State Route 1
Land Use & Transportation Study

SR 1
Land Use & Transportation Study
A joint effort of Sussex County and DelDOT

AUGUST 2003

State Route 1 Land Use & Transportation Study

Report prepared for:

DelDOT

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I. INTRODUCTION

A. The Problem

The resort area of Sussex County has experienced unprecedented growth in the past thirty years, and more recently in the past decade. From 1990 to 2000, the county's population grew an amazing 38%, placing it among the top 6% of counties in the nation for both absolute and relative (percentage) growth.[1]

People are moving to southern Delaware at an extremely rapid rate, and they are demanding places to live and a transportation network that will allow them to enjoy the enhanced quality of life the resort area offers. However, traffic trends in the study area are clear. As the figures on page 3 indicate, average daily traffic on SR 1 increased by 102% between 1980 and 2000, and 320% between 1967 and 2000. Of course, traffic on other important roads in the area also grew. Average daily traffic on SR 24 between Road 275 (Plantations Road) and SR 1 rose by 52% between 1980 and 2000, and traffic between Road 48 and Road 275 increased by 220% in the same time period.

In 1970, when Sussex County passed its first comprehensive zoning law, concentrating commercial development along the State Route 1 corridor from Lewes to Rehoboth Beach was a logical approach; county planners assumed that permitting businesses only along an approximately 600±-foot strip on both sides of the highway would discourage commercial sprawl and help preserve the resort character of the area. And it did for many years. Few could have predicted the population growth and changes that would occur. As recently as 1990, experts continued to underestimate the attraction of Delaware's resort communities and the unincorporated areas that surround them. Population estimates for 2000 for Sussex County fell a full 12% short, with most of the increase concentrated in the eastern part.[2]

Sussex County's 2001 Long Range Transportation Plan states the problem clearly: "Since the 1960s, SR 1 has been widened from two lanes to six, intersections with US 9 and SR 24 have been improved, left- and right-turn lanes added, and lights have been timed to aid flow, yet increased traffic volumes and continued land development have slowed vehicular movement along this notoriously congested stretch of road. . . . Route 1 has proven that intense commercial development with unlimited curb cuts is incompatible with moving large volumes of traffic along a major highway."[3]

The maps on the following page illustrate the changes in land use this increased population has brought, as well as the obvious demands on the transportation system generated by massive, and unmanaged, residential development.

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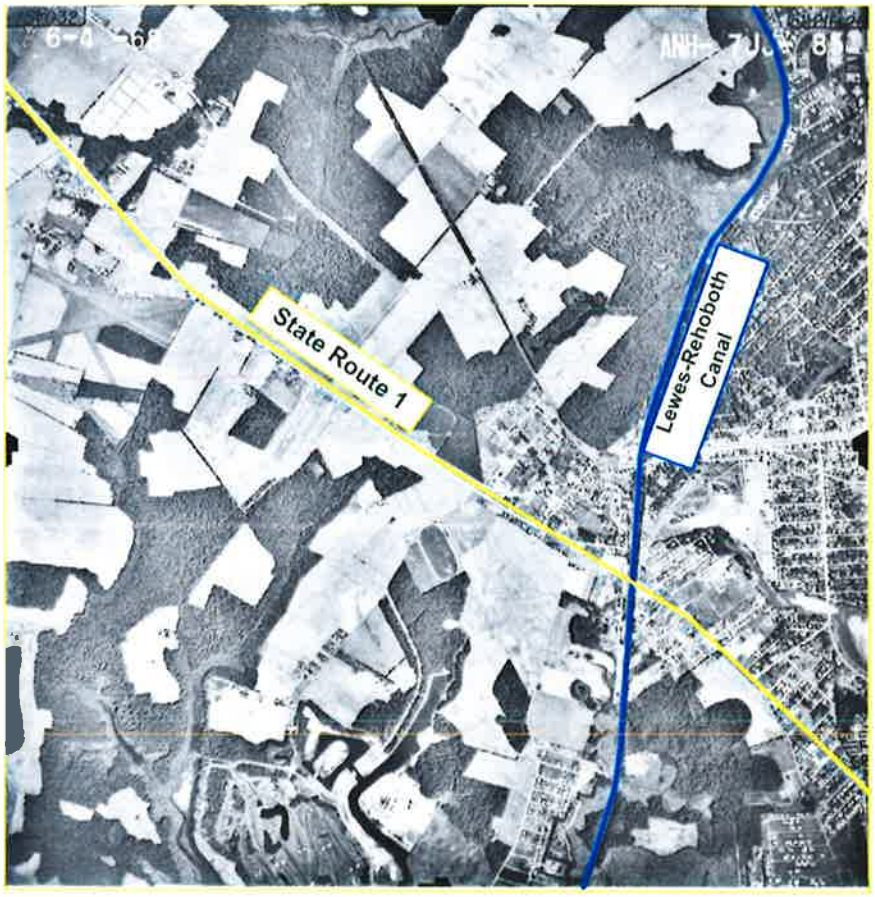
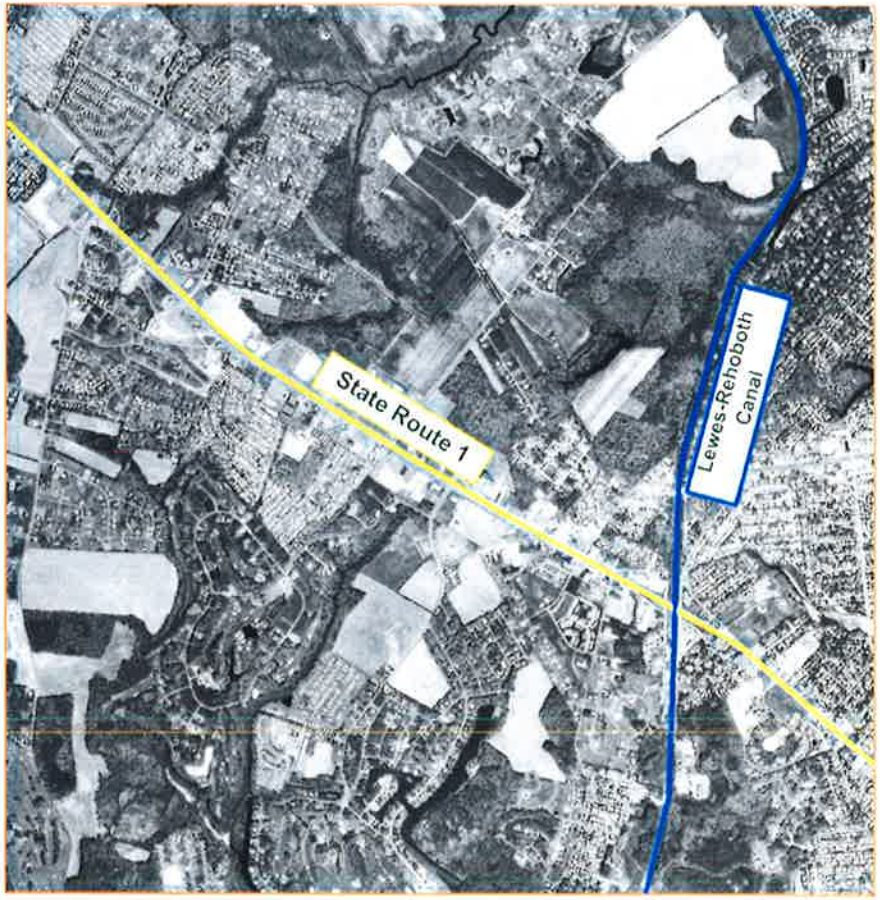
[1] 2001 Sussex County Long Range Transportation Plan. In comparison, New Castle and Kent counties grew by only about 13% each.

[2] Delaware Population Consortium

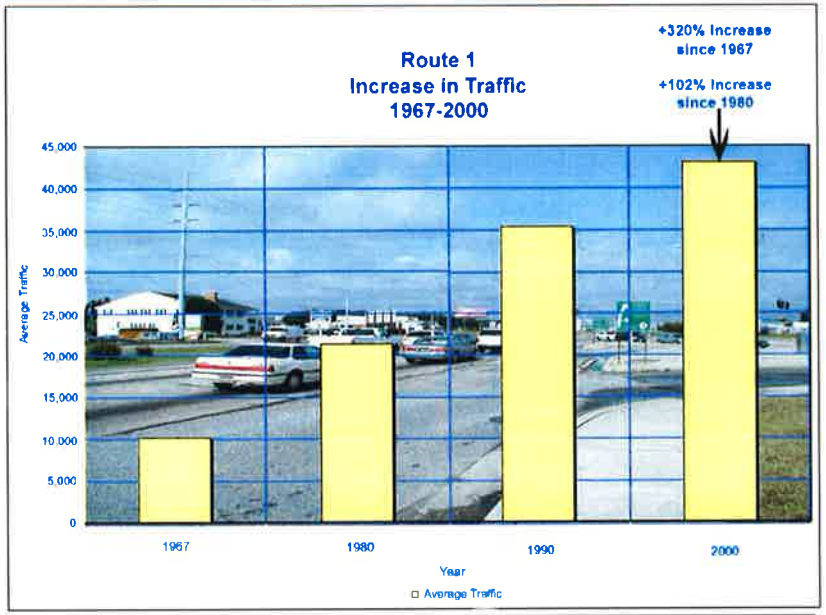
[3] 2001 Sussex County Long Range Transportation Plan

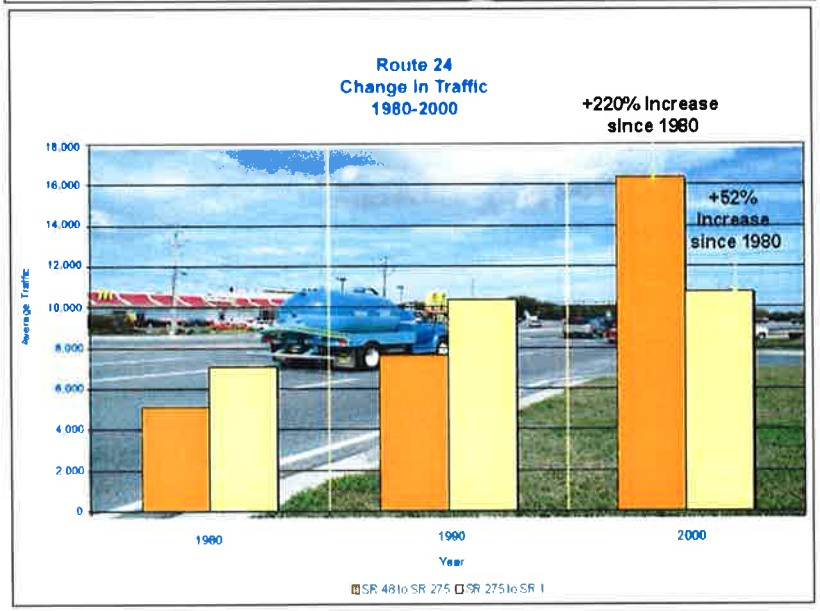

State Route 1
Lewes-Rehoboth Canal

1968

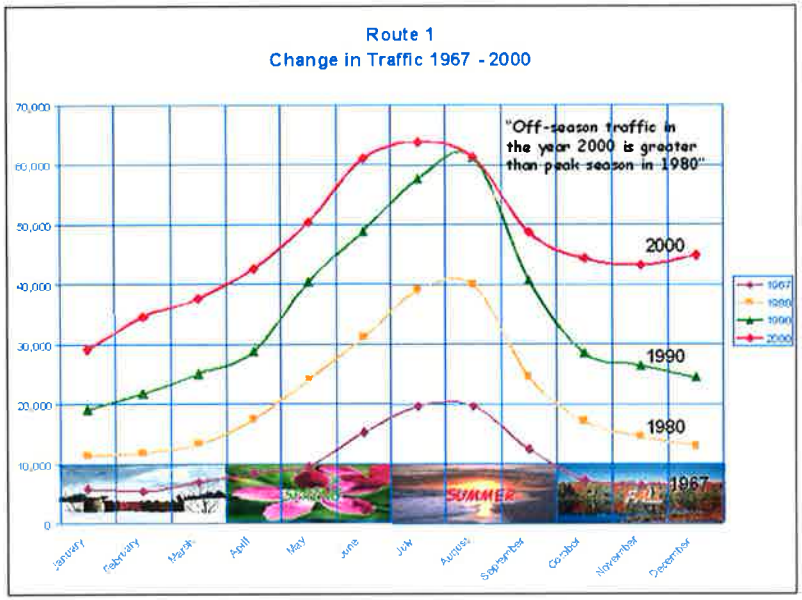

State Route 1
Lewes-Rehoboth Canal

1997





Perhaps as significant in terms of land use and travel demand, the seasonal differences that used to characterize traffic are leveling off while the volume of traffic grows. Although July and August continue to be the busiest months, with as many as 30,000 people visiting the study area on any given weekday (double that on weekends),[4] seasonal variations no longer show a traditional peak. As a result, traffic volume for a full nine months of the year in 2000 was greater than the July-August peak in 1980. Visitor attractions are scheduled year-round, and an event can draw as many as 10,000 people on a winter's weekend. "Off season" is very short, barely two months.



[4] Rehoboth Beach Chamber of Commerce website

Eastern Sussex County has become much more than a tourist destination. Although the area continues to attract visitors, the most crucial change is in the number of full-time residents. By the year 2025, the number of households in Sussex County is expected rise to 98,586, a 57.5% increase from 2000.[5] This growth does not include seasonal dwelling units, and most of it is expected to take place in the resort areas.

Always a retirement-friendly state owing to its low taxes and moderate climate, Delaware has become an increasingly popular place for senior citizens. Many people who vacationed there when they were younger are now choosing to relocate to the resort area. Now that the Baby Boomers are reaching retirement age, this influx of an older population will certainly increase and is reflected in the number of permanent and second homes being built. In 2000, 18.5% of Sussex County's residents were aged 65 or older; by 2025, that number will rise to 26.3%.[6]

B. Study Goals and Objectives

Both Sussex County and the Delaware Department of Transportation (DelDOT) have recognized the pressures this population increase is creating. The State Route 1 Land Use & Transportation Study is a direct result of a Memorandum of Agreement (MOA) between DelDOT and Sussex County "to effectively address joint interests in the transportation system and land use for the Rehoboth/Lewes area" (see appendix for memorandum).

The MOA recognizes the rapid growth occurring in the resort area and the need to develop a plan for land use to inform Sussex County's Comprehensive Plan Update and a corresponding plan for a transportation system to accommodate the projected travel needs of the area.

The study's overall objectives, developed jointly by Sussex County and DelDOT and affirmed by the Public Advisory Committee (PAC)[7] established at the study's outset, were to:

- Increase the mobility of area residents by developing alternative road links and connections
- Provide a variety of ways to travel
- Reduce congestion
- Improve safety
- Maintain the character of the study area
- Gain public acceptance of study recommendations.

The study was initially a follow-up to DelDOT's Grid Concept Study, completed in 1999. That study proposed a number of conceptual linkages that would provide road connections among developments and resulted in several other projects that were forwarded to development by DelDOT. Early in the current study, however, it became apparent that the proposed grid concept was not well understood and was creating

[5] Delaware Population Consortium
[6] Delaware Population Consortium

[7] See Chapter VI, Public Involvement, for the important role of this committee throughout the study.

anxiety among residents, who feared their property would be affected, as well as among developers who had purchased land in the conceptual rights-of-way. In addition, many of the proposed grid lines were no longer feasible owing to rapid and unmanaged growth in the SR 1 corridor.

The study team concluded that references to the Grid Study and the map it produced were counterproductive, and the SR 1 Land Use & Transportation Study was re-cast as a totally independent project.

As a result, the PAC adopted the following problem statement for this study:

"The Lewes-Rehoboth/Dewey Beach area has experienced unprecedented growth in the past ten years, and this growth is expected to continue. Thousands of people are moving into the area, attracted by the ambience of the resort towns and the quality of life their residents enjoy.

The resulting development is taxing local roads, and travel on State Route 1 has become increasingly difficult. Alternate modes – public transit, pedestrian and bicycle facilities – are limited, and safety has become a concern. By 2025, this situation will be much worse unless decisions are made about land use and transportation and actions are taken now.

The challenge is to improve daily travel for local residents while continuing to enable as many as 5 million visitors to get to the shore and the other regional attractions each year. This challenge also includes guiding land use, ensuring safety for all users, providing for orderly economic development, protecting open space, and maintaining the character of the study area."

C. Study Area

The study originally defined the SR 1 corridor as extending from the old railroad right-of-way north of the Five Points intersection in Lewes, east and south to the Rehoboth Canal, and west to the Love Canal. As a result of technical analyses and public comments that suggested the study should include more of the southern portion of SR 1, the traffic analyses only were extended to the intersection of SR 1 and Saulsbury Street in Dewey Beach. See Figure I-1 on the opposite page.

D. Methodology and Tools

1. Methodology

One of the major catalysts for this study was DelDOT's desire to plan appropriate transportation improvements for Sussex County that would support land use in the Lewes – Rehoboth/Dewey Beach area over the next 25 years as they are needed. This includes adding new capacity, creating connections among land uses and activities, and providing additional facilities and services to promote public transit and bicycling and walking as travel modes (not solely recreational choices).

The first focus was on land use and its effects on transportation. The study team established a Base Land Use Scenario that reflected existing conditions as well as development proposed and already under construction (through approximately 2007), assuming no transportation improvements were made beyond those already planned and programmed. The team forecasted these conditions to the year 2025 (the 2025 Base Land Use Scenario), and then forecasted travel conditions if all the land in the study area were fully developed in accordance with its current zoning (the 2025 Build-Out-To-Plan Land Use Scenario).

The study team then developed two alternative scenarios to test the effects changes in land use would have on travel. One would expand the Development District, increasing permitted residential density from SR 23 to Road 274; reduce the development density on parcels east of Road 274 and SR 24; and develop commercial land according to current zoning (as in the Build-Out-To-Plan Land Use Scenario). The other would cluster most of the anticipated new development in compact, mixed-use areas referred to as activity centers/villages in an expanded Development District.

These scenarios were presented to the PAC and the general public. After extensive discussion, the PAC recommended adoption of the Activity Center/Village Land Use Scenario by the current study and ultimately by reference by Sussex County in its Comprehensive Plan. (All the land use scenarios are described more fully in Chapter 2.)

Similarly, the study team analyzed travel using the recommended land use scenario under three alternative travel improvement scenarios, all of which were based on technical analyses and public comment. These transportation alternatives were presented to the PAC

Figure I-1 – Study Area Map

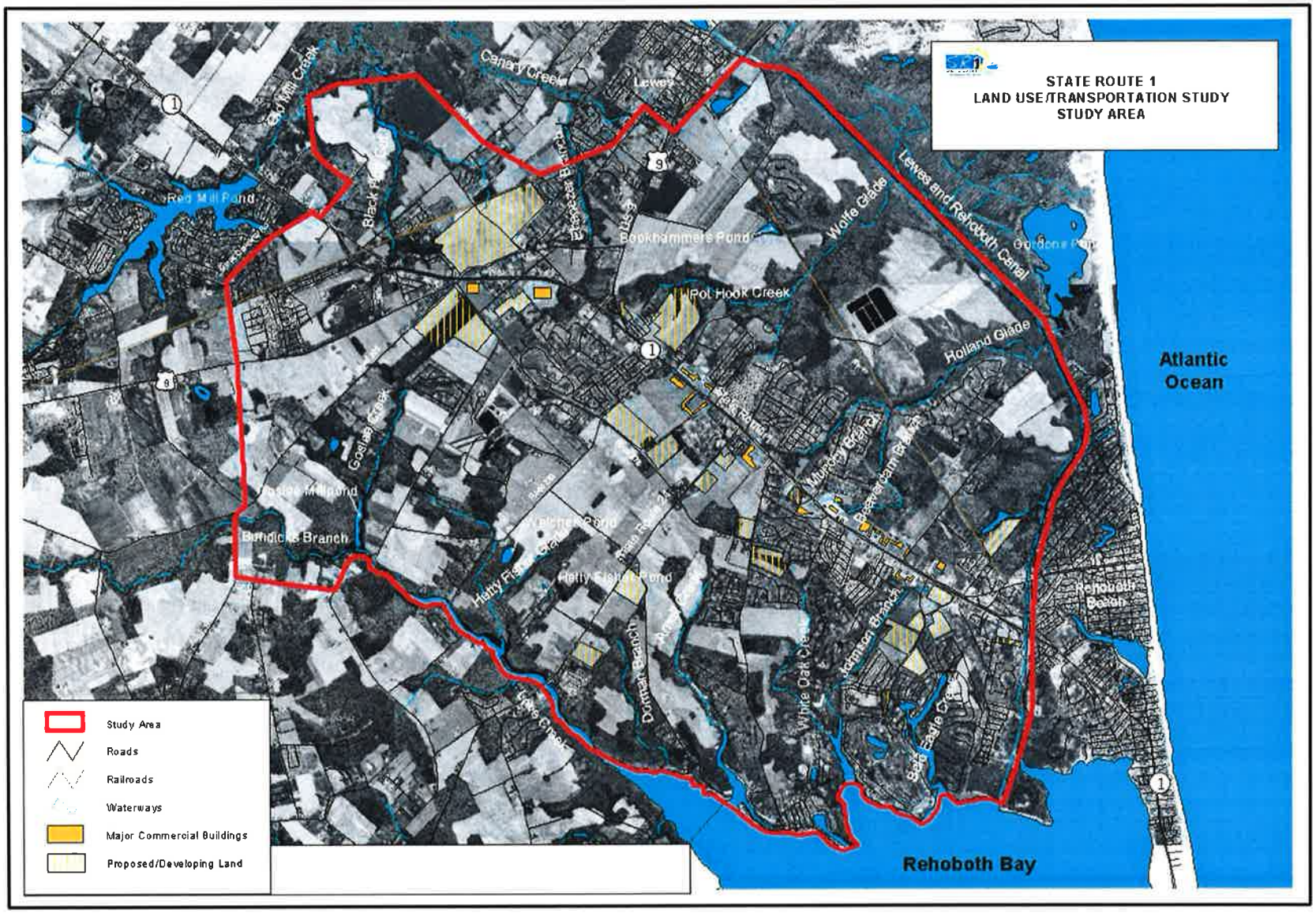
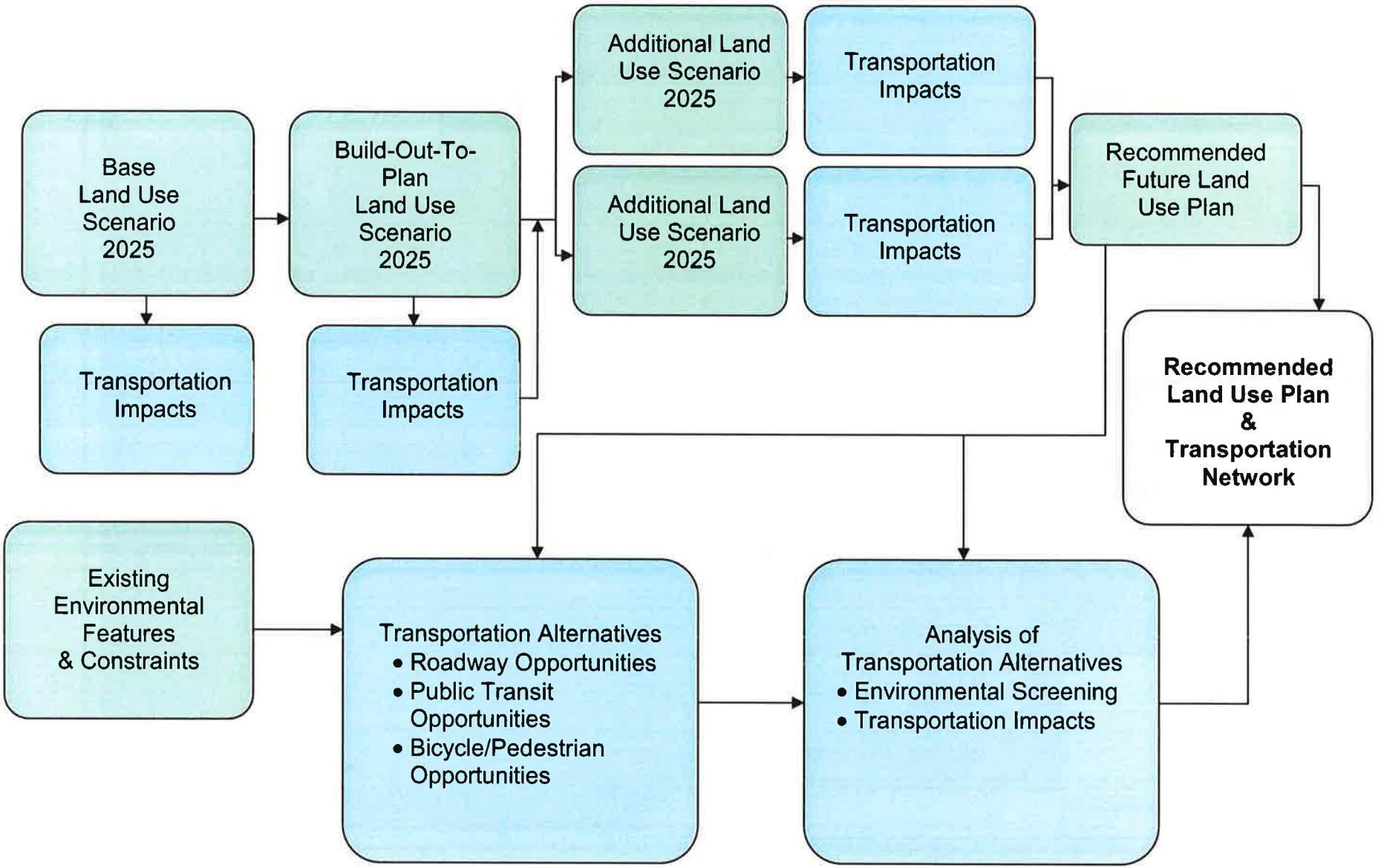


Figure I-2 – Study Process Flow Chart



and then modeled to determine their effects on travel in the study area.

Based on the study team's findings, the PAC recommended that Alternative #3, the centerpiece of which is a controlled access parkway, be developed by DelDOT. This alternative includes a number of short-, mid-, and long-term improvements. (See Chapters III and IV.) Figure I-2 on page 8 summarizes the study process.

2. Tools

The study team used several state-of-the-art transportation modeling programs to achieve quantifiable, reliable forecasts of system performance and travel behavior, as well as an accurate depiction of existing conditions.

TranPlan, a statewide travel demand forecasting model, uses four sequential steps to predict future travel based on known information. For the SR 1 study, TranPlan applied population and employment forecasts from the University of Delaware and DelDOT's summary traffic counts to the transportation network to determine where trips probably began and ended; what percentage used automobile, bus, bicycling, or walking; and what routes they took. DelDOT also developed a subarea model of this statewide model to focus on the SR 1 study area. The subarea model provided more refined travel analysis zones and greater detail for roadways.

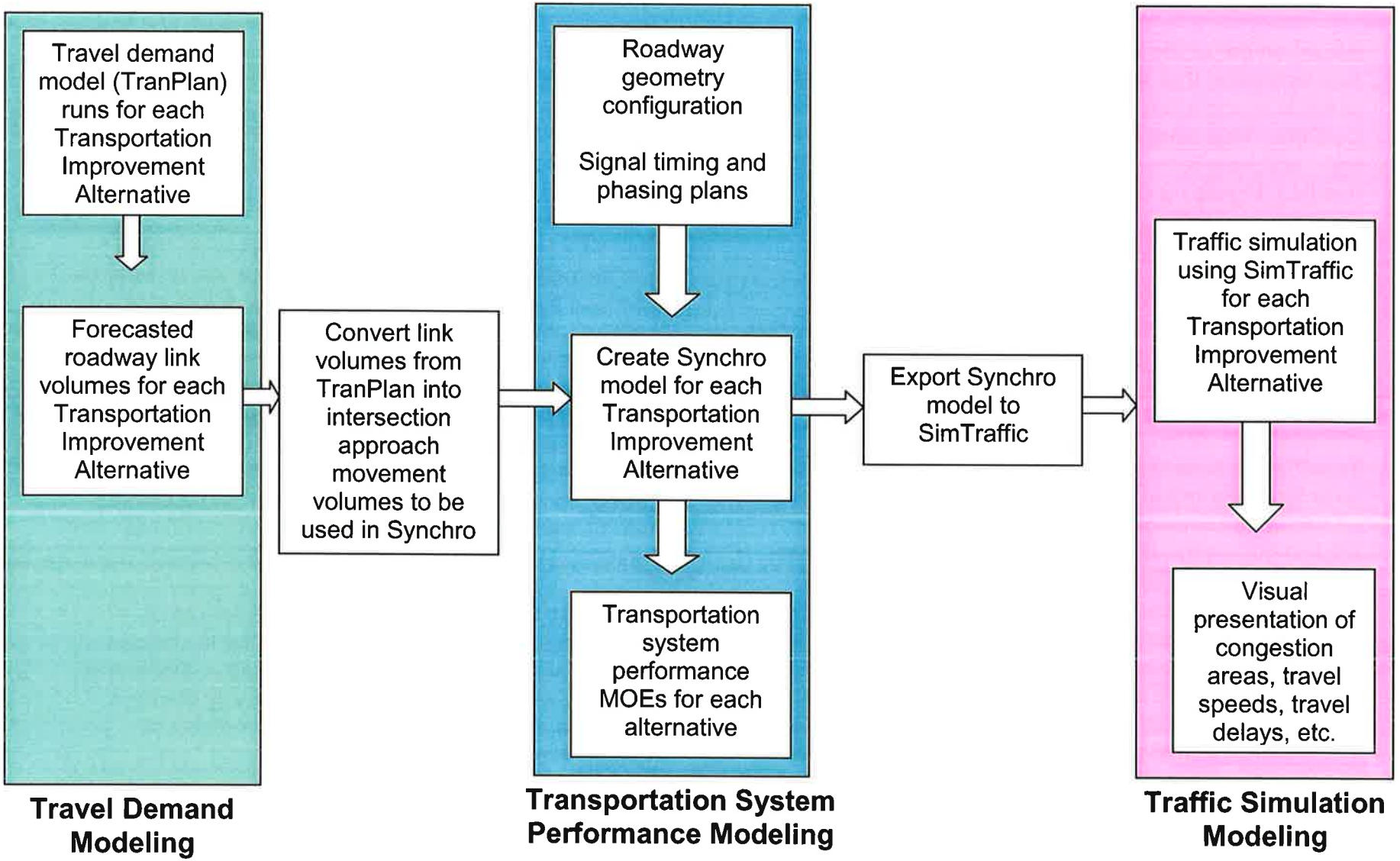
This subarea TranPlan model network was modified to incorporate committed transportation projects in the SR 1 study area that have not yet been built. This includes the addition of a third lane on SR 1, planned intersection improvements, and a north/south freeway on US 113. This model network was particularly useful in analyzing "what-if" scenarios for land use changes and transportation improvements and estimating the resulting impacts on travel patterns. TranPlan's major outputs for this study were average daily traffic on roadways and origin and destination patterns.

The study team then used **Synchro 5.0** to analyze corridor/network performance, given the travel patterns identified by TranPlan. Inputs to Synchro included roadway geometry (number of lanes, width, length, etc.), turning movement counts, and signal timings. The model then reported important measures of effectiveness (MOEs) like level of service (how well traffic is moving), vehicle delay, and the effects of traffic on air quality. Synchro was used in the SR 1 study to model intersections (with and without signals) and diamond interchanges, to calculate capacity, and to optimize traffic signals.

SimTraffic 5.0 is designed to model networks of signalized and unsignalized intersections to check and fine tune traffic signal operations. Because this model includes road network animation, it visually displays delay, speed, and lines of waiting automobiles at intersections.

The use of these models is diagrammed in Figure I-3 on the following page.

Figure I-3 – SR 1 Modeling Process



E. Organization of Report

Because the agreement between Sussex County and DelDOT is to concur on a land use scenario and then develop a transportation network to support it, Chapter II addresses the development of land use scenarios. Chapter III discusses the transportation alternatives that were considered to support the preferred land use scenario, with emphasis on the recommended alternative. Chapter IV describes the elements of the transportation plan in greater detail, Chapter V covers the screening for environmental constraints, and Chapter VI describes how the public was actively involved in these decisions. Chapter VII briefly outlines the next steps in the project development process.

The technical appendix to this report has been bound separately. Its contents are listed below.

Appendix I (Introduction)

- Memorandum of Agreement between the Delaware Department of Transportation and Sussex County Council related to the State Route 1 – Land Use/Transportation Study

Appendix II (Land Use Scenarios & Travel Conditions)

A. Refining Traffic Analysis Zones and Distributing Demographics (technical memorandum)
B. Base Land Use Scenario Trip Generation (technical memorandum)
C. Trip Generation for the Build-Out-To-Plan Land Use Scenario (technical memorandum)
D. Expanded Development District Land Use Scenario Trip Generation (technical memorandum)
E. Land Assembly Exercise for the Activity Center Land Use Scenario (technical memorandum)
F. Activity Center Trip Generation (technical memorandum)
G. Activity Center Alternatives Comparison (technical memorandum)
H. Preferred Land Use Scenario Trip Generation (technical memorandum)
I. Comparative Traffic Analysis for the Base & Build-Out-To-Plan Land Use Scenarios (technical memorandum)
J. Comparative Traffic Analysis for the Build-Out-To-Plan and Expanded Development District Land Use Scenarios (technical memorandum)
K. Comparative Traffic Analysis for All the Land Use Scenarios (technical memorandum)

Appendix III (Transportation Alternatives)

A. Development of the Transportation Alternatives (technical memorandum)
B. Signal System Optimization (technical memorandum)
C. Transportation Alternatives 1A and 1B Analysis (technical memorandum)
D. Transportation Alternative 2 Analysis (technical memorandum)

E. Transportation Alternative 3A Analysis (technical memorandum)
F. Transportation Alternative 3B Analysis (technical memorandum)

Appendix IV (Land Use & Transportation Plan)

- Transportation Improvements Comparison (technical memorandum)

Appendix V (Environmental Screening)

- Environmental Screening Technical Memorandum

Appendix VI (Public Involvement)

A. Summary of Public Advisory Committee Meetings
B. Summary of Question-and-Answer Sessions from Public Meetings
C. Public Comment Log
D. Presentations for Public Advisory Committee Meetings
E. Presentations for Public Meetings

II. LAND USE SCENARIOS & TRAVEL CONDITIONS

A. Current Travel and Development

The first step in determining what could be is to determine what already exists. This information then provides the basis for projecting into the future with a reasonable level of confidence that the results will be not only possible, but also probable.

The study team used the employment and population database from the University of Delaware's Population Consortium to establish baseline demographics for the study area, including number of people, number of jobs, and number of dwelling units.

The study team also analyzed Sussex County's tax parcel maps overlaid with zoning information to identify current land uses and development potential. In addition, Sussex County provided detailed information for each commercial or residential development proposed or under construction, including gross floor area, type of retail/commercial use, number of housing units, number of rooms in motels, etc., as appropriate. The study team then prepared an aerial map depicting:

- Current land use
- Vacant residential land
- Vacant commercial land
- Proposed residential or commercial development
- Open space (preserved agricultural land or state-owned land).

The study team had available traffic counts from the Grid Concept Study completed by DelDOT in 1999 as well as the results of an extensive data collection and tabulation conducted during the summer of 2000 as part of a Transportation Operations Management Plan for Sussex County.

B. Base Land Use Scenario & Travel Conditions (Year 2025)

Because one of this study's goals is to develop a land use and transportation plan to sustain the study area through 2025, incorporating information on proposed land development and transportation improvements into the analysis was important. This scenario, which represents the "best case" scenario for future growth in the study area, assumes that all existing development, new development under construction, and proposed development in the review process would be in place by 2007, but that no growth would occur beyond that already identified.

All travel information was projected for the year 2025 to analyze future roadway system performance. The study team then estimated the additional travel demand based on the development proposed or under construction in the study area. Traffic analysts used the Institute of Transportation Engineers' *Trip Generation Manual* to determine the number of trips that could be expected during the Saturday peak hour based on the

establishment types identified for the Base Land Use Scenario. This included the total number of trips and entering and exiting trips for all land development proposed or under construction. Trip generation was based on the number of dwelling units for residential development and the amount of gross floor area for commercial properties, as well as their type (for example, free-standing discount store).

This analysis indicated that 6,482 new Saturday peak-hour trips would be added to the transportation network simply from pending development; of these, 4,350 trips would be generated by new commercial development (100 acres of new commercial properties) and 2,131 trips would result from residential growth (3,129 new residential units). In addition to trips generated by new and proposed development, the study team used the TranPlan model to develop forecasts of background traffic, which accounts for regional growth trends.

The Synchro model was then used to determine how well the transportation system would be able to accommodate these additional trips. A common performance measure – level of service (LOS) – was assigned to signalized intersections in the study area. At an intersection with LOS A, drivers experience little or no delay; an intersection at LOS E or F has unacceptable delays.

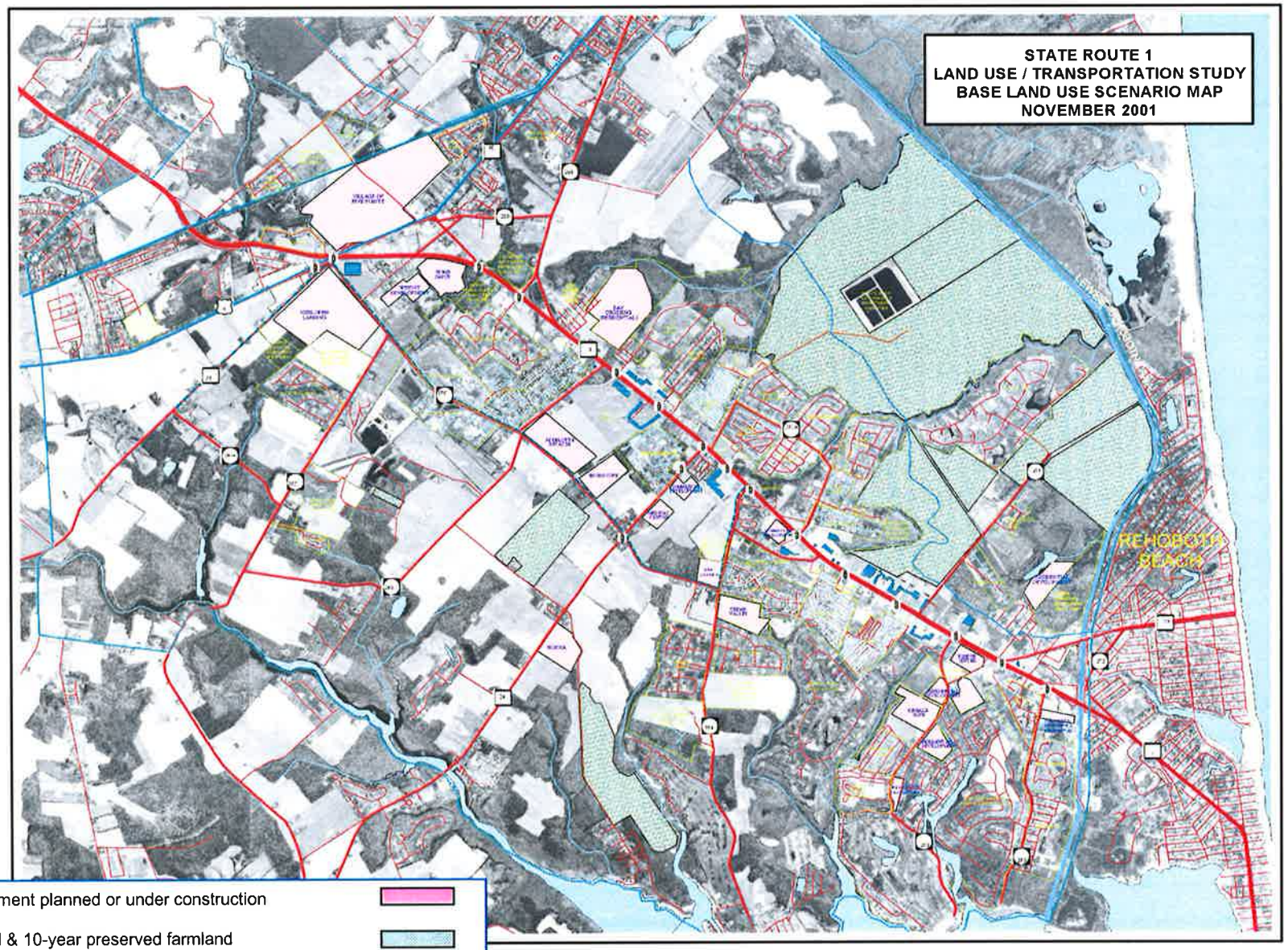
The results were grim, but not surprising. Because local traffic would have little alternative to using SR 1, the increase in both through and local traffic would cause the overall performance of all the signalized intersections in the study area to deteriorate, leading to longer delays and backups on streets feeding local traffic onto SR 1.

Of the 17 signalized intersections on SR 1 within the study area:

- Only two intersections would continue to operate at the same acceptable level of service in 2025.
- Eleven intersections that are operating at an acceptable level now would get much worse (i.e., go from LOS A to D or to LOS E or F).
- Four intersections that were already failing in 1998 (operating at a level of service E or F) would continue to fail, with even longer delays and lines of waiting cars.

Overall the analysis shows that the transportation system cannot handle the forecasted future traffic that would be generated by the Base Land Use Scenario.

Figure II-1 – Base Land Use Scenario



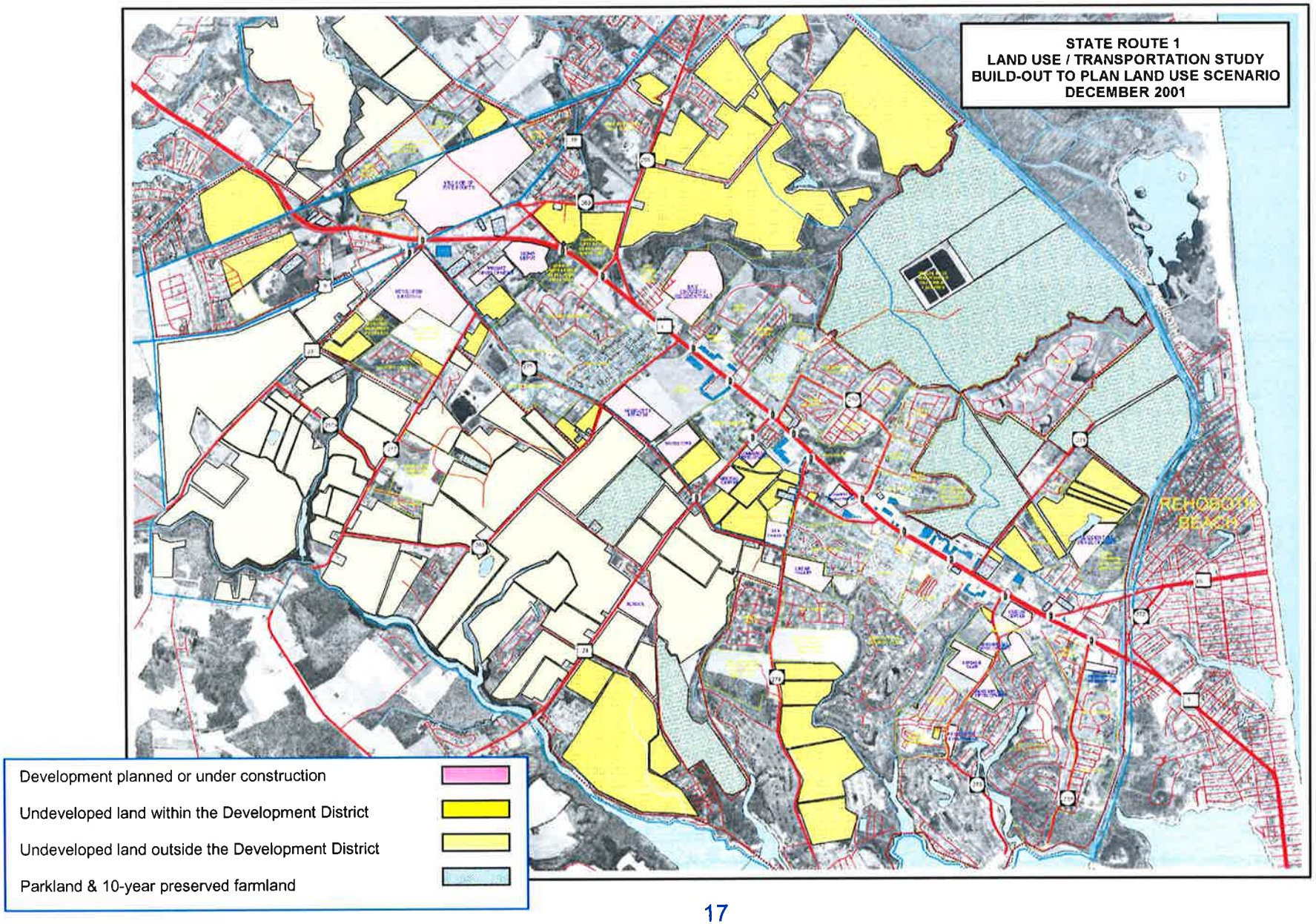
C. *Build-Out-To-Plan Land Use Scenario (Year 2025)*

Assuming that only the development currently under way or planned will occur in the next 25 years is unrealistic, of course. People will continue to move to Delaware and they will continue to need housing, community facilities and services, and the everyday necessities of life. Tourism will continue to attract visitors, and they will be looking for even more restaurants, shopping, and entertainment in addition to the delights of the ocean.

In the "best case" land use scenario, no additional development would occur beyond that under way and planned in the base scenario. However, for transportation planning purposes, consideration of a "worst case" scenario, or full build-out of the study area according to current zoning and the Comprehensive Plan, is appropriate. The 2025 Build-Out-To-Plan Land Use Scenario assumes that all parcels of land in the study area would be developed according to their current zoning (stores would be built on all commercially zoned parcels, housing on all residentially zoned parcels, etc.). Although this scenario is not likely to be in place by the year 2025, constraints inherent in the transportation models require that it be treated as if it is. It is reasonable to assume that actual growth within the study area by 2025 will be somewhere between the "best case" (Base Land Use Scenario) and the "worst case" (Build-Out-To-Plan Land Use Scenario).

The Build-Out-To-Plan Land Use Scenario is shown in Figure II-2 on the following page.

Figure II-2 – Build-Out-To-Plan Land Use Scenario



In addition to level of service, transportation planners use a number of other measures to determine how well a transportation system performs. Some of the most common are:

- Vehicle miles traveled (VMT) – the total number of miles driven by all motorists
- Vehicle hours traveled (VHT) – the total number of hours spent driving by motorists
- Average speed
- Signal delay at intersections.

Table II-1 shows the results when travel was measured on the network assuming growth under the Base and Build-Out-To-Plan land use scenarios. The changes in these measures are illustrated in Figures II-3 – II-5.

Table II-1 – Network Results

Network Measure	1998 Existing Condition	2025 Base Land Use *"Best Case"	2025 Build-Out-To-Plan **"Worst Case"
VMT	40,904	65,726	91,381
VHT	2,940	9,256	27,832
Average Speed	13.91 mph	7.10 mph	3.28 mph
Total Signal Delay	2,001 hrs	7,749 hrs	25,692 hrs
Signal Delay/Veh.	46 sec	112 sec	279 sec

* Represents "Best Case" Future Scenario – no additional development in study area occurs beyond what is currently in the "pipeline"

** Represents "Worst Case" Future Scenario – all vacant and currently farmed land in study area is developed under current zoning and land use plan to fullest potential

VMT would increase by 123% during the Saturday morning peak hour between 1998 and the 2025 Build-Out-To-Plan Land Use Scenario, and VHT would increase at an even more alarming rate, 846%. The implications for travel are serious. These increases indicate extreme congestion in the study area. Under the 2025 Build-Out-To-Plan Land Use Scenario, motorists would be moving very slowly and would be spending a very long time in traffic.

Figure II-3 – VMT and VHT

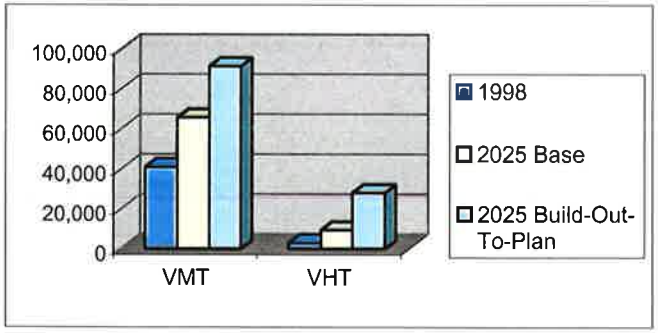


Figure II-4 – Average Speed

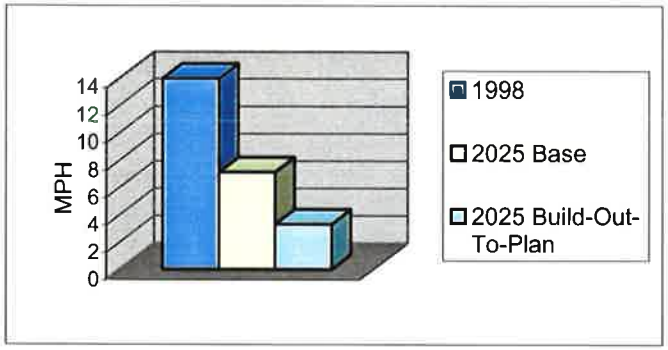
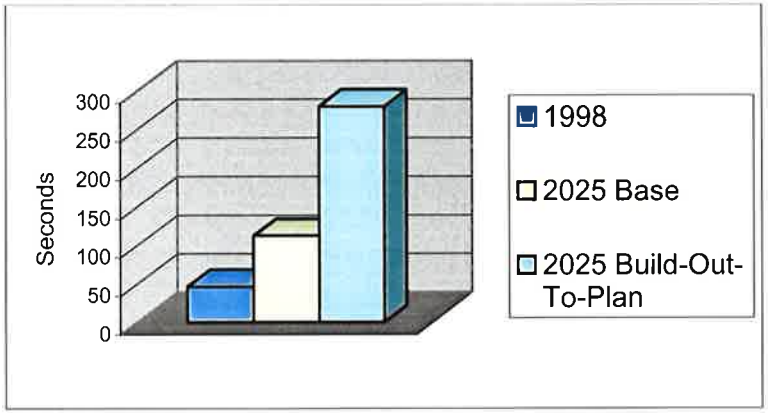


Figure II-5 – Signal Delay/Vehicle

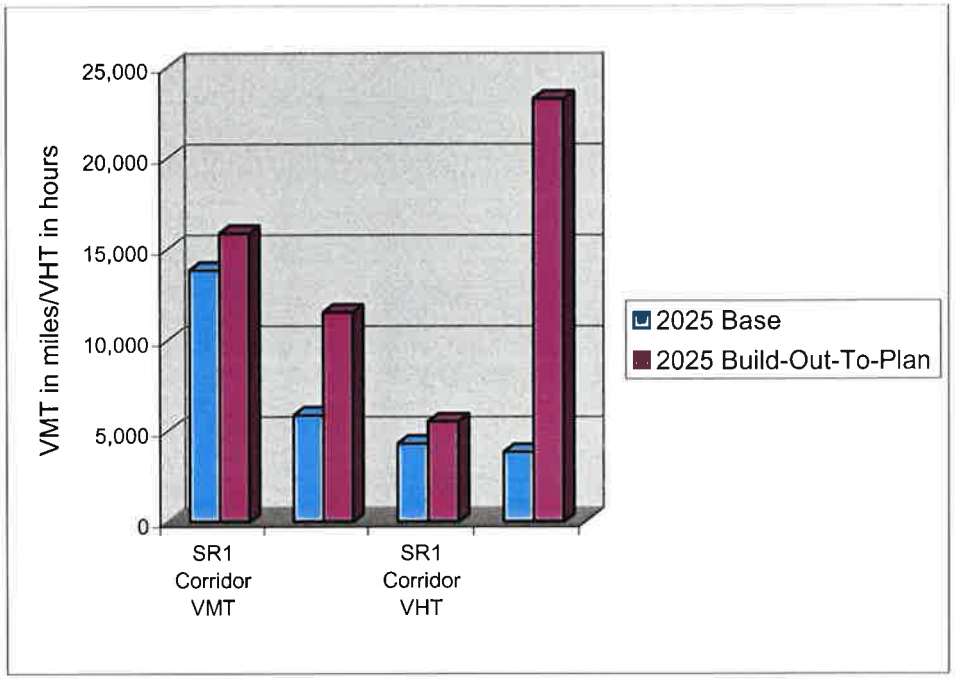


This comparative analysis shows that the study area's transportation system could not accommodate the "best case" scenario, and it would be functionally obsolete under the "worst case" scenario.

Under the 2025 Base Land Use Scenario, SR 1 would carry 70% of the VMT in the entire study area. In the Build-Out-To-Plan scenario, however, SR 1 would carry only 58% of the VMT. Because the corridor would become saturated with vehicles, the model indicates that much of the traffic would shift to local roadways in an effort to avoid excessive congestion and delay.

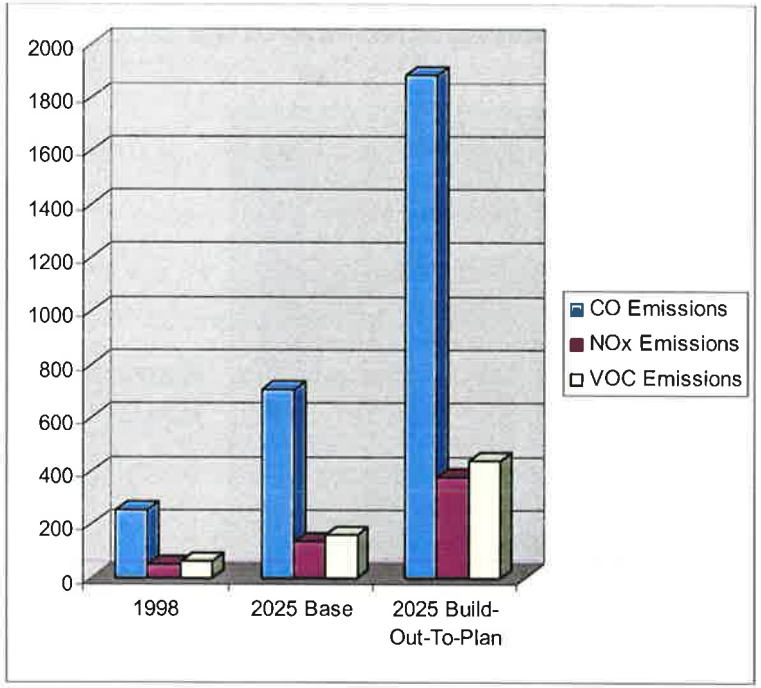
As Figure II-6 shows, while VMT does go up, the most significant change is a much greater increase in VHT, indicating rapidly increasing congestion. This is an important qualify-of-life effect.

Figure II-6 – Comparison of VMT and VHT for SR 1 Corridor and Remaining Roadways in the Study Area



Other quality-of-life factors include an overall increase in fuel consumption within the study area and a corresponding increase in toxic emissions. The table on the next page shows that emissions from carbon monoxide (CO) and the two components that create ozone (NO_x and VOC) would increase by 178%.

Figure II-7 – Air Quality Effects



The conclusion is unavoidable. The current and programmed transportation network in the SR 1 study area would not be able to sustain projected 2025 travel demand, with or without a full build-out.

D. Alternative Land Use Scenarios Considered

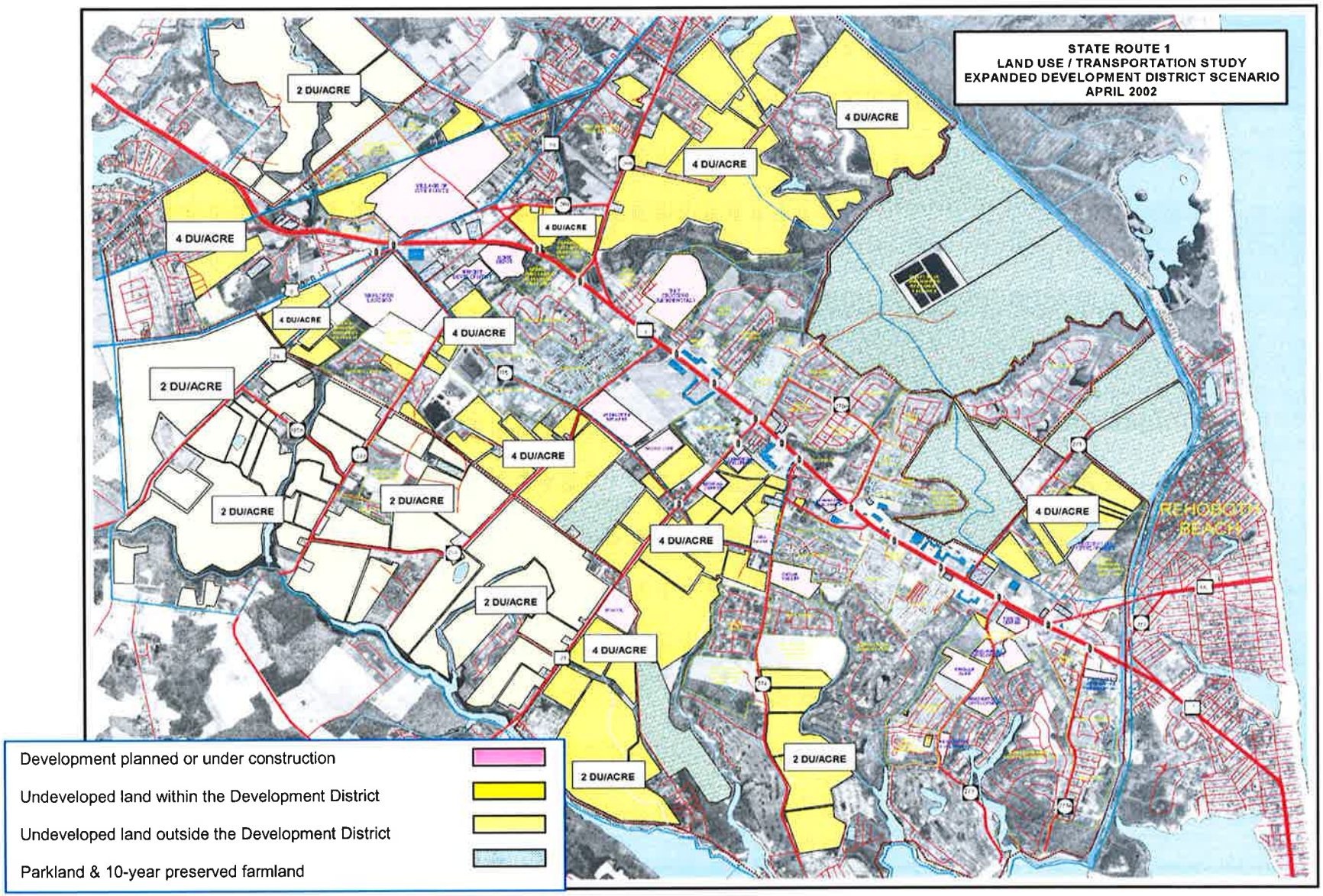
After a number of meetings dedicated to educating the PAC about land use options and their effects on both travel and quality of life in general, PAC members requested that the study team present a number of options for them to respond to rather than the PAC's creating its own land use scenario. The study team offered two land use scenarios for review and comment (in addition to the Build-Out-To-Plan Land Use Scenario). These scenarios were developed working with Sussex County and were based on discussions about its Comprehensive Plan Update. They also reflected the smart growth concepts stressed at the University of Delaware's seminar on "Sustainable, Integrated Land Use and Transportation Planning in Coastal Sussex County." (See Chapter VI, Public Involvement.)

1. Expanded Development District Scenario

This scenario would involve expanding the Development District to permit greater housing density in land zoned for agricultural/residential use (AR-1). Although it was not ultimately adopted, Sussex County was considering this change as part of its Comprehensive Plan Update. More specifically, this scenario would include:

- An expansion of the Development District to lands south of Road 275 (from SR 23 to Road 274), changing the permitted density from two dwelling units to four dwelling units per acre.
- An expansion of "environmentally sensitive developing land," reducing the development density on parcels east of Road 274 and east of SR 24 from four dwelling units to two dwelling units per acre.
- The development of commercial land according to current zoning (the same as the Build-Out-To-Plan Land Use Scenario).

Figure II-8 – Expanded Development District Land Use Scenario



2. Multi-Use Activity Centers/Villages in an Expanded Development District

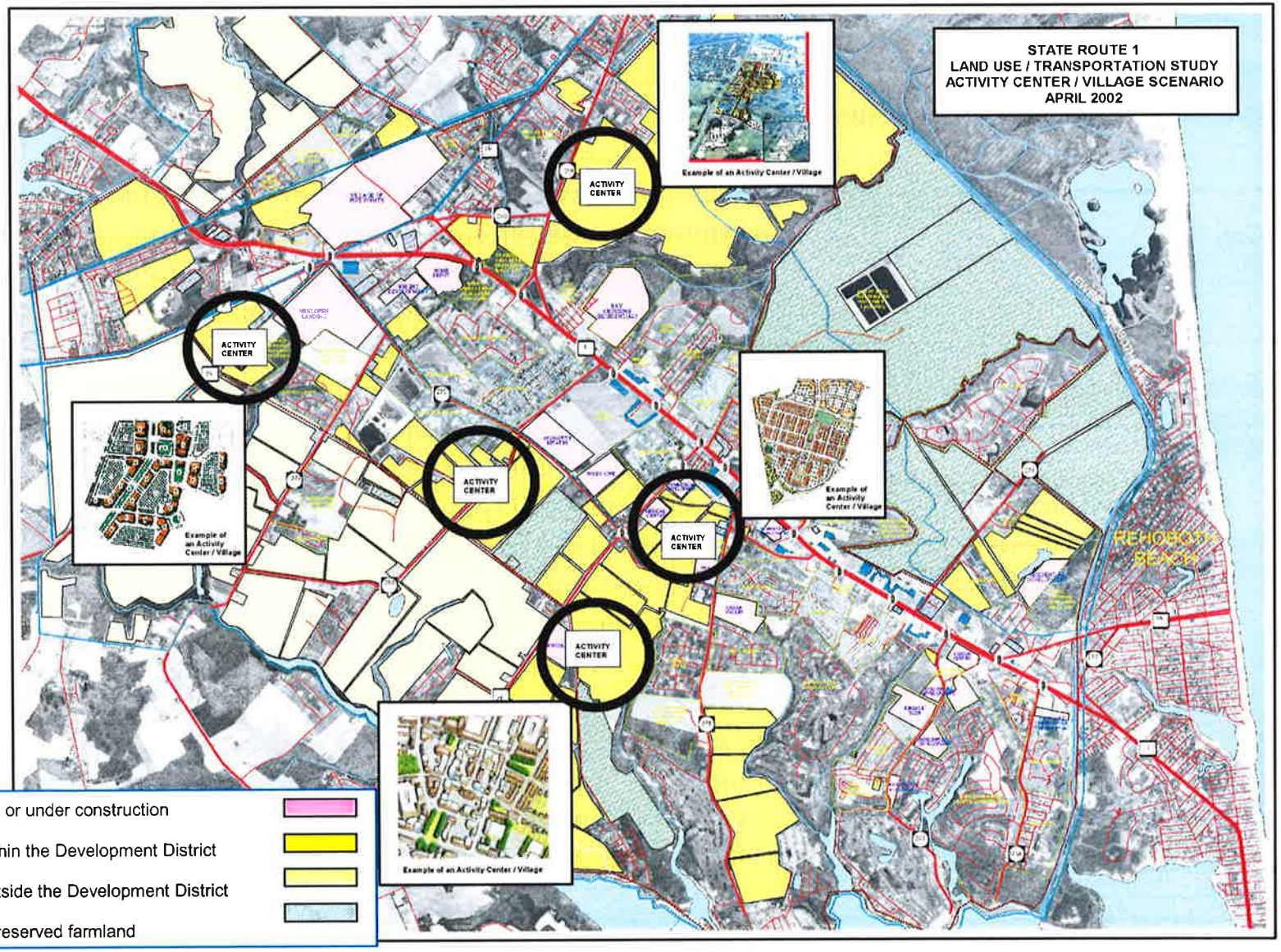
This scenario uses the same growth assumptions as the Expanded Development District Scenario, but would cluster most of the new development in compact, mixed-use areas to reduce the number and length of trips residents must make. This concept would also make alternative modes (walking, bicycling, and transit) more convenient and feasible.

Specifically, this scenario assumes:

- New development would occur in multi-use centers or villages.
- These centers would include neighborhood retail establishments and a mix of housing types in a more compact form with planned open space.
- Land outside the activity centers would develop at a reduced density of one dwelling unit per acre and the rest of the units allowed under zoning and an expanded Development District would transfer into the center; the greater density within the centers would compensate for a reduced density outside them.
- Commercial land would develop according to current zoning (as in the Build-Out-To-Plan Land Use Scenario).

The study team proposed five multi-use activity centers. Because this is a conceptual study, their exact locations were not identified. However, it was assumed that one would be near Lewes, one near the new school planned on SR 24, one near the site of the new Beebe Medical Center (also on SR 24), one near SR 23, and one near Road 283 (Cedar Grove Road). This alternative is shown in Figure II-9 on the following page.

Figure II-9 – Multi-Use Activity Centers/Villages in an Expanded Development District



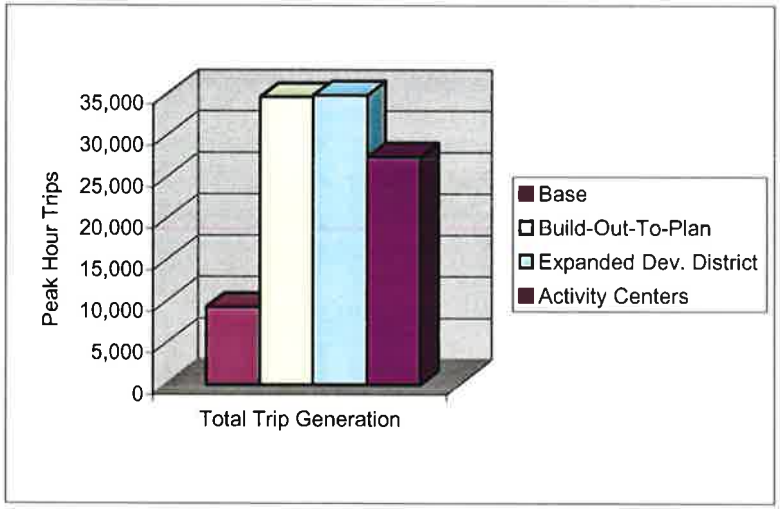
The land use scenarios are summarized in Table II-2.

Table II-2 – Summary of Land Use Scenarios

Scenario	Residential Units	Other Uses
Base	3,129 units	100 acres hwy commercial
Build-Out-To-Plan	Base Scenario plus 17,881 units	Base Scenario plus 103 acres hwy commercial
Expanded Development District	Base Scenario plus 18,103 units	Base Scenario plus 103 acres hwy commercial
Activity Centers/Villages	Base Scenario plus 18,103 units: 12,970 in villages & 5,133 outside	**Base Scenario plus 103 acres commercial, 9.4 acres village retail, 107 acres internal roads, open space**

One of the most important questions from the perspective of a land use and transportation study is how well the current transportation network would accommodate the travel demand generated in each of these scenarios. Transportation modeling revealed that an Expanded Development District Scenario would offer no improvement over the "worst case" Build-Out-To-Plan Land Use Scenario; it would in fact add trips and travel time. The Activity Center/Village Scenario, on the other hand, would generate almost 21% fewer trips, as Figure II-10 shows.

Figure II-10 – Trips Generated by Land Use Scenarios



To gauge the impact of these land use scenarios on the current transportation system, the study team applied the same measures of effectiveness used to determine the effects of the base land use scenarios: vehicle miles traveled, vehicle hours traveled, average speed, and signal delay per vehicle, among others. The network-wide results for the Saturday AM peak hour are shown in Figures II-11 – II-14.

Figure II-11 – Vehicle Miles Traveled

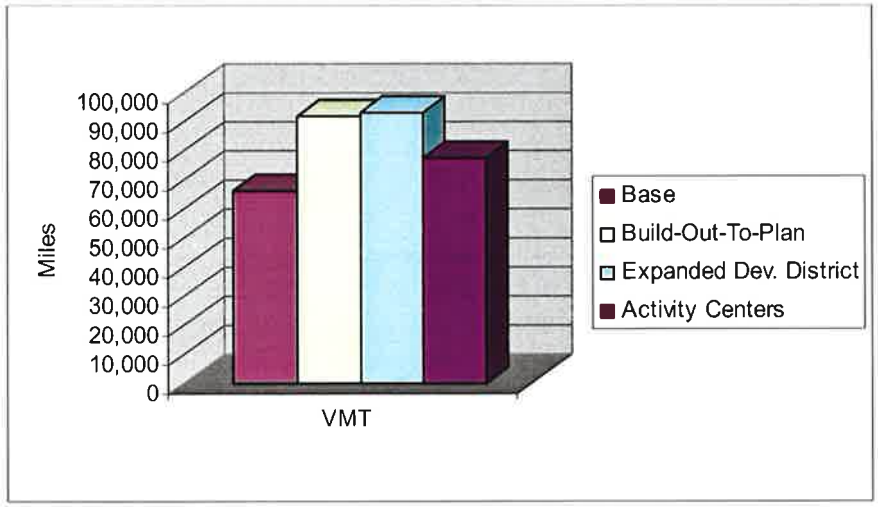


Figure II-12 – Vehicle Hours Traveled

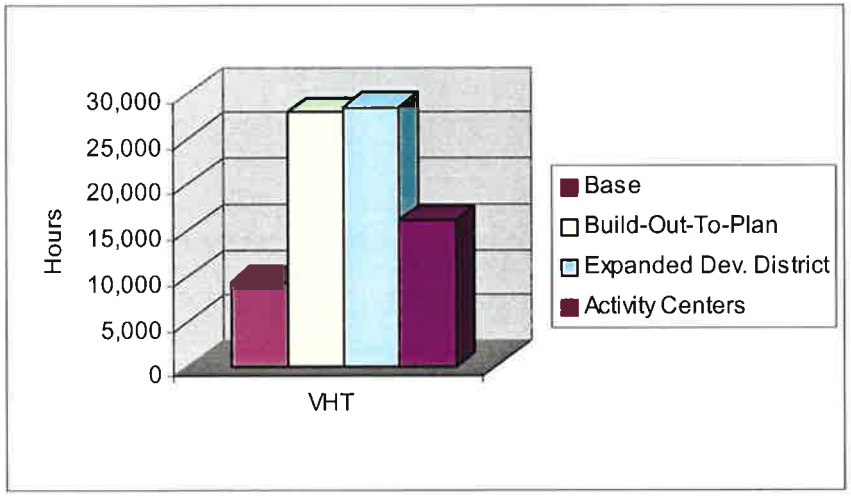


Figure II-13 – Average Speed

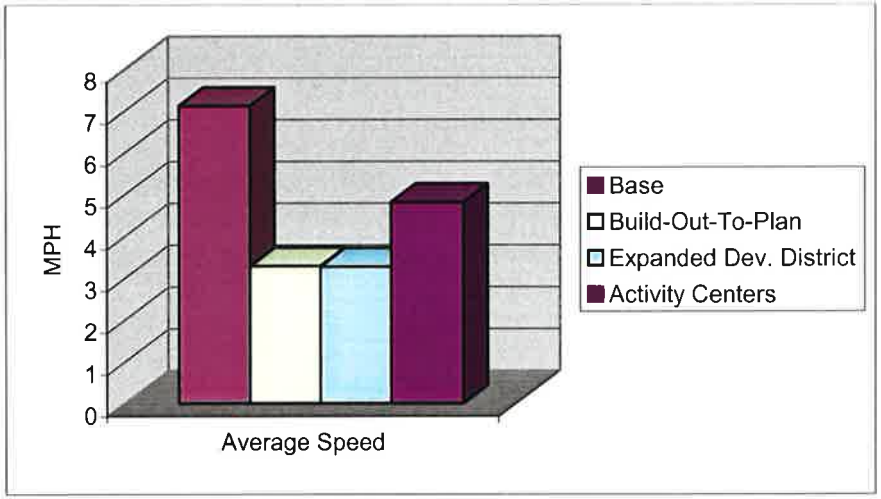
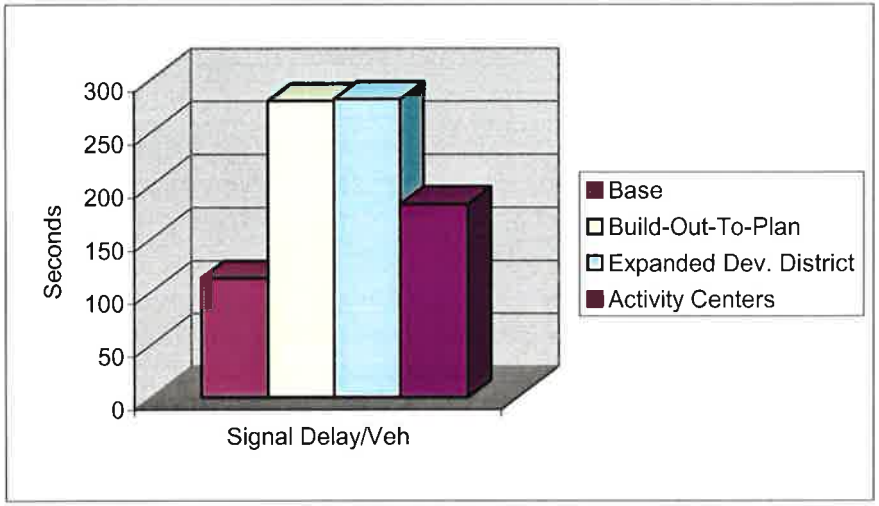


Figure II-14 – Signal Delay/Vehicle



While the Expanded Development District, Build-Out-To-Plan, and Activity Center/Village land use scenarios have similar development potential, the Activity Center/Village Scenario would have a markedly lower impact on the transportation system.

Of course, the study area includes roadways other than SR 1. The study team assessed the impacts of these various land use scenarios on SR 1, Road 275, SR 18, and SR 24.

Under the Base Land Use Scenario, 70% of the VMT in the study area would occur on SR 1. This would be primarily through-travel to the beaches and traffic to the outlet malls and other commercial development on SR 1. Comparatively less local traffic would originate within the study area.

Under the Build-Out-To-Plan and Expanded Development District scenarios, however, the share of VMT on SR 1 would drop to 58%. Local traffic would increase significantly due to development. The share of VMT carried by SR 1 would fall because the highway would become saturated with traffic. Motorists would seek other roadways to complete their trips.

Under the Activity Center/Village concept, the share of VMT on SR 1 would decrease somewhat because residents would be able to satisfy some of their everyday needs without using that roadway.

These travel effects are shown in the following figures.

Figure II-15 – Vehicle Miles Traveled on SR 1 vs. on the Remaining Roadways in the Study Area

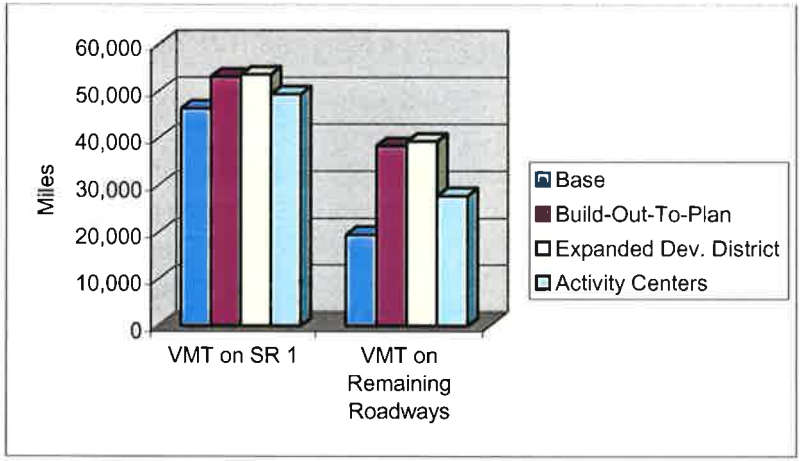
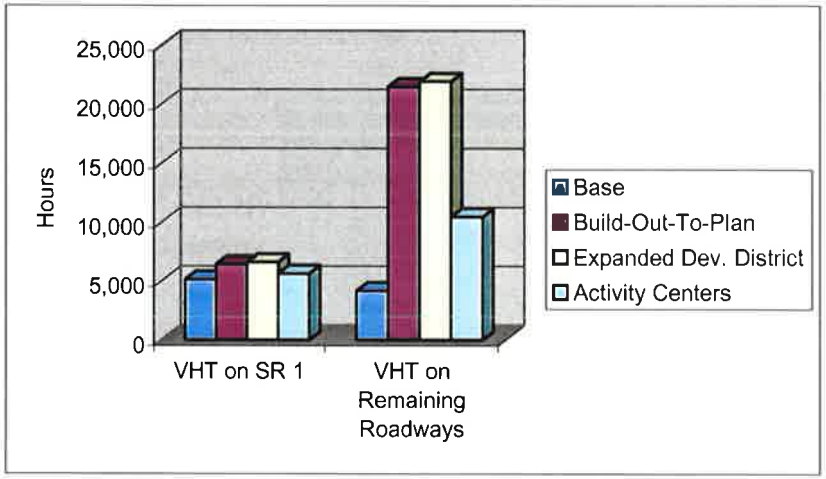


Figure II-16 – Vehicle Hours Traveled on SR 1 vs. on the Remaining Roadways in the Study Area



A small increase in the share of VMT (3%) carried by Road 275 under the Expanded Development District Scenario as compared to the Build-Out-To-Plan Scenario would have significant effects. VHT on Road 275 would increase by 12% and total signal delay would rise by 13%.

Comparing the Activity Center/Village Scenario to the Expanded Development District Scenario reveals that all the measures of effectiveness would improve (lower VMT, VHT, and signal delay and higher speeds), mainly because the number of internal trips would increase as a result of compact, mixed-use development.

Figure II-17 – Vehicle Miles Traveled on Road 275

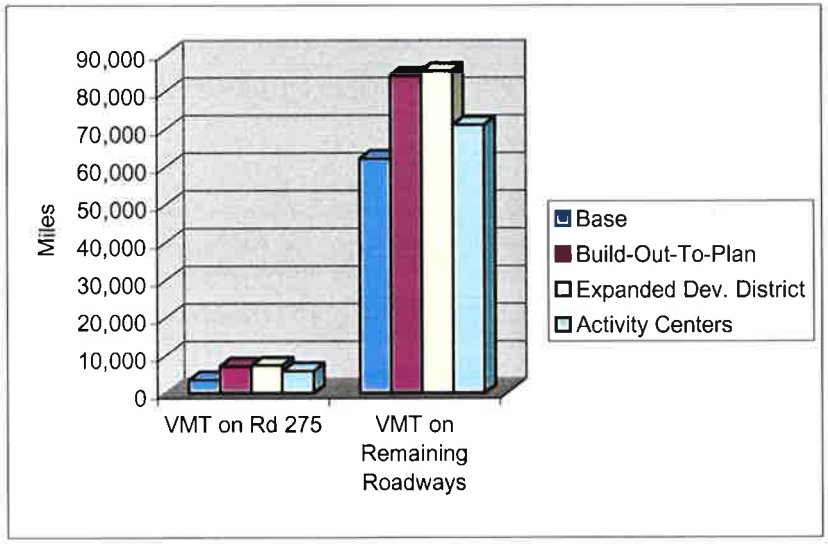
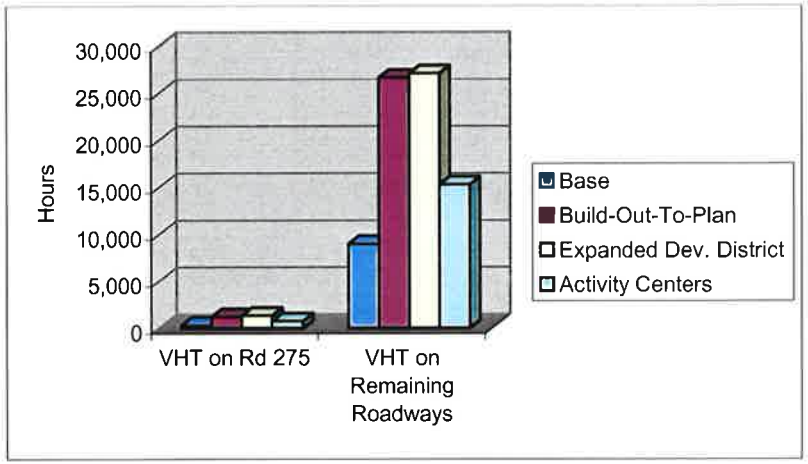
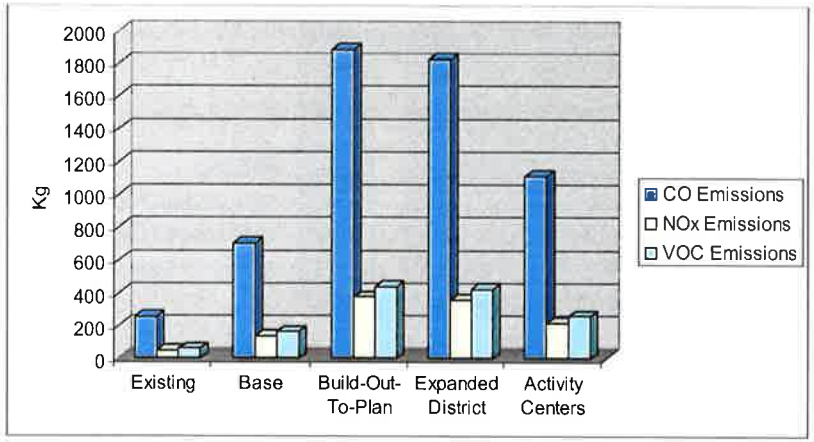


Figure II-18 – Vehicle Hours Traveled on Road 275



The effects on air quality of each of the land use scenarios show similar results. Although unwanted emissions would increase with significant increases in development, the results would be relatively less under an Activity Center/Village Land Use Scenario, as Figure II-19 illustrates.

Figure II-19 – Land Use Scenario Effects on Air Quality

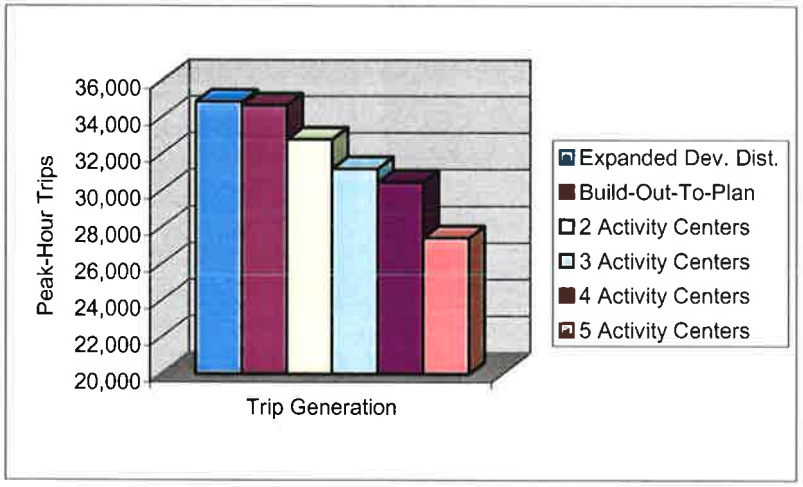


The Public Advisory Committee agreed that the Activity Center/Village Land Use Scenario offers significantly fewer traffic impacts compared to the Expanded Development District and Build-Out-To-Plan scenarios. However, its members did not want to see the Development District increased under any scenario because they believed that might lead to even greater suburban sprawl. The PAC asked the study team to develop an Activity Center Land Use Scenario that would not require expanding the Development District.

As a result, the revised Activity Center Land Use Scenario was restricted to only the two activity centers located within the existing Development District, significantly limiting the effectiveness of this approach. These two activity centers would be able to accommodate only 29% of the new residential development anticipated in the study area (compared to 72% in the original Activity Center Scenario), leaving most of the development to continue to occur in a sprawl pattern and most of the new residents to continue to rely on access to SR 1 for almost all their needs.

Given these limitations, the study team presented other options, including alternatives that would include only the land associated with the new activity centers in a new Development District. The team reviewed the advantages and disadvantages of three, four, and five activity centers, including the number of trips that would be made internally for each and the number of overall trips that would be generated for each. The previously modeled alternative with five activity centers was clearly superior in terms of trips generated.

Figure II-20 – Trip Generation for Activity Center Options

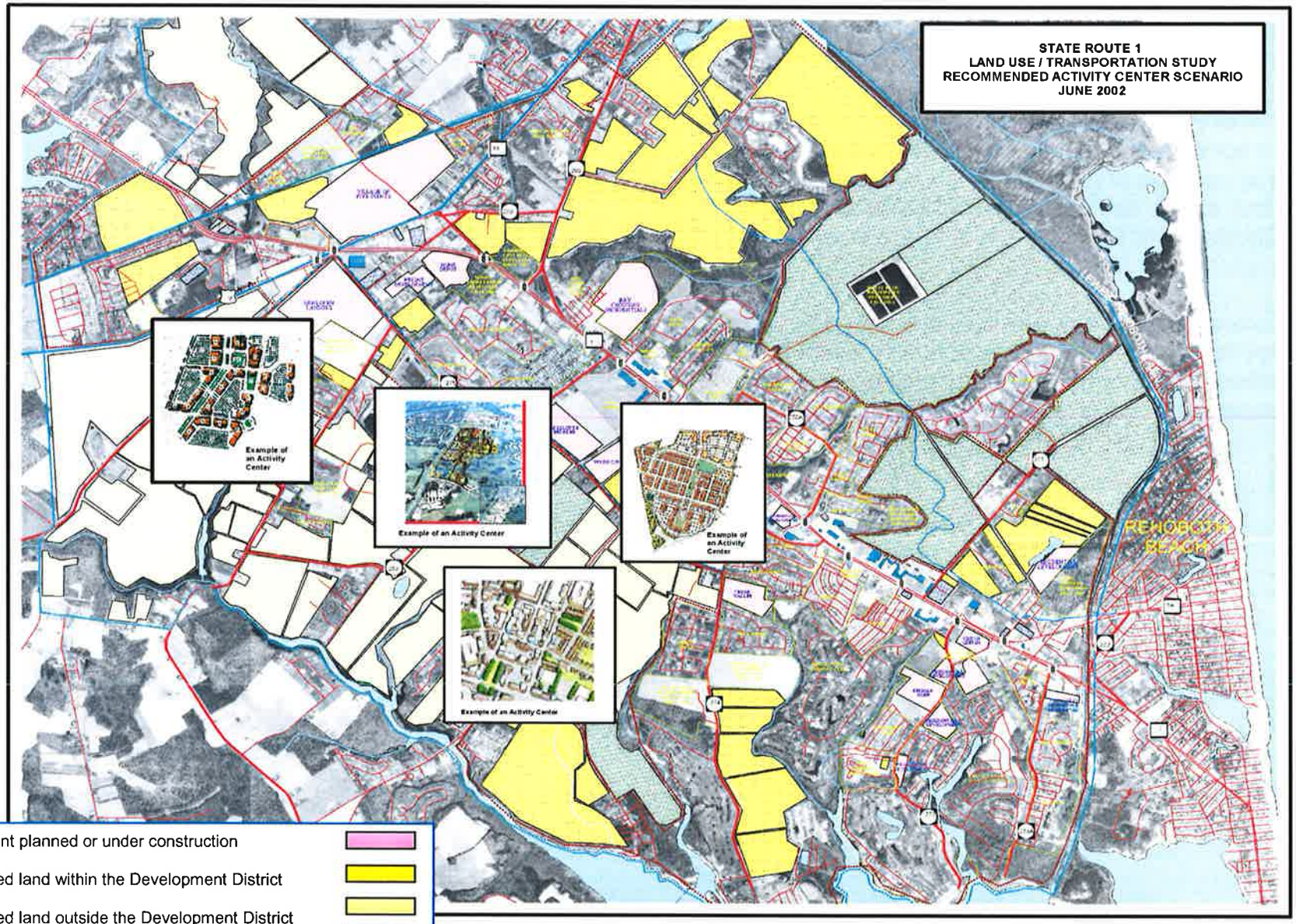


When considering the number of activity centers, the PAC indicated that, even though undeveloped land exists near Lewes and to the east of SR 1, it would prefer not to have an activity center in those locations.

Review of these results and detailed discussion led to the PAC's concurrence with the study team's final recommendation of the Activity Center/Village concept with four activity centers that would be considered part of the Development District as the land use scenario recommended in the plan.

This scenario is illustrated on the following page. The transportation alternatives developed to support it are described in Chapter III, and the complete Land Use and Transportation Plan is presented in Chapter IV.

Figure II-21 – Recommended Land Use Scenario – Activity Centers/Villages



III. TRANSPORTATION ALTERNATIVES

A. Identifying the Problems

Discussions about transportation problems in the study area and possible solutions began with comments from the public and continued with detailed deliberation by the Public Advisory Committee and the study team. The travel demand modeling conducted by the study team as part of the development of land use scenarios was also used for this effort and provided an excellent quantitative background for this dialogue. As the recommendations became more detailed, more technical analyses were performed to quantify the findings and support or contradict hypotheses.

The study team began this aspect of the work by identifying the general problem statements it had heard from the public and the PAC and supporting these statements with traffic analyses, as follows:

What we have heard: Serious problems at Five Points intersection

What traffic analysis shows:

- Failing signalized intersection under existing conditions with heavy backups. By 2025, intersection delay will be more than 225 seconds.
- By 2025, the maximum volume-to-capacity ratio will be more than three along the SR 1 approaches. (A V/C ratio of one indicates no available capacity.)

What we have heard: Congestion & delays on SR 1

What traffic analysis shows:

- Traffic volumes under existing conditions for the Saturday AM peak hour exceed capacity along SR 1 between Five Points and Rehoboth Avenue.
- By 2025, the corridor will be saturated, with excessive congestion; average speed along the corridor will drop as low as 8 mph while the total corridor signal delay could go as high as 5,394 hours in 2025 compared to 945 hours under existing conditions (1998).

What we have heard: Difficult access from side streets onto SR 1

What traffic analysis shows:

- Under existing Saturday AM peak hour conditions, through and left-turn approaches from all but two of the side streets that intersect SR 1 are near failing (LOS E) or failing (LOS F).
- By 2025, the side streets will experience even greater delays and backups, directly affecting the quality of life for residents.

What we have heard: Congestion and delays at entrance to Rehoboth Beach

What traffic analysis shows:

- The signalized intersection is failing under existing conditions, with heavy backups. By 2025, the intersection delay will be more than 275 seconds per vehicle.
- By 2025, the volume at the intersection will be almost twice the actual intersection capacity.

What we have heard: Problems with accommodating through traffic

What traffic analysis shows:

- Under existing summer Saturday AM peak hour conditions, through traffic is a major component of current SR 1 traffic volumes. Of the SR 1 traffic passing through Five Points, only 27% is destined for Dewey Beach and points south. The remaining traffic is going to the outlet malls and other attractions along SR 1 or is local traffic.
- By 2025, due to a significant increase in local traffic from development and saturation of the SR 1 corridor (with excessive delays and backups), SR 1 will discourage through traffic. Through traffic will be shifted to alternative roadways like US 113.

What we have heard: Lack of pedestrian mobility

What traffic analysis shows:

- SR 1 lacks a continuous sidewalk system.
- There are no pedestrian overpasses despite the width of the highway and commercial attractions on both sides.

What we have heard: Poor performance of intersection of SR 1/SR 24

What traffic analysis shows:

- By 2025, due to significant local development and background traffic growth along SR 24 (a major regional roadway), the intersection of SR 1 and SR 24 will be severely congested.
- By 2025, traffic volumes at this intersection will be more than twice its capacity.

What we have heard: Worry about impacts on Road 275 (Plantations Road)

What traffic analysis shows:

- Like SR 1, Road 275 will become almost saturated due to significant new development within the study area.

In summary, the travel demand forecasting results clearly indicate that the existing transportation network cannot accommodate anticipated travel demand without network improvements.

B. Suggested Solutions

The public suggested the following possible solutions:

Five Points intersection

- A grade-separated interchange at Five Points

Congestion on SR 1

- Access/service roads
- High-speed lanes and service roads
- Separate local and through traffic
- SR 1 as a limited access roadway
- Overpass at SR 1 & US 9
- Grade separation at US 9, SR 24, and Rehoboth Avenue
- Overhead road parallel to SR 1
- Four-lane elevated highway
- Jughandles with long egress and access at major roads
- Limited by-pass around the study area
- Use of median to create another lane
- Optimization and coordination of all traffic signals on SR 1

Access to SR 1

- Longer signals for side streets to allow traffic to enter SR 1

Congestion & delays at entrance to Rehoboth Beach

- Two- or three-lane bridge into Rehoboth Beach
- Overpass to cross northbound traffic

Accommodating through traffic

- Flashing signs: "Use US 113"

Lack of pedestrian mobility

- Pedestrian overpass from Camelot to K-Mart
- Overpasses in Dewey Beach and at outlets
- Overpass between Outlet Centers 2 & 3
- Continuous sidewalk system along SR 1 within the study area

To this list, members of the PAC also added the following problems/solutions:

- The traffic signals at Bay Vista and Rehoboth Avenue are not coordinated.
- Multi-use paths for bicyclists and pedestrians would be preferable to sidewalks.
- The intersection of Postal Lane/Plantations Road/Cedar Grove Road needs to be realigned and signalized.
- The traffic signal at Rehoboth Outlet One at Midway should be removed to eliminate backups.
- Traffic signal coordination going west from Lewes to Five Points should be revisited.
- There are discontinuous connections among the shopping areas – infill is required.
- The curb cuts on SR 1 near McDonalds are dangerous (two right turns -- one into McDonalds – are very close together).
- The new left turn northbound at Home Depot should be signalized.
- Some unsignalized left turns should be eliminated.
- Signage throughout the corridor is bad; directions to Rehoboth Beach are poor.
- Buses should be limited to 25 mph.
- Bus drivers should drive in general lanes when traffic is good and use the diamond lane only when necessary.
- Shady Road at Plantations Road could be used as a connector.
- Pedestrian tunnels should be considered.

All these suggestions set the stage for the development of three major transportation strategies to improve local travel in the SR 1 corridor. The study team also formulated a number of short-term and mid-term improvements to be made in concert with the major alternative selected, and these improvements were incorporated in the modeling process. (See Chapter IV, Land Use and Transportation Plan, for the short- and mid-range projects, some of which are already under way.)

C. *Alternative 1 – Add Capacity to Road 275 and SR 24*

1. Description of Alternative 1

Road 275 (Plantations Road) and SR 24 are particularly important to the study area. In addition to being the location of significant new development, Road 275 runs parallel to SR 1 for a limited portion and thus is frequently used as an alternative by local traffic. The volume of traffic on SR 24, always a busy roadway, has also risen significantly owing to new development, and the addition of a school and the new Beebe Medical Center will increase travel on this major collector.

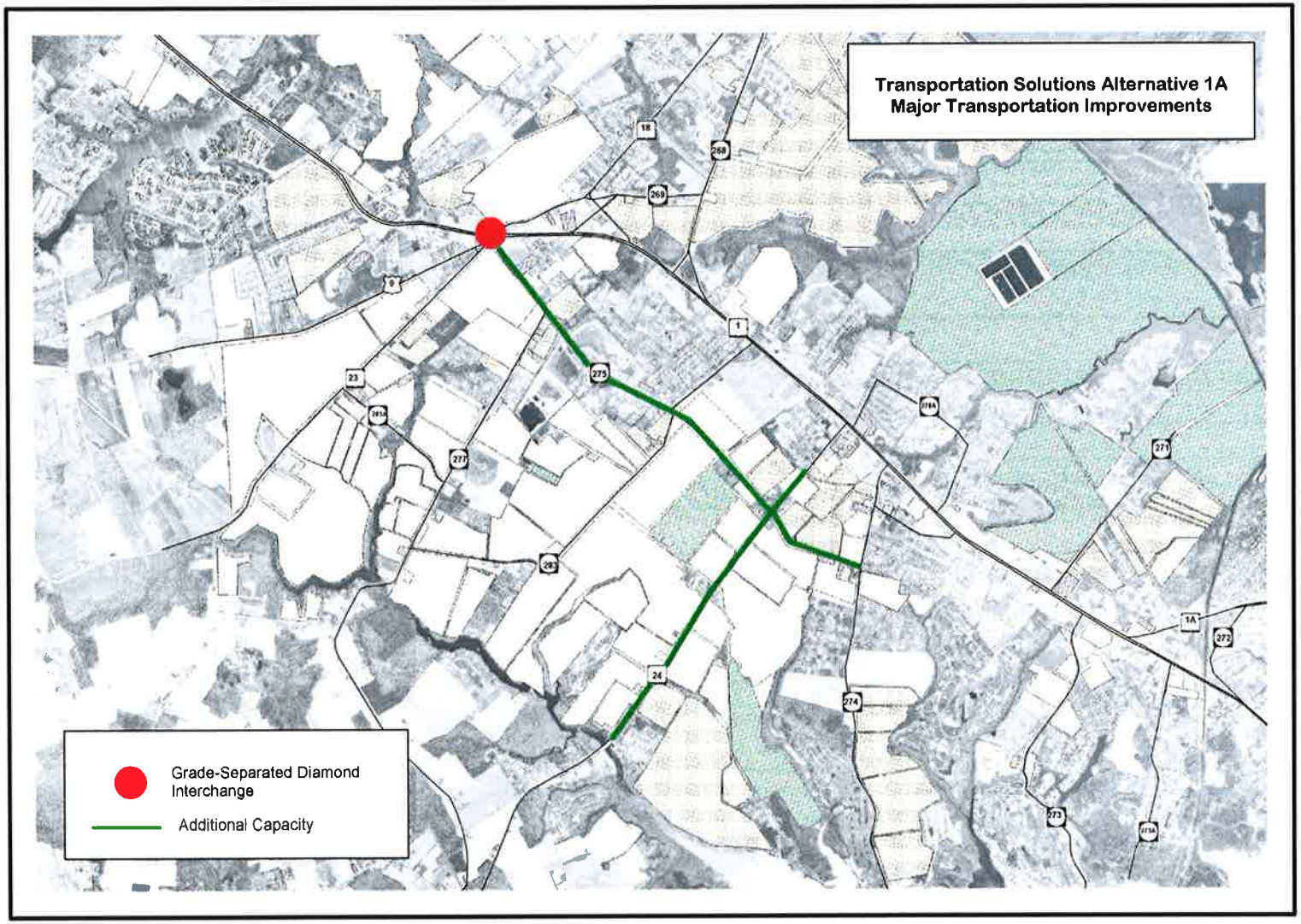
Under Alternative 1, additional capacity would be added to Road 275 and SR 24. Additional capacity along Road 275 would help move the forecasted increase in local traffic more effectively and would continue to provide more flexibility for local residents who wish to avoid SR 1. More capacity along SR 24 would serve the same purpose on that east-west route.

Alternative 1 considered two options at the Five Points intersection: it was evaluated with and without a grade-separated diamond interchange at Five Points. A diamond interchange at this location would help to reduce excessive delays, provide better connections to intersecting roads from SR 1, and improve safety. This is particularly important since Five Points has been identified as a high accident location.

Alternative 1A is shown on the following page. Alternative 1B would be identical but without the grade-separated diamond interchange.

Figure III-1 – Example of Grade-separated Diamond Interchange

Figure III-2 – Alternative 1 – Add Capacity to Road 275 and SR 24



2. Travel Effects of Alternative 1

The next step was to determine the effectiveness of this alternative in improving mobility for local residents. As with the land use scenarios, transportation system performance was measured in terms of vehicle miles traveled, vehicle hours traveled, average speed, signal delay, and other measures. The analysis was concerned with effects at two levels: the benefit to the entire transportation network in the study area and the specific benefit to SR 1.

The study revealed that Alternative 1 would not improve the overall performance of the network or of SR 1 significantly, although Alternative 1A (with the diamond interchange) would be more effective than Alternative 1B. Both alternatives would provide only very localized improvements, and 19 of the 25 signalized intersections under this alternative would operate at level of service E/F. Adding only one lane southbound on Road 275 was shown to be optimal (the addition of more than one lane would not yield better results), but this would have little effect on travel on SR 1. More detail is provided in Section III.F, Comparison of Transportation Alternatives, which begins on page 40.

D. Alternative 2 – Commercial Arterial Concept

1. Description of Alternative 2

This concept would separate local and through traffic on SR 1, thus theoretically improving travel for both residents and visitors. Through traffic would move on the inside lanes, where traffic signals would be eliminated. One-way local traffic would travel on the outer lanes, with slip ramps between the two types of lanes to enable movement between them. Three grade-separated diamond interchanges would be built – at Five Points, SR 24, and Rehoboth Avenue – to enable traffic to change directions and access the other side of SR 1. The locations of the three interchanges reflect industry standards for the minimum distance between interchanges in an urban area and the distances required to accommodate acceleration and deceleration lanes at the interchange and for the slip ramps. Traffic signals would be located only along the one-way local lanes.

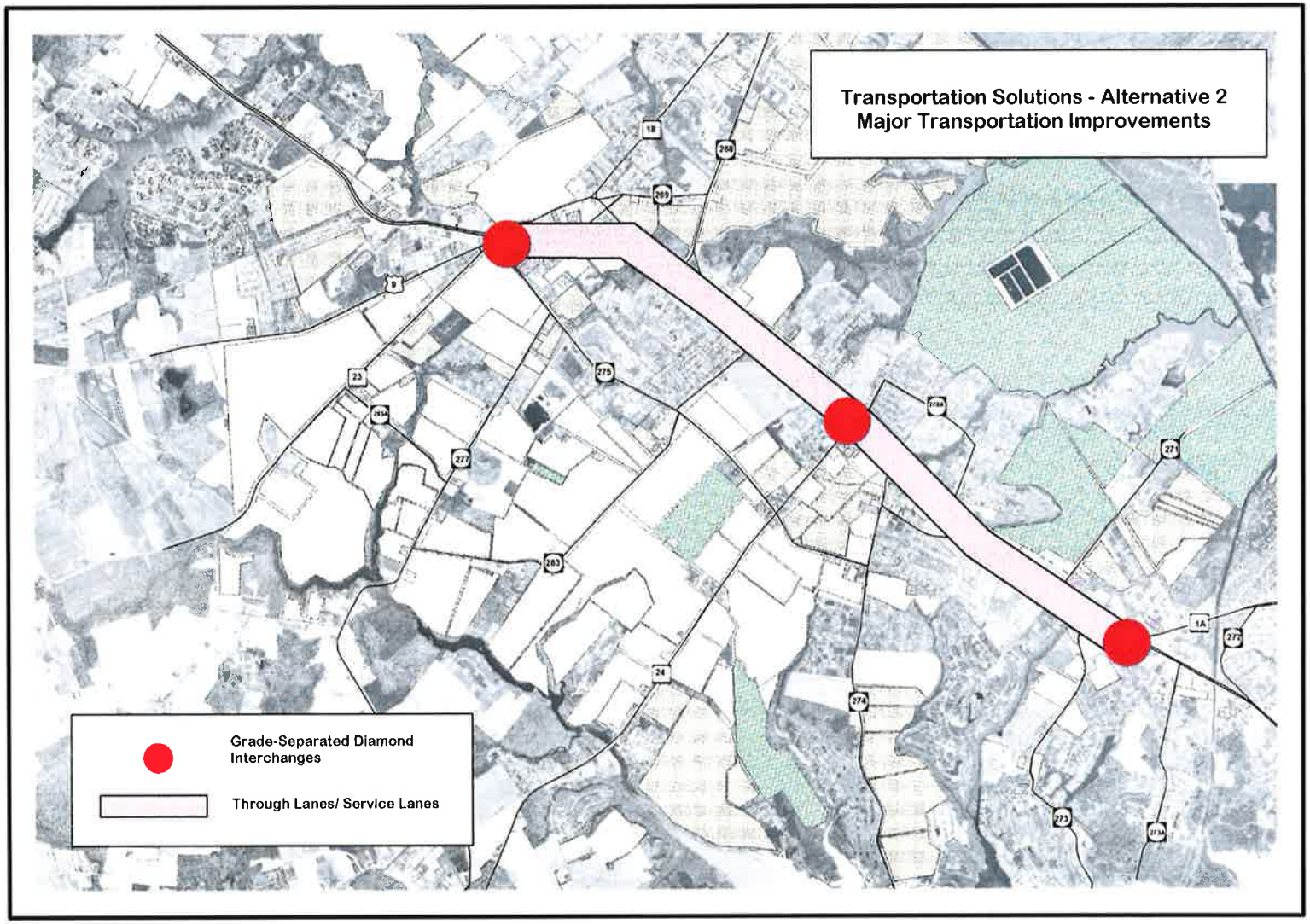
Alternative 2 is shown on the following page.

2. Travel Effects of Alternative 2

Alternative 2 would not improve the performance of the overall network. Although a limited number of signalized intersections in the study area would be better than in the base scenario, overall vehicle miles traveled and vehicle hours traveled would actually increase, and the signalized intersections that would control traffic at the diamond interchanges would fail miserably.

Because of the level of development projected in the study area, Alternative 2 would not accommodate the forecasted growth in local traffic. This alternative would not allow for left-turn and through movements from side streets onto SR 1 or left turns on SR 1; all local traffic would have to use the diamond interchanges to change direction and to access the other side of SR 1. This

Figure III-3 – Alternative 2 – Commercial Arterial Concept



would require additional circulation movements from SR 1, leading to increased VMT. In addition, traffic at these interchanges would be two to three times their capacity, causing significant signal delay and resulting in much higher VHT.

Alternative 2 would work only if it were possible to provide two local lanes and two express lanes in each direction on SR 1 (that is, eight lanes instead of the current six), six to seven lanes on the overpasses at the diamond interchanges, three- or four-lane ramps, two lanes on the slip ramps, and long acceleration and deceleration lanes. This configuration would seriously disrupt existing commercial businesses on SR 1 and would conflict with the objective of preserving the character of the area.

E. Alternative 3 – Controlled Access Parkway

1. Description of Alternative 3

Under Alternative 3, a new alignment beginning north of Five Points and running west of SR 1 to SR 24 would serve as a limited by-pass to SR 1 in the study area. This new roadway would provide an alternative to SR 1 for local residents, significantly reduce traffic along SR 1, and connect the proposed activity centers.

Alternative 3A would include a grade-separated diamond interchange at Five Points and widening the section of SR 24 in the study area to four lanes. Several options are possible to connect to the regional network at the southern end. Alternative 3A is shown on the following map. Alternative 3B would be identical but without the grade-separated diamond interchange.

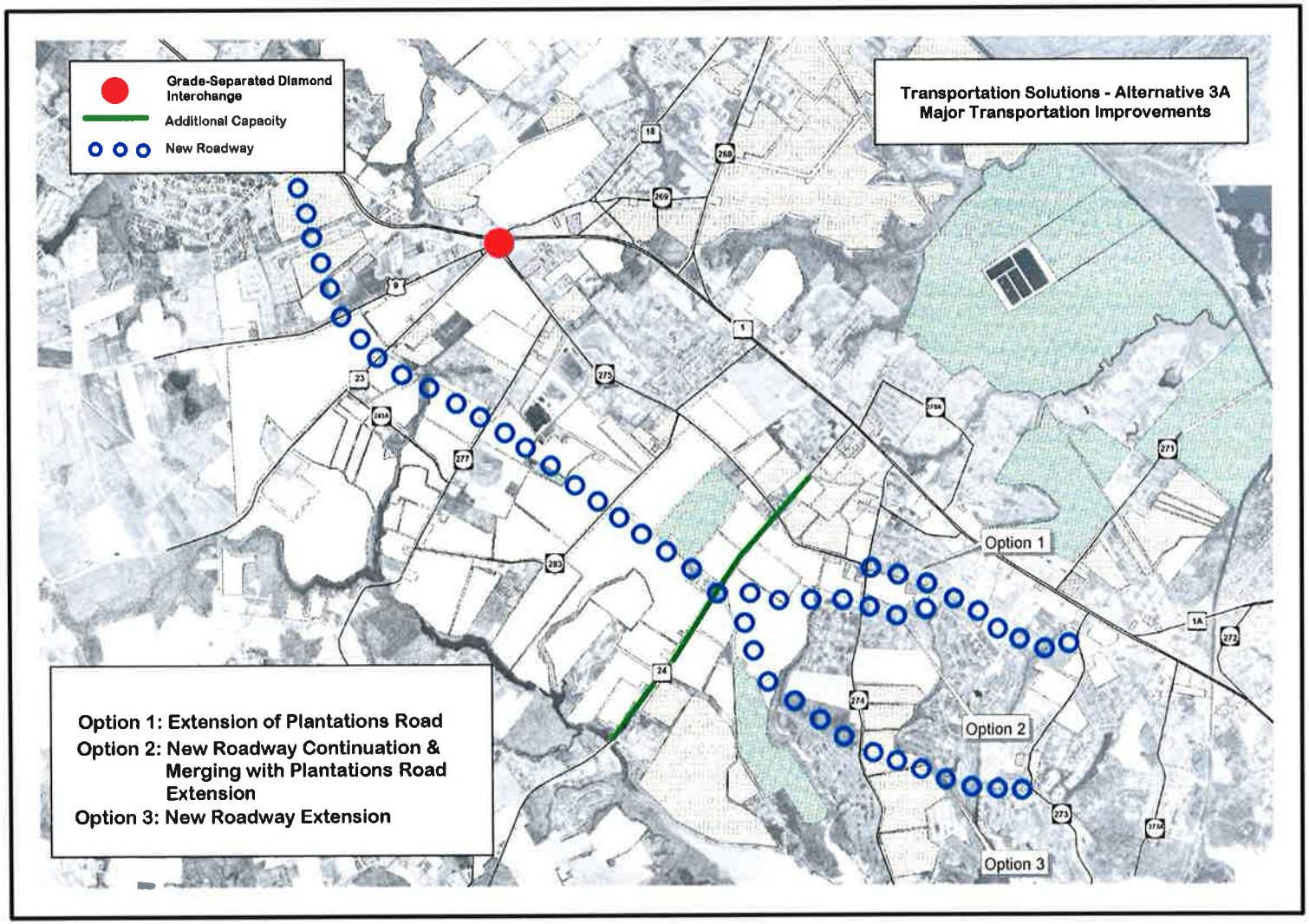
2. Travel Effects of Alternative 3

Compared to the other alternatives, Alternative 3A would provide the most significant benefits to the transportation network in the study area as well as the greatest benefits to travel on SR 1.

Because the new alignment would provide a direct connection between southbound SR 1 and US 9 and SR 24, local traffic would no longer have to go to SR 1 to reach locations between these roadways west of SR 1. The new roadway would also provide another alternative to SR 1 besides Road 275 for trips between activity centers on the west side of SR 1. Since traffic would be divided among SR 1, Road 275, and the new alignment, travel in the overall study area would improve. Thus, although vehicle miles traveled would increase, vehicle hours traveled, an important quality-of-life measurement, would decrease. All other measures of effectiveness would also improve.

All three options to connect the new parkway to the network at the southern end show similar results and will require further development as this alternative moves forward.

Figure III-4 – Alternative 3 – Controlled Access Parkway



F. Comparison of Transportation Alternatives

A comparison of the same measures of effectiveness used in the earlier analysis indicates that Alternative 3A is clearly the best option for the SR 1 study area. The base condition (2025) represents future travel conditions under the future "no build" case, the preferred land use scenario (Activity Centers/Villages) without any transportation improvements.

The table below summarizes the effects of the transportation alternatives. These factors are illustrated in charts and further described on the following pages.[8]

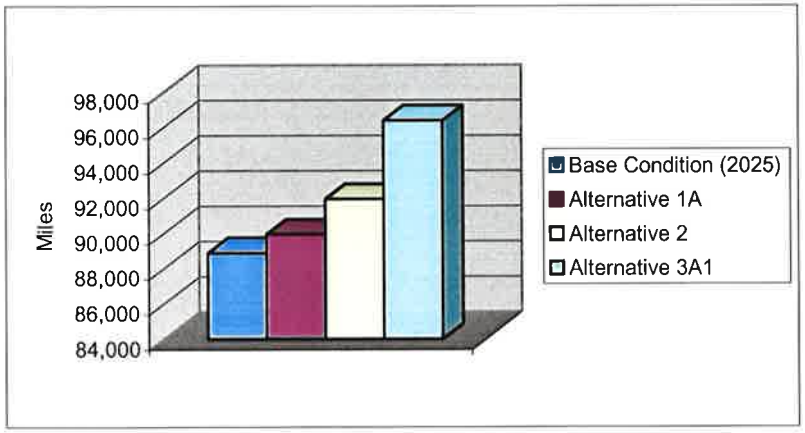
Table III-1 – Summary of Effects of Transportation Improvement Alternatives (Overall Network)

Measures of Effectiveness (MOEs)		Vehicle Miles Traveled	Vehicle Hours Traveled	Signal Delay/Vehicle (seconds)	Average Speed (mph)	Fuel Economy (mpg)	Fuel Consumption (gallons)
2025 Base Condition – No Improvements		88,852	18,451	134	4.82	4.4	20,131
Alt. 1A – Add Capacity to Road 275 & SR 24		88,919	16,416	114	5.48	5.4	16,767
Alt. 2 – Commercial Arterial Concept		91,916	19,251	139	4.77	5	18,435
Alt. 3A1 – Controlled Access Parkway		96,355	12,651	80	7.62	7.7	12,512

[8] Alternative 1A (with grade-separated diamond interchange) is used because it shows better results than Alternative 1B (without interchange). Alternative 3A (with grade-separated interchange) also shows better results than Alternative 3B (without interchange); Alternative 3A1 is used because all the options for the roadway from SR 24 to the regional network show similar results.

Because network travel conditions would improve substantially, vehicle miles traveled would be the highest with Alternative 3A1.

Figure III-5 – Vehicle Miles Traveled



However, Alternative 3A1 also shows the lowest vehicle hours traveled, the highest average speed, the shortest signal delay, the lowest fuel consumption, the highest fuel economy, and the lowest percentage of failing intersections, as the following figures illustrate.

Figure III-6– Vehicle Hours Traveled

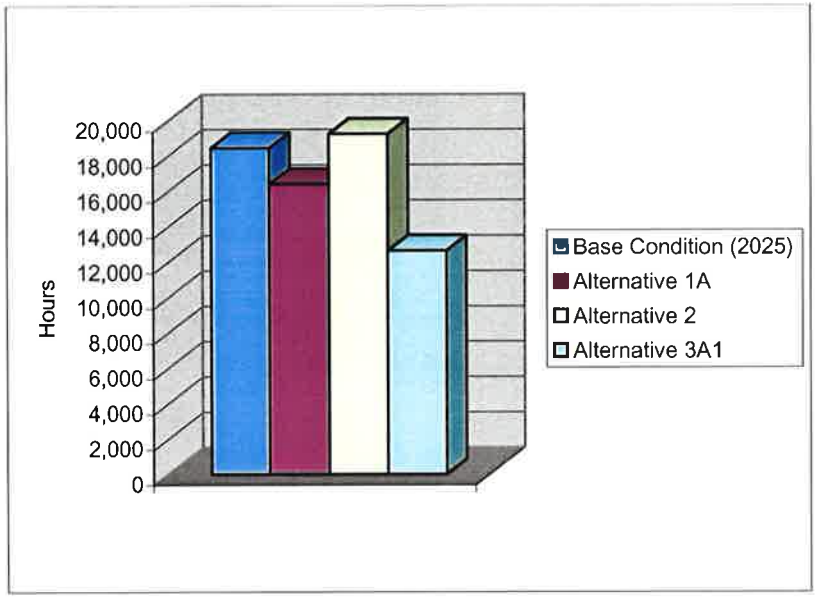


Figure III-7 – Signal Delay/Vehicle

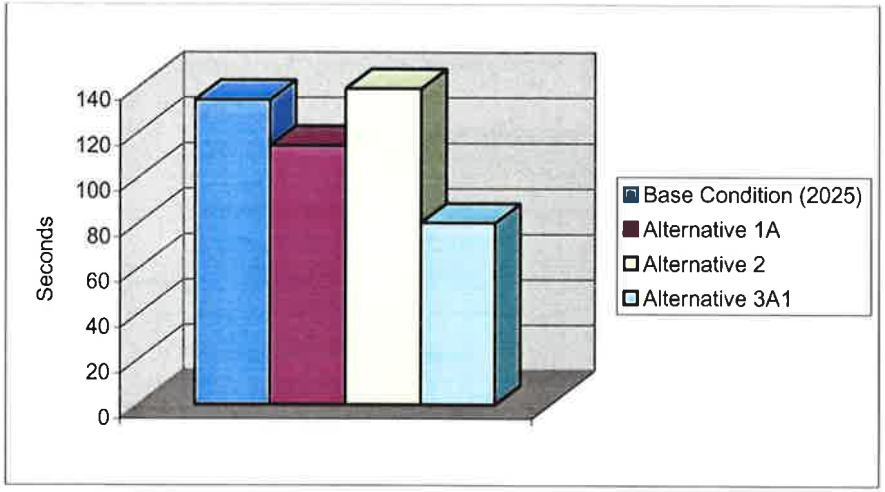


Figure III-8 – Average Speed

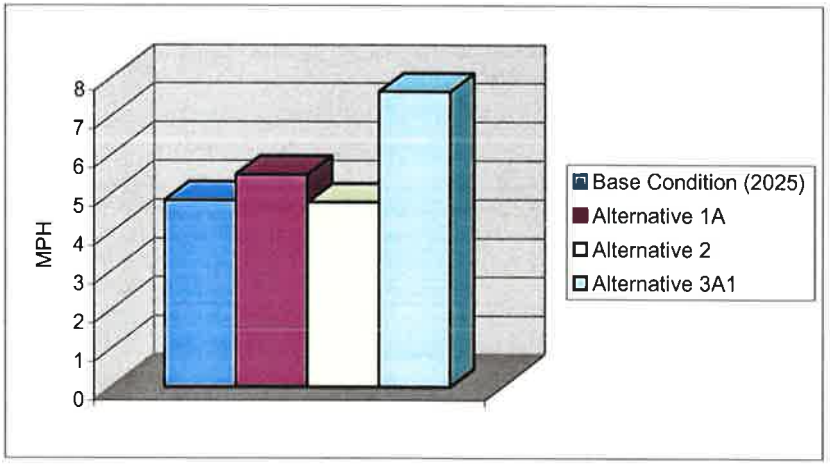


Figure III-9 – Fuel Economy

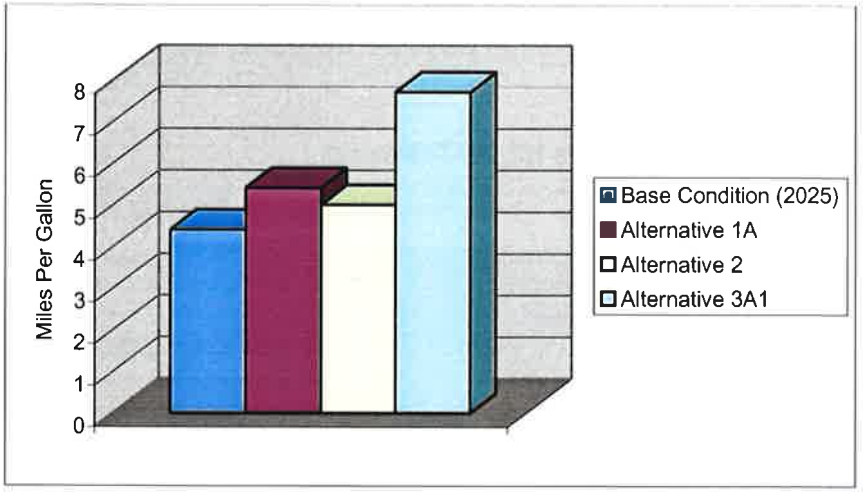


Figure III-10 – Fuel Consumption

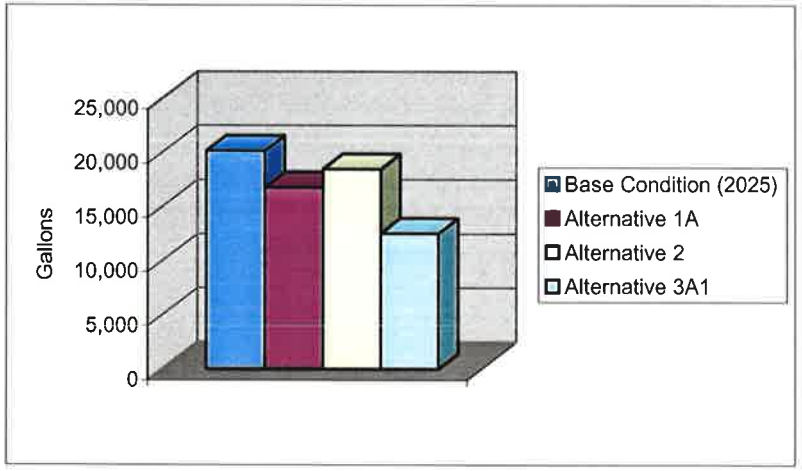
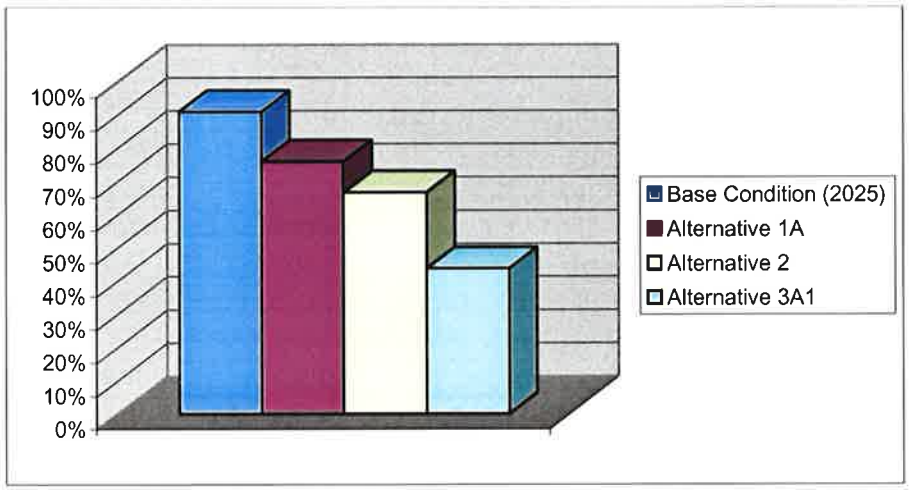


Figure III-11 – Percentage of Signalized Intersections at LOS E/F



Chapter IV, Land Use and Transportation Plan, presents the details of both elements of this study in greater detail.

IV. STATE ROUTE 1 LAND USE AND TRANSPORTATION PLAN

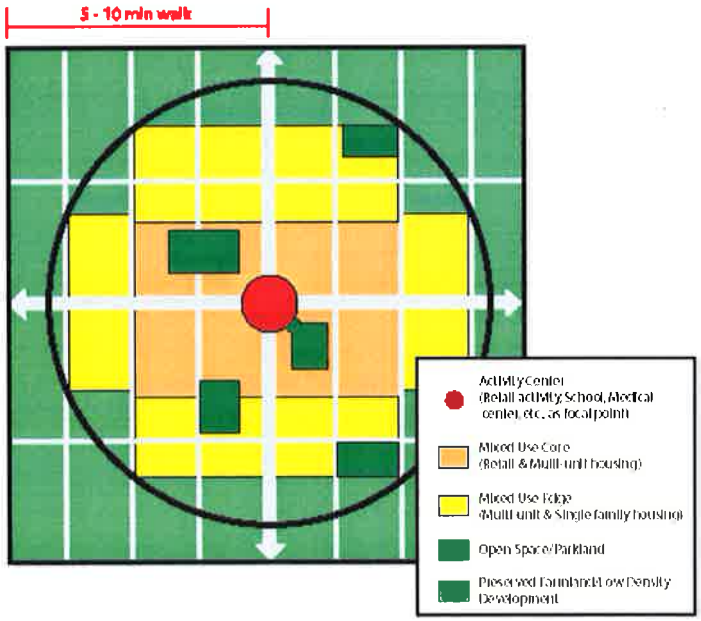
A. Land Use Plan

After much consideration, Sussex County, the PAC, the general public, and DelDOT have agreed that development in the form of planned activity centers is the preferred future land use to preserve the quality of life enjoyed by the residents of Sussex County. As Chapter II demonstrates, the creation of activity centers will help to relieve congestion on SR 1 and other roadways while enabling people who live in the study area to meet their daily needs.

The concept of activity centers is as old as villages, towns, and cities themselves. For centuries people have settled near the things they need – the general store, the blacksmith, the post office, church, and school. Until the last century, they traveled by horse and wagon and by foot. Planned cities, like Philadelphia and Wilmington, focused on larger centers of activity – the city's principal public buildings stand at the center of the city – and used a grid street system to provide connecting and multiple travel paths to destinations. Planned parks serve as additional activity centers. On a smaller scale, planned villages, like Arden, Delaware, were designed with activity centers like Gild Hall and a central green that serve as gathering points.

As Figure IV-1 indicates, this concept provides for limited commercial/retail development within a neighborhood setting. This could include such conveniences as a dry cleaner, deli, restaurant, a bakery, a video store, a hair salon, or any other local, small-scale business suitable for a neighborhood. It could also include professional offices for doctors or dentists, for example. Housing types could include single-family residences, townhouses, and apartments. Open space is an important element, and is planned and protected at the beginning of development. Development within an activity center is more compact, while very low-density development typically surrounds it.

Figure IV-1 – Activity Center Concept



Activity centers offer significant benefits, not all of them related to transportation. In the study area, they can:

- Reduce the number of times a person must travel to SR 1
- Reduce the number of trips people must make by car because many of their needs are only a short walk or bike ride away
- Provide walkable and bikeable neighborhoods
- Help to make public transit feasible because they concentrate more people in a compact area
- Help reduce infrastructure costs – water and sewer needs, as well as local roads, can be provided in a geographically limited area
- Promote a sense of community.

Under the recommended land use scenario, as many as four activity centers could concentrate new development in the Lewes – Rehoboth Beach area. All four multi-use centers could be located west of SR 1, including one near the new school site and one near the new Beebe Medical Center, both on SR 24.

One of the planning tools that could be used to create activity centers is "transfer of development rights." This concept has been proposed by the Office of State Planning and introduced into the state legislature. It would enable property owners outside the activity centers to sell the rights to develop their land to developers, who would then be able to use these rights to develop within the activity centers at greater densities. In that way, farmers and other land owners would be able to take advantage of the market potential of their land without actually developing it.

To support the adoption of compact, mixed-use activity centers as the preferred form of future development, the SR 1 Land Use and Transportation Plan also proposes the following actions:

- Development Patterns – Sussex County will:
  - Incorporate this concept by amendment in the Sussex County Comprehensive Plan, including revising the Future Land Use Map to show the general locations of these activity centers based on the preferred land use scenario
  - Adopt and implement a zoning ordinance, zoning map, and subdivision ordinance to provide for these activity centers
  - Use a voluntary program of transfer of development rights as a tool to implement activity centers and livable, smart growth
- Interconnectivity – Sussex County will:
  - Modify the existing Highway Corridor Overlay Zone to strengthen the requirements for cross-access easements and interconnections to provide better guidance on the placement of these connections
  - Review residential and mixed-use development proposals to ensure an internal local street network is created for larger projects to improve access among buildings and adjacent land uses; develop interconnectivity guidelines
- Urban Design – Sussex County will:

- Develop urban design standards to address buildings, parking, sidewalks, and landscaping to support the increasingly urban character of SR 1

- Controlled Access Parkway – DelDOT and Sussex County will prepare a corridor preservation plan and a memorandum of understanding between them that will:
  - Declare the new roadway to be controlled access, prohibiting development with direct access along the parkway
  - Preclude changing the zoning to permit commercial development along the parkway
  - Ensure coordinated review of development proposals.

B. Transportation Plan

The Transportation Plan developed and endorsed jointly with Sussex County and the Public Advisory Committee (SR 1 PAC) includes transportation improvements that have been prioritized and labeled as short, mid, and long term.

Short term indicates a priority for DelDOT to develop, design, and construct these projects within DelDOT's 2005-2010 Capital Transportation Program (CTP).

Mid-term projects are more complex and require further study and concept development. Mid-term projects will be prioritized and proposed for the 2006-2011 CTP.

Long-term projects are projects that will be needed based on future development and traffic projections. The need is not immediate, but these projects should be considered as part of the plan to provide for additional capacity as development and traffic increase. Long-term projects will require Environmental Impact Studies, more project development, and an intense public involvement process, as well as significant right-of-way acquisitions. The process to secure right-of-way through land use policy and subdivision review should be ongoing and some preliminary engineering should occur until such time that these projects are prioritized and proposed for funding. Once approved for funding, the projects will be moved to the CTP for project development, design, and construction.

1. Short-term Improvements

Each of the transportation alternatives evaluated for this study includes short-term improvements that will be implemented as soon as possible to relieve congestion in the SR 1 corridor. Short-term improvements will be implemented when they are funded and project development can occur. They are:

- SR 1 signals
  - Revise the plan for signal coordination, optimization, and phasing on SR 1 from Five Points through Dewey Beach. This work has already begun and is expected to improve traffic flow.
- Intersection Improvements
  - Increase the turning lane length at the intersection of Plantations Road and SR 24

  - Install a signal at the intersection of Plantations Road and Road 274
- Realign Wescoats Corner Road with Road 269A as a four-way intersection
- Upgrade the pavement on Road 283 (Cedar Grove Road) and Road 277 (Robbinsville Road), creating 11-foot travel lanes and 5-foot shoulders (this was recommended as part of an SR 24 study)
- Signage
  - Provide better signage at the US 113/SR 1 split recommending alternative routing
  - Consider real-time electronic signs at the US 113/SR 1 split to provide travel delay information
  - Review signage in the Rehoboth Beach area

The plan also makes the following recommendations to address transit service:

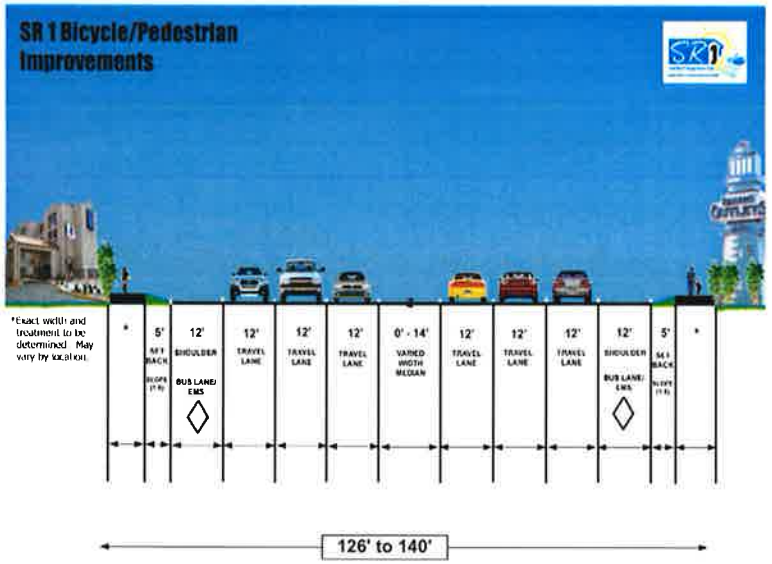
- Conduct a park-and-ride usage and planning study to determine the need for additional facilities and locations, and to determine their impact on the transportation system in the study area
- Perform a detailed study of transit needs
- Improve the coordination and training of bus drivers on the use of diamond lanes

2. Mid-term Improvements

The mid-term improvements recommended by this plan are more complex and require further development and right-of-way acquisitions.

Participants in this study stressed the problems with walking and bicycling on SR 1. Those sidewalks that do exist are not continuous, and bicycling in the heavy traffic can be dangerous, particularly for recreational cyclists. DelDOT will conduct an SR 1 Bicycle and Pedestrian Study to determine the opportunities and constraints along the highway for bicycle and pedestrian travel and to develop improvement proposals.

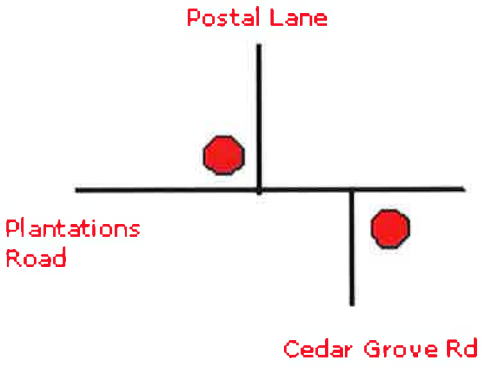
Figure IV-2 – SR 1 Cross Section with Shared Use Path



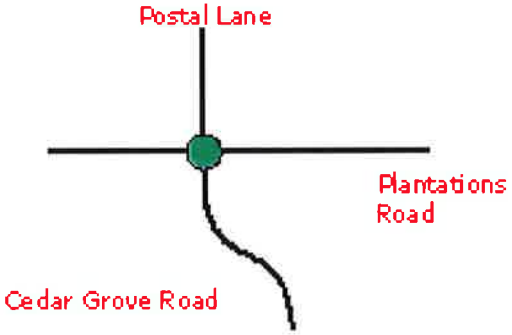
Another safety concern is the current alignment of Cedar Grove Road and Postal Lane on Plantations Road. The plan recommends creating a signalized, four-way intersection with turning lanes at this location, as illustrated in Figure IV-3.

Figure IV-3 – Realignment and Signalization of Cedar Grove Road/Postal Lane/Plantations Road

Existing Alignment



Proposed Concept



3. Long-term Improvements

The emphasis in this study has always been on planning appropriate improvements that will be ready to respond to the transportation requirements of the study area when they are needed. Although this area will always be a major tourist attraction, the study has focused on the tremendous additional demand that will be made on the transportation network by the increased number of permanent residents who will need an adequate, flexible transportation system to satisfy their everyday travel needs.

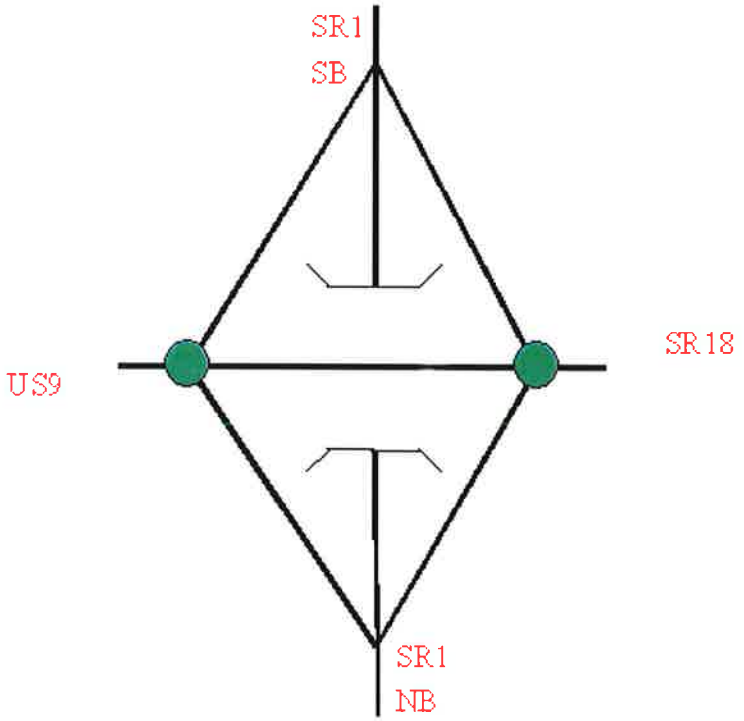
Long-term improvements, therefore, must be significant in their scope and approach. Immediate "fixes" cannot enable an already stressed transportation system to meet future demands. The SR 1 Land Use and Transportation Study recommends the following major concepts for further study and eventual implementation:

- Grade-separated diamond interchange at Five Points
- Controlled access parkway west of SR 1
- Widening of SR 24 to four lanes within the study area

Grade-separated Diamond Interchange

This interchange will be crucial to relieving congestion and improving safety at Five Points. Instead of a single signal controlling all the movements at an intersection, a signal at each end of a US 9/SR 18 overpass would handle traffic from these roadways and the SR 1 exit ramps. Through traffic on SR 1 would pass under the overpass without delay.

Figure IV-4 – Concept of Proposed Grade-separated Diamond Interchange

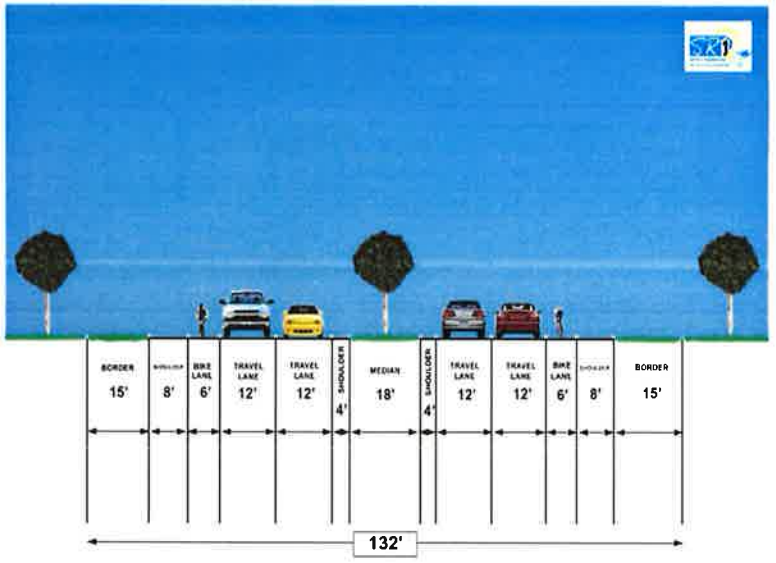


Controlled Access Parkway

The centerpiece of the long-term recommendations is a controlled access parkway on a new alignment west of SR 1 that would run from north of Five Points to Road 273, bypassing almost the entire five-mile section of SR 1 within the study area. Because this is a concept study, the exact alignment of the new parkway is unknown, but it is expected to consist of four lanes from north of Five Points to SR 24, with the section from SR 24 east from two to four lanes, depending on the option selected. This roadway would cross US 9, SR 23, Road 277, Road 283, SR 24, and Road 274 at signalized intersections.

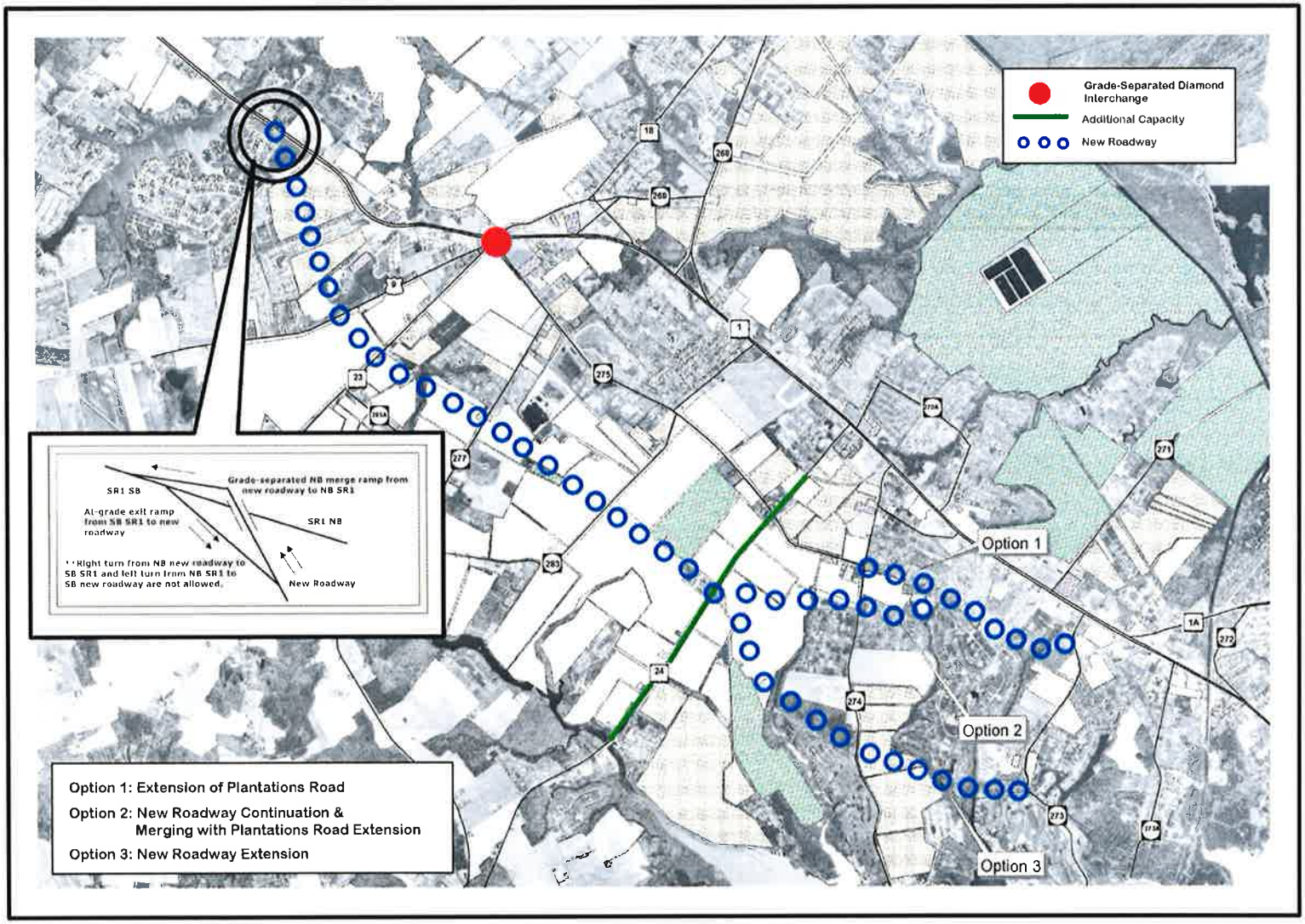
To ensure a smooth travel flow between SR 1 and the new parkway, an at-grade exit ramp from southbound SR 1 to the parkway would be provided, as well as a grade-separated northbound merge ramp from the parkway to northbound SR 1.

Figure IV-5 – Cross Section of Proposed Controlled Access Parkway



By designating this roadway as controlled access, Sussex County and DelDOT can prohibit development with direct access along its length. As a result,

Figure IV-6 – Long-term Transportation Improvements



development would not front the parkway. Instead, access to development would be limited to the intersections of the parkway with existing streets. The map on page 51 illustrates this concept.

Widening of SR 24 to Four Lanes

New development on SR 24 has already created a need for additional capacity, even without the growth projected for 2025. This plan recommends widening the section within the study area to four lanes to improve local circulation, in addition to operational improvements currently in design.

V. ENVIRONMENTAL SCREENING

A. Introduction

The environmental screening process conducted for this study identified the environmental constraints found within the SR 1 study area to assist future land use and transportation planning initiatives. Determining these environmental constraints early in the planning process allows for the best protection of the area's natural resources by ensuring the design of projects that avoid or minimize adverse impacts.

The objective of this effort was to obtain all available information pertaining to the existing environmental conditions within the study area. Coordination was conducted with more than twenty concerned federal, state, and local agencies and organizations.[9]

Any future transportation improvement will undergo additional environmental scrutiny via environmental permitting and the National Environmental Policy Act (NEPA). Potential improvements within the SR 1 study area that involve federal funding or require federal permits must be in accordance with NEPA regulations. NEPA compliance requires that a Categorical Exclusion Document, Environmental Assessment, or Environmental Impact Statement be prepared, depending on the nature, location, and significance of the impacts of any such undertaking. A variety of environmental permits and approvals may also be required at the federal, state, and local levels.

This environmental screening investigated the existing conditions of a variety of environmental parameters, including waterways, wetlands, floodplains, recharge and well-head protection areas, threatened and endangered species and their habitats, open space and recreational areas, agricultural resources, historic and cultural resources, and known or potential contaminated areas.

This information was translated into environmental base maps that identify environmentally sensitive areas that must be considered when developing land use and transportation alternatives. This assessment helped to determine which alternatives appear to be environmentally, socially, and economically feasible and which could have environmental fatal flaws. Future studies will ensure environmentally sensitive areas are protected while providing for future development in the most appropriate and acceptable locations.

The SR 1 study area encompasses many natural and man-made resources that contribute to the unique character of this area. These resources must be preserved, conserved, and protected.

[9] Appendix V (bound separately) is a technical memorandum that contains further details on the material presented in this chapter.

B. Waterways, Wetlands, and Floodplains

1. Waterways

The SR 1 study area is part of a very significant and sensitive environmental region due to its proximity and interaction with Rehoboth Bay, Delaware Bay, and the Atlantic Ocean. Its major waterways include Love Creek, Rehoboth Bay, and the Lewes & Rehoboth Canal. The area also includes a number of tributaries (creeks, branches, and smaller streams) and ponds.

These waterways and their beds are under the jurisdiction of the Delaware Department of Natural Resources and Environmental Control (DNREC) and are protected by its "Regulations Governing the Use of Subaqueous Lands." Additionally, Sussex County has established a 50-foot regulated buffer zone adjacent to tidal and non-tidal (freshwater) waterways.

2. Wetlands

Freshwater and tidal wetlands are abundant along Love Creek, Rehoboth Bay, and the Lewes & Rehoboth Canal and their associated tributaries. These wetland systems provide many important functions, such as habitat for diverse plant and animal communities (including endangered and threatened species), flood control, water quality filtration, and aesthetic values. Freshwater wetlands are under the jurisdiction of the United States Army Corps of Engineers. Tidal wetlands are under the jurisdiction of, and protected by, DNREC.

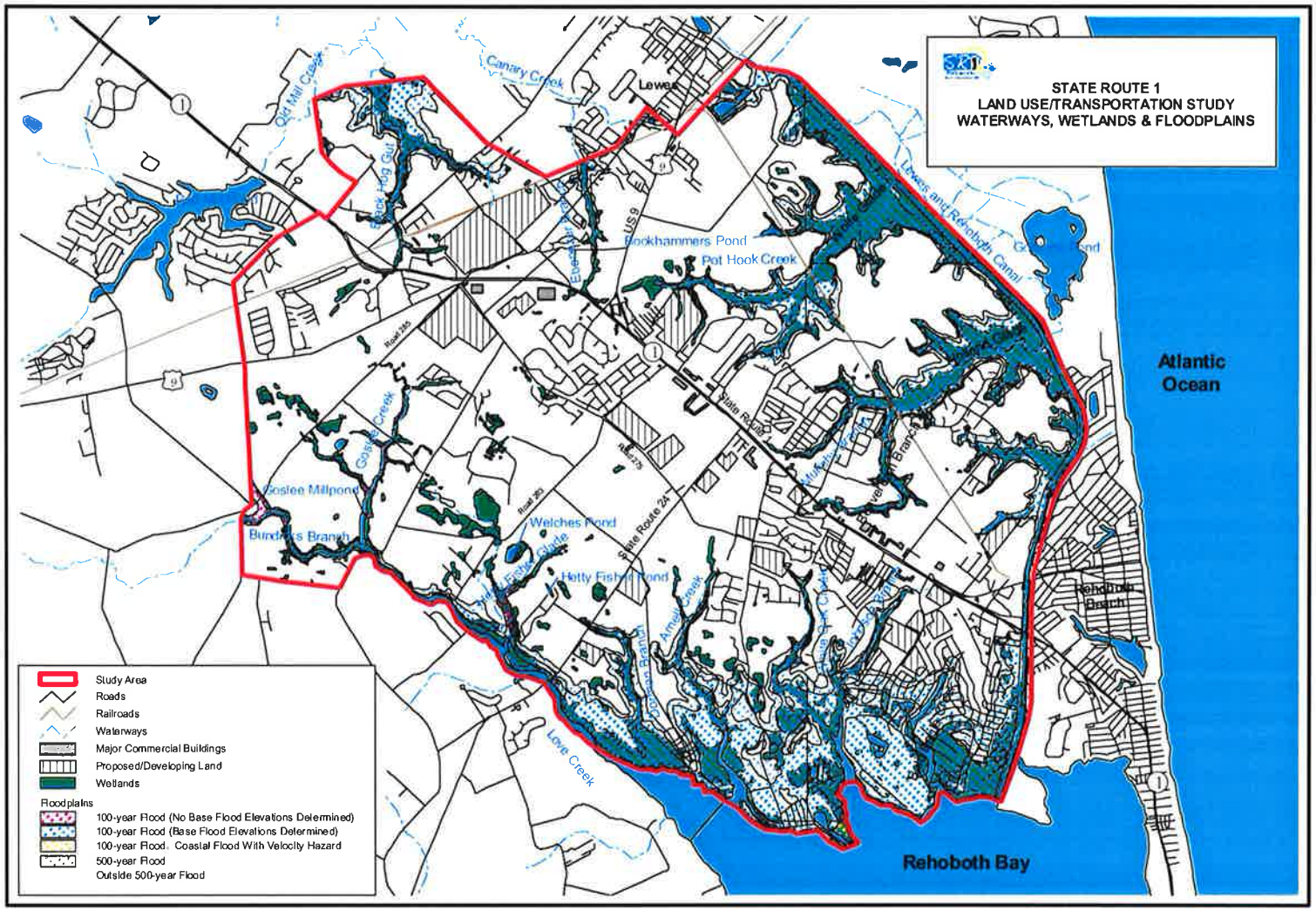
Sussex County also has provisions regulating disturbance to the 50-foot buffer zones adjacent to tidal wetlands. However, in the future, the buffer zone of tidal wetlands may be expanded to 100 feet and a 25-foot buffer zone may be established for non-tidal wetlands, according to the Sussex County Comprehensive Plan Update (January 1, 2003).

3. Floodplains

Floodplains are those areas that tend to flood adjacent to waterways during storms. Floodplains are important because they provide flood storage capacity (which minimizes flooding of upslope and developed areas), habitat to many wildlife and plant species, and include riparian buffers that benefit both aquatic and terrestrial species. Sussex County's Land Use Code regulates any disturbance to 100-year floodplains. DNREC has also established the Delaware Riparian Buffer Initiative to protect the transitional areas between land and water that provide many important functions for the area's ecosystem.

Waterways, freshwater and tidal wetlands, and floodplain areas are shown on the following map (Figure V-1). Proposed future improvements that could impact waterways and their adjacent areas should be minimized and should be coordinated with DNREC's Division of Soil and Water Conservation.

Figure V-1 – Waterways, Wetlands, and Floodplains



C. Soils and Well-Head Protection and Recharge Areas

Soils of the study area consist of two soil associations. As designated in the Sussex County Soil Survey, the Tidal Marsh association consists of "low areas that are regularly flooded by salt water, and areas of loose, salty beach and dune sands." These soils are generally located along the Lewes & Rehoboth Canal, Love Creek, and Rehoboth Bay. The Sassafras-Fallsington association consists of "well-drained and poorly drained soils that have a moderately permeable subsoil of sandy loam to sandy clay loam." This soil association accounts for the majority of the study area.

Groundwater is the main source of potable water for residents within the study area. This groundwater is provided by three main aquifers: the Columbia Aquifer, the Pocomoke Aquifer, and the Manokin Aquifer. The Columbia Aquifer is the most productive aquifer within the basin, with approximately 77% of the major public wells in the basin drawing water from it.

There are numerous public water supply wells within the study area. Fifteen of these are large public wells that generate >50,000 gallons per day (gpd). The Delaware Geological Survey has established Well-Head Protection Areas (WHPAs) for these wells and an additional 100-meter buffer provides further protection. These large public wells and their WHPAs are located, for the most part, within good and excellent recharge areas (see Figure V-2).

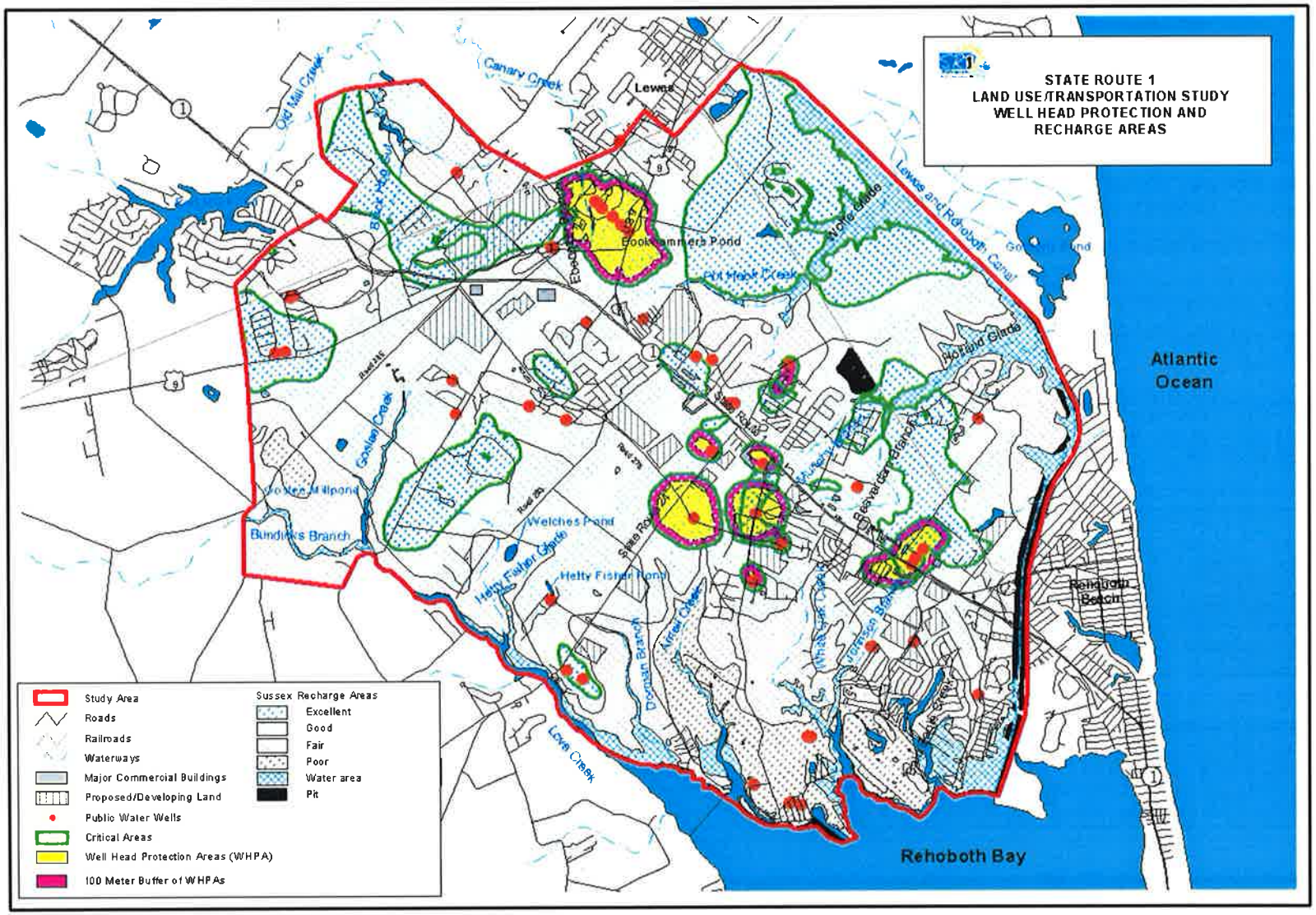
WHPAs and excellent groundwater recharge areas have been designated as Critical Areas in the State Land Use Code by the Delaware Geological Survey. All county comprehensive plans must consider Critical Areas in land use decisions by 2007. The 2003 Sussex County Comprehensive Plan Update mentions these Critical Areas but does not propose the development of regulations pertaining to them.

According to DNREC, the unconfined Columbia Aquifer is recharged by rainwater at an average rate of 193 million gallons per day. Current usage of the Columbia Aquifer within the basin is estimated at approximately 25 million gallons per day, and projections indicate that up to 100 million gallons per day can be developed from this aquifer without any adverse impacts. Therefore, potable groundwater will continue to be available.

However, the Columbia Aquifer is very vulnerable to contamination via surface runoff infiltration. The constituents of this surface runoff depend on the land uses within the area, including shallow septic tanks, agricultural runoff, man-made alterations of natural drainage patterns, and commercial and residential land development.

Any proposed improvements must avoid or minimize adverse impacts to Critical Areas.

Figure V-2 – Well-Head Protection and Recharge Areas



D. Threatened and Endangered Species

According to the United States Fish and Wildlife Service (USFWS) and DNREC, threatened and endangered species in the study area include 30 known state-listed plant and animal species and two federally listed animal species.

The Bald Eagle, a federally listed threatened species, is known to nest within the area, especially in forested areas along waterways. These nest areas are protected by the USFWS, and development initiatives should be conducted away from such areas. Specifically, no activity is allowed any time of the year within a 750-foot radius from the nest site. From 750 feet to 1,320 feet outward from the nest site, time-of-year restrictions prohibit activity between December 15th and July 1st of each year.

The Delmarva fox squirrel, a federally listed endangered species, may inhabit mature forested areas within the study area that have relatively open understories. Again, any development initiatives should be conducted away from such mature forested areas and in coordination with the USFWS.

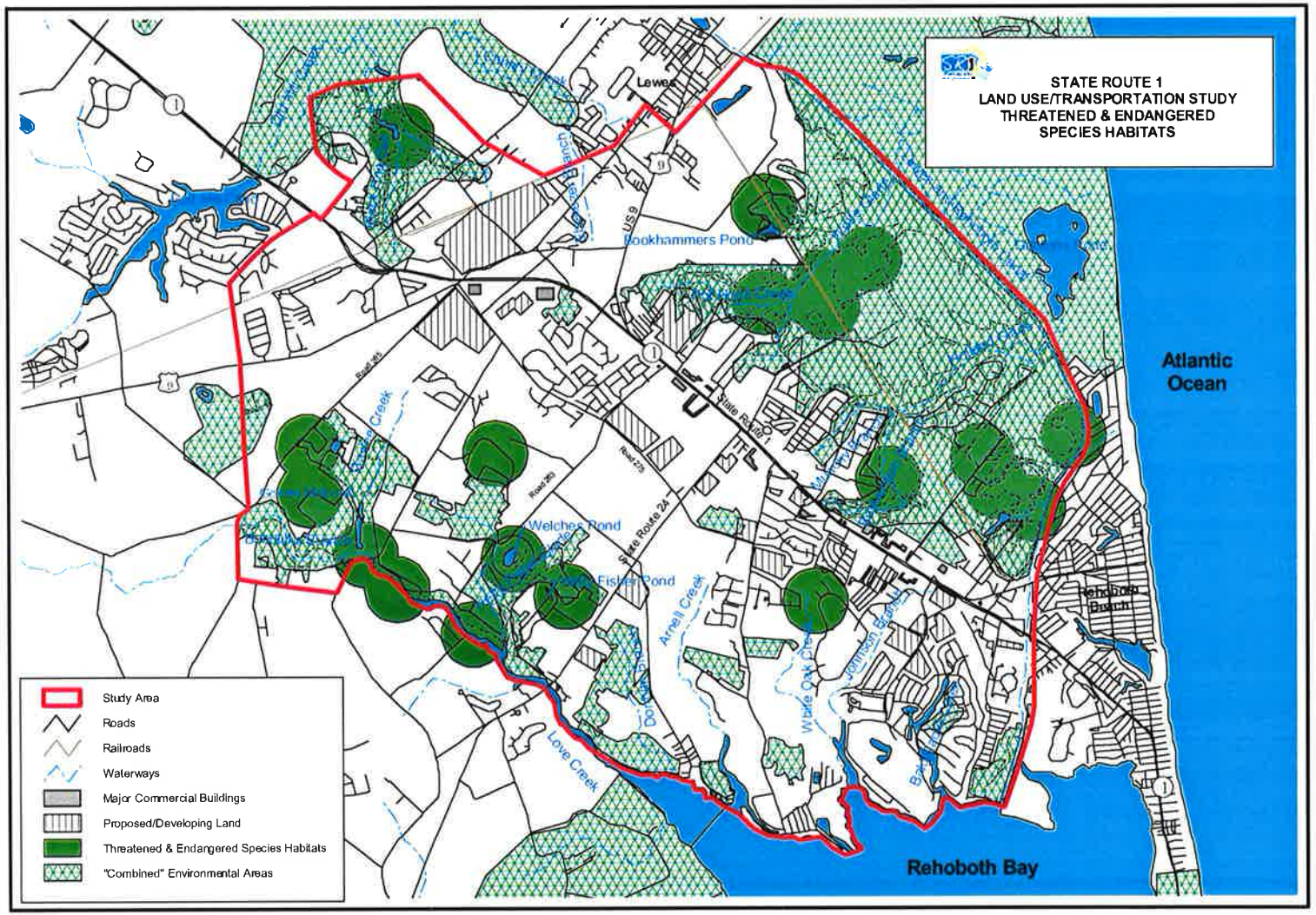
Threatened and endangered species on the state list are:

- Amphibians – Tiger Salamander, Cope's Gray Treefrog, Barking Treefrog
- Birds – Bald Eagle, Saltmarsh Sharp-tailed Sparrow, Red-headed Woodpecker, Black-crowned Night-heron, Sedge Wren
- Fish – Ironcolor Shiner
- Insects – Frosted Elfin, American Snout
- Plants – Small-fruit Beggar-ticks, Rose Coreopsis, Stiff Tick-trefoil, Roundleaf Sundew, Rattlesnake Master, Grassleaf Gayfeather, Elongated Lobelia, Large Marsh Pink, Fibrous Bladderwort, Purple Bladderwort, Northeastern Bladderwort, Coast Sedge, Wright's Witch Grass, Beaked Spike-rush, Ten-angle Pipewort, Subcaudate Rush, Southern Rein Orchid, Gibbous Grass, Engelmann's Arrowhead, Grassleaf Arrowhead

Generally, threatened and endangered species within the study area are located within forested upland and wetland areas near watercourses (see Figure V-3). Most of the lands designated as threatened and endangered species habitats are also designated as significant environmental areas such as State Parks, Nature Preserves, State Resource Areas, or Natural Areas.

Any potential improvements in the vicinity of threatened and endangered species habitat should be coordinated with the USFWS and DNREC's Natural Heritage Program to avoid any disturbance to these habitats.

Figure V-3 – Threatened and Endangered Species Habitats



E. Open Space/Natural Areas and Recreational Areas

1. Natural Areas Program

The Delaware Natural Areas Program consists of Nature Preserves and lands listed on the Natural Areas Inventory. To be included in the Natural Areas Inventory, an area must be of statewide significance and meet the following additional criteria: representativeness; biological rarity; uniqueness; diversity; size; viability; defensibility; research, education, or scenic value; and outstanding geological, archaeological, or aquatic features. Areas listed on the Natural Areas Inventory within the SR 1 study area are Cape Henlopen, Great Marsh, Thompson Island, and Angola Neck (see Figure V-4). Natural Areas receive voluntary protection in Sussex County.

Nature Preserves possess the highest level of legal protection in the state; permission from both the governor and legislature are required to declassify a natural area as a Nature Preserve. Nature Preserves within the study area include Thompson Island and the Cape Henlopen Hershberger Tract.

2. Open Space Program

The Delaware Open Space Program was created in 1990 by the Land Protection Act to protect State Resource Areas through purchase, donation, or conservation easement acquisitions. Current State Resource Areas within the study area include portions of Thompson Island and portions of Cape Henlopen State Park. "Proposed" State Resource Areas are located along Love Creek and its tributaries, the Great Marsh Natural Area near Black Hog Gut, portions of Thompson Island, and portions of Cape Henlopen State Park.

A conservation easement is a protected land area in which the landowner voluntarily places permanent restrictions on its future use. There is one conservation easement within the study area: Rabbit Ferry's Community Center located near Bundicks Branch.

3. The Nature Conservancy (TNC)

One Nature Conservancy "Priority Ecosystem Conservation Area" is located within the study area: Great Marsh is a high quality saline tidal marsh system. Additionally, Nature Conservancy "Important Species and Natural Communities Areas" within the study area include Cape Henlopen, Welches Pond, and Still Pond. Although no regulations prevent development of these TNC designations, TNC closely monitors them.

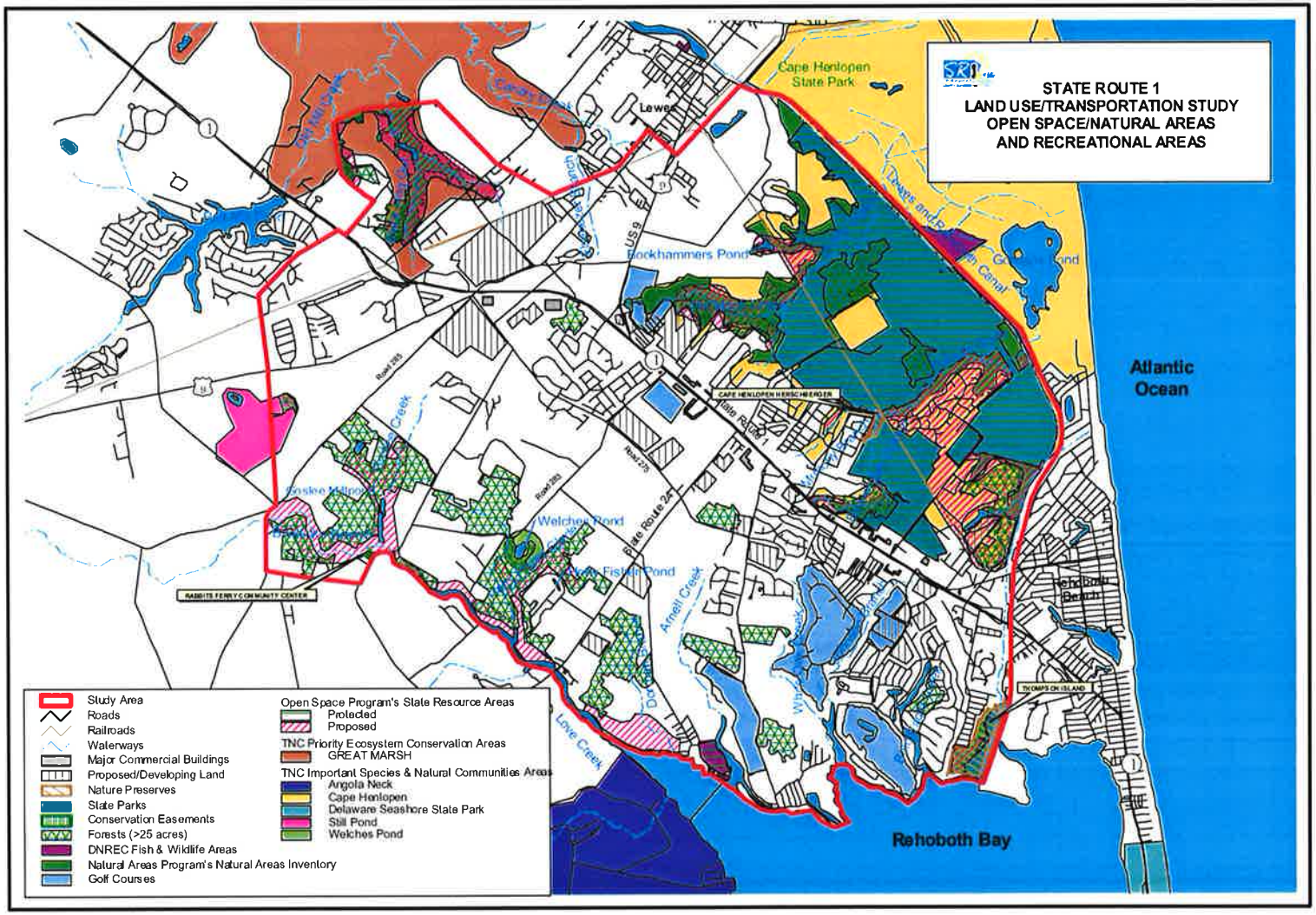
4. DNREC Fish & Wildlife Areas

The area's two DNREC Fish & Wildlife Areas are the Love Creek and Gordon Pond Wildlife Areas.

5. Recreational Areas

In addition to the natural areas that provide many recreational opportunities, there are six golf courses within the study area.

Figure V-4 – Open Space/Natural Areas and Recreational Areas



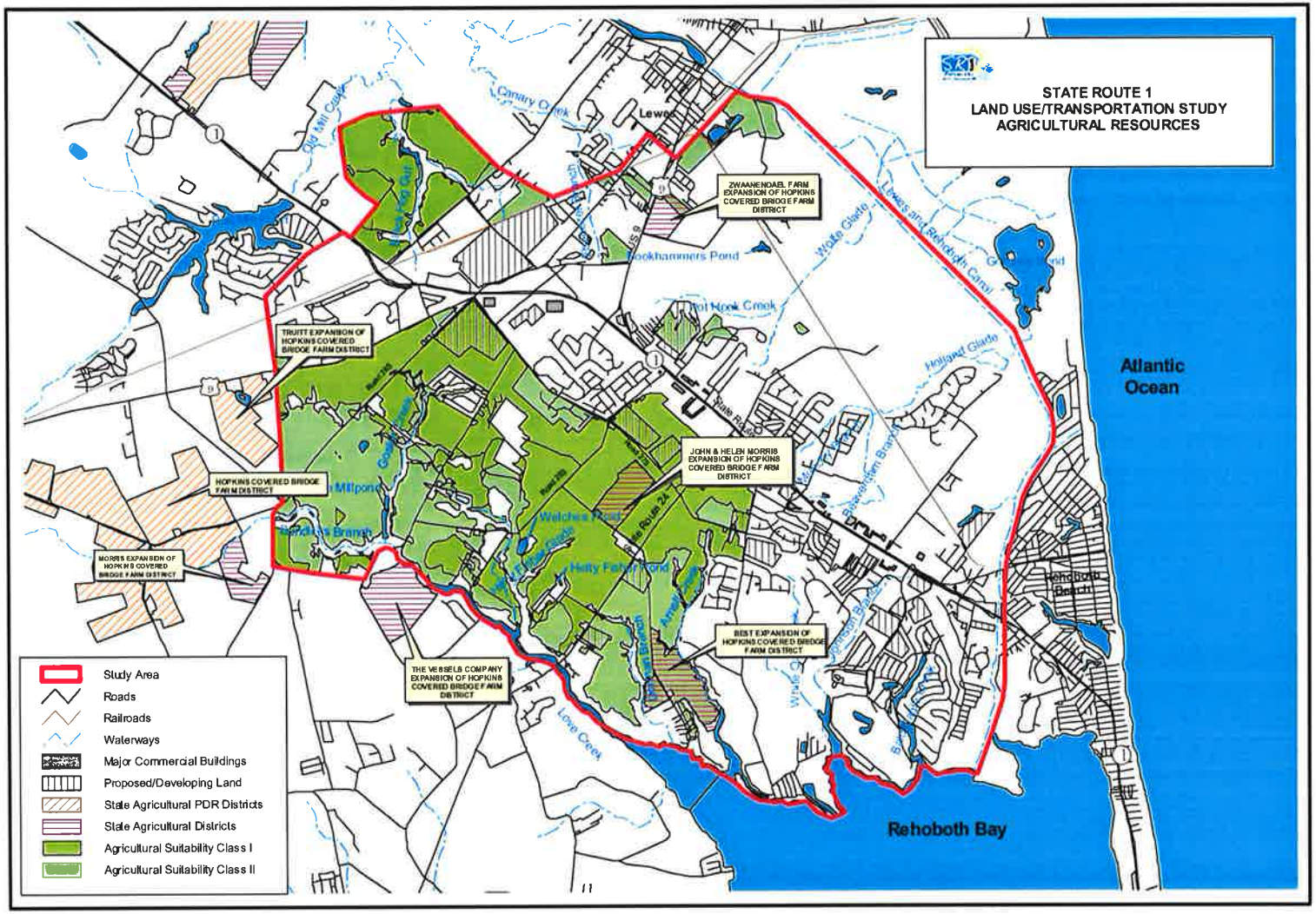
F. Agricultural Resources

There are many agricultural resources within the study area. Agricultural Purchase Development Rights (PDR) Districts are those lands that are permanently protected agricultural easements. A major stipulation of this designation is that they must be farmed and cannot sit fallow. Although there are no PDR Districts within the study area, the Hopkins Covered Bridge Farm PDR District in the adjacent areas to the west is associated with the Agricultural Districts within the project area (see Figure V-5).

Agricultural Districts are lands that are under contract to be preserved for a period of ten years. Agricultural Districts within the study area include the Zwaanendael Farm Expansion of Hopkins Covered Bridge Farm District, the John & Helen Morris Expansion of Hopkins Covered Bridge Farm District, and the Best Expansion of Hopkins Covered Bridge Farm District.

Agricultural suitability classes are designated within the western portion of the study area by the Delaware Department of Agriculture. Classes are designated as 1, 2, 3, 4, or 5 depending on whether the land area is rated as very high, high, medium, low, or very low, respectively, as being suitable for farming. Agricultural suitability depends on the soil type and is not greatly influenced by whether a house is located on a piece of rural land. A lower suitability rating results only when developed land is aggregated in larger communities. Class 1 (very high suitability) and Class 2 (high suitability) are the most important agricultural suitability classes and should be maintained when possible.

Figure V-5 – Agricultural Resources



G. Historic Resources

The study area features many historic architectural and archaeological resources because of its attractiveness to early settlers. Section 106 of the National Historic Preservation Act of 1966 must be satisfied for any improvements with the potential to directly or indirectly affect sites listed in, or eligible for, the National Register of Historic Places. Furthermore, a Federal Highway Administration Section 4(f) Evaluation must be conducted for any federally funded improvements that may directly or indirectly affect any historical sites and publicly owned parks, recreational areas, and wildlife and waterfowl refuges.

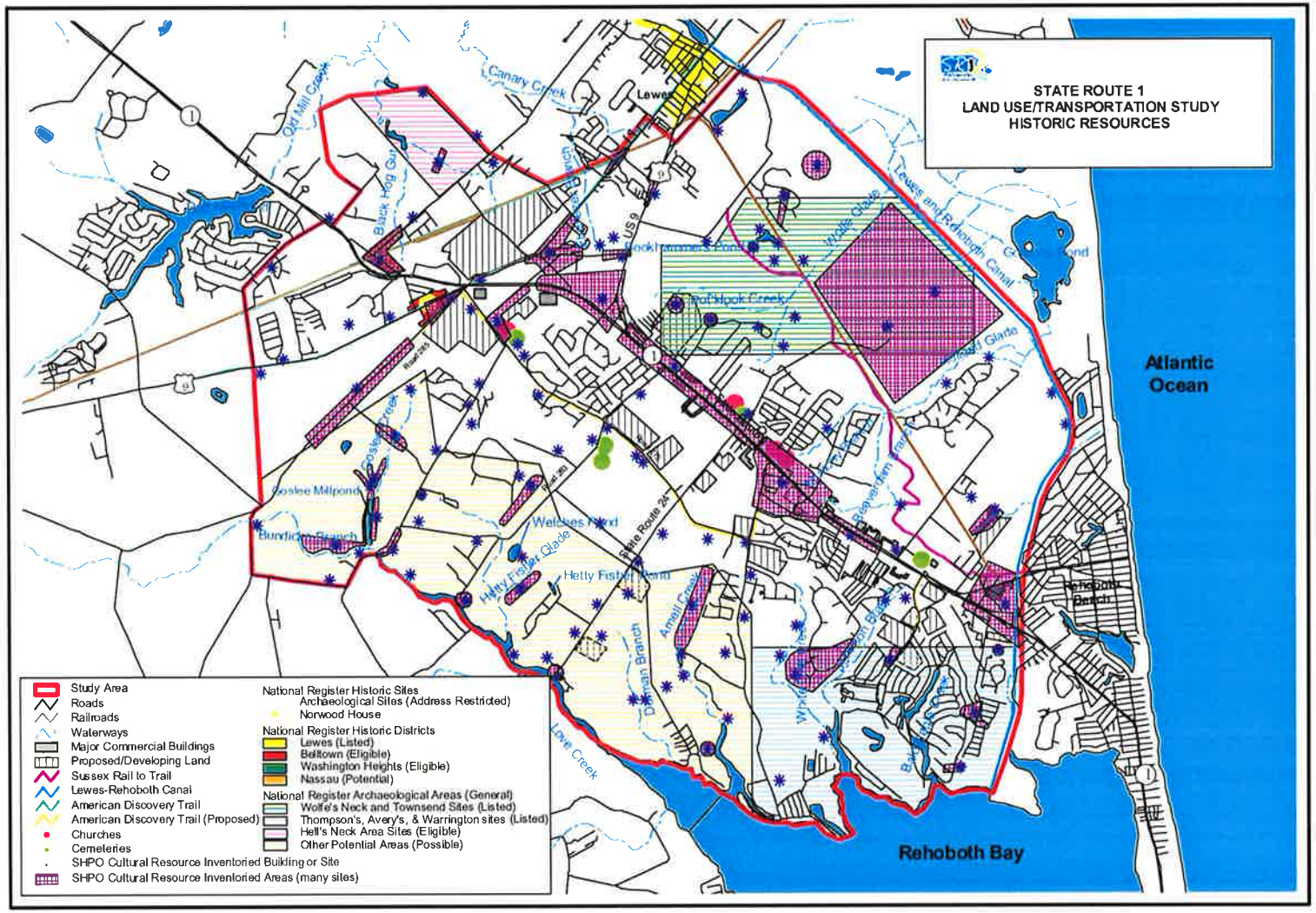
Sites categorized as "listed" on the National Register of Historic Places include the Norwood House, located within the Belltown National Register Historic District in the area of Five Points, and many archaeological sites whose address information is restricted for security reasons. National Register Historic Districts within and adjacent to the study area include the Lewes Historic District, which is "listed" on the National Register; the Belltown and Washington Heights historic districts, which are "eligible for listing"; and the Nassau Historic District, which is "potentially eligible for listing" (see Figure V-6).

Five of the archaeological sites are "listed" on the National Register: the Wolfe's Neck site, Townsend site, Thompson's Loss & Gain site, Avery's Rest site, and Warrington site. The Hell's Neck site is "eligible for listing."

The Delaware State Historic Preservation Office (SHPO) maintains the Cultural Resource Survey (CRS), which includes historic architectural and archaeological resources significant at the federal, state, and local levels. Although the CRS includes federally significant sites "listed" or "eligible for listing" on the National Register, this survey also includes smaller sites that are important at the state and local levels.

Many of these CRS sites are historic structures that may have been demolished since the last survey and smaller, lesser known archaeological sites that are often family cemeteries. There are also well-known church and cemetery sites throughout the study area. Due to the many tributaries in the study area that were likely inhabited by Native American communities and the historic agricultural heritage of the area resulting in many farmsteads, there is a very high probability of CRS sites or buildings throughout the study area.

Figure V-6 – Historic Resources



H. Contamination Concerns

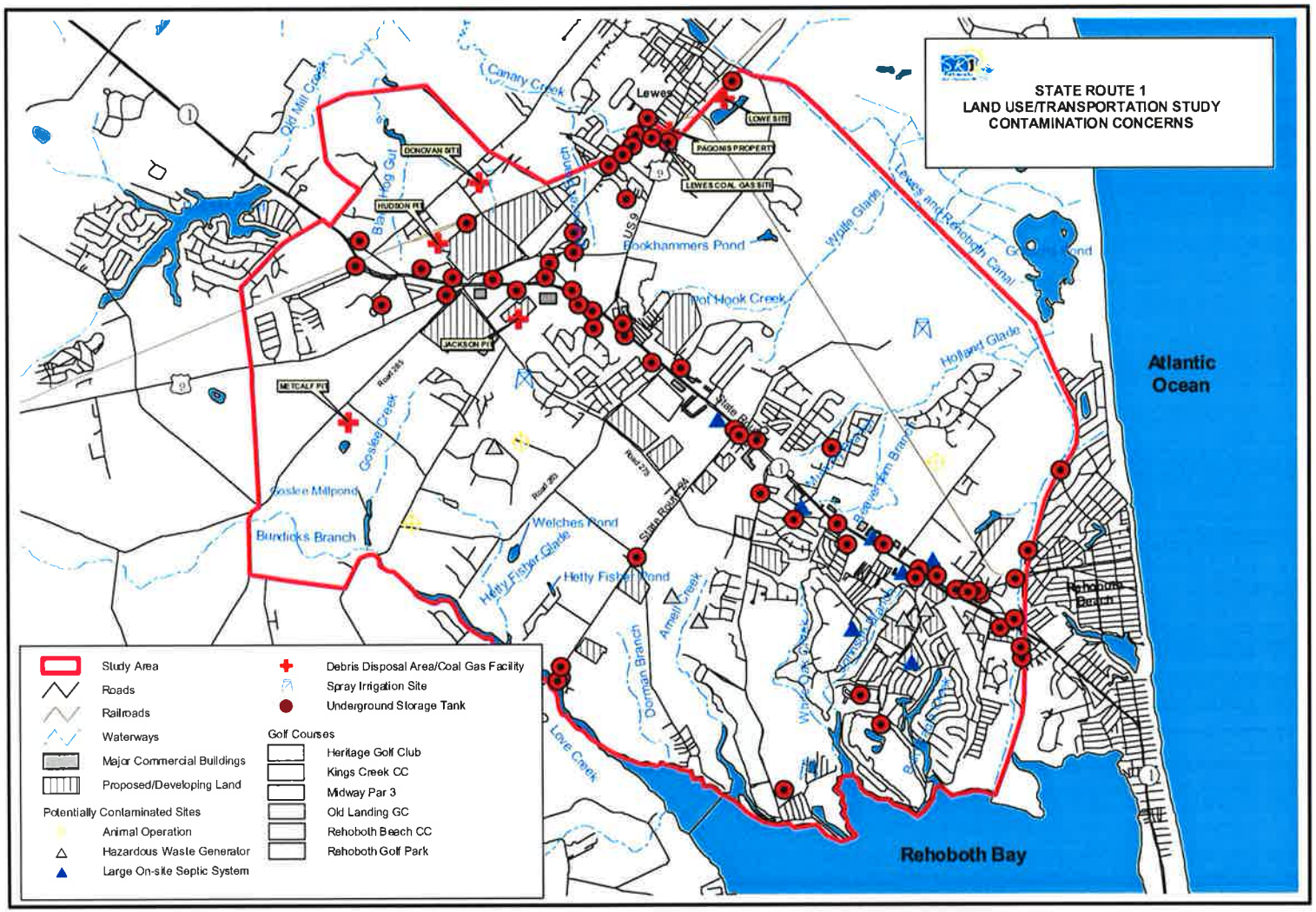
There are no federal Superfund sites within the study area. However, seven debris disposal areas/coal gas facilities within the study area are regulated by the DNREC Division of Air and Waste Management. Six of these sites are under the jurisdiction of the Hazardous Substance Control Act (HSCA), and one site is under the jurisdiction of the Voluntary Cleanup Program (see Figure V-7).

Additionally, there are approximately 90 other sites within the study area with former or existing operations that are associated with known or potential contamination issues. These consist of animal operations, hazardous waste generators, large on-site septic systems, spray irrigation sites, and underground storage tank sites.

There are also hundreds of small septic systems and six golf courses within the study area. Golf courses are inherently likely to have potential contamination issues due to the use of fertilizers, herbicides, and pesticides.

Any potential improvements near any of these sites should be coordinated with DNREC's Division of Air and Waste Management.

Figure V-7 – Contamination Concerns



VI. PUBLIC INVOLVEMENT

The study team used a variety of public outreach techniques and approaches to engage representatives of interested agencies, elected officials, key stakeholders, and the general public in the process of developing a workable and sustainable land use and transportation plan for the study area between Lewes and Rehoboth/Dewey Beach. The recommendations presented in this report represent a consensus from these groups. Of course, as individual elements of this plan move to implementation, a public involvement process will be mandatory to continue this effort to involve those most affected in decisions about their own communities.

A. Key Stakeholder Interviews

The public involvement effort for this study began with a series of 15 interviews of key stakeholders, including the mayors or their representatives from Lewes, Rehoboth Beach, Dewey Beach, and Henlopen Acres; senior staff from Sussex County and DelDOT; the president of the Citizens Coalition; the editor of the *Cape Gazette;* and selected citizens.

The study team asked these people basic questions that would help to give the study direction and focus, such as:

- When you think about the growth and development expected in the study area, what do you think the major issues will be?
- What are your goals for this study and how will you define it as successful?
- What advice would you like to give the technical team as we begin work?
- Who else should we be talking to?

These interviews provided the team with valuable background even before it met with the Public Advisory Committee described below.

B. Public Advisory Committee

The Public Advisory Committee was established by the Memorandum of Agreement between Sussex County and DelDOT to provide continual review of and comment on all study activities. Its membership was jointly determined and consisted of representatives of state, county, and local government, the Citizens Coalition, and key citizen stakeholders. About half the participants live in the study area, and almost all are residents of Sussex County.

Specifically, the PAC members' purpose and role were to:

- Representing their constituencies, inform and advise DelDOT and Sussex County about issues and concerns regarding the study
- Work with them to identify feasible solutions to meet project objectives
- Act as liaisons to "home" organizations – communicate study findings and solicit feedback

The PAC met eleven times during the study, and many members also participated in the public meetings (see page 71). PAC members asked questions, challenged

assumptions, made suggestions, and worked together to produce recommendations that they believe are essential to improve local travel and provide for sustainable development.

PAC members represented the following:

- Residents in the study area
- The towns of Rehoboth Beach, Dewey Beach, Henlopen Acres, and Lewes
- Delaware Department of Natural Resources and Environmental Control
- Council on Transportation
- The Center for Inland Bays
- Sussex County
- DART First State
- Sussex County Association of Realtors
- Rehoboth/Dewey Beach Chamber of Commerce
- Sussex County Conservation District
- Citizens Coalition
- Delaware Historic Preservation Office
- Delaware River and Bay Authority
- Delaware Department of Agriculture
- Delaware Office of State Planning
- Lewes Chamber of Commerce
- Sussex County Farm Bureau
- Delaware Division of Public Safety
- West Side New Beginnings
- Sussex County Volunteer Fireman's Association
- Southern Delaware Home Builders Association
- Delaware Department of Transportation

Because the PAC members represented a variety of interests, their understanding of the technical issues surrounding land use and transportation also varied. In particular, the study team spent considerable time working with the PAC to ensure everyone understood the types of land uses possible, and the negative effects of the kind of suburban sprawl that has begun to characterize much of the study area. The team also endeavored to avoid jargon as much as possible and to explain both the study process and its findings clearly. One entire session was dedicated to explaining transportation modeling and its use in the study.

In addition, 18 PAC members and the study team participated in a seminar on "Sustainable, Integrated Land Use and Transportation Planning in Coastal Sussex County" at the University of Delaware Campus in Lewes in March 2002. This seminar, hosted by the Greater Lewes Foundation and the University of Delaware Sea Grant Program, included national experts and featured a design charrette that used the SR 1 corridor from Lewes to Rehoboth as a case study. This opportunity was

valuable in further grounding PAC members in the subject.

The presentations made for the PAC, as well as summaries of its meetings, are included in the separately bound Technical Appendix. It should be noted that these meetings were open to the public and non-members were given the opportunity to comment at the end of each session. Individual invitations to the meetings were also sent to elected state and local officials and representatives from other interested agencies such as the Environmental Protection Agency, Federal Highway Administration, and Lewes Historical Society.

C. Public Meetings

Four public meetings were held:

- August 15, 2001, Cape Henlopen High School
- February 6, 2002, Rehoboth Beach Convention Center
- September 18, 2002, Virden Center, University of Delaware
- March 1, 2003, Cape Henlopen High School

The first meeting introduced the project, the second presented information about existing and projected travel conditions, the third discussed the preferred land use scenario, and the fourth focused on elements of the transportation plan. Each was well attended, with 93, 128, 103, and 246 participants, respectively.

These meetings took the form of open houses where the public could review displays and discuss their issues and concerns with members of the study team and the PAC. At all but the first meeting, brief presentations were made twice during the sessions to provide a structured review of the study process and its findings (only one presentation was made at the first meeting). These presentations were followed by question-and-answer periods. These presentations and summaries of the question-and-answer periods are also included in the Technical Appendix.

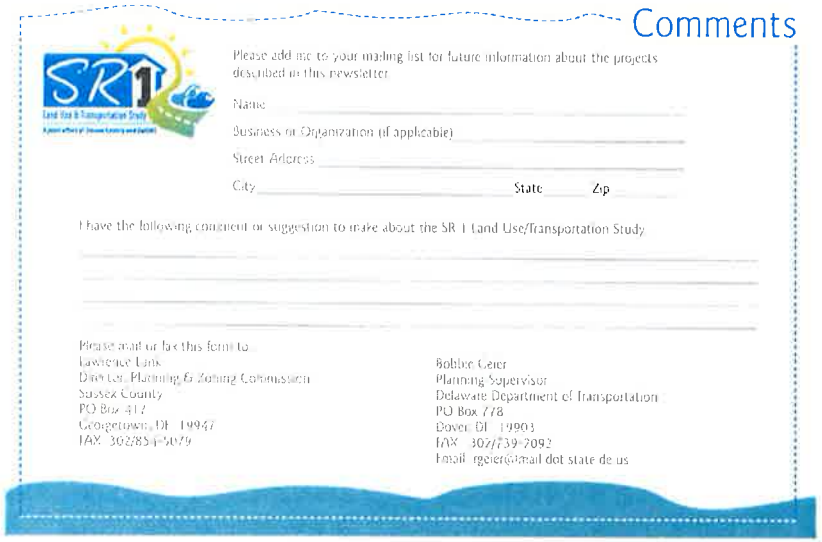
D. Study Newsletters

Study newsletters were another excellent means for reaching out to the public, both to keep them informed and to solicit their comments. Four six-page newsletters were developed and distributed to the four major zip codes in the study area – 19971, 19968, 19951, and 19969, a total of about 16,650 households. The study team also developed a mailing list of almost 1,000 persons; anyone on the mailing list but not in the

designated zip codes also received newsletters and other announcements.

The newsletter content focused on the highlights of the planning process. Like the public meetings, the newsletters introduced the study, presented existing and future conditions, described the land use scenario preferred by the PAC, and discussed the recommended transportation elements of the plan.

Each newsletter also included a "comment card" that could be mailed or faxed to Sussex County or DelDOT.



Comments

Please add me to your mailing list for future information about the projects described in this newsletter.

Name _____

Business or Organization (if applicable) _____

Street Address _____

City _____ State _____ Zip _____

I have the following comment or suggestion to make about the SR 1 Land Use/Transportation Study:

_____

_____

_____

Please mail or fax this form to:

Lawrence Lank
Director, Planning & Zoning Commission
Sussex County
PO Box 417
Georgetown, DE 19947
FAX 302/854-5079

Bobbie Geier
Planning Supervisor
Delaware Department of Transportation
PO Box 778
Dover, DE 19903
FAX 302/739-2092
Email rgeier@mail.dot.state.de.us

E. Public Comment Log

The public responded with enthusiasm to the study team's invitation for comments. By study's end, a comment log summarizing (or repeating verbatim) comments received at Public Meetings, by mailed and faxed comment cards, and in letters had grown to more than 300.

The comment log is included in the Technical Appendix, although the names of individual people have been deleted in that version.

F. Website

Announcements of PAC meetings and Public Meetings were made on Sussex County's website, with the prominent study logo serving as the appropriate link. Adobe portable document format (pdf) files of each newsletter were also available for viewing and downloading.

VII. SUMMARY AND NEXT STEPS

A. Statement of Purpose and Need

As noted in this report, the SR 1 Land Use & Transportation Study was a concept-level needs assessment. The results will be subject to further project definition as well as the National Environmental Policy Act (NEPA) process. Therefore, a Purpose and Need Statement for the major transportation improvements recommended is fundamental. Clarity of purpose and confirmation of need are in themselves sound practices when developing proposals for large-scale, long-term transportation improvements requiring public money. The statements below provide an initial foundation and will be further refined as project development commences and NEPA study and documentation are undertaken.

1. Five Points Grade-separated Diamond Interchange

A grade-separated diamond interchange is proposed to replace the existing at-grade signalized intersection that operates with a single four-phase traffic signal controlling all the movements at the Five Points intersection (SR 1, SR 18, US 9). Under the recommended concept, a three-phase traffic signal would operate at each end of the US 9/SR 18 overpass to handle traffic from these roadways and the SR 1 exit/entrance ramps. Through traffic on SR 1 would pass under the overpass as a continuous movement.

Purpose

The purpose of this project is to improve traffic safety and reduce traffic congestion at the intersection known commonly as Five Points (intersection of SR 1, SR 18, US 9).

Need

The Five Points intersection has been identified as an intersection congestion problem location in the Sussex County Long Range Transportation Plan Update (November 2001) for the forecast years 2005, 2015, and 2025. DelDOT's Federal-State Highway Safety Improvement Program (HSIP) also identified SR 1 from the Nassau Overpass to Five Points as a high accident location in 2001.

This study found that under existing conditions (1998) for the Saturday AM peak hour, the intersection operates at a level of service (LOS) F, with total intersection signal delay at 156.8 seconds and intersection capacity utilization at 106.3%. LOS F is the worst operating condition and is considered unacceptable by most drivers. It happens when the demand volume exceeds the capacity of the intersection, causing queuing and severe delays. LOS F indicates the need for improvement.

The SR 1 Land Use & Transportation Study found a continued LOS F at the Five Points intersection for all future year (2025) land use scenarios examined. Additionally, a LOS F for the Five Points intersection was found in an interim year traffic analysis conducted for

2007, in which the effects of development currently proposed and under construction was taken into account.

Without improvements, total intersection signal delay at Five Points would continue to increase from 156.8 seconds for existing conditions to 201.4 seconds in 2007. Total intersection signal delay at Five Points is forecasted to be 237.9 seconds in the 2025 Base Land Use Scenario, 238.4 seconds in the 2025 Build-Out-To-Plan Land Use Scenario, 230.3 seconds in the 2025 Expanded Development District Land Use Scenario, and 229.4 seconds in the 2025 Activity Center/Village Land Use Scenario.

Intersection capacity utilization continues to increase from 106.3% under existing conditions to 135% in 2007. By 2025, intersection capacity utilization is forecasted to be 177.6% in the 2025 Base Land Use Scenario, 211.3% in the 2025 Build-Out-To-Plan Land Use Scenario, 210.5% in the 2025 Expanded Development District Land Use Scenario, and 199.3% in the 2025 Activity Center/Village Land Use Scenario.

In summary, Five Points is a failing signalized intersection under existing conditions with heavy backups. By 2025, intersection delay at Five Points would be more than 225 seconds. By 2025, the maximum volume-to-capacity ratio would be more than three along the SR 1 approaches at the intersection.

This congestion within and near the Five Points intersection affects not only regional traffic and commuters and visitors using SR 1, but also travel on the arterial highway US 9, collector roads like SR 23, and local roads like Road 275.

2. Controlled Access Parkway

This controlled access roadway would add additional north-south roadway capacity to the transportation network. Under the recommended concept, its alignment would be west of SR 1. The parkway would run from north of the Five Points intersection to Road 273, bypassing an almost five-mile section of SR 1 within the study area. The alignment would provide improved circulation options for locally generated traffic.

The new alignment would be four lanes from north of Five Points to SR 24, and from two to four lanes between SR 24 and Road 273. The intersections of all major roadways (US 9, SR 23, Road 277, Road 283, SR 24, and Road 274) with the new parkway would be signalized.

A grade-separated northbound merge ramp would connect the parkway with northbound SR 1. An at-grade exit ramp would be provided from southbound SR 1 to the parkway for southbound travel on the parkway. Under the concept being recommended by this study, right-turning movements for northbound parkway traffic to southbound SR 1 and left-turning movements from northbound SR1 traffic to the southbound parkway would not be allowed.

Purpose

The purpose of this project is to reduce traffic congestion on SR 1 from Five Points to Rehoboth/Dewey Beach and to provide greater mobility alternatives for local traffic.

Need

As indicated in the Sussex County Long Range Transportation Plan Update (November 2001), SR 1 from Five Points to Rehoboth/Dewey Beach is the biggest transportation problem area in Sussex County. The plan states that improvements currently contained in the Capital Improvement Program (including the addition of a third southbound lane) will not address the long-term problem.

The Sussex County Long Range Transportation Plan Update asserts that SR 1 from Five Points to Rehoboth/Dewey Beach currently suffers from seasonal congestion and deteriorated levels of service. The plan states that congestion generated by local, non-seasonal traffic is forecasted to grow significantly. The plan concludes that within 25 years, SR 1 between Five Points and Rehoboth/Dewey Beach will experience locally generated, recurring, year-round, peak-hour congestion. This is because the rapid residential land use growth that has been occurring in the study area is expected to continue through 2025 and beyond.

This study also found that the traffic volumes predicted for 2025 under each of the four future year land use scenarios would be beyond the capabilities of the existing transportation network. For the 17 signalized intersections on SR 1 in the study area, all or almost all would have a near failing level of service (LOS E) or failing level of service (LOS F) by 2025.

More importantly, operational deficiencies currently exist on SR 1, and the interim year analysis done for the year 2007 indicates that of the 17 signalized intersections on SR 1 in the study area:

- 5 intersections are operating under failing LOS for the existing year (1998) and they would continue to operate under a failing LOS in 2007, with worsening delay and queue lengths.
- 3 intersections are operating under acceptable LOS for the existing year (1998), but they would operate at a failing LOS in 2007.
- 5 intersections are operating at an acceptable LOS for the existing year (1998), but their LOS would deteriorate closer to the failing level (i.e., go from LOS A or B to LOS D).

Traffic volumes under existing conditions for the Saturday summer AM peak hour exceed capacity along the SR 1 corridor between Five Points and Rehoboth/Dewey Beach. Operating conditions on SR 1 would deteriorate by 2007 with just planned development, and by 2025 the SR 1 corridor would be saturated with excessive congestion; average speed along the highway would drop as low as 8 mph while the total SR 1 signal delay could go as high as 5,394 hours in 2025 compared to 945 hours in 1998.

The comparative analysis conducted as part of this study indicates that the existing transportation network in the study area cannot handle even the best-case (Base Land Use Scenario) traffic by 2025. With the worst case (Build-Out-To-Plan Land Use Scenario), the transportation network would be functionally obsolete.

Both these future year scenarios show highly deteriorated travel conditions within the study area with an excessive amount of delays and long traffic backups. For the 2025 Build-Out-To-Plan Land Use Scenario, the average network speed would be close to 3 miles per hour during the peak hour on Saturdays in the summer months, which is only slightly higher than the speed of walking. Major roadway corridors within the study area would be saturated by 2025 and traffic would shift to local roads. The excessive congestion and delays on the entire roadway system, in turn, would impact safety and quality of life.

The analysis clearly shows that transportation infrastructure improvements are essential to ensure the satisfactory flow of traffic within the study area by 2025. It can be assumed that the actual future growth by 2025 would be somewhere between the best-case and worst-case scenarios. It should be noted that both these scenarios are based on existing zoning.

3. Additional Capacity on SR 24

Under the recommended concept, an additional lane would be added in each direction on SR 24 from Love Creek to Road 275. Additional capacity is required to move forecasted increases in local traffic volumes effectively in the corridor.

Purpose

The purpose of this project is to reduce traffic congestion on SR 24 from Love Creek to Road 275.

Need

As indicated in the Sussex County Long Range Transportation Plan Update (November 2001), SR 24 east of Millsboro will be an anticipated problem area by 2025. The plan asserts that this section of SR 24 will suffer from high seasonal congestion.

According to this study, under the 2025 Build-Out-To-Plan Land Use Scenario, VMT and VHT would be much higher when compared to the 2025 Base Land Use Scenario. This would occur because most of the land along Route 24 in the study area is vacant residential land or farmland with agricultural/residential zoning. If the land is developed according to existing zoning, these parcels would create significant local traffic, and operating conditions would deteriorate.

By 2025, due to significant local development and background traffic growth along SR 24 (a major regional roadway), the intersection of SR 1 and SR 24 would pose severe congestion problems. By 2025, traffic volumes at this intersection would be more than twice its capacity. Additionally, the signalized intersection of SR 24 and Road 275 would have a near failing level of service by 2007 (LOS E), and by 2025 the signal would fail (LOS F).

These results show a crucial need for roadway infrastructure improvements on SR 24 within the study area. Planned (2007) and projected (2025) land use growth indicate that extreme levels of congestion will exist.

B. Future Projects and Studies

The recommended elements of this Land Use and Transportation Plan will not happen all at once. The short-term components of the transportation plan can be addressed almost immediately (and some, like the optimization of signals on SR 1, are already under way). Similarly, Sussex County has already begun to address the ordinances and other commitments it has made to support the development of compact, mixed-use activity centers. DelDOT and Sussex County are both working toward designating the recommended parkway as controlled access and protecting it from residential and commercial development along its length.

The longer-range elements of the transportation plan will now move through DelDOT's Project Pipeline, illustrated on the following page. Because the SR 1 study was a concept-level analysis, more work will have to be done to identify specific alignments, purchase necessary rights-of-way and easements, and work with the public to define particulars.

At least four major studies will be needed to complete the Project Development phase of these recommendations:

- A more detailed study to develop a grade-separated diamond interchange at Five Points and improve local circulation at that location
- A determination of the final alignment for the section of the controlled access parkway from north of Five Points to SR 24
- A determination of the final alignment of the parkway from SR 24 east
- An examination of the specific opportunities for implementing bicycle and pedestrian accommodations on SR 1.

These studies will be followed by the Engineering phase, where actual plans and specifications are produced, and finally by Construction.

Other studies will examine public transportation needs in the area and address whether additional park-and-ride facilities are needed.

Figure VII-1 – DelDOT Project Pipeline

Pipeline Step		Work Activity		Time Frame
Project Development*	=	Work with the public to define the problem, possible solutions and a preferred alternative	=	12-36 months
Engineering*	=	Produce plans and specifications	=	12-24 months
Construction*	=	Build improvement	=	Depends on complexity of improvement

* Funding for each step is based on relative priorities as they are established in the annual budget process. ***Community support is very important.***

C. Environmental Impacts

The environmental screening performed as part of this study is only the first step to ensure that every effort is made to avoid or minimize negative effects on the area's environment, and to mitigate any that cannot be avoided.

An Environmental Assessment or an Environmental Impact Statement will be required for construction of the diamond interchange, the controlled access parkway, and the widening of SR 24. This document will address the extent of effects anticipated on the following and the use of mitigation measures to avoid or minimize them:

- **Natural systems** – wildlife, vegetation, water and air quality, wetlands and floodplains, recharge and well-head protection areas, etc.
- **Land use** – land acquisition and displacement, parklands, open space and recreational areas, farmland, consistency with other plans, etc.
- **Socioeconomic systems** – historic and archaeological resources, aesthetics/visual impacts, community disruption, environmental justice, pedestrians/bicyclists, etc.

In addition, it will be necessary to satisfy the requirements for a number of federal, state, and local permits.