmed as part of statewide or regional highway improvement plans. In the late 1980's, however, Pennsylvania made significant amounts of funding available for repair, rehabilitation, resurfacing, and restoration of state-owned bridges. Known as the "Billion-Dollar Bridge Bills," these two pieces of legislation gave the financial

backing to make bridges a high priority in the state's 12-year Transportation Program. Many bridge projects in southeastern Pennsylvania continue to receive funding from this source.

GOODS MOVEMENT ISSUES

The subject of goods, or freight, movement in the region is one with many facets. Not only are there several modes (truck, rail, port, air), but also numerous private companies and oversight authorities, and issues which involve the relationship among modes (such as port access). This topic will be addressed by DVRPC in a forthcoming comprehensive goods movement plan. Nevertheless, there are certain issues pertaining to freight movements within the region which also impact other transportation systems.

Issue: Operating Constraints

Roadway conditions in the older cities, such as Camden, Chester, Trenton, and Philadelphia, often pose difficulties to truck drivers. Local deliveries can sometimes be difficult given the narrow streets, sharp turning radii, low clearance railroad bridges, and weight-restricted bridges often found in the more industrialized areas. Many companies restrict their receiving hours to regular business hours, thus obligating truckers to be on the road during periods of peak congestion.

In suburban areas, conditions facilitate truck movements. Industrial parks were built to allow generous lanes and turning areas for easy truck operations. Suburban manufacturing operations rely heavily on the trucking industry for shipment of their finished products, as they are often sited away from established rail service corridors. The Twin-Trailer network is not restricted to interstate or limited access highways in suburban or rural areas, thus improving the efficiency of goods movement to suburban terminals.

In New Jersey, the state proposed to improve rail access to the facilities operated by the South Jersey Port Corporation in Camden. A long-standing need is to facilitate the movement of freight from South Jersey to the north. Currently, only two routes connect South Jersey with the national rail network - the Delair lift bridge to Philadelphia and the Bordentown Branch, which parallels the Delaware River, to Trenton. New Jersey has expressed an interest in reopening the abandoned Jersey Central line to Lakehurst, seeing potential increased demand for moving sand, gravel, and clay out of South Jersey.

In surveys conducted during the early 1980s, several problems associated with access and efficiency at the Port of Philadelphia were identified. These can be grouped into three types: intermodal connections to rail, truck accessibility, and shipper concerns. The railroad's trouble with port operations echo the same complaints as the port has with railroad operations: overhead clearances near the port prevent the use of doublestack equipment. Improvements could lead to increases in inland bound traffic. Of the firms that use rail access to the terminals, some expressed concern that the quality and frequency of service by Conrail was inadequate. Truckers also cited a number of problems with access to the ports of Philadelphia, including rough road

conditions leading to the port, the need to use city streets, peak hour urban congestion, low overpasses, freeway ramp problems, and weight limits too low to handle trucks on the most direct routes.

Issue: Competition

The Philadelphia region is severely hampered in its competition with other regions because of the lack of a high-clearance route across the state. Increased clearances on the Conrail mainline and on the Philadelphia-Binghamton route used by the C-P has been approved by the Pennsylvania legislature. Although it set a precedent, providing direct assistance to a major carrier was seen as a way to preserve and increase the state's economic competitiveness.

There are numerous trucking companies operating in the Delaware Valley region, ranging from small delivery operations to branch offices of national companies. Deregulation of the trucking industry allows trucking operations to compete with rail for the same freight, often leading to stiff competition among truckers, as well. This has forced the railroads to restructure many of their operations in the region. In competing with the trucking industry for long-distance hauling, the railroad industry developed such capabilities as trailer on flat car (TOFC) and double stacking. With these innovations the railroads became much more competitive in the longer hauls (300 to 1,500 miles). However, increased weight limits and the use of tandem trailers also improved the productivity of the trucking industry.

The rail freight industry has undergone tremendous change within the Delaware Valley Region over the last fifteen years. The consolidation of the Pennsylvania and Reading railroads into Conrail, as well as the incorporation of the Baltimore and Ohio Railroad into the CSX system, remains foremost among these changes. In order to provide some competition, the Delaware and Hudson Railroad (D&H) was granted trackage rights to Philadelphia. However, the weakened financial condition of the parent company, Guilford Transportation Industries, prevented the D&H from competing effectively. Guilford sold the railroad with its operating rights in 1991 to the Canadian Pacific Railroad. At this time, only these three freight railroads have access to the Delaware Valley Region.

While competition is expected among the various trucking operators of the region, competition among the railroads and port authorities often leads to a loss of regional business. There are constant disputes and intense competition between the Philadelphia and South Jersey port authorities, and trucks hauling newly unloaded cargo to piers or storage facilities on the other side of the river are charged full price to use the DRPA bridge. The three freight railroads are in constant litigation over trackage rights into Philadelphia's ports.

Many regional shippers have vacated facilities in Philadelphia because of this situation. The unified port operations in New York, Baltimore, and Norfolk present a much more coordinated group of shipper services. Shippers who prefer to deal with only one agency are far more likely to take their business to these ports. In answer to this, the Delaware River ports, in general, and the Port of Philadelphia, in particular, recently underwent a major organizational restructuring in an effort to become more competitive relative to other mid-Atlantic ports. In comparison with

these nearby ports, items cited as worse at Philadelphia included: higher loading charges, time delays, poor labor productivity, and shipment documentation problems[3]. These problems are being addressed as Pennsylvania and New Jersey endeavor to change the management of and renovate the port's facilities. Between 1982 and 1988, the Port of Philadelphia spent $8 million on facilities, compared to $157 million spent in Baltimore and $287 million in New York.

Issue: Safety

Human error, mechanical failure and vehicle defects are contributing factors in crashes of heavy vehicles. Brake failures and inadequate braking ability accounted for the highest proportion of mechanical problems, although tire and wheel failures are also among those conditions. Deregulation and a highly competitive environment in the trucking industry have exacerbated safety issues. In an effort to cut costs, some truckers skimp on maintenance and repairs, overload their vehicles, and extend the time spent by drivers behind the wheel. Enforcement of safety regulations is often uneven and varies by jurisdiction.

Issue: Decline in Regional Economic Activity

The long-term loss of high and medium value freight traffic to the trucking industry greatly affected all railroads. The industry is left with predominantly lower value, high volume commodities such as coal, grain, chemicals (including petroleum products and hazardous waste), and sand and gravel. Automobiles and automobile parts represent a high value commodity that still moves by rail in significant volume.

Coal constitutes the largest component of rail freight movement in this region, but its share is declining. Traditional markets for coal include export traffic, steel making, and generation of electricity. Conrail is now routing most of its export coal through Baltimore, and steel production has largely ceased, leaving utility coal as the primary market. Grain is another important commodity that fits well into the rail network because it is a bulk good, but the demand for export is highly variable and grain cannot be counted as a dependable cargo.

Several factors caused port traffic to decline in recent years, including:

- the change from break-bulk (non-packaged) shipped freight to container-packaged freight;
- the general decline of the manufacturing sector;
- reduced traffic in export coal;
- fractionated control and promotion of port facilities; and,
- the lack of easy accessibility from the highway system.

Advances in containerized cargo created many benefits for the cargo shipper. Because the ports

of the Delaware River were late in developing the facilities needed to attract this traffic, shippers moved to other ports to exploit these advantages. Conrail has consolidated its coal export operations through Baltimore and has phased out use of local piers. Combined with a general decline in export coal markets, this action caused exports from Delaware River ports to drop significantly in the last year. These factors, when combined with the decline in break-bulk shipping, are part of overall market share loss experienced in the last few years by the Delaware River ports.

The decline of the manufacturing sector also hurt the region's ports as imports of raw materials and the export of finished products decreased. This led to the abandonment of many piers, especially those near the central business districts. The land and piers adjacent to Center City Philadelphia and downtown Camden are now more valuable for residential, office, and other commercial uses than for port related uses.

AIR PASSENGER AND AIR FREIGHT ISSUES

With the exception of corporate and charter air passenger flights, and limited commuter flights from Mercer County Airport, all passenger flights in the DVRPC region are handled out of Philadelphia International Airport. DVRPC is in the process of preparing a long-range aviation plan for the region. The plan will address the issues and needs of the entire system, including air freight and passenger issues, management issues, capacity issues, intermodalism, and noise issues from both airside and landside standpoints.

BICYCLE AND PEDESTRIAN ISSUES

Within the region, bicycling and walking to work are all but impossible except for a very small percentage of the population. Although recreation facilities are available, there are currently no bicycle facilities to serve commuters. As part of the Clean Air Act Amendments of 1990, these activities may be incorporated into a variety of transportation programs, including congestion management and employer trip reduction programs. These programs can only demonstrate measurable results, however, if adequate facilities and institutional support area made available for pedestrians and bicyclists at their worksites. Such amenities as ancillary changing and bathing facilities are important, as are lockers and other types of incentives.

The planning effort for these facilities is funded as part of both the CAAA and ISTEA, and federal funding is available if projects are consistent with an approved plan. In fiscal 1993, DVRPC will conduct a study to address bicycle and pedestrian needs in the Pennsylvania portion of the region. The planning effort for New Jersey is contained in the proposed New Jersey Statewide Bicycle and Pedestrian Plan. The DVRPC Bicycle and Pedestrian Mobility Plans will be completed in FY 1994, at which time recommendations from both states' plans will be incorporated into the DVRPC work program.

LAND USE/TRANSPORTATION ISSUES

The existing network of transportation systems in the region has historically grown in response

to land use development patterns. As new development extended outward from the region's core, expanded transportation improvements provided improved access which in turn furthered the climate for additional development. In recent years, the region's population and employment patterns have further decentralized, with the resultant increased suburban highway congestion and a decrease in transit ridership. Recent development has not closely integrated new land uses with the transportation system in such a way that the efficiencies of transit can be utilized. Increased congestion and air pollution are the direct byproducts of these land use patterns.

In order to better integrate land use, transportation and air quality planning, DVRPC's DIRECTION 2020 long-range plan will link these issues through policy, planning and implementation. ***Policies For The 21st Century*** presents a draft framework for this larger plan, with proposed goals, policies and actions designed to address issues of physical form, traffic congestion, environmental protection, air quality, economic development, freight movement, mobility and housing. The proposed goals would give priority to infrastructure investments to encourage development within existing communities and appropriate growth areas, rather than further dispersion of land uses. Concentrating development in centers and corridors would provide a better link with transportation facilities, while preserving open space, natural resource areas and farmland.

DIRECTION 2020 will examine the interim municipal population and employment forecasts which present the picture of trend and market growth in the region to 2020. The land use, transportation and air quality impacts of this trend growth will be assessed to determine the long-term impacts of continuing current growth and development policy. A preferred future scenario for the region will be devised, based on the 2020 policies, that establishes a more efficient land use pattern with an integrated transportation system. ▮

GOALS FOR THE YEAR 2020 INTERMODAL TRANSPORTATION PLAN

Creating a transportation plan for the year 2020 begins with an understanding of present conditions and concerns. Based upon the range of issues identified and discussed, a set of goals and objectives for the future of the Delaware Valley's transportation system can be defined. These establish a vision for a more effective regional transportation network, and provide a framework for the DIRECTION 2020 planning process.

The basic purpose of a transportation system is to provide mobility of people and goods. With the demands on this region's system placed by growth, legislation, and deteriorating conditions, significant investment in the region's infrastructure is required to modernize and maintain it into the year 2020. The entire system, taken as a whole or in sections, is in need of attention.

Nevertheless, there would be little benefit to improving physical conditions if there is no goal or strategy for these plans. In light of the various constituencies concerned, it is imperative that there be a set of regional goals to consider when making transportation planning decisions for the future. Existing needs must be balanced against a plan for growth. In following these guidelines, planners will have the means to insure that the transportation needs of the region will be met into the next century. Planning for the future of transportation systems in the region should include the following goals:

- Develop an intermodal transportation plan which reduces the need for single-occupant vehicle transportation and demonstrates environmental sensitivity.

- Integrate transportation and land use plans to achieve the Regional Development Strategy.

- Initiate a regional transportation planning process which includes consideration of financial constraints and opportunities.

- Maintain a state-of-the-art modeling process for more responsive decision making.

- Establish a regional action agenda for transportation using a broad-based consensus of public and private interests.

- Advocate improvements to goods movement networks as a means to enhance the region's economic competitiveness.

- Create a development and prioritization process for selection and completion of transportation projects.

- Maximize efficiency of and manage the existing regional transportation systems to relieve congestion and improve regional mobility.

- Insure safety and security of all transportation systems.

- Comply with all appropriate government regulations and with guidance including those associated with the 1990 Clean Air Act Amendments and the 1991 Intermodal Surface Transportation Efficiency Act. ▮

Endnotes

1. Highway Capacity Manual, Special Report Number 209, Transportation Research Board, Washington, D.C., 1985, pp.1-3.

2. Traffic Accident Facts and Statistics, Pennsylvania Department of Transportation, Harrisburg, PA, 1991, p. 8.

3. Survey of Shippers Using the Ports of Philadelphia, Delaware Valley Regional Planning Commission, Philadelphia, PA, May, 1983, pp. 10-11.

APPENDIX A
DESCRIPTION OF THE PUBLIC TRANSPORTATION SYSTEM IN THE DELAWARE VALLEY

Southeastern Pennsylvania Transportation Authority

The Southeastern Pennsylvania Transportation Authority (SEPTA) provides almost all rail and public transit services to the Pennsylvania side of the region. SEPTA was created in 1968 to consolidate the routes of the numerous failed transit agencies which had been competing prior to that time. Financial support for current operating expenses is given by the City of Philadelphia and four suburban counties (Bucks, Chester, Delaware, and Montgomery). There are three operating divisions within SEPTA, which offer different types of services in different areas of the region.

City Transit Division. The City Transit Division is the largest of the groups, and provides numerous types of transit services. Two heavy rail lines, the Market-Frankford Subway/Elevated and the Broad Street Subway, serve as the foundation of this division's services. They are supplemented by eight light rail (trolley), five trackless trolley, and 74 bus routes, which handle an average of 610,000 linked trips on an average weekday[1] .

- The Market-Frankford Line carries approximately 160,000 daily trips and is the most heavily used line in the entire SEPTA system. The line follows an L-shaped route, running east along Market Street from 69th Street in Upper Darby Township through Center City to the Delaware River waterfront, where it turns northward to follow Front Street, Kensington Avenue, and Frankford Avenue to its terminus between Bridge and Pratt streets. Service is provided by a fleet of 250 Budd cars, which, although reliable, are noisy and lack air conditioning.

  The Center City portion between 40th and 2nd streets operates as a subway, and the rest of the route runs on an elevated structure built in 1922. The western terminus at 69th Street serves as a major transfer point to other rail and bus routes, and handles a significant number of Delaware County commuters. The northeastern terminus provides an important transfer point for travelers to Northeast Philadelphia and adjacent Bucks County, although several other stations on the Frankford end also handle large numbers of transfer passengers. At the Frankford end, the entire elevated structure is being renewed, while under operation, in the largest reconstruction project in SEPTA's history.

- The Broad Street Subway is a north-south line running underground between Fern Rock station and Pattison Street via City Hall, where passengers may transfer to the east-west Market Street subway. Philadelphia's sports complex is located adjacent to the Pattison Avenue station. A spur under Ridge Avenue provides a direct connection to Eighth & Market streets. Many of the stations have been recently refurbished. Comfortable reliable service is provided by a fleet of 125 air-conditioned cars acquired from Kawasaki in 1983. In 1991, express tracks were extended northward from Erie to Olney Avenue.

- Trolley Service is currently offered on five regularly scheduled routes. They are all in West Philadelphia and are classified as Subway-Surface, as they travel underground between 40th or 36th Streets and 13th Street in Center City. The Subway-Surface fleet is currently made up of 112 air-conditioned Kawasaki cars purchased in 1983. There is one other line, which operates only on weekends between Chestnut Hill in the northwest corner of the city through Center City. This route is the only surviving remnant of the North Philadelphia network.

- Trackless Trolley Service (electric bus service) is operated by SEPTA on five routes; three that act as feeder to the Frankford Elevated in Northeast Philadelphia, and a crosstown route in South Philadelphia that connects with the Broad Street Subway.

- Bus Routes - The City Transit Division operates diesel busses, which carry about 56 percent of the division's riders[2] . Several routes go beyond the city limits into areas of Bucks, Montgomery, and Delaware counties. Due to an aggressive program of bus replacement, most of the buses operated by SEPTA are less than 10 years old.

- Depots - Within the City Division, there are currently seven bus and trolley depots. With the exception of the two new facilities, one of which is located at 26th Street and Allegheny Avenue, the other at Island and Elmwood Avenues, most of these facilities are quite old and outdated, making maintenance more expensive than it would be at modern facilities. The number of facilities is also insufficient to adequately handle all of SEPTA's rolling stock.

Regional Rail Division. The Regional Rail Division in FY 1992 operated commuter trains on a total route length of 264 miles and carried approximately 84,000 trips per weekday[3] . These lines include:

- R1: service between Center City Philadelphia and Philadelphia International Airport.

- R2: service between Wilmington/Marcus Hook and Center City Philadelphia; service between Center City Philadelphia and Warminster.

- R3: service between Elwyn and Center City Philadelphia; service between Center City Philadelphia and West Trenton.

- R5: service between Parkesburg/Paoli and Center City Philadelphia; service between Center City Philadelphia and Lansdale/Doylestown.

- R6: service between Norristown and Center City Philadelphia; service between Center City Philadelphia and Cynwyd.

- R7: service between Trenton and Center City Philadelphia; service between Center City Philadelphia and Chestnut Hill East.

- R8: service between Chestnut Hill West and Center City Philadelphia; service between Fox Chase and Center City Philadelphia.

Commuter rail service in the Philadelphia area was originally offered by the Pennsylvania and Reading Railroads. The Pennsylvania commuter trains served the Main Line, the county seats of West Chester and Media, the Delaware River corridor into Marcus Hook, the Chestnut Hill area, and Trenton. The Reading also operated into Chestnut Hill and Trenton, as well as other communities north of Philadelphia, including the county seats of Norristown and Doylestown.

Both companies had extensive route networks that together fanned out in all directions on the Pennsylvania side of the Delaware River. Most of the routes were electrified. Electric traction was required for entry into the Pennsylvania's Suburban Station, although the Reading did operate some diesel trains into the Reading Terminal. When Conrail was formed in 1976 from the remains of the Pennsylvania, Reading, and four other bankrupt railroads, it took over operation of the commuter lines, which were by then operating with public subsidies.

Service on non-electrified lines ended in 1981, as it became too difficult to maintain the system with no funding commitments for capital investment. In 1983, SEPTA took over direct operation of the trains and became owner of most of the track and structures over which they run, with the principal exceptions of the Northeast Corridor and the Harrisburg Mainline. These lines had earlier passed to Amtrak upon the formation of Conrail.

Though the overall route mileage had shrunk somewhat from earlier years, SEPTA continued to operate the old Pennsy and Reading systems separately. A major change to this practice occurred late in 1984 when the Center City Commuter Tunnel opened, connecting the two separate rail systems. The complete system is shown in Figure A-1. Reading routes were paired with Pennsylvania routes, and schedules were rewritten to allow run-through operation from one side to the other, allowing riders to reach any of the three Center City terminals, regardless of which route their trip started from.

The construction of a new passenger line to Philadelphia International Airport was the second major capital project completed in recent years. It significantly expanded the utility of the rail system, enabling passengers to go directly to the airport from the closest regional rail station. Though the route took advantage of existing track for much of the way, the track had to be upgraded to passenger standards and supplied with overhead power for electric traction.

Suburban Transit Division. The Suburban Transit Division is composed of the Victory and Frontier Districts. Each of these districts has its own routes, garages, and labor contracts.

> The Victory (formerly Red Arrow) District operates twelve bus routes out of its principal terminus at 69th Street in Upper Darby Township. Other bus routes focus on the Darby Terminal (subway-surface trolley connections to West Philadelphia and City Hall) and

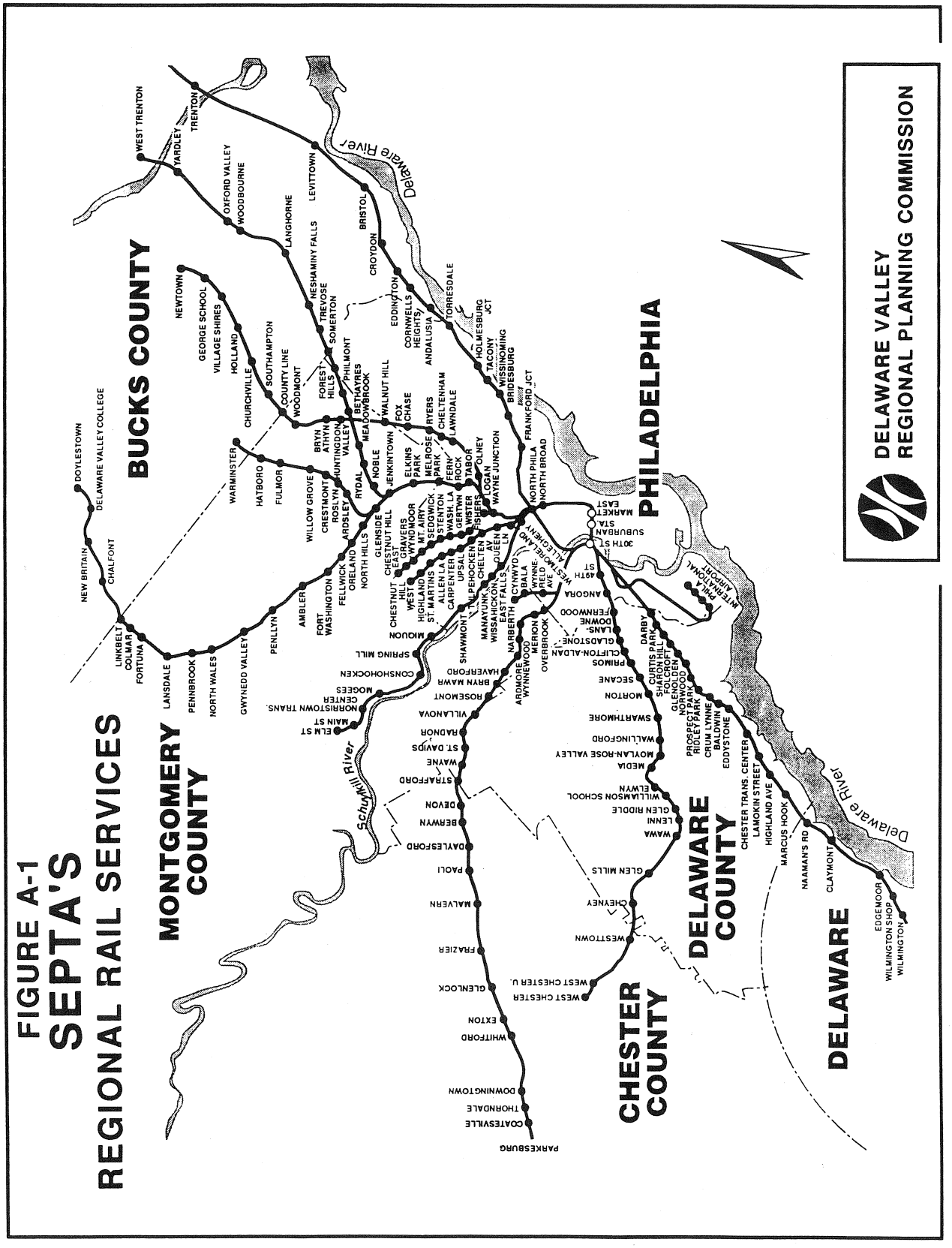


FIGURE A-1
SEPTA'S
REGIONAL RAIL SERVICES
DELAWARE VALLEY
REGIONAL PLANNING COMMISSION
BUCKS COUNTY
MONTGOMERY COUNTY
PHILADELPHIA
DELAWARE COUNTY
CHESTER COUNTY
DELAWARE
Delaware River
Schuylkill River
WEST TRENTON
TRENTON
YARDLEY
OXFORD VALLEY
WOODBOURNE
LANGHORNE
LEVITTOWN
NESHAMINY FALLS
BRISTOL
CROYDON
EDDINGTON
CORNWELLS HEIGHTS
ANDALUSIA
TORRESDALE
HOLMESBURG JCT
TACONY
WISSINOMING
BRIDESBURG
FRANKFORD JCT
NEWTOWN
GEORGE SCHOOL
VILLAGE SHIRES
HOLLAND
CHURCHVILLE
SOUTHAMPTON
COUNTY LINE
WOODMONT
TREVOSE
SOMERTON
FOREST HILLS
PHILMONT
BETHAYRES
MEADOWBROOK
WALNUT HILL
FOX CHASE
RYERS
CHELTENHAM
LAWNDALE
DOYLESTOWN
DELAWARE VALLEY COLLEGE
NEW BRITAIN
CHALFONT
WARMINSTER
HATBORO
FULMOR
BRYN ATHYN
HUNTINGDON VALLEY
NOBLE
JENKINTOWN
ELKINS PARK
MELROSE PARK
FERN ROCK
TYLER
OLNEY
LOGAN
WAYNE JUNCTION
NORTH PHILA
NORTH BROAD
MARKET EAST
SUBURBAN STA.
30TH ST
WILLOW GROVE
CRESTMONT
ROSLYN
ARDSLEY
RYDAL
GLENSIDE
CHESTNUT HILL EAST
GRAVERS
WYNDMOOR
MT. AIRY
SEDGWICK
STENTON
WASH. LA
GERMTWN
WISTER
FISHER
QUEEN LN
WEST PHILA
ALLEGHENY
49TH ST
ANGORA
FERNWOOD
LANSDOWNE
GLADSTONE
CLIFTON-ALDAN
PRIMOS
SECANE
MORTON
SWARTHMORE
WALLINGFORD
MOYLAN-ROSE VALLEY
MEDIA
WILLIAMSON SCHOOL
ELWYN
GLEN RIDDLE
LENNI
WAWA
GLEN MILLS
CHEYNEY
WESTTOWN
WEST CHESTER U.
WEST CHESTER
LINKBELT
COLMAR
FORTUNA
LANSDALE
PENNBROOK
NORTH WALES
GWYNEDD VALLEY
PENLLYN
AMBLER
FORT WASHINGTON
FELLWICK
ORELAND
NORTH HILLS
CHESTNUT HILL WEST
HIGHLAND
ST. MARTINS
ALLEN LA
CARPENTER
UPSAL
PHILADELPHIA
CHELTEN
QUEEN LN
MANAYUNK
WISSAHICKON
EAST FALLS
CYNWYD
BALA
WYNNE FIELD
AVE
NARBERTH
MERION
WYNNEWOOD
OVERBROOK
ARDMORE
MIDDLE
SHAWMONT
MIDDLE
MIQUON
SPRING MILL
CONSHOHOCKEN
MOGEES
NORRISTOWN TRANS. CENTER
ELM ST
MAIN ST
HAVERFORD
BRYN MAWR
ROSEMONT
VILLANOVA
RADNOR
ST. DAVIDS
WAYNE
STRAFFORD
DEVON
BERWYN
DAYLESFORD
PAOLI
MALVERN
FRAZIER
GLENLOCK
EXTON
WHITFORD
DOWNINGTOWN
THORNDALE
COATESVILLE
PARKESBURG
DARBY
CURTIS PARK
SHARON HILL
FOLCROFT
GLENOLDEN
NORWOOD
PROSPECT PARK
RIDLEY PARK
CRUM LYNNE
BALDWIN
EDDYSTONE
CHESTER TRANS. CENTER
LAMOKIN STREET
HIGHLAND AVE
MARCUS HOOK
NAAMAN'S RD
CLAYMONT
EDGEMOOR
WILMINGTON SHOP
WILMINGTON
PHILA. INTERNATIONAL AIRPORT

the City of Chester. Three bus routes originate in Center City and are shared with the City Transit Division.

There are also three rail lines operating out of 69th Street. Two of them are light rail lines (Sharon Hill and Media). The third rail route possesses some rather unique characteristics. Route 100 runs for almost fourteen miles through suburbs to the Norristown Transportation Center. With its mixture of attributes and rolling stock, the line defies classification as either heavy or light rail.

The Frontier District provides bus service to selected outlying portions of the region. Six routes extend SEPTA's service north and west from the Norristown Transportation Center. Additional routes connect King of Prussia with West Chester and Chestnut Hill with Lansdale. Routes originating at the Oxford Valley Mall in lower Bucks County serve Morrisville, Bristol, Trenton, and other nearby points.

Early in 1988, in response to employer request for transit service to their sites, SEPTA created a new class of suburban service - feeder bus routes designed to connect office centers and industrial parks with nearby Regional Rail stations. These routes, called the "200 Series", are scheduled to pulse with train arrival at the Wayne, Fort Washington, Willow Grove, Warminster, Paoli, and Lansdale stations, and offer lower fares for transfer passengers. Six routes were established, financed in part by employer subsidies. However, patronage remains light, and one route was discontinued in 1992.

New Jersey Transit

New Jersey Transit (NJ TRANSIT) is the principal bus transit service provider in the South Jersey portion of the region, and provides transit service across the Delaware River between New Jersey and Philadelphia. There are three Divisions, each providing service to separate regions of the state.

Southern Division. Bus operations in South Jersey consist of 30 bus routes, 13 of which provide service to Philadelphia from Camden, Burlington, and Gloucester counties. These routes carried 66 percent of the ridership for NJ TRANSIT's Southern Division. Local intrastate service is provided on 11 routes, carrying 21 percent of the ridership. While these latter routes mostly focus on Camden County, some extend into Burlington and Gloucester counties[4].

Service to shore points is provided by six bus routes, three of which terminate at Atlantic City. Trips between Philadelphia and seashore points originate and terminate at the Greyhound Terminal located at Tenth and Filbert streets in Philadelphia. Seashore service represents 13 percent of the ridership in the Southern Division, though its share rises during the summer months.

Although the infrastructure, fixed facilities, and rolling stock of NJ TRANSIT's Southern Division currently remains in adequate condition, steps have been taken to improve the existing service. One of the major initiatives is the addition of eighty-four replacement buses to the existing fleet of 318. These replacement buses will be a combination of suburban and commuter-style buses.

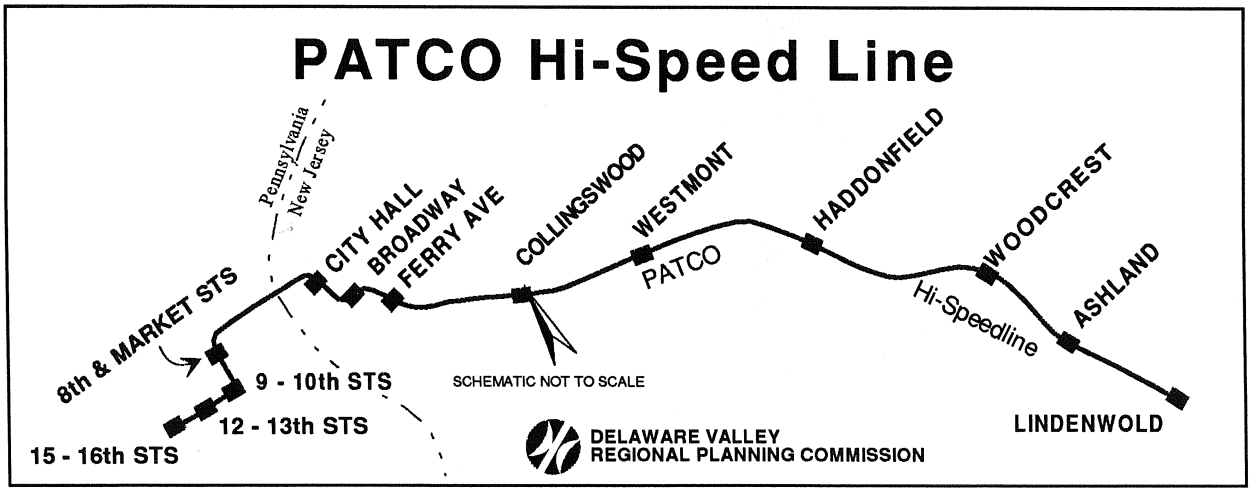
In 1989, a new Transportation Center opened in downtown Camden on Broadway to provide off-street parking and station facilities for both NJ TRANSIT bus lines and the PATCO rail transit line to Philadelphia. Except for some express commuter routes running on I-676, all bus routes passing through Camden stop at the Center. Another important addition to NJ TRANSIT's infrastructure is the $17 million Washington Township Maintenance Facility, which was completed in July, 1988. The Newton Avenue Garage Building houses the administrative offices for the Southern Division, in addition to providing bus maintenance.

NJ TRANSIT Mercer. NJ TRANSIT Mercer provides bus service primarily to Trenton and the surrounding municipalities within Mercer County, with some service extending to Hunterdon County. Many of the bus routes originate outside of Trenton and provide local service into downtown Trenton where transfers can be made, then continue outbound to other suburban communities.

Port Authority Transit Corporation

Regularly scheduled commuter rail service is currently operated in South Jersey by the Port Authority Transit Corporation (PATCO). The 14.2-mile line (Figure A-2) was constructed during 1966-69 by PATCO's parent organization, the Delaware Regional Port Authority, using its own financial resources. Costs were minimized by connecting an existing rail line to a reconstructed transit line over the Ben Franklin Bridge.

FIGURE A-2



This line provides rail service 24 hours a day and seven days per week between Lindenwold in New Jersey and 16th and Locust Streets in Philadelphia. There are seven stations in suburban Camden County, all of which are adjacent to free park-and-ride lots. The line also has four subway stations in Center City Philadelphia and two in the City of Camden, all providing convenient pedestrian access to commercial and employment areas. The Camden Transportation Center provides transfer connections to buses, as well as providing access to Cooper Hospital and the adjacent portions of the central business district. The City Hall station at Fifth and Market Streets in Camden provides access to the Camden campus of Rutgers University.

Amtrak

Amtrak offers intercity rail service from Philadelphia 30th Street station to points around the country. Passenger stops along the regional rail lines in Pennsylvania include Ardmore, Paoli, North Philadelphia, and Trenton. Although passengers are not carried locally within the region, passengers may board at any of these stations for destinations outside the region.

South Jersey Rail Service

Both NJ Transit and Amtrak operate trains between Atlantic City and Philadelphia. Amtrak also operates through trains to points beyond Philadelphia on three daily round trips, plus extra trips on weekends. NJ TRANSIT operates 11 weekday round trips, and also offers extra service on weekends.

Pottstown Urban Transit

Pottstown Urban Transit (PUT) serves the southwestern portion of Montgomery County and northern Chester County. The current system consists of 3 bus routes offering dialy service to the City of Pottstown and its surrounding communities. Service is provided by a fleet of 9 regular and 4 paratransit buses, which are operated and maintained by a private company. In fiscal 1992, PUT served about 300,00 riders. Current plans call for expanding service in the next fiscal year into Berks County and additional service to Chester County.[5] ▮

Endnotes

1.SEPTA Ridership and Statistics Report, Fiscal Year 1991, Southeastern Pennsylvania Transportation Authority, Philadelphia, PA, 1991, p.19

2. Ibid., p. 21

3. Ibid. p. 37

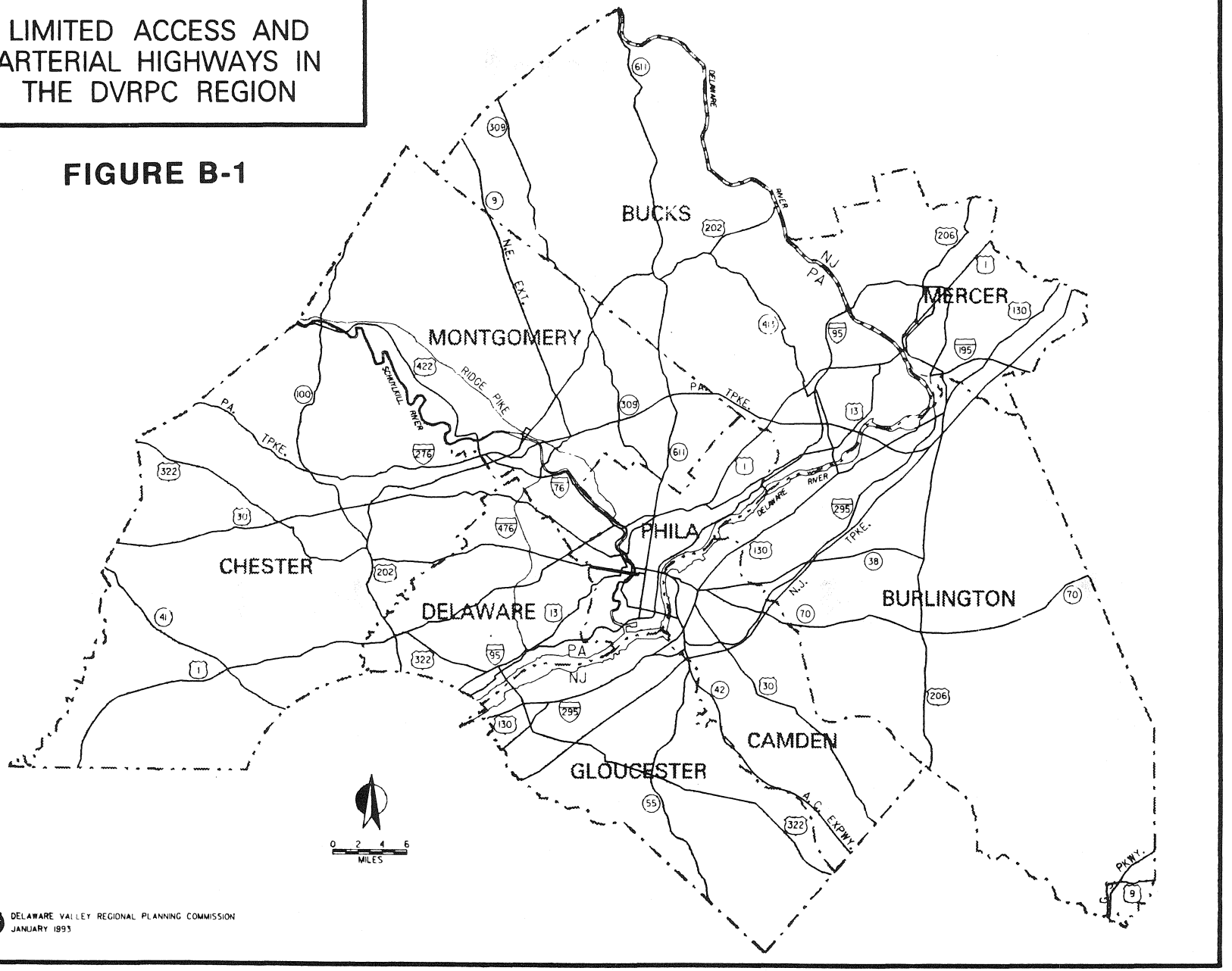
4. Source: New Jersey Transit.

5. Source: Pottstown Urban Transit

APPENDIX B
HISTORY AND DESCRIPTION OF THE HIGHWAY SYSTEM IN THE DELAWARE VALLEY

LIMITED ACCESS AND ARTERIAL HIGHWAYS IN THE DVRPC REGION

FIGURE B-1



- Pennsylvania Turnpike (I-76 and I-276) - A toll road running east-west across the state of Pennsylvania, which links the Ohio and New Jersey Turnpikes, and serves as a partial circumferential route extending around the northern section of Philadelphia.

- Northeast Extension of the Pennsylvania Turnpike (PA 9) -Toll facility starting from the Pennsylvania Turnpike at Plymouth Meeting, provides access to Scranton Wilkes/Barre and the Pocono Mountains resort area.

- Schuylkill Expressway (I-76) - Parallels the Schuylkill River from the Pennsylvania Turnpike at Valley Forge (King of Prussia) to the approach to the Walt Whitman Bridge over the Delaware River.

- Delaware Expressway (I-95) - Parallels the Delaware River and serves the corridor from Wilmington, Delaware to Trenton, where it terminates at I-295. Serves Philadelphia International Airport and Center City Philadelphia.

- Mid-County Expressway (I-476) - Traverses a north-south route between I-95 north of the City of Chester and I-276 in Plymouth Meeting, and acts as a southward extension of PA 9. Serves as a bypass around Philadelphia through the western and northern suburbs.

- US 422 Expressway - Connects Pottstown with US 202 at King of Prussia and serves a growing corridor in Montgomery County.

- PA 309 Expressway - Provides a bypass of the old Bethlehem Pike. Completed sections run from Northwest Philadelphia to the Springhouse area in Montgomery County, and from Souderton to near Quakertown in Bucks County.

- US 202 Expressway - A north-south limited access route between West Chester in Chester County and King of Prussia in Montgomery County.

- US 202/611 Bypass - A limited access facility which bypasses Doylestown Borough in Bucks County.

- US 30 Bypass - A limited access facility to bypass the Coatesville/Downingtown area in Chester County.

- US 1 Freeway - A north-south limited access facility in Bucks County between Philadelphia County and Trenton which bypasses old US 1 through various commercial areas. The most recent section opened to traffic in 1989.

- US 1 Media Bypass - A limited access facility to bypass the Media area in Delaware County.

- US 1 - A limited access facility in Chester County south of PA Route 52 to a point between Sylmar Road and the Pennsylvania/Maryland state line.

- New Jersey Turnpike - Toll facility traversing the region north-south, providing access from the Baltimore/Washington area via the Delaware Memorial Bridge to the Newark/New York area north of Rutherford. Eight interchanges along its 65-mile length in the Delaware Valley.

- I-295 - A limited access highway paralleling the New Jersey Turnpike, serving the corridor from Wilmington to Trenton. Small segments north of Bordentown and in Gloucester County are as yet incomplete.

- Atlantic City Expressway - East-west toll facility connecting the North-South Freeway (NJ 42) at Turnersville with Atlantic City. Highway connections to other south shore resorts via the Garden State Parkway interchange just west of Atlantic City.

- NJ 55 Freeway - Completed in 1989, extending from NJ 42 in Deptford Township to the Vineland area in Cumberland County.

- Trenton Freeway (US 1) - A limited access bypass of old US 1 through Trenton, connecting with an expressway portion through Bucks County, Pennsylvania.

The region's network of limited access highways does not cover all of the trunk corridors important to regional and interstate commerce. In some cases, demand does not warrant the investment in new facilities. In other cases, the shortfall of available construction funds or environmental concerns have delayed or canceled plans for new highways. Travel along these corridors is accommodated by arterial roadways.

Arterial Facilities. An extensive network of major arterial facilities supplements the limited access highway network of this region. An arterial highway, characterized by its use and its design, is usually the main thoroughfare between the established centers of the region. For the most part, these routes predate the limited access facilities, since many are remnants of the earlier federal-aid primary system and others are upgraded older two-lane roads between country towns.

Some of the original primary highways became so heavily traveled that they were replaced by limited access highways along the same corridor. As a result, these roads now serve a local function, often providing access to commercial and industrial areas. Examples include US 13, which is paralleled by I-95 along the Pennsylvania side of the Delaware River, and US 130, which is paralleled by I-295 on the New Jersey side.

Sometimes older primary highways are upgraded to expressway status on a piecemeal basis. Under such circumstances, parts of the route are limited access, while others are typical arterial roadways. US 202, which serves as a circumferential highway through the western and northern

suburbs of Philadelphia, is a good example of this, as is US 309 between the City of Philadelphia and Quakertown in Bucks County.

Arterials provide the connections needed to fill in the more open grid of limited access highways. Though many of these routes extend radially outward from the region's core of Philadelphia and Camden and, to a lesser degree, from Chester and Trenton, others accommodate circumferential travel.

Collector Roads and Local Streets. Collector roads provide the links between local streets and the arterial and limited access highways. In Pennsylvania these routes are generally unnumbered and are under the authority of local municipalities, although some of the minor state highways can be classified as collectors. In New Jersey, collectors usually carry secondary route numbers and are under the control of the counties. However, many of these secondary routes are more properly classified as arterials.

Highway Bridges Linking Pennsylvania and New Jersey. There are eighteen bridges spanning the Delaware River connecting Pennsylvania and New Jersey in this region, comprising a significant element of the highway network (Figure B-2). North of the Trenton area, eight highway bridges connect roads in Bucks County to New Jersey. Most of the bridges are minor, and not generally intended for a high volume of commercial traffic. The major bridges in this section is the US 202 toll bridge just north of New Hope, and the Scudders Falls (I-95) bridge, which has no toll. Two bridges link local streets at Trenton.

From Trenton to the Delaware border, there are eight major bridges linking Pennsylvania and New Jersey. The are as follows:

- US 1 Freeway;
- Delaware River Turnpike Bridge (I-276);
- Burlington-Bristol (PA 413/County 541);
- Tacony-Palmyra (PA/NJ 73);
- Betsy Ross (NJ 90);
- Benjamin Franklin (I-676, US 30);
- Walt Whitman (I-76); and,
- Commodore Barry (US 322).

All of these bridges are toll facilities.

The US 202 bridge is owned and operated by the Joint Toll Bridge Commission. The Burlington-Bristol and Tacony-Palmyra bridge are operated by the Burlington Bridge Authority, and the Turnpike Bridge is operated jointly by the Turnpike Commissions of New Jersey and Pennsylvania. The Betsy Ross, Ben Franklin, Walt Whitman, and Commodore Barry bridges are operated by the Delaware River Port Authority (DRPA). The toll on the DRPA bridges is currently $2.00 for non-commercial vehicles. Tolls are collected on the westbound trip.

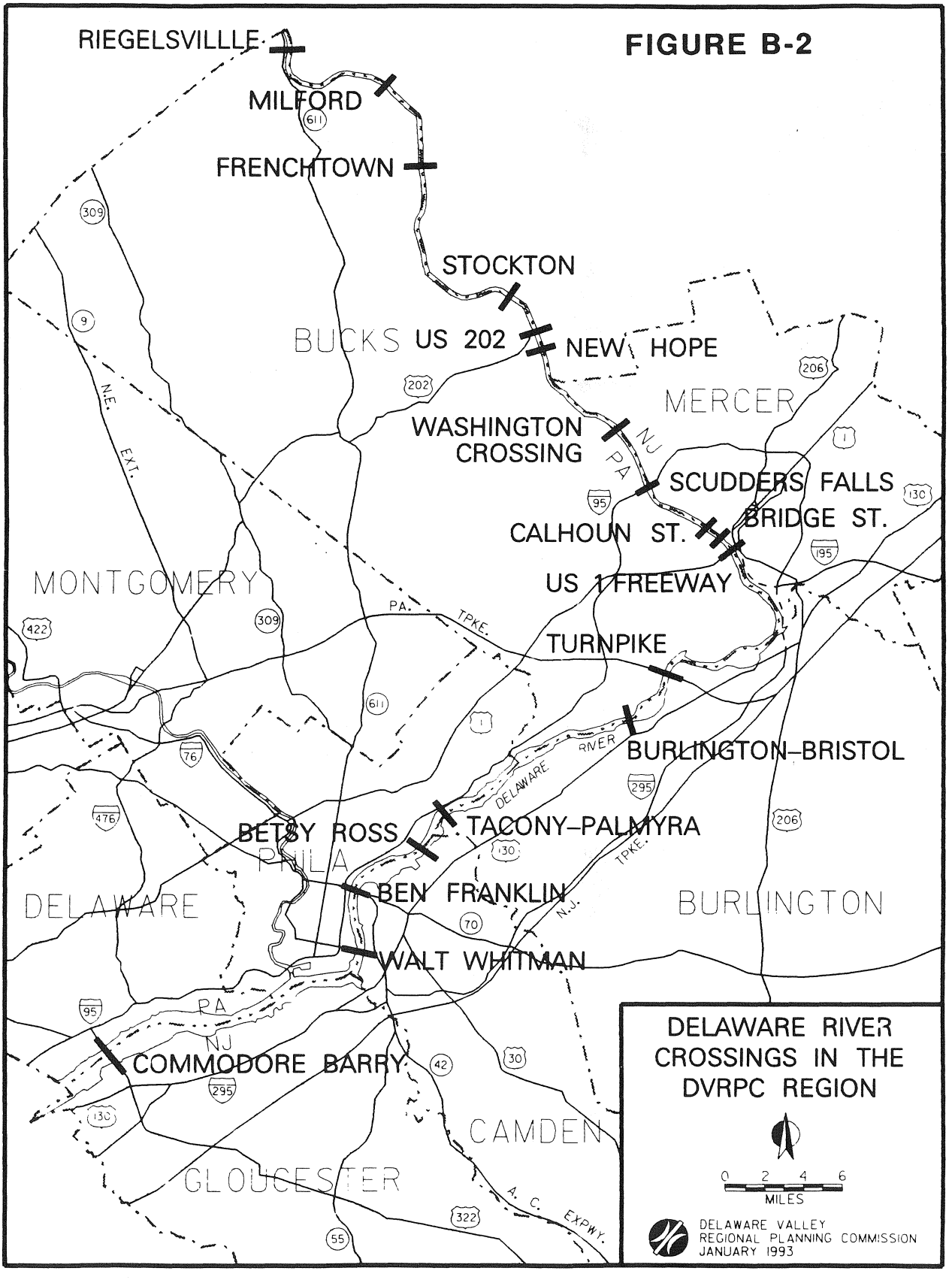


FIGURE B-2
RIEGELSVILLE
MILFORD
611
FRENCHTOWN
309
STOCKTON
9
BUCKS
US 202
NEW HOPE
206
202
MERCER
N.E. EXT.
WASHINGTON CROSSING
NJ
PA
1
SCUDDERS FALLS
95
130
BRIDGE ST.
CALHOUN ST.
195
MONTGOMERY
US 1 FREEWAY
PA. TPKE.
422
309
TURNPIKE
611
1
76
DELAWARE RIVER
BURLINGTON–BRISTOL
295
476
BETSY ROSS
TACONY–PALMYRA
206
PHILA
130
TPKE.
DELAWARE
BEN FRANKLIN
N.J.
BURLINGTON
70
WALT WHITMAN
95
PA
NJ
COMMODORE BARRY
42
30
295
130
CAMDEN
GLOUCESTER
A. C. EXPWY.
322
55
DELAWARE RIVER CROSSINGS IN THE DVRPC REGION
0 2 4 6
MILES
DELAWARE VALLEY REGIONAL PLANNING COMMISSION
JANUARY 1993

APPENDIX C
DESCRIPTION OF THE GOODS MOVEMENT AND AIR PASSENGER SYSTEMS IN THE DELAWARE VALLEY

Freight movements in the Delaware Valley Region can be organized into four basic categories: trucking operations, rail operations and facilities, and port operations and facilities, and air freight systems. Freight transportation services in the Delaware Valley are diverse and fragmented, with carriers handling a wide variety of cargoes serving numerous markets. Before the early 1980s, interstate freight movement predominantly was regulated by the federal government, but the rail and trucking industries have since become largely deregulated. This has resulted in a more competitive, and often more efficient, freight network.

Philadelphia enjoys the geographical advantage of being within 300 miles of most major cities in the Northeast. Though there was a reduction in the amount of rail traffic caused by declines in steel and coal industries, the city has an excellent opportunity to become a distribution center for the Mid-Atlantic area. Several terminals throughout the region, which Conrail and CSX operate, are able to handle piggyback and container traffic. In addition, intermodal terminals with open accessibility to all carriers recently opened adjacent to the Packer Marine Terminal, I-76, and I-95. With Philadelphia International Airport not far away, Philadelphia is well positioned to become a major shipping hub.

Port Facilities

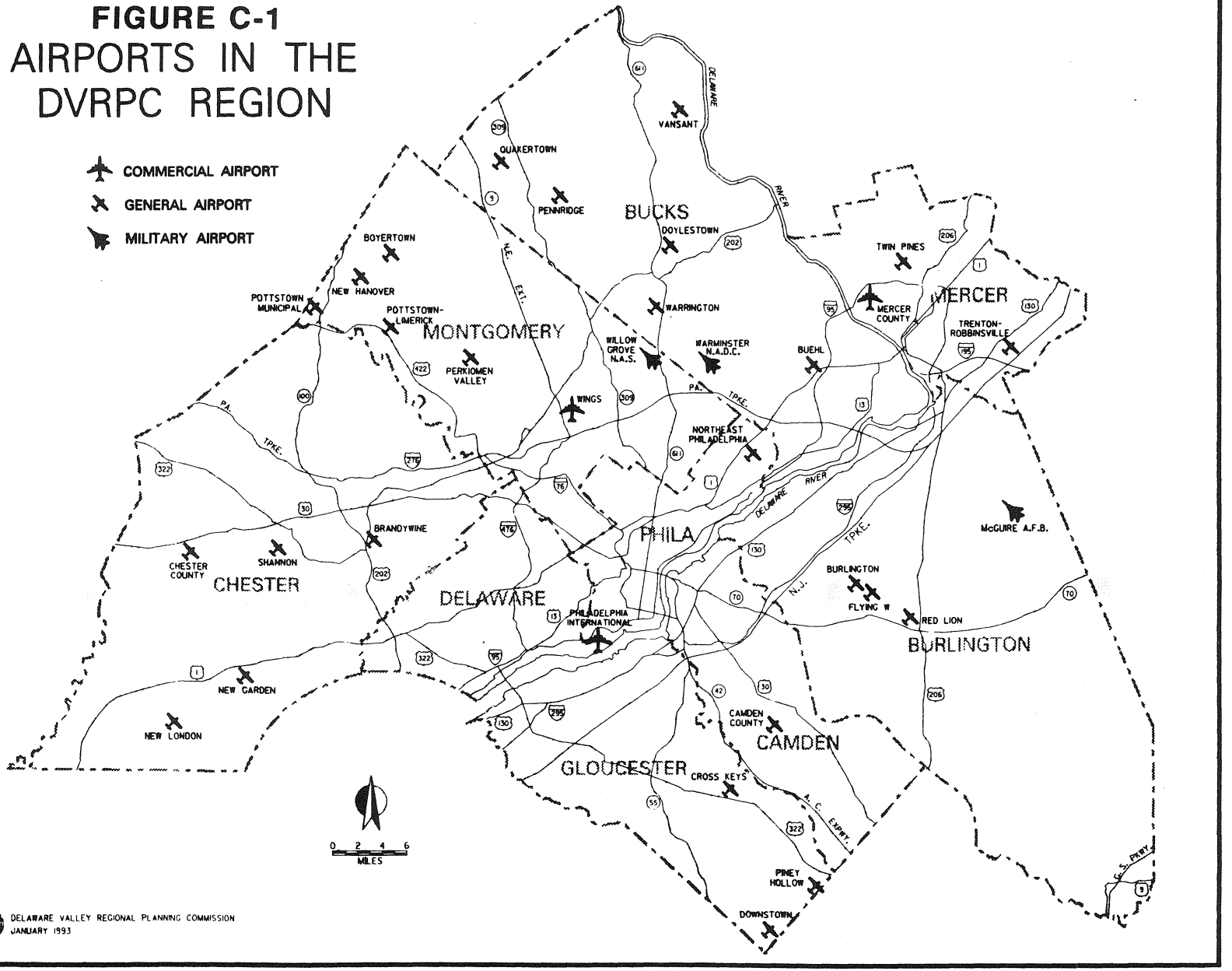
The Delaware River ports are operated by three separate port authorities: 1) The Philadelphia Regional Port Authority, which oversees the operations of port activities on the Pennsylvania side of the Delaware River; 2) The South Jersey Port Corporation, which performs a similar function on the New Jersey side; and 3) The Delaware River Port Authority which oversees all of the major river crossings. Operations of the three agencies are completely separate.

Airports and Air Freight

Aviation in the Delaware Valley region is comprised of four categories: general aviation (business, recreational), commercial aviation (corporate, charter, courier), commercial passenger (airline), and air cargo. Currently, there are a total of 32 airports in the region (Figure C-1). The major facility for aviation within this region is Philadelphia International Airport (PHL), located partially within the City of Philadelphia and partially in Delaware County. There are smaller, but commercially important airports located in Northeast Philadelphia, Trenton, and in Wilmington, Delaware.

PHL is currently ranked fifteenth in the nation for cargo tonnage handled. High value cargo generated by regional service sector and high technology firms dominate air freight traffic, because of the relatively high price associated with air movements. Cargo at PHL is handled through a separate terminal, Cargo City, at the western end of the main runway with 339,000 square feet of working space. United Parcel Service, Federal Express, and the Post Office are three of the major shippers located there. Access to Philadelphia International Airport is excellent: it is located on I-95 and is easily reached from all of the area's major highways.

FIGURE C-1
AIRPORTS IN THE DVRPC REGION



The Air Passenger System

With the exception of corporate and charter air passenger flights, all passenger flights are handled by Philadelphia International Airport. Located in Philadelphia and Delaware Counties, PHL served 15, 534,361 passengers and handled 388,453 tons of cargo in fiscal 1991.[1] Planned expansion of facilities is expected to generate additional passenger and freight traffic in the future.

All major domestic airlines, as well as several commuter air services and foreign-based carriers, offer service out of PHL. US Air is the primary carrier, occupying the largest number of gates and employing the largest staff. With the opening of the new international flight facilities in Terminal A in 1991, however, the number of airlines offering international flights originating in Philadelphia increased. In fiscal 1991, there were almost 1100 daily operations (take-offs and landings).[2] ▮

Endnotes

1. Philadelphia Airport System 1991 Annual Report, City of Philadelphia, Division of Aviation, Philadelphia, PA, 1991, p. 4.

2. Ibid., p. 5.

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