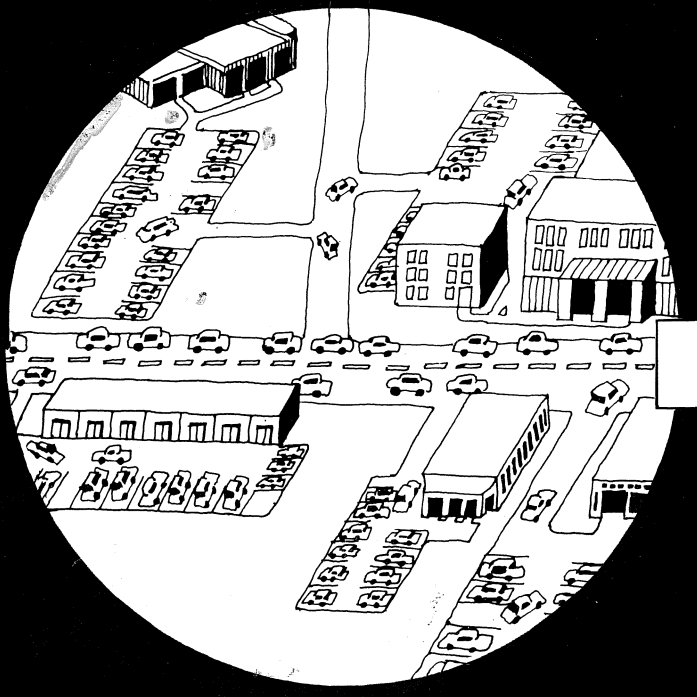
ROUTE 422 CORRIDOR

Montgomery County, PA

DEVELOPMENT POTENTIAL & GROWTH MANAGEMENT STRATEGIES

TODAY



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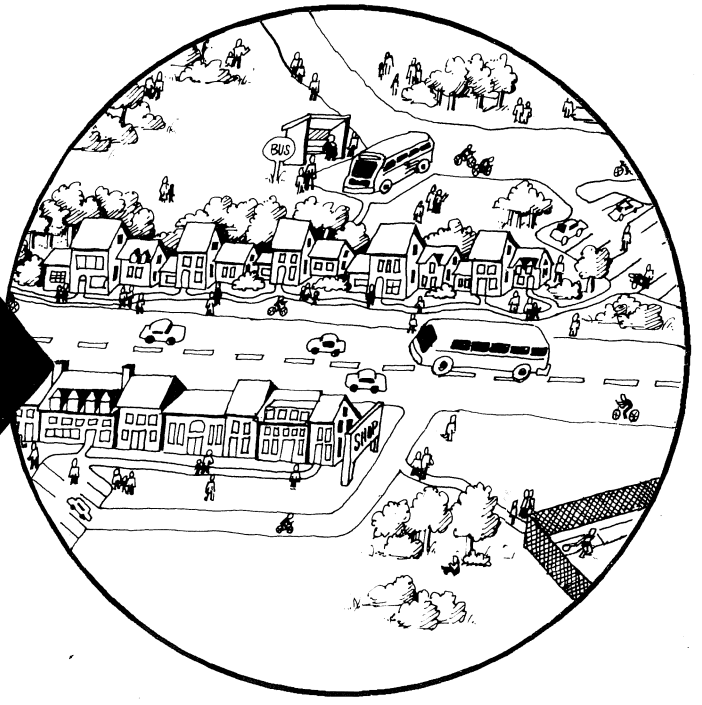

Prepared by

Delaware Valley Regional Planning Commission

June 1992

THE ROUTE 422 CORRIDOR

Montgomery County, Pennsylvania

DEVELOPMENT POTENTIAL AND

GROWTH MANAGEMENT STRATEGIES

PREPARED BY:

DELAWARE VALLEY REGIONAL PLANNING COMMISSION

THE BOURSE BUILDING
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JUNE 1992

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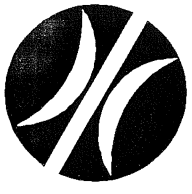
Created in 1965, the Delaware Valley Regional Planning Commission (DVRPC) is an interstate, intercounty and intercity agency which provides continuing, comprehensive and coordinated planning for the orderly growth and development of the Delaware Valley region. The region includes Bucks, Chester, Delaware, 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 between the Office of the Executive Director, the Office of Public Affairs, and three line Divisions: Transportation Planning, Regional Information Services Center, which includes Regional Planning Office, 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:	JUNE 1992
THE ROUTE 422 CORRIDOR DEVELOPMENT POTENTIAL AND GROWTH MANAGEMENT STRATEGIES	Publication No.	92006

Geographic Area Covered:

Route 422 Corridor in Montgomery and Chester counties between King of Prussia and Pottstown

Key Words:

Development Scenarios; Proposed Development; Potential Zoning; Traffic Impacts; Sewage and Water Facilities; Growth Management; Land Use Planning and Transportation Tools

ABSTRACT

Identifies development potential and opportunities along the Route 422 Corridor within the townships of Limerick, Lower Pottsgrove, Lower Providence, North Coventry, and Upper Providence and the boroughs of Collegeville, Pottstown and Trappe. Analyzes development potential of Corridor to 2010. Recommends land use and transportation planning tools and growth management strategies to 2010.

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EXECUTIVE SUMMARY

As documented in the Delaware Valley Regional Planning Commission's 1990 study, ***US Route 422 Expressway Corridor Impact Study - Phase I,*** the Route 422 Corridor in Montgomery County has experienced considerable growth and development since the highway opened in 1985. The current study carries this examination a step further by identifying the future development potential of the study area to the year 2010, and recommends the appropriate planning tools to integrate transportation and land use planning. These tools are designed to assist the study area municipalities in managing further growth in order to control traffic congestion.

DEVELOPMENT SCENARIOS

The Route 422 study identifies two development scenarios for each of the Corridor's eight municipalities: boroughs of Collegeville, Pottstown, Trappe and townships of Limerick, Lower Pottsgrove, Lower Providence, and Upper Providence in Montgomery County and North Coventry Township in Chester County.

The Market Trends Development Scenario identifies approximately 100 development proposals which could be completed by 2010. These proposals could generate 9,000 dwelling units and over ten million square feet of non-residential space.

The proposed developments will add considerable traffic volumes to the existing road network which will cause the current level of service along Route 422 to deteriorate significantly by 2010. The study's Traffic Impact Analysis identifies current and future traffic volumes with these new developments and recommends conceptual solutions to alleviate anticipated traffic congestion.

The study's Potential Development Scenario identifies the amount of development that could take place within each study municipality if all buildable land was developed at its maximum permissible density per current zoning. Under the scenario, the study area could theoretically support a total of 57,000 dwelling units and 83 million square feet of non-residential space.

Although this total amount of development is not likely to occur, the Potential Zoning Development Scenario is a good indicator of a municipality's official zoning policies. For example, the analysis reveals that the Route 422 Corridor will be a net importer of commuters. For every one dwelling unit that could be built, four jobs could be supported within the non-residential zoning districts. The zoning analysis also shows that current

zoning favors low density housing, thus precluding the densities and concentrations needed to support a viable public transportation system.

RECOMMENDATIONS

In order to accommodate the orderly growth and development of the Route 422 Corridor in the near term, the study provides ten planning tools which each municipality can easily and inexpensively incorporate into their current planning efforts. These tools are designed to better integrate land use and transportation planning by minimizing the negative impacts of growth, such as traffic congestion. Implementation of these planning tools will enable the impacted municipalities to effectively manage future development in the near term while the municipalities work together towards a long-range plan.

These tools range from widely known and applied approaches such as zoning ordinances or site design standards to the newer techniques now emerging, such as trip reduction ordinances, impact fees, or highway access management plans. Other tools discussed in detail include comprehensive plans, official maps, capital improvement programs, traffic impact analysis, and adequate public facilities ordinances. The matrix on page 63 identifies the ten planning tools and indicates when each tool should be implemented in each municipality.

CONCLUSIONS

The most important recommendation within this study is that the Route 422 municipalities should participate and cooperate in joint planning with each other and the appropriate counties. The purpose of this joint planning effort would be to promote integrated and cohesive land use and transportation planning along the entire Route 422 Corridor. This joint planning effort should result in a long-range plan for the entire corridor.

As a continuation to this study, the Montgomery County Planning Commission (MCPC) is working on such a plan. The MCPC's plan will include a Transit-Oriented Future for the Route 422 Corridor. This long-range plan (beyond 2010) will include transit activity centers designed to accommodate the land use patterns appropriate to support a viable corridor-wide bus or rail system. However, without a cohesive plan for the entire study area, a long-range plan cannot be effective.

The impacts of individual actions will be felt corridor-wide; therefore the Route 422 Corridor must be viewed as a single entity with all parties working together towards a common goal: integrated inter-municipal land use and transportation planning.

I. INTRODUCTION

In April of 1985, the Route 422 Expressway was completed and opened to traffic. Traveling through urban, suburban and rural areas in Montgomery, Chester and Berks counties, the 18-mile expressway cost approximately $110 million and took over 30 years from proposal to completion.

With the completion of the expressway, the land and communities along the Route 422 Corridor became directly accessible to the Delaware Valley region and the eastern seaboard of the United States. This improved access and the availability of vacant land has made the Route 422 Corridor attractive to developers. A substantial amount of residential and non-residential development has taken place within the Corridor since 1985 and is expected to continue throughout the 1990s and beyond.

In order to properly plan for the future growth and development of the Route 422 Corridor it is necessary to analyze what impact the expressway has had on its neighboring communities since its completion in 1985. In 1990, the Delaware Valley Regional Planning Commission undertook a study which documented land use, transportation and economic conditions along the corridor prior to and since the completion of Route 422. This study compared pre-1985 conditions to conditions in 1990. The study ***US Route 422 Expressway Corridor Impact Study - Phase I,*** found significant changes have taken place during the first five years following the expressway's completion.[1]

The study, which included 13 municipalities in Berks, Chester and Montgomery counties, found that the Route 422 Corridor has experienced significant increases in population, employment, development activity, traffic and housing sales and prices. Most of the increases experienced were above average for the host counties and the region overall. The study found the Route 422 Corridor is rapidly suburbanizing and has the potential to become an extension of the King of Prussia area.

The suburbanization of the Route 422 Corridor is dramatically demonstrated through an analysis of municipal real estate values. In 1985, the total market value of real estate for

[1]Delaware Valley Regional Planning Commission, *US Route 422 Expressway Corridor Impact Study - Phase I,* Publication No. 90015, June 1990. Appendix A contains a copy of the study's table of contents.

eight of the municipalities along the Route 422 Corridor was $2.4 billion (1990 dollars) (refer to Table I). By 1990 this value had increased 62% to $3.9 billion dollars.[2]

TABLE I

ROUTE 422 CORRIDOR GROWTH IMPACT STUDY

MARKET VALUE OF REAL ESTATE, 1985 AND 1990

MUNICIPALITY	1985 VALUE	1990 VALUE	PERCENT CHANGE
	(Millions - 1990 Dollars)		1985 to 1990
Collegeville	$ 94	$ 174	85.1%
Limerick	$ 209	$ 408	95.2%
Lower Pottsgrove	$ 285	$ 464	62.8%
Lower Providence	$ 674	$ 1,024	51.9%
North Coventry	$ 225	$ 370	64.5%
Pottstown	$ 540	$ 819	51.7%
Trappe	$ 60	$ 128	113.3%
Upper Providence	$ 327	$ 533	63.0%
Total Study Area	$ 2,414	$ 3,620	62.4%

Source: Montgomery County and Chester County Boards of Assessment Appeals, 1992

Delaware Valley Regional Planning Commission, March 1992

[2]The analysis of real estate values was conducted by the Montgomery County Planning Commission from information obtained from the Montgomery County Board of Assessment Appeals.

STUDY PURPOSE

The current study builds on the work completed in the Phase I study, by analyzing the future growth potential of the study area to 2010. This study analyzes future growth through the use of possible development scenarios, which are based on current zoning policies and current development trends. The study concludes by recommending appropriate land use and transportation planning tools to accommodate orderly growth and development given anticipated land use changes.

The study area includes seven municipalities in Montgomery County: the boroughs of Collegeville, Pottstown and Trappe, and the townships of Limerick, Lower Pottsgrove, Lower Providence, and Upper Providence. Additionally, the northern section of North Coventry Township in Chester County is included within the study area (see Figure I).

The continuing suburbanization of the Route 422 Corridor has put tremendous pressure on municipal and county governments to accommodate numerous residential and commercial developments. These developments have the potential to have significant impacts on the corridor, both negative and positive. On the positive side, the new developments will generate much needed employment opportunities for current and future residents, in addition to new housing opportunities for employees in the corridor as well as those in other nearby employment centers such as King of Prussia. Additionally, land within the Route 422 Corridor is less expensive than in surrounding areas, therefore the opportunity for affordable housing exists. The new development is also beneficial because it will increase municipal and county tax bases.

On the negative side, increased development will generate more residents, employees and traffic. Most roads within the area were built as rural two-lane roads which may not be able to accommodate high volumes of traffic without some traffic mitigation measures. Additionally, the new residents moving into the area will demand increased municipal services (schools, recreation, police) beyond what currently exists. In many cases, the increased taxes generated by new developments do not cover the municipal expenses of providing these services. Other problems associated with rapid suburbanization include a loss of open space, agriculture land, and environmentally sensitive lands; and poorly planned developments which result in suburban sprawl and thus further create traffic congestion problems.

Most of the negatives associated with rapid suburbanization can be eliminated if the proper planning tools are in place prior to intensive development. The purpose of this study, therefore, is to identify these planning tools and recommend implementation strategies which the municipalities and counties can have in place to accommodate the anticipated growth in the corridor by the year 2010.

DEVELOPMENT POTENTIAL BEYOND 2010

Although this study only examines anticipated land use changes to 2010, the impacts of the Route 422 Expressway will continue to be felt on the surrounding communities beyond 2010. In an effort to manage these long-term impacts, the Montgomery County Planning Commission (MCPC) is conducting a companion study which identifies the study area's growth potential after 2010 by examining two future development scenarios:

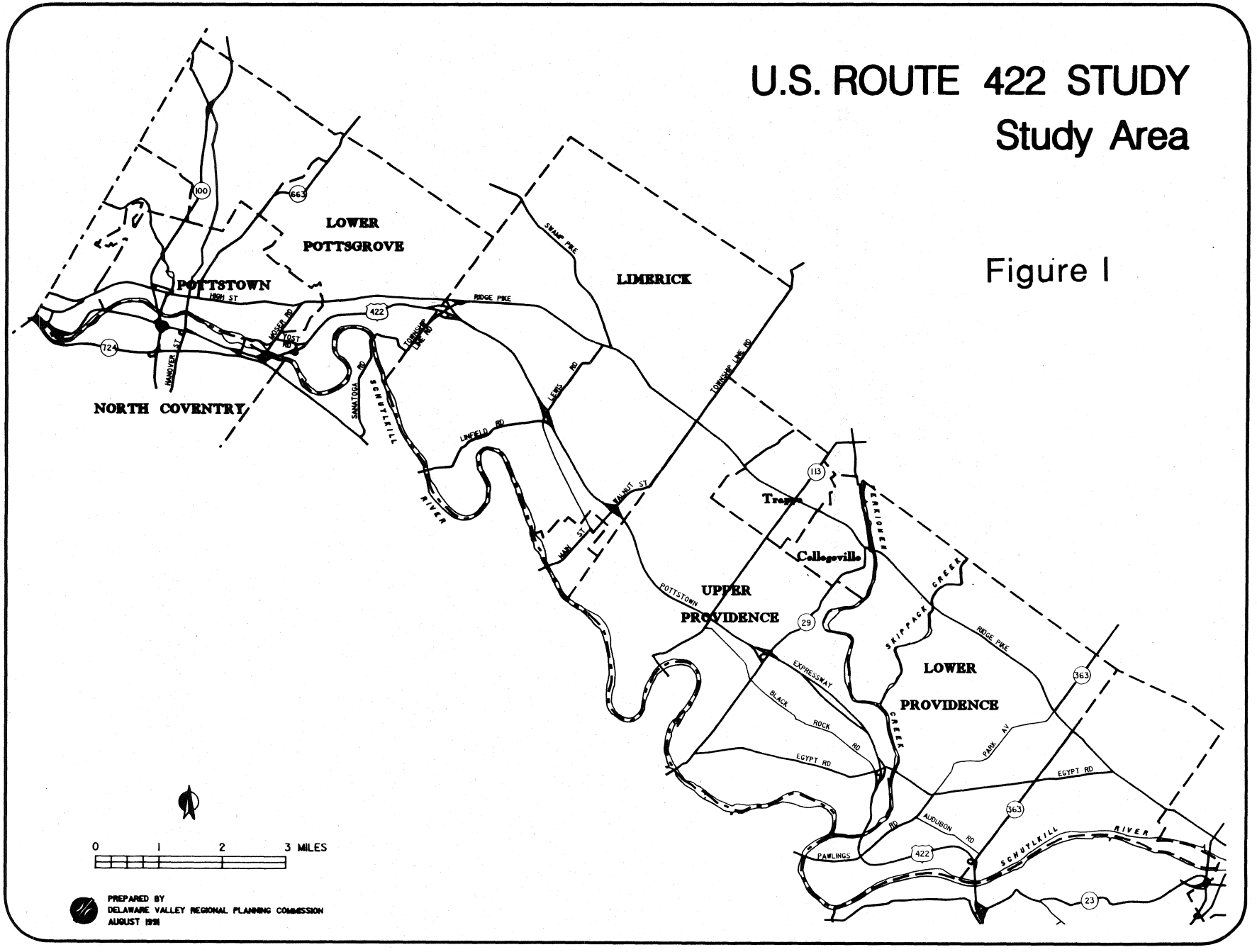
1. the Auto Oriented Future; and
2. the Transit Oriented Future.

The Auto Oriented Future is a continuation of the existing development patterns which are documented in the current DVRPC study under the Market Trends Development Scenario and the Potential Zoning Development Scenario.

The Transit Oriented Future envisions the Route 422 Corridor as becoming a transit corridor, with regional rail or bus service provided within the Route 422 median. The rail or bus service would be frequent and convenient enough to give study area residents and employees a viable alternative to the automobile for their commuting and other travel needs. However, to support this type of public transit service the development patterns within the Route 422 Corridor will have to be modified.

The Transit Oriented Future envisions the establishment of Transit Activity Centers (TAC) along Route 422. The TACs would be locations of mixed-use, medium-to-high density employment and residential centers linked by public transportation. The formation of the TACs would enable a viable rail or bus service to be provided along the Route 422 Corridor. The MCPC anticipates completing the "Two Futures" study in late-1992.

The design, construction and operation of a new transit system within the Route 422 Corridor will take many years to complete. Therefore, the recommendations in the current DVRPC study are designed to be implemented prior to implementation of the proposed transit service. The recommended planning tools in this study may need to be revised once transit service is available, however, in the interim the tools will enable the municipalities to manage growth and development at the present time and in the immediate future.


U.S. ROUTE 422 STUDY
Study Area
Figure I
LOWER POTTSGROVE
POTTSTOWN
NORTH COVENTRY
LIMERICK
UPPER PROVIDENCE
LOWER PROVIDENCE
Collegeville
Trappe
HIGH ST
RIDGE PIKE
422
724
100
663
113
29
363
23
SWAMP PIKE
TOWNSHIP LINE RD
LEWIS RD
LINFIELD RD
MAIN ST
WALNUT ST
POTTSTOWN EXPRESSWAY
BLACK ROCK RD
EGYPT RD
PARK AV
AUDUBON RD
PAWLINGS RD
SANATOGA RD
HANOVER ST
SCHUYLKILL RIVER
SKIPPACK CREEK
0 1 2 3 MILES
PREPARED BY
DELAWARE VALLEY REGIONAL PLANNING COMMISSION
AUGUST 1991

II. MARKET TRENDS DEVELOPMENT SCENARIO: PROPOSED DEVELOPMENTS

The purpose of the Market Trends Development Scenario is to estimate the development potential of the Route 422 study area to the year 2010 given currently proposed developments. This development scenario consists of three analyses: (1) current development proposals; (2) public sewer and water facilities; and (3) traffic assessment which is found in Chapter III. Through the findings of these analyses it is possible to estimate the total population, jobs and traffic that can be anticipated within the Route 422 Corridor based on future land use and infrastructure changes.

CURRENT DEVELOPMENT PROPOSALS

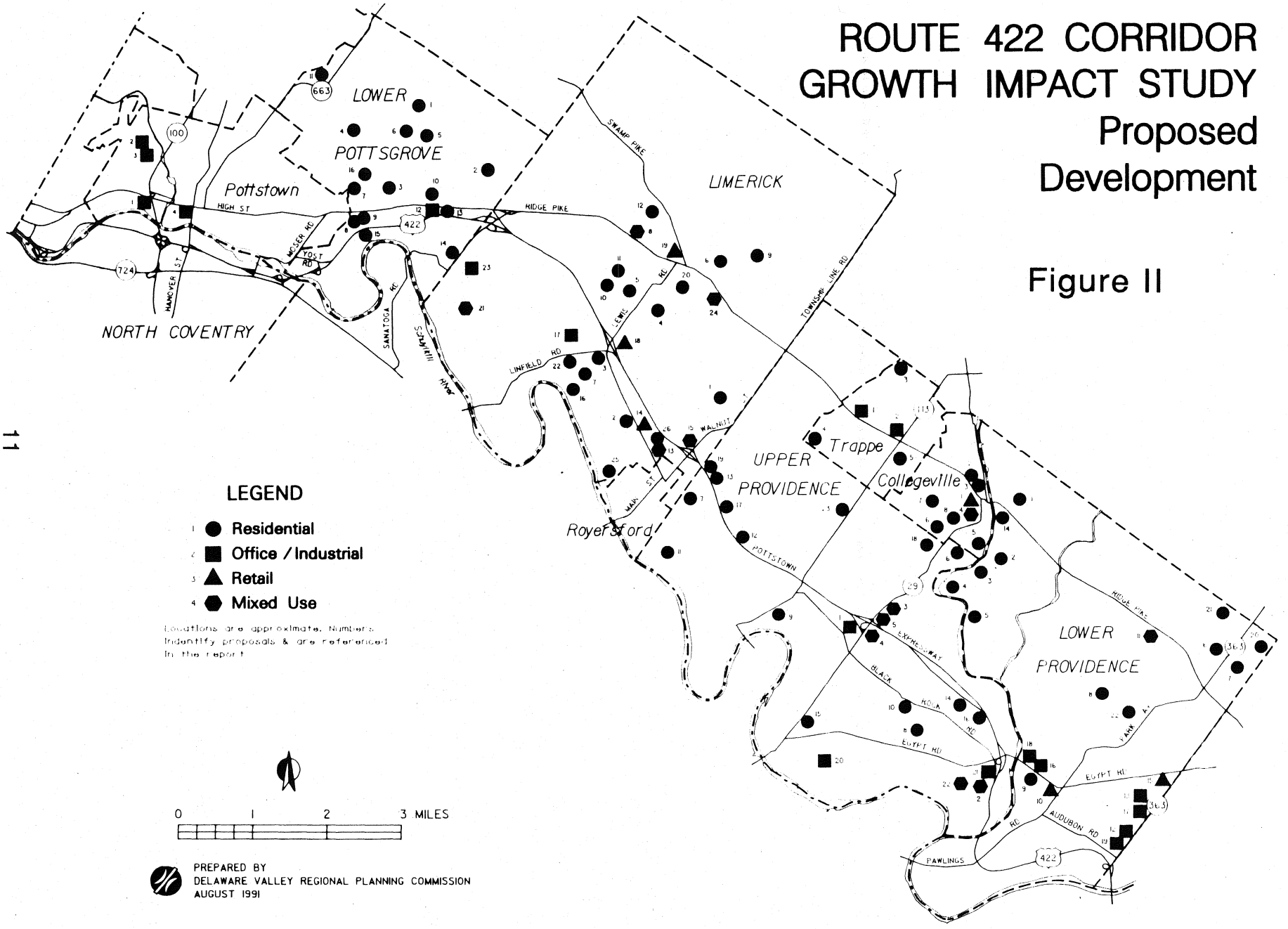
In order to understand what type of land uses may exist within the Route 422 Corridor over the next 20 years an analysis of current development activity was undertaken. This analysis documents projects currently under construction or proposed within the study area. An understanding of future land uses is important since they will determine future traffic patterns and levels of congestion. The anticipated traffic generated by these future developments is used to operate the traffic simulation model undertaken as part of this study.

The Montgomery County Planning Commission and the eight study municipalities provided a detailed inventory of projects under construction and proposed within the study area since 1990. It was not necessary for a proposal to have received preliminary or final approvals to be included in the inventory, therefore the analysis probably includes many proposals which will never be built. However, even if these proposals are not built they are important since they are representative of the type of development that is attracted to the Route 422 Corridor. In other words, even if a specific proposal listed on the inventory is not built, chances are a similar project will eventually be built.

The proposed development inventory includes all projects of 50 or more dwelling units and 30,000 or more square feet of non-residential space. However, in several cases smaller developments were included since they are proposed in close proximity to one another and will therefore have the same traffic impacts as larger developments. The inventory includes 104 possible developments. The number of developments within each municipality ranged from four to 26. The inventory for each municipality can be found in Appendix B and the approximate location of the proposals are mapped on Figure II.

ROUTE 422 CORRIDOR GROWTH IMPACT STUDY
Proposed Development

Figure II



As Table II shows, the inventory includes 9,000 dwelling units and 10.2 million square feet of non-residential space. The highest percentage of development is proposed in three townships: Limerick, Upper Providence and Lower Providence. The Boroughs of Pottstown and Collegeville are nearly built-out and although Trappe has non-developed land much of the farmland north of Main Street is under an agricultural preservation

TABLE II
ROUTE 422 CORRIDOR GROWTH IMPACT STUDY
PROPOSED DEVELOPMENT SUMMARY
RESIDENTIAL DWELLING UNITS

MUNICIPALITY	SFD	TH	MF	OTHER	TOTAL
Collegeville	288	177	0	0	465
Limerick	849	2,153	741	0	3,743
Lower Pottsgrove	633	198	134	120	1,085
Lower Providence	726	174	303	0	1,203
North Coventry	0	0	0	0	0
Pottstown	0	0	0	0	0
Trappe	96	0	240	0	336
Upper Providence	962	1,227	0	0	2,189
TOTAL	3,554	3,929	1,418	120	9,021
% OF TOTAL	39.4%	43.6%	15.7%	1.3%	100.0%

NON-RESIDENTIAL SQUARE FEET

MUNICIPALITY	OFF	RE	IND	INST	OTHER	TOTAL
Collegeville	18,000	163,960	0	0	0	181,960
Limerick	1,366,500	596,500	1,050,000	0	0	3,013,000
Lower Pottsgrove	14,000	0	105,000	0	0	119,000
Lower Providence	661,465	336,265	0	0	45,000	1,042,730
North Coventry	0	0	0	0	0	0
Pottstown	94,000	0	0	98,816	70,000	262,816
Trappe	34,000	0	0	0	3,000	37,000
Upper Providence	690,000	1,020,000	2,100,000	0	1,761,000	5,571,000
TOTAL	2,877,965	2,116,725	3,255,000	98,816	1,879,000	10,227,506
% OF TOTAL	28.1%	20.7%	31.8%	1.0%	18.4%	100.0%

KEY: SF = SINGLE FAMILY DETACHED; TH = TOWNHOUSE; MF = MULTI-FAMILY; OF = OFFICE; RE = RETAIL; IND = INDUSTRIAL; INST = INSTITUTIONAL

NOTE: DEVELOPMENTS OF LESS THAN 50 DWELLING UNITS OR 30,000 SQUARE FEET WERE EXCLUDED FROM THIS ANALYSIS, UNLESS IT WAS FELT THAT THEIR CONSTRUCTION WOULD HAVE A SIGNIFICANT IMPACT ON TRAFFIC.

SOURCES: DELAWARE VALLEY REGIONAL PLANNING COMMISSION, MUNICIPAL ADMINISTRATORS AND MONTGOMERY COUNTY PLANNING COMMISSION, OCTOBER 1991
Delaware Valley Regional Planning Commission, January 1992

easement. Although Lower Pottsgrove and North Coventry are conducive to development their location at the western end of the corridor will probably cause more development to occur as the eastern municipalities approach build-out.

RESIDENTIAL PROPOSALS

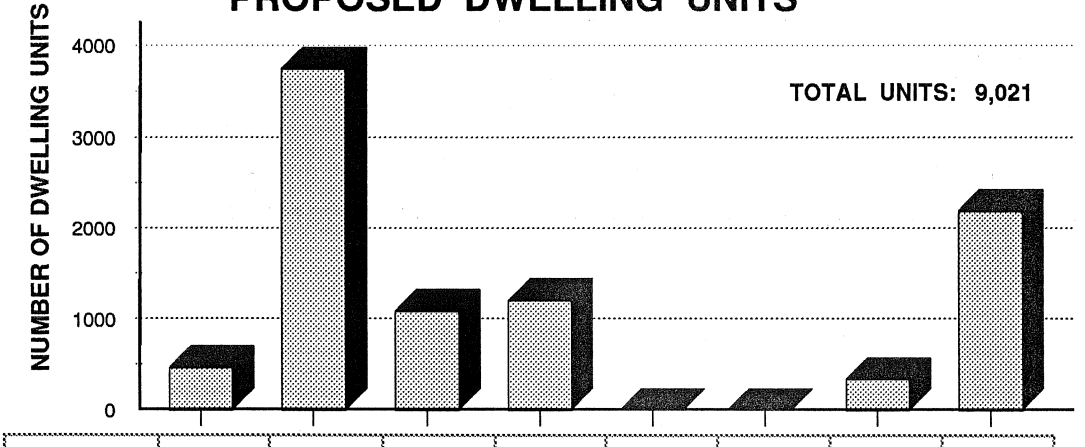
The eight study area municipalities are currently aware of potential developments totaling 9,000 dwelling units. Approximately 39% of the units are single-family detached homes and 44% are attached homes, primarily townhouses. The majority of the remaining units are multi-family units, such as two-story garden apartments. Proposals in Limerick, Upper Providence, Lower Pottsgrove and Lower Providence represent 91% of the entire study area's proposed dwelling units (refer to Figure III). In both Limerick and Upper Providence) the majority of the proposed dwelling units are townhouses, accounting for 86% of all proposed townhouse units in the study area.

The percentage of proposed townhouses within the study area is higher than the total percentage of townhouses proposed in Montgomery County during 1990. For the entire county, 43% of all 1990 residential proposals were single-family detached units and 28% were attached unites (primarily townhouses) and an additional 28% of the proposed units were for multi-family housing.

Figure III

ROUTE 422 CORRIDOR GROWTH IMPACT STUDY

PROPOSED DWELLING UNITS



MUNICIPALITY	COLL	LIMIR	LPOTT	LPROV	NCOV	POTTS	TRAPP	UPROV
DWELLING UNITS	465	3,743	1,085	1,203	0	0	336	2,189

Delaware Valley Regional Planning Commission, September 1991

The propensity towards a greater percentage of townhouse units may be indicative of several trends. First, the townhouse developments may indicate a greater willingness on the part of some suburbanizing municipalities to zone for higher densities. Second, the current recession may indicate that developers, at least in the short term, are forced to build less expensive housing.

The third and probably most significant trend is an indicator of the type of residents developers feel will be attracted to the Route 422 Corridor. Typically, townhouse units are attractive to singles and young couples who are first-time homebuyers. The presence of large corporations such as Sterling and Rorer will probably offer employment opportunities for the residents of these units. Additionally, entry level and young professionals employed in the King of Prussia area probably cannot afford suitable housing in that area. The presence of Route 422 makes the housing market within the study area very attractive to these workers. As land values rise and more large employers move into the Route 422 Corridor, it is likely that townhouses will continue their strong presence in the residential sector of the Corridor.

Population Estimates

Based on the 1990 Census' average household size, the proposed 9,000 dwelling units could support a population of 25,000 (refer to Table III). Added to the 1990 population of 80,211, the proposed residential developments will increase the study area's population by 31% to 105,000. As expected, the majority of the population (66%) would reside in Limerick and Upper Providence townships.

Table III

ROUTE 422 CORRIDOR GROWTH IMPACT STUDY
ESTIMATED POPULATION
PROPOSED DEVELOPMENTS

MUNICIPALITY	1990 CENSUS POPULATION	ESTIMATED POPULATION PROPOSED DEVELOPMENTS
Collegeville Borough	4,227	1,213
Limerick Township	6,691	10,630
Lower Pottsgrove Township	8,808	3,071
Lower Providence Township	19,351	3,308
North Coventry Township	7,506	0
Pottstown Borough	21,831	0
Trappe Borough	2,115	853
Upper Providence Township	9,682	5,954
TOTAL	80,211	25,029

Delaware Valley Regional Planning Commission, August 1991

NON-RESIDENTIAL PROPOSALS

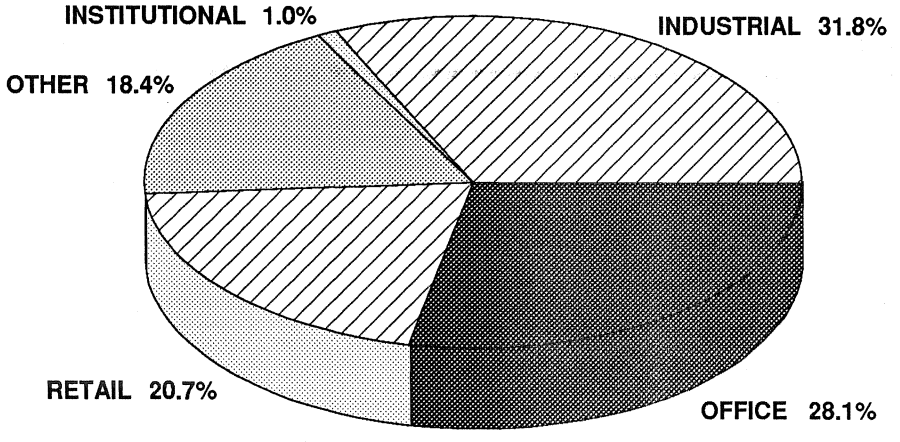
The proposed development inventory examined five categories of non-residential development proposals: office, retail, industrial, institutional and other which includes multi-functional buildings such as a corporate headquarters and research laboratory. As Table II shows, approximately 10.2 million square feet of space is being considered within the study area.

Approximately 84% of the total space is proposed in Upper Providence (55%) and Limerick (30%) townships. In addition to these two municipalities, only Lower Providence has proposals for one million or more square feet.

Figure IV shows the percentage of proposed space devoted to the five major land use categories. As the figure shows, the largest percentage (32%) of proposed space falls within the industrial category, with Limerick and Upper Providence accounting for 97% of the space. It should be noted that the estimates of industrial space may change considerably since they are based on total acres and maximum zoning standards. Most of the large industrial projects have come before their respective planning commissions for subdivision approval only; therefore square footage figures from the developers are not yet available.

Figure IV

ROUTE 422 CORRIDOR GROWTH IMPACT STUDY
PROPOSED NON-RESIDENTIAL DEVELOPMENT



Delaware Valley Regional Planning Commission, November 1991

The office category represents 28% of all proposed non-residential space within the study area. Limerick Township accounts for 48% of the space and Lower Providence and Upper Providence account for 23% and 24% of the space, respectively. The size of the proposals varies considerably from less than 30,000 square feet to 400,000 square feet. Several of the larger projects (over 100,000 square feet) are proposed as part of mixed-use developments, which include retail or industrial space.

The retail category includes 2.1 million square feet of space which accounts for 21% of all proposed space. Again, Limerick, Upper Providence and Lower Providence account for the majority (92%) of this space. The retail space is proposed among several shopping centers of 100,000 square feet or more, some of which are part of a larger mixed-use development.

Approximately 18% of the proposed non-residential space falls within the "other" category. This category includes 1.9 million square feet of space, of which 94% is divided among two developments in Upper Providence Township. The Rhone-Poulene Rorer and Sterling Drug developments are currently under construction within the eastern quadrant of the Route 29 interchange. Both pharmaceutical companies are building complexes of approximately 900,000 square feet each which will include office, research and laboratory facilities.

The Rorer facilities 330,000 square foot headquarters building will be ready for occupancy during the Fall of 1991. Employees will be relocated from an existing facility in Fort Washington. Rorer's 730,000 square foot research and development center is scheduled for completion in 1992. The Upper Providence site, upon completion, will employ 1,900 people.

The Sterling facility is being built in phases. The first facility is scheduled to open in 1993 and the entire development should be completed by 1995. Sterling will employ approximately 1,200 people.

A third pharmaceutical, SmithKline Beecham is also expected to relocate part of its operations to Upper Providence, within the western quadrant of the Route 29 interchange. SmithKline has received the necessary zoning amendments for its 30-acre site and currently is constructing a 200,000 square foot development, primarily office space.

Jobs Estimates

The proposed 10.2 million square feet of non-residential space could generate approximately 28,000 jobs. This estimate is 51% higher than the 1990 estimate of jobs and 144% higher than the 2010 forecast of jobs. The largest percentage of jobs (55%) would be located in Upper Providence Township and 30% would be located in Limerick Township.

SUMMARY

Although the current recession has slowed new construction within the region considerably, the Route 422 Corridor continues to attract major new development proposals. Current proposals include 9,000 dwelling units and over 10 million square feet of commercial space. Limerick and Upper Providence are the dominant municipalities in terms of highest number of dwelling units and square feet under proposals. These two municipalities account for 66% of all proposed dwelling units and 84% of the proposed square feet.

In addition to a high number of development proposals, the corridor is attracting national corporations which will draw from the regional labor pool as well as attract new residents to the region. These proposed developments will not only substantially increase the current population and the number of jobs but they will also make the Route 422 Corridor a regional housing and employment center.

SEWER AND WATER CAPABILITIES

Although 9,000 dwelling units and 10 million square feet of commercial space are proposed within the study area, all of these proposals may not be built. Most of this development will require connection to public sewage and water facilities. Although these facilities currently exist within the study area, they may lack the capacity in the future to meet the demands of current and future development proposals. It is, therefore, necessary to examine the capacities of the current facilities and estimate whether or not they will have adequate capacity to service future developments.

The findings of this analysis are based on current capacities and current expansion plans (if they exist). No attempt was made to "predict" the construction of new wastewater treatment or water supply facilities, or the expansion of current facilities unless the operators of existing facilities were aware of long-range plans to do so.

Additionally, this analysis only examines public wastewater and water supply facilities. It does not analyze the ability of local conveyance systems to transport sewage or water from its point of origin to its destination. It is assumed that if the capacity exists, the developer and/or the municipality will provide the conveyance system necessary to connect with the sewage or water facilities.

SEWAGE TREATMENT FACILITIES

Phase I of the Route 422 study found that in most municipalities, public sewage treatment for new development had been available only since 1988. In 1988, the Oaks Treatment Plant, which services four of the study area municipalities, was expanded from a DER-rating of 3.7 million gallons per day (mgd) to its current rating of 8.5 mgd. Prior to 1988, the plant was under a ban on new connections which had been in effect since 1978. Limerick Township received public wastewater treatment capacity in 1989 when the Limerick Sewage Treatment Plan opened. Although both of these facilities are relatively new, the previous study found that all excess capacity in Limerick Township had been reserved by 1990 and the study area municipalities serviced by the Oaks plant had little or no excess capacity in 1990. Additionally, North Coventry Township, Pottstown, and Lower Pottsgrove had no excess capacity.

Since the completion of Phase I of the Route 422 study, the study area's wastewater treatment capabilities have changed considerably (see Table IV). At the present time, the Oaks, Limerick, and Pottstown treatment plants have requested re-ratings from DER. The

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TABLE IV
ROUTE 422 CORRIDOR GROWTH IMPACT STUDY
FUTURE SEWAGE TREATMENT NEEDS
MILLION GALLONS PER DAY

SEWAGE TREATMENT PLANT	MAXIMUM PLANT ALLOCATION	MAXIMUM MUNICIPAL ALLOCATION	CURRENT AVG DAILY USAGE	ESTIMATED FUTURE DEMAND	EXCESS FUTURE CAPACITY
OAKS STP (1)(3)	9,500,000				
Collegeville & Trappe		1,231,200	696,575	235,525	299,100
Lower Providence		4,446,000	2,601,775	403,025	1,441,200
Upper Providence		2,025,400	960,000	1,205,500	(140,100)
LIMERICK STP (3)	1,300,000				
Limerick		1,300,000	1,000,000	1,171,291	(871,291)
POTTSTOWN STP (2)(3)	15,500,000				
Lower Pottsgrove		2,690,000	1,970,000	334,378	385,622
Pottstown		8,400,000	7,510,000	22,936	867,064
NORTH COVENTRY STP	600,000				
North Coventry		600,000	540,000	0	60,000
TOTAL	**26,900,000**	**20,692,600**	**15,278,350**	**3,372,655**	**2,041,595**

NOTES: (1) INCLUDES PERKIOMEN AND SKIPPACK TOWNSHIPS.
(2) INCLUDES UPPER POTTSGROVE AND WEST POTTSGROVE TOWNSHIPS.
(3) ASSUMES REQUESTED RE-RATING WILL BE APPROVED.

SOURCES: DELAWARE VALLEY REGIONAL PLANNING COMMISSION
MONTGOMERY COUNTY PLANNING COMMISSION
OPERATORS OF SEWAGE TREATMENT PLANTS

DELAWARE VALLEY REGIONAL PLANNING COMMISSION, JANUARY 1992

expanded capacity at the Oaks and Pottstown facilities will have a significant impact on development opportunities in the seven study area municipalities serviced by these two plants. This analysis assumes that the anticipated re-rating requests will be approved and the new allocations on-line by year end 1992. Table IV summarizes the allocations and excess capacities for each municipality within the study area and Figure V shows the existing and future sewage service areas within the study area.

Corridor-wide, the re-ratings, if approved, will allow the study area municipalities to have a maximum treatment capacity of 20.6 million gallons per day. Based on the current average daily usage, approximately 15.3 million gallons, or 74%, of the maximum allocation is actually being used, leaving an excess sewage treatment capacity of approximately 5.3 mgd. Based on current PA DER estimations, the proposed developments will demand approximately 3.3 mgd of wastewater treatment, leaving an estimated excess capacity (assuming all developments occur as proposed) of approximately 1.9 mgd. This amount of treatment capacity is the gross equivalent of approximately 6,900 equivalent dwelling units or approximately 20,000 new residents.

While the corridor-wide analysis shows excess capacity to support development beyond what is currently proposed, an analysis of individual municipal capacity is more appropriate. As Table IV shows, Upper Providence and Limerick townships will not have sufficient capacity to provide treatment for currently proposed developments. Additionally, North Coventry Township has minimal excess capacity.

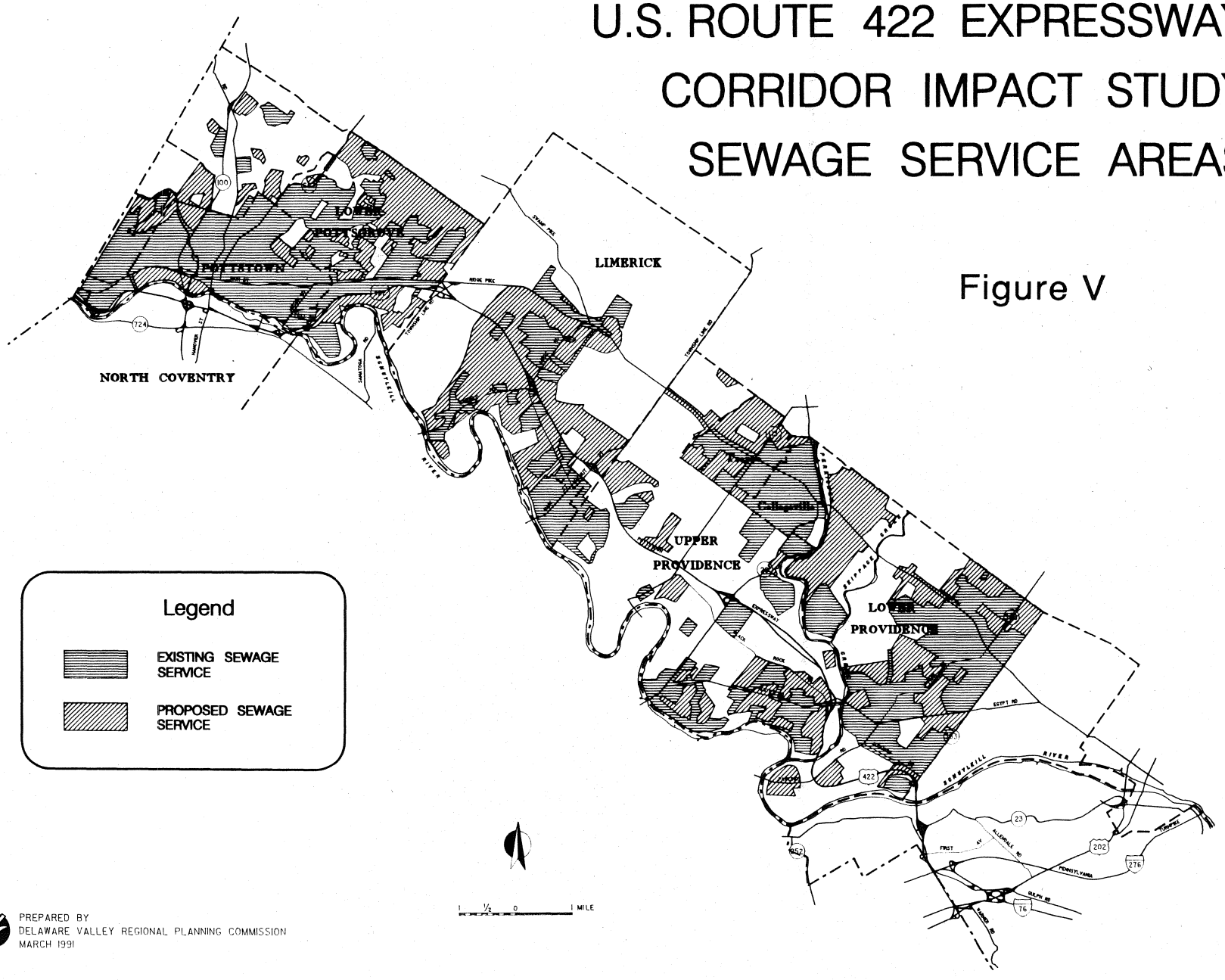
The North Coventry Municipal Utility Authority has hired an engineer to amend the township's Act 537 Plan. Although not completed, the preliminary amendment includes a recommendation for a re-rating from the current 600,000 gallons per day to 1.2 to 1.3 mgd.

Although current expansion plans at the Limerick Sewage Treatment Plant include a re-rating of only an additional 300,000 gallons, the plant can be expanded to 3.0 mgd. This expansion, however, will require major capital improvements. Although no formal plans have been devised, the expansion is expected to take place within the next ten years. As this analysis shows, the Limerick expansion will have to take place as soon as possible, if the township is to continue to grow.

Even with the re-rating of the Oaks plant, Upper Providence will have insufficient capacity to meet proposed demands over the twenty-year period. The township will have to negotiate a new agreement with the Oaks Sewer Treatment Plant if it desires additionally treatment capacity. Current agreements allow each of the six municipalities serviced by Oaks a certain percentage of the plant's total treatment capacity. If the plant will not seek a re-rating beyond the 9.5 mgd within the foreseeable future, Upper Providence may have to purchase additional capacity from a municipality serviced by Oaks which has excess capacity. The Lower Perkiomen Valley, which is the Oaks service area, is the fastest growing area within Montgomery County. Given the current and anticipated rates of

U.S. ROUTE 422 EXPRESSWAY
CORRIDOR IMPACT STUDY
SEWAGE SERVICE AREAS

Figure V



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MARCH 1991

growth in this area, it is likely that the Oaks plant will again have to be expanded by the year 2010.

WATER FACILITIES

The primary sources of potable water within the study area are the Schuylkill River and wells. Although there is no water supply problem in the area, some of the municipal distribution systems cannot carry additional amounts of water, this is particularly true in Lower Pottsgrove. This problem will have to be rectified before substantial development can take place.

Table V summarizes the supply and demand for potable water within the study area. The study area currently has a maximum water capacity of approximately 17.7 mgd. Approximately 55% of the capacity is being used. Proposed development will increase the demand for water to 75% of capacity, leaving an excess capacity of 4.4 mgd.

TABLE V

ROUTE 422 CORRIDOR GROWTH IMPACT STUDY
FUTURE WATER SERVICE NEEDS

MUNICIPALITY	MAXIMUM CAPACITY (MGD)	CURRENT USAGE (MGD)	ESTIMATED FUTURE DEMAND (MGD)	EXCESS FUTURE CAPACITY (MGD)
Collegeville & Trappe	1,248,000	620,361	247,301	380,338
Limerick & Upper Providence	4,448,000	600,000	2,495,631	1,352,369
Lower Pottsgrove & Pottstown	8,000,000	6,000,000	375,179	1,624,821
Lower Providence	4,000,000	2,500,000	423,176	1,076,824
North Coventry				
TOTAL	17,696,000	9,720,361	3,541,287	4,434,352

SOURCE: Montgomery County Planning Commission, January 1992

SUMMARY

The municipalities experiencing the greatest amount of proposed development, Limerick and Upper Providence, currently do not have sufficient sewage treatment capacity to meet future demands. As has been done in the past, developers may purchase the right to sewage treatment capacity even if they will not be connecting into the system in the near future. This will severely limit immediate development opportunities within these two municipalities. Although this is a current problem, operators of the sewage treatment plant in Limerick feel the problem will be resolved within the next ten years. The solution to the problem in Upper Providence is less clear. The remaining municipalities currently have excess sewage treatment capacity to meet currently proposed developments.

The current supply of potable water in the study area is sufficient to meet current and future demands. However, water distribution systems will need to be expanded and upgraded to meet demand in some portions of the study area.

CONCLUSION

The Route 422 Corridor has the potential to become a regional housing and employment center as is evident by the 9,000 dwelling units and 10 million square feet of commerical space proposed within the study area. The consequences of this intensive development will be considerable on the local roadway network. Most of the roads within the Route 422 Corridor were originally built as rural, two-lane roads designed to service the local farming community. The opening of Route 422 has changed the purpose and use of this road system. The following chapter, Traffic Impact Analysis will examine the impact that proposed development will have on the highway network.

III. MARKET TRENDS DEVELOPMENT SCENARIO: TRAFFIC IMPACT ANALYSIS

The purpose of the study's Traffic Impact Analysis is to determine what impact future development will have on the study area's road network. This analysis allows a "visual" picture of what future problems may occur in traffic flow and where they may occur.

The traffic analysis provides information on existing and future traffic volumes along Route 422, Ridge Pike and the major roads which intersect Route 422. A level of service analysis was also conducted along Route 422 to evaluate future roadway conditions. Lastly, potential conceptualized solutions are presented which address the deficiencies identified by the level of service analysis and the impact of the projected traffic volumes on the road network.

TRAFFIC SIMULATION MODEL

Traffic demand projections for the year 2010 were estimated using a focused traffic simulation model. The model, an extension of the DVRPC Regional Traffic Simulation Model, was specifically calibrated to evaluate impacts within the Route 422 study area. Trip generation and traffic flow patterns were driven by existing and proposed demographic data while the assignment of traffic to particular roads was a function of the highway network; thus changes to land development patterns or the highway network were reflected in the model's output.

The DVRPC Traffic Simulation Model is essentially the Federal Highway Administration's Urban Transportation Planning System (UTPS) package customized for the Delaware Valley. The model is periodically updated and recalibrated to reflect changing conditions. PennDOT uses the model for alternatives testing and 20 year traffic projections.

The model is based on the standard four step transportation planning process described below:

1. Trip Generation - The DVRPC region is divided into 1,335 zones, generally corresponding to census tracts. The number of trips generated by each zone is estimated using the following demographic data: population, households, employed residents, households stratified by auto ownership, total automobiles, and employment stratified by the 11 standard industrial classification (SIC) groups. Estimates of external and through travel to the region are developed independently.

2. Trip Distribution - Trips are distributed among the zones within the region by means of a gravity model. This model assumes that the propensity to travel to a zone of destination increases with the attractiveness of the destination (as measured by employment) and decreases as the difficulty of travelling between zones increases.

3. Modal Split - Modal split divides the trips between zones into highway trips and transit trips. This element of the modal was not included in the Route 422 analysis since little public transit opportunities currently exist.

4. Traffic Assignment - Through an iterative process the trips are assigned to the highway network, based upon minimal path travel times, forming link volumes. The minimum path between zones is calculated on the basis of link length, highway type (limited access expressway, arterial or collector) and link volumes.

The DVRPC highway network contains virtually every street of significance in the region. All expressways, arterials and a majority of the collector roads are included in the network. Statistically, the network includes over 1,000 miles of expressways, 8,500 miles of arterials, and 3,000 miles of collectors. Each highway segment, or link, is defined by the following parameters: length in miles, functional classification, type of surrounding area (e.g., urban, suburban, or rural), geographic location, hourly capacity, toll class and number of lanes.

Due to increasing development activity in the study area, it was necessary to subdivide the original traffic simulation zones into smaller zones in order to provide a more accurate estimate of trip generation and highway assignment. Several roads within the Route 422 study area have been added to the regional highway network as part of this process in order to more accurately simulate the trip making patterns, thus the highway network was customized to reflect the changes in traffic flows that have or will occur as a result of recent and future development along the Route 422 Corridor.

The existing trips in the model are based on existing traffic volumes, trips generated from background growth within the DVRPC region, and trips generated by pass-through vehicles. These total existing trips are then used as the base data for calculating projected traffic volumes.

FUTURE DEVELOPMENT

To estimate future trips, the existing number of trips for the study area required updating. As presented in Chapter II, data were collected for developments which are either proposed, planned or under consideration but not formally proposed as yet. No attempt was made to speculate on the future development of undeveloped parcels for which there are no discussions of development activity.

The number of proposed residential units and the proposed square footage of non-residential development was aggregated for the study area by traffic zone. This data was converted into generated trips using trip rates from the Institute of Transportation Engineers (ITE) Trip Generation Manual. The new trips were added to the existing trips within the network, distributed among the traffic zones and assigned to the road network through the modeling process.

HIGHWAY NETWORK

The highway network under study consists of Route 422 between PA 363 and the Berks County Line, the major roads intersecting Route 422 within the study area and Ridge Pike between PA 363 and Route 422.

Route 422 is a four-lane limited access facility which links US 202 in King of Prussia to Pottstown. West of Pottstown, the highway changes to a four-lane, at-grade, controlled access highway connecting Pottstown to Reading. In the study area, the highway is accessed through a series of grade-separated interchanges which are found at the following locations:

- PA 363 (Trooper)
- Egypt Rd (Oaks)
- PA 29 (Collegeville/Phoenixville)
- Walnut Street/Township Line Road (Royersford)
- Lewis Road (Limerick/Linfield)
- Township Line Road (Evergreen Road)/Ridge Pike (Sanatoga)
- Armand Hammer Boulevard
- PA 724
- Keim Street
- Hanover Street
- PA 100
- Old Reading Pike (Stowe)

The grade of Route 422 is relatively level with occasional gently rolling hills. The speed limit is posted at 55 MPH. A typical cross section of the highway consists of two 12 foot lanes in each direction plus a 4 foot left shoulder and a 10 foot right shoulder in each direction. The highway is divided by a variable width grass median.

For purposes of this study, the network for the Year 2010 is assumed to include the completion of the Chester-Montgomery Connector, a four-lane arterial road which connects PA 724 in East Pikeland, Chester County to PA 29 in Upper Providence, Montgomery County (refer to Figure VI). PennDOT is currently conducting an Environmental Assessment Report and the engineering phase of this project is programmed to occur by 1994 and the construction phase is programmed to begin by 2000. The Year 2010 highway network also assumes that PA 29 will be widened from two

lanes to four lanes from its junction with the Chester-Montgomery Connector to Route 422. Also included in the 2010 network is the widening of US 202 to three lanes in each direction from Route 422 to US 30 and improvements to the I-76, US 202 and Route 422 interchange.

EXISTING TRAFFIC VOLUMES

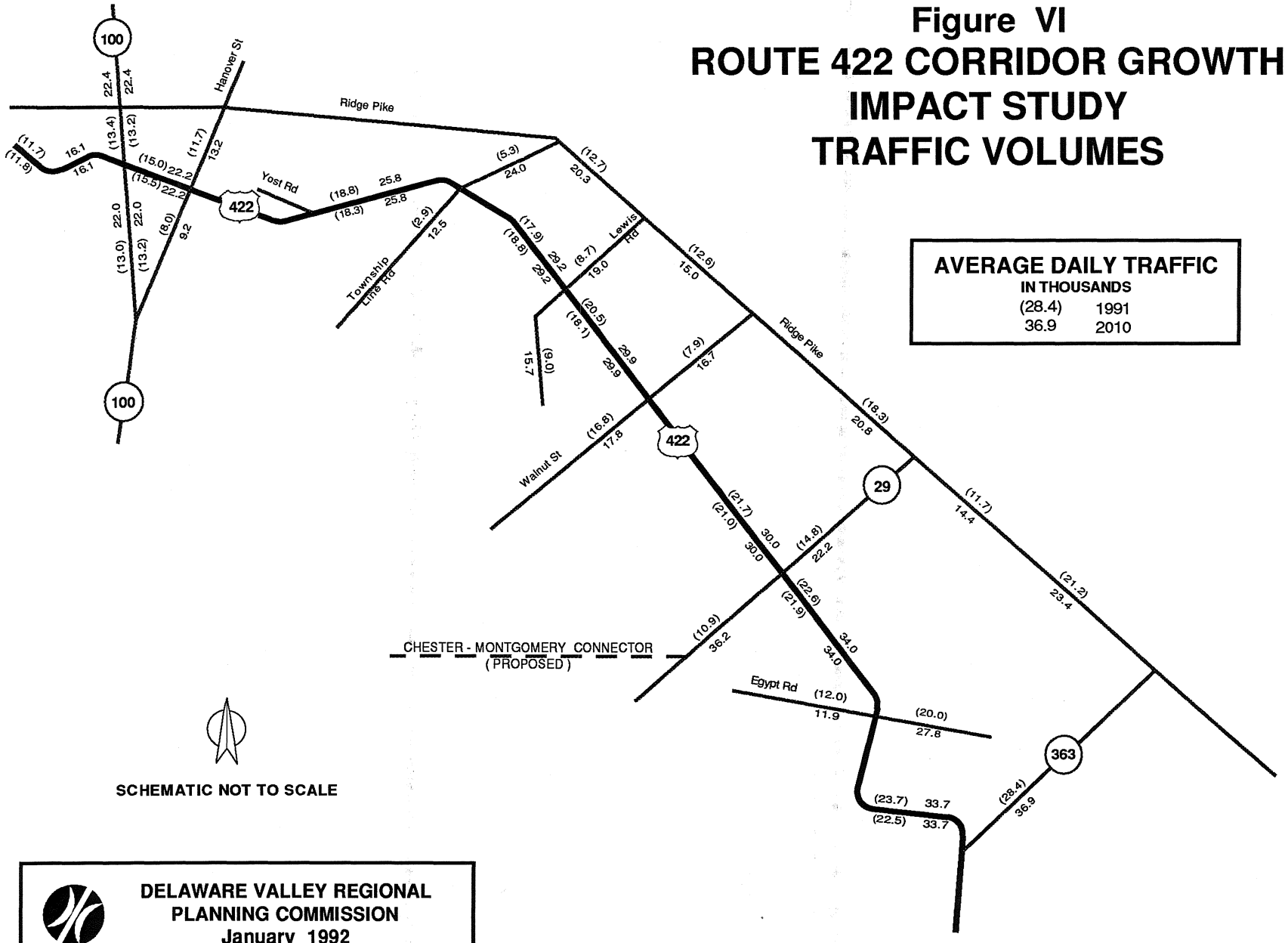
Existing traffic counts were taken within the study area highway network in October and November, 1991. These counts are displayed graphically on Figure VI. The highest existing traffic volume on Route 422 in the study area is the 46,200 vehicles per day between PA 363 and Egypt Road. The traffic volumes are considerably lower in the western portion of the corridor. The lowest existing volume on Route 422 in the study area is 23,500 vehicles per day between PA 100 and the Berks County Line, representing almost a doubling of traffic from the western end of the corridor to the eastern end. A similar pattern exists on Ridge Pike where traffic volumes are approximately 67% higher in the eastern end. A total of 21,200 vehicles per day were counted on Ridge Pike between PA 363 and Sunnyside Avenue. This is a noticeable difference from the 12,700 vehicles per day between Route 422 and Neiffer Road. Counts were also taken on the roads which intersect with Route 422 just outside the interchange areas. Table VI lists the traffic volumes on the network taken in 1986 and 1991 as well as the traffic volumes projected by the model for the Year 2010. The absolute and percentage increase between 1991 and 2010 are also presented in this table.

PROJECTED 2010 TRAFFIC VOLUMES

The daily traffic volumes on the network, projected by the model for the Year 2010, are displayed on Figure VI. The daily volumes on Route 422 are expected to increase in the range of 35 to 60 percent. The link between Egypt Road and PA 29 is projected to carry the highest traffic volumes in the study area, 68,000 vehicles per day. This represents an increase in traffic of approximately 53% by the Year 2010 and accounts for the highest absolute increase in traffic along the corridor at 23,500 vehicles per day. The western end is expected to continue to have the lowest volumes along the corridor. The link between PA 100 and the Berks County Line is expected to carry 32,200 vehicles per day; at 37%, this link is projected to have the lowest rate of increase on Route 422. The link with the highest projected growth rate is the link between Lewis Road and Township Line Road, which is expected to experience a 59% increase in traffic by the Year 2010.

The roads in the network that feed Route 422 are expected to experience considerable traffic growth by the Year 2010. Exceptions to this statement include the link of Egypt Road in Upper Providence between Black Rock Road and Brower Avenue which, based on current development proposals as analyzed by the regional traffic simulation model, is projected to experience a slight decrease in traffic and the link of Walnut Street in Royersford between Route 422 and Ninth Street which is projected to increase only slightly. This situation can be attributed to the effects of the changing traffic patterns that

Figure VI
ROUTE 422 CORRIDOR GROWTH IMPACT STUDY TRAFFIC VOLUMES



DELAWARE VALLEY REGIONAL
PLANNING COMMISSION
January 1992

TABLE VI
TRAFFIC VOLUMES
(000)

FACILITY	SEGMENT	MUNICIPALITY	1986 COUNT	1991 COUNT	2010 EST.	Change 1991-2010	PERCENT CHANGE 1991-2010
US 422 EB	PA 363 to Egypt Rd	Lwr. Prov./Upr. Prov.	14.7	22.5	33.7	11.2	49.8
US 422 WB	PA 363 to Egypt Rd	Lwr. Prov./Upr. Prov.	14.4	23.7	33.7	10.0	42.2
US 422 EB	Egypt Rd to PA 29	Upper Providence	14.6	21.9	34.0	12.1	55.3
US 422 WB	Egypt Rd to PA 29	Upper Providence	15.1	22.6	34.0	11.4	50.4
US 422 EB	PA 29 to Walnut St	Upr. Prov./Limerick	14.8	21.0	30.0	9.0	42.9
US 422 WB	PA 29 to Walnut St	Upr. Prov/Limerick	14.3	21.7	30.0	8.3	38.2
US 422 EB	Walnut St to Lewis Rd	Limerick	11.7	18.1	29.9	11.8	65.2
US 422 WB	Walnut St to Lewis Rd	Limerick	11.2	20.5	29.9	9.4	45.9
US 422 EB	Lewis Rd to Township Line Rd	Limerick	11.0	18.8	29.2	10.4	55.3
US 422 WB	Lewis Rd to Township Line Rd	Limerick	10.5	17.9	29.2	11.3	63.1
US 422 EB	Township Line Rd to Yost Rd	Limerick/Lwr. Potts.	11.0	18.3	25.8	7.5	41.0
US 422 WB	Township Line Rd to Yost Rd	Limerick/Lwr. Potts.	12.6	18.8	25.8	7.0	37.2

TABLE VI - Continued

FACILITY	SEGMENT	MUNICIPALITY	1986 COUNT	1991 COUNT	2010 EST.	Change 1991-2010	PERCENT CHANGE 1991-2010
US 422 EB	Hanover St to PA 100	North Coventry	13.0	15.5	22.2	6.7	43.2
US 422 WB	Hanover St to PA 100	North Coventry	12.7	15.0	22.2	7.2	48.0
US 422 EB	PA 100 to Berks Co. Line	N. Cov./W. Potts.	9.2	11.8	16.1	4.3	36.4
US 422 WB	PA 100 to Berks Co. Line	N. Cov./W. Potts.	9.3	11.7	16.1	4.4	37.6
PA 363	Van Buren to Parkview	Lower Providence	19.2	28.4	36.9	8.5	29.9
Ridge Pike	PA 363 to Sunnyside Ave	Lower Providence	n/a	21.2	23.4	2.2	10.4
Ridge Pike	Pechins Mill Rd to Cross Keys Rd	Lower Providence	n/a	11.7	14.4	2.7	23.1
Ridge Pike	8th St to 9th St	Collegeville	n/a	18.3	20.8	2.5	13.7
Ridge Pike	Limerick Rd to Royersford Rd	Limerick	10.9	12.6	15.0	2.4	19.0
Ridge Pike	US 422 to Neiffer Rd	Limerick	11.1	12.7	20.3	7.6	59.8
Egypt Rd	US 422 to Pinetown Rd	Upper Providence	n/a	20.0	27.8	7.8	39.0
Egypt Rd	Black Rock to Bower Ave	Upper Providence	8.7	12.0	11.9	-0.1	-0.8
PA 29	US 422 to Arcola Rd	Upper Providence	12.2	14.8	22.2	7.4	50.0
PA 29	US 422 to Black Rock Rd	Upper Providence	7.3[b]	10.9	36.2	25.3	232.1
Walnut St	US 422 to 9th St	Limerick/Royersford	10.8	16.8	17.8	1.0	6.0
Township Line Rd Lmrck/Upr Prv	Linfield-Trappe Rd to Spring Lake	Upr. Prov./Limerick	5.4	7.9	16.7	8.8	111.4

TABLE VI - Continued

FACILITY	SEGMENT	MUNICIPALITY	1986 COUNT	1991 COUNT	2010 EST.	Change 1991-2010	PERCENT CHANGE 1991-2010
Lewis Rd	US 422 to Cherry Lane	Limerick	n/a	8.7	19.0	10.3	118.4
Lewis Rd	Linfield Rd to Benner Rd	Limerick	n/a	9.0	15.7	6.7	74.4
Hanover St	US 422 to Industrial Highway	North Coventry	9.5[a]	11.7	13.2	1.5	12.8
Hanover St	US 422 to PA 724	North Coventry	n/a	8.0	9.2	1.2	15.0
PA 100 NB	US 422 to PA 724	North Coventry	n/a	13.2	22.0	8.8	66.7
PA 100 SB	US 422 to PA 724	North Coventry	n/a	13.0	22.0	9.0	69.2
PA 100 NB	US 422 to High St	Pottstown	11.0[a]	13.2	22.4	9.2	69.7
PA 100 SB	US 422 to High St	Pottstown	11.6[a]	13.4	22.4	9.0	67.2
Township Line Rd Lmrck/Lwr Potts	US 422 to Possum Hollow	Limerick/Lwr. Potts.	n/a	2.9	12.5	9.6	331.0
Township Line Rd Lmrck/Lwr Potts	US 422 NB off ramp to Ridge Pike	Limerick/Lwr. Potts.	n/a	5.3	24.0	18.7	352.8

a - 1985 count
b - 1987 count

Source: Delaware Valley Regional Planning Commission, January 1992

will result from the completion of the Chester-Montgomery Connector. The most significant increase in traffic will occur on PA 29 west of Route 422, also due to the completion of the Chester-Montgomery Connector and the opening of the pharmaceutical developments. The link of PA 29 from Route 422 to Black Rock Road is projected to experience the largest increase in traffic of any link in the study area network. Traffic on this segment is expected to increase from the existing 10,900 vehicles per day to the projected 36,200 vehicles per day; an increase of 25,300 vehicles per day. The impacts of this traffic increase on PA 29 will be mitigated by the widening of this roadway.

Other roads which are projected to experience a considerable growth in traffic volumes are Township Line Road in Limerick and Lower Pottsgrove Township Line Road in Upper Providence and Limerick, and Lewis Road, north of Route 422. These large increases are due to the substantial amount of projected development in Limerick Township. If all industrial and commercial developments now proposed are completed by 2010, Township Line Road in Limerick and Lower Pottsgrove is projected to increase from 5,300 to 24,000 vehicles per day between Route 422 and Ridge Pike and from 2,900 to 12,500 vehicles per day between Route 422 and Possum Hollow Road, increases of 353% and 331%, respectively. Traffic on Lewis Road between Route 422 and Cherry Lane is projected to increase from 8,700 to 19,000 vehicles per day; a growth rate of 118%. A growth rate of 111% is expected in the section of Township Line Road in Upper Providence and Limerick between Linfield-Trappe Road and Spring Lake Road, representing an increase from 7,900 to 16,700 vehicles per day.

LEVEL OF SERVICE ANALYSIS

The concept of Level Of Service (LOS) is a qualitative measure describing operational conditions within a traffic stream and their perception by motorists in terms of speed and travel time, traffic interruptions, freedom to maneuver, comfort, and convenience. Six levels of service are defined; they are given letter designations, A to F, with level of service A representing the best operating conditions and level of service F the worst. Level of service C is the minimum desirable condition; however, jurisdictions frequently tolerate level of service D when the cost to upgrade the highway facility becomes prohibitive.

Methodology to determine level of service is presented in the Highway Capacity Manual, Transportation Research Board Special Report 209. Different methodologies are specified for two lane roadways, signalized intersections, unsignalized intersections, freeways and ramps.

Level of service criteria for freeway segments are defined in terms of density, passenger cars per mile per lane. Although speed is a major concern of drivers with respect to service quality, freedom to maneuver and proximity to other vehicles are equally important parameters. These qualities are directly related to the density of the freeway traffic stream. For different design speeds and average travel speeds maximum service flow

rates are expected to exist under ideal conditions for a given density. Ideal conditions are affected by lane widths, lateral clearance, truck activity, grades, and driver characteristics. A subjective description of level of service criteria is presented in Appendix C.

A level of service analysis was performed along Route 422 and the results can be found in Table VII and on Figures VII and VIII. The analysis was performed for the eastbound only direction in the AM Peak Period and for the westbound only direction in the PM Peak Period. The directional distribution of traffic on Route 422 during the peak periods is so uneven that the volumes are extremely light in the AM Peak westbound direction and in the PM Peak eastbound direction. Therefore a level of service analysis for those directions in those peak periods was unnecessary.

Generally, service levels on each segment of Route 422 are projected to deteriorate one level between 1991 and 2010. The most serious problems appear to be in the eastern half of the corridor where level of service E will be evident in both peak periods for the heavier direction of traffic. This means that traffic conditions will be level of service E in the eastbound direction between Lewis Road and PA 363 in the AM Peak and between PA 363 and Walnut Street in the westbound direction in the PM Peak.

It appears that the traffic conditions on the segments from Lewis Road to Township Line Road and from Township Line Road to Yost Road do not deteriorate because the service levels remain constant at C. However each level represents a range and the existing conditions fall at the beginning of the C range while the projections lie at the end of the C range approaching D. Although there is actually some deterioration of traffic conditions, this change is not substantial and conditions are still at an acceptable level. Traffic conditions in the western end of the corridor will continue to operate at acceptable service levels.

CONCEPTUAL SOLUTIONS

This section presents conceptual solutions to the transportation issues identified through the previous analyses. The identified transportation issues are likely to occur by 2010, therefore these conceptional solutions should be implemented prior to 2010. These solutions will be reviewed first on a corridor-wide basis, then the interchanges will be assessed individually to determine the appropriateness and applicability of these solutions.

This report documents the projected increases in traffic volumes on the highway network in the Route 422 corridor for the period from 1991 to 2010 and is based on current development proposals and market trends. These volumes indicate a deterioration in the level of service on Route 422, however the magnitude of the increasing volumes and deteriorating level of service does not appear to justify a physical widening of Route 422. However, if actual volumes exceed current projections, the widening of Route 422 may be justified prior to 2010. There are however other options to investigate which may mitigate the impacts of the projected increase in traffic volumes. Some solutions deal with

TABLE VII

LEVEL OF SERVICE ANALYSIS
1991 AND 2010

Facility	Segment	Existing LOS AM Peak	Existing LOS PM Peak	Projected LOS AM Peak	Projected LOS PM Peak
US 422 EB	PA 363 to Egypt Rd	D	-	E	-
US 422 WB	PA 363 to Egypt Rd	-	C	-	E
US 422 EB	Egypt Rd to PA 29	D	-	E	-
US 422 WB	Egypt Rd to PA 29	-	C	-	E
US 422 EB	PA 29 to Walnut St	D	-	E	-
US 422 WB	PA 29 to Walnut St	-	C	-	E
US 422 EB	Walnut St to Lewis Rd	D	-	E	-
US 422 WB	Walnut St to Lewis Rd	-	C	-	D
US 422 EB	Lewis Rd to Township Line Rd	C	-	D	-
US 422 WB	Lewis Rd to Township Line Rd	-	C	-	C
US 422 EB	Township Line Rd to Yost Rd	C	-	C	-
US 422 WB	Township Line Rd to Yost Rd	-	C	-	C
US 422 EB	Hanover Street to PA 100	B	-	C	-
US 422 WB	Hanover Street to PA 100	-	B	-	C
US 422 EB	PA 100 to Berks County Line	A	-	B	-
US 422 WB	PA 100 to Berks County Line	-	A	-	B

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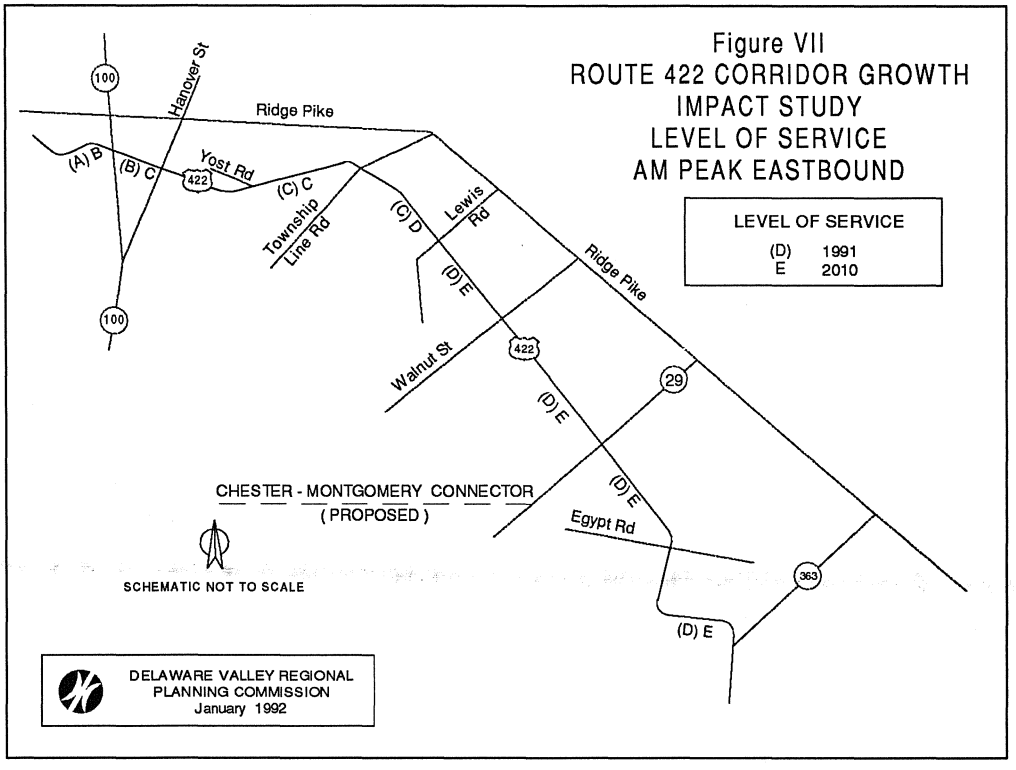
Figure VII
ROUTE 422 CORRIDOR GROWTH
IMPACT STUDY
LEVEL OF SERVICE
AM PEAK EASTBOUND
LEVEL OF SERVICE
(D) 1991
E 2010
Hanover St
Ridge Pike
(A) B
(B) C
Yost Rd
422
(C) C
Township Line Rd
(C) D
Lewis Rd
(D) E
Ridge Pike
100
Walnut St
29
CHESTER - MONTGOMERY CONNECTOR
(PROPOSED)
Egypt Rd
363
SCHEMATIC NOT TO SCALE
DELAWARE VALLEY REGIONAL
PLANNING COMMISSION
January 1992

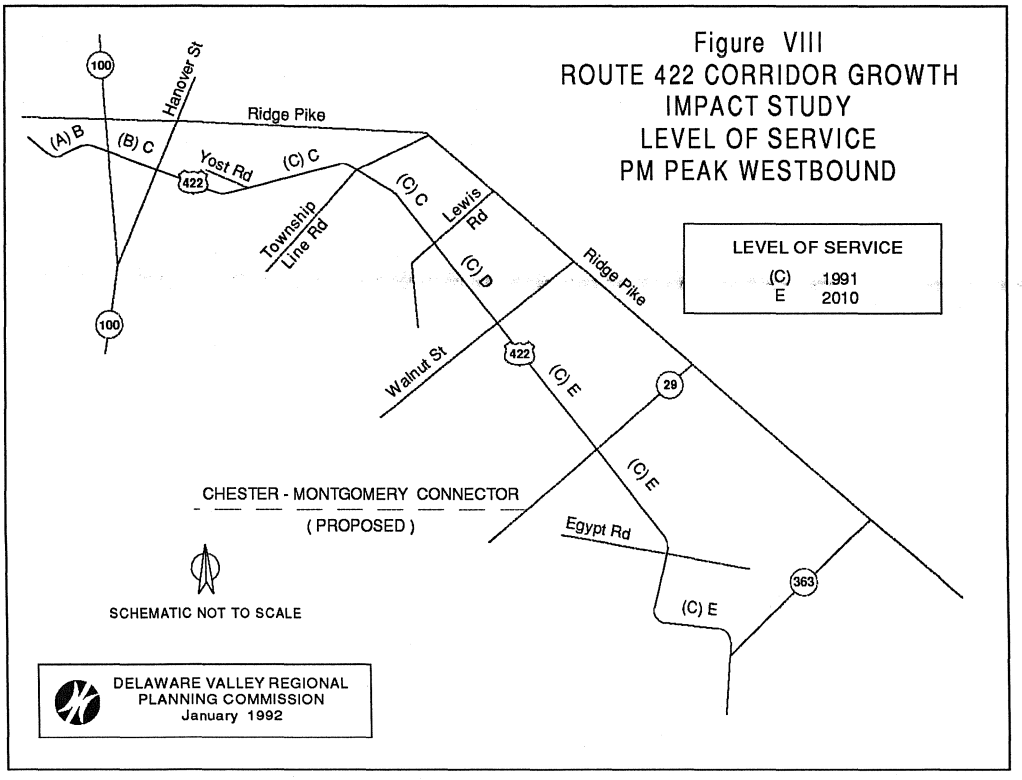
Figure VIII
ROUTE 422 CORRIDOR GROWTH
IMPACT STUDY
LEVEL OF SERVICE
PM PEAK WESTBOUND
LEVEL OF SERVICE
(C) 1991
E 2010
Hanover St
Ridge Pike
(A) B
(B) C
Yost Rd
422
(C) C
Township Line Rd
(C) D
Lewis Rd
Ridge Pike
100
Walnut St
(C) E
29
CHESTER - MONTGOMERY CONNECTOR
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demand management strategies such as municipal-level trip reduction ordinances and the construction of park and ride facilities which promote ridesharing, vanpooling and transit usage. Other improvements, such as, signalization, left turn lanes, or the possible reconfiguration of interchange ramps, may address problems associated with increased traffic at interchange areas. Additionally, ramp metering should be investigated along the corridor to improve the efficiency of the freeway operations by attempting to reduce factors that contribute to congestion.

The Route 422 corridor is an ideal area for park and ride facilities. The directional distribution of traffic indicates considerably heavier flows eastbound than westbound in the AM Peak and westbound vs eastbound in the PM Peak; which, it is reasonable to assume, represents a large number of work trips to and from employment centers in King of Prussia, Philadelphia and other employment centers to the east. The existing traffic counts indicate an AM Peak hour directional distribution of approximately 75% eastbound and 25% westbound. However, if extensive employment centers are developed along the corridor or to the west, the future directional distribution may not be as great.

This high percentage of trips in one direction demonstrates potential for park and ride facilities. In fact, unofficial park and ride activity has been observed at several interchange areas and as a result PA DOT has recently constructed a park and ride lot at the Lewis Road interchange. Park and ride sites provide a common parking site for persons in single occupancy vehicles to gather in order to transfer to high occupancy vehicles, such as carpools, vanpools or public transit vehicles in which they share a ride to a common destination. These facilities promote more efficient use of transportation facilities by reducing the number of single-occupant vehicles on the road, decreasing demand for parking space in high density employment centers and reducing air pollution and fuel consumption. This study recommends the investigation of developing park and ride facilities in the vicinity of each Route 422 interchange within the study area.

The projected traffic volumes on the roads which intersect Route 422 are likely to cause congestion in the interchange area if these interchanges are not adequately designed to handle the increased volumes. Although this study did not monitor traffic on the interchange ramps, it is likely that the installation of traffic signals, the construction of left turn lanes, or the possible redesign or reconfiguration of the interchange ramps may be necessary to alleviate possible traffic congestion in the interchange areas.

The findings of this study also suggests that ramp metering may be an alternative to consider to alleviate congestion problems. The underlying principal of ramp metering is to limit the number of vehicles entering the freeway so that the demand on the freeway will not exceed its capacity. Maximum flow rates will thus be achieved by ensuring that the freeway traffic moves at or near optimum speeds. Ramp metering, therefore, is a tool to improve the efficiency of the freeway, however, frequently at the expense of the entrance ramps. Motorist may choose to wait in the resultant queues on the entrance ramps in the hope that the improved freeway operations will more than compensate for

the ramp delay, or they may choose another entry point, another time when the demand is lower or another mode of transportation such as transit or ridesharing. If future queues on interchange ramps exceed their capacity, the eventual redesign or lengthening of those ramps may be required to provide stacking capacity.

The following section describes possible conceptual solutions for each interchange within the study area.

Route 422 and PA 363 Interchange (Trooper)

- The eastbound on-ramp should be monitored for the installation of ramp metering
- Consider the addition of a park and ride lot
- If future traffic volumes increase beyond projected volumes, investigate the need for the addition of eastbound (off ramp) and westbound (on ramp) ramps

Route 422 and Egypt Road Interchange (Oaks)

- Consider the addition of a park and ride lot. Possible site locations include, but are not limited to:
  - south side of Egypt Road between Route 422 westbound off-ramp and New Mill Road
  - north side of Egypt Road between Route 422 westbound on-ramp and Lower Indian Head Road
- Monitor Egypt Road for widening to four lanes from Route 422 to PA 363
- The eastbound and westbound on-ramps should be monitored for the installation of ramp metering

Route 422 and PA 29 Interchange (Collegeville/Phoenixville)

- Consider the addition of a park and ride lot. Possible site locations include, but are not limited to:
  - inside the eastbound on-ramp jughandle
  - along PA 29 between Route 422 and the proposed Chester-Montgomery Connector

- Monitor the intersections of PA 29 with the Route 422 on and off-ramps for signalization

- The eastbound and westbound on-ramps should be monitored for the installation of ramp metering

- Completion of the Sterling Drug facility includes the construction of an eastbound on-ramp which will facilitate the free flow of traffic by eliminating the current need to turn left from Route 29 onto Route 422

- If future traffic volumes increase beyond projected volumes, investigate the need to redesign the interchange to prevent congestion/back-ups on interchange ramps

Route 422 and Walnut Street Interchange (Royersford)

- The introduction of a park and ride facility in the vicinity of this interchange is being pursued. Possible additional/alternative site locations include:

  - the parking area of the amusement park, southwest of the interchange, if it is redeveloped as a commercial use

- Monitor the ramps for signalization at Walnut Street

- The eastbound and westbound on-ramps should be monitored for the installation of ramp metering

- If future traffic volumes increase beyond projected volumes, investigate the need to redesign the interchange to prevent congestion/back-ups on interchange ramps

Route 422 and Lewis Road Interchange (Limerick/Linfield)

- The newly constructed park and ride lot on Lewis Road should be properly signed, both on Lewis Road and on Route 422

- The intersections of Lewis Road with the on and off-ramps should be monitored for signalization

- The eastbound and westbound on-ramps should be monitored for the installation of ramp metering

- If future traffic volumes increase beyond projected volumes, investigate the need to redesign the interchange to prevent congestion/back-ups on interchange ramps

Route 422 and Township Line Road (Evergreen Road)/Ridge Pike Interchange (Sanatoga)

- Consider the addition of a park and ride facility. One possible site may be the PennDOT maintenance facility, located adjacent to the westbound off-ramp
- Investigate the feasibility of constructing left turn lanes on Township Line Road for vehicles turning onto the eastbound on-ramp or the westbound on-ramp
- Monitor the intersections of Township Line Road with the on and off-ramps for signalization
- Investigate the need to improve signage
- If future traffic volumes increase beyond projected volumes, investigate the need to redesign the interchange to prevent congestion/backups on interchange ramps

Route 422 Interchanges West of Sanatoga Interchange

Although these interchanges have old and possibly outdated designs, and missing movements, the projected traffic volumes and level of service along the western section of Route 422 do not currently warrant the need for changes. However, as development progresses these interchanges should be monitored particularly for safety problems. Once the traffic volumes increase and the level of service deteriorates there may be a need to improve some or all of these interchanges.

PUBLIC TRANSIT

BUS SERVICE

Public transit within the Route 422 Corridor is limited to four SEPTA bus routes and the Pottstown Urban Transit (PUT) System in Pottstown. None of these bus routes travel along Route 422; most travel along Ridge Pike. All of the SEPTA routes service the Norristown Transportation Center, which is a major multi-modal transfer station in the region. The SEPTA routes provide service Monday through Friday from 6:30 a.m. to 8:00 p.m. on an hourly basis. Service is provided on Saturday and Sundays, although the number and frequency of trips is limited. Since bus service is infrequent (approximately every 60 minutes during peak hours) it is not a viable alternative to the automobile for many study area commuters.

The PUT bus routes service the Borough of Pottstown, the Coventry Mall in North Coventry and the areas between Stowe in West Pottsgrove and Saratoga in Lower Pottsgrove.

Capitol Trailways has been providing bus service between Reading and Philadelphia along Route 422 with stops in Pottstown and King of Prussia. The service began in 1990, with seven daily trips, however ridership has been extremely low resulting in the reduction of service to one trip per weekday.

EXISTING PASSENGER RAIL SERVICE

SEPTA operated commuter rail service between Norristown and Pottstown until 1981, when service was retrenched in Norristown and all commuter service on non-electrified rail lines was terminated. Several parties have lobbied at various times since 1981 for reinstatement of commuter rail service in the corridor, but prohibiting costs and increased freight traffic on shared rail lines have discouraged such efforts to date.

FUTURE PASSENGER (RAIL) SERVICE

According to the MCPC, a feasibility study will be conducted to examine the physical, engineering and operating feasibility of a rail line along the Route 422 Corridor. The study will also examine the resumption of service on the existing rail line along the Schuylkill River and the use of buses along Route 422 as an alternative to a Route 422 rail line.

The feasibility study will make future assumptions regarding land use, density and the location of developments. These will be used as inputs into determining if a rail (or bus) line can be successfully operated in the corridor. The feasibility study should begin in early 1993, and is expected to take about 12 to 18 months to complete.

CONCLUSION

The Traffic Impact Analysis has revealed a deterioration in the level of service along Route 422 from Lewis Road east by 2010. Based on current development proposals, the estimated traffic volumes do not warrant a widening of the expressway, however, the analysis does suggest that the increased volumes may negatively impact some of the interchanges. For this reason, it is recommended that the interchange ramps be monitored on a regular basis to identify problem areas. Such mitigation measures as ramp widenings, lengthenings, signalization or metering may be necessary in the future.

The analysis also shows a future demand for park and ride facilities at certain interchanges. These facilities would help reduce traffic volumes, air pollution and fuel consumption.

Although public transit is limited within the study area the opportunity will exist for the use of shuttle buses to and from high density employment and residential centers. This type of service should be required as part of the development review process in all major residential and employment proposals. Additionally, all major proposals should be required to include roadways designed to accommodate buses and bus stops or shelters.

Although traffic volumes along Route 422 and the local network will increase substantially by 2010, the network overall, should be able to handle these increases. However, delays and areas of congestion should be anticipated, especially within interchange areas. If the impacted municipalities incorporate traffic mitigation and demand management measures into their development ordinances, many of these areas of congestion can be eliminated or at least reduced in size.

Projected traffic volumes indicate that the level of service along Route 422 will be severely diminished by 2010. It should be expected that future vehicular speeds may decrease from 50 mph to 30 mph in the future. Building more highway capacity should not be viewed as the ultimate solution to this traffic congestion. The level of service can be improved significantly if opportunities for public transit (bus or rail) existed within the Route 422 Corridor. Municipalities can enhance transit opportunities through their planning efforts. Transit is a viable alternative to traffic congestion within the Route 422 Corridor and should be seriously considered by the public and private sectors. Future development patterns should be designed to encourage mass transit usage rather than automobile usage. The Montgomery County Planning Commission's companion study to the current study will address transit opportunities beyond 2010 (refer to page 6).

IV. POTENTIAL ZONING DEVELOPMENT SCENARIO

The two components of the Market Trends Development Scenario: the Proposed Development Analysis and the Traffic Impact Analysis, are indicators of what the Route 422 Corridor may look like by 2010. However, this development scenario does not directly depict the planning and zoning policies of each municipality. Although the policies of elected officials control the intensity and type of development allowed within their borders it is not clearly visible through the Market Trends Development Scenario. Local policies can vary considerably from one municipality to the next. Additionally, when these individual policies are implemented they collectively have significant corridor-wide ramifications.

The Potential Zoning Development Scenario is designed to identify municipal planning and zoning policies and assess their corridor-wide impacts. This is accomplished by mapping permitted land uses given maximum density and bulk standards within current zoning ordinances. This development scenario carries the analysis a step further by estimating the total population and jobs which would be permitted within the study area based on the permitted land uses.

METHODOLOGY

During the spring of 1991, the zoning maps of the eight municipalities within the Route 422 - Phase II study were plannimetered to determine the total acreage within each zoning district. The intent was to analyze density patterns and to calculate the maximum population and number of jobs that could be supported in each zoning district given current zoning standards. The acreage figures were translated into population and jobs based on gross land use characteristics and the density and bulk standards specific to each zoning district. These numbers were then compared to the population and jobs figures available from the Bureau of the Census, DVRPC's forecasts for the years 1990 and 2010, and information provided by the Montgomery County Board of Assessment Appeals. Appendix D includes the data for each study area municipality.

In three municipalities, Collegeville, Lower Pottsgrove, and Pottstown, floodplains and major streams were excluded from the analysis since they were measurable on the zoning map. Land devoted to major roadways which were shown on the zoning maps were excluded in Collegeville, Pottstown, Trappe and Upper Providence. Additionally, Lower Providence's zoning map was detailed enough to allow the exclusion of all municipal, state and national parks. Whenever possible, only the buildable acreage in each zoning district was calculated. Additionally, the buildable acreage was calculated on all parcels even if they have already been developed. It was not possible to make adjustments for

land that has been developed at densities other than the maximum density permitted in the current zoning ordinances.

The land use characteristics and assumptions which drove the population and jobs figures varied between residentially zoned and non-residentially zoned districts. The assumptions and findings for each municipality are detailed in the worksheets found in Appendix B.

FINDINGS

DENSITY PATTERNS

As Figure IX shows, each zoning district within the study area was mapped by land use type and density. Since the zoning analysis revealed over 60 different zoning districts, it was necessary to make a composite of the districts. The zoning districts were combined into three land use types with three levels of density within each land use, as follows:

		Density	
Land Use	Low	Medium	High
Residential (Dwelling Units/Acre)	Less Than 2.9	3 to 6.9	7 to 23
Retail (Square Feet/Acre)	Less Than 10,000	10,000 to 19,999	Greater Than Equal To 20,000
Office/Industrial (Square Feet/Acre)	Less Than 10,000	10,000 to 19,999	Greater Than Equal To 20,000

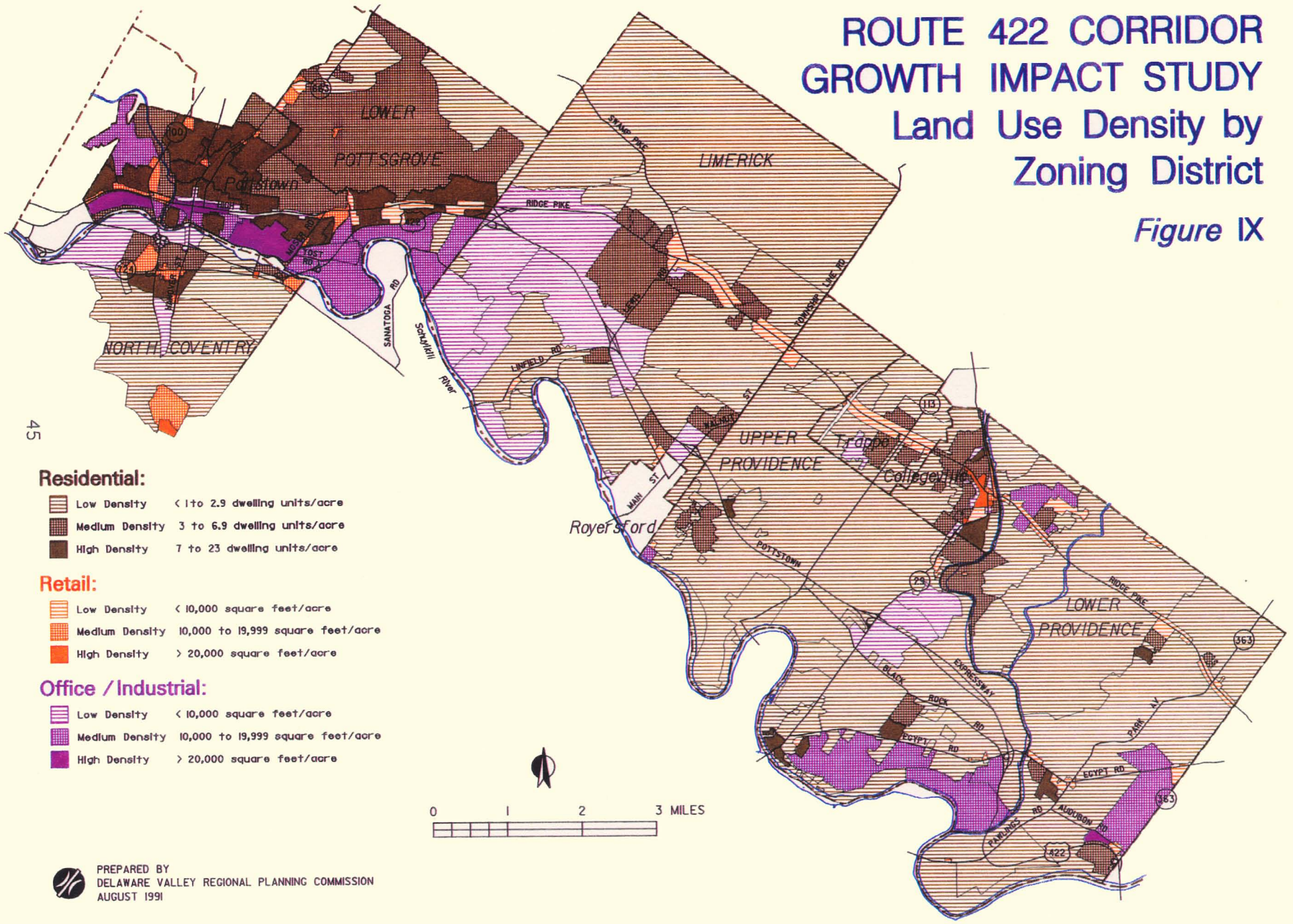
As Figure IX shows, the majority of the residentially zoned land falls within the low density (less than three dwelling units per acre) category. These homes are single-family detached houses on lots of at least one-third of an acre. Lower Pottsgrove and Pottstown are the only municipalities where this type of housing does not predominate.

Most districts zoned for retail uses are strip shopping centers along Ridge Pike that have already been built. Given the quantity of residentially zoned land it is surprising that more land is not zoned for retail uses, especially those of community or regional size. It should be noted that some residentially zoned districts do allow neighborhood shopping centers as a conditional use. These uses do not appear on Figure IX.

There is a sizeable amount of land zoned for office and industrial uses within the study area. Most of this land is zoned for low density (less than 10,000 square feet per acre) business parks which allow a variety of uses. These districts require large set-asides for open space and generous parking (surface lots) standards, with building coverage in the

ROUTE 422 CORRIDOR GROWTH IMPACT STUDY
Land Use Density by Zoning District

Figure IX



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AUGUST 1991

low density category averaging approximately 30%. A disproportionate amount of land in Limerick is zoned for low density office and industrial acres.

Medium density office and industrial zoning districts are located primarily in Upper Providence and Lower Pottsgrove townships. The average building coverage in these districts is approximately 50%.

All of the districts zoned for office and industrial uses are located along major roadways, primarily along Route 422 and its interchanges.

POPULATION ESTIMATES

For all residentially zoned districts, the total buildable acres was based on the assumption that 25% of the total acres would be reserved for infrastructure needs such as roadway and drainage systems. The maximum density, per the municipal zoning ordinance, permitted in each zoning district was then applied to the total buildable acres to get a total number of housing units which could be built within each zoning district. However, in several cases the zoning density varied depending upon whether or not public sewer and/or water facilities were available. If the zoning district lies within a current or future sewer service area (see Figure V, page 21) the density appropriate to this situation was used. If, however, the zoning district does not lie within a future sewer service area the lower density standard found within the ordinance was applied.

The next step required the translation of dwelling units into population. The 1990 Census includes household size by municipality, as shown on Table VIII. These household sizes were applied to the maximum number of dwelling units that could be built in each zoning district. Table IX shows the results of this analysis under the heading, *"Potential Zoning Population."* The table also compares the potential zoning population to the 1990 and 2010 populations for each municipality. As the table shows, the corridor-wide potential zoning population is 91% higher than the 1990 Census and 30% higher than the 2010 forecast. An examination of the individual municipal populations shows the Potential Zoning population to be substantially higher than the 1990 population in most municipalities.

As Table IX and Figure X show, in most municipalities it should be anticipated that the zoning potential population will occur beyond 2010.[3] Given the amount of vacant land in the study area, the market's general ability to absorb a finite number of housing units over a given time period and the fluctuations of the economy it is unlikely that the potential zoning population will occur before 2010.

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[3]The 2010 forecasts will be revised by DVRPC during 1992. Some of the study area forecasts may be higher than the current 2010 forecasts.

TABLE VIII

HOUSEHOLD SIZE BY MUNICIPALITY, 1990

Municipality	Persons Per Household
Collegeville Borough	2.61
Limerick Township	2.84
Lower Pottsgrove Township	2.83
Lower Providence Township	2.75
North Coventry Township	2.71
Pottstown Borough	2.37
Trappe Borough	2.54
Upper Providence Township	2.72
Average	**2.67**

Source: U.S. Bureau of the Census, 1990

Delaware Valley Regional Planning Commission

TABLE IX
ROUTE 422 CORRIDOR GROWTH IMPACT STUDY
ESTIMATED POPULATION
POTENTIAL ZONING, 1990, 2010

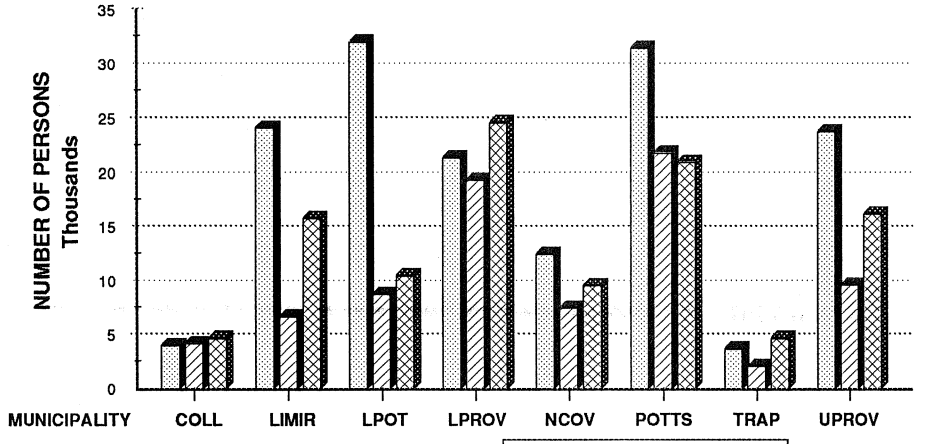
MUNICIPALITY	POTENTIAL ZONING POPULATION (1)	1990 CENSUS	2010 FORECAST	% CHANGE POTENTIAL ZONING VS 1990
Collegeville Borough	4,014	4,227	4,700	-5.04%
Limerick Township	24,086	6,691	15,800	259.98%
Lower Pottsgrove Township	32,036	8,808	10,500	263.71%
Lower Providence Township	21,376	19,351	24,600	10.46%
North Coventry Township (2)	12,493	7,506	9,600	66.44%
Pottstown Borough	31,459	21,831	21,000	44.10%
Trappe Borough	3,703	2,115	4,700	75.08%
Upper Providence Township	23,751	9,682	16,200	145.31%
TOTAL	**152,918**	**80,211**	**107,100**	**90.64%**

Notes: (1) The potential zoning population is based on the maximum permitted density within each zoning district. These standards were applied to the estimated number of developable acres within each zoning district. No differentiation was made between vacant land and land that is already developed. Developed land may or may not be developed at the maximum permissible density.

(2) Only the eastern section of North Coventry Township is included in the zoning analysis, however the 1990 population includes the entire township. The Census does not include multiple census tracts for North Coventry.

Figure X

ROUTE 422 CORRIDOR GROWTH IMPACT STUDY
ESTIMATED POPULATION POTENTIAL ZONING, 1990 and 2010



Source:
DELAWARE VALLEY REGIONAL PLANNING COMMISSION
AUGUST 1991

	TOTAL
POTENTIAL ZONING	152,918
1990	80,211
2010	107,100

Although Table IX shows the maximum population of each municipality based on current zoning densities, it should be noted that the actual potential zoning population, if it were to occur, may be different for several reasons. The actual developable acreage may be less than this analysis assumes since this analysis could not measure certain factors which impact development potential. Many environmental factors limit development potential, such as wetlands and steep slopes. Additionally, limited access to a site may prohibit development at the highest allowable density.

While the potential zoning population reflects maximum allowable densities, many projects will not use the maximum density. Additionally, it is possible that existing developments were not build at the maximum density or that the allowable density at the time of development differed from today.

These factors and others, such as a reduction in household size, may reduce the potential zoning population, however, other forces could actually increase the population. As the marketability of the Route 422 Corridor increases land values will increase. Developers may pressure municipal officials to increase densities to maintain profit levels.

Additionally, new development's demands on municipal services may force municipal officials to institute bonus incentives to obtain funding for new and expanded municipal services and other community amenities. Typical bonus incentives include increasing densities.

Future zoning map amendments may also increase the potential zoning population. Market forces, for example, may pressure municipal officials to rezone agricultural land to allow residential uses of a higher density than currently permitted.

This analysis provides municipal and county officials with an estimate of a community's population if it were "build-out" at the maximum densities permitted within current zoning ordinances. Although the "true" number cannot be calculated, these estimates are an indicator of what each municipality's future could look like. The zoning map, which is a municipality's blueprint for the future, not only reflects future land uses it also shows the community's population potential. Through this population potential, municipalities should have a clearer idea of what municipal services will be required to support the future population.

JOB ESTIMATES

For all commercially and industrially zoned districts the maximum buildable acres was based on the maximum allowable building coverage as specified in each zoning district per each municipal zoning ordinance. The maximum buildable acres was then translated into square feet based on the general rule-of-thumb that one acre yields 10,000 square feet of non-residential space. This standard generally allows sufficient land to meet required parking, loading, setback and open space requirements. The maximum square footage figure was multiplied by the maximum number of allowable floors as specified in the zoning ordinances which led to the total square feet per zoning district.

The next step required the translation of square feet into jobs. Based on the Institute of Transportation Engineers (ITE) and DVRPC studies, office space in southeastern Pennsylvania requires 3.29 jobs per 1,000 square feet and light industrial space requires 2.3 employees per 1,000 square feet.[4] Using these ratios, the analysis showed a low potential zoning scenario of 192,000 jobs and a high potential zoning scenario of 274,000 jobs with the average at 233,000 jobs (refer to Table X).

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[4]ITE, Trip Generation Manual, 4th Edition; and DVRPC, Trip Generation From Suburban Office Buildings in Pennsylvania, May 1990.

As Table X shows, under the average scenario, the potential number of jobs (233,063) is 438% higher than the 1990 estimate of jobs and 235% higher than DVRPC's 2010 forecast of jobs.[5] As Figure XI shows, the potential zoning estimate of jobs is substantially higher than the 1990 estimate of jobs in all eight municipalities. These job estimates reflect the fact that the amount of land zoned for employment-generating uses is quite high.

As Table XI shows, under the potential zoning scenario the study area could support 83 million square feet of non-residential space approximately 24% of the square footage could be supported by Limerick's current zoning standards. By comparison, the eight municipalities currently contain 22.6 million square feet of space with 32% of the existing space located in Pottstown (see Table XI).[6] As a point of reference, Center City Philadelphia has approximately 35 million square feet of office space and the Valley Forge/King of Prussia area has approximately 8 million square feet of office space. By comparison, as Table XI shows, the potential zoning within most of the Route 422 municipalities could support the square footage of space currently found in the Valley Forge/King of Prussia area.

CONCLUSION

Given the development potential allowed under current zoning ordinances it is not likely that build-out at maximum zoning standards will become a reality due to market restraints. However, this analysis has many advantages.

The Potential Zoning Development Scenario is a worse case scenario, showing the land uses and maximum densities that could be built if the market was supportive. Although the maximum densities within each municipality are not likely to occur, it is extremely likely that the maximum densities permitted on specific parcels will occur since the zoning ordinance gives a developer the legal means to do so.

This type of analysis also allows municipal officials to see what neighboring municipalities are doing and what impact their zoning policies will have within their own borders. For example, by concentrating employment-generating developments in one area, it is possible to identify traffic sources and flows. Since traffic crosses municipal boundaries,

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[5]DVRPC will be updating the 2010 job forecasts during 1992, therefore, it is likely that the forecasted numbers will change.

[6]Refer to Appendix C for a break-down of existing non-residential space by land use type within each municipality.

TABLE X

ROUTE 422 CORRIDOR GROWTH IMPACT STUDY

ESTIMATED JOBS: POTENTIAL ZONING, 1990, 2010

MUNICIPALITY	POTENTIAL ZONING (SQ. FT.)	POTENTIAL ZONING JOBS (LOW) (2)	POTENTIAL ZONING JOBS (AVG) (2)	POTENTIAL ZONING JOBS (HIGH) (2)	1990 ESTIMATE OF JOBS (3)	2010 FORECAST OF JOBS	% CHANGE AVG VS 1990
Collegeville	1,553,050	3,572	4,341	5,110	1,985	3,450	118.7%
Limerick	20,347,471	46,799	56,871	66,943	8,146	8,600	598.1%
Lower Pottsgrove	12,336,940	28,375	34,482	40,589	4,121	5,900	736.7%
Lower Providence	8,892,090	20,452	24,853	29,255	8,082	11,500	207.5%
North Coventry (5)	8,567,040	19,704	23,945	28,186	1,210	1,470	1878.9%
Pottstown	16,618,355	38,222	46,448	54,674	14,567	22,700	218.9%
Trappe	1,567,680	3,606	4,382	5,158	1,234	900	255.1%
Upper Providence	3,502,955	31,057	37,741	44,425	3,937	15,100	858.6%
TOTAL	**83,385,581**	**191,787**	**233,063**	**274,339**	**43,282**	**69,620**	**438.5%**

NOTES:
(1) THE POTENTIAL ZONING ESTIMATE OF JOBS IS BASED ON THE MAXIMUM PERMISSIBLE BULK STANDARDS WITHIN EACH ZONING DISTRICT. THESE STANDARDS WERE APPLIED TO THE ESTIMATED NUMBER OF DEVELOPABLE ACRES WITHIN EACH ZONING DISTRICT, HOWEVER, NO DIFFERENTIATION WAS MADE BETWEEN DEVELOPED AND VACANT LAND. DEVELOPED LAND MAY OR MAY NOT BE BUILT AT THE MAXIMUM ALLOWABLE BULK STANDARDS.
(2) THE ESTIMATED NUMBER OF JOBS UNDER POTENTIAL ZONING IS BASED ON A LOW SCENARIO OF 2.3 JOBS/1,000 SQUARE FEET, AN AVERAGE SCENARIO OF 2.795 JOBS PER 1,000 SQUARE FEET AND A HIGH SCENARIO OF 3.29 JOBS/1,000 SQUARE FEET.
(3) THE 1990 ESTIMATE OF JOBS IS BASED ON THE OCCUPATIONAL PRIVILEGE TAX OR THE EARNED INCOME TAX COLLECTED BY THE MUNICIPALITIES, AS REPORTED TO THE PA DCA.
(4) ONLY THE EASTERN SECTION OF NORTH COVENTRY TOWNSHIP IS INCLUDED IN THIS ANALYSIS.

DELAWARE VALLEY REGIONAL PLANNING COMMISSION, AUGUST 1991

Figure XI

ROUTE 422 CORRIDOR GROWTH IMPACT STUDY

ESTIMATED JOBS POTENTIAL ZONING, 1990 and 2010

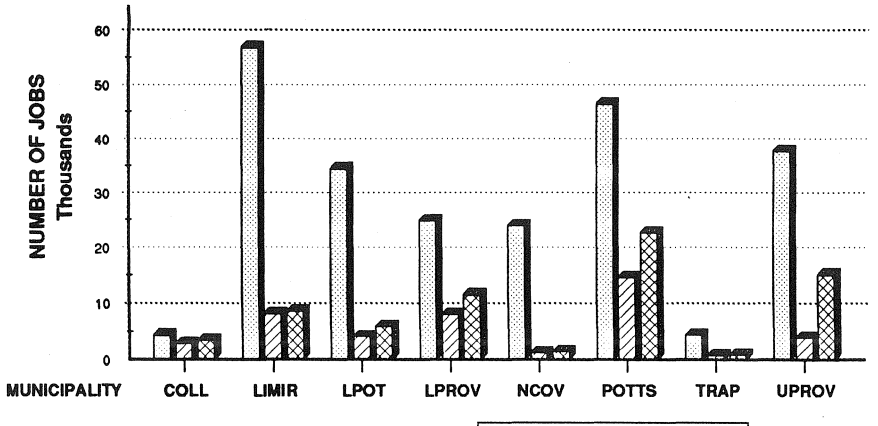

Table XI

ROUTE 422 CORRIDOR GROWTH IMPACT STUDY
COMMERCIAL DEVELOPMENT

MUNICIPALITY	POTENTIAL ZONING SQUARE FEET	EXISTING SPACE SQUARE FEET
Collegeville Borough	1,553,050	586,541
Limerick Township	20,347,471	3,586,368
Lower Pottsgrove Township	12,336,940	3,104,623
Lower Providence Township	8,892,090	3,942,408
North Coventry Township	8,567,040	621,000
Pottstown Borough	16,618,355	7,163,878
Trappe Borough	1,567,680	501,286
Upper Providence Township	13,502,955	3,141,140
TOTAL	83,385,581	22,647,244

Delaware Valley Regional Planning Commission, August 1991

future traffic improvements along municipal and county roads can be identified. This analysis also allows municipalities to anticipate public service needs and infrastructure deficiencies.

The Potential Zoning Development Scenario also shows municipal officials the results of local zoning policies. Although it is unlikely that 83 million square feet of non-residential space will be built in the study area, nevertheless, the potential for a substantial amount of employment-generating development exists. Current zoning policies along the Route 422 Corridor clearly indicate that municipalities want to be "net" importers of jobs.

Given the potential zoning development scenario's population and jobs estimates, the study area could have a jobs to housing ratio of approximately 4:1. This means the Route 422 Corridor will import substantially more employees from outside the study area as compared to those who live within the study area (an *"ideal"* jobs to housing ratio is

approximately 1.5:1).[7] The consequences of this ratio are substantial in terms of traffic generation, parking and the need to provide municipal services for a daytime population that will far exceed the resident population of the study area.

An examination of Figure IX, *"Land Use Density By Zoning District,"* shows that current zoning policies favor low density (less than three dwelling units/acre) single family detached housing. This policy precludes the use of public transit within the study area. The low densities and large lot sizes prevent bus service from being feasible. To operate a viable bus service, one that is convenient and frequent, a minimum population density of approximately seven dwelling units per acre within a quarter-mile is necessary. Additionally, rail service requires greater residential densities of approximately 15 to 20 dwelling units per acre.[8]

The housing units should also be sufficiently clustered to allow a large number of riders to board at a minimum number of bus stops or rail stations to keep travel times within acceptable commuting limits. Although greater densities will increase the number of residents, the viability of bus or rail service may reduce the traffic congestion which will likely be experienced at the lower residential densities. The MCPC's companion study to this study is investigating the type of bus service which will be best for the study area and how future land uses can be designed to encourage the most viable service.

The ramifications of these zoning policies and solutions to the problems they may create clearly need to be studied and solutions put in place prior to the occurrence of a substantial amount of development within the Route 422 Corridor.

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[7]Cervero, Robert, "Jobs/Housing Balance as Public Policy," Urban Land, October 1991, pp. 10-18.

[8]USDOT, Guidelines For Transit-Sensitive Suburban Land Use Design, July 1991.

V. RECOMMENDATIONS

The trends are clear: as both the Market Trends and Potential Zoning Scenarios have shown, the Route 422 study area has become highly desirable for new residential and commercial development. Current proposals alone assure rapid growth along the corridor.

Examining the traffic impact analysis of that future development it is also clear that these developments will have a tremendous impact on the study area roadways, creating additional volume and traffic congestion. Action should be taken now to lessen the impacts of this future growth.

In addition to traffic congestion, new development will have other impacts, although less visual or quantifiable than traffic congestion, but just as important. With new development comes the need for more municipal services such as schools, recreation, or new infrastructure. Through careful planning the services demanded by new residents and employees can be provided. Additionally, if the proper planning tools are in place prior to development many of the negative impacts of intensive development can be avoided or at least lessened in severity.

The purpose of this chapter is to recommend the appropriate planning tools which will accommodate orderly growth and development by linking together sound land use and transportation planning. With the exception of certain of the capital-intensive transportation recommendations found in Chapter III, all of the recommendations in this report are designed to be easily and inexpensively implemented at the municipal and county levels. Most of the recommended planning tools can be implemented through amendments to existing ordinances or through the creation of new ordinances. The major transportation capital improvements require more significant outlays which must be included in future year's budgets.

The following planning tools are designed to assist each municipality in independently managing growth. However, the actions of one municipality will impact the entire corridor, therefore **the most important recommendation within this study is that *the Route 422 municipalities should participate and cooperate in joint planning with each other and the appropriate counties.***

The Pennsylvania Municipalities Planning Code (MPC) grants municipalities the legal authority to form joint municipal planning commissions (P.L.247, article XI) and to participate in joint municipal zoning (P.L.247, article VIII-A). Under the MPC, municipalities

participating in joint municipal planning are granted the same powers as allowed under individual planning and zoning. Since there are numerous municipalities impacted by Route 422 it may be advisable at this time for the municipalities to participate in a more informal cooperative planning and zoning structure, while they explore the concept of a formalized joint planning commission.

It is recommended that an informal committee consisting of representatives from the counties and municipalities be formed to coordinate planning and facilitate an ongoing dialogue of development concerns along the Route 422 Corridor.

This informal committee could meet on a quarterly basis or as needed to discuss major development proposals, transportation problems and any other issues of mutual concern to the Corridor. It is further recommended that the Montgomery County Planning Commission take the lead role in organizing this committee, keeping its momentum going and providing staff, if the need arises. This committee should also act as a liaison between the Corridor municipalities, business associations, such as the Greater Valley Forge TMA, developers and employers, and outside agencies such as PennDOT, SEPTA, and DVRPC.

The primary goal of any joint planning effort should be the development and implementation of a long-range plan for the entire Route 422 Corridor. As mentioned in the Introduction, the Montgomery County Planning Commission (MCPC) is proposing such a plan. The foundation of this plan is transit-sensitive and transit-oriented development. As was demonstrated in earlier chapters of this report, future development will create more traffic on the expressway and local roads. Adding more lanes may help in the short term, but congestion is inevitable. By providing transit service that is convenient, reliable and frequent, automobile trips can be reduced.

The MCPC envisions the establishment of a transit oriented corridor along Route 422, such as the extension of an existing rail line from Norristown along the Route 422 Corridor. An alternative would be a busway or a dedicated bus lane along Route 422, offering frequent service between Norristown and Pottstown. This type of service (bus or rail) would also allow connections to King of Prussia and Philadelphia.

The MCPC's Transit Oriented Corridor would have several distinct "transit activity centers" (TACs), which would be multi-use, pedestrian friendly, compact areas of development. The TACs would each include a transit stop, as well as multiple land uses and park and ride sites, if feasible. By concentrating growth in the transit activity centers, other areas of the municipalities can be developed less intensely or preserved as open space or farmland. The location and design of the TACs would be determined by the joint planning efforts of the impacted municipalities, the county, PennDOT, and the designated transit operator. Transit service should be established in advance of development, to assure early integration of design and use.

The TACs would also encourage non-auto trips by having several land uses in close proximity to one another. These land uses could include medium to high density residential, offices, retail (at a community or neighborhood level), retirement communities, hotels, schools and colleges, hospitals and park and ride sites. Providing a mix of uses within walking distance can help to reduce daytime and after work auto trips.

PLANNING TOOLS

Planning for the future growth and development of the Route 422 Corridor must include a larger, long-range vision, such as the Transit Oriented Corridor plan now being developed by the Montgomery County Planning Commission. A coordinated design for the corridor such as this will ultimately be the best way to manage growth in an orderly and desirable way.

A proposal such as this, however, will take time to fully conceptualize, design and put in place. The municipalities along Route 422 are under pressure today to address the many proposals for development now before them. As detailed in the chapter on market trends, proposals currently before the municipalities include 9,000 new residential units and over 10 million square feet of office or commercial space. While the municipalities work toward a coordinated and integrated long-term plan, they must also plan for and direct short-term growth.

Numerous planning tools exist which can ease the growing pains of suburbanization. These tools do not have to be implemented all at once, nor will all the tools be appropriate for every municipality. These planning tools provide a framework for the municipalities to manage and direct the short-term growth, and set the stage for the implementation of the long-range plan. What follows is a brief description of the planning tools that may be appropriate for the Route 422 Corridor between now and 2010 and recommendations for implementation by municipality. Included is a matrix which shows, by municipality, which tools are in effect now and which ones should be implemented now or in the future as development warrants (see Figure XII).

The brief description of the tools was taken from DVRPC's recently completed report, ***Linking Transportation and Land Use Planning In The Delaware Valley.***[9] Refer to this report for a more complete description of the tools, their legislative basis, and the specific steps necessary to adopt and implement each.

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[9]Delaware Valley Regional Planning Commission, *Linking Transportation and Land Use Planning In The Delaware Valley,* Report No. 91024, July 1991. For a copy of this report, please contact DVRPC at 215-592-1800.

1. COMPREHENSIVE PLAN

The Comprehensive Plan is the fundamental starting point for those communities looking to link the land use and transportation planning functions. The Comprehensive Plan is an opportunity — both as a process and as a product — to examine the existing conditions in a community and to define a series of goals, or directions, for where the community wishes to go. The comprehensive planning process should precede the other planning approaches which follow in this chapter because it is the Comprehensive Plan which can help to define where a community is headed; the other planning techniques are the implementing tools used to achieve that direction.

The Comprehensive Plan has also become of increasing importance in Pennsylvania as a legally-required prerequisite for the use of many of the other tools. The legislature has recognized the value of the comprehensive planning process and the benefits which that process can bring, as well as the importance of the Comprehensive Plan as a necessary foundation for the use of certain other planning tools.

On paper, the Comprehensive Plan is a "blueprint for the future" which specifies the amount, density and distribution of different land uses; infrastructure such as utilities and community facilities; parks and open spaces; the transportation and circulation systems; and the other physical, social and economic elements which comprise a community.

The Comprehensive Plan is an opportunity to establish those policies which link transportation and land use, such as utilizing major transportation routes as a tool to help influence development patterns or planning for higher density land uses along public transportation corridors. A policy to promote a mixture of land uses at public transportation facilities such as bus stops, transit centers, rail stations or park-and-ride lots will provide more efficient usage of the transportation network. A policy to develop land use patterns that facilitate multi-purpose trips by providing a mix of uses will help to minimize the number and length of vehicle trips. These goals can be achieved for the Route 422 municipalities by coordinating their comprehensive plans to promote the land use patterns necessary to support a transit oriented corridor and transit activity centers.

The process of preparing a Comprehensive Plan is also important as an opportunity for citizen participation and empowerment and for intergovernmental cooperation and coordination. The goals and objectives defined in a Comprehensive Plan should reflect a collective vision of the future. The process of preparing the Comprehensive Plan should therefore include the active solicitation of the residents of that community through surveys, public hearings and town meetings. While differences of opinion and priorities will emerge, issues of consensus will also emerge and the public will be part of the process to define their future. The comprehensive planning process is also an opportunity to improve the linkages among levels of government. A municipality which coordinates its plan with county, regional and state plans will be in a better position to capitalize on the investments and programs of these different agencies.

Recommendation: *Review and revise existing Comprehensive Plan.*

Although all of the study area municipalities have comprehensive plans, most are more than five years old and therefore should be thoroughly reviewed and revised as needed. All Comprehensive Plans, at a minimum, should include the following elements: land use plan, circulation plan (including public transit), capital facilities plan and recreation plan. Additionally, all Comprehensive Plans should be coordinated and in agreement with the municipal Act 537 Plan (Pennsylvania Sewage Facilities Act) which provides for the planning and regulation of local sewage systems. All Comprehensive Plans must be adopted by the governing body since many of the tools which can implement the goals and objectives of the Comprehensive Plan require an adopted plan before they can be implemented.

Individual comprehensive plans should be coordinated among municipalities to assure a consistent vision for the corridor. Once a joint planning effort is underway, a regional Comprehensive Plan should be adopted by the impacted municipalities which governs growth and development along the Route 422 Corridor.

Although all of the municipalities have a Comprehensive Plan, most may be out-of-date or are missing key elements:

- Collegeville
  Plan adopted 1972; amended 1991 to include Route 29 Right-of-Way study, no other revisions or additions were made; Plan should be further updated and adopted.

- Limerick
  Plan adopted 1972; updates: Land Use-1989; Parks and Open Space-1991; Township is in process of updating other elements. These elements should be incorporated into a new plan for adoption.

- Lower Pottsgrove
  Plan adopted 1982; Plan should be updated and adopted.

- Lower Providence
  Plan adopted 1971; Plan updated 1981 but not adopted; All elements of plan should be updated and adopted.

- North Coventry
  Plan adopted 1989; includes all necessary elements.

- Pottstown
  Plan adopted 1986; Plan should be updated with particular emphasis on identifying redevelopment opportunities.

- Trappe
  Plan adopted 1971; Plan should be updated and adopted.

- Upper Providence
  Plan adopted 1983 and includes more recent amendments; All plan elements should be reviewed and updated if necessary.

2. ZONING ORDINANCE AND MAP

Zoning is perhaps the single most important tool for local land use regulation. Originally conceived as a way to segregate the location of noxious industrial uses from the residential areas where people live, zoning has grown into a sophisticated and complex means to regulate the physical character of a community. Through zoning regulations, municipalities are able to regulate not only the specific use to which land is devoted, but the size, bulk and density of buildings, the mix of different uses, the amount of open space preserved, and controls on off-street loading and off-street parking. The establishment of zoning regulations will also have a direct relation to the transportation network of a community, because it is the distribution and density of land uses which generates the travel demands on the transportation system. By carefully considering the transportation impacts of the zoning designations, a community may actually be able to improve traffic flow, reduce congestion and save the costs associated with new road construction.

In recent years, innovations in zoning techniques have been used, and successfully defended from legal challenges, in many areas of the country. These innovations have allowed municipalities to develop strict performance standards for uses in manufacturing or industrial zones, including limits on noise, dust, light and glare, and fencing or buffering requirements. Zoning innovations for linking transportation to land use include the use of bonus or incentive zoning, whereby density bonuses may be granted for developer improvements such as a transit center, operating an employee shuttle service, or locating adjacent to a regional rail station. An overlay zone or a special district may be created at an intersection or around a rail station, to allow more intense and efficient use of land, a unique mix of uses, or to require the provision of certain amenities. Planned unit development (PUD) zoning is used to encourage coordinated development of larger tracts of land while permitting more creativity and flexibility.

Zoning may also be used to protect sensitive environmental characteristics, including floodplains, steep slopes, streams or significant habitat areas. Zoning may even be used to protect historic structures or to preserve unique neighborhood character. Such techniques as the Transfer of Development Rights (TDR) and Land Preservation are particularly effective.

The Transfer of Development Rights (TDR), as authorized by the Municipalities Code (P.L. 247, Article VI) allows a developer to purchase the development rights from a landowner

FIGURE XII

ROUTE 422 CORRIDOR GROWTH IMPACT STUDY

IMPLEMENTATION OF RECOMMENDED MUNICIPAL LAND USE AND TRANSPORTATION PLANNING TOOLS

	PLANNING TOOLS	COLLE.	LIMER.	LPOTT.	LPROV.	NCOV.	POTTS.	TRAPPE	UPROV.
1.	Comprehensive Plan	O	◊	◊	◊	O	◊	◊	◊
2.	Zoning Ordinance and Map	◊	◊	◊	◊	◊	◊	◊	◊
3.	Site Design Standards	◊	◊	◊	◊	◊	◊	◊	◊
4.	Official Map	●	●	●	●	●	◊	●	●
5.	Capital Improvement Program	●	●	●	●	●	●	●	●
6.	Traffic Impact Analysis	◊	◊	◊	◊	◊	◊	◊	◊
7.	Impact Fee Ordinance	X	●	●	O	X	X	X	●
8.	Highway Access Management Plan	●	●	●	●	X	X	X	●
9.	Trip Reduction Ordinance	X	■	X	■	X	X	X	●
10.	Adequate Public Facilities	X	●	■	X	■	X	X	●

KEY:

Currently in place	O
Review or update existing document	◊
Implement now	●
Implement as development warrants	■
Not necessary at this time	X

Delaware Valley Regional Planning Commission, March 1992

whose property lies within an area of a municipality where development is not allowed or severely restricted. These development rights may be transferred into a developable area within the same municipality and used to create a higher density development. The use of TDRs is useful in that it allows compensation to a landowner whose development rights are restricted and allows higher density development in areas where such development would be more appropriate. The use of TDRs also helps to preserve farmland or open space and discourages development in areas without the appropriate infrastructure. The Pennsylvania General Assembly is currently considering a bill (S.973) which would allow the use of TDRs from one municipality to another if the two municipalities have a joint municipal zoning ordinance.

Another zoning technique that is effective in preserving open space and sensitive natural areas is the Land Preservation District (LPD). The LPD was developed by the MCPC in 1989 as an alternative to standard residential lotting. Although similar in concept to "cluster" zoning, the LPD goes further by emphasizing community open space goals and using design techniques which preserve greater amounts of contiguous open space while allowing residential development in the form of small, compact neighborhoods.

Recommendation: *Periodically review existing ordinance and map.*

All of the study area municipalities have zoning ordinances and maps which have been updated since Route 422 was completed in 1985. However, these documents should be continuously reviewed and updated if necessary to make sure the latest and most applicable zoning techniques are in use to ensure sound planning and development within each municipality. The zoning ordinance should mirror the goals of the comprehensive plan and be used to guide growth in the form envisioned in the comprehensive plan. Once a joint municipal comprehensive plan has been developed for the Route 422 Corridor, a joint municipal zoning ordinance and map should also be adopted.

3. SITE DESIGN STANDARDS

Municipal planning authority allows local governments to define not only the permitted use and density of new development, but to also set standards that regulate the general design and layout of that development. By preparing and adopting site design standards within a subdivision ordinance, a community is able to build further on the general vision of the Comprehensive Plan, the permitted uses of the Zoning Ordinance, and the desired streets identified on the Official Map. Site design standards provide the specific guidance for the layout and construction of new developments in accordance with these other policies.

Site design standards may apply to both residential and non-residential developments. For those communities seeking to integrate transportation considerations into the land use planning process, site design standards can provide guidance for:

- The layout and arrangement of streets within the development.
- The design and capacity of streets, including the ability to accommodate mass transit vehicles (such as buses and vans).
- The placement of buildings within a development and in relation to the streets, for pedestrian, vehicular, and transit access.
- The amount and location of parking within a development.
- Pedestrian circulation, bikeways, and transit facilities such as bus stops or shelters.

Recommendation: *Adopt site design standards as part of the subdivision ordinance which integrate transportation needs into land use planning.*

All of the study municipalities have site design standards within their zoning ordinances or subdivision ordinances. However, the standards concerning transportation needs rarely specify more than a minimum number of parking spaces and parking sizes. The site design standards could also establish a maximum number of parking spaces and eliminate free parking in certain areas to encourage public transit usage and ridesharing. The site design standards relating to transportation should be updated to include detailed standards on the internal circulation system of a proposed development. At a minimum these standards should specify street layout and require accommodation of buses or vans.

4. OFFICIAL MAP

The Official Map is an important mechanism which can be used to begin to turn the vision and goals of the Comprehensive Plan into reality. An "Official Map" is not just any map adopted by a local government. It is not a zoning map, a street map or a map from the Comprehensive Plan. Instead, the Official Map has a very specific meaning and function which relates to all of these other planning documents.

An Official Map can be used as a tool to implement the transportation network and circulation systems and public/community facilities elements as identified in the Comprehensive Plan. It follows logically in a community's approach to creating a planning function to manage growth and to link transportation needs with land use planning. The Official Map adds more specificity to the broader outline of the Comprehensive Plan and, perhaps more importantly, provides a recognized legal basis to implement the goals of the Comprehensive Plan in a specific, concrete way.

Essentially, an Official Map is an ordinance, in map form, adopted by a municipality or a county (the municipal Official Map supersedes the county's Official Map), which can designate the existing and proposed location for public streets, watercourses, flood control areas or other public areas for that county or municipality. The Official Map can include all, or only a part of the county or municipality. By identifying proposed streets and other public areas on an Official Map, the governing body announces its intention to use these areas for public purposes. The map is "official" in that it is adopted by

ordinance following prescribed public notice and review procedures. Once adopted, the Official Map gives notice to property owners of the governing body's intentions. It does not, in and of itself, serve to acquire the land for public purposes nor does it constitute the opening or establishment of any street. The MPC requires a municipality to purchase or otherwise acquire the designated property through a donation or negotiated settlement within one year of the property owner notifying the municipality of his intent to subdivide or develop the property.

An Official Map can be as comprehensive or as site-specific as the needs of a community at that time. The Official Map could identify and designate the entire existing and proposed roadway network, including widenings, narrowings, extensions, diminutions, or closings. Alternatively, the Official Map could designate a single intersection, reserve a right-of-way along a single road for future widening, identify the route for a new roadway to link already existing roads, or preserve the right-of-way for the transit corridor. An Official Map can follow from a Comprehensive Plan which comprehensively assesses the entire transportation, open space and natural resource network of a community, or it can follow from a local area study which examines only a single issue or problem. However it is used, the Official Map is an important, relatively simple and flexible planning implementation tool.

Recommendation: *All municipalities should adopt an official map, as soon as possible.*

Most municipalities with an official map only specify future rights-of-way on their maps. As explained earlier the Official Map must include more if it is to be an effective planning tool. Additionally, the Official Map must be adopted to make it a legal document. Although the Official Map does not have to include the entire municipality, it should include all of the Route 422 interchange areas and major new roadway needs:

- Collegeville
  Borough should adopt an Official Map which applies to the Route 29 Corridor.

- Limerick
  Township should adopt an Official Map which applies to the three Route 422 interchange areas.

- Lower Pottsgrove
  Township should adopt an Official Map which applies to the area(s) of the Township subject to the proposed Impact Fee Ordinance.

- Lower Providence
  Township does not have an adopted Official Map. However, Township does have a map which specifies ultimate rights-of-way and road classifications. This map should be updated and expanded to include all transportation and community

facilities necessary to support development within the Egypt Road interchange area and along Route 363. This map should be adopted by the governing body.

- North Coventry
  Township should adopt an Official Map which applies to the Route 100 Corridor.

- Pottstown
  Official Map is extremely old (date not available); has legal standing but applies to alleys only.

- Trappe
  Borough does not have an Official Map; the Borough's zoning map specifies rights-of-way on all public streets. The Borough should adopt an Official Map which applies to the developable areas along Main Street and Route 113.

- Upper Providence
  The Township has adopted an ultimate right-of-way map. This map should be amended to include all transportation and community facilities necessary to support development within the Route 29 interchange area and the Egypt Road interchange area.

All of the municipalities should also work closely with Montgomery County to identify a preferred route for the proposed transit corridor and preserve a right-of-way, where needed, on each municipal official map.

5. CAPITAL IMPROVEMENT PROGRAM

The process of moving from a conceptual idea for a capital improvement to the actual physical construction will often take several years and may involve decisions and actions by local, county, regional, state and federal agencies. Those communities which have clearly analyzed and identified their needs and priorities will fare better in this decision-making process than those which have not. While the Comprehensive Planning process is the preferred way to define priorities and proposed improvements, the Capital Improvement Program (CIP) is the method to translate those goals into a specific and achievable timeframe.

The CIP is a plan for capital improvements to be incurred each year over a fixed period of years. It sets forth the specific projects and other contemplated expenditures in which the local government is to have a part and specifies the resources available to finance the projected expenditures on an annual and total basis.

The time period for the CIP may vary from one to 20 years, but most are prepared for a five to 10-year period. The projects and budget commitment for the next fiscal year is called the capital budget, which will become a part of the legally-adopted annual operating

budget. The projects and proposed budgets for subsequent years are reviewed and adjusted annually, depending on priority needs and financial conditions, to be incorporated into the operating budgets of subsequent years.

The CIP is thus both firm enough to provide a realistic framework for fiscal planning, yet flexible enough to respond to changing conditions or to incorporate essential projects which could not be predicted in advance.

A carefully considered CIP can provide a number of important benefits for a community:

1. Ensures that plans for capital projects and improvements are implemented.
2. Allows proposed improvements to be tested against funding and land use policies.
3. Improves the scheduling of multi-year projects.
4. Provides an opportunity to predict needs and acquire land before costs rise.
5. Establishes a system for long-range financial planning and management.
6. Tax rates may be stabilized by predicting debt needs.
7. Avoids miscommunication and misscheduling of projects among agencies.
8. Offers an opportunity for public participation.
9. Contributes to better management and coordination among levels of government.

Recommendation: *Adopt a Capital Improvement Program, as soon as possible.*

Although some municipalities include a capital facilities element in their comprehensive plans and all have an annual capital budget, these do not serve as a true Capital Improvements Program (CIP). As explained earlier, the CIP must be more than a conceptual plan of desired capital improvements and it must plan beyond the next year. The CIP must be adopted by the governing body before an impact fee ordinance can be adopted.

6. TRAFFIC IMPACT ANALYSIS

A traffic impact analysis undertaken during the subdivision or site plan review stage of a development application will assist a community to understand the demands that a proposed development will place on the area's transportation network and the resulting changes in level of service or congestion which might be expected. A well-considered traffic impact study includes sufficient information to enable a staff reviewer or a planning board member to understand the traffic impact of a proposed development and to determine what must be done to accommodate that proposal. These studies are essential elements and necessary prerequisites for the use of such other tools as an Adequate Public Facilities Ordinance, Trip Reduction Ordinance, or Impact Fees.

At a minimum, a traffic impact analysis study predicts the future volume of traffic a proposed project design will place on the existing transportation network. With this information, the planning board, municipality, or county may choose to approve or deny the project application. However, the methodology available for traffic impact analysis enables these studies to do much more. Alternative future transportation system scenarios can be explored to reflect the uncertainty of future investments and capital improvements. The study can examine the potential impacts of a project using a different land use mix or site design assumptions. And, perhaps most importantly, the impact analysis can test the results of undertaking a variety of different mitigation measures to reduce or eliminate the projected impacts.

Because a traffic impact analysis study can range from the relatively simple to the highly complex (and expensive), it is important for a community to develop guidelines to establish when and what type of traffic analysis is appropriate. For example, a project of three or four residential units will create a traffic impact too negligible to be measured, but one of three or four hundred will be a very different story. A commercial or industrial project can be expected to present different traffic patterns from a residential project. Impacts will also vary depending on where a project is located, whether it is in an area of excess capacity or existing congestion. Therefore, guidelines should define what type of study to do based on the traffic characteristics (e.g., such as 100 new trips generated during the peak hour traffic), the size of the project (e.g., 50 residential units or 50,000 square feet of commercial space), the location relative to the road network (e.g., adjacent to a major arterial, minor arterial or subcollector), or some combination of the three factors.

Also, while a well-considered study can serve to generate useful and accurate information for decision-making, a study which utilizes a different methodology or different assumptions will certainly generate very different results. It is therefore equally critical for a community to adopt and understand a single approved methodology and assumptions for traffic impact analyses within that community. The use of a professional traffic engineer can assist in the review of the studies.

Recommendation: *All municipalities should perform traffic impact studies on most proposed developments.*

The study area municipalities require some type of traffic study for most major developments. However, it is recommended that each municipality establish specific guidelines and one methodology to enable more detailed traffic impact analyses to be made. The municipalities should also coordinate their methodologies with the other communities of the corridor, to assure a common approach.

As this study's Traffic Analysis has demonstrated the proposed developments in the study area will significantly increase overall traffic volumes and lead to a deterioration in the level of service in many areas. Although many of the smaller residential developments

individually do not generate large volumes of traffic, collectively they will significantly impact the local road network.

Additionally, this tool must be in place to adopt adequate public facilities, trip reduction and impact fee ordinances.

7. IMPACT FEES

Planning and designing the transportation improvements and other infrastructure necessary to serve new development in a community is accomplished through many of the approaches already discussed, including the Comprehensive Plan, Capital Improvement Program and Traffic Impact Analysis. Impact fees are an important tool used throughout the country, and available for communities in Pennsylvania, to help pay for these transportation improvements.

Through the subdivision and site plan review process, it is typical for a developer to provide the necessary infrastructure on the site which is needed to serve that development. For undeveloped areas, this may include a street system, curbs and sidewalks, water supply and sewage disposal systems, utilities and storm water management provisions. In certain areas utility lines or water and sewer lines may already be in place, but whatever is needed on site will generally be provided by the developer.

Many developments, however, place demands on the services and physical infrastructure of a community beyond the boundary of that development. For example, although sewer lines may be provided on-site, the development's flow affects the capacity of the municipal sewage treatment plant. The development creates additional demands for police and fire services, and school seats. And, although an internal road network may be provided, a large project will generate additional traffic on the surrounding road network or place additional demands on the mass transit system.

It was these concerns about off-site impacts and the costs associated with providing the additional services or increasing the capacity of infrastructure systems which have led many communities to adopt impact fee requirements, whereby new developments pay a fee, calculated based on the size of the development, specifically for providing the off-site improvements generated by that project. While communities elsewhere in the country have developed impact fee programs to pay for such elements as affordable housing, parks and recreation facilities, day care services and libraries, in this region impact fees are used primarily for off-site transportation and water and sewer improvements.

Impact fees have been used, sometimes abused, and the subject of a number of legal challenges in the Delaware Valley region. As a result of recent judicial decisions, Act 209 was recently enacted in Pennsylvania, to provide better guidance than before for communities seeking to adopt an impact fee program which is legally defensible.

Impact fees have generally been defined by the courts as single payments required of developers as a condition of approval, to be used by localities to pay the development's proportionate share of the cost of off-site public services or facilities necessitated by new development. These fees are differentiated from taxes, which are collected and spent as part of the general fund; impact fees are collected into a separate account and used only for the previously identified improvements. Impact fees also differ from taxes in that impact fees are calculated based on the proportionate cost to mitigate the identified impacts, rather than the assessed value of the property or improvements. Impact fees are based on the estimated cost of the necessary improvements, and proposed developments should be required to pay no more than their "fair share" of the cost.

In order for an impact fee program to be constitutionally valid, it must meet certain defined criteria:

1. The fee should be reasonably related to the benefits provided to the development by the off-site improvements.
2. The fee cannot exceed the development's proportionate share of the cost of the improvements necessitated by new development.
3. There must be a reasonable relationship, or "nexus," between the impacts of the development and the required improvements.

In order to adopt an impact fee program, a municipality must meet a certain number of conditions and have completed a number of steps. In addition to the adoption of a transportation capital improvement program and an identified transportation service area, a municipality must have adopted either a municipal or county comprehensive plan, subdivision and land development ordinance, and a zoning ordinance. The municipality must then:

1. Appoint an impact fee advisory committee of seven to 15 members, including not less than 40% representation of the real estate and building industries.
2. Define a service area and prepare land use assumptions for growth over at least the next five years.
3. Conduct a roadway sufficiency analysis which examines existing deficiencies and defines preferred levels of future service for all roads subject to impact fees. This analysis must include projected traffic volumes separated into pass-through trips and those trips generated by new development, and the required road improvements needed to bring the existing level of service up to the preferred levels.

Recommendation: *The following municipalities should immediately undertake the steps necessary to adopt an Impact Free Ordinance within the following specified service areas:*

- Limerick Township
  - Lewis Road interchange area

- Walnut Street interchange area

- Lower Pottsgrove Township
  - Township has begun process and Impact Fee Advisory Committee is recommending the area between Township Line Road, Route 422, Porter Road and the Schuylkill River as the service area.

- Lower Providence Township
  - Township adopted an Impact Fee Ordinance in December 1991. Two Transportation Service Areas have been designated:

    1. Central section of Township; between Park Avenue and Skippack Creek.
    2. Western section of Township; adjacent to Perkiomen Creek.

- Upper Providence Township
  - Route 29 interchange area
  - Egypt Road interchange area

8. HIGHWAY ACCESS MANAGEMENT PLAN

Intensive growth and development within the Delaware Valley region has led to severe traffic congestion along many segments of the regional highway system. In addition to the time delays motorists experience, the traffic congestion hinders the region's economy and increases air pollution. Limited financial resources, a lack of land and environmental constraints prohibit the expansion of the regional highway network in many areas. Even if the highway network is expanded, the congestion problem may not be abated since increased development is attracted to the easily accessible locations brought about by new or improved highways.

Part of the solution to the traffic congestion problem in this region must be to better utilize the existing highway network and to change motorists driving habits. Techniques associated with Trip Reduction Ordinances (discussed on page 75) are one means to influence travel demand. Another approach is the use of a Highway Access Management Plan.

Through access management, the existing roadway network can be more efficiently and safely utilized. Access management is a simple, but effective tool which regulates the number and type of access points allowed on a roadway resulting in an improved level of service for motorists. Careful access planning can prevent or eliminate many of the major points of traffic congestion within the region.

Traditional land use planning has given little attention to the impact that the development of abutting properties has on the roadway. However, rapid development has already

resulted in the deterioration of the level of service on most major roadways. The states, counties and municipalities can no longer segregate land use planning from access planning.

A sound highway access management strategy is one that is incorporated into the entire land use planning process. All levels of government should have an Access Management Plan which applies to the roads within their jurisdiction. The Access Management Plan should carefully consider the functional design and purpose of the roadway. For example, state highways are designed primarily to carry high-speed, through traffic. Therefore, access to abutting properties should be subordinate to the free flow of traffic in the Access Management Plan.

Although PennDot requires access permits onto roads under their jurisdiction, little attention has been paid to the overall impact numerous access points have on the roadway. While local and state regulations may dictate spacing requirements and engineering standards for driveways, intersecting roads and traffic signals, the permit applications are generally reviewed on a case-by-case basis with little consideration given to the overall impact the new access point will have on the flow of traffic or safety. Additionally, the current review process rarely considers the use of alternative roads for access.

At the county level, the county Access Management Plan should consider sub-regional or intra-county travel. That is, the plan should examine an access point's impact on travel from one county road to another. County roads should provide access to major land uses along abutting properties, however reverse frontage, service roads and shared-driveways should be required for minor land uses and most adjacent land uses, where feasible.

At the local level, the Access Management Plan should be adopted through ordinance by the municipality and incorporated into the site plan and subdivision review process. All traffic impact studies should address the Access Management Plan in detail, and the findings should be compared to the goals and objectives of the municipal Comprehensive Plan.

PennDOT, the county, the municipality and the developers must be willing to cooperate with one another. An access review process must be established to discuss access alternatives before local approvals are granted. By incorporating the goals and objectives of the state, county, and municipal Access Management Plans into the early stages of the local development review process, sound access management can be incorporated into plans prior to the expenditure of a significant amount of time and money by the developer.

Recommendation: *PennDOT should develop a state-wide Access Management Plan to facilitate coordinated development at the local level and Access Management Plans should be designed for the following roads:*

- Collegeville
  - Route 29

- Limerick
  - Lewis Road
  - Linfield Road
  - Ridge Pike
  - Township Line Road (Lower Pottsgrove border)
  - Township Line Road (Upper Providence border)

- Lower Pottsgrove
  - High Street
  - Township Line Road (Limerick border)

- Lower Providence
  - Egypt Road
  - Ridge Pike
  - Route 363

- Upper Providence
  - Ridge Pike
  - Route 29
  - Route 113
  - Black Rock Road
  - Egypt Road
  - Lewis Road
  - Township Line Road

9. TRIP REDUCTION ORDINANCE

Methods to improve the level of service on the road network by reducing the number of cars on the road can be equally effective at improving traffic flow and improving congested conditions as roadway widenings or other methods which increase capacity. These methods operate by enticing people out of their cars through voluntary, incentive, or mandatory programs which in turn may encourage ridesharing, vanpools or increased usage of mass transit. These transportation demand strategies should be an integral component of a comprehensive program to link transportation and land use planning.

Simply, transportation demand strategies seek to reduce the demand on the system by changing people's behavior. Demand management strategies typically include a set of

incentives intended to induce people, particularly commuters, out of their cars and into an alternative transportation mode or service. By reducing the number of cars on the road (the demand), traffic conditions have a better chance at operating within the capacity of the roadway system (the supply).

Transportation demand management (TDM), was borne of the recognition that the funding and land available for capital improvements programs were not limitless and that it could be possible to improve roadway conditions by maximizing the use of existing facilities. Beginning as voluntary programs by large employers or developers, the concept of transportation demand management has been expanded through Transportation Management Associations, which aggregate the employers and developers of an area to pool their resources and programs. As municipalities — faced with traffic and congestion problems — negotiated with developers for ways to reduce the traffic generated by projects, incentives began to appear. For example, the amount of required parking could be reduced if the project provided a program to reduce automobile use. More recently, a number of municipalities throughout the country have adopted local ordinances which mandate transportation demand programs.

These local ordinances, known as Trip Reduction Ordinances, have been used most frequently in California and most recently in New Jersey. The advantages of a trip reduction ordinance over voluntary Transportation Management Associations or negotiated project-by-project agreements are several:

1. The ordinance will typically cover the entire municipality, rather than a given project or smaller area, and thus achieve more results;
2. The burden is spread more equitably among existing and future developments and the ordinance provides clear goals and uniformity for all parties; and
3. The ordinance may be less vulnerable to legal challenges than conditions imposed on individual development approvals.

A Trip Reduction Ordinance can apply in only part of a municipality such as the central business district or commercial area, over the entire municipal area, or even as a multi-jurisdictional program, such as the six-city joint powers authority recently formed to oversee the implementation of ordinances in San Mateo County, near San Francisco.

Ordinances may apply only to new and existing employers; to new and existing employers and new developments; or to new developments and substantial expansions of existing structures. Existing residential developments are generally not subject to the trip reduction ordinances, although some ordinances apply to new residential projects over a minimum number of units. The scope of coverage of the ordinances will generally depend on the objectives of the program. For example, if the objective is to reduce the traffic impact of new development, only those would be subject to the ordinance. However, if the goal is to improve overall traffic conditions, the ordinance should apply

to both new and existing employers. There should also be thresholds or different requirements for small versus large developments.

Recommendation: *The following municipalities should implement a Trip Reduction Ordinance which applies to all new developments which will generate a significant amount of traffic during peak hours. The threshold at which the ordinance becomes effective should be determined by the impacted municipality. For some municipalities the ordinance will not be necessary until warranted by future development. Once adopted, the conditions of the ordinance must be met prior to the issuance of a Certificate of Occupancy.*

- Limerick - Implement as new development warrants
- Lower Providence - Implement as new development warrants
- Upper Providence - Implement immediately; should apply to all businesses located within the Route 29 interchange

10. ADEQUATE PUBLIC FACILITIES ORDINANCE

It is a well-accepted tenet among planners at all levels of government that new development should only proceed in those areas where the infrastructure necessary to support that development is, or soon will be, in place. This notion is often referred to by planners as "concurrency." Such basic elements as roadway access, utility lines, water supply and a means of sewage disposal are necessary prerequisites for almost any form of commercial or industrial development. In addition, residential projects will likely require such elements as parks and public schools. This infrastructure or services should be in place at the time of development or be established "concurrent" with the new development.

As self-evident as this principle may appear, however, it is sometimes the case where new development occurs or is approved in areas without the necessary public infrastructure to support that development over time. Or, as may be more likely in the Delaware Valley region, new development may take place in areas where the existing infrastructure is already at or near its capacity limit, and is thus unable to support the additional demands created by the new development.

In areas where the rate of growth has exceeded the ability of local government to provide the necessary infrastructure, problems of congestion and overcrowding have resulted. To address these problems and provide a closer match between growth and infrastructure, governments in certain areas of the country have devised and adopted an *Adequate Public Facilities Ordinance (APF).* Once in effect, an adequate public facilities ordinance would prohibit development in areas where the existing infrastructure was at

or near capacity. Developers would be required to improve the infrastructure beyond the scope of their development.

The APF also serves to channel new growth into areas where sufficient infrastructure does exist. In Montgomery County, Maryland, for example, development targets, based on the existing infrastructure, are established for many areas within the county. Once the target is reached, no new development can take place. New growth, therefore is encouraged to occur in those areas which have not met their targets since they have the infrastructure available.

Adequate Public Facilities Ordinances currently have no legal standing in Pennsylvania. Pennsylvania impact fee legislation does give municipalities the power to hold developers responsible for limited infrastructure improvements outside their development. However, these improvements are limited to those necessary as a result of the developers proposal only. Unlike the APF Ordinance, the impact fee legislation does not require developers to correct existing problems. It appears an APF Ordinance would require state enabling legislation before it could be implemented.

Although there is no state enabling legislation for an APF Ordinance, its use is recommended in this report as a viable planning tool for integrating transportation and land use planning. Although this tool cannot be implemented immediately, perhaps within the timeframe of this study's recommendations the legal means for implementing this tool will exist, therefore it should be considered for future use.

Recommendation: *The following municipalities should adopt an Adequate Public Facility Ordinance if the legal means to do so exists:*

- Limerick - Implement immediately (if legal means existed) since sewage treatment capacity is inadequate to service all currently proposed developments
- Lower Pottsgrove - Implement when development warrants since public water distribution system is poor
- North Coventry - Implement when development warrants since excess sewage treatment capacity is marginal
- Upper Providence - Implement immediately (if legal means existed) since sewage treatment capacity is inadequate to service all currently proposed developments

SUMMARY

The ten planning tools presented in this report are methods that the Route 422 municipalities can use now to better integrate transportation and land use planning. These tools range from widely known and applied approaches such as zoning ordinances

to the little known techniques which are now emerging, such as trip reduction ordinances or highway access management plans. Most of these methods are currently available to municipalities in the region and, when utilized as part of a comprehensive planning approach, can yield positive benefits.

While municipalities are encouraged to apply as many of these techniques as applicable in their communities, it is absolutely essential to incorporate at least several of these tools at a minimum. A well-considered Comprehensive Plan with a transportation and circulation element is the essential first step. The Route 422 municipalities should work towards a cooperative plan for the corridor by coordinating their planning to assure a unified vision of the future. From there, each municipality can update or revise their Zoning Ordinance to be consistent with the plan and used, together with site design standards, to implement the specific land use goals of the Comprehensive Plan. Another essential element to implement the goals of the Plan is the use of a Capital Improvement Program to identify a specific timetable and funding source for the recommended improvements. From this basis, a municipality would be ready to use such other tools as an official map or impact fees.

This report has identified the land use and transportation management tools which should be implemented within each municipality. Although some of these tools have not been tested in Pennsylvania, they are successfully in use in other states. In FY1993 (July 1, 1992 through June 30, 1993) the DVRPC Work Program will include two studies which examine the implementation and use of the above recommended planning tools.[10] The case studies, which will result from these projects, will be particularly useful to the Route 422 study area municipalities in actually implementing the recommended land use and transportation management tools in this report.

While the recommendations presented in this report focus on land use and transportation management tools, it is important to note that the expected development along the Route 422 Corridor will also affect a number of other important issues which the municipalities must also address. As development increases, the agricultural lands and natural open spaces will come under increasing development pressures. The municipalities should establish agricultural and open space land preservation programs as soon as possible. The preservation of these lands should be incorporated into municipal comprehensive plans and zoning ordinances. Concentrating new development in the transit activity centers and adopting a Transfer of Development Rights (TDR) program will be an effective means to preserve farmland and open space.

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[10]Project #25-100-93: Land Use Implementation Mechanisms and Project #25-103-93: Demonstration of Land Use Transportation Linkage Techniques (as adopted by DVRPC Board of Commissioners, February 27, 1992).

The issue of housing affordability will also become important as the corridor develops. Development pressures will increase land values and force housing prices to rise above their currently affordable levels. If the Route 422 Corridor is to attract employment-generating development, an ample supply of affordable housing must exist within the Corridor. Municipalities can encourage the construction of affordable units by increasing densities through developer incentive programs, by keeping administrative and regulatory costs and approval times to a minimum and by encouraging a diverse mix of housing types. A recent DVRPC report, ***Building The Dream: Solutions For Affordable Homeownership,*** provides recommendations for municipalities to assure housing affordability.[11]

These issues, as well as others, must be integrated into the development goals, objectives and policies of each municipality and county along with the recommended land use and transportation management tools.

ADDITIONAL RECOMMENDATIONS

1. *Form a Transportation Management Association (TMA)*

   As more large developments are built in the study area a TMA should be formed to assist large employers to develop transportation demand management programs to lessen the severity of increased commuter traffic. The Route 422 municipalities and the counties should actively encourage this type of private sector participation as an effective (and inexpensive) means of managing traffic problems. The Greater Valley Forge TMA has already begun work in the eastern section of the Route 422 Corridor.

2. *Revise and Update County Comprehensive Plans*

   Pennsylvania counties are now required to prepare and adopt Comprehensive Plans. The Comprehensive Plans in Chester and Montgomery counties should be reviewed and updated, as soon as possible. At a minimum, the revised plans must include a land use and transportation element. It is further recommended that the counties treat the Route 422 Corridor as a subregion within their boundaries and devise goals, objectives and policies specific to this Corridor. The implementation of the MCPC's long-range transit plan will require the adoption of a joint municipal and county Comprehensive Plan.

3. *Revise and Update County Capital Improvement Program*

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[11]DVRPC, *Building The Dream: Solutions For Affordable Homeownership,* Report No. 91029, July 1991. For a copy of this report, please contact DVRPC at 215-592-1800.

Montgomery and Chester counties should prepare an annual Capital Improvement Program with a five or six-year horizon. The counties should request input from the municipalities into the preparation of the CIP. The CIP should include a plan specific to the Route 422 Corridor.

4. *Pennsylvania Department of Transportation should work with the Route 422 municipalities and counties to achieve the provisions of the Clean Air Act.*

   The Clean Air Act requires increases in vehicle occupancy by 25% over the regional average for employers of 100 or more employees. PennDOT should utilize the planning tools in this report to achieve this reduction, especially in high growth areas such as the Route 422 Corridor. Additionally, the relationship between various land use patterns and air quality should be examined. In particular the implementation of an Access Management Plan for state roads should be considered.

5. *SEPTA should work with the Route 422 municipalities to encourage mass transit in the Corridor at the present time, until a dedicated transit corridor can be established.*

   Although current densities prohibit rail or bus service through the Corridor, proposed development does warrant an examination of the feasibility of operating SEPTA's #200-series bus service within the Corridor. SEPTA's 200-series provides bus service for reverse commuters in Fort Washington and Great Valley. This service transports employees from suburban rail stations to employment centers. This type of service could pick-up employees in King of Prussia and transport them to the pharmaceutical companies within the Route 29 interchange area and other large employment centers, as development warrants (the Route 422 interchanges in Limerick may be future sites of potential service).

CONCLUSION

Most of the above recommendations are designed to be easily implemented at the local level either immediately or over time as development warrants. The implementation of these recommendations will result in solutions that will have different effects in each municipality and may or may not impact (positively or negatively) the Route 422 Corridor as a whole. In order to most appropriately plan for the positive growth and development of the Route 422 Corridor a joint planning effort must take place.

As noted in the beginning of this chapter, the most important recommendation of this report is that the Route 422 municipalities and the counties implement a joint planning effort that results in a long-range plan for the entire Corridor. The purpose of this joint planning effort would be to promote integrated and cohesive land use and transportation planning along the entire Route 422 Corridor. The Montgomery County Planning Commission's proposed Transit Activity Centers (TACs) are one approach to accomplish

this goal by concentrating growth in designated areas in densities which are sufficient to promote mass transit (rail or bus).

The TACs, as envisioned by the MCPC, would include a mix of land uses that would be conducive to mass transit and pedestrians. These uses would include multiple types of housing units at medium to high densities. Those areas outside the TACs would include low density housing areas where the rural character of the landscape would be preserved through such techniques as low density zoning, the Land Preservation District, and the Transfer of Development Rights.

The TACs would also include concentrations of employment, such as office parks and light industrial uses, such as flex space. Heavier industrial uses and uses involving substantial truck traffic, such as warehouses, would be located outside the TACs, but along the Route 422 Corridor.

The TACs would also include those retail uses that would be demanded by the TAC residents and employees. The circulation systems of the TACs would foster non-automobile trips by providing for such things as clear, direct and short paths for walkers and bikers. This would allow residents and employees of the TACs to take care of their retail needs within the TAC and without the use of an automobile. Auto oriented retail uses, such as auto dealers, would be located outside the TACs.

Although the MCPC Plan envisions the TACs as having the most intensive land uses within the Route 422 Corridor, the plan also foresees a continued mix of uses in the villages and Boroughs along the Corridor and along Ridge Pike/Main Street. These areas would have smaller scale retail uses, such as those found at the neighborhood scale or specialty retail uses. The Villages and Boroughs would also continue to have limited office uses and a mix of residential uses.

A transit conducive corridor along the Route 422 Corridor would help to eliminate the anticipated congestion and pollution problems that new development will bring about. Additionally, a concentration of uses at medium densities will help to preserve natural open spaces throughout the Corridor and result in a more efficient use of the existing and future infrastructure.

This type of long-range plan, however, will not become reality without the active support and commitment of the municipalities. All decision-makers along the Corridor must actively promote and support the TAC Plan; governing bodies must be willing to adopt the tools necessary to implement a joint planning effort. These tools, at a minimum, include a coordinated comprehensive plan and zoning ordinances. This type of project will require careful research and planning before it can be implemented.

While this research is underway, the planning tools recommended in this report should be implemented at the appropriate time to alleviate some of the current and anticipated

growth pressures within the Corridor. The use of these planning tools and the other report recommendations will put the impacted municipalities and counties in a better position to implement the MCPC's Transit Oriented Plan or another coordinated plan once the appropriate research and agreements have taken place.

Sound planning within the Route 422 Corridor must include ongoing cooperation among many different groups. If orderly growth and development (as opposed to the more typical suburban sprawl) is to take place, cooperative planning at all levels of the public and private sectors must take place, together with the use of the planning tools identified in this chapter. The recommendations in this report need to be implemented prior to intensive development, in order to be effective and to mitigate any potential negative effects of that development. If the recommended actions are in place at the appropriate time, the Route 422 Corridor can successfully become a regional subcenter without encountering the land use and transportation problems which have occurred in other suburbanizing areas in the region.

Successful planning along the Route 422 Corridor can only take place if all public and private interests continually communicate and cooperate with one another. The impacts of individual actions will be felt corridor-wide; therefore the Route 422 Corridor must be viewed as a single entity with all parties working together towards a common goal: integrated inter-municipal land use and transportation planning.

APPENDIX A
US ROUTE 422 EXPRESSWAY
CORRIDOR IMPACT STUDY
PHASE I
JUNE 1990
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APPENDIX B
PROPOSED DEVELOPMENT INVENTORY
BY MUNICIPALITY

The following tables provide an inventory of all proposed, conceptual and rumored developments within each study area municipality. The inventories were obtained from municipal representatives and the records of the Montgomery County Planning Commission.

The inventory was completed in August 1991. Due to the continuously changing nature of this information, it is possible that some of the development proposals have been dropped or changed substantially. Although each one of these projects may not be built as proposed (or built at all) they are a good indicator of the type of development that the Route 422 Corridor attracts and what the Corridor may look like by 2010.

The last row on each municipal table, % of Total, indicates the percent of **all study area** proposals which are proposed within each municipality. All of the proposals listed on the inventories are mapped on Figure II, on page 11.

ROUTE 422 GROWTH IMPACT STUDY
PROPOSED DEVELOPMENT INVENTORY
COLLEGEVILLE BOROUGH

MAP #	NAME	SFD	TH	MF	OTHER	TOTAL	OFF	RE	IND	INST	OTHER	TOTAL	NOTES
		(Dwelling Units)					(Square Feet)						
1	Collegeville S.C.					0		20,000				20,000	EXPANSION/ACME
2	Glenwood Commons		26			26						0	
3	Glenwood Terrace	10				10						0	
4	TJ Cope-Marketplace					0	18,000	143,960				161,960	
5	Collegeville Crossing	204				204						0	
6	Collegeville Glen	74				74						0	
7	Collegeville Park		80			80						0	
8	Collegeville Green		71			71						0	
	SUBTOTAL	288	177	0	0	465	18,000	163,960	0	0	0	181,960	
	% of subtotal	61.9%	38.1%	0.0%	0.0%	100.0%	9.9%	90.1%	0.0%	0.0%	0.0%	100.0%	
% OF TOTAL		8.1%	4.5%	0.0%	0.0%	5.2%	0.6%	7.7%	0.0%	0.0%	0.0%	1.8%	

KEY: SFD=single family detached housing; TH=townhouse/twins; MF=multi-family garden apartments; OFF=office; RE=retail; IND=industrial; INST=institutional

SOURCE: Delaware Valley Regional Planning Commission, August 1991

ROUTE 422 GROWTH IMPACT STUDY
PROPOSED DEVELOPMENT INVENTORY
LIMERICK TOWNSHIP

MAP #	NAME	SFD	TH	MF	OTHER	TOTAL	OFF	RE	IND	INST	OTHER	TOTAL	NOTES
		(Dwelling Units)					(Square Feet)						
1	Royersford Village Clusters		700			700						0	
2	Abbey Downs	194				194						0	
3	Aronimink		84			84						0	
4	The Hamlet	120	168	143		431						0	Mixed du types
5	Golf Club Estates		414	198		612	155,000					155,000	
6	Chapel Heights	81				81						0	
7	Glen at Greenfields	41				41						0	
8	Fox Ridge		133	80		213		55,000				55,000	
9	Fair Crest Farms	85				85						0	
10	Heather Glen	275				275						0	
11	Cutler Twins		132			132						0	
12	Conti Townhouses		89			89						0	
13	Gambone		75			75		58,000				58,000	
14	Shoppes at Abbey Downs					0		33,000				33,000	
15	Windon Development					0	200,000	100,000				300,000	
16	Callahan-The Meadows	53				53						0	
17	Linfield Corp. Ctr.*					0	990,000		990,000			1,980,000	Estimate
18	Hughs-Loew -Limerick Village					0		125,000				125,000	
19	Vesterra-Limerick Town Ctr.					0		197,000				197,000	
20	Waltz Golf Farm		61	64		125						0	18-hole Golf
21	Golf Course-Kempnor Inc.					0						0	LLI District
22	Linfield Woods		97			97						0	
23	Possum Hollow Ind. Park*					0			60,000			60,000	Estimate
24	Ridge Pike Center					0	21,500	28,500				50,000	
25	Twin County Apts.			56		56						0	Add'l. du in Royersford
26	Montgomery Brooke		200	200		400						0	Under Const. & Built
	SUBTOTAL	849	2,153	741	0	3,743	1,366,500	596,500	1,050,000	0	0	3,013,000	
	% OF SUBTOTAL	22.7%	57.5%	19.8%	0.0%	100.0%	45.4%	19.8%	34.8%	0.0%	0.0%	100.0%	
% OF TOTAL		23.9%	54.8%	52.3%	0.0%	41.5%	47.5%	28.2%	32.3%	0.0%	0.0%	29.5%	

KEY: SFD=single family detached housing; TH=townhouse/twins; MF=multi-family garden apartments; OFF=office; RE=retail; IND=industrial; INST=institutional

* The developer of this project has not submitted a plan which includes square feet. This estimate of square feet is based on the known acreage (200 ac) and the current zoning ordinance.

SOURCE: Delaware Valley Regional Planning Commission, August 1991

ROUTE 422 GROWTH IMPACT STUDY
PROPOSED DEVELOPMENT INVENTORY
LOWER POTTSGROVE

MAP #	NAME	SFD	TH	MF	OTHER	TOTAL	OFF	RE	IND	INST	OTHER	TOTAL	NOTES
		(Dwelling Units)					(Square Feet)						
1	Sprogel Run Woods	42				42						0	
2	Norton Way	100				100						0	
3	Valley Green	131				131						0	
4	Brook Rd. Assoc.	20				20						0	
5	Pleasantview Est. I	90				90						0	
6	Pleasantview Est. II	80				80						0	
7	Rosedale Ests.	15				15						0	
8	Maple Ridge			114		114						0	
9	Maple Glen		138			138						0	
10	Sanatoga Ridge		60	20		80						0	Elderly units
11	Southview	22				22						0	
12	Sanatoga Commons					0	14,000					14,000	
13	Sanatoga Commons II	54				54						0	
14	Dinnocenti Nursing Home				120	120						0	Beds
15	Riverview *					0			105,000			105,000	Estimate
16	Brookside	79				79						0	
	SUBTOTAL	633	198	134	120	1,085	14,000	0	105,000	0	0	119,000	
	% of SUBTOTAL	58.3%	18.2%	12.4%	11.1%	100.0%	11.8%	0.0%	88.2%	0.0%	0.0%	100.0%	
% OF TOTAL		17.8%	5.0%	9.4%	100.0%	12.0%	0.5%	0.0%	3.2%	0.0%	0.0%	1.2%	

KEY: SFD=single family detached housing; TH=townhouse/twins; MF=multi-family garden apartments; OFF=office; RE=retail; IND=industrial; INST=institutional

* The developer of this project has not submitted a plan which includes square feet. This estimate of square feet is based on the estimated number of lots and the current zoning ordinance.

SOURCE: Delaware Valley Regional Planning Commission, August 1991

ROUTE 422 GROWTH IMPACT STUDY
PROPOSED DEVELOPMENT INVENTORY
LOWER PROVIDENCE TOWNSHIP

MAP #	NAME	SFD	SFA	MF	OTHER	TOTAL	OFF	RE	IND	INST	OTHER	TOTAL
		(Dwelling Units)					(Square Feet)					
1	Windsong Meadow	5	174			179						0
2	Stillmeadow	35				35						0
3	Crestwood	63				63						0
4	Runnymeade	97				97						0
5	Arrowhead	58				58						0
6	Providence Properties	53				53						0
7	Heyser Estates	36				36						0
8	Estates of Audubon	117				117						0
9	Casselberry Farm	32				32						0
10	Audubon Vill. S.C.					0		81,985				81,985
11	The Highlands					0	356,100	165,000			45,000	566,100
12	PJM Control Ctr.					0	32,400					32,400
13	Seton Center					0	75,550					75,550
14	Stonebridge Village			303		303						0
15	Audubon Square S.C.					0		89,280				89,280
16	Audubon Professional					0	12,160					12,160
17	Eisenhower Bldg.					0	35,600					35,600
18	Audubon Business Center					0	49,000					49,000
19	Trooper Bldg.					0	100,655					100,655
20	Providence Crossing	152				152						0
21	Moister Tract	46				46						0
22	Audubon Hunt	32				32						0
	SUBTOTAL	726	174	303	0	1,203	661,465	336,265	0	0	45,000	1,042,730
	% OF SUBTOTAL	60.3%	14.5%	25.2%	0.0%	100.0%	63.4%	32.2%	0.0%	0.0%	4.3%	100.0%
% OF TOTAL		20.4%	4.4%	21.4%	0.0%	13.3%	23.0%	15.9%	0.0%	0.0%	2.4%	10.2%

KEY: SFD=single family detached housing; TH=townhouse/twins; MF=multi-family garden apartments; OFF=office; RE=retail; IND=industrial; INST=institutional

SOURCE: Delaware Valley Regional Planning Commission, August 1991

ROUTE 422 GROWTH IMPACT STUDY
PROPOSED DEVELOPMENT INVENTORY
NORTH COVENTRY TOWNSHIP

MAP #	NAME	SFD	TH	MF	OTHER	TOTAL (Dwelling Units)	OFF	RE	IND	INST	OTHER	TOTAL (Square Feet)	NOTES

N O P R O P O S E D D E V E L O P M E N T

KEY: SFD=single family detached housing; TH=townhouse/twins; MF=multi-family garden apartments; OFF=office; RE=retail; IND=industrial; INST=institutional

SOURCE: Delaware Valley Regional Planning Commission, August 1991

ROUTE 422 GROWTH IMPACT STUDY
PROPOSED DEVELOPMENT INVENTORY
POTTSTOWN BOROUGH

MAP #	NAME	SFD	TH	MF	OTHER	TOTAL	OFF	RE	IND	INST	OTHER	TOTAL	NOTES
		(Dwelling Units)					(Square Feet)						
1	Montgomery County Comm. Coll.					0				48,640		48,640	College
2	Prince Tucker Assoc.					0	70,000				70,000	140,000	Office & Retail
3	81 Robinson St. Assoc.						24,000					24,000	
4	Mercury Bldg.									50,176		50,176	Newspaper
	SUBTOTAL	0	0	0	0	0	94,000	0	0	98,816	70,000	262,816	
	% of SUBTOTAL	0.0%	0.0%	0.0%	0.0%	0.0%	35.8%	0.0%	0.0%	37.6%	26.6%	100.0%	
% OF TOTAL		0.0%	0.0%	0.0%	0.0%	0.0%	3.3%	0.0%	0.0%	100.0%	3.7%	2.6%	

KEY: SFD=single family detached housing; TH=townhouse/twins; MF=multi-family garden apartments; OFF=office; RE=retail; IND=industrial; INST=institutional

SOURCE: Delaware Valley Regional Planning Commission, August 1991

ROUTE 422 GROWTH IMPACT STUDY
PROPOSED DEVELOPMENT INVENTORY
TRAPPE BOROUGH

MAP #	NAME	SFD	TH	MF	OTHER	TOTAL	OFF	RE	IND	INST	OTHER	TOTAL	NOTES
		(Dwelling Units)					(Square Feet)						
1	Univest					0					3,000	3,000	Bank
2	Knickerbocker					0	34,000					34,000	
3	RAF Properties	25				25						0	
4	Trappe Meadows	71				71						0	
5	Unknown			240		240						0	
	SUBTOTAL	96	0	240	0	336	34,000	0	0	0	3,000	37,000	
	% of SUBTOTAL	28.6%	0.0%	71.4%	0.0%	100.0%	91.9%	0.0%	0.0%	0.0%	8.1%	100.0%	
% OF TOTAL		2.7%	0.0%	16.9%	0.0%	3.7%	1.2%	0.0%	0.0%	0.0%	0.2%	0.4%	

KEY: SFD=single family detached housing; TH=townhouse/twins; MF=multi-family garden apartments; OFF=office; RE=retail; IND=industrial; INST=institutional

SOURCE: Delaware Valley Regional Planning Commission, August 1991

ROUTE 422 GROWTH IMPACT STUDY
PROPOSED DEVELOPMENT INVENTORY
UPPER PROVIDENCE TOWNSHIP

MAP #	NAME	SFD	TH	MF	OTHER	TOTAL	OFF	RE	IND	INST	OTHER	TOTAL	NOTES
		(Dwelling Units)					(Square Feet)						
1	Smith Kline Beecham					0	250,000					250,000	
2	Neilsen-422 Bus. Ctr.					0		500,000	1,000,000			1,500,000	Flex
	& Marketplace					0							
3	Rorer Pharm.					0					875,000	875,000	HQ & Lab
4	Sterling Drug					0					886,000	886,000	HQ & Lab
5	Nolen Group*					0	440,000	220,000				660,000	Estimate
6	Perkiomen Woods		458			458						0	
7	Oak Crest Village		68			68						0	
8	Pin Oaks II & III	99				99						0	
9	Ramsgate	87				87						0	
10	Heritage Hills		341			341						0	
11	RCS/Thomas Tract	56				56						0	
12	Country Roads	69				69						0	
13	Providence Quarters	65				65						0	
14	Green Trees	97				97						0	
15	Scarlet Oak Estates	41				41						0	
16	Linpro-Laurel Estates,	61				61						0	
	Meadows & Woods												
17	Spring Meadow Homes	43				43						0	
18	Weatherlea I & II	118				118						0	
19	Old Mill Estates II	46				46						0	
20	Upper Providence Ind. Pk.*					0			800,000			800,000	Estimate
21	Acorn-Oak Corp. Ctr.*					0			300,000			300,000	
22	Walmart/Sam's*					0		300,000				300,000	Estimate
23	Anderson Farm*	180	360			540						0	18-Hole Golf/Estimate
												0	
	SUBTOTAL	962	1,227	0	0	2,189	690,000	1,020,000	2,100,000	0	1,761,000	5,571,000	
	% OF SUBTOTAL	43.9%	56.1%	0.0%	0.0%	100.0%	12.4%	18.3%	37.7%	0.0%	31.6%	100.0%	
% OF TOTAL		27.1%	31.2%	0.0%	0.0%	24.3%	24.0%	48.2%	64.5%	0.0%	93.7%	54.5%	

KEY: SFD=single family detached housing; TH=townhouse/twins; MF=multi-family garden apartments; OFF=office; RE=retail; IND=industrial; INST=institutional

* The developer of these developments has not submitted plans which include square feet. The square feet are estimates based on total acres.

SOURCE: Delaware Valley Regional Planning Commission, August 1991

APPENDIX C
LEVEL OF SERVICE CRITERIA
FREEWAYS

LEVEL OF SERVICE A - Free flow operation with average travel speeds near 60 mph or more on freeways with a design speed of 70 mph. Vehicles are almost completely unimpeded in their ability to maneuver within the traffic stream. The effects of minor incidents or breakdowns are easily absorbed at this level.

LEVEL OF SERVICE B - Reasonably free flow conditions where speeds of over 57 mph are maintained on freeways with a design speed of 70 mph. The ability to maneuver within the traffic stream is only slightly restricted. The effects of minor incidents and breakdowns are still easily absorbed, though local deterioration in service would be more severe than for level of service A.

LEVEL OF SERVICE C - Stable operations, but flows approach the range in which small increases in traffic volumes will cause substantial deterioration in service. Average travel speeds are still over 54 mph. Freedom to maneuver within the traffic stream is noticeably restricted at level of service C, and lane changes require additional care and vigilance by the driver. Minor incidents may still be absorbed, but the local deterioration in service will be substantial.

LEVEL OF SERVICE D - Borders on unstable flow, in this range small increases in flow cause substantial deterioration in service. Average travel speeds of 46 mph or more can still be maintained on freeways with 70 mph design speeds. Freedom to maneuver within the traffic stream is severely limited. Even minor incidents can be expected to create substantial queuing, because the traffic stream has little space to absorb disruptions.

LEVEL OF SERVICE E - The boundary between level of service D and level of service E describes operation at capacity. Operations in this level are extremely unstable, because there are virtually no usable gaps in the traffic stream. Any disruption to the traffic stream, such as a vehicle entering from a ramp, or a vehicle changing lanes, causes following vehicles to give way to admit the vehicle. This condition establishes a disruption wave which propagates through the upstream traffic flow. Average travel speeds at capacity are approximately 30 mph.

LEVEL OF SERVICE F - Describes forced or breakdown flow, generally exists within queues forming behind breakdown points. Breakdowns occur for a number of reasons: traffic incidents cause a temporary reduction in capacity, at recurring points of congestion such as merge or weaving areas, or when traffic flow exceeds capacity.