

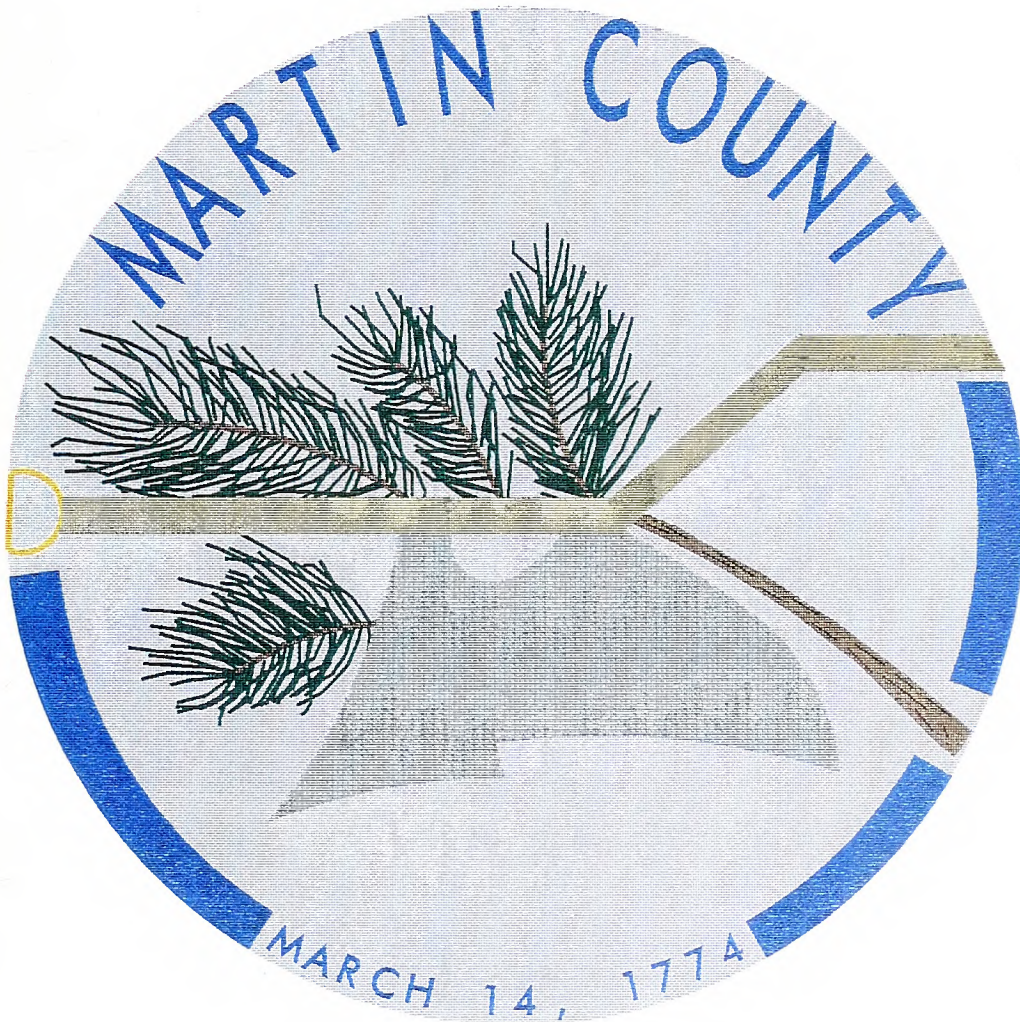
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North Carolina Department of Transportation  
Statewide Planning Branch  
Small Urban Planning Unit

# *Thoroughfare Plan*

*for*



*May, 1995*



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MARTIN COUNTY  
THOROUGHFARE PLAN

May, 1995

Prepared by the:

Small Urban Planning Unit  
Statewide Planning Branch  
North Carolina Department of Transportation

In Cooperation with:

Martin County  
The Federal Highway Administration  
The U.S. Department of Transportation

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Forrest L. Robson 9/12/95  
Forrest L. Robson, P.E.

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## **ACKNOWLEDGMENTS**

The coordinated efforts of many individuals and government agencies made the 1995 Martin County Thoroughfare Plan possible. The Project Engineer conducted Martin County's thoroughfare planning process and wrote this report. The Thoroughfare Planning Engineer was responsible for providing necessary practical experience to ensure the plan conforms with the Small Urban Unit's objectives. The Statewide Planning Branch Manager was responsible for making sure the thoroughfare plan conformed with Department of Transportation policy.

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## I. INTRODUCTION

A county's transportation system is one of the most important factors contributing to the economic and social quality of life in the county. Because county transportation systems affect so many people and are very expensive to construct, developing transportation systems requires extensive planning. Policy makers established a "thoroughfare planning process" to guide transportation planning activities.

The primary objective of thoroughfare planning is to provide a transportation system which can progressively develop to meet future travel demands. By developing the street system to keep pace with increasing traffic demands, street capacity can be maximized. Proper planning saves money by eliminating unnecessary improvements and minimizing the amount of land needed for streets.

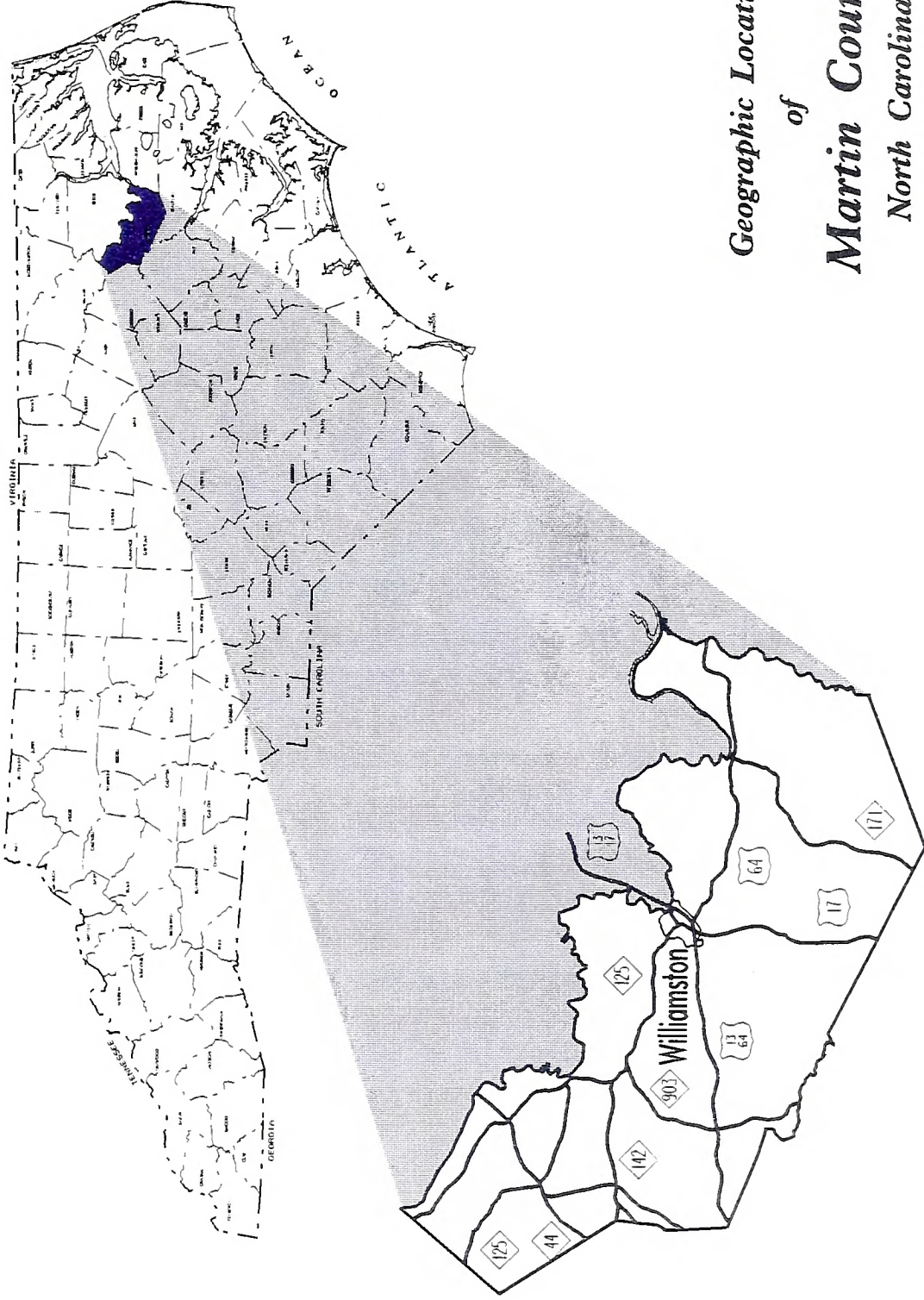
Other thoroughfare planning objectives include:

1. reducing transportation related environmental impacts, such as air, water, land, and noise pollution,
2. reducing travel and transportation costs,
3. reducing the cost of street improvements to the public through the coordination of subdivision and commercial developments with street developments,
4. enabling local citizens to plan their actions with full knowledge of public intent,
5. minimizing disruption and displacement of people and businesses through published long range street improvement plans, and
6. increasing travel safety.

Martin County, illustrated in figure 1, requested the Department of Transportation for assistance developing a Thoroughfare Plan on February 21, 1992. Martin County's Planning Board and County Commissioners participated in the thoroughfare planning process. On April 19, 1995, the Martin County Commissioners adopted the Martin County Thoroughfare Plan map dated March 10, 1995. Subsequently, the North Carolina Department of Transportation adopted the plan on June 2, 1995.

Martin County's Thoroughfare Plan map is long-range transportation plan which illustrates how the street system

*North Carolina*



*Geographic Location  
of  
Martin County  
North Carolina*

*FIGURE 1*

*Martin County*





will probably be classified in thirty years. This report documents the thoroughfare planning process. After the introduction chapter, there are three chapters of the report:

- \* Chapter 2 details the Martin County Thoroughfare Plan Recommendations;
- \* Chapter 3 details the local involvement during the thoroughfare planning process; and
- \* Chapter 4 details implementation options.

At the end of the report, there are several appendices with additional information on the computer traffic forecasting model and other related items.



## II. RECOMMENDATIONS

Recommendations are based on the thoroughfare planning principles (detailed in Appendix A), Martin County's travel deficiency analysis (detailed in Appendix B), and a computer traffic model (detailed in Appendix C). Figure 2 illustrates the thoroughfare plan mutually adopted by Martin County and the North Carolina Department of Transportation. Additional information on environmental concerns is discussed in Appendix D. Department of Transportation recommendations are tabulated in Appendix E with references to typical thoroughfare cross-sections illustrated in Appendix F.

This chapter discusses thoroughfare plan recommendations in detail. Recommendations are organized by functional classification in six categories:

Rural Principal Arterials

Rural Minor Arterials

Rural Major Collectors

Rural Minor Collectors

Rural Local Road System

## Urban Thoroughfares

The last section of the chapter discusses project benefits.

### **RURAL PRINCIPAL ARTERIALS**

US 17, US 64 and Proposed US 13 are Rural Principal Arterial roadways. US 17 and US 64 are designed for high speed traffic movement, and the proposed US 13 will be designed for high speed traffic movement. The proposed US 13 Bypass in conjunction with US 64 is part of the intrastate corridor between Raleigh and the Outer Banks. All three of these facilities are intended to serve primarily through traffic and not provide direct land access.

In North Carolina's 1995-2001 Transportation Improvement Program, illustrated in Figure-3, US 17 will be widened to a multi-lane facility. Planning for the US 17 widening is scheduled to begin in 1999. The proposed US 13 will be a four-lane freeway on a new location. Construction of this facility is scheduled to begin in 1995.

### **RURAL MINOR ARTERIALS**

NC 11 and part of NC 42 are Rural Minor Arterial roadways. The NC 11 corridor extends from Greenville to Bertie County. Although minor arterials may serve abutting property, their principle function is to carry larger volumes

FIGURE 2

**MARCH 10, 1995  
THOROUGHFARE PLAN**

ADOPTED BY:  
Martin County MARCH 16, 1994

Dept. of Transportation MAY 6, 1994

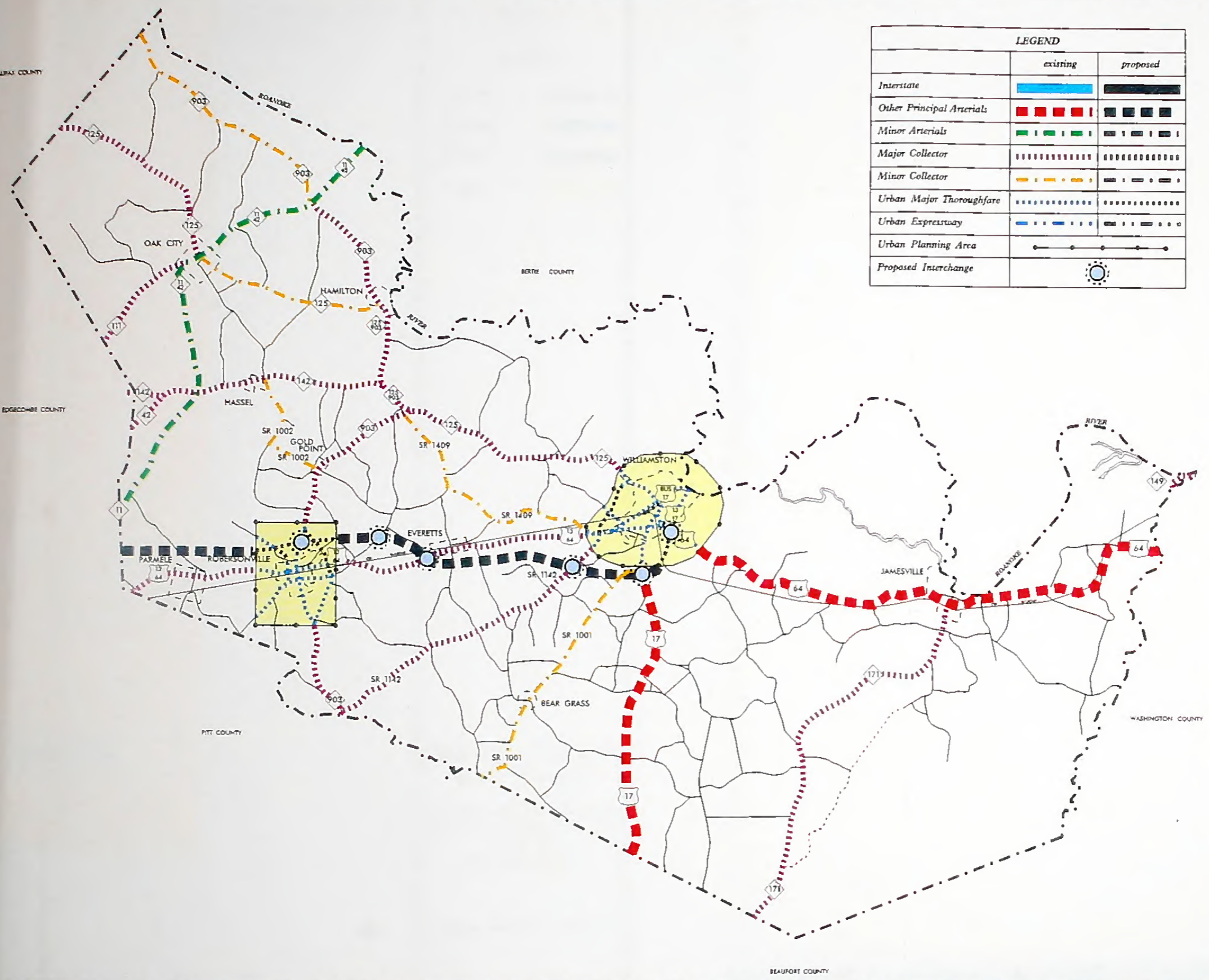
RECOMMENDED BY:  
Statewide Planning APRIL 18, 1994

REVISED BY:  
Martin County APRIL 19, 1995

Dept. of Transportation JUNE 2, 1995

RECOMMENDED BY:  
Statewide Planning APRIL 25, 1995

LEGEND		
	existing	proposed
Interstate		
Other Principal Arterials		
Minor Arterials		
Major Collector		
Minor Collector		
Urban Major Thoroughfare		
Urban Expressway		
Urban Planning Area		
Proposed Interchange		



**MARTIN COUNTY  
NORTH CAROLINA**

PREPARED BY:  
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS-STATEWIDE PLANNING BRANCH  
IN COOPERATION WITH THE  
U.S. DEPARTMENT OF TRANSPORTATION  
FEDERAL HIGHWAY ADMINISTRATION





# TRANSPORTATION IMPROVEMENT PROGRAM PROJECTS 1995 - 2001

Figure 3

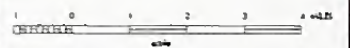
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- R-2700
- R-2511
- R-2415



**MARTIN COUNTY**  
NORTH CAROLINA

PREPARED BY  
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS-STATEWIDE PLANNING BRANCH  
IN COOPERATION WITH THE  
U.S. DEPARTMENT OF TRANSPORTATION  
FEDERAL HIGHWAY ADMINISTRATION



BEAUFORT COUNTY





of traffic. In North Carolina's 1995-2001 Transportation Improvement Program, NC 11 will be widened to four lanes. Planning for this widening is scheduled to begin in 1996.

### **RURAL MAJOR COLLECTORS**

Martin County has eight Rural Major Collector roadways - US 13, NC 111, NC 125, NC 142, NC 149, NC 171, NC 903, and SR 1142. The rural major collector system is a network of continuous routes that serve substantial intra-county travel. These routes provide service to the large towns and large traffic generators not served by the higher systems. In North Carolina's 1995-2001 Transportation Improvement Program, NC 171 will have safety improvements. Construction along NC 171 is currently underway and will continue through 1996. Based on existing traffic volumes and the minimum recommended lane widths listed in Table B-3, SR 1142 (Prison Camp Road) should be widened to have 3.3 meter lanes.

### **RURAL MINOR COLLECTORS**

SR 1001, SR 1002, and SR 1409 are Rural Minor Collector roadways in Martin County. The rural minor collector system is a network of continuous routes that serve smaller communities and locally important traffic generators. Based on existing traffic volumes and the minimum recommended lane widths listed in Table B-3, SR 1001 should be widened to have

3.3 meter lanes, and SR 1409 should be widened to have 3.0 meter lanes.

### **RURAL LOCAL ROAD SYSTEM**

The rural local road system is a network of all roads which are not part of the higher systems. Subdivision streets and residential streets are examples of the local road system.

### **URBAN THOROUGHFARES**

On county thoroughfare plans all roads illustrated inside an urban planning area boundary are considered urban thoroughfares. In Martin County, only Williamston and Robersonville have urban planning area designations. For more information on urban thoroughfares in these planning areas, please see the Williamston Thoroughfare Plan or the Robersonville Thoroughfare Plan.

### **PROJECT BENEFITS**

Martin County's Thoroughfare Plan contains one proposed new thoroughfare, two widening projects and one safety improvement project. Each project affects different transportation users, and each project has different costs and benefits. This section of the report quantifies the

positive and the negative aspects of each project. The analysis is based on *Technical Report #8: Transportation Project Evaluation Using The Benefits Matrix Model* published by the Statewide Planning Branch of the Department of Transportation. This analysis provides general information on the relative significance of each project to Martin County's Thoroughfare Plan.

Each project's benefits are determined by comparing the traffic on the existing street network with traffic on the thoroughfare plan network. Table-1 shows the results from this analysis. Item one shows the monetized project benefits. Project benefits include vehicle operating cost savings, travel time cost savings, and accident cost savings. Cost savings were calculated by comparing how much existing and future traffic would shift to use the proposed project.

Item two shows the project cost estimates. The cost estimates are based on average cost-per-mile construction information from across North Carolina. Because these cost estimates are not particular to Martin County or to specific roadway design plans, the actual construction costs may be significantly different. The costs listed in the table are useful for illustrating the relative cost difference between alternative projects.

Economic impacts are listed as item three. The probability of economic development enhanced by the project is ranked on a continuous scale from low to high. Projects which have a minimal probability of economic development have a value of zero. Projects which have a high probability of economic development have a value of one.

<b>TABLE 1</b>	
<b>PROJECT COMPARISON SUMMARY</b>	
Proposed US 13/64 Bypass	
Benefits (Millions):	\$190
Cost (Millions):	\$73.0
Economic Impacts:	0.75
Environmental Impacts:	-0.8
Through Trips:	80%
US 17 widening:	
Benefits (Millions):	\$14
Cost (Millions):	\$16.1
Economic Impacts:	0.25
Environmental Impacts:	-0.8
Through Trips:	80%
NC 171 Safety Improvements	
Benefits (Millions):	\$11
Cost (Millions):	\$3.4
Economic Impacts:	0.25
Environmental Impacts:	-0.4
Through Trips:	20%
NC 11 widening:	
Benefits (Millions):	\$21
Cost (Millions):	\$29.9
Economic Impacts:	0.25
Environmental Impacts:	-0.6
Through Trips:	50%

Environmental impacts are listed as item four. Impacts ranging from very negative to very positive correspond to values ranging from negative one to positive one. Physical

environment considerations include: air pollution, water pollution, land pollution, noise pollution, geological resources, wildlife habitats, and natural vegetation. Social environmental considerations include: housing, neighborhoods, schools, churches, parks, public safety, national defense, and aesthetics. Each of these standard environmental factors are ranked and averaged for each project to generate the value listed in the table.

The average daily through trips in the design year are listed as the last item. The number of through trips indicate the significance the project will have on the State Arterial system. Projects which have high volumes of through traffic are more important to the State Arterial system. Projects which have very few through trips are more important to the local street system.



### III. LOCAL INVOLVEMENT

In today's complex democratic society, creating a thoroughfare plan requires working with many different people. Often thoroughfare planning involves: transportation planning engineers, roadway design engineers, community planners, environmental specialists, federal agencies, state agencies, local officials, and local citizens. Martin County's thoroughfare planning process began when Martin County requested the Department of Transportation for assistance developing the Martin County Thoroughfare Plan.

In May 1992, the Department of Transportation met with Martin County's Land Use Planning Committee. At that meeting, the thoroughfare planning process and the time-line from "thoroughfare planning to road construction" was discussed. In addition, a proposed schedule for Martin County's Thoroughfare Plan was developed.

In May 1993, the Department of Transportation met with Martin County's Land Use Planning Committee a second time. Traffic counts, accident locations, deficient bridges,

functional classification, environmental concerns, local railroads, Transportation Improvement Program projects, and the National Highway System were discussed.

In March 1994, the Department of Transportation met with Martin County's Land Use Planning Committee a third time. Population projections, employment projections, dwelling unit projections, and land-use projections were all discussed. Subsequently, after a brief review of the computer model development and the associated traffic projections, the recommended thoroughfare plan was discussed. After everyone's questions and ideas were considered, the Land Use Planning Committee endorsed a recommended thoroughfare plan for the County Commissioners to review.

On March 16, 1994, the Department of Transportation met with the Martin County Commissioners. After a general overview of the work completed over the previous two years, the Martin County Commissioners adopted the Thoroughfare Plan map dated February 21, 1994. Martin County Commissioners decided a public hearing was not necessary because there were no "new controversial" projects being proposed by the Thoroughfare Plan. Subsequently, the North Carolina Department of Transportation adopted the plan on May 6, 1994.

After the plan was adopted, there were three events which prompted Martin County to request an update of the



Thoroughfare Plan map before this documentation could be completed.

- 1) In November 1994, Williamston adopted an updated thoroughfare plan. Since the major thoroughfares on Williamston's Thoroughfare Plan are referenced on Martin County's Thoroughfare Plan, Martin County officials wanted Martin County's Thoroughfare Plan to show Williamston's new Thoroughfare Plan.
  
- 2) The alignment and interchange locations of the proposed US 13/64 Bypass shown on the Thoroughfare Plan were based on the Environmental Impact Statement for that project. During the roadway design process, the alignment of the US 13/64 bypass was slightly shifted, and a new interchange was added to SR 1142. Consequently, Martin County officials wanted SR 1142 be upgraded on the Thoroughfare Plan to a major collector. Due to functional classification mileage limitations, SR 1142 was upgraded to a major collector in exchange for SR 1001 being downgraded to a minor collector.
  
- 3) On May 9, 1994, Traffic Ordinance #9438 changed the name of NC 44 to NC 111. Consequently, Martin County officials wanted the Thoroughfare Plan Map to show this name change.

On April 10, 1995, Martin County's Land Use Planning Committee endorsed the revised Thoroughfare Plan, map date March 10, 1995, for the County Commissioners to review. On April 19, 1995, the Martin County Commissioners officially adopted the revised Martin County Thoroughfare Plan. On June 2, 1995, the North Carolina Board of Transportation adopted the revised Martin County Thoroughfare Plan.

#### IV. IMPLEMENTATION

Martin County's Thoroughfare Plan is a detailed set of recommendations for how the communities should develop a street system to keep up with the area's growth. Because there are no guarantees the area will develop as planned, anticipated traffic growth and future capacity deficiencies may change. Before any of the proposed roads will be considered for construction, a detailed project study will determine if actual development justifies the projects. Environmental studies and roadway design plans will determine specific road alignments.

No one in the Department of Transportation has the job of implementing the recommendations listed in thoroughfare plans because funding is not available for building roads based on predicted need. Local officials are responsible for requesting projects as the need arises. With hundreds of municipalities competing for projects funded by the state's tight budget, Martin County must make well planned requests to be effective. The documented public and political involvement, in addition to technical feasibility, give

thoroughfare plan project requests the competitive edge over all other requests.

## **REGULATIONS**

Communities which actively protect their thoroughfare corridors have the best success actually getting projects constructed. Protecting thoroughfare corridors saves citizens hundreds of thousands and even millions of dollars each year. Thoroughfare Plan adoption, subdivision regulations, future street line ordinances, zoning ordinances, development reviews, and official maps are regulations available to protect thoroughfare corridors.

### **Thoroughfare Plan Adoption**

Section 136-66.2 of the North Carolina General Statutes provides guidelines for adopting a thoroughfare plan. After the county and the Department of Transportation cooperatively develop a thoroughfare plan, the plan may be adopted by the county and the Department of Transportation. Subsequently, the thoroughfare plan serves as the basis for future street and highway improvements.

The Martin County Thoroughfare Plan should be reviewed locally at least once a year. When significant changes are necessary, the county should request the Statewide Planning

Branch of the Department of Transportation to update the thoroughfare plan. Depending on actual growth patterns, the plan should be formally updated once every five to ten years.

### **Subdivision Regulations**

Subdivision regulations specify roadway width, right-of-way, and sight distances in new subdivisions. The Department of Transportation manual *Subdivision Roads: Minimum Construction Standards* documents the design, construction, and utility placement standards necessary for state maintained roads. Regulations are classified by road functions (local street, collector street, etc). Appendix G contains an example subdivision ordinance. These regulations minimize roadway safety hazards and maintenance costs. Counties must have developers construct roads to North Carolina subdivision road standards for the North Carolina Department of Transportation to accept and maintain the road. Roads not meeting state regulations must be constructed and maintained by local or private funding.

Martin County's proposed thoroughfares depend on local officials actively using subdivision regulations. When a proposed subdivision conflicts with the thoroughfare plan, the municipalities and the county should protect the transportation corridor. During the planning stage, the conflicting **subdivision** roads can be realigned and improved

to match the thoroughfare plan. Developers who construct thoroughfare plan streets can benefit from local or state agency coordination. Developers who do not help build the thoroughfare plan improvements should dedicate the necessary road right-of-way. As a minimum, developers should reserve property needed for future road right-of-way.

### **Future Street Line Ordinances**

Typically, by the time an existing road needs widening, houses and buildings line both sides of the road with no room to spare. Residents are understandably upset when widening the road swallows their entire yard, or worse their whole house. Businesses are equally upset when widening the road eliminates their only customer parking spaces, or their entire office. Building setbacks based on the thoroughfare plan recommendations reduce this problem.

As time passes, existing buildings age; some are renovated, others are replaced with newer buildings. Simultaneously, new buildings fill in the land between established buildings as zoning density limits increase. With adequate setback requirements, all the buildings constructed or renovated after thoroughfare plan adoption can have space for road widening. Ultimately, when the road is widened, fewer property owners will be negatively affected.

## Zoning Ordinances

Zoning is a legal device available for implementing a land use plan. Most legislation today is based on the U.S. Department of Commerce 1924 Standard Zoning Enabling Act. Zoning involves dividing a municipality into districts and regulating each district's population density, land use, open space, and other local concerns. Although zoning ordinances do not regulate street design or right-of-way, zoning directly influences transportation by protecting thoroughfare corridors and controlling transportation demand.

Zoning can control transportation demand by discouraging strip development zones along highways which create inefficient traffic flows. Isolated, single purpose businesses connected by highways congest the roads with people driving from one place to another for everyday activities. Driving to the grocery store for a loaf of bread and then driving to the post office to buy a roll of stamps often takes more driving time than shopping time. Zoning business areas for campus developments instead of strip development reduces automobile traffic by eliminating unnecessary automobile trips.

Zoning can also reduce automobile traffic by encouraging walking or bicycling. Just as shopping malls encourage people to walk from one shop to another, other developments

can encourage people to walk from one business to another. Sidewalks should connect office complexes with lunch time eating and shopping areas. Neighborhoods, schools, libraries, and parks should also have connecting sidewalks and bicycle paths so people can choose their travel mode. Appendix H is a copy of the DOT Pedestrian Policy Guidelines.

### **Development Reviews**

Development reviews save developers and counties the headache of dealing with avoidable transportation related problems. Reviews done at an early stage often save developers and municipalities money and increase the site's accessibility. Depending on how the development will affect existing and future traffic, different Department of Transportation specialists review the development plans.

Since the developers usually contact the county first, the county should advise them to contact the District Engineer. The District Engineer reviews all requests for driveway access to State maintained roads. If necessary, the District Engineer will forward development requests to other Department of Transportation branches. If requested, the Statewide Planning Branch reviews all development requests on or near proposed thoroughfares and all requests which may prevent existing thoroughfares from being widened in the future. The Traffic Engineering and Highway Design Branches



review large traffic generating developments like shopping centers, large industries, and fast food restaurants. The District Engineer can be contacted by writing:

District Engineer  
N.C. Department of Transportation  
P.O. Box 928  
Plymouth, NC 27962

### **Official Maps**

The North Carolina Statutes 136-44.50 through 136-44.53 are collectively designated as the "Roadway Corridor Official Map Act." This act gives state and municipal governments the power to protect transportation corridors based on official corridor maps. The official map which details the proposed thoroughfare alignment, the functional design, and the preliminary right-of-way boundaries is filed with the county Register of Deeds.

Roadway corridor maps may be adopted by the Department of Transportation or the municipality. The Department of Transportation makes official corridor maps only for fully controlled access facilities outside municipal jurisdiction. Municipalities must make official corridor maps for facilities without fully controlled access or facilities inside municipal jurisdictions. County Commissioners must

approve municipal official corridor maps that extend beyond the municipality's extraterritorial jurisdiction.

Counties protect road corridors by prohibiting building permits or subdivision approvals on property within the corridor alignment. Because this places severe restrictions on private property rights, land owners are sometimes compensated by having a reduced tax rate on any undeveloped or unsubdivided land within the transportation corridor.

Awkward legislation makes official corridor maps ineffective or inappropriate for most road corridors. Unless an environmental impact study or preliminary engineering study begins within one year of the official corridor map recording, the official map becomes legally void. If the environmental impact process is initiated, property restrictions only last up to three years, beginning when the developer requests permit or subdivision approval. Even if all other criteria are met, if federal funds are used, the environmental impact process chooses the road corridor with the least environmental damage, not necessarily the official map corridor.

The document *Guidelines for Municipalities Considering Adoption of Roadway Corridor Official Maps* has more details. Request this document from:

Program and Policy Branch  
N.C. Department of Transportation  
P.O. Box 25201  
Raleigh, North Carolina 27611.

The Program and Policy Branch of the North Carolina Department of Transportation is responsible for coordinating Official Corridor Maps.

### **Regulation Coordination**

Individually, thoroughfare plan adoption, subdivision regulations, zoning ordinances, development reviews, and official maps are all useful regulation tools. However, these regulations should be coordinated together to enhance their total effectiveness. Although each regulation applies to different items, each regulation can support other regulations. Counties with coordinated regulations can transfer severable development rights as bargaining chips to attract and influence development in the community's best interest.

### **FUNDING**

Almost every city, town, and village from the mountains to the coast would like some type of road improvements. Each year communities request funding for everything from new Interstates to bicycle paths. Right-of-way costs consume up

to half of the total project costs. When municipalities can actively protect transportation corridors, reduce right-of-way costs and save North Carolina tax payers millions of dollars, Board of Transportation members notice.

### **State and Federal Funding**

The Department of Transportation, Division of Highways, is responsible for all state maintained roads outside municipal corporate limits. Inside municipal corporate limits, the Division of Highways is responsible for major streets and highways which carry primarily through traffic and traffic to major commercial, industrial, or governmental destinations. Division of Highways funds for the construction, maintenance, and improvements to the state road system can help implement thoroughfare plan recommendations.

North Carolina's Transportation Improvement Program (TIP) is a document which lists all major construction projects the Department of Transportation plans for the next seven years. Similar to local Capital Improvement Program projects, TIP projects are matched with projected funding sources. Each year when the TIP is updated, completed projects are removed, programmed projects are advanced, and new projects are added (typically during the seventh year).

During annual TIP public hearings, counties and municipalities request projects to be put in the TIP. A Board of Transportation member reviews all of the project requests in a particular area of the state. Based on the technical feasibility, need, and available funding, the board member decides which projects will be included in the TIP. In addition to highway construction and widening, TIP funds are available for bridge replacement projects, highway safety projects, public transit projects, railroad projects, and bicycle projects.

Non-TIP funds are also available for special purposes. The Department of Transportation has separate funds for paving secondary roads, building industrial access roads, and miscellaneous spot improvements in small urban areas. To find out if any of these funds are available, contact the Board of Transportation member for Division 1, or the DOT Division Engineer for Division 1. The Federal Government provides useful block grants such as urban renewal grants and demonstration project funding. Used in coordination with thoroughfare planning objectives, these other funding sources can make significant transportation improvements.



# APPENDICES

A series of vertical lines of varying lengths, increasing from left to right, representing the relative length of each appendix. The lines are arranged in a roughly triangular shape, with the longest line on the far right and the shortest on the far left.





## APPENDIX A

### THOROUGHFARE PLANNING PRINCIPLES

Through time, villages grow into towns, towns grow into small cities, and small cities grow into large cities. All communities are dynamic places, constantly changing to keep pace with the increasing demands of today's citizens. Older buildings are replaced with newer more efficient structures. Agricultural land is converted to residential or commercial land. Low density zones are raised to high density zones to allow more people to use smaller parcels of land.

Only the roads remain much the same today as they were when they were originally built. True, today's engineered asphalt and concrete roads are far more efficient than the horse and buggy trails of yesterday. But, often the old horse and buggy trail alignment is the only alignment available for new highways. Once communities establish development patterns based on the existing roads, improving the alignment of the roads is difficult and sometimes impossible. Even after General Sherman burned Atlanta to the ground during the American Civil War, the city was still rebuilt using the original road corridors. Since the street system is permanent and expensive to build, policy makers established thoroughfare planning principles to guide transportation planning.

## OBJECTIVES

The primary objective of thoroughfare planning is to provide a transportation system which can progressively develop to meet future travel demands. By developing the urban street system to keep pace with increasing traffic demands, street capacity can be maximized. Proper planning saves money by eliminating unnecessary improvements and minimizing the amount of land needed for streets.

Other thoroughfare planning objectives include:

1. reducing transportation related environmental impacts, such as air, water, land, and noise pollution,
2. reducing travel and transportation costs,
3. reducing the cost of street improvements to the public through the coordination of subdivision and commercial developments with street developments,
4. enabling local citizens to plan their actions with full knowledge of public intent,
5. minimizing disruption and displacement of people and businesses through published long range street improvement plans, and
6. increasing travel safety.

Thoroughfare planning objectives are achieved by improving the "operational efficiency" and the "system

efficiency" of the street system. Improving the operational efficiency means increasing street capacity. Improving system efficiency means coordinating all the streets to support each other.

### **OPERATIONAL EFFICIENCY**

A street's operational efficiency is the ability of the street to carry vehicles and people. A street's traffic capacity is the maximum number of vehicles which can pass a given location during a given time under the existing traffic conditions. Capacity is affected by the physical features of the roadway, nature of traffic, and weather. Three ways to improve street capacity are: physical roadway improvements, traffic flow management, and travel demand management.

Although physical road improvements are typically the first method people think of to increase capacity, physical improvements are very expensive and often politically controversial. Physical road improvements include: adding lanes, modifying intersections, improving vertical alignment, improving horizontal alignment, and eliminating roadside obstacles. By reducing the impedances to the main traffic flow caused by slow moving or turning vehicles, these improvements can significantly increase street capacity.

Traffic flow management improvements are another effective method for increasing street capacity. Although the political controversy can still be significant, traffic flow management generally costs less than physical road improvements. Traffic flow management improvements include:

1. Controlling land access -- A roadway with complete access control can often carry three times the traffic handled by a non-controlled access street with the same number of lanes.
2. Removing parking -- By removing parking, additional street width is available for traffic. The additional width can make another traffic lane or simply reduce traffic friction caused by parking vehicles.
3. One-way operation -- One-way streets can handle 20-50 percent more vehicles than two-way streets with the same number of lanes. One-way streets also improve traffic flow by decreasing potential traffic accidents and increasing intersection capacity.
4. Minimizing traffic signals -- Each traffic signal reduces the amount of time available for traffic to travel straight through an intersection.
5. Spacing and coordinating traffic signals -- A coordinated series of traffic signals minimizes the excessive stop-and-go operation common with closely spaced signalized intersections. With adequate spacing, coordinated signals increase street

capacity by enabling traffic to flow at more uniform speeds.

Increasing concern over the world's diminishing natural resources is causing people to oppose highway improvements which take additional land and increase the total number of vehicles on the roads. Travel demand management increases street capacity by changing people's travel patterns, without building new roads and without significantly increasing environmental damage. The following policies are part of travel demand management:

1. Encourage people to form carpools and vanpools. Increasing the number of people in each vehicle reduces the number of vehicles on the road and increases the people carrying capacity of the street system.
2. Encourage people to walk. Williamston's pleasant community atmosphere and nice climate make walking fun, easy, and safe. Getting people out of their cars and on to the sidewalks changes auto-oriented business areas into friendly people-oriented community areas.
3. Encourage people to ride bicycles. Every person who rides a bicycle instead of driving removes one car from the street network. In addition, bicycle riding does not contribute to our planet's ozone problem.

4. Encourage industries, businesses, and institutions to stagger work hours or establish variable work hours for employees. Variable work hours spread the morning and afternoon peak travel over a longer time and increase the street's daily traffic capacity.
5. Encourage land use development in a more pedestrian oriented manner. Avoid imprisoning citizens to automobiles for daily necessities. Allow citizens to choose whether to drive or not by providing appropriate sidewalks and bicycle facilities.

### **SYSTEM EFFICIENCY**

Any system is only as good as each of its parts. For example, an automobile - no matter how expensive, no matter how powerful, or how high the speedometer scale - if one tire is flat, the car will not go fast. Street networks operate the same way. If one important link is missing, the whole network is burdened with unnecessary traffic. Every street has a particular functional classification which is important to the entire street system. An efficient system reduces travel distances, travel time, and travel costs.

### **Urban Functional Classification**

Streets have two primary functions, traffic service and land access. Traffic service involves moving many high speed

vehicles; land access involves slow moving vehicles turning into driveways. Combining slow turning vehicles with high speed traffic creates significant conflicts. The conflicts are not serious if both traffic service and land access demands are low. However, when traffic volumes increase, conflicts cause intolerable traffic congestion and serious safety hazards. Urban thoroughfare plans designate a functional system of streets which minimizes these problems. Streets are categorized as local access streets, minor thoroughfares, or major thoroughfares.

Local access streets provide access to abutting property. Depending on the land use, local streets may be subclassified as residential, commercial, or industrial. Local streets should not carry heavy volumes of traffic, and by design, they should discourage unnecessary traffic.

Minor thoroughfares connect local access streets to the major thoroughfares. They provide some access to abutting property, but they should be protected enough to allow a safe traffic flow to the major thoroughfares. Designing minor thoroughfares to serve limited areas protects them from excessive traffic.

Major thoroughfares are the primary traffic arteries of the town. Although they may serve abutting property, their principle function is to carry large volumes of traffic.

Uncontrolled strip development significantly lowers their capacity because each driveway impedes the traffic flow. Similarly, on-street parking should be avoided because it also impedes the traffic flow.

### **Ideal Small Urban Thoroughfare System**

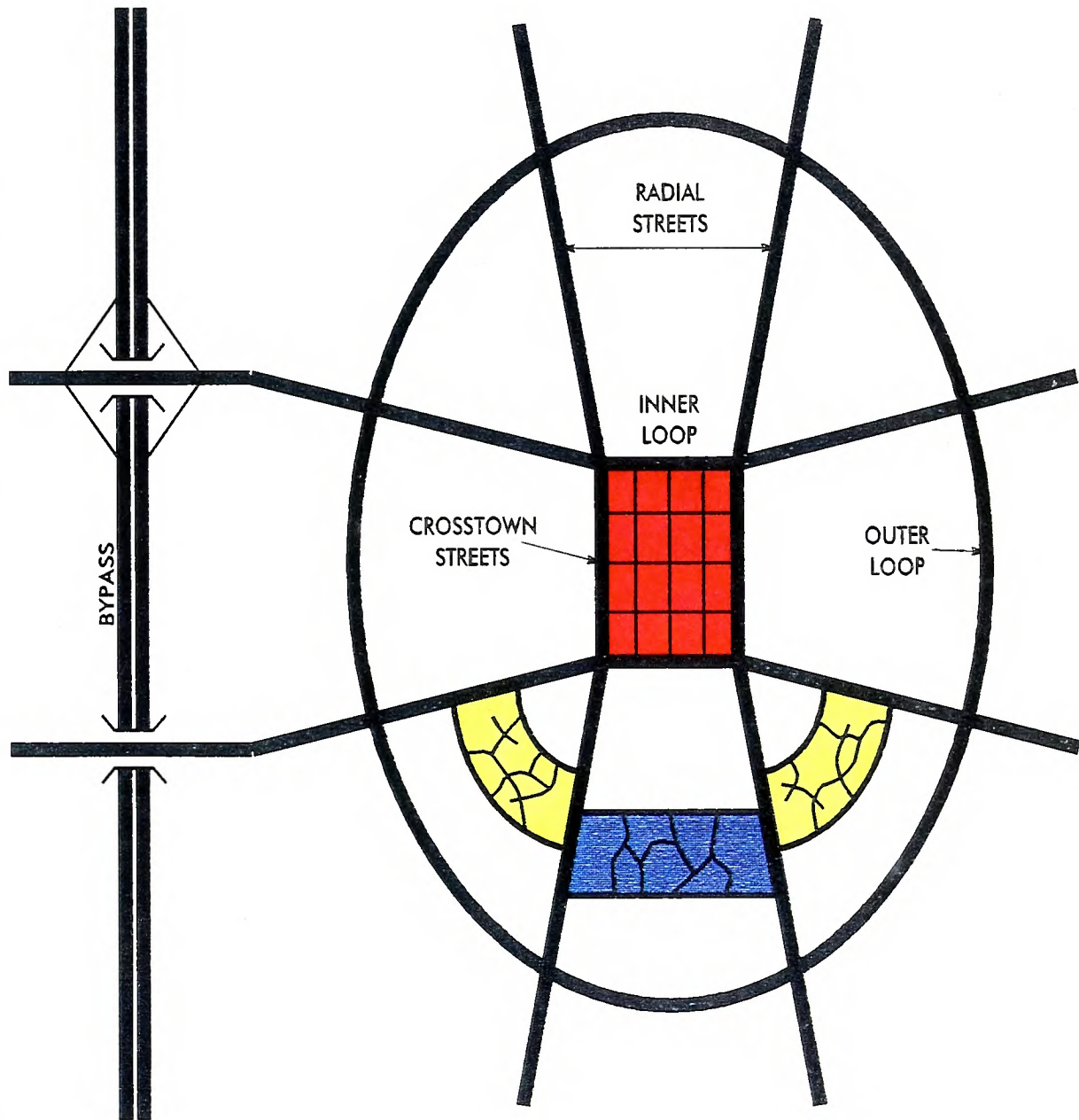
An ideal thoroughfare system coordinates local streets, minor thoroughfares, and major thoroughfares into a radial-loop pattern. The radial-loop arrangement provides direct access between all municipal areas. Figure A-1 shows how radial streets, cross-town streets, loop streets, and bypasses work together.


Similar to the spokes on a bicycle tire, radial streets run from outside the planning area to inside the planning area. Radial streets are major thoroughfares which provide traffic movement between points located on the outskirts of the city and the central area. This major traffic movement provides economic strength in the central business district.


Cross-town streets and a loop around the central business district prevent the traffic congestion caused by all the radial streets converging at one location. Cross-town streets provide convenient access to the local businesses and merchants. Traffic destined for downtown can circle on the loop, and then enter downtown near its





# IDEAL SMALL URBAN THOROUGHFARE PLAN



MAJOR THOROUGHFARE BYPASS 

OTHER MAJOR THOROUGHFARES 

MINOR THOROUGHFARES 

LOCAL LAND ACCESS STREETS 

LAND USES:

RESIDENTIAL 

COMMERCIAL 

INDUSTRIAL 

Figure A-1

destination. Local traffic not destined for downtown can drive around the loop. This cross-town system removes unnecessary traffic from the downtown and enhances the business and shopping atmosphere.

Loop streets connect suburban areas together. As people and businesses move away from the central business areas to the suburbs for cheaper land and lower taxes, many commuters drive from one suburb to another, without stopping downtown. The outer loop moves traffic between suburban areas avoiding the downtown altogether. Depending on the size of the urban area, more loops may be necessary; they should be spaced one-half mile to one mile apart.

A bypass carries through traffic around the urban area and removes it from the city street system. Bypasses are designed with controlled access to move through traffic quickly, not to access property. Occasionally, a bypass can function as a portion of an urban loop. By freeing the local streets for shopping and home-to-work traffic, bypasses typically increase the economic vitality of the local area.

### **Rural Functional Classification**

The rural functional classification system has five major parts: principal arterials, minor arterials, major collectors, minor collectors, and local roads. Table A-1

lists the typical statewide mileage distribution on these components. Figure A-2 illustrates the rural highway network functional classification. Figure A-3 illustrates Martin County's functional classification from 1993 when the Federal Highway Administration required all roads in North Carolina be functionally classified.

<b>Table A-1</b>	
<b>Rural System Road Mileage Distribution</b>	
Classification	Percentage of Total Rural Miles
Principal Arterial System	2-4%
Principal Arterial System plus Minor Arterial Road System	6-12%
Major and Minor Collector Road System	20-25%
Local Road System	65-75%

#### **Rural Principal Arterial System**

The rural principal arterial system is a network of continuous routes that serve substantial statewide or interstate travel. The principal arterial system should serve all urban areas of over 50,000 population and a majority of those with a population greater than 5,000. The interstate system is a significant portion of the principal arterial system.

#### **Rural Minor Arterial System**

The rural minor arterial system is a network of

Figure A-2

# RURAL HIGHWAY NETWORK FUNCTIONAL CLASSIFICATION

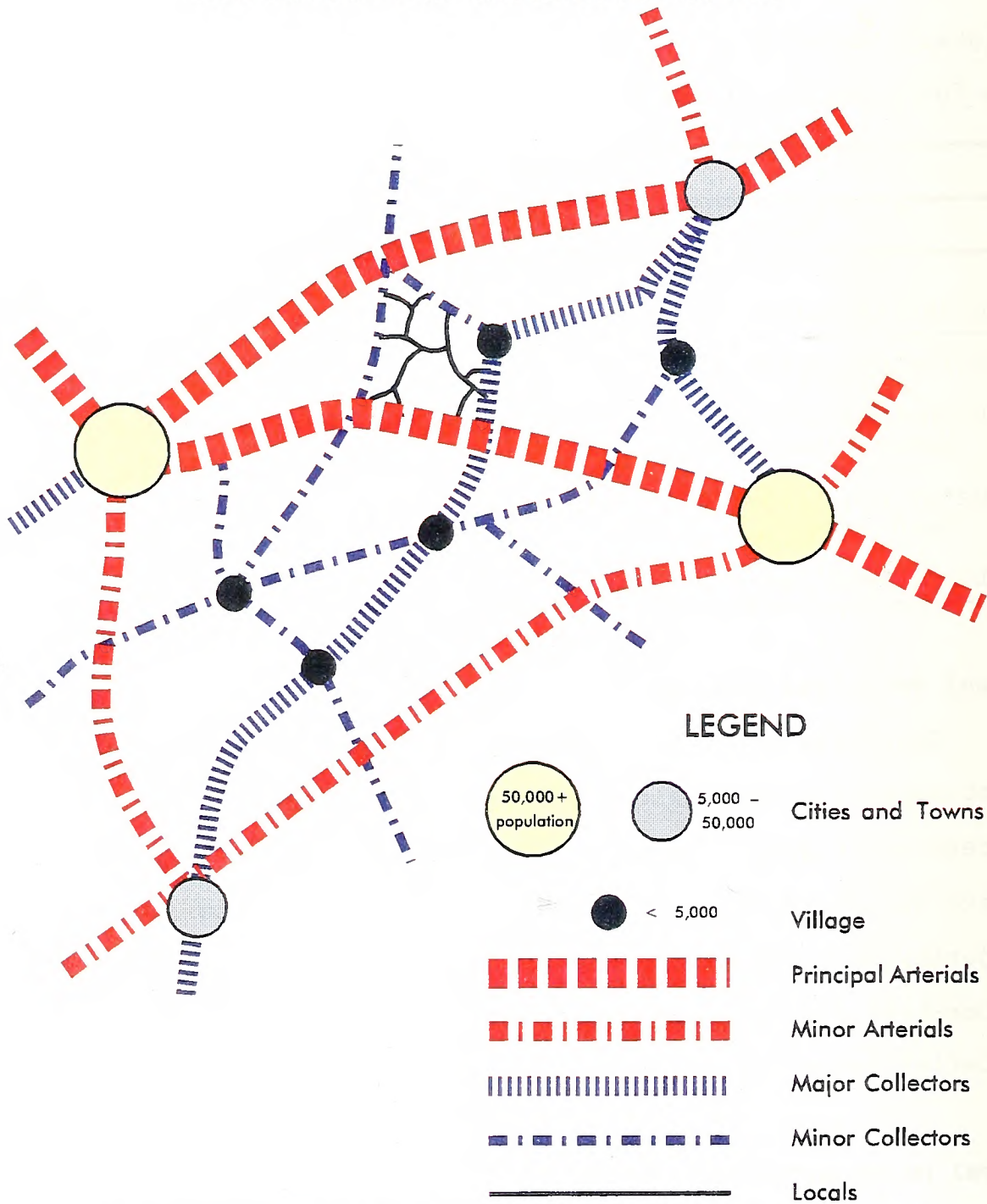








Figure A-3  
 1992  
 FUNCTIONAL  
 CLASSIFICATION  
 LEGEND

- INTERSTATE 
- OTHER PRINCIPAL ARTERIAL 
- MINOR ARTERIAL 
- MAJOR COLLECTOR 
- MINOR COLLECTOR 
- URBAN PLANNING AREA 



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continuous routes that serve substantial intrastate and inter-county travel. The combined principal arterial system and the minor arterial system should serve all urban areas with a population greater than 5,000.

#### **Rural Major Collector System**

The rural major collector system is a network of continuous routes that serve substantial intra-county travel. These routes provide service to the large towns and large traffic generators not served by the higher systems.

#### **Rural Minor Collector System**

The rural minor collector system is a network of continuous routes that serve smaller communities and locally important traffic generators.

#### **Rural Local Road System**

The rural local road system is a network of all roads which are not part of the higher systems. Subdivision streets and residential streets are examples of the local road system.

### **PRACTICAL APPLICATIONS**

The ideal "radial-loop urban thoroughfare system" and the ideal "rural functional classification system" are a great goal, but are often not 100% attainable. In practice,

all areas have natural constraints which complicate the thoroughfare planning process. These constraints include: existing land uses, existing streets, existing developments, public attitudes, local politics, and future development projections. During the thoroughfare planning process, a transportation engineer analyzes the critical constraints to determine the best mix of existing and proposed roads.



**APPENDIX B  
TRAVEL DEFICIENCY ANALYSIS**

The North Carolina Department of Transportation has invested valuable time and money in the Martin County street system over the past century. Development patterns along the streets in the local areas have established a unique community character. Developing a thoroughfare plan requires detailed information on this local character and other existing local conditions. Existing roads, population trends, traffic accidents, travel demand, and street capacity are all used for evaluating travel deficiencies.

**EXISTING ROADS**




US 13, US 17, and US 64 serve Martin County by providing direct access to the entire Intra-state Highway Network. US 64 extends from the western tip of NC in the Appalachian Mountains to the Atlantic ocean. US 17 follows the coastal plain extending from South Carolina to Virginia. US 13 connects Martin County to communities like Greenville and Goldsboro.

Eight NC routes (NC 11, NC 42, NC 44, NC 125, NC 142, NC 149, NC 171, and NC 903) serve Martin County. Lined with agricultural, residential, and commercial parcels of land, these NC routes have both traffic flow and land access functions. Parts of NC 42, NC 125, and NC 142 have such a

FIGURE B-1

EXISTING ROADS

LEGEND

-  Four Lane Divided Highway
-  Paved Road
-  Dirt Road

(NOTE: MOST DIRT ROADS ARE NOT SHOWN)



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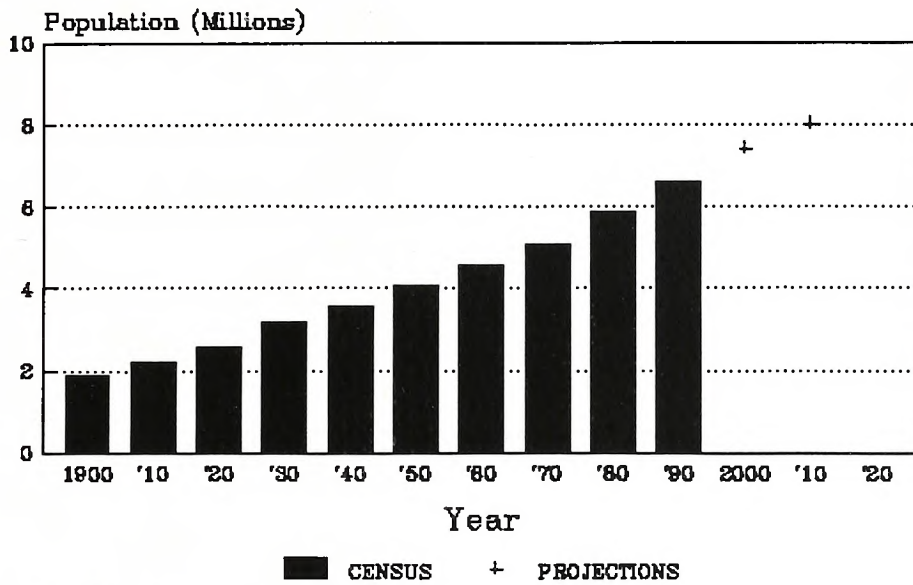


BASE MAP



# NC POPULATION TRENDS

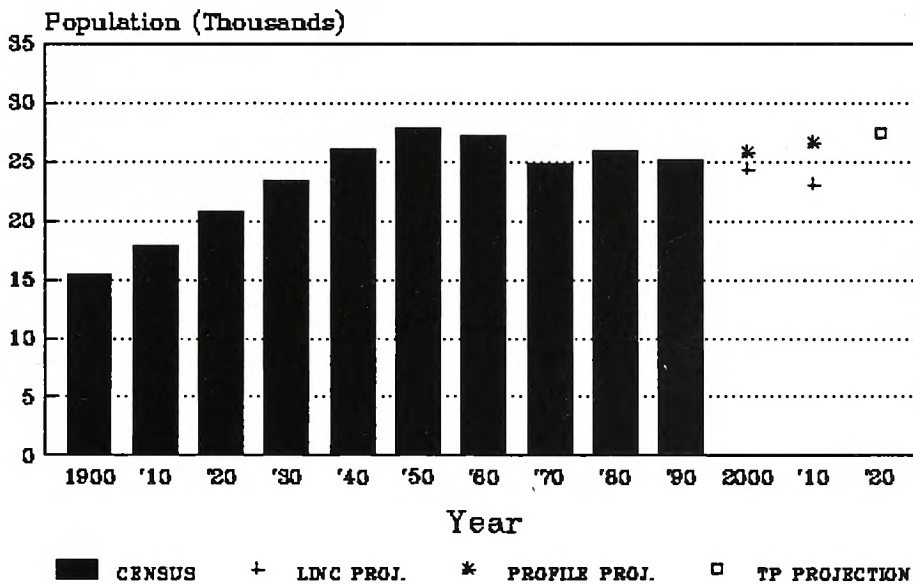
## FIGURE B-2



Sources: US Census and State Data Center

# MARTIN COUNTY POPULATION

## FIGURE B-3



Sources: US Census, LINC, State Profile

thoroughfare planning purposes, traffic projections are based on the population growth of 0.3% per year.


### **TRAFFIC ACCIDENTS**

Traffic accidents cost all insured North Carolina citizens hundreds of dollars each year in automobile insurance premiums. Traffic accidents are attributed to three general causes: driver characteristics, vehicle characteristics, and environmental characteristics. Driver characteristics include driving ability, mental alertness, and reaction time. Vehicle characteristics include vehicle type, vehicle condition, and vehicle responsiveness. Environmental characteristics include road conditions, weather conditions, physical obstructions, and traffic conditions.

All traffic accidents listed in the Division of Motor Vehicles' files from January 1988 through December 1992 inside Martin County (but outside Williamston or Robersonville) were reviewed. Table B-1 lists all intersections with ten or more accidents during the past five years and Figure B-4 illustrates the most frequent accident locations. The intersection of US 17 with SR 1001 tops the list with 16 accidents. The two high accident locations along US 64 should improve now that US 64 has been upgraded to a four-lane divided facility.

Figure B-4  
**ACCIDENT LOCATIONS**  
 1988-1992

**LEGEND**

Areas With 10  
 Or More Accidents 

NOTE: Williamston and Robersonville  
 Accident Locations are not shown



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BEAUFORT COUNTY



**TABLE B-1  
MARTIN COUNTY ACCIDENT INVENTORY**

Intersections with 10 or more accidents occurring between January 1988 and December 1992 are listed.

LOCATION	NUMBER OF ACCIDENTS
US 17 & SR 1001 .....	16
SR 1142 & SR 1113 .....	11
NC 44 & NC 125 .....	10
US 64 & SR 1500 .....	10
US 64 & SR 1563 .....	10

(Note - Accidents inside Williamston's City Limits are not listed)

**TRAVEL DEMAND**

Have you ever traveled on a busy Interstate and wondered where all the other thousands of cars were going? Travel demand is the technical term for analyzing this question. The name comes from the concept of people wanting to "travel" and "demanding" the road adequately handle all the traffic. Existing travel demand is reported as average daily traffic (ADT). Average daily traffic is the average amount of traffic which passes a particular point on the road in a typical day.



## BRIDGES

Bridges are a significant part of all highway networks. In Martin County, there are 92 bridges. Because bridges are so expensive to build and because they require such extensive engineering design, bridges need to be planned long before they are critical links. The North Carolina Department of Transportation inspects all bridges on the State Highway System and rates each bridge according to specific attributes. Bridge sufficiency ratings range from 0 to 100, with 100 being the best. Low sufficiency ratings do not mean bridges are unsafe, ratings simply compare all bridges relative to an ideal design and safety standard. Table B-2 lists all bridges in Martin County along with the corresponding "sufficiency rating" and figure B-5 illustrates their locations.

Figure B-5

### DEFICIENT BRIDGES (SUFFICIENCY RATINGS LESS THAN 50)

#### LEGEND

DEFICIENT BRIDGES 

BRIDGE NUMBER 49

NOTE: Bridges located on dirt roads are not shown



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LEAUFORT COUNTY



TABLE B-2

MARTIN COUNTY BRIDGES

Bridge #	Rating	Bridge #	Rating
C1	96.3	49	46.4
C2	99.7	53	49.4
C3	96.0	60	71.5
4	92.2	64	39.9
5	53.4	66	72.6
6	50.6	P69	99.9
7	73.5	71	41.8
8	48.6	75	22.5
9	55.6	76	39.9
C10	99.7	77	83.7
11	59.6	81	89.1
12	67.7	83	92.8
13	65.0	88	60.0
14	92.3	90	74.2
15	74.5	98	55.9
16	57.5	101	65.5
C17	99.0	P103	99.9
18	88.9	107	37.2
19	75.3	110	36.2
20	52.6	112	47.2
21	55.5	118	36.3
22	91.9	121	100.0
C23	99.3	132	49.3
24	47.0	P136	99.9
25	37.9	137	89.2
26	88.6	P143	99.8
27	59.1	P144	100.0
28	83.9	156	47.1
29	66.4	159	27.7
31	75.7	165	65.1
C32	99.3	169	46.8
33	91.9	173	51.5
34	71.9	179	77.7
35	68.1	187	41.2
36	30.0	188	53.3
37	39.9	194	44.9
38	99.0	196	59.4
39	53.7	220	89.3
40	34.7	226	72.7
41	65.3	230	99.9
42	74.4	C231	99.6
43	47.0	C232	99.7
44	35.3	R234	NA
46	30.6	P235	99.1
47	34.5	P236	99.7
48	53.7	237	93.9

## CAPACITY ANALYSIS

The maximum number of vehicles that can drive on a street at the same time is called the street's traffic capacity. Unlike the definite "capacity" of a glass holding water, the "capacity" of a street includes a variable element based on driver acceptance. People will not accept bumper-to-bumper traffic 24 hours a day, but they will accept bumper-to-bumper traffic for a short time. People accept different street capacities based on expected "level of service." Figure B-6 illustrates the traffic conditions for six typical levels of service:

1. Level-of-service "A" describes free flow operations. People can choose a desirable speed and maneuver easily in the traffic stream.
2. Level-of-service "B" describes almost free flowing operations. People can drive at posted speeds and are only slightly restricted maneuvering in the traffic stream.
3. Level-of-service "C" describes stable operations. Many vehicles have to drive at the same speed because of moderately restricted maneuverability. Motorists experience some tension from driving.
4. Level-of-service "D" describes acceptable congestion during rush hour. Most vehicles have to drive slightly below the posted speed because of restricted maneuverability. Motorists experience noticeable

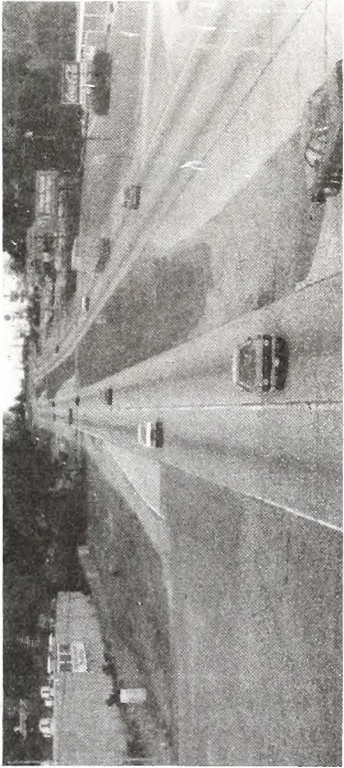
driving tension.

5. Level-of-service "E" describes congested rush hour conditions. All vehicles have to drive below the posted speed because maneuvering is very difficult. Tense motorists often become annoyed waiting at traffic signals and feel fatigued after driving.
6. Level-of-service "F" describes a traffic jam. Vehicles are subject to stop-and-go traffic because maneuvering is seemingly impossible. Intersection congestion and delays are common. Tense motorists, annoyed at traffic signals and irritated with the other "incompetent" drivers, feel angry after driving.

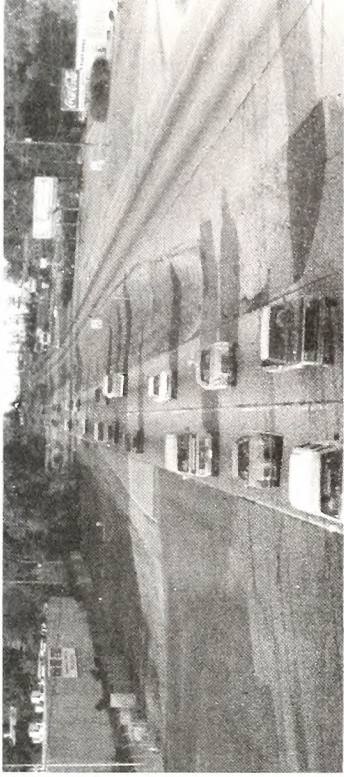
The thoroughfare plan recommendations are based on a minimum level-of-service D. Although most people prefer a better level of service, level-of-service D is the highest level of service people are willing to fund. Figure B-7 illustrates the 1992 and projected 2020 average daily traffic volumes. Based on the projected 2020 traffic volumes and the programmed Transportation Improvement Program projects, there are no roads which are projected to be over capacity in 2020. However, based on the existing traffic volumes and the minimum recommended lane widths listed in Table B-3, four roads should have wider lanes. NC 171, SR 1001, and SR 1142 should be increased to 3.3 meter lanes, and SR 1409 should be increased to 3.0 meter lanes.

**TABLE B-3****MINIMUM RECOMMENDED LANE WIDTHS IN METERS (FT.)**

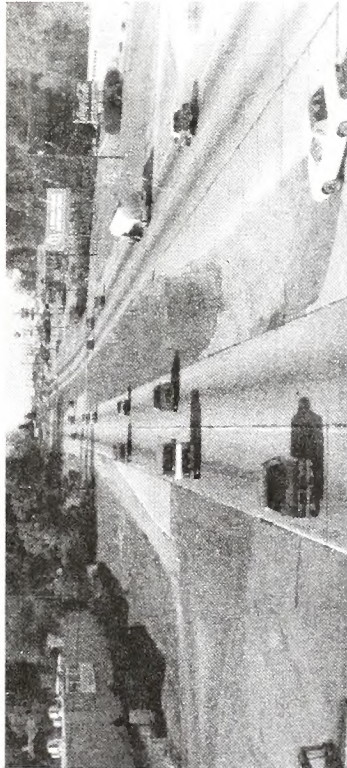
Average Daily Traffic	Principal Arterials	Minor Arterials	Major & Minor Collectors
over 2000	3.3 (11)	3.3 (11)	3.3 (11)
400 - 2000	-	3.0 (10)	3.0 (10)
100 - 400	-	3.0 (10)	2.7 (9)
below 100	-	-	2.7 (9)



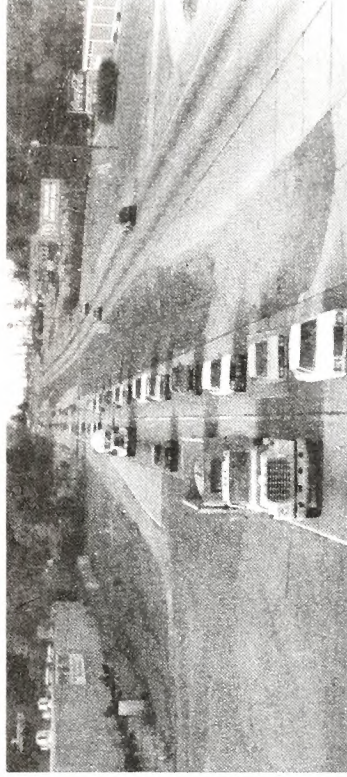
LEVEL OF SERVICE - A



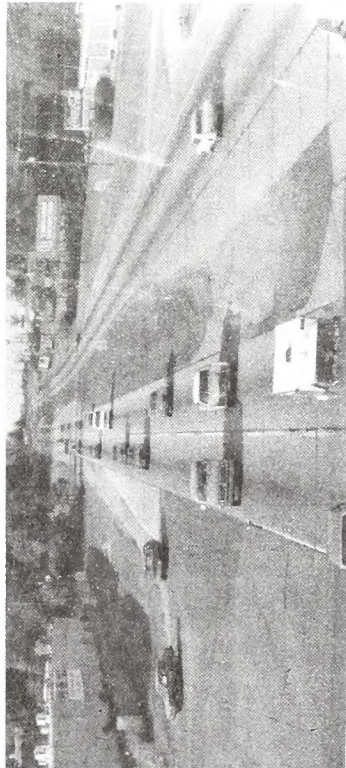
LEVEL OF SERVICE - D



LEVEL OF SERVICE - B



LEVEL OF SERVICE - E



LEVEL OF SERVICE - C



LEVEL OF SERVICE - F

LEVELS OF SERVICE

Figure B-6





Figure B-7  
Current and Projected  
ADTs

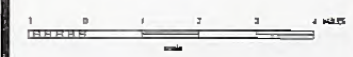
LEGEND

1992	1992 ADT
2020	2020 ADT



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## APPENDIX C COMPUTER MODEL DEVELOPMENT

Future travel demand was estimated with a combination of a "Sketch" and a "TRANPLAN" computer transportation model. The combined modeling process involved collecting rough socio-economic data based on the requirements for a sketch model, and then analyzing the socio-economic data using the TRANPLAN software on a microcomputer. The combined modeling process uses three basic steps:

- \* collect socio-economic data,
- \* estimate through and external trips, and
- \* estimate internal trips.

Once the model accurately estimates the existing traffic patterns, socio-economic data projections were used in the computer model to estimate the 2010 traffic on the street network.

### SOCIO-ECONOMIC DATA

Martin County is divided into 23 traffic analysis zones. The traffic analysis zones are based on 1990 Census block groups. Figure C-1 illustrates the Martin County zone map. Table C-1 lists the total dwelling units in each traffic analysis zone based on Census data and projections. Tables C-2 and C-3 list the number of employees in each traffic-analysis zone and in each employment category.

**TABLE C-1****MARTIN COUNTY DWELLING UNITS**

ZONE NUMBER	TOTAL DWELLING UNITS 1990	TOTAL DWELLING UNITS 2020
1	400	440
2	386	409
3	305	351
4	445	472
5	585	673
6	340	391
7	465	535
8	480	552
9	426	490
10	393	452
11	503	553
12	465	535
13	525	557
14	595	631
15	338	358
16	396	420
17	664	730
18	445	490
19	302	332
20	522	600
21	257	296
22	635	730
23	232	267

Figure C-1

# ZONE MAP

## LEGEND

- Planning Boundary 
- Zone Boundary 
- Zone Number 24



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TABLE C-2

MARTIN COUNTY EMPLOYEES 1990

ZONE	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10
1	0	15	154	20	30	7	60	49	71	0
2	49	30	140	43	28	6	31	20	33	21
3	11	18	84	26	10	7	24	14	26	17
4	50	38	181	35	20	39	99	33	36	23
5	15	28	103	34	31	28	141	25	45	49
6	15	37	16	59	18	14	46	59	58	25
7	21	10	53	18	31	13	91	76	107	36
8	49	77	145	44	35	17	92	59	75	61
9	15	17	101	28	0	9	93	44	51	29
10	12	38	53	17	23	32	82	47	51	42
11	27	35	122	61	47	31	101	98	33	58
12	37	47	107	33	66	9	76	51	102	57
13	42	19	232	42	24	18	74	36	47	26
14	119	27	168	72	32	44	58	22	75	13
15	75	18	127	19	4	22	62	38	52	10
16	36	29	97	38	20	15	79	35	67	44
17	52	90	182	52	67	68	98	96	109	66
18	51	57	107	29	10	14	63	76	57	20
19	34	24	139	25	34	8	51	23	40	8
20	86	27	148	66	23	2	82	50	66	37
21	13	4	53	11	22	5	44	42	50	13
22	30	29	202	37	24	13	98	58	123	24
23	53	8	64	17	8	11	17	10	31	15

Where: X1 = Agriculture, forestry, and fisheries  
 X2 = Construction  
 X3 = Manufacturing, nondurable goods  
 X4 = Manufacturing, durable goods  
 X5 = Transportation, communication, and utilities  
 X6 = Wholesale trade  
 X7 = Retail trade  
 X8 = Financial and personal services  
 X9 = Professional health and education services  
 X10 = Public administration and other professional services



**TABLE C-3**

**MARTIN COUNTY EMPLOYEES 2020**

ZONE	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10
1	0	21	216	28	42	10	84	69	99	0
2	56	35	161	49	32	7	36	23	38	24
3	15	25	118	36	14	10	34	20	36	24
4	57	44	208	40	23	45	114	38	41	26
5	21	39	144	48	43	39	197	35	63	69
6	21	52	22	83	25	20	64	83	81	35
7	29	14	74	25	43	18	127	106	150	50
8	69	108	203	62	49	24	129	83	105	85
9	21	24	141	39	0	13	130	62	71	41
10	17	53	74	24	32	45	115	66	71	59
11	35	46	159	79	61	40	131	127	43	75
12	52	66	150	46	92	13	106	71	143	80
13	48	22	267	48	28	21	85	41	54	30
14	137	31	193	83	37	51	67	25	86	15
15	86	21	146	22	5	25	71	44	60	12
16	41	33	112	44	23	17	91	40	77	51
17	68	117	237	68	87	88	127	125	142	86
18	66	74	139	38	13	18	82	99	74	26
19	44	31	181	33	44	10	66	30	52	10
20	120	38	207	92	32	3	115	70	92	52
21	18	6	74	15	31	7	62	59	70	18
22	42	41	283	52	34	18	137	81	172	34
23	74	11	90	24	11	15	24	14	43	21

Where: X1 = Agriculture, forestry, and fisheries  
 X2 = Construction  
 X3 = Manufacturing, nondurable goods  
 X4 = Manufacturing, durable goods  
 X5 = Transportation, communication, and utilities  
 X6 = Wholesale trade  
 X7 = Retail trade  
 X8 = Financial and personal services  
 X9 = Professional health and education services  
 X10 = Public administration and other professional services

**THROUGH and EXTERNAL TRIPS**

Through trips were estimated using the procedures documented in *Technical Report #3: Synthesized Through Trip Table For Small Urban Areas*. Table C-4 lists the summary statistics for through and external trips.

**TABLE C-4**

**THROUGH AND EXTERNAL TRIP SUMMARY**

LOCATION (STA #)		1992 ADT	1992 THRU	1992 EXT.	2020 ADT	2020 THRU	2020 EXT.
US 64	#102	5,800	4,400	1,400	17,400	13,100	4,300
SR 1552	#103	300	0	300	600	0	600
NC 171	#104	2,100	200	1,900	4,200	300	3,900
SR 1516	#105	200	0	200	400	0	400
US 17	#106	3,200	1,200	2,000	5,120	1,900	3,220
SR 1100	#107	200	0	200	400	0	400
SR 1001	#108	1,800	100	1,700	3,600	200	3,400
SR 1113	#109	300	0	300	600	0	600
NC 903	#110	1,400	100	1,300	2,240	100	2,140
SR 1159	#111	1,400	100	1,300	2,800	100	2,700
SR 1164	#112	300	0	300	600	0	600
US 13	#113	5,600	4,300	1,300	7,840	6,200	1,640
P. US 13	#114	0	0	0	7,840	5,900	1,940
NC 11	#115	2,300	1,800	500	4,600	3,600	1,000
NC 42	#116	1,300	100	1,200	2,600	100	2,500
NC 142	#117	600	0	600	1,200	0	1,200
NC 44	#118	1,600	100	1,500	3,200	200	3,000
NC 125	#119	2,100	200	1,900	4,200	400	3,800
NC 903	#120	600	0	600	1,200	0	1,200
NC 11	#121	2,300	1,800	500	4,600	3,600	1,000
US 13	#122	8,400	3,700	4,700	16,800	7,400	9,400
<b>TOTAL</b>		<b>41,800</b>	<b>18,100</b>	<b>23,700</b>	<b>92,040</b>	<b>43,100</b>	<b>48,940</b>

## INTERNAL TRIPS

Internal trips were generated and distributed using the gravity model. Table C-5 lists the trip generation rates for 1990 and 2010. Table C-6 lists the percentage of trips categorized by trip purpose. Table C-7 lists the regression equations used for trip attractions. The regression equations are based on "combined census employment categories" and associated employment trip attraction rates.

TABLE C-5	
TRIP GENERATION RATES FOR 1990 AND 2010	
Excellent DU:	8.0
Above Average DU:	8.0
Average DU:	8.0
Below Average:	8.0
Poor:	8.0

TABLE C-6	
PERCENTAGE OF TRIPS CATEGORIZED BY PURPOSE	
Internal of total:	85%
Home based work:	33%
Other home based:	33%
Non home based:	> 34%

TABLE C-7

REGRESSION EQUATIONS

HOME-BASE-WORK PURPOSE:

$$\text{Trip Attractions} = \text{Total Employees}$$

OTHER-HOME-BASE PURPOSE:

$$\begin{aligned} \text{Trip Attractions} = & 0.50*X1 + 0.50*X2 + 0.50*X3 + \\ & 0.50*X4 + 0.50*X5 + 1.83*X6 + \\ & 1.83*X7 + 2.55*X8 + 2.55*X9 + \\ & 2.60*X10 + 0.50*(DU) \end{aligned}$$

NON-HOME-BASE PURPOSE

$$\begin{aligned} \text{Trip Attractions} = & 0.50*X1 + 0.50*X2 + 0.50*X3 + \\ & 0.50*X4 + 0.50*X5 + 1.83*X6 + \\ & 1.83*X7 + 2.55*X8 + 2.55*X9 + \\ & 2.60*X10 + 0.50*(DU) \end{aligned}$$

EXTERNAL-INTERNAL PURPOSE

$$\begin{aligned} \text{Trip Attractions} = & 0.50*X1 + 0.50*X2 + 0.50*X3 + \\ & 0.50*X4 + 0.50*X5 + 1.83*X6 + \\ & 1.83*X7 + 2.55*X8 + 2.55*X9 + \\ & 2.60*X10 + 0.50*(DU) \end{aligned}$$

- Where: X1 = Agriculture, forestry, and fisheries  
 X2 = Construction  
 X3 = Manufacturing, nondurable goods  
 X4 = Manufacturing, durable goods  
 X5 = Transportation, communication, and utilities  
 X6 = Wholesale trade  
 X7 = Retail trade  
 X8 = Financial and personal services  
 X9 = Professional health and education services  
 X10 = Public administration and other professional services

## PROJECTIONS

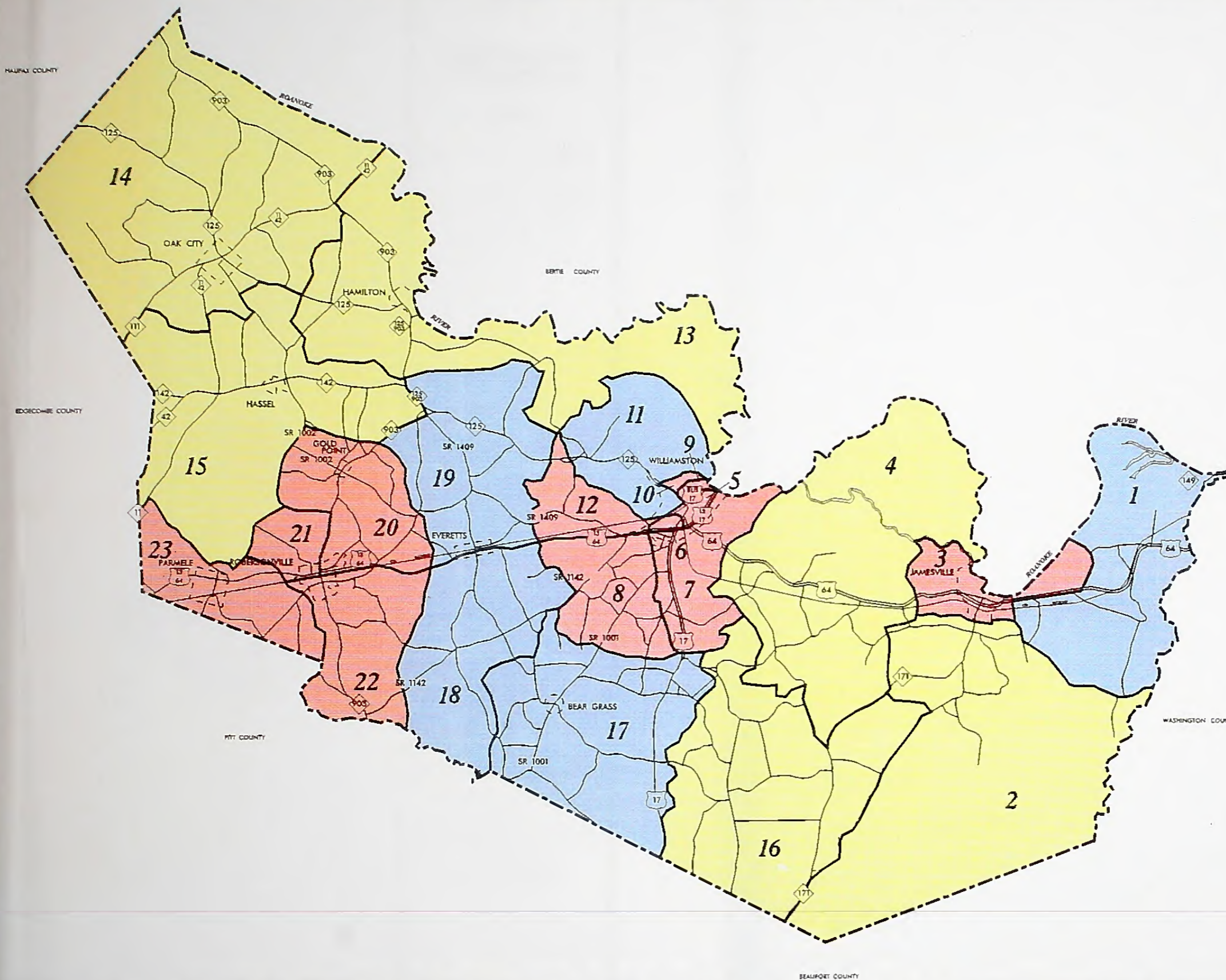
Socio-economic data projections are based on Martin County's population and land-use trends. Figures C-2 and C-3 illustrate "Martin County's Dwelling Unit Projections" and "Martin County's Employment Projections" respectively. High, medium, and low growth areas for housing and employment were estimated subjectively based on discussions with local County officials and Planning Board members.

Figure C-2

# DWELLING UNIT PROJECTIONS

## LEGEND

- High Growth
- Medium Growth
- Low Growth



## MARTIN COUNTY NORTH CAROLINA

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 FEDERAL HIGHWAY ADMINISTRATION



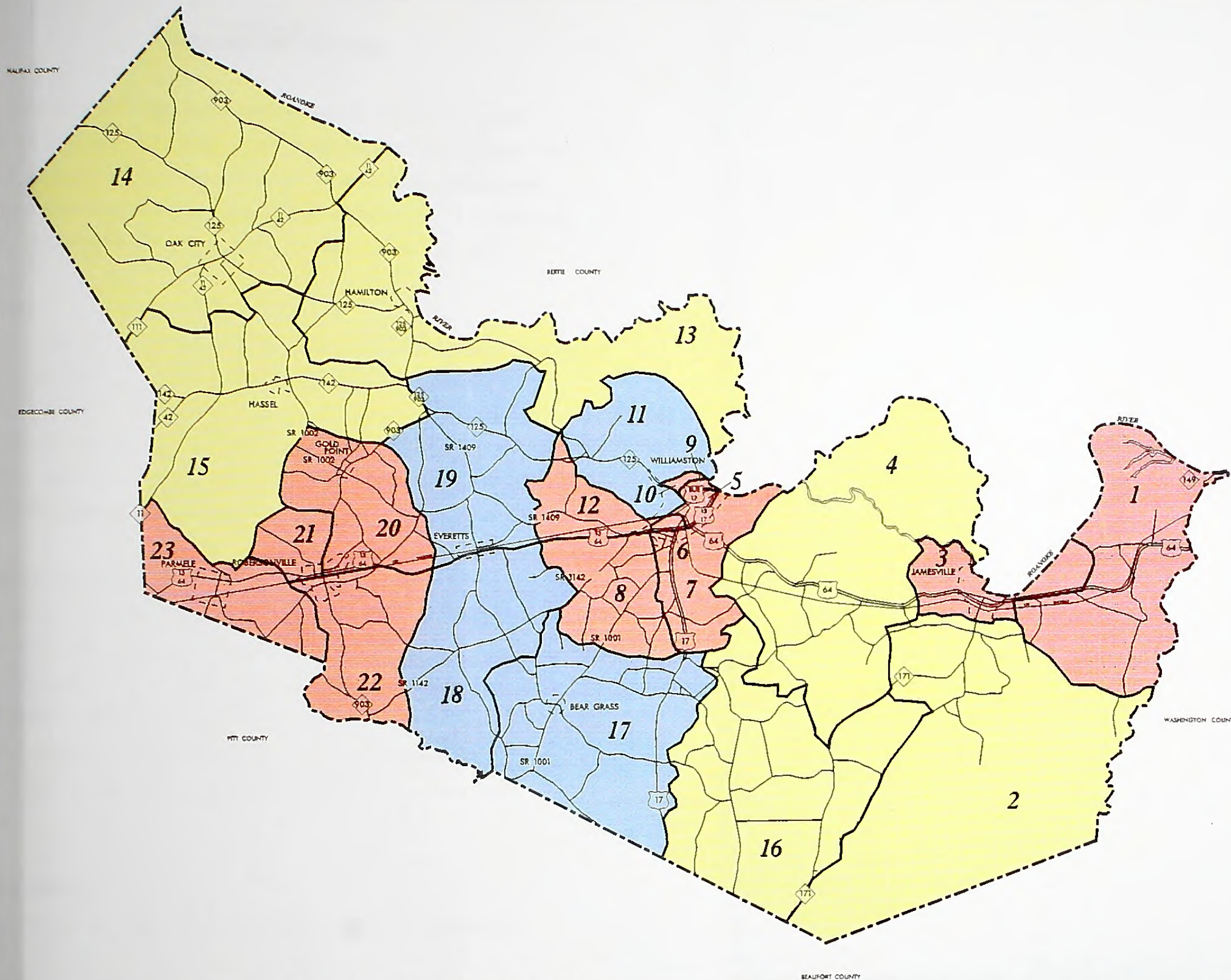


Figure C-3

# EMPLOYMENT PROJECTIONS

## LEGEND

- High Growth
- Medium Growth
- Low Growth



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FEDERAL HIGHWAY ADMINISTRATION







**APPENDIX D  
ENVIRONMENTAL CONCERNS**

During Martin County's thoroughfare planning process, there were several related items considered. Ecological and social environmental concerns such as wetlands, endangered species, and historic property were considered. In addition, alternative modes of transportation were also reviewed.

**WETLANDS**

Located in North Carolina's Coastal Plain, Martin County has a significant area classified as wetlands. Based on information in the National Wetlands Inventory, Figure D-1 illustrates the general areas classified as wetlands. During the Thoroughfare Planning Process, local officials did not propose any new roads in wetlands.

**ENDANGERED SPECIES**

Based on information recorded in the North Carolina Natural Heritage Program files as of January 1993, there are six plants and four animals which are threatened or endangered in Martin County. During the Thoroughfare Planning Process, local officials did not propose any new roads which would affect these threatened or endangered species.

**HISTORIC PROPERTY**

Based on information in the Archeology and Historic

Preservation Section of the NC Department of Cultural Resources, there are eight properties or districts listed in the historic register. Figure D-2 illustrates the locations of these areas. During the Thoroughfare Planning Process, local officials did not propose any new roads which would affect these historic structures.

### **BICYCLES**

Based on information recorded in the North Carolina Department of Transportation Bicycle Program files as of February 1995, there are no existing NCDOT bicycle facilities in Martin County.


### **RAILROADS**

Based on information recorded in the North Carolina Department of Transportation Railroad Program files as of February 1995, CSX Transportation has the only railroad in Martin County. Figure D-3 illustrates the location of this railroad.

Figure D-1

SIGNIFICANT WETLANDS

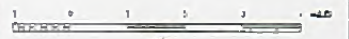
LEGEND

WETLANDS 



MARTIN COUNTY  
NORTH CAROLINA

DEPARTMENT OF  
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FEDERAL HIGHWAY ADMINISTRATION




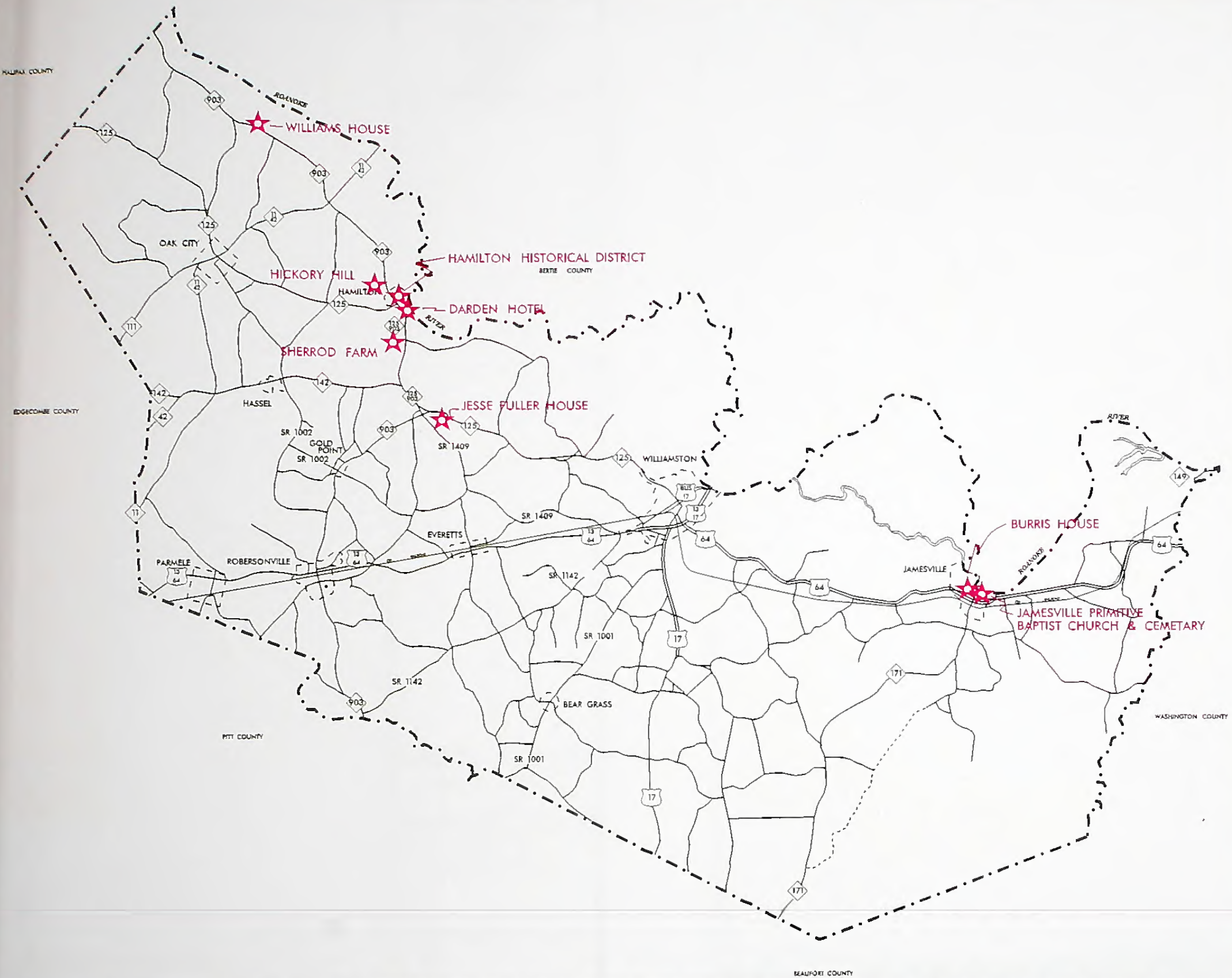
SEAFORD COUNTY



Figure D-2  
**HISTORIC STRUCTURES  
 AND DISTRICTS**

**LEGEND**

HISTORIC SITE   
 Historic sites located in  
 Robersonville and Williamston  
 are not shown



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Figure D-3

### RAIL ROADS LEGEND

CSX TRANSPORTATION 



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FEDERAL HIGHWAY ADMINISTRATION







FACILITY & SECTION	----- Existing -----		Capacity		----- Volume -----		----- Recommended -----			
	R/W (m)	SPEED (kph)	LANES (#)	WIDTH (m)	CURRENT (FUTURE)	1991 ADT	TRUCK %	2020 ADT	R/W (m)	Type
<b>US 13</b>										
PITT CO	30	88.5	2	7.2	12,000	5600	2	9,500	ADQ	ADQ
WCL PARMEL	30	80.5	2	7.2	12,000	5600	2	9,500	ADQ	ADQ
SR 1164	30	80.5	2	7.2	12,000	5600	2	9,500	ADQ	ADQ
ECL PARMEL	30	88.5	2	7.2	12,000	4900	2	9,500	ADQ	ADQ
WCL ROBERS	30	56.3	2	12.2	12,000	7666	2	9,500	ADQ	ADQ
ROBERSN ST	30	56.3	2	12.2	12,000	7666	2	9,500	ADQ	ADQ
NC 903	30	56.3	2	12.2	12,000	8700	3	9,500	ADQ	ADQ
GRIMES ST	30	56.3	2	7.2	12,000	8700	3	9,500	ADQ	ADQ
ECL ROBERS	30	88.5	2	7.2	12,000	6500	3	9,500	ADQ	ADQ
SR 1159	30	88.5	2	7.2	12,000	6500	3	9,500	ADQ	ADQ
PROP US 13	30	88.5	2	7.2	12,000	6500	3	9,500	ADQ	ADQ
SR 1405	30	88.5	2	7.2	12,000	6500	3	9,500	ADQ	ADQ
WCL EVERET	30	56.3	2	7.2	12,000	6800	3	9,500	ADQ	ADQ
SR 1138	30	56.3	2	7.2	12,000	6800	3	9,500	ADQ	ADQ
ECL EVERET	30	88.5	2	7.2	12,000	6492	3	9,500	ADQ	ADQ
SR 1139	30	88.5	2	7.2	12,000	6492	3	9,500	ADQ	ADQ
SR 1428	30	88.5	2	7.2	12,000	6492	3	9,500	ADQ	ADQ
SR 1142	30	88.5	2	7.2	12,000	6492	3	9,500	ADQ	ADQ
MAIN ST	30	72.4	2	11.0	12,000	6492	3	12,000	ADQ	ADQ
WOODSIDE	52	72.4	4	14.4	24,000	14404	3	21,000	ADQ	ADQ
US17	30	72.4	4	16.5	24,000	19000	2	23,000	ADQ	ADQ
WOODSD AVE	30	72.4	4	14.4	24,000	11800	2	24,000	ADQ	ADQ
US 17	30	88.5	4	14.4	24,000	11800	2	15,000	ADQ	ADQ
US 64	30	88.5	4	14.4	24,000	11800	2	20,100	ADQ	ADQ
PROP US 13	30	88.5	4	14.4	24,000	11800	2	20,100	ADQ	ADQ
US 17 BUS	30	88.5	4	14.4	24,000	8380	2	20,100	ADQ	ADQ
BERTIE CO										
<b>US 13 PROPOSED</b>										
EDGE CO	-	-	-	-	(24,000)	-	-	10,000	68.4	A
US 17	-	-	-	-	(24,000)	-	-	13,700	68.4	A
US 64	-	-	-	-	(24,000)	-	-	12,600	68.4	A
Exist. US 13										
<b>US 17</b>										
BEAU CO	46	88.5	2	7.2	(24,000)	3237	3	6,400	68.4	A
SR 1106	46	88.5	2	7.2	(24,000)	3237	3	6,400	68.4	A
CENT CONN										



FACILITY & SECTION	----- Existing -----		Capacity		----- Volume -----		-----Recommended-----		
	R/W (m)	SPEED (kph)	LANES (#)	WIDTH (m)	CURRENT (FUTURE)	1991 ADT	2020 ADT	R/W (m)	Road Type
R/R	18	56.3	2	11.9	13,000	4600	9,600	ADQ	ADQ
NC 125 (NB)									
WATTS ST	18	32.2	2	14.4	12,000	1836	3,100	ADQ	ADQ
BIGGS ST	-	56.3	2	12.5	12,000	1836	3,100	ADQ	ADQ
HENDRS ST	-	56.3	2	8.8	12,000	1836	3,100	ADQ	ADQ
US 13-17	18	56.3	2	9.1	12,000	1836	3,100	ADQ	ADQ
WASHINGTON	-	56.3	2	11.0	13,000	5300	7,700	ADQ	ADQ
MAIN ST (SB)									
NC 125 (SB)	-	32.2	2	14.0	13,000	9200	13,000	ADQ	ADQ
<b>NC 11</b>									
EDGE CO	SR 1303	18	88.5	2	9.8	(24,000)	2335	5,200	68.4 A
SR 1303	NC 42	18	88.5	2	9.8	(24,000)	2335	5,200	68.4 A
NC 42	WCL OAK CY	30	88.5	2	9.8	(24,000)	3003	5,200	68.4 A
WCL OAK CY	NC 44	30	72.4	2	9.8	(24,000)	2563	5,200	68.4 A
NC 44	NC 125	30	72.4	2	13.4	(24,000)	4400	5,200	68.4 A
NC 125	ECL OAK CY	30	72.4	2	7.2	(24,000)	3068	5,300	68.4 A
ECL OAK CY	SR 1347	130	88.5	2	7.2	(24,000)	2607	5,300	68.4 A
SR 1347	NC 903	130	88.5	2	7.2	(24,000)	2607	5,300	68.4 A
NC 903	BERTIE CO	30	88.5	2	7.2	(24,000)	3410	5,300	68.4 A
<b>NC 42</b>									
EDGE CO	NC 142	18	88.5	2	7.2	12,000	1253	3,900	ADQ
NC 142	NC 11	18	88.5	2	7.2	12,000	1253	3,900	ADQ
NC 11	BERTIE CO	SEE NC 11							
<b>NC 44</b>									
EDGE CO	NC 11	18	88.5	2	6.7	11,000	1579	3,200	ADQ
<b>NC 125</b>									
US 13	ELM ST	SEE US 17	88.5	2	10.7	12,000	6881	13,500	ADQ
ELM ST	MAIN ST	SEE US 17	88.5	2	13.4	12,000	6881	13,500	ADQ
MAIN ST	FRANKLN ST	18	56.3	2	13.4	12,000	5735	13,500	ADQ
FRANKLN ST	LIBERTY ST	18	56.3	2	13.4	12,000	5735	13,500	ADQ
LIBERTY ST	NCL WILSTN	18	56.3	2	6.7	11,000	5735	9,000	ADQ
NCL WILSTN	CURVE	30	88.5	2	6.7	11,000	5735	9,000	ADQ

**APPENDIX E: ROUTE INVENTORY**

FACILITY & SECTION	----- Existing -----		Capacity		----- Volume -----		----- Recommended -----			
	R/W (m)	SPEED (kph)	LANES (#)	WIDTH (m)	CURRENT (FUTURE)	1991 ADT	TRUCK %	2020 ADT	R/W (m)	Road Type
CURVE	30	88.5	2	6.7	11,000	5735	2	9,000	ADQ	ADQ
SR 1421	30	88.5	2	6.7	11,000	5735	2	9,000	ADQ	ADQ
SR 1422	30	88.5	2	6.7	11,000	3459	2	9,000	ADQ	ADQ
CURVE	30	88.5	2	6.7	11,000	3459	2	9,000	ADQ	ADQ
SR 1411	30	88.5	2	6.7	11,000	3278	2	9,000	ADQ	ADQ
SR 1415	30	88.5	2	6.7	11,000	3278	2	6,000	ADQ	ADQ
NC 903	30	88.5	2	6.7	11,000	4000	2	11,500	ADQ	ADQ
NC 142	30	88.5	2	6.7	11,000	3717	2	9,000	ADQ	ADQ
SR 1416	30	88.5	2	6.7	11,000	3717	2	9,000	ADQ	ADQ
SCL HAMILT	18	56.3	2	11.6	12,000	3700	2	9,000	ADQ	ADQ
NC 903	18	56.3	2	12.2	12,000	2036	2	9,000	ADQ	ADQ
WCL HAMILT	18	88.5	2	12.2	12,000	1296	2	9,000	ADQ	ADQ
SR 1320	18	88.5	2	7.2	12,000	1296	2	3,400	ADQ	ADQ
ECL OAK CY	80	72.4	2	7.2	12,000	2068	2	3,400	ADQ	ADQ
SR 1002	80	72.4	2	12.2	12,000	2068	2	3,400	ADQ	ADQ
NC 11	80	72.4	2	7.2	12,000	2846	2	3,400	ADQ	ADQ
NCL OAK CY	80	88.5	2	7.2	12,000	2056	3	3,400	ADQ	ADQ
SR 1329	80	88.5	2	7.2	12,000	2056	3	4,600	ADQ	ADQ
CURVE	80	88.5	2	7.2	12,000	2056	3	4,200	ADQ	ADQ
<b>NC 125 S</b>										
WASHINGTON ST	SEE US	17	BUS	S						
MAIN ST	SEE US	17	BUS	S						
<b>NC 142</b>										
EDGE CO	18	88.5	2	6.7	11,000	0623	1	2,000	ADQ	ADQ
NC 42	SEE NC	42								
NC 11	18	88.5	2	6.1	10,000	1048	1	3,400	ADQ	ADQ
WCL HASSEL	18	56.3	2	6.1	10,000	0934	1	3,400	ADQ	ADQ
ECL HASSEL	18	88.5	2	6.1	10,000	0980	1	3,400	ADQ	ADQ
NC 125-903										
<b>NC 149</b>										
WASHINGTON CO	30	72.4	2	7.2	12,000	11542	2	-	ADQ	ADQ

FACILITY & SECTION	R/W (m)	SPEED (kph)	Existing LANES (#)	WIDTH (m)	Capacity		1991 ADT	Volume TRUCK %	2020 ADT	-Recommended-	
					CURRENT	(FUTURE)				R/W (m)	Road Type
<b>NC 171</b>											
BEAU CO	30	88.5	2	6.1	10,000	2100	2	4,200	ADQ	ADQ	
SR 1538	30	88.5	2	6.1	10,000	2100	2	4,200	ADQ	ADQ	
SR 1535	30	88.5	2	6.1	10,000	2100	2	4,200	ADQ	ADQ	
SR 1530	30	88.5	2	6.1	10,000	2100	2	4,200	ADQ	ADQ	
SR 1544	30	88.5	2	6.1	10,000	2100	2	4,200	ADQ	ADQ	
SR 1500	30	88.5	2	6.1	10,000	2100	2	4,200	ADQ	ADQ	
SR 1514	30	88.5	2	6.1	10,000	2100	2	4,200	ADQ	ADQ	
SR 1514	30	88.5	2	6.1	10,000	2100	2	4,200	ADQ	ADQ	
SR 1538	18	88.5	2	6.1	10,000	1889	2	4,200	ADQ	ADQ	
SR 1510	18	88.5	2	6.1	10,000	1889	2	4,200	ADQ	ADQ	
SCL JAMESV	18	56.3	2	12.8	12,000	3273	2	4,200	ADQ	ADQ	
US 64											
<b>NC 903</b>											
PITT CO	18	88.5	2	7.2	12,000	1387	2	2,500	ADQ	ADQ	
SR 1142	18	88.5	2	7.2	12,000	1387	2	2,500	ADQ	ADQ	
SR 1145	18	88.5	2	12.8	12,000	1387	2	2,500	ADQ	ADQ	
SCL ROBERS	18	56.3	2	10.7	12,000	2512	2	2,500	ADQ	ADQ	
SR 1159	18	32.2	2	11.0	12,000	3600	2	2,500	ADQ	ADQ	
US 13-64	18	56.3	2	9.8	12,000	2987	2	4,100	ADQ	ADQ	
NCL ROBERS	18	88.5	2	7.2	12,000	2689	2	4,100	ADQ	ADQ	
PROP US 13	18	88.5	2	7.2	12,000	2689	2	4,100	ADQ	ADQ	
SR 1306	18	88.5	2	7.2	12,000	2689	2	4,100	ADQ	ADQ	
SR 1401	18	88.5	2	7.2	12,000	2689	2	4,100	ADQ	ADQ	
SCL GOLD P	18	88.5	2	7.2	12,000	2689	2	4,100	ADQ	ADQ	
SR 1309	-	56.3	2	7.2	12,000	1400	2	4,100	ADQ	ADQ	
NCL GOLD P	-	56.3	2	7.2	12,000	1400	2	4,100	ADQ	ADQ	
SR 1159	18	88.5	2	7.2	12,000	1331	2	4,100	ADQ	ADQ	
SR 1409	18	88.5	2	7.2	12,000	1331	2	4,100	ADQ	ADQ	
SR 1409	18	88.5	2	7.2	12,000	1331	2	4,100	ADQ	ADQ	
NC 125	SEE NC 125										
NC 125		56.3	2	11.6	12,000	1923	2	4,000	ADQ	ADQ	
NCL HAMILT		56.3	2	11.6	12,000	1923	2	4,000	ADQ	ADQ	
CURVE	30	88.5	2	7.2	12,000	2200	2	4,000	ADQ	ADQ	
NC 11	18	88.5	2	6.4	10,000	0653	2	4,000	ADQ	ADQ	
HALIFAX CO											

**APPENDIX E: ROUTE INVENTORY**

FACILITY & SECTION	R/W (m)	SPEED (kph)	Existing LANES (#)	WIDTH (m)	Capacity CURRENT (FUTURE)	Volume		ADT	R/W (m)	Recommended- Road Type
						1991 ADT	TRUCK %			
<b>SR 1001</b>										
US 17	-	88.5	2	6.1	10,000	2318	1	5,000	ADQ	ADQ
CURVE	-	88.5	2	6.1	10,000	2318	1	5,000	ADQ	ADQ
SR 1114	-	56.3	2	6.1	10,000	2318	1	5,000	ADQ	ADQ
SR 1106	-	56.3	2	6.1	10,000	2318	1	5,000	ADQ	ADQ
SR 1100	-	88.5	2	6.1	10,000	1804	1	5,000	ADQ	ADQ
BEAUFERT CO										
<b>SR 1002</b>										
NC 903	18	56.3	2	6.7	11,000	0834	1	3,000	ADQ	ADQ
WCL GOLD P	18	88.5	2	6.7	11,000	0834	1	3,000	ADQ	ADQ
SR 1306	18	88.5	2	6.7	11,000	0834	1	3,000	ADQ	ADQ
NC 142	18	88.5	2	6.7	11,000	0834	1	3,000	ADQ	ADQ
SR 1320	18	88.5	2	6.7	11,000	0834	1	3,000	ADQ	ADQ
SR 1320	18	88.5	2	6.7	11,000	0834	1	3,000	ADQ	ADQ
SCL OAK CY	18	56.3	2	7.2	11,000	0834	1	3,000	ADQ	ADQ
NC 125	18	56.3	2	7.2	11,000	0834	1	3,000	ADQ	ADQ
<b>SR 1142</b>										
NC 903	-	88.5	2	6.7	11,000	2115	-	5,700	ADQ	ADQ
SR 1145	-	88.5	2	6.4	11,000	3716	-	5,700	ADQ	ADQ
SR 1113	-	88.5	2	6.4	11,000	3716	-	5,700	ADQ	ADQ
SR 1138	-	88.5	2	6.4	11,000	3716	-	5,700	ADQ	ADQ
SR 1139	-	88.5	2	6.4	11,000	3716	-	5,700	ADQ	ADQ
SR 1106	-	88.5	2	6.4	11,000	3716	-	5,700	ADQ	ADQ
SR 1126	-	88.5	2	6.4	11,000	3716	-	5,700	ADQ	ADQ
SR 1126	-	88.5	2	6.4	11,000	3716	-	5,700	ADQ	ADQ
PROP US 13	-	88.5	2	6.4	11,000	3716	-	5,700	ADQ	ADQ
PROP US 13	-	88.5	2	6.4	11,000	3716	-	5,700	ADQ	ADQ
US 13	-	88.5	2	6.4	11,000	3716	-	5,700	ADQ	ADQ
<b>SR 1409</b>										
NC 903	-	88.5	2	6.1	10,000	0677	-	3,000	ADQ	ADQ
SR 1411	-	88.5	2	5.5	9,000	0677	-	3,000	ADQ	ADQ
SR 1404	-	88.5	2	5.5	9,000	1000	-	4,000	ADQ	ADQ
SR 1407	-	88.5	2	5.8	9,000	1191	-	4,000	ADQ	ADQ
SR 1410	-	56.3	2	5.8	9,000	1273	-	4,000	ADQ	ADQ
SR 1423	-	56.3	2	5.8	9,000	1273	-	4,000	ADQ	ADQ
US 13	-	56.3	2	5.8	9,000	1273	-	4,000	ADQ	ADQ

## APPENDIX F TYPICAL THOROUGHFARE CROSS SECTIONS

Cross section "A" illustrates a fully controlled access freeway. Rural Interstates typically have this cross section. The 3.6 meter lanes, wide median and wide shoulders provide maximum speed, efficiency, and safety for travelers.

Cross section "B", illustrates a seven-lane urban roadway. This cross section should only be limited to situations when right-of-way is severely restricted and additional capacity is needed on an existing five-lane roadway. When the conditions warrant six through lanes, cross section "E" is preferable.

Cross section "C" illustrates a five-lane urban roadway with four through lanes and a center turning lane. Turning vehicles crossing the main traffic flow create accident hazards and traffic friction.

Cross section "D" illustrates a six-lane divided highway with a raised median and partial control of access. The 4.8 meter (16') median is the minimum recommended for an urban boulevard type cross section. Medians may be landscaped in urban areas when municipalities assume responsibility for the regular landscaping maintenance.

Cross section "E" illustrates an urban four-lane highway with a raised median and partial control of access. The 4.8 meter (16') median is the minimum recommended for an urban boulevard type cross section. Medians may be landscaped in urban areas when municipalities assume responsibility for the regular landscaping maintenance.

Cross section "F" illustrates an urban four-lane divided highway with curb, gutter and partial control of access. This curb and gutter section only uses half of the right-of-way required by the shoulder section and still allows efficient and safe traffic flow.

Cross section "G" illustrates a four-lane roadway with no center lane for left turns. When traffic volumes are high, vehicles turning left into driveways block traffic in the through lane. Additional left turn lanes are typically necessary at major intersections.

Cross section "H" illustrates a three-lane roadway. For two-directional traffic flow, the center lane can be a turning lane. For one-way traffic flow, all three lanes flow in the same direction with a parallel road operating in the opposite direction.



Cross section "I" illustrates a two-lane road with parking on both sides. Because this facility serves both land use and traffic, it should be designated a minor thoroughfare or a local street.

Cross section "J" illustrates a two-lane road with parking on one side. Because this facility serves both land use and traffic, it should be designated a minor thoroughfare or a local street.

Cross section "K" illustrates a rural two-lane roadway with shoulders. When two lanes will have enough capacity through the design year, but may ultimately need additional capacity, 30 meters of right-of-way are recommended. This allows future local officials the ability to widen the road as much as necessary, up to a four-lane divided cross section with a raised median.

Cross section "L" illustrates a six-lane divided highway with a grass median and full control of access. The median is eight to nine meters wide.

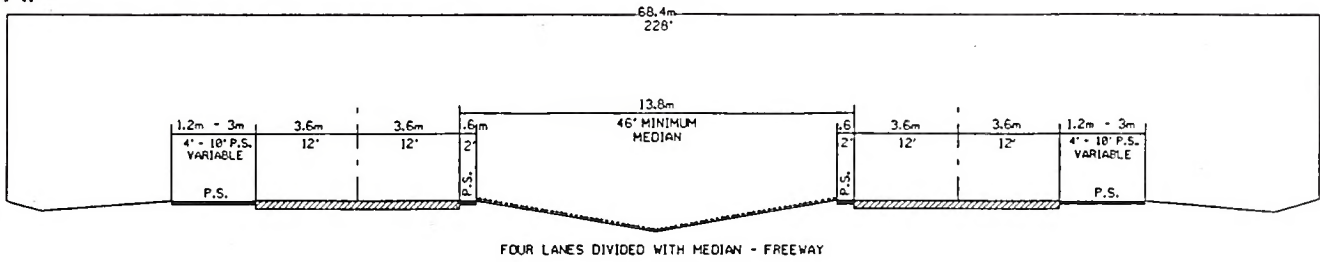
Cross section "M" illustrates an urban eight-lane divided highway with a raised median and partial control of access. Medians may be landscaped in urban areas when municipalities assume responsibility for the regular landscaping maintenance.

The curb and gutter urban cross sections illustrate the sidewalk between the road and the utility strip. The sidewalk width is the minimum recommended safety buffer between moving automobiles and utility poles. For additional pedestrian safety and community aesthetics, municipalities often place sidewalks outside of this buffer zone. Additional right-of-way is necessary if the sidewalk is moved farther away from the street.

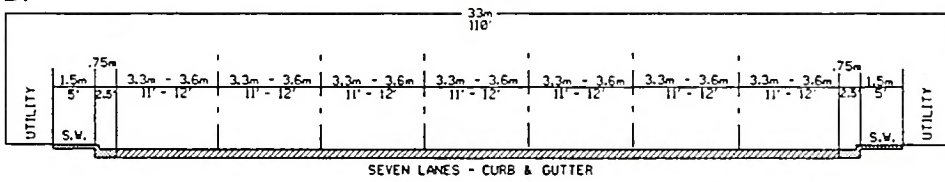
Communities encouraging bicycling should allow additional right-of-way for the bicycle facilities. Cross sections N, O and P are typically used to accommodate bicycle travel. The *Guide For Development of New Bicycle Facilities* published by the American Association of State Highway and Transportation Officials details design standards for bicycle facilities.

# TYPICAL THOROUGHFARE CROSS SECTIONS

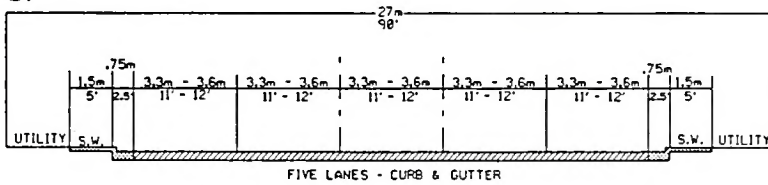
A.



B.



C.



D.

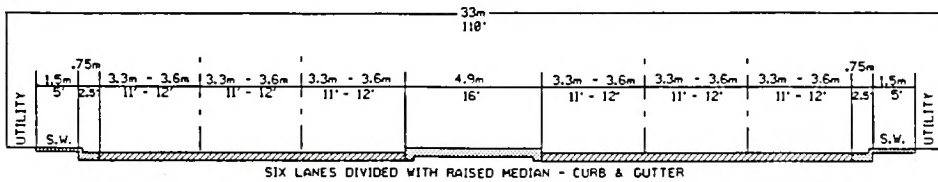
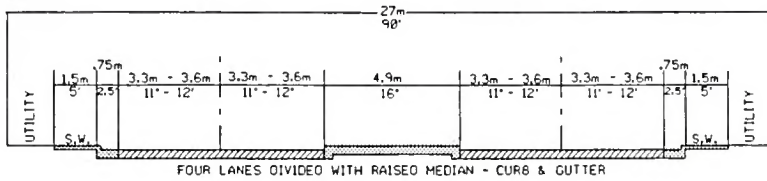


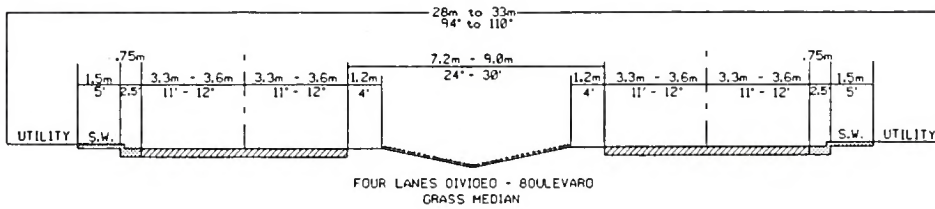
FIGURE F-1

# TYPICAL THOROUGHFARE CROSS SECTIONS

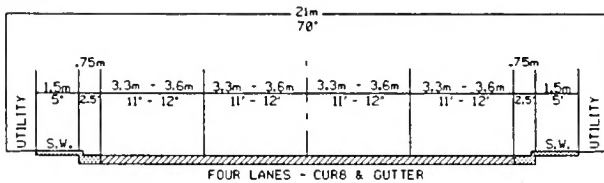
E.



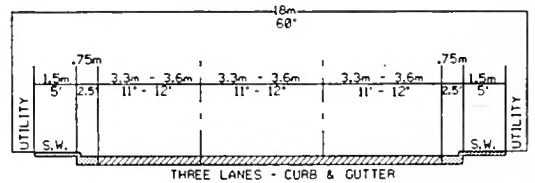
F.



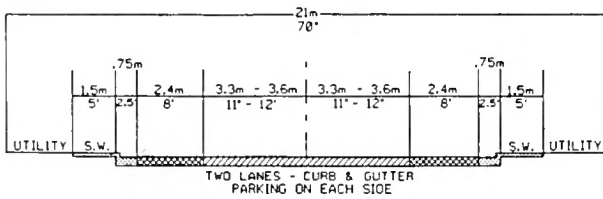
G.



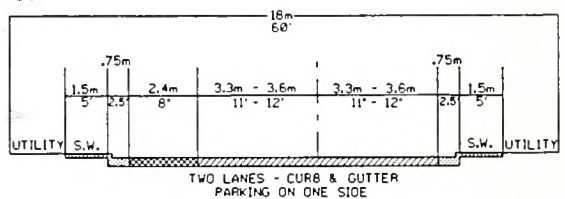
H.



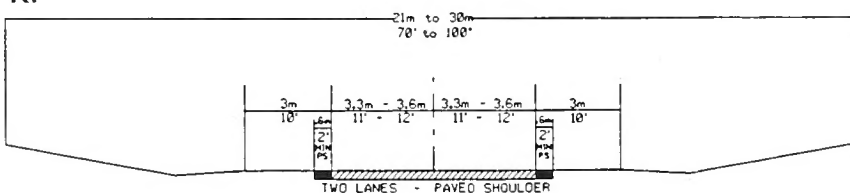
I.



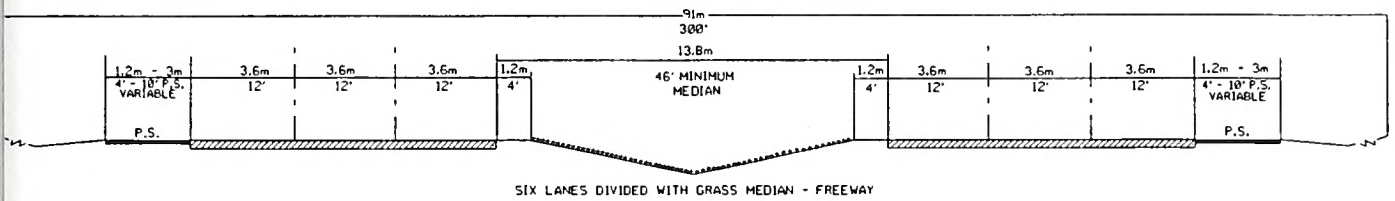
J.



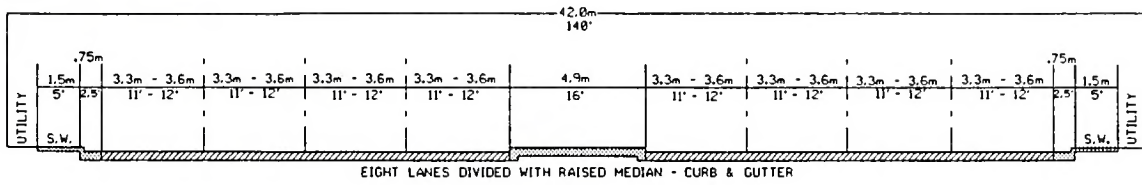
K.



# TYPICAL THOROUGHFARE CROSS SECTIONS

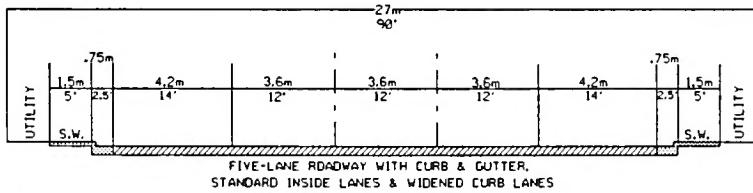


M.

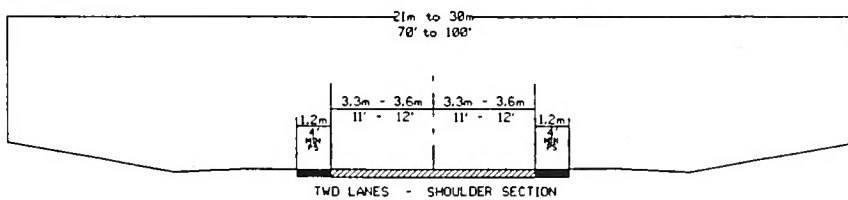


## TYPICAL THOROUGHFARE CROSS SECTIONS FOR ACCOMMODATING BICYCLES

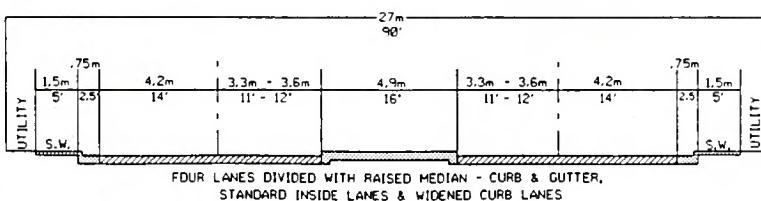
N.



O.



P.





**APPENDIX G**  
**EXAMPLE SUBDIVISION ORDINANCES**

**DEFINITIONS**

I. Streets and Roads:

A. Rural Roads

1. Principal Arterial - a rural road serving statewide or interstate travel. Principal Arterial roads should serve high volumes of through traffic, not direct land access.
2. Minor Arterial - a rural road serving intrastate and inter-county travel by connecting cities and towns. Minor Arterial roads should provide efficient traffic flow, but may have limited direct land access.
3. Major Collector - a rural road serving major intra-county travel and large traffic generators. Major Collector roads should connect traffic to the Arterial roads.
4. Minor Collector - a rural road serving local communities and moderate traffic generators. Minor Collector roads should provide both traffic movement and direct land access.
5. Local Road - a rural road which provides direct access to adjacent land.

B. Urban Streets

1. Major Thoroughfare - a major street which carries high volumes of traffic in and through urban areas. Major Thoroughfares primarily serve traffic movement, not direct land access.
2. Minor Thoroughfare - a street which connects local streets to Major Thoroughfares. Minor Thoroughfares should serve both traffic movement and direct land access.
3. Local Street - a street which provides direct access to adjacent land.

### C. Specific Streets (Rural or Urban)

1. Interstate Highway - a divided multilane highway designed to carry large volumes of high speed traffic through states. Interstate Highways must be accessed by interchanges because they do not provide any direct land access.
2. Freeway - a divided multilane highway designed to carry large volumes of high speed traffic. Freeways must be accessed by interchanges because they do not provide any direct land access.
3. Expressway - a divided multilane roadway designed to carry large volumes of high speed traffic. Expressways have either full or partial control of access and generally have grade separations at major intersections.
4. Parkway - a roadway designed for non-commercial traffic. Parkways may have either full or partial control or access.
5. Frontage Road - a road that is parallel to a partial or full access controlled facility. Frontage roads provide direct land access.
6. Local Residential Street - a street less than one mile long that does not serve major traffic generators or collect traffic from more than 100 dwelling units. Local residential streets can be cul-de-sacs or circles.
7. Alley - a narrow road used only for service vehicles accessing the back side of properties.
8. Cul-de-sac - a short street having one end open to traffic and the other end a vehicular turnaround.

### II. Property

- A. Building Setback Line - a line parallel to the street which specifies the minimum distance between the street right-of-way and buildings.
- B. Easement - a grant by the property owner limiting the land use on a specific piece of property. For example, the property owner can give or sell easement rights for a street across a particular section of the property.
- C. Lot - a portion of land which can be bought or sold. A lot may also be referred to as a plat, parcel, or tract.

### III. Subdivision

- A. Subdivider - a person, firm, corporation or official agent who divides large lots into smaller lots.
- B. Subdivision - (1) All divisions of a tract of land into two or more lots or building sites for sale or development (2) All divisions of land involving the dedication of new streets or changes in existing streets.
- C. Dedication - Property given by the owner to another party. Official dedications are made and accepted in writing.
- D. Reservation - An agreement to keep property free from development for a period of time. Property reservations do not involve any transfer of property rights.



## DESIGN STANDARDS

All roads shall be designed in accordance with the NC Department of Transportation design standards and American Association of State Highway and Transportation Officials' (AASHTO) policies. The design standards listed in this appendix are for general reference only. Please refer to the *NC DOT Roadway Design Manual* or to the AASHTO's *A Policy on Geometric Design of Highways and Streets* for more detailed information.

I. Right-of-way - Minimum right-of-way (ROW) for roads shall conform with the recommendations listed in the thoroughfare plan. When the thoroughfare plan does not specify a ROW, the following widths should be used:

A. Rural Roads	Min. ROW
1. Principle Arterial Freeway	105 meters
2. Other Principle Arterial	60 meters
3. Minor Arterial	30 meters
4. Major Collector	30 meters
5. Minor Collector	24 meters
6. Local Road	18 meters (1)
B. Urban Roads	
1. Major Thoroughfare other	27 meters
2. Minor Thoroughfare	21 meters
3. Local Street	18 meters (1)
4. Cul-de-sac	Variable (2)

- 
- (1) The minimum desirable ROW is 18 meters, but if curb and gutter is provided, 15 meters of ROW are adequate on local residential streets.
- (2) The ROW dimension will depend on radius used for vehicular turnaround. The distance from the edge of the pavement of the turnaround to ROW should not be less than distance from edge of pavement to ROW on the street approaching turnaround.

Subdivisions should provide access to properties from local streets. Direct property access to major thoroughfares, principle arterials, minor arterials, and major collectors should be avoided.

When proposed subdivisions conflict with proposed thoroughfares, the subdivider shall dedicate the necessary ROW for the proposed thoroughfare. The subdivider will only be required to dedicate a maximum of 30 meters of ROW. In cases where over 30 meters of ROW are needed, the subdivider should dedicate 30 meters, and reserve the amount in excess of 30 meters.

When a proposed subdivision borders a proposed thoroughfare, and undeveloped land borders the opposite side of the proposed thoroughfare, partial width ROW may be dedicated. However, the partial ROW must be at least eighteen meters, and the width of the partial dedication must be wide enough to construct necessary facilities to serve abutting lots. Subsequently, when the undeveloped land on the opposite side of the road is subdivided, the remainder of the required ROW shall be dedicated.

When proposed subdivisions are adjacent to proposed thoroughfare widenings, subdividers shall dedicate the necessary ROW for the proposed thoroughfare widening.

II. Street Widths - Street widths should conform with the recommendations listed in the thoroughfare plan. When the thoroughfare plan does not specify a street width, the following widths should be used:

A. Local residential streets with a curb and gutter should have 7.8 meters of pavement from face-to-face of the curb. Local residential streets with a shoulder should have six meters of pavement and 1.2 meter shoulders.

B. Residential collector streets with a curb and gutter should have 10.2 meters from face-to-face of the curb. Residential collector streets with a shoulder should have six meters of pavement and 1.8 meter shoulders.

III. Geometric Characteristics - The standards outlined below shall apply to all subdivision streets proposed for addition to the State Highway System or Municipal Street System.

A. Design Speed - The design speed should be a minimum of ten kilometers per hour greater than the posted speed limit. The design speeds for subdivision streets shall be:

DESIGN SPEEDS (km/hr)			
Facility Type	Desirable	Minimum	
		Level	Rolling
<b>RURAL</b>			
Minor Collector Roads	100	80	70
Local roads including Residential Collectors and Local Residential	80	80	70

DESIGN SPEEDS continued (km/hr)			
Facility Type	Desirable	Minimum	
		Level	Rolling
<b>URBAN</b>			
Major Thoroughfares other than Freeway or Expressway	100	80	80
Minor Thoroughfares	100	80	70
Local Streets	70	70	50

B. Maximum and Minimum Grades

1. The maximum grades in percent shall be:

MAXIMUM VERTICAL GRADE				
Facility Type	Design Speed (km/h)	Maximum Grade (Percent)		
		Flat	Rolling	Mountain
<b>RURAL</b>				
Minor Collector Roads	30	7	10	12
	50	7	9	10
	60	7	8	10
	100	5	6	8
Local roads including Residential Collectors and Local Residential Streets	30	-	11	16
	50	7	10	14
	60	7	9	12
	100	5	6	-
<b>URBAN</b>				
Major Thoroughfares other than Freeway or Expressway	50	8	9	11
	60	7	8	10
	100	5	6	8
Minor Thoroughfares	30	9	10	12
	50	9	9	10
	60	9	8	10
	100	6	6	8
Local Streets	30	-	12	17
	50	8	11	15
	60	8	10	13
	100	6	7	-

2. Minimum grade should not be less than 0.5%.
3. Grades for 30 meters each way from intersections (measured from edge of pavement) should not exceed 5%.
4. For streets and roads with projected annual average daily traffic less than 250, short grades less than 150 meters long, may be 150% of the value in the above table.

C. Minimum Sight Distance - In the interest of public safety, no less than the minimum sight distance applicable shall be provided. Vertical curves that connect each change in grade shall be provided and calculated using the following parameters:

<b>SIGHT DISTANCE</b>					
Design Speed (km/h)	30	50	60	90	100
Stopping Sight Distance					
Minimum (meters)	30	60	80	140	160
Desirable (meters)	30	70	90	170	210
Minimum K Value for:					
Crest curve	3	10	18	71	105
Sag curve	4	12	18	40	51

(1) K is a coefficient which the algebraic difference in grade is multiplied to determine the length of the vertical curve which will provide the desired sight distance. (General practice calls for vertical curves to be multiples of 10 meters.)

D. The superelevation table below shows the maximum radius and maximum superelevation for design speeds. The maximum rate of roadway superelevation (e) for rural roads with no curb and gutter of 0.08. The maximum rate of superelevation for urban streets with curb and gutter is 0.06.

SUPERELEVATION TABLE		
Design Speed (km/h)	Maximum e	Minimum Radius (meters)
50	0.04	100
60	0.04	150
90	0.04	375
100	0.04	490
50	0.06	90
60	0.06	135
90	0.06	335
100	0.06	435
50	0.08	80
60	0.08	125
90	0.08	305
100	0.08	395

e = rate of roadway superelevation, meter per meter

#### IV. Intersections

- A. Streets shall intersect as nearly as possible at right angles. No street should intersect any other street at an angle less than sixty-five degrees.
- B. Property lines at intersections should be set so that the distance from the edge of pavement, of the street turnout, to the property line will be at least as great as the distance from the edge of pavement to the property line along the intersecting streets. This property line can be established as a radius or as a sight triangle. Greater offsets from the edge of pavement to the property lines will be required, if necessary, to provide sight distance for the stopped vehicle on the side street.
- C. Offset intersections should be avoided. Intersections which cannot be aligned should be separated by a minimum length of 60 meters between survey center lines.
- D. Intersections along major thoroughfares should be spaced at regular intervals. Five hundred meters is the minimum desirable spacing between intersections.

#### V. Cul-de-sacs

Cul-de-sacs shall not be more than 150 meters long.

## VI. Alleys

Alleys shall be at least sixty meters wide. Dead-end alleys shall be avoided. However, if dead-end alleys are unavoidable, adequate turnaround facilities shall be provided at the dead-end.

## VII. Driveways Connecting To State Roads

A permit from the Department of Transportation is required for connecting driveways to any state maintained road. Permit approval is required prior to any construction on the road. Driveway permit applications are available from the District Engineer's office.

## VIII. Offsets To Utility Poles

On roadways with shoulders, utility poles should be located a minimum of nine meters from the edge of pavement. On streets with curb and gutter, utility poles should be a minimum of 1.8 meters behind the face of the curb.

## IX. Wheel Chair Ramps

All street curbs being constructed or reconstructed for maintenance purposes, traffic operations, repairs, correction of utilities, or altered for any reason, shall provide wheelchair ramps for the physically handicapped at intersections where both curb and gutter and sidewalks are provided and at other major points of pedestrian flow.

## X. Bridge Deck Width

A. The bridge deck widths for new bridges serving 2-lane, 2-way traffic should meet the following specifications:

1. Shoulder section approach
  - a. If the design year average daily traffic is under 800 vehicles per day, the bridge deck should be three meters wider than the roadway width or 8.4 meters, whichever is greater.
  - b. If the design year average daily traffic is between 800 and 2000 vehicles per day, the bridge deck should be 3.6 meters wider than the roadway width or 10.2 meters, whichever is greater.
  - c. If the design year average daily traffic is over 2000 vehicles per day, the desirable

bridge deck is 13.2 meters. The minimum bridge deck width is 12 meters.

2. Curb and gutter approach

- a. If the design year average daily traffic is under 800 vehicles per day, the bridge deck should be a minimum of 7.2 meters from face-to-face of curbs.
- b. If the design year average daily traffic is over 800 vehicles per day, the bridge deck should be the width of the approach pavement from face-to-face of curbs.
- c. Where curb and gutter sections are used on roadway approaches, curbs on bridges shall match the curbs on approaches in height and in crown drop.

B. The bridge deck widths for new bridges having four or more lanes serving undivided two-way traffic should meet the following specifications:

1. If the approaching roadway has a shoulder, the bridge deck should have the width of approach pavement plus width of usable shoulders on both sides.
2. If the approaching roadway has a curb and gutter, the bridge deck should have the width the of approach pavement measured from face-to-face of the curbs.

<b>ENGLISH TO METRIC CONVERSION TABLE</b>			
<u>English Units</u>		<u>S.I. Units</u>	
1 inch	equals	25.4 millimeters	(mm)
1 foot	equals	0.3 meters	(m)
1 mile	equals	1.6 kilometers	(km)
1 acre	equals	2.47 hectares	(hect)

**APPENDIX H**  
**DOT PEDESTRIAN POLICY GUIDELINES**  
**4-20-94**

**EXECUTIVE SUMMARY**

These guidelines provide a procedure for implementing the Pedestrian Policy adopted by the Board of Transportation in August 1993. The Pedestrian Policy addresses TIP projects and makes an important distinction between "considering the needs of pedestrians to avoid creating hazards to pedestrian movements" and the concept of "facilitating pedestrian movements for other reasons."

**HAZARDS**

A hazard in this context is defined as a situation when pedestrian movements are physically blocked in a manner which forces pedestrians to use another mode of transportation or walk in an automobile traffic lane (parallel with the automobile traffic) to pass a barrier. The concept of "not creating a hazard" is intended to allow municipalities to have the flexibility to add pedestrian facilities as part of the project, or in the future after the TIP project is complete. Our current standard cross sections generally do not create barriers for pedestrian movements. One exception is on urban bridges where the bridge rail is at the back of the curb.

**QUANTIFYING THE NEED FOR PEDESTRIAN FACILITIES**

Planning studies should evaluate the need for pedestrian facilities based on the degree to which the following criteria are met.

1. Local Pedestrian Policy
2. Local Government Commitment
3. Continuity and Integration
4. Location
5. Generators
6. Safety
7. Existing or Projected Pedestrian Traffic

**REQUIREMENTS FOR DOT FUNDING**

**REPLACING EXISTING SIDEWALKS**

The DOT will pay 100% of the cost to replace an existing sidewalk which is removed to make room for a widening project.



PREVENTING HAZARDS

If there is evidence that a TIP project would create a hazard to existing pedestrian movements, the DOT will take the initiative to not create the hazard. However, if there is not evidence that a TIP project would create a hazard to existing pedestrian movements, the municipality will need to prove there will be pedestrian movements which will be affected within five years by the hazard created by the TIP project.

INCIDENTAL PROJECTS

Due to the technical difficulty of describing justification for pedestrian facilities, the committee chose a cost sharing approach to provide cost containment for the pedestrian facilities. The DOT may share the incremental cost of constructing the pedestrian facilities if the "intent of the criteria" are met. The DOT will pay a matching share of incidental pedestrian facility total construction costs up to a cap of no more than 2% of total project construction cost. The matching share is a sliding scale based on population as follows:

MUNICIPAL POPULATION	PARTICIPATION	
	DOT	LOCAL
> 100,000	50%	50%
50,000 to 100,000	60%	40%
10,000 to 50,000	70%	30%
< 10,000	80%	20%

FUNDING CAPS

Under normal circumstances, the cumulative funding for preventing hazards and providing incidental pedestrian facilities should not exceed 2% of the total project construction cost.

INDEPENDENT PROJECTS

The DOT will have a separate category of money for all independent pedestrian facility projects in North Carolina. The independent pedestrian facility funds will be administered similar to the Bicycle Program.

RIGHT-OF-WAY

In general, municipalities are responsible for providing any right-of-way needed to construct pedestrian facilities. However, the 2.4 meter (8 foot) berm the DOT generally provides on urban curb and gutter facilities can accommodate pedestrian facilities.

MAINTENANCE

Local governments will be responsible for maintaining all pedestrian facilities.

**PEDESTRIAN POLICY GUIDELINES**  
**4-20-94**

**INTRODUCTION**

These guidelines provide a procedure for implementing the Pedestrian Policy adopted by the Board of Transportation in August 1993. The Pedestrian Policy addresses TIP projects and makes an important distinction between "considering the needs of pedestrians to avoid creating hazards to pedestrian movements" and the concept of "facilitating pedestrian movements for other reasons." Consequently, these guidelines are divided into three main sections:

- 1) Considering the needs of pedestrians to avoid creating hazards.
- 2) Quantifying the need for pedestrian facilities.
- 3) Requirements for DOT funding.

**CONSIDERING THE NEEDS OF PEDESTRIANS  
TO AVOID CREATING HAZARDS**

Section "d" of the Pedestrian Policy states: "*In the planning, design, and construction of TIP transportation projects, the DOT shall consider the needs of pedestrians and will not create hazards to pedestrian movements.*" This means that during each phase of a project, a DOT employee should consider how the project will affect pedestrian movements. If the project will create a hazard to pedestrian movement, the DOT should use engineering judgement and find a way to remove the hazard. A hazard in this context is defined as a situation when pedestrian movements are physically blocked in a manner which forces pedestrians to use another mode of transportation, or walk in an automobile traffic lane (parallel with the automobile traffic) to pass a barrier.

This does not mean that the DOT should build pedestrian facilities on all TIP projects. However, it does mean that the DOT should consider how projects will affect pedestrians and how projects can be designed to accommodate vehicular demands without creating barriers to pedestrians. Hazards can be divided into two categories, lateral barriers and perpendicular barriers. Lateral barriers prevent pedestrians from traveling parallel to the roadway. Perpendicular barriers prevent pedestrians from crossing a roadway.

The concept of "not creating a hazard" is intended to allow municipalities to have the flexibility to add pedestrian facilities as part of the project or in the future after the TIP project is complete. Because bridges are so expensive and because they often have useful lives over fifty years, bridges should be given special consideration when pedestrian travel is anticipated.

## **BRIDGES**

Current standard cross sections generally do not create barriers for pedestrian movements. One exception is on urban bridges where the bridge rail is at the back of the curb. A bridge which has barrier rail or support columns at the back of the curb and gutter is a lateral barrier. On rural bridges, a minimum shoulder may be sufficient to "not create a hazard for pedestrian movements" over or under the bridge.

## **SHOULDER CROSS SECTIONS**

Currently, there is no typical cross section for a rural road with a shoulder, and a pedestrian facility which is outside of the ditch. However, when a rural road with a shoulder section has a pedestrian facility outside of the ditch, the ditch will not be considered a perpendicular barrier. Similarly, as long as there is some space where pedestrians can walk which is not in an automobile travel lane, the ditch will not be considered a lateral barrier either.

## **WIDENING PROJECTS**

If a TIP project widens a road from 2 lanes to 5 lanes, the new 5-lane road is not considered a perpendicular barrier. Similarly, as long as there is some space where pedestrians can walk which is not in an automobile travel lane, the new 5-lane road is not considered a lateral barrier either.

## **RELOCATING PEDESTRIAN MOVEMENTS**

This policy is not intended to require a pedestrian bridge or tunnel at interchanges where sidewalks and crosswalks are not practical. In these cases, the DOT may consider relocating the pedestrian movement to avoid creating unsafe situations or making unpractical design modifications. Typically, relocated pedestrian movements should be no more than 800 meters (0.5 miles) away from the original path of the pedestrians. The 800 meter distance is a one way distance, not a round trip distance.

## **CONSTRUCTION PROCESS**

During the construction phase of a project, there may be times when it is not possible to maintain all pedestrian movements through the entire construction process. When necessary, there may be temporary barriers to pedestrian movements in the work zone.

## **EXAMPLE**

For example, the "XYZ" Expressway is a new controlled-access freeway through an established urban area. A major thoroughfare with sidewalks which will have a new interchange with the Expressway, connects a neighborhood on the north side of the Expressway with a hospital on the south side of the Expressway. Because the proposed interchange for the major thoroughfare is a Single-Point-Diamond design with free-flowing ramps in all four quadrants, there is no safe way for a pedestrian to cross the Expressway with out conflicting with free-flowing traffic. Although there is a nearby railroad bridge over the Expressway, pedestrians are prohibited from that bridge because it was not designed to accommodate both trains and pedestrians. Consequently, residents who live in a neighborhood a few blocks from the hospital will now need to drive to the hospital or walk through a free-flowing traffic lane.

Using this example with the new pedestrian policy in effect, the design engineer should make every reasonable effort to design this interchange to accommodate the automobile traffic, and not create a barrier for pedestrian movements. If the interchange design requires free-flow ramps as this Single-Point-Diamond design does, the engineer should determine if it is possible for pedestrians to cross the free-flow traffic lanes. If the peak hour traffic flow has acceptable gaps to allow pedestrians to cross safely, the ramps will not be considered a barrier. However, if traffic volumes or pedestrian volumes are too great, an alternative pedestrian facility should be considered. If accommodating pedestrians at the interchange will compromise safety or good engineering judgement, the engineer should consider if shifting the pedestrian movement away from the interchange is a feasible alternative. Since there is a nearby railroad bridge over the Expressway, maybe the railroad bridge could be designed to handle pedestrian movements too.

## **QUANTIFYING THE NEED FOR PEDESTRIAN FACILITIES**

Section "e" of the Pedestrian Policy states: "*The Department recognizes there are certain situations in which pedestrian facilities provide significant benefits in the movement of pedestrian traffic...*" If a municipality would like the DOT to consider a project for "significant benefits," the municipality is responsible for collecting any necessary information and submitting a written request prior to the initiation of a planning study. The DOT will review the request and, if necessary, verify the data from the municipality. If pedestrian facilities are not incorporated into a project during the planning phase, and if there are

significant factors which change during the time between the project planning study and the project design phase, municipalities may resubmit a request for pedestrian facilities prior to the closure of comment period for the Design Public Hearing.

Planning studies should evaluate the need for pedestrian facilities based on the degree to which the following seven criteria are met. Municipalities should address each of these criteria when submitting requests for pedestrian facilities. Subsequently, the DOT will make the final determination for pedestrian facility eligibility.

1. **Local Pedestrian Policy.** There is evidence that local policies on urban development are encouraging urban densities and residential developments to occur in a manner to facilitate pedestrian travel by reducing walking distances, and requiring sidewalk construction in development ordinances.
  - \* Is a pedestrian plan included in local thoroughfare plan?
  - \* Do subdivision ordinances require pedestrian facility construction?
  - \* Do local zoning ordinances facilitate pedestrian travel? (For example, do the zoning ordinances encourage mixed-use developments which are accessible to pedestrians or do the zoning ordinances encourage highway strip development which is not accessible to pedestrians?)
  
2. **Local Government or Local Sponsor Commitment.** There is a local government/sponsor plan and commitment to provide an integrated system of pedestrian facilities which will connect with pedestrian facilities provided by the project.
  - \* Does the local Capital Improvement Program include local funds for providing pedestrian facilities which will connect with pedestrian facilities provided by the NC TIP project?
  - \* How many pedestrian facilities currently connect with the pedestrian facilities provided by the project?
  - \* How many subdivisions have provided pedestrian facilities which are or will be connected with pedestrian facilities provided by the project?
  - \* Has a responsible local government agency agreed in writing to maintain the pedestrian facility?
  
3. **Continuity and Integration.** The project provides a connection to an existing or a proposed pedestrian network and will provide a critical link in the network.
  - \* Is the project a critical link in an existing network? (For example, will this project provide a missing link in an existing network where there are pedestrian facilities extending beyond the length of this project?)

\* Is the project a critical link in a proposed network?  
(For example, will this project provide any link in a proposed network where there will be pedestrian facilities extending beyond the length of this project?)

4. **Location.** The project is located within a Census defined urban area or growth area where development is anticipated in the immediate future; a majority of the properties within walking distance of the project are developed, or projected to be developed within 5 years at urban type residential densities. This five year period will begin at the completion of the appropriate environmental document.

\* Is the project located in a Census defined urban area?

\* Is the project located in a growth area (Urbanized Area Boundary) where development is anticipated in the immediate future, but is not in a Census defined urban area?

\* Are a majority of the properties within walking distance of the project developed, or projected to be developed within 5 years at urban type residential densities (a minimum of 1 dwelling unit per acre)?

5. **Generators.** The project serves as a primary access from one or more of the following to one another:

- day care, elementary or secondary school
- college or university
- community facility (such as library or park)
- public transportation
- commercial, office, industry, or business centers
- residential areas

\* Will any of these land-uses within two kilometers (1.2 miles) of the project use this project as a primary access?

6. **Safety.** The project provides demonstrable safety benefits for pedestrians.

\* Will the pedestrian facility separate pedestrians from automobile traffic with a posted speed greater than 80 kilometers per hour (50 miles per hour)?

\* Will the pedestrian facility be used by children (0-14), elderly (65+), handicapped, or low-income people?

\* Will the pedestrian facility reduce potential pedestrian-vehicle conflicts?

\* Will the pedestrian facility address the identified safety needs of the area?

7. **Existing or Projected Traffic.** Continued, sustained pedestrian travel can be shown by any of the following:

- Evidence of existing usage such as well worn paths.
- Projected usage based on previous experience with similar facilities.
- Minimum of 150 pedestrians per 24 hour period along a corridor planned for the project.

## REQUIREMENTS FOR DOT FUNDING

### REPLACING EXISTING SIDEWALKS

Section "b" of the Pedestrian Policy states: "When a highway construction project having to do with the widening of an existing street requires that an existing sidewalk be torn up to make room for the widening, it is the policy of the Department of Transportation to replace the sidewalk." This statement says the DOT will pay 100% of the cost to replace an existing sidewalk which is removed to make room for a widening project. There is no monetary cap for this category of funding pedestrian facilities.

### PREVENTING HAZARDS

Section "d" of the Pedestrian Policy states: "In the planning, design, and construction of TIP transportation projects, the DOT shall consider the needs of pedestrians and will not create hazards to pedestrian movements." If there is evidence that a TIP project would create a hazard to existing pedestrian movements, the DOT will take the initiative to not create the hazard. However, if there is not evidence that a TIP project would create a hazard to existing pedestrian movements, the municipality will need to prove there will be pedestrian movements which will be affected within five years by the hazard created by the TIP project. The five year period will begin at the completion of the appropriate environmental document (Categorical Exclusion, Finding of No Significant Impact, or Environmental Impact Statement).

### CERTAIN SITUATIONS

Section "e" of the Pedestrian Policy states: "The Department recognizes there are certain situations in which pedestrian facilities provide significant benefits in the movement of pedestrian traffic. The Department of Transportation may participate in the provision of these facilities on a full or shared-cost basis." This statement says the DOT may participate in funding incidental projects, and independent projects as described below.

### INCIDENTAL PROJECTS

Incidental pedestrian projects are defined as TIP projects where pedestrian facilities are included as part of the project. The DOT may share the incremental cost of constructing the pedestrian facilities if the "intent of the criteria" are met, and the request for DOT participation is made prior to the closure of comment period for the Design

Public Hearing. The DOT will pay a matching share of incidental pedestrian facility total construction costs up to a cap of no more than 2% of total project construction cost. This "total project construction cost" does not include the construction cost of any incidental pedestrian facilities. The matching share is a sliding scale based on population as follows:

MUNICIPAL POPULATION	PARTICIPATION	
	DOT	LOCAL
> 100,000	50%	50%
50,000 to 100,000	60%	40%
10,000 to 50,000	70%	30%
< 10,000	80%	20%

The local government share of the pedestrian facility construction funding may not be Federal or State money for the purposes of these guidelines. In addition, the right-of-way municipalities provide for pedestrian projects may not be counted toward the required local contribution.

INDEPENDENT PROJECTS

Independent pedestrian projects are defined as projects where pedestrian facilities are the entire project. The DOT will have a separate category of money for all independent pedestrian facility projects in North Carolina. The independent pedestrian facility funds will be administered similar to Bicycle Program. Municipalities will prioritize their requests under the enhancements section of the local request list, and the DOT will fund as many projects as funding will allow.

**GENERAL INFORMATION**

The attached flow chart illustrates the decision process for a project engineer. In addition, the funding caps, right-of-way and maintenance requirements described below must also be met.

FUNDING CAPS

Under normal circumstances, the cumulative funding for preventing hazards and providing incidental pedestrian facilities should not exceed 2% of the total project construction cost. This "total project construction cost" does not include the construction cost of any incidental pedestrian facilities. The 2% cap is intended as a guide, not as an absolute cap. Consequently, the appropriate Branch Manager can approve pedestrian funds over the 2% cap.



## RIGHT-OF-WAY

In general, municipalities are responsible for providing any right-of-way needed to construct pedestrian facilities. The DOT will allow pedestrian facilities on DOT right-of-way only if the pedestrian facility will not compromise the safety of vehicles or pedestrians. For preventing hazards, the DOT may buy the necessary right-of-way. For incidental and independent projects the DOT shall not pay extra right-of-way cost for pedestrian facilities.

Since the DOT's typical curb and gutter cross-section generally has a 2.4 meter (8 foot) berm, a 1.5 meter (5 foot) pedestrian facility may fit within this standard right-of-way. However, on curb and gutter sections, most municipalities want a 3 meter (10 foot) berm to put a 1.5 meter (5 foot) grassy strip and a 1.5 meter (5 foot) pedestrian facility. In this situation, the municipalities will need to provide the additional 0.6 meters (2 feet) of right-of-way.

On shoulder cross sections, the DOT typically does not have additional right-of-way behind the ditch. In addition, the DOT does not put paved pedestrian facilities between the road and the ditch. Since the DOT would not typically have the right-of-way needed for a pedestrian facility, the municipality must provide all of the additional right-of-way.

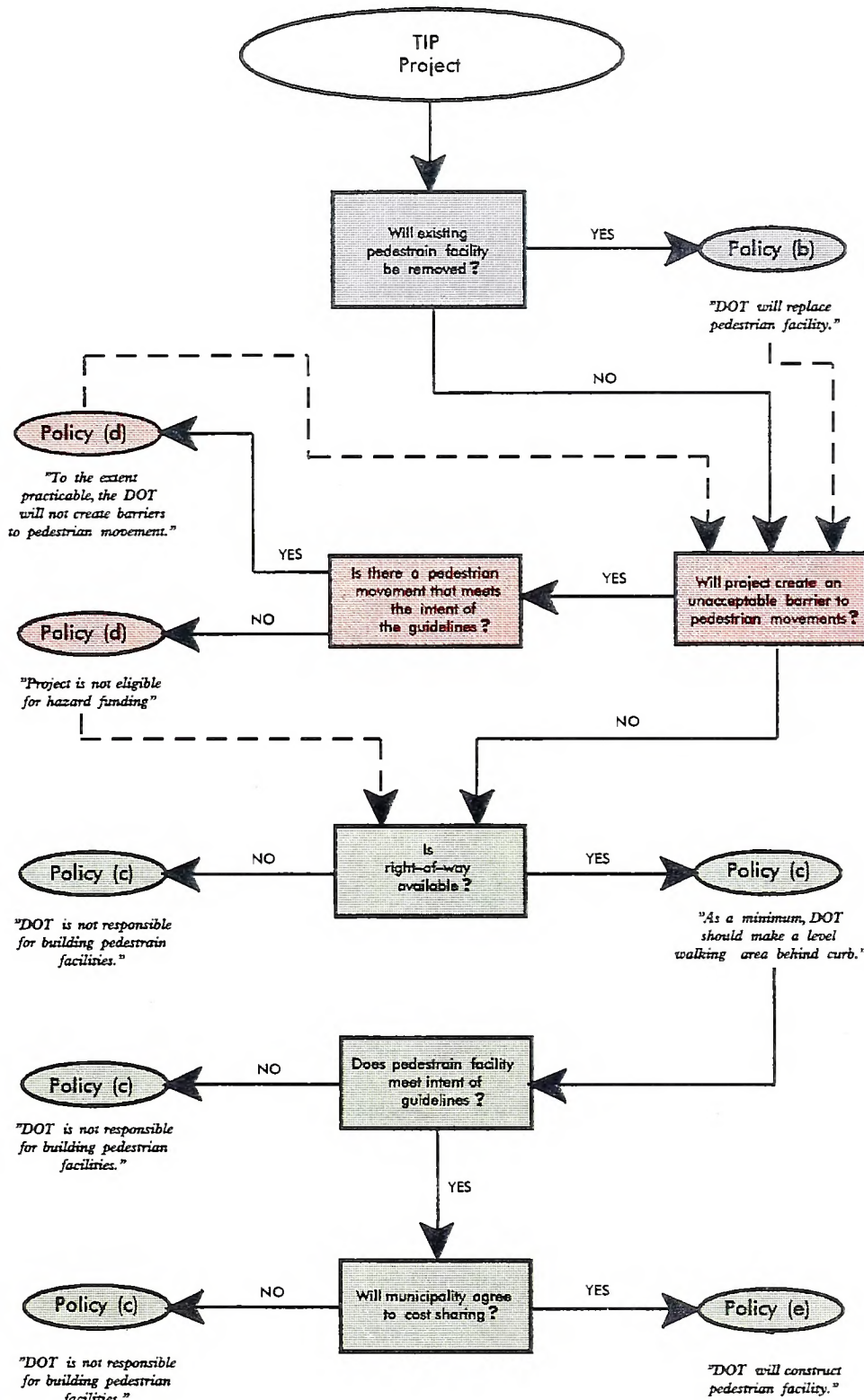
Applicable AASHTO standards for right-of-way and design must be met. The DOT will not narrow automobile travel lanes to accommodate incidental pedestrian facilities. For example, if a project specifies five 3.6 meter (12 foot) lanes on a section of road, the DOT will not reduce the width of the travel lanes to 3.0 meters (10 feet) to create room for pedestrian facilities. In addition, if right-of-way is restricted, and there is insufficient room for pedestrian facilities and a utility strip, the utility strip will take precedence.

Applicable Federal and State regulations must also be met. For example, if right-of-way for a particular project is restricted by historic property, federal regulations on historic preservation may prohibit the DOT from using additional right-of-way for pedestrian facilities.

## MAINTENANCE

Local governments are responsible for maintaining all pedestrian facilities. The Municipal Agreement will formally specify that the DOT is not responsible for maintaining pedestrian facilities.

Process For Determining Eligible TIP Projects For Incidental Pedestrian Facilities



LEGEND

- Guidelines related to existing pedestrian facilities.
- Guidelines related to "hazards."
- Guidelines related to "other significant benefits."

Figure H-1



**APPENDIX I  
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