Transportation Planning for a High Technology Corridor in Suburban Philadelphia

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ABSTRACT

A study of the new and growing high technology firms in the corridor between West Chester and Willow Grove, Pennsylvania, was conducted to develop an understanding of the locational criteria of these firms and to recommend short-range transportation improvements. Through these improvements, "high technology" firms will be encouraged to remain and expand at their current sites and the area will continue to appear attractive to new or existing firms seeking sites. The study recommendations were based on a survey of high technology and nonhigh technology firms in the corridor, and on field observations of highway problem areas identified by survey respondents. Among the findings of the survey: (a) few firms considered Center City Philadelphia as a possible location; most restricted their search to suburban sites; (b) ownership (or rental) costs, existing residence of the professional/managerial staff and the physical environment are the most important criteria for locating in the corridor; (c) access to Philadelphia International Airport is much more important to high technology firms than others and therefore interest in the completion of the rehabilitation of major access facilities is keen; and (d) the quality of airport limousine service is a concern, and many want mass transit and special transportation services improved. In a strategic plan for transportation, 12 policies have been developed that emphasize the need for increased maintenance of the transportation system, additional low cost roadway improvements, improved transit and paratransit services, and better accessibility to airports.

The Delaware Valley has long enjoyed a reputation for having outstanding centers of higher education, a well-educated and trained work force, and a pleasant quality of life. These characteristics have contributed to the startup of many technology-oriented, industrial, and business activities in the region. The emergence and special needs of those technology-based firms along US-202 and the Pennslyvania Turnpike in Chester and Montgomery counties were the subject of a special study conducted by the Delaware Valley Regional Planning Commission (DVRPC). The recommendations were intended to advance high technology business within this corridor and thus provide greater employment opportunities in the region. The corridor is located within the Delaware Valley region shown in Figure 1.

DEFINITION

Technology-oriented, technology-based, advanced technology, or high technology firms are those that have a high rate of change in processes and products and a research and development orientation. Industries such as computers, laser electronics, robotics, and biomedical equipment are examples. These firms may be characterized by their systematic use of recent scientific discoveries and knowledge and their output of high-value products. Transportation costs are typically a small portion of total production costs. The rationale for their locational decisions has not been well documented.

For analytical purposes of this study, technology-based firms have been defined by a series of Standard Industrial Code (SIC) categories. This classification is currently used by the Pennsylvania Department of Commerce.

STUDY OBJECTIVES

The literature has suggested that high technology firms require specialized transportation services and infrastructure, and value accessibility to residential areas and amenities attractive to a highly trained work force. These firms also may be able to substitute telecommunication systems for travel needs and improve communications. Because technology-based industries appear to be different from traditional firms, an understanding of the firms' operations and goals was a prerequisite for proposing modifications to the transportation system. Because a primary emphasis of this study was to identify existing and future deficiencies in the highway and transit system, it was recognized that transportation requirements must be put into perspective. Therefore, objectives of the study included obtaining a better understanding of (a) the location criteria of high technology firms in the corridor; (b) the advantages and disadvantages of the corridor as a location for high technology firms; (c) perceived problems and obstacles for future expansion of business activities and economic growth within the corridor; and (d) differences between high technology and other firms, especially with regard to transportation needs.

The transportation improvement recommendations that resulted from this study were to the ultimate purpose of stimulating the growth of jobs in the corridor through the retention of present firms and the attraction of new firms. It is in the region's best interest to develop advanced technology in the region. Not only are jobs created by the expanding high technology firms, but productivity will be improved in the region's industries that buy high-technology products, improving their ability to compete and protecting the jobs of those in nonhigh

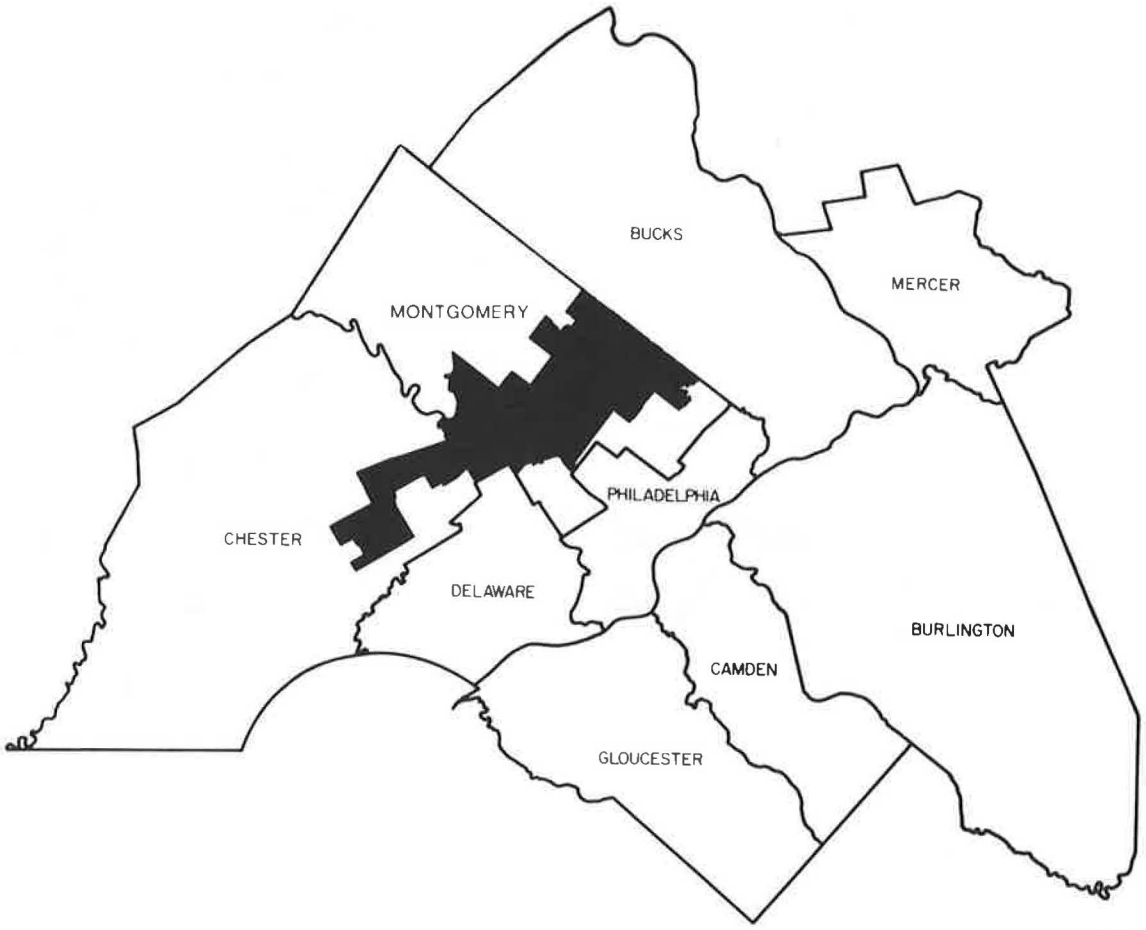


FIGURE 1 Study area within region.

technology industries. There is, in other words, a multiplier effect of establishing high technology jobs. In this way, the firms now sprouting in the US-202/Turnpike corridor can help to slow the decline of traditional manufacturing in the older areas of the region.

STUDY AREA

In cooperation with planning officials in Chester and Montgomery counties, the limits of the study area were defined. Figure 2 shows those municipalities that were included. The corridor is broader in Montgomery County because of the greater number of firms and their tendency to locate along both US-202 and the Pennsylvania Turnpike, which diverge east of King of Prussia. The firms in the corridor in Chester County are fewer and tend to be located near US-202 only.

The study area was composed of 24 municipalities that included 213 mi^2 lying between 10 and 25 mi from City Hall in Philadelphia. The total population of these minor civil divisions was 327,000 in the 1980 Census. Preliminary projections for the study area indicate the year 2000 population will be about 350,000, about 7 percent more than 1980.

In summary, the study area is a large, partly developed and affluent section of the region, which by plan and by trend should continue to grow between now and the end of the century.

HIGH TECHNOLOGY IN PERSPECTIVE

According to a study by the Massachusetts Division of Employment Security (1), there were 208,000 jobs in high technology firms in early 1981 throughout the Commonwealth of Pennsylvania. This amounted to about 4 percent of the estimated 5,500,000 jobs in all fields. DVRPC estimates that 43,000 of the current 210,000 jobs in the study area are with high technology firms, about 20 percent. So the "density" of high technology jobs is five times greater in the corridor than in the state as a whole. Also, one out of five high technology jobs in Pennsylvania is located in the corridor. No attempt was made to determine if other high concentrations of high technology jobs exist within the Pennsylvania portion of the region.

An economist with the Federal Reserve Bank in Philadelphia suggested that growth in jobs with high technology firms in the 1980s may not be more than 1 million nationwide (2). If Pennsylvania succeeds in keeping up with the national rate, about 40,000 of those jobs would be located in the Commonwealth, and if the corridor maintains its share of state jobs, 8,000 would be located in the study area.

STUDY APPROACH

A three-phased approach was used to accomplish the study objectives. In the first phase of the project,

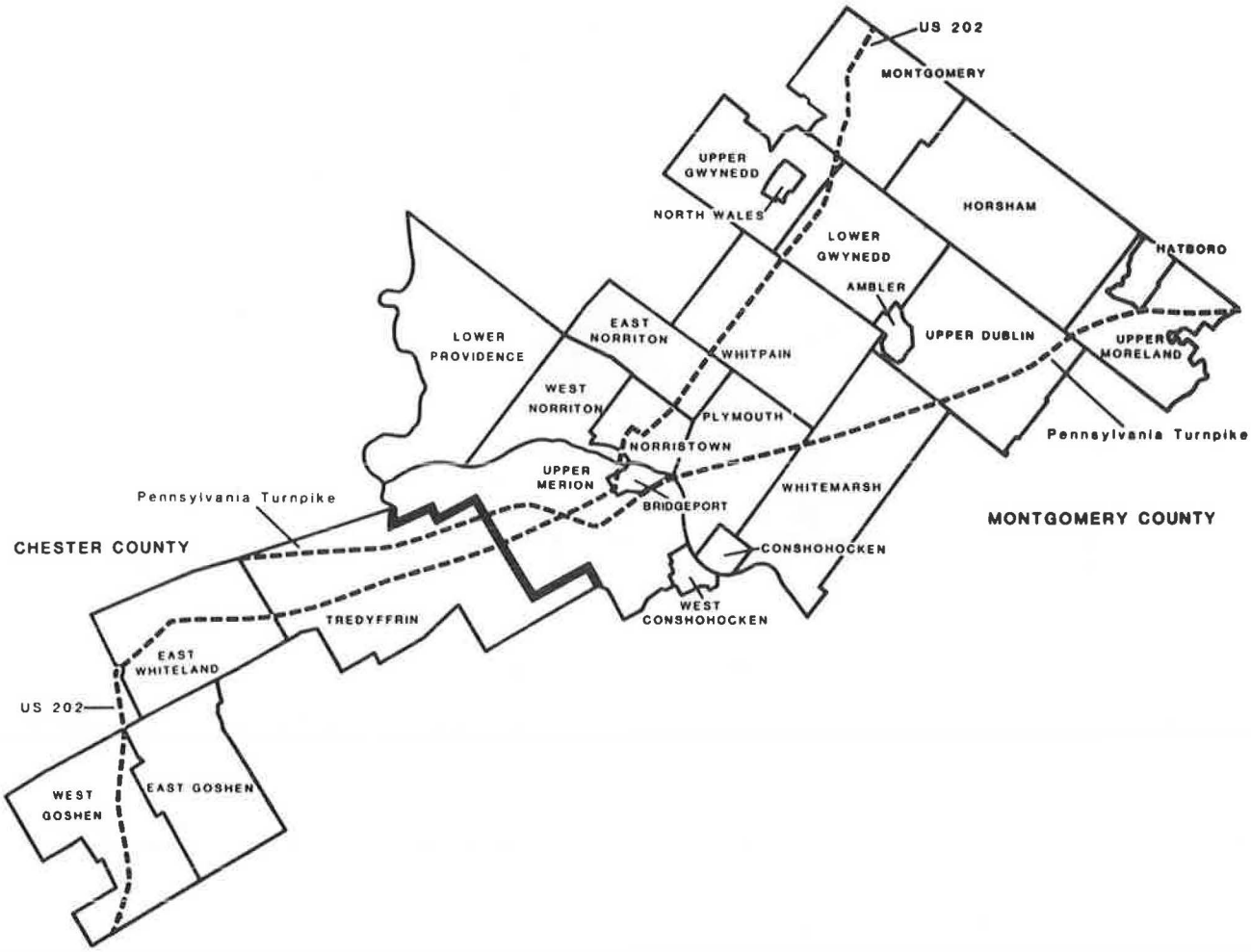


FIGURE 2 Municipalities within the study area.

staff interviews were conducted with selected executive officers, developers, and other interests in the corridor. A mail-back questionnaire was used to obtain information on location and transportation from all other technology firms that were identified in the corridor. In addition, the questionnaire was mailed to a selected sample of nonhigh technology firms for comparison.

The second phase of the study included field views and analysis of the corridor and locations with transportation problems; a review of existing studies, plans, and programs; and a general literature review. The field views included site visits and classification of the problems (or problem symptoms) that were identified during the survey and the review of past planning studies. Data about the corridor were collected in this phase to supplement the survey and to verify its findings.

The study recommendations were prepared during the final phase and are based on the results of Phases I and II. This action plan consists of a policy statement, transportation improvements, and proposed future studies.

Survey Design and Sample

The objective was to tailor the recommendations of the study to the needs and desires of the users of the transportation system--in this case the technology-oriented firms in the corridor. In this way, the corridor would continue to be an attractive location and would stimulate the development of this sector of the local economy. To learn the improvements that are desired by the client, it became necessary to conduct a survey.

Having identified 167 firms as meeting the study criteria of being high technology, it appeared reasonable to offer each the opportunity to respond to the survey. Inasmuch as it is also desirable to serve the needs of all firms in the region, it was determined that a sample of nonhigh technology firms also be surveyed. To assure adequate representation, surveys that had 12 questions about location and 14 about transportation were sent to 100 nonhigh technology firms with representation from each geographic subarea.

Executive officers from 25 of the high technology firms were asked to be interviewed. These interviews were designed to last about 1 hr and cover topics relating to location, transportation, and other issues defined by the person being interviewed. The executive officers interviewed were selected on the basis of achieving a representative sample of the size and geographic location of firms.

The 167 high technology firms employed more than 44,000 persons, accounting for approximately 20 percent of the estimated 210,000 jobs located in the study area in 1980. Figure 3 shows where the firms are located by four categories of size. The map also demonstrates that the high technology corridor contains several clusters of firms, which are circumscribed.

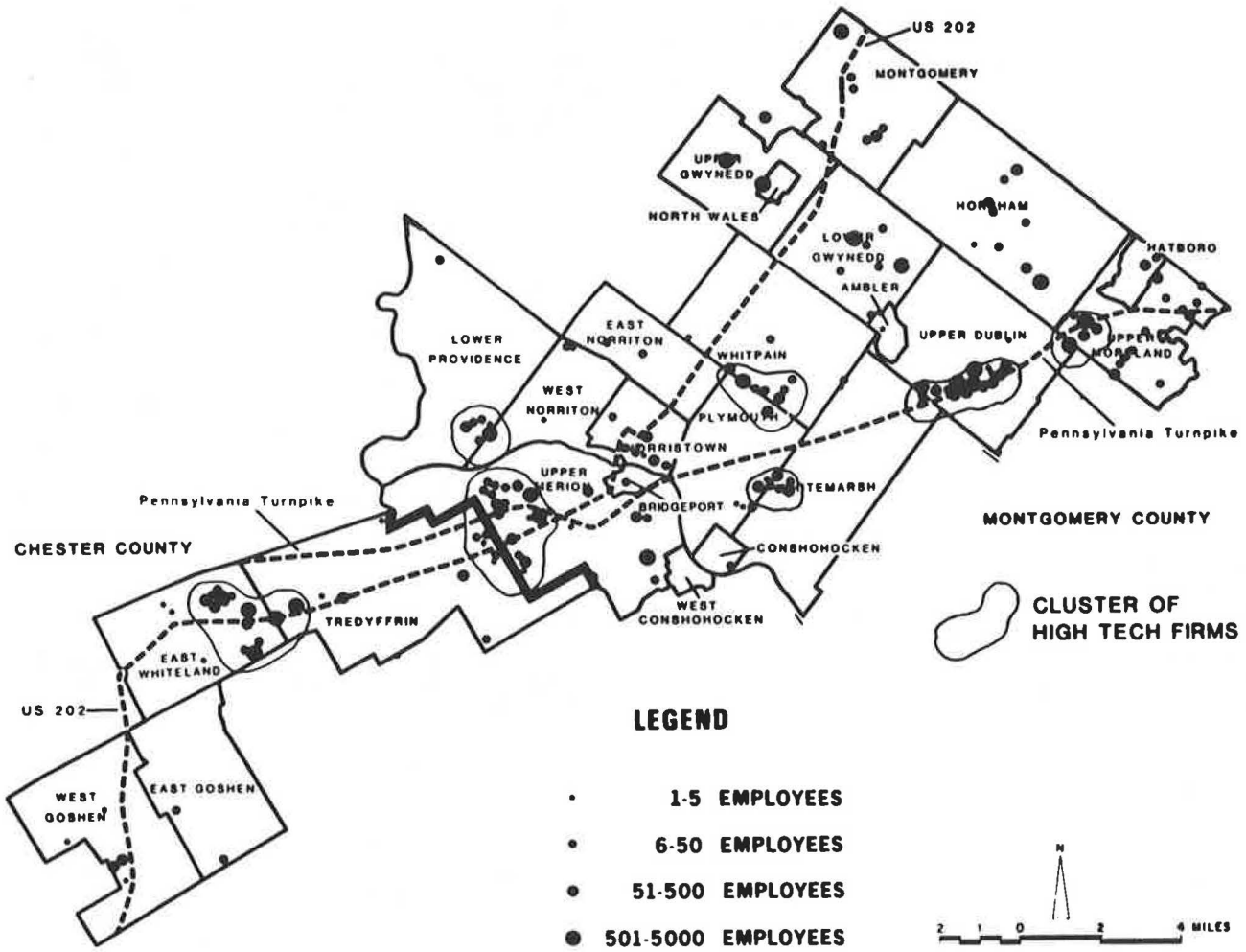


FIGURE 3 Location of high technology firms.

Transportation Problem Areas and Field Investigations

An objective of the study was to recommend transportation improvements that will support economic development and solve existing transportation problems. For this purpose, responses to a survey question were plotted on a map of the corridor to display locations with severe traffic problems. Because these responses represented perceived problems and often were only symptoms of the real problems, additional analysis was performed.

Those mapped locations that were cited more than once in the survey were aggregated into transportation problem areas based on their proximity and interrelationship to each other. The individual problem areas were then discussed with staff members of the Chester County and Montgomery County Planning Commissions to determine which areas should be addressed further in this study. Certain areas that may experience future transportation problems if development plans are implemented and problem areas outside of the corridor were not given further treatment.

To collect data on the physical and operational aspects of the transportation system in the problem areas and to determine the cause of problems, field investigations were conducted by a team of DVRPC staff. Data analysis, field reviews, and strategy assessments resulted in a number of improvement recommendations for each location or subcorridor. These recommendations include traffic flow, signing, and safety improvements.

THE SURVEY

A total of 102 firms responded out of 167 to whom the survey was distributed, about 6 out of every 10. Fifty-five out of 100 questionnaires were returned from nonhigh technology firms. No pattern was discerned in the characteristics of the firms that chose to respond, and it was assumed that the responsiveness of the person receiving the survey was the only factor at work.

Two types of high technology firms are known to be thriving in this region: pharmaceuticals and computer software developers. It was, therefore, deemed useful to separate responses from these firms from those of all others. SIC 283, including biological products, medicinals and botanicals, and pharmaceutical preparations were included in pharmaceuticals; SIC 737, including computer programming and other software services, data processing, and other computer services were included in computer services. Seven responses were received from pharmaceutical firms and 32 were received from computer service firms. A complete profile of responding firms is provided in Table 1.

Each of the newly located or newly founded firms was asked if transportation facilities played an

TABLE 1 High Technology Firms—Profile of Respondents

Standard Industrial Classification	Number
283 Pharmaceuticals	7
737 Computer services and software	32
357 Computer and calculating equipment	7
366 Communications equipment	5
367 Electronic parts including semiconductors	11
376 Spacecraft	1
381 Scientific instruments	2
382 Process instruments	12
383 Optical instruments	2
384 Medical instruments	7
386 Photographic equipment	2
739 Research and development labs	9
807 Medical labs	3
892 Noncommercial educational and scientific organizations	3
Size of firm	
1 to 5 employees	10
6 to 50 employees	38
51 to 500 employees	33
501 to 5,000 employees	16

important role in their location decision. Slightly more than 50 percent of the high technology firms answered yes but slightly more than 80 percent of the other firms agreed. This response can be traced to the fact that high technology firms are, for the most part, free of the burden of moving large quantities of raw materials to their site and moving high-volume products to market. Indeed, in the case of computer service firms, input and output may occur through telecommunications.

Location of Firm

Each respondent was asked if the firm had been located at its present site less than 10 years. If so, the respondent was asked to answer the next three questions pertaining to the firm's choice of location. Slightly more than one-half of the high technology firms were new and slightly less than one-half of the nonhigh technology firms were old. As expected, the pharmaceutical firms were well-established and the computer service firms were the youngest.

Respondents indicated the alternative sites they considered when selecting a location. Very few firms considered Center City as a possible location. In interviews, the firm official was asked: "Do you think that Center City Philadelphia is a suitable location for your firm?" In most cases, the operation could have been located in Center City, but most persons were quick to volunteer why locating there was not considered. The most often heard responses were (a) the existence of the (high) wage tax, and (b) the perception that the firm or its employees would be more likely to be victimized by crime.

Firm officers were asked if each of the following seven criteria were very important, important, somewhat important, or not important in choosing their location:

1. Existing residence of professional/managerial staff,
2. Ownership or rental costs,
3. Physical environment,
4. Highway facilities,
5. Availability of trained labor force,
6. Local taxes, and
7. Local government attitude or incentives.

This is presented in the rank order of importance expressed by high technology firms. Scores were very close for 1 and 2 and for 3 and 4; together these four criteria scored well above the last three. Both high technology and nonhigh technology firms rated most criteria similarly, including highway facilities. The most remarkable divergence was on existing residences, which were very important or important to 79 percent of the high technology respondents, but important to only 53 percent of nonhigh technology respondents. This confirms the popular notion that executives of high technology firms value accessibility to residential areas. It suggests to economic developers that the best sites to promote for high technology firms are those that are close to good housing stock.

Almost one-third found the physical environment very important among high technology firms and almost as many nonhigh technology firms.

Municipalities (or any other government entities) that are attempting to attract high technology industries should carefully monitor development of their communities so that they are assured that the visual surroundings are not degraded by development. It also means that public facilities, and particularly streets and highways, be built and maintained to high standards. Greater attention should be given to landscaping, highway fixtures, vistas, visual barriers, and so forth, if the corridor is to compete more effectively for new industry. Cooperative efforts by municipalities and county planning agencies to upgrade land development design standards are therefore encouraged.

Attributes of Region

Respondents were asked to compare the Delaware Valley Region with other metropolitan areas of the Northeastern United States and to judge a series of 14 attributes to be either assets or liabilities. Respondents could also answer "uncertain." The following list classifies the attributes. (The score is computed by subtracting the percent judging the attribute a liability from the percent judging it an asset.)

Clearly assets:	
Universities/technical graduates	85
Cultural and recreational opportunities	74
Size and skills of labor force	69
Housing costs	59
Energy reliability	55
Climate	28
Attitudes toward business	24
Neither an asset nor a liability:	
Transportation	9
Labor costs	6
Venture capital availability	4
Financial incentives	-6
Energy cost	-10
Clearly liabilities	
Local taxes (individual and corporated)	-18
State taxes (individual and corporate)	-36

The preceding results indicate that there is a positive attitude about the Philadelphia Region among the officers of technology-oriented companies. Attributes that scored highly are among those that are thought to be valued by high technology firms.

The negative scores that indicate a net liability are all fiscal attributes and one wonders if respondents may be exercising an automatic negative response, especially in the case of taxes. But note that two other fiscal attributes--labor costs, and especially housing costs--are considered assets to the region.

The most outstanding attribute of the Philadelphia region, according to the executives who completed DVRPC's survey, was its universities and their technical graduates. Not only did the largest number judge this attribute an asset but the fewest number judged it a liability; the fewest number were also uncertain.

In a study conducted recently by the Institute of Public Administration (IPA) of Pennsylvania State University and the Pennsylvania MILRITE Council, however, only 1 of the 31 firms surveyed in the corridor listed proximity to universities as important in its location decision, and in that case it was the fifth most important (3). No firm included closeness to universities as important in determining whether to expand in the region.

It appears, then, that high technology firms are happy to have access to many well-educated graduates, and to have universities nearby for continuing education. These advantages are not so important, however, to draw firms away from the benefits they find in the suburbs. Continuing education will become more important in the future as the half-life of a college degree decreases while the complexity of a technological world increases.

More than two-thirds of the high technology firms reported that they have no problem hiring professionals or persons with the skills they require. About two-thirds of the nonhigh technology firms also reported no problems. These percentages look favorable, although no comparisons with other metropolitan areas are available.

Future of the Corridor

Four questions addressed the attitude of the firm toward further growth of the corridor and its role in it. The responses from high technology firms are summarized as follows:

1. Almost one-half stated that it is an advantage to be located among other firms whose products or services, or labor requirements, are similar to their own. (Only one-third of the nonhigh technology firms considered proximity an advantage.) Only 8 percent considered it a disadvantage.
2. Seven out of every eight respondents believed that continued growth of the corridor would be good for their firm.
3. Forty-six percent asserted that they plan to expand their operations at their present location; another 13 percent preferred not to divulge this information.
4. Only seven firms indicated plans to relocate. It may be significant that three of these firms are located in King of Prussia. An officer of one such firm stated in an interview that his firm would relocate farther west on US-202 because of the almost paralyzing congestion experienced on highways in the vicinity of US-202 and the Schuylkill Expressway. Note, however, that relocation does not imply that the firms will leave the corridor.

The conclusion that must be drawn from these four points is that, given a strong economy, the corridor will continue to grow and prosper, requiring additional transportation improvements to handle the attendant traffic.

Company Practices that Affect Traffic Conditions

Almost one-half of all firms have considered the use of flexible work schedules. Apparently such schedules have been more successful at high technology firms, where one of every five respondents report their normal work hours as variable, a rate three times greater than nonhigh technology firms. Furthermore, one-half of the respondents indicated that their firm would be willing to modify their work schedule as part of a plan to decrease traffic congestion in the area.

Only 7 of the 102 firms surveyed have a shared-ride program. In interviews, several firm officers spoke skeptically of the concept of carpooling and vanpooling. Many high technology firms prefer to think of their employees as highly motivated people who leave their jobs when their work is completed and not in time to meet shared-ride schedules.

As noted earlier, these firms prefer to be located near the homes of their employees so that the employee can travel to and from his or her job easily--in the evening or on weekends as well. Such a location makes carpooling unnecessary and sometimes counterproductive in the eyes of company executives.

Transportation Needs of the Firms: Non-Highway

The survey asks the executive if his location is served by public transportation. Responses ranged from one out of three to two out of three answering yes in different parts of the corridor. The results appear to indicate that people have different ideas about what being "served" is, but also, no doubt, that many people do not know if they are served. The interviews support this contention. Public transit is not even considered an alternative to many persons working in the study area, and so there is little knowledge about routes, stops, frequencies, and destinations.

Those who stated that they are served by transit were asked to indicate which attributes of the service are most in need of improvement. Most often cited was frequency. Reliability was mentioned next most often, but only about one-half as many times. It is not known if reliability is really in need of attention in the corridor, or if it was mentioned often because it tends to be an automatic response. People appear not to easily forget an unhappy experience in using transit. In third place is information, which can be relatively inexpensive to improve.

During the testing of the draft survey, it became apparent that some dissatisfaction is felt with paratransit services--particularly taxicabs and airport limousine service--and so two questions were added. The first question elicited that only 4 out of 10 respondents were satisfied with the service offered in Upper Merion, but in other areas 6 out 10 respondents found the service adequate.

Attributes of taxicab and limousine service in need of improvement are reliability (showing up when promised), destinations served (being too limited), and vehicle qualities. This last attribute received a lot of attention in interviews, along with drivers' attitudes. At least one executive mentioned that he felt embarrassed when customers and business associates used the limousine service to the airport. Inasmuch as the survey results demonstrate that fare is not a concern to many respondents, it may be that higher fares that pay for improved service may be welcomed.

Compared to 90 percent who believe that more public funds should be spent on highway improvements, 70 percent of the respondents believed that more money should be spent on mass transportation. Less than 30 percent believed, however, that more funds should be expended for bicycle and pedestrian facilities.

Transportation Needs of the Firms: Highways

Firm officers were given six destinations and asked to indicate their relative importance to their com-

pany as high, medium, low, or none. The results point to some differences between high technology firms and other firms. The most striking of these is in access to air travel. Philadelphia International Airport was cited as a highly important destination by 60 percent of high technology firms, and of no importance to only 4 percent. For nonhigh technology firms, it was highly important to only 30 percent and not important to 20 percent.

Interviews confirmed the significance of airport access to high technology firms. The market for many technological products is nationwide and sometimes worldwide, which means a higher than ordinary rate of air travel for the executives of such firms. Perhaps even more important, these firms often produce small, high-value products (or paper) for which the cost of air freight is small relative to its value. High technology firms are frequent users of private air express services. It is interesting to note that the airport is less important to computer service and software firms than to other technology-oriented firms, perhaps because so much of their input and output is moved through telecommunications. Access to local airports and heliports is also important to high technology firms, more so than with nonhigh technology firms, but not by such wide margins as travel to and from Philadelphia International Airport.

Center City remains an important destination, being of medium or high importance to 65 percent of high technology firms and 54 percent of others. In addition to using services located in Center City--legal and financial, primarily--firms also find many of their clients in Center City.

The survey asked the executive to locate severe traffic problems in the vicinity of his firm. In each of the subareas, a majority of the respondents reported severe problems. These citations were found to be clustered into 14 problem areas with the study boundaries shown in Figure 4. Recommendations in the study primarily addressed solving problems in these areas. About 90 percent of the questionnaires returned indicated that the chief executive officers and others who completed the forms believed that more public funds should be spent on highway improvements.

Finally, the questionnaire listed six major programmed capital improvements either in or affecting the study area and asked the respondent to state which are important to the operation of his firm.

To firms in the eastern, central, and western part of the corridor, the Schuylkill rehabilitation is the most important project. The expressway forms a tether to Philadelphia, and its free flow is important to permitting Philadelphia to remain the focus of services to the corridor. As an example, some executives of high technology firms are finding Trenton and Wilmington rail stations more convenient than 30th Street, even though the over-the-road distance is greater.

The second most important project to each group is the Mid-County Expressway. This selection reflects

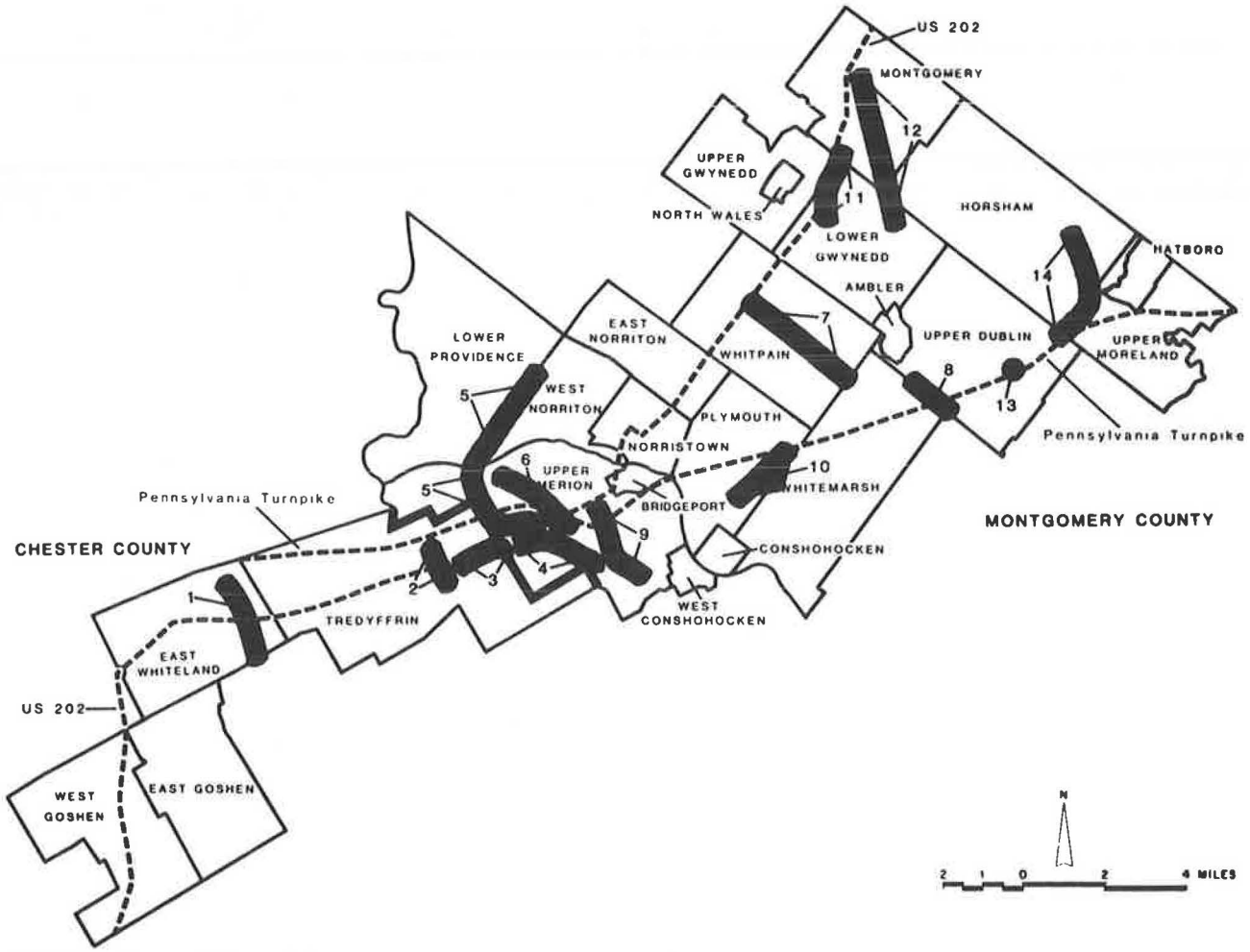


FIGURE 4 Transportation problem areas.

the importance of access to Philadelphia International Airport. Several executives were critical of the transportation bureaucracy for failing to surmount the obstacles to completion of the project. They stated that their investment in the corridor was in part predicated as the concept of a fast, direct route to the airport. After these two priority projects, the areas differed in their responses.

STRATEGIC PLAN FOR TRANSPORTATION

This section of the paper contains a summary of the study recommendations and proposed strategies for action. These recommendations were based on an evaluation of the office interviews and mailback surveys of the existing firms in the US-202/Pennsylvania Turnpike Corridor. Field views of locations with transportation problems, other studies, planned projects, and funding constraints, have been considered in this action plan. The action plan consisted of three elements:

1. Statements of policy.
2. Recommended transportation improvements.
3. Proposed studies and outstanding issues.

The policies, transportation improvements, and proposed studies contained in the plan have been coordinated with the current plans of the member governments, the transportation operators, and local businesses. Simultaneous and continuing action by the municipalities, counties, state, and the private sector is required to maximize the effectiveness of these concepts and proposals.

Policy

To foster economic growth and the location of technology-oriented firms in the corridor, the existing and future needs of business must be satisfied. These needs are complex, changing, and require continuous attention. Generally, this broad-based effort must involve the maintenance and upgrading of a total environment and many quality-of-life considerations.

The policies discussed below address the most important areas of concern expressed during the corridor study. As a guideline for decision makers, these transportation policies should provide overall direction for planning activities.

1. Support the increased use of taxicabs, limousines, and other private transportation services to assist in meeting the corridor's travel demand and the special needs of the technology-oriented firms.
2. Preserve rail corridors within the corridor for possible transportation uses in the future.
3. Provide for convenient and safe local airport and heliport facilities to meet the increasing air transportation needs of the corridor.
4. Pursue transportation improvements that increase accessibility to the Philadelphia International Airport.
5. Support the advancement of telecommunication services to augment transportation facility improvements.
6. Gradually convert transit vehicles to the most appropriate sizes and types to better meet the needs of the corridor.

In addition, six additional policies, which apply throughout the region, were recommended to receive special attention in the corridor. The policies focused on increasing maintenance on the existing network, spreading the peak periods, staging implementation plans, environmental quality, minimizing travel requirements, and encouraging transit.

Transportation Improvements

Transportation improvements recommended for completion during the next 5 years were outlined. Each set of improvements was based on a description of the problem area and the transportation deficiencies that were observed. As shown in Figure 5, a schematic of the street system indicating the location of problems, proposed improvements, and cost estimates for planning purposes was prepared.

The recommended improvements primarily addressed deficiencies and problems cited in the survey of firms in the corridor and the followup field investigations. The region's Transportation Improvement Program, Year 2000 Transportation Plan, Transportation System Management Plan, and the ongoing planning efforts of local governments were considered in the development of these recommendations.

The proposed transportation improvements did not represent a complete response to all problems that exist or that will occur in the corridor. Other traffic studies should be integrated into these recommendations. Continuous monitoring of corridor growth and traffic was also encouraged to enhance and modify the set of projects. Additional evaluation may be needed to assign a priority to improvements and to stage implementation activities.

Transportation improvements in other parts of the region are also required. For purposes of improving the attractiveness of the corridor to advanced technology, the projects should focus on improving accessibility to critical destinations of technology-oriented business. Included among these important locations are the Philadelphia Central Business District, the Philadelphia International Airport, cultural and recreational areas in the region, and suburban residential locations.

Outstanding Issues

This study recognized that many issues and transportation problems could not be adequately addressed. Implementation of transportation policies and facilities require detailed project studies. A commitment to investigate problems and undertake such studies was, therefore, an important part of the plan.

IMPLEMENTATION

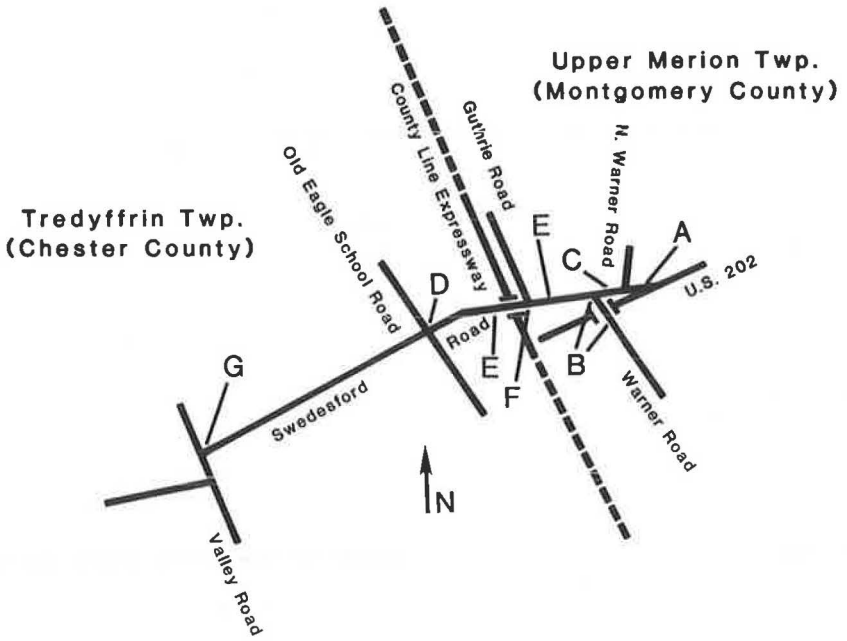
Implementation of the study recommendations is the most important phase in the planning process because it results in the construction of new and improved facilities and better transportation service. Successful implementation, however, requires coordination and depends on many considerations and decisions by a number of individuals and groups.

Agencies' Responsibilities

To implement the recommended transportation improvements, agencies at the local, county, regional, and state levels were advised that they must do their part in the planning, capital programming, design, and construction process. It was important that all parties agree to the policy guidelines and work cooperatively.

Municipalities

The municipalities in the study corridor were asked to concur with the proposed improvements. After con-



RECOMMENDED IMPROVEMENTS (Approximate Total Cost = $250,000)

- A Erect Overhead Sign, Construct Improved Traffic Island
- B Paint Pavement Lines, Cutback Northbound Swedesford Road Curb, Remove Vegetation, Install Improved Stop Signs
- C Remove Vegetation
- D Remove Treadle Pad on Westbound Old Eagle School Road Approach, Widen Eastbound Approach to Provide 2 Lanes, Restripe Northbound Approach
- E Provide Shoulders on West Side of Swedesford Road*
- F Restrict Northbound Swedesford Road Left Turns During Peaks
- G Install Directional Informational Signing

*Future Developers should provide shoulders on West Side of Road.

FIGURE 5 Problem area schematic: Swedesford Road between north Warner Road and Valley Road.

currence on the scope of the proposed improvements, each municipality, with the assistance of Montgomery or Chester counties, must follow through in the implementation of the traffic improvements for the problem areas. Assistance in implementation, which includes local financing, engineering, land acquisition, and construction should also be sought from appropriate developers and businesses.

Counties

The function of the Chester County Planning Commission and the Montgomery County Planning Commission is to develop projects and priorities for capital programming by the county and region and to coordinate with Minor Civil Divisions (MCDs) on traffic studies. In addition, the planning commissions coordinate with the municipalities, DVRPC, and the Pennsylvania Department of Transportation (PennDOT) in the process. Because of funding constraints, a high priority was assigned to improvements in the corridor so that they would advance in the implementation process.

Delaware Valley Regional Planning Commission

Toward the implementation of transportation improvements in the high technology corridor, DVRPC's primary responsibilities are to evaluate the technical merits of projects, establish priorities, and to program projects. Before programming, the commission staff must evaluate projects based on criteria established by PennDOT and the U.S. Department of Transportation. In addition, the recommended improvements may be potential candidates for special state programs.

Pennsylvania Department of Transportation

PennDOT's responsibility is to support local, county, and regional initiatives by programming transportation improvements at the state level. After programming, it is charged with the tasks of engineering, acquiring any needed land, obtaining federal and state funds, and constructing the improvements. Local acceptance and cooperation will assist PennDOT in implementing high technology corridor improvements.

Southeastern Pennsylvania Transportation Authority (SEPTA)

Public transportation recommendations are usually the responsibility of SEPTA, the primary transit operator in Southeastern Pennsylvania. Working cooperatively with governments and the residential and business communities in the corridor, SEPTA must seek to provide improved transit service. Several issues concerning new local, express, and shuttle bus services raised during the study are currently being addressed.

Other Agencies

Because this study had the indirect goal of assisting in the economic development of the region by improving transportation service, many other local and state agencies have a role. Organizations, such as those responsible for paratransit services, taxicabs and limousines, and airport planning, must be aware of the opportunities and the potential of the high technology corridor for development. The special needs of the technology-oriented firms must be addressed on a continuing basis.

The findings of the study were shared with the Chester County Consortium for Economic Development, the Montgomery County Commerce Department, and other agencies, to provide a basis for supporting the transportation recommendations and advancing their own planning efforts. Overall promotion of the corridor for industrial development will be the responsibility of these agencies.

Private-Public Partnership (Creative Financing)

The benefits from constructing transportation projects in the corridor will accrue to employers, developers, and others who use the improvements or who are better-off by increased economic development. It is in the interest of these firms and groups to participate in the planning and financing of the projects if the benefits to each exceed their share of the costs, particularly if governments or transportation operators would not implement the improvements without this private support. It is in the interest of governments and transportation operators to develop and support improvements that have identifiable benefits to businesses and developers, especially when public funds are scarce and the transportation improvements would benefit the region.

Private-public partnerships and creative financing arrangements should be developed and built on this economic principle. It is most effectively accomplished by including the public and private sectors from the early stages of planning to the final implementation stages of programmed projects. The formation of special transportation task forces for specific project locations were recommended to assure active participation of the interested parties.

Transportation task forces have been or are currently working in various locations in the corridor, including the US-29 area, Upper Merion Township, and the Dresher area. The task forces provide a forum to discuss issues, establish goals, undertake studies, define alternatives, make recommendations, and design implementation strategies.

CONTINUING PLANNING

Transportation service in the corridor is related to many technological and socioeconomic factors that are changing. For example, there are many possibilities for substituting telecommunication for personal travel. Special television systems may provide a means for business meetings, education, and the conveyance of papers. Also, the magnitude and type of future development or changes in travel behavior because of special situations such as fuel shortages are difficult to predict. Therefore, priorities may change in the context of new funding constraints and political forces.

Transportation policies and recommended improvements for the high technology corridor should be reviewed in several years to confirm or modify these guidelines for decisionmakers. During the interim period efforts should be made to resolve outstanding issues. Small traffic studies to support, revise, and augment recommendations should be advanced.

CONCLUSION

Though the transportation needs of high technology firms are not significantly different from those of other industries, high technology executives and employees are accustomed to working with state-of-the-art products and systems. Therefore, they have a limited tolerance for traffic congestion and poor public transportation. In determining location sites for their industries, technology-oriented executives value highly the quality of transportation service that includes adequate maintenance of existing streets and highways.

As shown in this study, technology-oriented industries are often small (fewer than 50 employees) and they often research and produce products that have national and international markets. Access to these markets requires air travel that is frequent and dependable with a range of destination options. In addition, products and key employees must be transported to the international airport with minimum delay and maximum convenience.

The search for excellence associated with high technology translates into a desire to improve quality of life. In terms of transportation, this means fast and comfortable access to residential neighborhoods, shopping and restaurants, other regional amenities, educational institutions, and international airport facilities. The amount of new high technology that may be anticipated may be directly related to the extent that the corridor can offer or has access to these opportunities.

Therefore, the preparation and local acceptance of a strategic plan (providing recommended improvements, policy, and implementation strategies) addressing transportation and other environmental concerns and infrastructure, is an appropriate step toward planning for high technology.

REFERENCES

1. High Technology Employment--Massachusetts and Selected States 1975-1981. Division of Employment Security, 2nd ed., Commonwealth of Massachusetts, Boston, July 1982.
2. J. Gruenstein. High Tech in the Third District. Federal Reserve Bank, Philadelphia, Pa., May 19, 1983.
3. Silicon, Sensors and Software: Listening to Advanced Technology Enterprises in Pennsylvania, Institute of Public Administration, Pennsylvania State University and Pennsylvania MILRITE Council, University Park, July 1983.

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