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

Thoroughfare Plan for Beaufort County

July, 2000

Beaufort County Thoroughfare Plan

Prepared by the:

Statewide Planning Branch
Division of Highways
North Carolina Department of Transportation

In cooperation with:

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

July, 2000

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Small Urban Planning Unit Head

Acknowledgments

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Executive Summary

This plan documents the findings of a thoroughfare plan study for Beaufort County. Below is a listing and brief description of these findings. A more detailed discussion of these recommendations can be found in Chapter 2.

Principal Arterials

- US 17: this facility is divided into two sections, both being projects in the Transportation Improvement Program (TIP). R-2511 - widen to 4-12 ft. lanes from Martin County to the northern Washington Urban Planning Boundary (WUPB). R-2513 - widen to 4-12 ft. lanes from the southern WUPB to Craven County.

Minor Arterials

- US 264: widen to a multi-lane facility from NC 32 to NC 99 in Belhaven (R-2601).

Major Collectors

- BUS 264 (Main Street): widen to 4-12 ft. lanes from NC 99 to Pamlico Street in Belhaven.
- NC 33: this facility is divided into three sections. Widen to 4-12 ft. lanes from Pitt County to the western WUPB and from SR 1003 (Tunstall Swamp Road) to the intersection of NC 33/306. The section from the eastern WUPB to SR 1952 (Stilley Station Road) should be upgraded to a 24-ft. cross section.
- NC 92/99: widen this facility to a 24-ft. cross section from SR 1741 (Jackson Swamp Road) to SR 1718 (Yeatesville Road) and from SR 1714 (Seed Tick Neck Rod) to US 264.
- NC 171: widen to a 24-ft. cross section from Martin County to US 17.
- NC 306: improve to a 24-ft. cross section from SR 1003 (Tunstall Swamp Road) to Craven County.
- SR 1003 (Tunstall Swamp Road): upgrade this facility to a 24-ft. cross section from NC 33 to Craven County.

Minor Collectors

- NC 32: this facility should be upgraded to a 24-ft. cross section from Washington County to SR 1612 (Terra Ceia Road).

RECOMMENDATIONS

LEGEND

- WIDEN TO 12 FT LANES
- 4-LANE DIVIDED
- 4-LANE UNDIVIDED
- URBAN PLANNING BOUNDARY

BEAUFORT COUNTY
NORTH CAROLINA

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

0 .5 1 2 3 4 5
Scale in Miles

Base map dated 5-27-99 **FIGURE 3**

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Chapter 1
Introduction

Overview

Officials of Beaufort County, prompted by a desire to adequately plan for future transportation needs, requested the North Carolina Department of Transportation's (NCDOT) assistance in conducting a thoroughfare plan study. The County Commissioners' primary concern was the increased development in the western portion of Beaufort County, as well as potential future growth associated with the construction of the US 17 Bypass. A thoroughfare plan study was requested to determine the impact of this development on the existing transportation system.

The objective of thoroughfare planning is to enable a transportation system to be progressively developed to adequately meet the transportation needs of a community, or region, as land develops and traffic volumes increase. It is essential to plan now for future transportation needs in order to avoid unnecessary costs to the physical, social, and economic environment. Thoroughfare planning is a tool that can be used by local officials to plan for future transportation needs, while at the same time reducing costs to our environment.

The primary purpose of this report is to present the findings and recommendations of the thoroughfare plan study conducted for Beaufort County. The secondary purpose of this report is to document the basic thoroughfare planning principles and procedures used in developing these recommendations. This report can be divided into three parts. The first part of the report, covered in Chapter 1, covers the highlights of the study. Chapters 2 and 3 provide a detailed description of the thoroughfare plan study recommendations and address different methods by which these recommendations can be implemented. The final chapter, Chapter 4, covers study procedures and details findings.

Information that will be especially useful to the practitioners is provided in the Appendices. The principles of thoroughfare planning are covered in Appendix A. A detailed tabulation of all routes on the thoroughfare plan and a graphical representation of typical cross sections can be found in Appendices B and C, respectively. Information related to subdivision ordinances is covered in Appendix D. Appendix E provides an index for secondary road numbers for Beaufort County. Finally, Appendix F addresses the process of requesting Transportation Improvement Program Projects.

Background

Beaufort County is located in the eastern section of the State and is bounded by Craven, Hyde, Martin, Pamlico, Pitt, and Washington counties. Beaufort County has a total area of 958 square miles, with 827 square miles of land area. The geographic location for Beaufort County is shown in Figure 1.

Beaufort County was originally called Pamptecough, but changed names in 1712. It was named for Henry Somerset, Duke of Beaufort. Washington was made the county seat in 1785. Lumber

products, agriculture and the river trade were the backbone of this new region's economy. Today, Beaufort County has a diversified economic base. The agricultural, logging, manufacturing, seafood and textile industries are key economic foundations. The lumber industry continues, as it did in the 18th century, to be a major factor in the economy of the area.

Land use in the county is primarily a mixture of agricultural, commercial, and residential development, with the majority of commercial development being in and around the county's incorporated municipalities.

The major routes in Beaufort County include US 17, US 264, NC 32, NC 33, NC 45, NC 92, NC 99, NC 102, NC 171, and NC 306.

Highlights

Major highlights of the 1999 Beaufort County Thoroughfare Plan are outlined below. The Thoroughfare Plan is shown in Figure 2 and the Recommended Improvements are shown in Figure 3. Projects included in the 2000-2006 Transportation Improvement Program (TIP) are shown in parenthesis.

- **US 264 (R-2601)**
  Widen roadway to a multi-lane facility from NC 32 to NC 99 in Belhaven.

- **Widen the following to provide 4-12 ft lanes:**
  BUS 264 (Main Street) in Belhaven - NC 99 to Pamlico Street
  NC 33 - Pitt County to the western Washington Urban Planning Boundary (WUPB)
  NC 33/306 - SR 1003 (Tunstall Swamp Road) to intersection of NC 33/306
  US 17 - Martin County to the northern WUPB **(R-2511)**
  US 17 - Southern WUPB to Craven County **(R-2513)**

- **Widen the following to provide 2-12 ft lanes:**
  NC 32 - Washington County to SR 1612 (Terra Ceia Road)
  NC 33 - Eastern WUPB to SR 1952 (Stilley Station Road)
  NC 92/99 - SR 1741 (Jackson Swamp Road) to SR 1718 (Yeatesville Road)
  NC 92/99 - SR 1714 (Seed Tick Neck Road) to US 264
  NC 171 - Martin County to US 17
  NC 306 - SR 1003 (Tunstall Swamp Road) to Craven County
  SR 1003 (Tunstall Swamp Road) - NC 33 to Craven County

The North Carolina Department of Transportation and Beaufort County are jointly responsible for the proposed thoroughfare improvements. Cooperation between the State and the County is of primary concern if the recommendations outlined above are to be successfully implemented. All parties have mutually adopted the thoroughfare plan, and it is the responsibility of the County to implement the plan following the guidelines set forth in Chapter 3. This plan was adopted by Beaufort County on December 7, 1999 and by the North Carolina Department of Transportation on March 3, 2000.

It is important to note that the recommended plan is based on anticipated growth of the county as indicated by past trends and future projections. Prior to construction of projects proposed herein, a more detailed study will be required to reconsider development trends and to determine specific locations and design requirements.

GEOGRAPHIC LOCATION
FOR
BEAUFORT COUNTY, NORTH CAROLINA

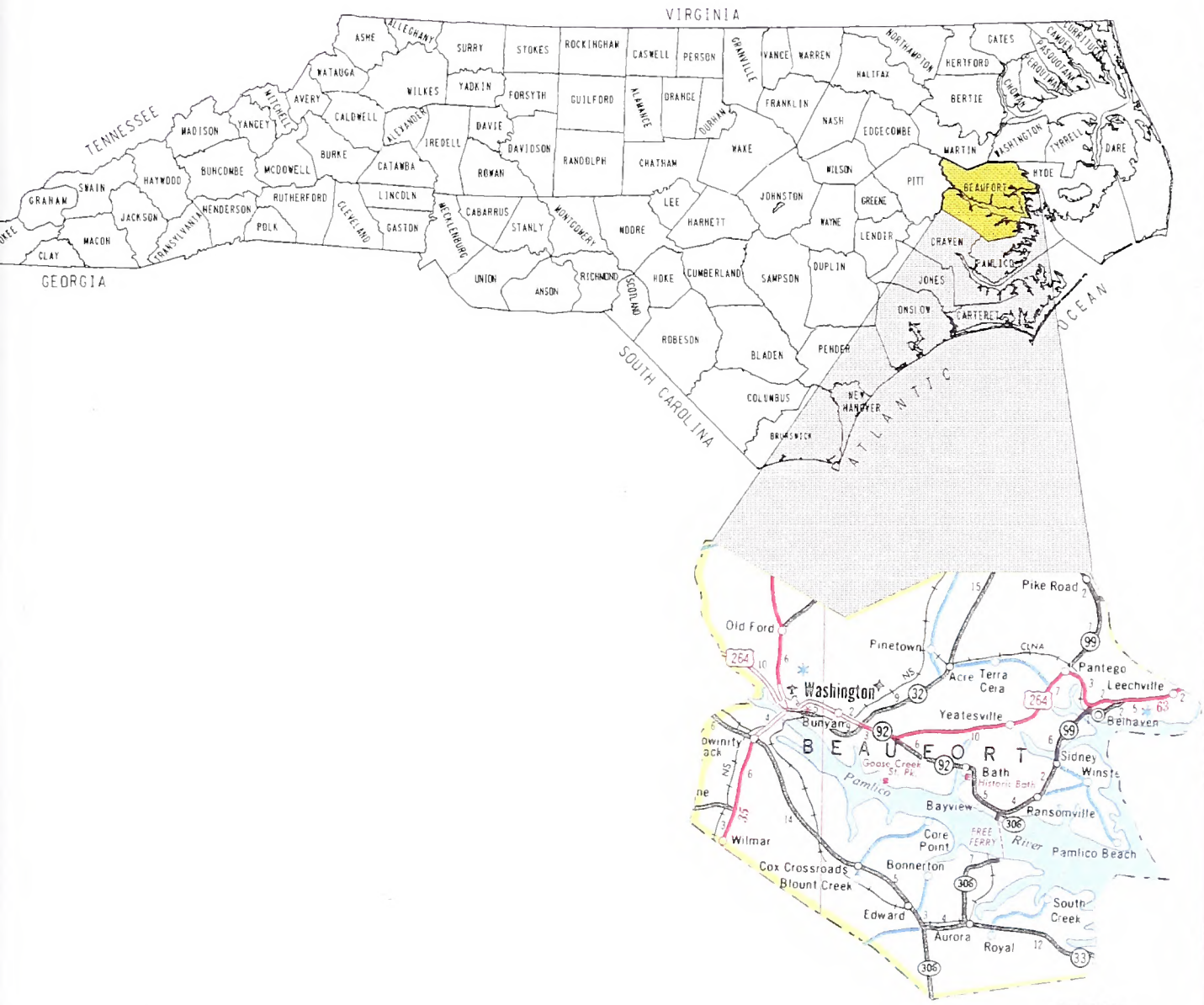


FIGURE 1

LEGEND

- INTERSTATE
- OTHER PRINCIPAL ARTERIAL
- MINOR ARTERIAL
- MAJOR COLLECTOR
- MINOR COLLECTOR
- URBAN MAJOR EXISTING
- URBAN MAJOR PROPOSED
- URBAN PLANNING BOUNDARY

ADOPTED BY:

BEAUFORT COUNTY	DECEMBER 7, 1999
RECOMMENDED BY: STATEWIDE PLANNING BRANCH	DECEMBER 23, 1999
N.C. DEPARTMENT OF TRANSPORTATION	MARCH 3, 2000

DECEMBER 7, 1999

THOROUGHFARE PLAN

BEAUFORT COUNTY

NORTH CAROLINA

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS - STATEWIDE PLANNING BRANCH

IN COOPERATION WITH THE
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

0 .5 1 2 3 4 5
SCALE IN MILES

FIGURE 2

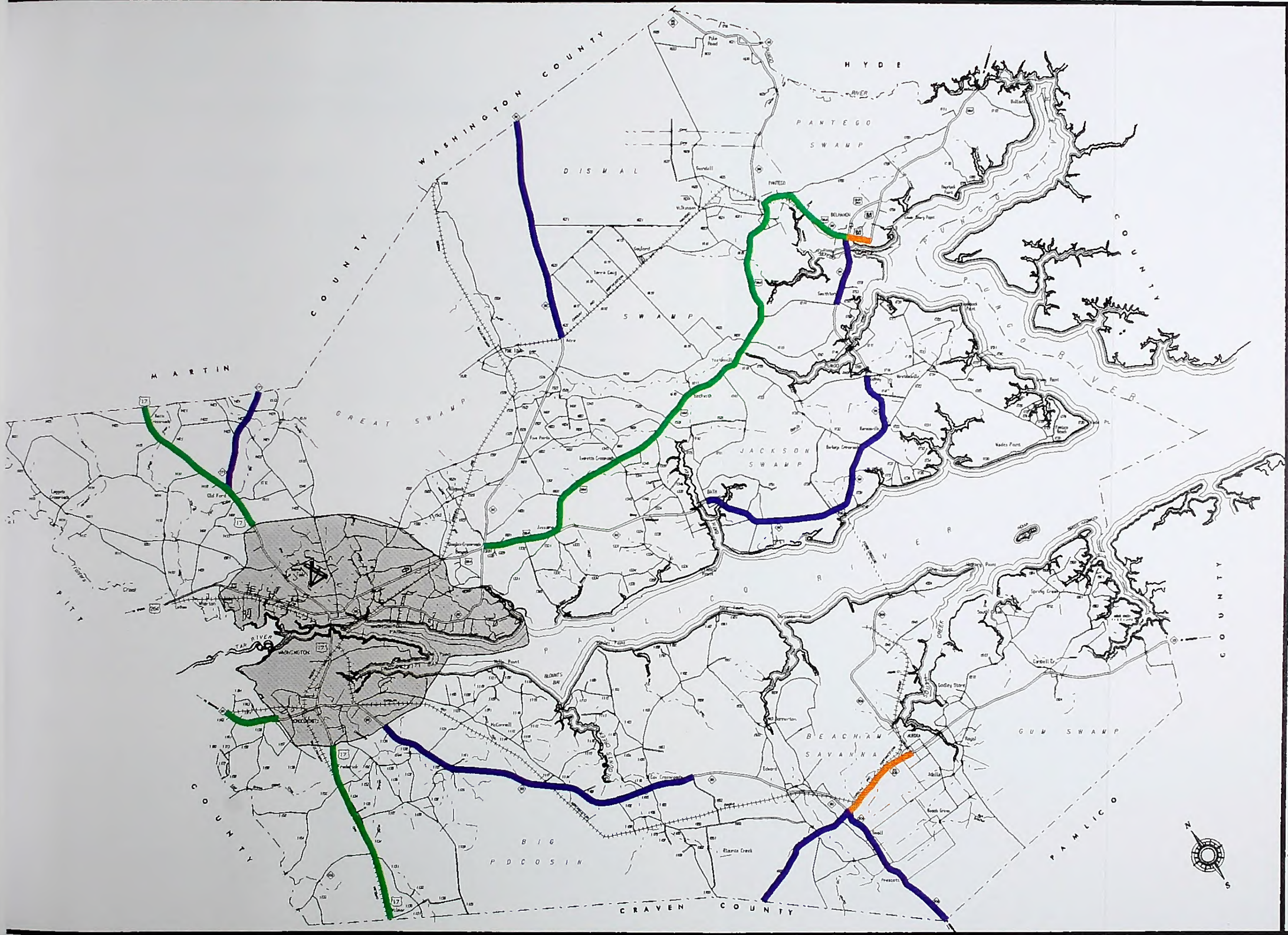

WASHINGTON COUNTY
HYDE
MARTIN
COUNTY
DISMAL
SWAMP
PANTEGO
SWAMP
PANTEGO
RIVER
PUNGO
RIVER
GREAT SWAMP
JACKSON
SWAMP
PAMLICO
RIVER
TAR RIVER
PAMLICO
BLOUNTS
BAR
BEACHAM
SAVANNA
GUM SWAMP
BIG
PDCOSIN
CRAVEN COUNTY
PAMLICO COUNTY
BEAUFORT COUNTY
NORTH CAROLINA
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS – STATEWIDE PLANNING BRANCH
U.S.DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
0 .5 1 2 3 4 5
Scale in Miles
RECOMMENDATIONS
LEGEND
WIDEN TO 12 FT LANES
4-LANE DIVIDED
4-LANE UNDIVIDED
URBAN PLANNING BOUNDARY
N
S

FIGURE 3

Chapter 2
Recommended Thoroughfare Plan

Intent of the Thoroughfare Plan

Transportation is the backbone of a region's economic vitality. Without an adequate transportation system people cannot easily reach their intended destination, goods cannot be delivered in a cost effective manner, and investors may look to invest in better served areas. Recent trends such as regional economies, "just in time" delivery, increased automobile ownership, and increased migration away from the central cities and towns are taxing existing transportation systems and requiring that more emphasis be placed on planning for our transportation future.

A thoroughfare plan study identifies existing and future deficiencies in a transportation system, as well as uncovers the need for new facilities. A county thoroughfare plan also provides a representation of the existing highway system by functional use. This use can be characterized as a part of the arterial road system, the collector road system, or the local street system. A full description of these various systems and their subsystems is given in Appendix A.

This chapter presents the thoroughfare plan recommendations. The goal of this study is to propose a transportation system that will serve the anticipated traffic and land development needs of Beaufort County. The primary objective of this plan is to reduce traffic congestion and improve safety by eliminating both existing and projected deficiencies in the transportation system.

Thoroughfare Plan Recommendations

The process of developing and evaluating thoroughfare plan recommendations involves many considerations, including the goals and objectives of the area, identified roadway deficiencies, environmental impacts, existing and anticipated land development, and travel services. Chapter 4 contains the documentation of the analysis involved in developing the recommendations for Beaufort County. A detailed description of the purpose and need for the recommended improvements that were cooperatively developed are given below. Refer to Figure 3 for a depiction of the recommendations.

US 17 - Purpose and Need

- **Project Recommendation:** It is recommended that US 17 be widened to a four-lane divided facility from Martin County to the northern Washington Urban Planning Boundary (WUPB) and from the southern WUPB to Craven County. The project limits combine for a total of approximately 22.3 miles. These projects are included in the 2000 - 2006 Transportation Improvement Program (TIP) as projects R-2511 and R-2513, respectively. They are being developed in conjunction with the US 17 Bypass of the City of Washington (TIP project R-2510), which will be a full control of access facility. However, these projects will have limited control of access. Planning is currently in progress for both projects with the purchase

of right-of-way scheduled for the fiscal year 2006. The estimated cost of the both projects is $98.8 million, as reported in the 2000 - 2006 TIP.

- **Transportation Demand:** US 17 is functionally classified as a principal arterial, primarily serving statewide and interstate travel. It is a north-south route through the eastern part of the state, connecting cities such as Wilmington, Jacksonville, New Bern, Washington, and Elizabeth City. US 17 is the only route east of I-95 that is an alternative for continuous north-south travel. In Beaufort County, US 17 serves as the primary north-south route in the western part of the county, connecting Washington and Chocowinity.

- **Roadway Capacity and Deficiencies:** The current average daily traffic (ADT) on US 17 ranges from 4,800 to 6,900 vehicles per day (vpd). For some portions of US 17 in Beaufort County, the existing traffic already exceeds the average capacity of the road, which is approximately 6,000 vpd. Additionally, US 17 carries over 10 percent trucks, which further impedes the traffic flow. The 2030 projected average daily traffic of 8,000 to 11,900 vpd will result in both sections of US 17 in Beaufort County being over capacity. US 17 is currently operating at level of service (LOS) of B to C. (Refer to Chapter 4 for an explanation of level of service). Without any improvements, the level of service by 2030 will deteriorate to C to D, if traffic growth continues as expected. The proposed cross section, a four-lane divided facility, will provide capacity of approximately 33,300 vpd and will improve the level of service to A.

- **Safety Issues:** Several sections of US 17 are ranked among Beaufort County's highest accident locations. The intersection of US 17 with SR 1152 (Barr Road) is among the highest accident intersections in the county. The accidents on this section of US 17 involve vehicles making left turns on the same roadway. If no improvements are made to US 17, the resulting increase in congestion will result in the potential for increased accident rates. However, the recommended improvements to US 17 will provide increased capacity, greater maneuverability, and more control of access, resulting in safer driving conditions.

  Due to the current lack of access control, there is a significant amount of development along several sections of US 17. Most of the development has direct driveway access to US 17, thus reducing the capacity of the facility and creating the potential for increased accident rates. This type of strip development is expected to continue to degrade the ability of the road to carry traffic safely and smoothly. Therefore, it is recommended that access control be implemented to the extent possible and that the bypasses of Washington and Chocowinity *(See 2000 City of Washington Thoroughfare Plan)* be full control of access. Bypasses of Washington and Chocowinity are more beneficial than widening existing US 17 in these areas, in part due to the disruption and high cost that would be incurred in relocating businesses along the facility. In addition, bypasses will provide improved safety by controlling driveway access points. Bypasses provide safe, efficient travel for through traffic by separating it from the local traffic that will continue to use existing US 17.

- **Social Demands and Economic Development:** The western portion of Beaufort County, which is primarily served by US 17, has the highest growth expectations in the county, specifically in Washington and Chocowinity. The US 17 corridor is identified by Beaufort County as one of their industrial growth focuses. Residential and commercial/retail development is also expected in the vicinity of US 17. The recommended improvements to US 17, in addition to accommodating the expected traffic increase, may also help spur further economic development in this area. Economic development in any portion of the county will increase the tax base, which can be used to improve public services throughout the county, thereby inducing other industries to locate in the county. Further, the goal of providing a

multilane, limited access facility in the coastal corridor currently served by US 17 is essential in realizing the full potential of the tourism industry in the coastal region of this state.

- **System Linkage:** Improving US 17 to a four-lane divided facility is part of an objective in North Carolina to provide an adequate intrastate system, as specified in State Law 136-178. This provision by the NC Legislature designates US 17 as an intrastate system highway, designed to "provide high-speed... safe, convenient, through travel for motorists". According to the criteria set forth by this legislation, all intrastate system facilities are proposed to be widened to at least four lanes. The improvements proposed for US 17, an intrastate system project, are to complete the four-laning from the Virginia Line to the South Carolina Line. Improvements to US 17 are also part of the Governor's Transportation Plan for the 21st century and the 1996 Highway Bond Program, a package designed to expedite funding to projects that are key to the economic development of the state of North Carolina.

  In addition, US 17 has been designated as part of the National Highway System (NHS), which includes roadways that serve major population centers, intermodal transportation facilities, national defense, and interstate and interregional travel. The NHS comprises only 4 percent of the road network in the nation, but carries over 40 percent of total vehicle miles of travel (vmt) and 70 percent of truck traffic. US 17 is also an integral part of the National Truck Network. Further, US 17 is included in the NHS as a Strategic Highway Network (STRAHNET) Route, providing military access to Cherry Point Marine Corps Air Station and Camp LeJeune Marine Corps Base. Further, the portion of US 17 that is concurrent with NC 58 is designated as a hurricane evacuation route. Because of the significance of US 17 on a statewide and national basis, it is imperative to insure the highway is kept in optimum operating condition.

- **Modal Interrelationships:** In Beaufort County, a section of US 17 is designated as part of NC Bike Route 2 (Mountains to Sea). The portion of US 17 included is from US 264 (5th Street) to Main Street within the City of Washington. Due to this designation, bicycle traffic should be expected along this section of US 17. The recommended improvements to US 17, including bypasses of Washington and Chocowinity, will improve safety to bicyclists by decreasing vehicular congestion on existing US 17. Coordination with the NCDOT Division of Bicycle and Pedestrian Transportation is recommended before any improvements are implemented.

- **Relationship to Other Plans:** The proposed multilane widening of US 17 extends northward into Martin County as Transportation Improvement Program Project R-2511 and is included in the 1995 Martin County Thoroughfare Plan. The proposed multilane widening also follows US 17 southward into Craven County as TIP Project R-2513 and is included in the 1992 Craven County Thoroughfare Plan. The US 17 Bypass, TIP Project R-2510, is included in the 2000 City of Washington Thoroughfare Plan.

US 264 - Purpose and Need

- **Project Recommendation:** It is recommended that US 264 be widened to a multi-lane facility from NC 32 to NC 99 near the Town of Belhaven, for a total of approximately 22.8 miles. This project is included in the 2000 - 2006 Transportation Improvement Program (TIP) as project R-2601. Planning is scheduled to begin in fiscal year 2001 with the purchase of right-of-way scheduled for the fiscal year 2004. The estimated cost of this project is $56.7 million, as reported in the 2000 - 2006 TIP. It is recommended that partial control of access be implemented for this section of roadway.

- **Transportation Demand:** The portion of US 264 from Pitt County to the western Washington Urban Planning Boundary (WUPB) is functionally classified as a principal arterial, primarily serving statewide and interstate travel. US 264, from the eastern WUPB to Hyde County is functionally classified as a minor arterial, which primarily joins cities and larger towns and provides intrastate and intercounty service at relatively high overall travel speeds with minimum interference to through traffic. It is an east-west route through the eastern part of the state, connecting cities such as Raleigh, Wilson, Greenville, and Washington. In Beaufort County, US 264 serves as the primary east-west route in the central part of the county, connecting Washington, Pantego, and Belhaven.

- **Roadway Capacity and Deficiencies:** The current average daily traffic (ADT) on US 264 ranges from 2,300 to 13,900 vehicles per day (vpd). The capacity of the existing roadway ranges from 6,000 (on 2-lane sections) to 33,300 vpd (on four-lane sections). Additionally, US 264 carries over 10 percent trucks, which further impedes the traffic flow. The 2030 projected average daily traffic of 3,100 to 25,300 vpd will result in sections of US 264 in Beaufort County being over capacity. US 264 is currently operating at level of service (LOS) of A to B. (Refer to Chapter 4 for an explanation of level of service). Without any improvements, the level of service by 2030 will range from C to D, if traffic growth continues as expected. The proposed cross section, a four-lane divided facility, will increase the capacity to approximately 33,300 vpd and will improve the level of service to A.

- **Safety Issues:** Several sections of US 264 are ranked among Beaufort County's highest accident locations. The intersection of US 264 with SR 1409 (Wharton Station Road) is among the highest accident intersections in the county. The accidents on this section of US 264 are due to angle accidents and accidents involving left turns of the same roadway. If no improvements are made to US 264, the resulting increase in congestion will result in the potential for increased accident rates. However, the recommended improvements to US 264 will provide increased capacity, greater maneuverability, and more control of access, resulting in safer driving conditions.

  Due to the current lack of access control, there is a significant amount of development along several sections of US 264. Most of the development has direct driveway access to US 264, thus reducing the capacity of the facility and creating the potential for increased accident rates. This type of strip development is expected to continue to degrade the ability of the road to carry traffic safely and smoothly. Therefore, it is recommended that access control be implemented to the extent possible and that the bypass of Washington *(See 2000 City of Washington Thoroughfare Plan)* provide some control of access. A bypass of Washington is more beneficial than widening existing US 264 in these areas, in part due to the disruption and high cost that would be incurred in relocating businesses along the facility. In addition, a bypass will provide improved safety by controlling driveway access points. Bypasses provide safe, efficient travel for through traffic by separating it from the local traffic that will continue to use the existing US 264.

- **Social Demands and Economic Development:** Beaufort County identifies the US 264 corridor as one of their industrial growth focuses. Residential and commercial/retail development is also expected in the vicinity of US 264. The recommended improvements to US 264, in addition to accommodating the expected traffic increase, may also help to spur further economic development in this area. Economic development in any portion of the county will increase the tax base, which can be used to improve public services throughout the county, thereby inducing other industries to locate in the county. Further, the goal of providing

a multilane facility in the coastal corridor currently served by US 264 is essential in realizing the full potential of the tourism industry in the coastal region of this state.

- **System Linkage:** Improving US 264 to a multi-lane facility is imperative because of its significance in serving intercounty travel and providing a connection between cities and larger towns. For the very same reason, it is important that the highway is kept in good operating condition. Further, US 264 plays a valuable role in providing continuous east-west travel across the county.

- **Modal Interrelationships:** In Beaufort County, a section of US 264 is designated as part of NC Bike Route 2 (Mountains to Sea). The portion of US 264 included is from SR 1403 (Clark's Neck Road) to US 17 (Bridge Street) within the City of Washington. Due to this designation, bicycle traffic should be expected along this section of US 264. The recommended improvements to US 264, including a bypass of Washington, will improve safety to bicyclists by decreasing vehicular congestion on existing US 264. Coordination with the NCDOT Division of Bicycle and Pedestrian Transportation is recommended before any improvements are implemented.

- **Relationship to Other Plans:** The US 264 Bypass, TIP Project R-3422, is included in the 2000 City of Washington Thoroughfare Plan and is currently classified as an unfunded project.

NC 33 - Purpose and Need

- **Project Recommendation:** It is recommended that two sections of NC 33 be widened to a four-lane divided facility. The project limits for these projects are from Pitt County to the western WUPB and from SR 1003 (Tunstall Swamp Road) to the intersection of NC 33/306, for a combined total length of 5.4 miles.

- **Transportation Demand:** The portion of NC 33 from Pitt County to the intersection of NC 33/306 in Aurora is functionally classified as a major collector, which primarily serves intracounty travel and traffic generators in addition to providing access to the arterial system. NC 33, from the intersection on NC 33/306 in Aurora to Pamlico County is functionally classified as a minor collector, which primarily serves small local communities and traffic generators providing access to the major collector system. NC 33 runs west-northwest through the central portion of the state from Hobucken, North Carolina near the Pamlico Sound to NC 4/48, near Whitakers, North Carolina. In Beaufort County, NC 33 serves as an east-west route in the southern part of the County, from Pitt County to Pamlico County.

- **Roadway Capacity and Deficiencies:** The current average daily traffic on NC 33 ranges from 300 to 7,600 vpd. The capacity of the existing roadway ranges from 9,100 to 9,800 vpd. The projected average daily traffic of 400 to13,700 vpd will result in portions of NC 33 in Beaufort County being over capacity by the year 2030. Portions of NC 33 are currently operating at level of service (LOS) C and, without any improvements, will be at LOS D by the year 2030, based on traffic growth projections. The proposed cross section, a four-lane divided facility, will provide a capacity of approximately 34,000 vpd and will improve the level of service to A.

- **Safety Issues:** If no improvements are made to NC 33, increasing traffic congestion will result in the potential for increased accident rates. However, the recommended improvements to NC 33 will provide increased capacity, greater maneuverability, and more control of access, resulting in safer driving conditions.

- **Social Demands and Economic Development:** NC 33 carries traffic east-west through the southern part of Beaufort County. Development is currently rural along the route, with the exception of the portion within the limits of the Town of Chocowinity. The anticipated future development in this area is moderate. However, traffic will continue to increase, especially through traffic, as well as some local traffic due to the construction of the US 17 Bypass, the Cypress Landing Residential development, and a new educational facility on SR 1127 (Possum Track Road) in the vicinity. The recommended improvements to NC 33, in addition to accommodating the expected traffic increase, may also help to spur economic development.

- **System Linkage:** Because of the significance of NC 33 in serving intracounty travel, it is important that the highway is kept in good operating condition. Further, NC 33 plays an extremely crucial role in providing continuous east-west travel across the county.

- **Relationship to Other Plans:** The multilane widening of NC 33 also impacts the Towns of Chocowinity and Aurora within Beaufort County. Recommendations made in the City of Washington Thoroughfare Plan, which is currently being updated, complement the Beaufort County Thoroughfare Plan. The Pitt County Thoroughfare Plan was last updated in 1993 and includes widening NC 33 to 2-12 ft. lanes up to the Beaufort County line.

US 264 BUSINESS - Purpose and Need

- **Project Recommendation:** It is recommended that a section of US 264 BUS (Main Street) in Belhaven be widened to a four-lane divided facility. The project limits for this project are from NC 99 to Pamlico Street, for a total length of 1.6 miles. It is recommended that partial control of access be implemented for this section of roadway.

- **Transportation Demand:** US 264 BUS is functionally classified as a major collector, which primarily serves intracounty travel and traffic generators in addition to providing access to the arterial system. This route serves as a business alternative to US 264 in the Town of Belhaven, located in the northeastern part of the County.

- **Roadway Capacity and Deficiencies:** The current average daily traffic on this section of US 264 BUS is 6,100 vpd. The capacity of the existing roadway is 6,100 vpd. The projected average daily traffic of 10,100 vpd will result in this portion of US 264 BUS in Beaufort County being over capacity by the year 2030. This section of US 264 BUS is currently operating at level of service (LOS) C and, without any improvements, will be at LOS D by the year 2030, based on traffic growth projections. The proposed cross section, a four-lane divided facility, will provide capacity of approximately 33,300 vpd and will improve the level of service to A.

- **Safety Issues:** If no improvements are made to US 264 BUS, increasing traffic congestion will result in the potential for increased accident rates. However, the recommended improvements to US 264 BUS will provide increased capacity, greater maneuverability, and more control of access, resulting in safer driving conditions.

- **Social Demands and Economic Development:** US 264 BUS carries traffic east-northeast through the Town of Belhaven, located in the northeastern part of Beaufort County. Since much of the outlying area is rural, this route is important for access to shopping and business for both Belhaven residents and outlying communities. The anticipated future development in this area is light. However, traffic will continue to increase, especially through traffic, as well

as some local traffic due to the four-laning of US 264 in the vicinity. The recommended improvements to US 264 BUS, in addition to accommodating the expected traffic increase, may also help to spur economic development.

- **System Linkage:** Because of the significance of US 264 BUS in serving intracounty travel, it is important that the highway is kept in good operating condition. Further, US 264 BUS plays an invaluable role serving as a business alternative to US 264 in the Town of Belhaven.

- **Relationship to Other Plans:** The multilane widening of US 264 BUS also impacts the Town of Belhaven within Beaufort County. The Town of Belhaven Thoroughfare Plan was last updated in 1992 without any improvements to US 264 BUS.

Widening Projects

The following projects are recommended to be widened to improve safety and capacity. Each of the sections of roadway listed below currently has lane widths less than 12 feet and, based on the volume of traffic on the road, are recommended to be widened. Before any roadway improvements are made, especially to roads that are part of the NC Bike Route system, the NCDOT Division of Bicycle and Pedestrian Transportation should be consulted on the most appropriate cross section.

- **NC 32:** It is recommended that NC 32 be widened from two 10-foot lanes to two 12-foot lanes from Washington County to SR 1612 (Terra Ceia Road).

- **NC 33:** It is recommended that NC 33 be widened from two 11-foot lanes to two 12-foot lanes from the eastern Washington Urban Planning Boundary (WUPB) to SR 1952 (Stilley Station Road).

- **NC 92/99*:** It is recommended that NC 92/99 be widened from the existing two 9 and 11-foot lanes to two 12-foot lanes from SR 1741 (Jackson Swamp Road) to SR 1718 (Yeatesville Road) and from SR 1714 (Seed Tick Neck Road) to US 264.

- **NC 171:** It is recommended that NC 171 be widened from two 10-foot lanes to two 12-foot lanes from Martin County to US 17.

- **NC 306:** It is recommended that NC 306 be widened from two 9-foot lanes to two 12-foot lanes from SR 1003 (Tunstall Swamp Road) to Craven County.

- **SR 1003 (Tunstall Swamp Road)*:** It is recommended that SR 1003 be widened from two 9-foot lanes to two 12-foot lanes from NC 33 to Craven County.

** Denotes facilities on the NC Bike Route system*

Bicycle Routes

Beaufort County has two designated bicycle routes: the Mountains to Sea, NC Bike Route 2, and the Ports of Call, NC Bike Route 3. Because of this designation, these facilities may be subjected to more bicycle traffic than other facilities of similar design. Due to the shared, or multi-modal, use of these facilities, it is recommended that sub-standard sections be widened to a standard cross section for bicycles (Appendix C, cross section O) as funding permits. These improvements will enhance safety and the functional design of the facility. The bicycle routes, described below, are shown in Figure 4.

Mountains to Sea **(NC Bike Route 2)**

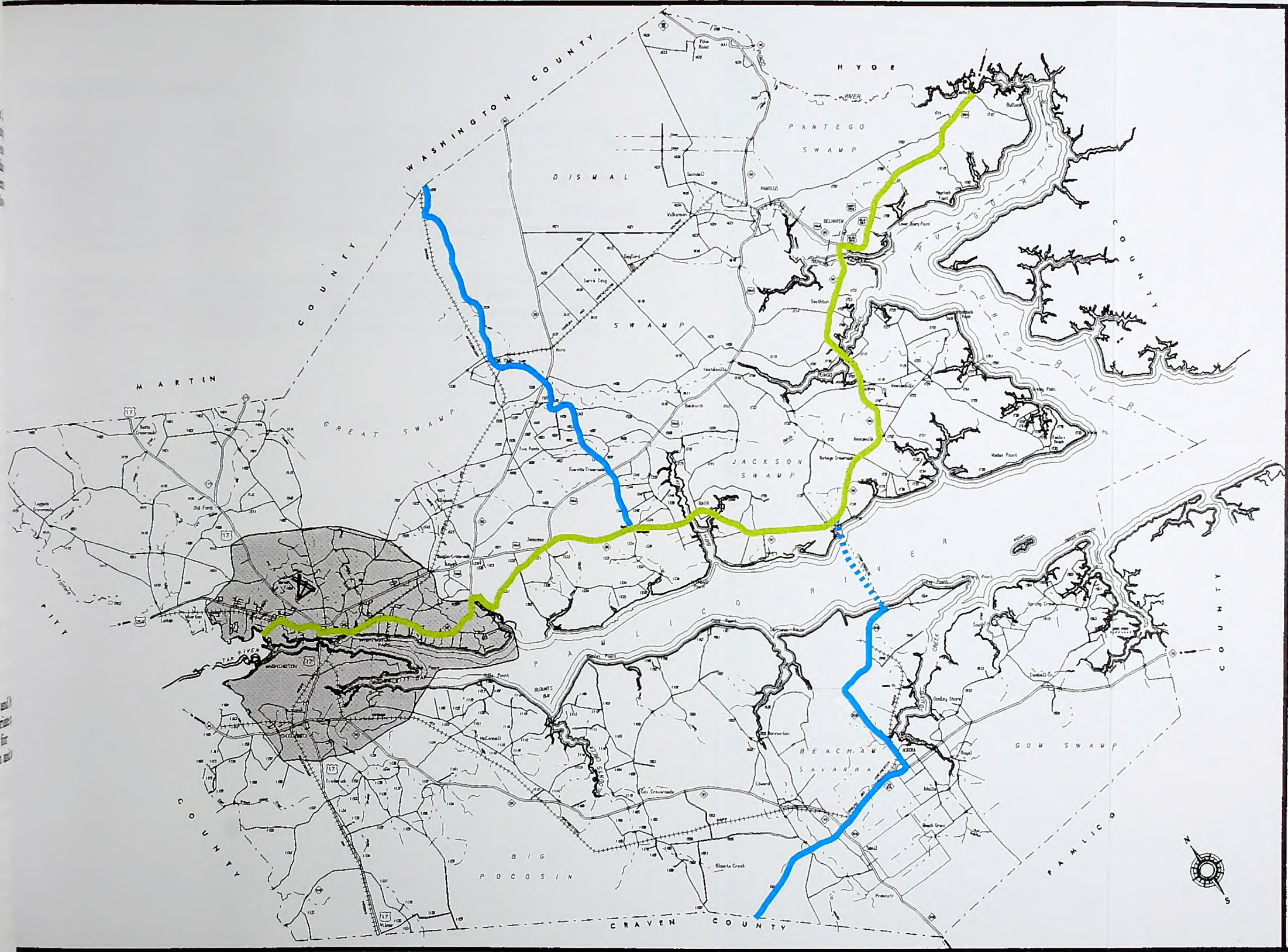
SR 1403 (Clarks Neck Road): from Pitt County to US 264
US 264: from SR 1403 to US 17 (Bridge Street)
US 17: from US 264 (5th Street) to Main Street
Main Street: from Bridge Street to Stewart Parkway
Stewart Parkway: Entire Street
Main Street: from Stewart Parkway to 2nd Street
2nd Street: from Bridge Street to SR 1352 (Hudnell Street)
NC 32: from SR 1352 to SR 1331
SR 1331 (Harvey Road 1): from NC 32 to NC 92
NC 92/99: from SR 1331 to US 264/NC 99
US 264 BUS: from NC 99 to BYP 264
US 264: from BYP 264 to Hyde County

Ports of Call **(NC Bike Route 3)**

SR 1003 (Tunstall Swamp Road): from Craven County to NC 33
NC 33/306: from SR 1003 to NC 33/306 Split
NC 306: from NC 33 take ferry across Pamlico River
NC 92: from NC 306 to SR 1343
SR 1343 (White Post Road): from NC 92 to SR 1528
SR 1528 (Boyd Road): from SR 1343 to SR 1508
SR 1508 (Long Ridge Road): from SR 1528 to Washington County

When considering the widening of these facilities, the NCDOT Division of Bicycle and Pedestrian Transportation should be consulted. This division can recommend the most appropriate cross section for the widening, in addition to providing assistance in identifying the need for improvements based on present and future bicycle traffic. For further consideration and assistance, the coordinator of this division can be contacted at the address below.

NC Department of Transportation
Division of Bicycle and Pedestrian Transportation
P.O. Box 25201
Raleigh, NC 27611



BICYCLE ROUTES FOR BEAUFORT COUNTY

LEGEND

- NC BIKE ROUTE #2 MOUNTAINS TO SEA
- NC BIKE ROUTE #3 PORTS OF CALL
- URBAN PLANNING BOUNDARY

BEAUFORT COUNTY

NORTH CAROLINA

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS - STATEWIDE PLANNING BRANCH

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

0 1 2 3 4 5
Scale in Miles

FIGURE 4

Public Involvement

Based on a request from the Beaufort County Board of Commissioners in October of 1996, the study to develop a thoroughfare plan for Beaufort County was officially started in March of 1997. NCDOT officials met with the Beaufort County Manager, the Beaufort County Planning Director, and the Planning Director for the City of Washington on March 18, 1997. This meeting was held to present information on the thoroughfare planning process and to gather input on the transportation needs of the County. On November 17, 1999, NCDOT representatives, the Beaufort County Manager and the Beaufort County Planner met to develop preliminary recommendations for the thoroughfare plan.

The proposed thoroughfare plan was presented to the Beaufort County Commissioners at the December 7, 1999 County Commissioners' meeting, with members of the public present. After a public hearing, the County Commissioners adopted the Beaufort County Thoroughfare Plan. The thoroughfare plan was adopted by the North Carolina Board of Transportation March 5, 2000.

Chapter 3
Implementation of the Thoroughfare Plan

Once the thoroughfare plan has been developed and adopted, implementation is one of the most important aspects of the transportation plan. Unless implementation is an integral part of this process, the effort and expense associated with developing the plan will be lost. There are several tools available for use by the County to assist in the implementation of the thoroughfare plan. They are described in detail in this chapter.

State-County Adoption of the Thoroughfare Plan

Beaufort County and the North Carolina Department of Transportation (NCDOT) have mutually approved the thoroughfare plan shown in Figure 2. The mutually adopted plan now serves as a guide for the NCDOT in the development of the transportation system for the county. The approval of this plan by the County also enables standard road regulations and land use controls to be used effectively in the implementation of this plan.

Subdivision Controls

Subdivision regulations require every subdivider to submit to the County Planning Board a plan of any proposed subdivision. It also requires that subdivisions be constructed to meet certain standards. Through this process, it is possible to require the subdivision streets to conform to the thoroughfare plan and to reserve or protect necessary right-of-way for proposed roads. The construction of subdivision streets to adequate standards reduces maintenance costs and simplifies the transfer of streets to the State Highway System. Appendix D outlines the recommended subdivision design standards as they pertain to road construction.

Land Use Controls

Land use regulations are an important tool in that they regulate future land development and minimize undesirable development along roadways. The land use regulatory system can improve highway safety by requiring sufficient setbacks to provide for adequate sight distances and by requiring off-street parking.

Development Reviews

The District Engineer's office and the Traffic Engineering Branch of NCDOT review driveway access to any state-maintained road. In addition, any development expected to generate large volumes of traffic (e.g., shopping centers, fast food restaurants, or large industries) should be comprehensively studied by the Traffic Engineering Branch, the Project Development and Environmental Analysis Branch, and/or the Roadway Design Unit of NCDOT. If reviewed at an

early stage, it is often possible to significantly improve the development's accessibility while preserving the integrity of the thoroughfare plan.

Funding Sources

County Construction Account

The County Construction Account is used to allocate funding to pave unimproved roads, widen roadways, stabilize dirt roads, make minor alignment improvements, and even construct short connectors when appropriate. These improvements are implemented on a priority basis that is developed through the NCDOT Division Offices. The appropriate Division Engineer's Office should be contacted for more information on the County Construction Account. The office address for Division Two, which includes Beaufort County, is given below. For more specific contact information for the division office or any other NCDOT personnel, the Customer Service Office can be contacted toll free at 1-877-DOT-4YOU or by visiting the website at www.dot.state.nc.us.

Division Two Engineer's Office
N.C. Department of Transportation
P.O. Box 1587
Greenville, NC 27835
(252) 830-3490

Transportation Improvement Program

North Carolina's Transportation Improvement Program (TIP) is a document that lists all major transportation projects, and their funding sources, planned by the NCDOT for a seven-year period. Every two years, when the TIP is updated, completed projects are removed, programmed projects are advanced, and new projects are added. In addition to highway construction and widening, TIP funds are available for bridge replacement, highway safety projects, enhancement projects, environmental mitigation, railroad crossings, bicycle facilities, and public transportation.

During biannual TIP public hearings, municipalities, local citizens groups, and other interested parties request projects to be included in the TIP. The group requesting a particular project(s) should submit to the NCDOT Board of Transportation Member from the county's respective division the following: a letter with a prioritized summary of requested projects, TIP candidate project request forms, and project location maps with a description of each project. Refer to Appendix F for an example of a TIP project request packet. The Board of Transportation reviews all of the project requests from each area of the state. Based on the technical feasibility, need, and available funding, the board decides which projects will be included in the TIP.

Industrial Access Funds

If certain economic conditions are met, Industrial Access Funds are available for construction of access roads for industries that plan to develop property that does not have access to any state-maintained road. The NCDOT Secondary Roads Office should be contacted for information on Industrial Access Funds.

Small Urban Funds

Small Urban Funds are annual discretionary funds that are distributed to municipalities for qualifying projects. A given municipality may receive funding for multiple projects, but there is a maximum of one million dollars per year per division. Requests for Small Urban Fund assistance should be directed to the Division Engineer.

The North Carolina Highway Trust Fund Law

The Highway Trust Fund Law was established in 1989 as a plan with four major goals for North Carolina's roads and highways. These goals are:

1. To complete the remaining 1,716 miles of four lane construction on the 3,600 mile North Carolina Intrastate System.

2. To construct a multilane connector in Asheville and portions of multilane loops in Charlotte, Durham, Greensboro, Raleigh, Wilmington, and Winston-Salem.

3. To supplement the secondary roads appropriation in order to pave, by 1999, 10,000 miles of unpaved secondary roads carrying 50 or more vehicles per day, and all other unpaved secondary roads by 2006.

4. To supplement the Powell Bill Program.

A portion of this bill, which will benefit Beaufort County over the thirty-year planning period, is the paving of most, if not all, of its unpaved roads on the state-maintained system. The Program Development Branch of NCDOT should be contacted for information on the Highway Trust Fund Law.

Implementation Recommendations

The following table gives recommendations for the most suitable funding sources and methods of implementation for the major project proposals of the Beaufort County Thoroughfare Plan.

Table 1

Funding Sources and Recommended Methods of Implementation

Projects	Funding Sources				Methods of Implementation			
	Local Funds	TIP Funds	Indust. Access	Small Urban	T-fare Plan	Subdiv. Ord.	Zoning Ord.	Develop. Review
US 17		X			X			X
US 264		X			X			X
NC33		X			X			X
BUS 264		X			X			X

Construction Priorities and Cost Estimates

Construction priorities will vary depending on what criterion is considered and what weight is attached to the various criteria. Most people agree that improvements to the major thoroughfare system and major traffic routes are more important than minor thoroughfares where traffic volumes are lower. For inclusion in the North Carolina Transportation Improvement Program, a project must show favorable benefits relative to costs and should not be prohibitively disruptive to the environment. For the major project proposals of the Beaufort County Thoroughfare Plan, cost estimates have been developed with respect to user benefits. Additionally, probabilities have been estimated for stimulation of economic development and environmental impact.

Offsetting the benefits derived from any project is the cost of construction. A new facility, despite high projected benefits, might prove to be unjustified due to excessive right-of-way and construction costs. Construction costs are estimated by comparison to average statewide construction costs per mile for similar project types. Anticipated right-of-way costs are based on average property costs per acre for the project area. Table 2 gives the breakdown of the total project cost into construction and right-of-way costs for the major project proposals of the Beaufort County Thoroughfare Plan. Refer to the Transportation Improvement Program for cost estimates of US 17 (Projects R-2511 & R-2513) and US 264 (Project R-2601).

Table 2

Project Cost Estimates for Major Projects

Projects	Construction Cost	Right-of-Way Cost	Total Cost
US 264*	72,677,000	13,831,000	86,508,000
US 17*	64,848,000	32,674,000	97,522,000
NC 33	13,027,000	976,000	14,003,000
BUS 264	3,577,000	361,000	3,938,000

*Cost estimates taken from the 2000-2006 Transportation Improvement Program. US 17 projects are designated as R-2511 and R-2513. US 264 project is designated as R-2601.

Reduced user cost should result from any roadway improvement, from simple widening to construction of a new roadway. Roadway improvements should also relieve congested or unsafe conditions. Comparisons of the existing and the proposed facilities are made in terms of vehicle operating costs, travel time costs, and accident costs. These user benefits are computed as total dollar savings, over the thirty-year design period, using data such as project length, base year and design year traffic volumes, traffic speed, type of facility, and volume to capacity ratio.

The impact of a project on economic development potential is shown as the probability that it will stimulate the economic development of an area by providing access to developable land and by reducing transportation costs. This is a subjective estimate based on knowledge of the proposed project, local development characteristics, and land development potential. The probability is rated on a scale from 0 (representing no development potential) to 1.00 (representing excellent development potential).

Environmental impact analysis considers the effect of a project on the physical, social/cultural, and economic environment. Listed below are thirteen items considered when evaluating the impacts on the environment.

- air quality
- water resources
- soils and geology
- wildlife
- vegetation
- neighborhoods
- noise
- educational facilities
- churches
- parks and recreational facilities
- historic sites and landmarks
- public health and safety
- aesthetics

Environmental impact analysis also uses a probability rating from 0 (representing no benefit to the environment) to 1.00 (representing a positive impact to the environment.) Negative values are assigned to probabilities to indicate negative impact. The summation of both positive and negative impact probabilities with respect to these factors provides a measure of the relative environmental impact of a project. Table 3 shows the probability scale used in the analysis. This table can be used as a guideline for interpreting the "Economic Development" and "Environmental Impact" values given in Table 4. Benefit evaluations for US 17 Projects (Project R-2511 & R-2513) and US 264 (Project R-2601) are not given due to their status as funded projects in the TIP.

Table 3

Probability Estimation Guide

Subjective Evaluation	Impact Probability
Excellent - very substantial	1.00
Very good - substantial	0.75
Good - considerable	0.50
Fair - some	0.25
Poor - none	0.00

Table 4

Benefits Evaluation for Major Projects

Projects	Benefits (millions)	Cost (millions)	Length (miles)	Benefits/ Mile	Economic Development	Environmental Impact
NC 33	127.0	14.0	5.4	23.5	0.63	0.15
BUS 264	68.4	3.94	1.6	42.8	0.75	0.15

Chapter 4
Analysis of Beaufort County's Roadway System

This chapter presents an analysis of the ability of the existing roadway system to serve the area's travel desires. Emphasis is placed not only on detecting the deficiencies, but also on understanding their cause. Travel deficiencies may be localized and the result of substandard highway design, inadequate pavement width, or intersection controls. Alternately, the underlying problem may be a system deficiency such as a need for a bypass, loop facility, construction of missing links, or additional radials.

Analysis of the roadway system involves examination of the existing travel patterns and identification of existing deficiencies. Roadway capacity and safety analyses are also essential in evaluating the existing transportation system. After a picture of the existing travel conditions has been developed, factors that will impact the future transportation system must be analyzed. These factors include projected population growth, economic development potential, and land use trends. This information is used to determine anticipated future deficiencies in the transportation system.

Current Transportation Plans for Beaufort County

Thoroughfare Plans

A thoroughfare plan is a tool to aid officials in the development of an appropriate transportation system. It is important that the communities within a county and county officials cooperate in the development of their transportation system. Thoroughfare plan development and implementation, jointly undertaken, will help ensure the development of an efficient system for travel throughout the county. The following thoroughfare planning studies have previously been done for Beaufort County:

1. Washington – Washington Park, plan adopted in 1979*
2. Belhaven, plan adopted in 1992

* Thoroughfare plan currently under study

Transportation Improvement Program Projects

The Transportation Improvement Program (TIP) is a seven-year project planning document that lists the major transportation improvement projects planned by the North Carolina Department of Transportation (NCDOT). In addition to roadway projects, the TIP includes funding for bridge replacement, highway safety projects, enhancement projects, environmental mitigation, railroad crossings, bicycle facilities, and public transportation. Listed below are projects identified in the 2000 – 2006 TIP for Beaufort County.

1. **US 17**

   R-2510: Washington Bypass. Four-lane divided freeway on new location.

   R-2511: Washington Bypass to multi-lanes south of Williamston. Widen roadway to a multi-lane facility.

   R-2513: SR 1438 (Spruill Town Road) to Washington Bypass. Widen to a multi-lane facility.

2. **US 264**

   R-2601: NC 32 to NC 99 at Belhaven. Widen roadway to a multi-lane facility.

   *R-3422: Washington Northern Bypass, SR 1409 west of Washington to SR 1600 east of Washington. Construct a four-lane divided facility on new location.

3. **NC 32**

   R-1014: SR 1309 to SR 1300. Widen roadway to a multi-lane facility.

4. **SR 1501**

   *U-2723: SR 1306 (12th Street) to SR 1507. Widen to five lanes with curb and gutter.

5. **Bridge Projects**

   B-4018: Broad Creek. NC 32 – Replace bridge #104.

   B-4019: Runyon Creek. NC 32 – Replace bridge #103.

   B-3478: Pungo River Canal. NC 45 – Replace bridge #30.

   B-3611: Pantego Creek. NC 99 – Replace bridge #77.

   B-3809: Pungo Creek. NC 99 – Replace bridge #64.

   B-2806: Cuckold's Creek. US 264 & NC 99 – Replace bridge #63.

   B-4020: Tranters Creek. SR 1403 & SR 1567 – Replace bridge #8.

   B-4021: Latham Creek. SR 1410 – Replace bridge #84.

   B-4022: Tranters Creek. SR 1414 & SR 1556 – Replace bridge #90.

   B-4023: Tranters Creek. SR 1416 & 1551 – Replace bridge #93.

   B-3810: Big Swamp. SR 1514 – Replace bridge #272.

   B-4024: Canal. SR 1626 – Replace bridge #136.

   B-4025: Creek. SR 1925 – Replace bridge #39.

   *X-4: Pamlico River. NC 306 – Construct bridge and approaches across river.

* Project listed in TIP, but no funds have been assigned.

Existing Travel Patterns and Deficiencies

Traffic Demand

For the purposes of a thoroughfare plan study, roads that are functionally classified are principally the ones studied. Appendix A provides an explanation of functional classification and Figure A-2 depicts Beaufort County Functional Classification. Travel demand on these facilities is measured in the form of average daily traffic counts. Traffic counts are periodically taken by the NCDOT throughout the state, including several locations in Beaufort County. The 1997 average daily traffic (ADT) for Beaufort County's functionally classified roads is shown in Figure 6 and listed in Appendix B, Table B-1.

Width and Alignment Deficiencies

NCDOT's roadway design standards establish criteria for minimum pavement widths, dependent on the type of facility, the design speed, and the current and design year ADT. These criteria call for 12-foot lanes for all highways with design speeds greater than 50 miles per hour (mph) and design year ADT greater than 2,000 vehicles per day (vpd). However, roads with lower speeds and ADT are designed with lane widths as narrow as 10 feet. In addition to criteria for designing new facilities, there are standards for minimum tolerable lane widths on existing roads. These minimum tolerable lane widths are summarized below in Table 5.

Table 5

Minimum Tolerable Lane Widths

Average Daily Traffic (vpd)	Principle Arterials (ft)	Minor Arterials (ft)	Collectors (ft)
Over 2000	11	11	11
400 - 2000	-	10	10
100 - 400	-	10	9
Below 100	-	-	9

There are a number of roads in Beaufort County that have substandard widths. Due to the substantial cost of upgrading all secondary roads to standard 12-foot lanes, narrower widths may have to be tolerated until sufficient funds are available for improvements. The roads identified as part of the Beaufort County's Thoroughfare Plan study that have substandard widths and, based on the volume of traffic on the road, are recommended to be widened to 12-foot lanes are shown in Figure 9 and are listed below.

- NC 32: Washington County to SR 1612
- NC 33: Eastern Washington Urban Planning Boundary (WUPB) to SR 1952
- NC 92/99: SR 1741 to SR 1718 and from SR 1714 to US 264
- NC 171: Martin County to US 17
- NC 306: SR 1003 to Craven County
- SR 1003: NC 33 to Craven County

Capacity Analysis of the Existing System

The adequacy of the existing roadway system is evaluated by comparison of traffic volumes to the ability of the roads to move traffic freely at a desirable speed. The ability of a facility to move traffic freely, safely, and efficiently with minimum delay is controlled primarily by the type and spacing of traffic control measures. Thus, the ability of a road to move traffic can be increased by restricting parking and turning movements, using proper sign and signal devices, and by applying other traffic engineering strategies.

Capacity is the maximum number of vehicles which have a "reasonable expectation" of passing over a given section of roadway, during a given time period under prevailing roadway and traffic conditions. Roadway capacities and 1997 average daily traffic for facilities in Beaufort County are shown in Figure 6 and listed in Appendix B, Table B-1. Currently, the following facility in Beaufort County is over capacity:

- US 17: From SR 1418 to the northern Washington Urban Planning Boundary (WUPB) and from the southern WUPB to NC 102

The relationship of traffic volumes to the capacity of the road determines the level of service (LOS) provided. Six levels of service have been defined, with letter designations from A to F. LOS A represents the best operating conditions and LOS F represents the worst.

The definitions of levels of service are general and conceptual in nature. Levels of service for interrupted flow, or signalized, facilities vary widely in terms of both the users perception of service quality and the operational variables used to describe them. The 1995 Highway Capacity Manual contains more detailed descriptions of the levels of service as defined for each facility type. The six levels of service, whose definitions follow, are illustrated in Figure 5.

Levels of Service

LOS A

Describes primarily free flow conditions. Motorists experience high levels of physical and psychological comfort. The effects of minor incidents of breakdown are easily absorbed. Even at the maximum density, the average spacing between vehicles is about 528 feet, or 26 car lengths.

LOS B

Represents reasonably free flow conditions. The ability to maneuver within the traffic stream is only slightly restricted. The lowest average spacing between vehicles is about 330 feet, or 18 car lengths.

LOS C

Provides for stable operations, but flows approach the range in which small increases will cause substantial deterioration in service. Freedom to maneuver is noticeably restricted. Minor incidents may still be absorbed, but the local decline in service will be great. Queues may be expected to form behind any significant blockage. Minimum average spacings are in the range of 220 feet, or 11 car lengths.

LOS D

Borders on unstable flow. Density begins to deteriorate somewhat more quickly with increasing flow. Small increases in flow can cause substantial deterioration in service. Freedom to maneuver is severely limited, and drivers experience drastically reduced comfort levels. Minor incidents can be expected to create substantial queuing. At the limit, vehicles are spaced at about 165 feet, or 9 car lengths.

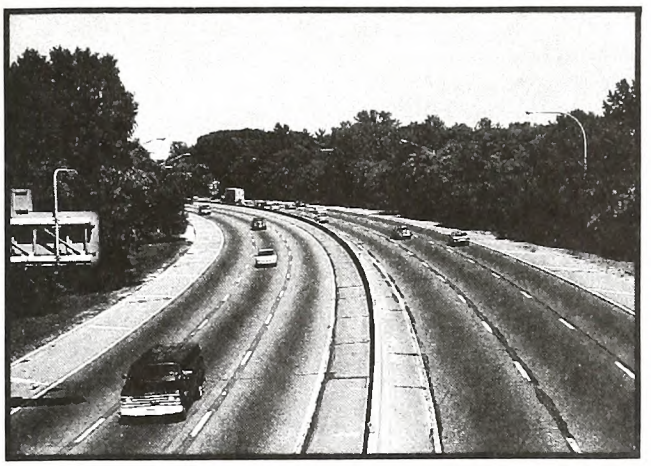
LOS E

Describes operation at capacity. Operations at this level are extremely unstable, because there are virtually no usable gaps in the traffic stream. Any disruption to the traffic stream, such as a vehicle entering from a ramp, or changing lanes, requires the following vehicles to give way to admit the vehicle. This establishes a disruption wave that propagates through the upstream traffic flow. At capacity, the traffic stream has no ability to dissipate any disruption. Any incident can be expected to produce a serious breakdown with extensive queuing. Vehicles are spaced at approximately 6 car lengths, leaving little room to maneuver.

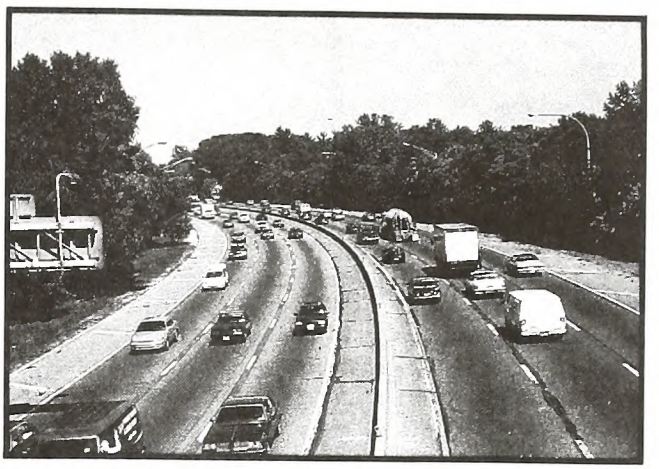
LOS F

Describes forced or breakdown flow. Such conditions generally exist within queues forming behind breakdown points.

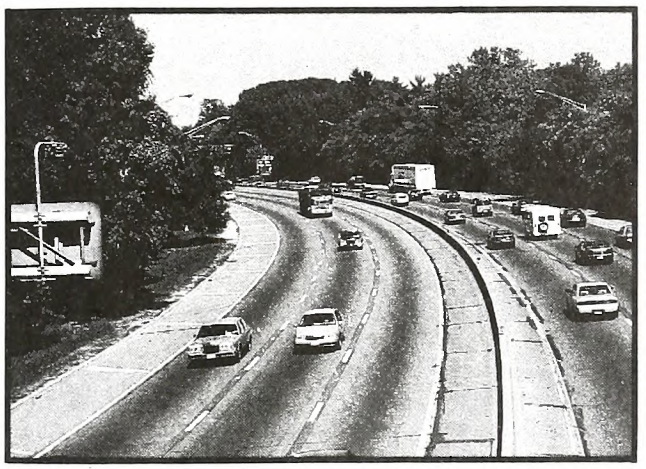
Source: 1994 Highway Capacity Manual



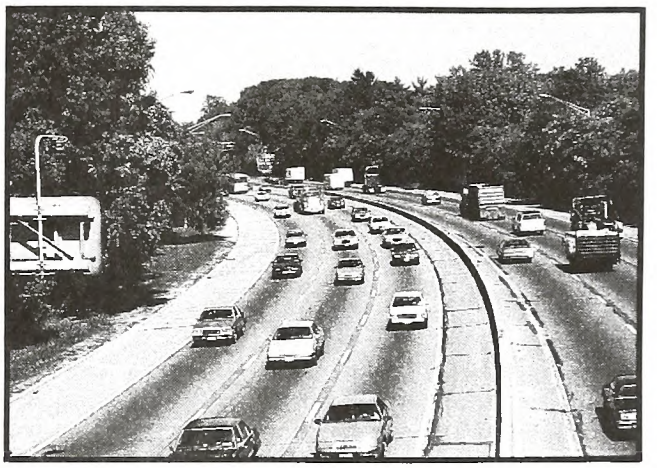
LOS A.



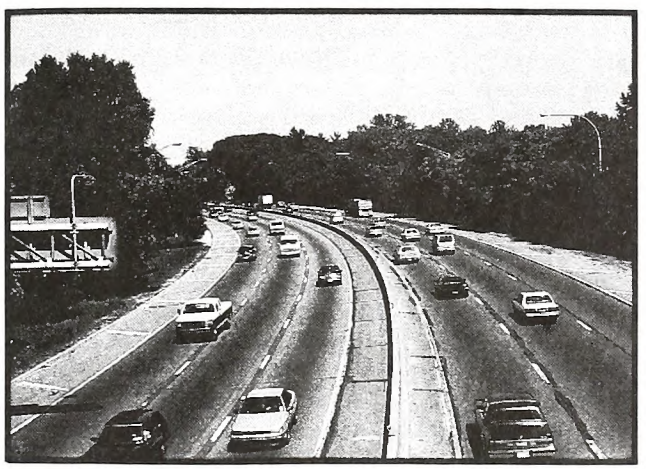
LOS D.



LOS B.



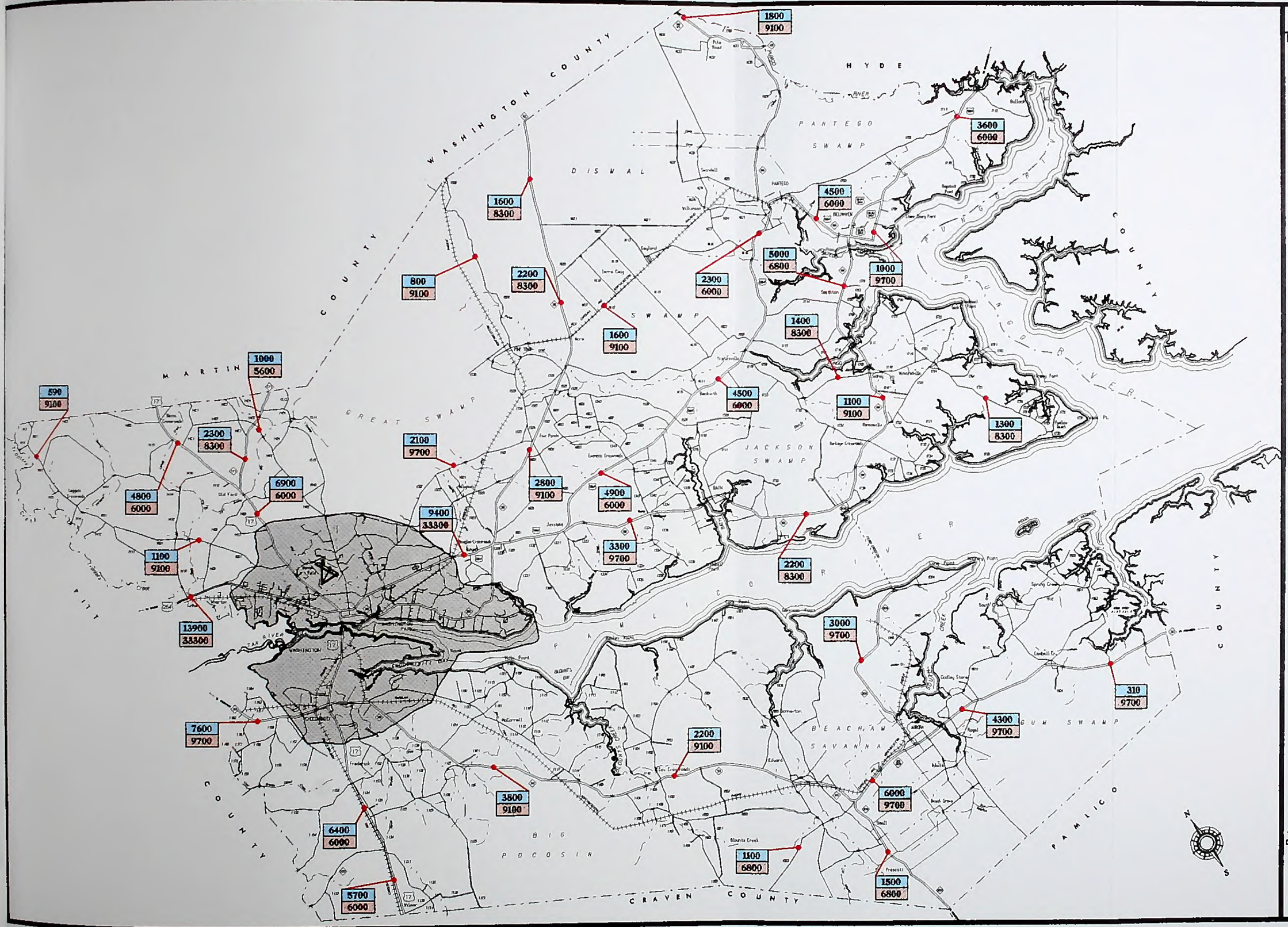
LOS E.



LOS C.

LOS F.

LEVELS OF SERVICE **FIGURE 5**



1997 TRAFFIC WITH EXISTING ROADWAY CAPACITIES

LEGEND

1997 ADT / ROADWAY CAPACITY — 00000 / 00000

URBAN PLANNING BOUNDARY

BEAUFORT COUNTY
NORTH CAROLINA

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS – STATEWIDE PLANNING BRANCH

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

0 .5 1 2 3 4 5

FIGURE 6

Traffic Crashes

Traffic crash statistics can often be used as an indicator for locating congestion problems. Traffic crash records can also be reviewed to identify problem locations or deficiencies such as substandard design, inadequate signing, ineffective parking, or poor sight distance. Crash patterns identified from analysis of crash data can lead to improvements that will reduce the number of crashes.

The NCDOT Traffic Engineering and Safety Systems Branch periodically reviews crash data statewide to identify areas where crash rates may be reduced as a result of roadway improvements. The Highway Safety Improvement Program identifies the highest crash intersections so that they may be studied further. To be included in the program, each location must meet one of several warrants, or minimum criteria. For intersections, the categories of warrants are front impact crash rate, previous year crash rate, severity index levels, and night crash rate without streetlights.

Crash data is given by type in order to identify any trends that may be correctable through roadway or intersection improvements. The total number of crashes and the average crash severity are useful for ranking the most problematic intersections. The severity index is based on a series of weighting factors developed by the NCDOT. These factors define a fatal or incapacitating crash as 47.7 times more severe than one involving only property damage, and an crash resulting in minor injury as 11.8 times more severe than one with only property damage. In general, a higher severity index indicates more severe crashes. Listed below are levels of severity for various severity index ranges.

Severity	Severity Index
low	< 6.0
average	6.0 to 7.0
moderate	7.0 to 14.0
high	14.0 to 20.0
very high	> 20.0

Table 6 is a summary of the intersections in Beaufort County with the highest crash rates. For each intersection, the total number of crashes is given by type and by average severity index. The criterion used to identify these locations includes all crashes within 200 feet of an intersection over a three-year period, between January 1996 and December 1998. To request a more detailed crash analysis for any of the above mentioned intersections, or other intersections of concern, the appropriate Area Traffic Engineer, which is Area 1 for Beaufort County, should be contacted.

Table 6

Beaufort County Highest Crash Intersections

Location Number	Intersection	Angle	Rear End	Run Off Road	Left Turn	Right Turn	Other	Total	Severity Index
1	US 264 / SR 1409	5		1	5		2	13	17.22
2	US 17 / SR 1152	3	2	1	4		1	11	18.15

Existing Bridge Conditions

Bridges are a vital and unique element of a highway system. First, they represent the highest unit investment of all elements of the system. Second, any inadequacy or deficiency in a bridge reduces the value of the total investment. Third, a bridge presents the greatest opportunity of all potential highway failures for disruption of community welfare. Finally, and most importantly, a bridge represents the greatest opportunity of all highway failures for loss of life. For these reasons, it is imperative that bridges be constructed to the same design standards as the system of which they are a part.

Congress enacted the National Bridge Inspection Program Standards on April 27, 1971, implementing the Federal Highway Act of 1968. These standards require that "all structures designed as bridges located on any of the Federal-Aid Highway Systems be inspected and the safe load carrying capacity computed at regular intervals, not to exceed two years." The NCDOT Bridge Maintenance Unit, with assistance from various consultants, inspects all bridges on the State Highway System.

The Transportation Improvement Program (TIP) development process for bridge projects involves consideration of several evaluation methods in order to prioritize needed improvements. A sufficiency index is used to determine whether a bridge is sufficient to remain in service, or to what extent it is deficient. The index is a percentage in which 100 percent represents an entirely sufficient bridge and zero represents an entirely insufficient or deficient bridge. Factors evaluated in calculating the index are listed below.

- structural adequacy and safety
- serviceability and functional obsolescence
- essentiality for public use
- type of structure
- traffic safety features

A bridge is considered deficient if it is either structurally deficient or functionally obsolete. Bridges in the functionally obsolete category have below average ratings in approach roadway alignment, under clearance, deck geometry, waterway adequacy, or structural condition. Structurally deficient bridges have below average ratings in deck superstructure, substructure, overall structural conditions, or waterway adequacy. A bridge must be classified as deficient before it is eligible for Federal Bridge Replacement Funds. The sufficiency rating must be less than 50 to qualify for replacement or less than 80 to qualify for rehabilitation under federal funding.

In addition to the sufficiency index, further analysis is performed using the Level of Service Analysis and Prioritization (LOSAP) program. This program ranks bridges by deficiency points, which are calculated based on maintaining desired levels of service. The levels of service for lane and shoulder width, vertical clearance, and load capacity vary with roadway functional classification and average daily traffic. Another tool for prioritizing bridge improvements is the Optimum Bridge Budget Forecasting and Allocation System (OPBRIDGE). This program determines the optimum improvement action and time for each bridge in a network given certain level of service goals and funding constraints.

The output from each of these evaluation methods, along with input from NCDOT Bridge Maintenance personnel and local communities, is used to prioritize bridge projects. Bridges with the highest priority are replaced as federal and state funds become available.

All bridges in Beaufort County have been analyzed, rated, and inventoried. Table 7 shows the all functionally obsolete bridges and Table 8 shows the fifteen most structurally deficient bridges in the county.

Table 7

Functionally Obsolete Bridges in Beaufort County

Bridge No.	Facility Carried	Water Source	Location	Rating
17	SR 1946	PORTER CREEK	0.6 MI N JCT. SR 1958	40.1
38	SR 1924	GUM SWAMP RUN	0.3 MI W JCT. SR 1002	36.1
41	US 17	997RRY RUN	2.5 MI N JCT. US 264	64.2
48	NC 33	SOUTH CREEK	4.5 MI E JCT. NC 306	65.4
50	US 17	OLD FORD SWAMP	5.7 MI N JCT. US 264	61.3
55	US 264	PANTEGO CREEK	.01 MI SE JCT. NC 99	74.1
59	NC 99	JACK CREEK	0.2 MI N JCT. SR 1718	44.8
64*	NC 99	PUNGO CREEK	18.6 MI E JCT. US 264	40.8
75	NC 33	CHOCOWINITY CREEK	1.1 MI SE JCT. US 17	72.7
93*	SR 1416	TRANTER'S CREEK	0.4 MI W JCT. SR 1001	44.9
103*	NC 32	RUNYON CREEK	0.2 MI SE JCT. SR 1352	49.2
105	SR 1326	BROAD CREEK	0.4 MI E JCT. SR 1311	52.8
110	SR 1507	CREEK	0.6 MI E JCT. SR 1524	54.3
174	SR 1919	FORK OF SOUTH CREEK	0.2 MI N JCT. SR 1912	63.9
321	NC 306 FERRY RAMP	PAMLICO SOUND	AURORA	59.0
322	NC 306 FERRY RAMP	PAMLICO RIVER	SOUTH END OF NC 306	61.0

Notes: * Denotes the bridge is in the current Transportation Improvement Program.

Table 8

Fifteen Most Structurally Deficient Bridges in Beaufort County

Bridge No.	Facility Carried	Water Source	Location	Rating
54	NC 99	ST CLAIR CREEK	1.3 MI SW JCT SR 1732	7.2
8*	SR 1403	TRANTERS CREEK	0.6 MI W JCT SR 1402	9.0
104*	NC 32	BROAD CREEK	0.4 MI NE JCT SR 1348	9.3
21	NC 32	PUNGO CREEK	7.5 MI NE JCT US 264	11.0
6	SR 1422	BIG SWAMP	0.3 MI S JCT NC 171	12.9
77*	NC 99	PANTEGO CREEK	0.5 MI W JCT US 264 BUS	14.2
9	SR 1112	BLOUNTS CREEK	1.8 MI E JCT SR 1118	15.1
12	NC 171	SINGLETON SWAMP	3.9 MI NE JCT US 17	18.9
76	NC 33	CAROLINA & NW RR	0.6 MI W JCT US 17	26.6
84*	SR 1410	LATHAM CREEK	0.1 MI N JCT SR 1414	29.1
178	SR 1743	BRANCH OF BACK CREEK	1.4 MI NE JCT NC 92	29.1
40	SR 1932	HORSE PEN SWAMP	0.4 MI S JCT NC 33	29.2
113	SR 1331	BROAD CREEK	0.9 MI E JCT NC 32	33.0
140	SR 1626	CANAL	4.1 MI S JCT SR 1633	35.5
63*	US 264	CUCKOLD'S CREEK	1.9 MI SE JCT NC 99	37.2

Notes: * Denotes the bridge is in the current Transportation Improvement Program.

Factors Affecting the Future Roadway System

The objective of thoroughfare planning is to develop a transportation system that will meet future travel demand and enable people and goods to travel safely and efficiently. To determine the needs of an area it is important to understand the effect of population, economics and land use on the roadway system. Examination of these factors helps to explain historic travel patterns and lays the groundwork for thoroughfare planning.

Population

The amount of traffic on a section of roadway is a function of the size and location of the population that it serves. Investigating past trends in population growth and projecting future population growth and dispersion is an essential step in transportation planning. Table 9 shows the historical trends and projected population for Beaufort County through the year 2030. Table 10 shows population trends by township.

Table 9

Beaufort County Population Trends and Projections

Year	Population	Percent Growth Per Year
1970	35,980	
1980	40,355	+12.2
1990	42,283	+4.8
2000	43,729[a]	+3.4
2010	44,482[a]	+1.7
2020	45,879[a]	+3.1
2030	46,900[b]	+2.2

Note: a - Estimate by the Office of State Budget and Management
b - Projection

Table 10

Beaufort County Population by Township

Township	1970	1980	1990	1980 – 1990
Bath	3237	3472	3797	+325 / 9.4%
Chocowinity	4661	6241	6489	+248 / 4.0%
Long Acre	6976	8423	7845	-578 / -6.9%
Pantego	5126	5417	6925	+1508 / 27.8%
Richland	3626	3898	3543	-355 / -9.1%
Washington	12354	12904	13684	+780 / 6.0%

Economy and Employment

Another important factor to be considered in estimating the future traffic growth of an area is its economic base. The number of employers and the average per capita income, or purchasing power, influences how much population can be supported in an area and the number of motor vehicles that will be locally owned and operated. Generally, as family income increases so does

the number of vehicles owned, as well as the number of vehicles trips generated per day by each household. An accurate projection of the future economy of an area is essential in estimating future travel demand.

Factors that will influence economic growth and development in Beaufort County over the thirty-three year planning period include the expansion of the Washington and Chocowinity urban areas. Another influence on the future economic growth of Beaufort County is potential industrial development along US 17 and US 264. Increased amounts of tourism and development in prime waterfront location may also result in secondary growth for Beaufort County.

Land Use

Land use refers to the physical patterns of activities and functions within a municipality or county. Traffic problems in a given area often can be attributed to adjacent land use. For example, a large industrial plant may cause congestion during shift change hours on a road that otherwise has little, if any, congestion. The spatial distribution of different types of land uses is a predominant determinant of when, where, and to what extent traffic congestion occurs. The travel demand between different land uses and the resulting impact on traffic conditions varies depending on the size, type, intensity, and spatial separation of development.

For use in transportation planning, land uses are grouped into the categories defined below.

- **Residential** - land devoted to the housing of people (excludes hotels and motels)
- **Commercial** - land devoted to retail trade, including consumer and business services and offices
- **Industrial** - land devoted to manufacturing, storage, warehousing, and transportation of products
- **Public** - land devoted to social, religious, educational, cultural, and political activities

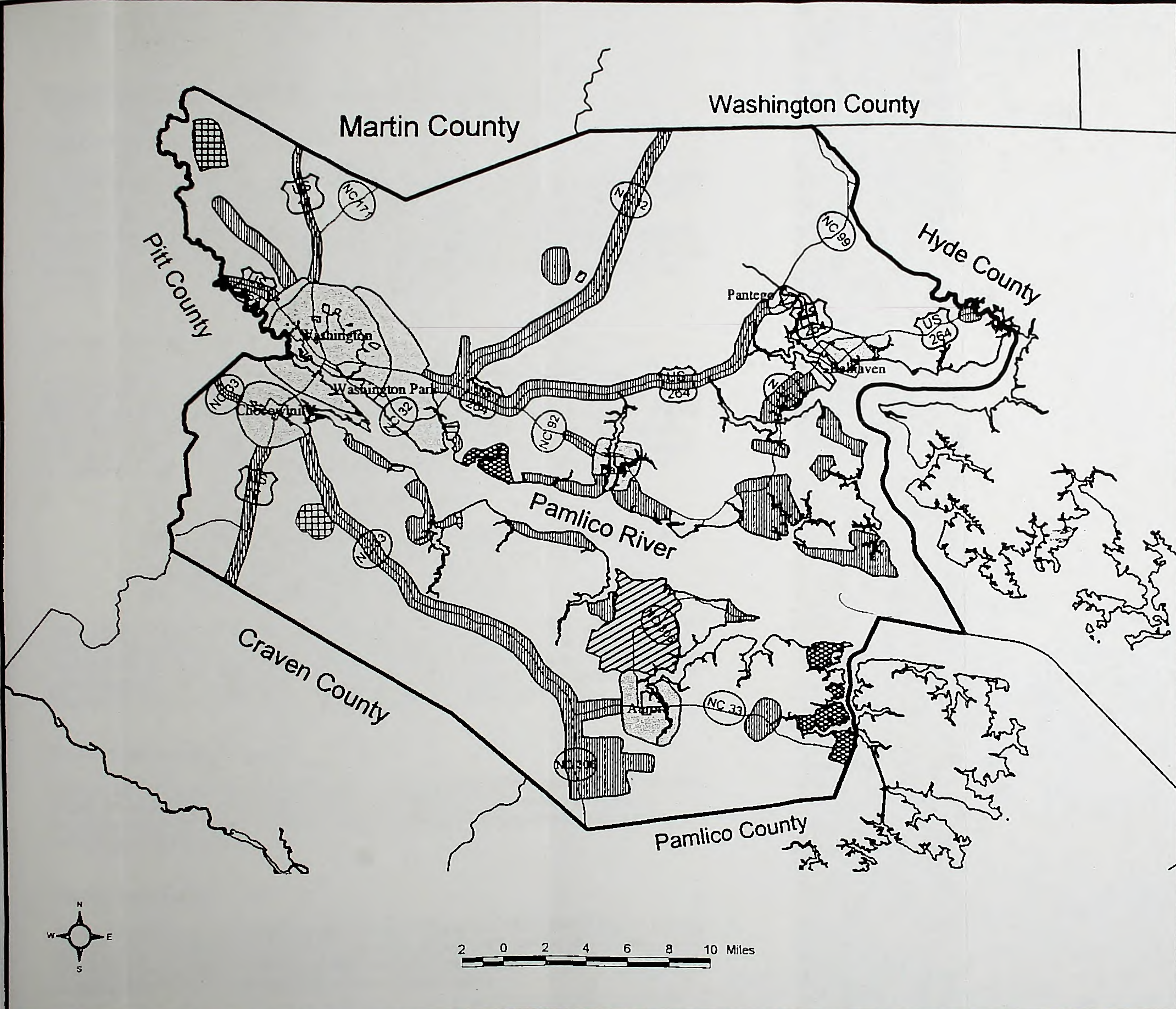
Figure 7 shows the area's existing land use map, which was provided by Beaufort County.

Anticipated future land use is a logical extension of the present spatial distribution. Determination of where and what type of growth is expected to occur within the planning area facilitates developing proposed thoroughfares or the improvement of existing thoroughfares. Areas of anticipated development and growth for Beaufort County are listed below.

- Residential - Chocowinity, Pantego, and Washington Townships
- Commercial/Retail - Chocowinity and Washington Townships
- Industrial -Aurora, Bath, Pantego, and Washington Townships
- Public - continued preservation of the Tar River, the Pamlico River, waterfront property, and all historic districts

The largest growth expectations are for western Beaufort County. This development is anticipated primarily along NC 33, US 264, and US 17,which is scheduled in the TIP for improvements, including bypasses of Washington and Chocowinity. The slowest growth expectations are for the

eastern portions of the county. This slow growth is primarily attributed to the fact that most of the commercial, retail, and industrial development will occur in the western to central portion of the county due to access of US 17, US 264, NC 32, and NC 33.



Beaufort County Land Uses 1997

Industrial
Institutional
Municipal Planning Jurisdiction
Public Recreational
Private Recreational
Rural
Undeveloped
Urban

The preparation of this map was financed in part through a grant provided by the North Carolina Coastal Management Act of 1972, as amended, which is administered by the Office of Ocean and Coastal Resource Management, National Oceanic and Atmospheric Administration.

Figure 7

Forecasted Travel Patterns and Deficiencies

Future Travel Demand

Future travel demand can be forecasted by looking at past traffic trends and calculating the average annual growth rates for specific routes. Using historical traffic trends, along with projected land use and projected population growth, future travel demand can be estimated and future transportation deficiencies can be identified. For this thoroughfare plan study average daily traffic (ADT) counts for the past thirty years were used in a linear regression analysis to estimate ADT for the planning year 2030. The projected 2030 ADT for Beaufort County's functionally classified roads are shown in Figure 8 and listed in Appendix B, Table B-1.

Capacity Deficient Corridors

Capacity deficient corridors are identified using the volume to capacity ratio (V/C), which is the projected traffic over the practical capacity of the facility for a given level of service (LOS). For this analysis, capacity is based on LOS C, except LOS B for rural roadways functionally classified as arterials. A V/C ratio greater than one indicates the volume of traffic on the road exceeds its capacity and the facility should be considered for improvement. Based on this analysis, the roads in Beaufort County listed below are anticipated to be over capacity by the planning year 2030.

- US 17: From Martin County to Craven County
- US 264: From NC 32 to NC 99
- NC 33: From Pitt County to the Washington Urban Planning Boundary (WUPB) West and from SR 1003 to the intersection of NC 33/306
- NC 92/99: From SR 1714 to US 264
- BUS 264: From NC 99 to Pamlico Street in Belhaven

US 17 and US 264 are scheduled for improvements in the 2000-2006 Transportation Improvement Program (TIP). Refer to Figure 9 for depiction of these deficient corridors and to Chapter 2 for recommendations. Widening these facilities will increase their traffic carrying ability and alleviate traffic congestion. The existing and recommended capacities, right-of-way, and cross sections for Beaufort County's functionally classified roads are given in Appendix B, Table B-1.

Roads Approaching Capacity

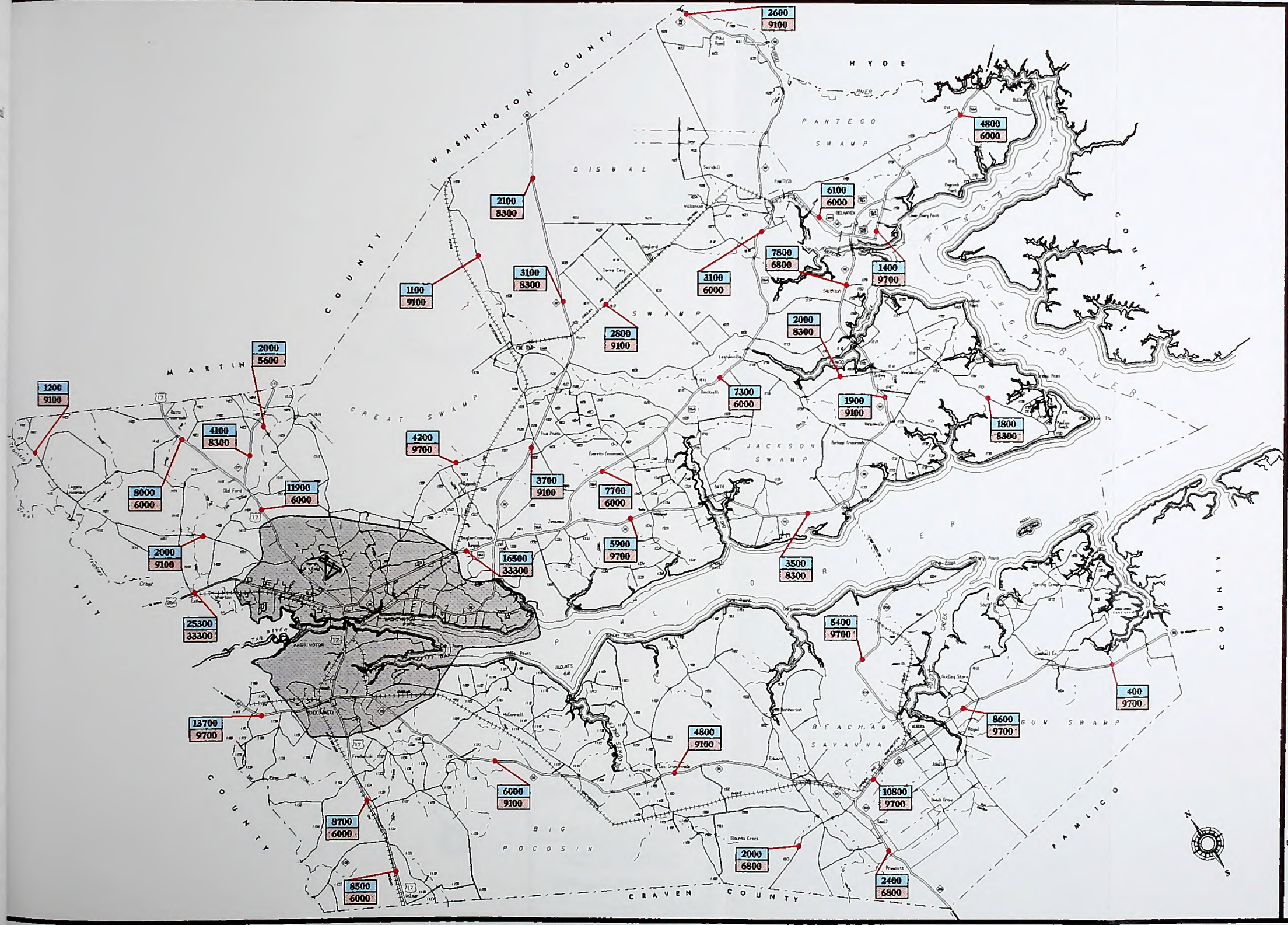
No other roads in the planning area are expected to have congestion problems within the planning period. However, to improve safety and operating conditions, it is recommended that the functionally classified roads in Beaufort County with substandard land widths be upgraded to meet safety and design standards.

System Deficiencies

System deficiencies result in areas that lack a cohesive, continuous, and complimentary major road network. More simply put, a system deficiency exists when drivers must go out of their way to get to their desired destination, or when the route is not cohesive or continuous. For Beaufort County, no system deficiencies were identified that warrant improvements.

Intersection Deficiencies

Ineffective intersection design or control can contribute to poor traffic flow, increased traffic crashes, and driver irritation. Most of the major traffic intersections in Beaufort County are located within the municipalities. Analysis of Beaufort County's roadway system did not reveal any intersection deficiencies.



FORECASTED 2030 TRAFFIC WITH EXISTING ROADWAY CAPACITIES

LEGEND

FORECASTED 2030 ADT / ROADWAY CAPACITY — 00000 / 00000

URBAN PLANNING BOUNDARY

BEAUFORT COUNTY

NORTH CAROLINA

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

0 .5 1 2 3 4 5
Scale in miles

FIGURE 8

ANTICIPATED ROADWAY DEFFICIENCIES

LEGEND

- OVER CAPACITY
- SUBSTANDARD DESIGN
- TIP PROJECT
- URBAN PLANNING BOUNDARY

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0 .5 1 2 3 4 6
SCALE IN MILES

Base map dated 5-27-99

FIGURE 9

Consideration of Environmental Factors

In recent years, environmental considerations associated with highway improvements or construction have come to the forefront of the planning process. The legislation that dictates the necessary procedures regarding environmental impacts is the National Environmental Policy Act. Section 102 of this act requires the execution of an environmental impact statement (EIS) for road projects that have a significant impact on the environment. An EIS includes an evaluation of a project's impact on wetlands, water quality, historic properties, wildlife, and public lands.

Although the technical report for the thoroughfare plan is not intended to cover environmental concerns in as much detail as an EIS, preliminary research on environmental factors is generally done at the thoroughfare planning stage. For Beaufort County the development of an EIS is currently underway for a major new location project proposed as part of the thoroughfare plan, US 17 Bypass of Washington and Chocowinity. Therefore, the environmental factors described below are being reviewed as part of the development of the EIS, making it unnecessary to conduct a review as part of this thoroughfare plan study.

Wetlands

In general terms, wetlands are lands where saturation with water is the dominant factor in determining the nature of soil development and the types of plant and animal communities living in the soil and on its surface. The single feature that most wetlands share is soil or substrata that is at least periodically saturated with or covered by water. Water creates severe physiological problems for all plants and animals except those that are adapted for life in it or in saturated soil.

Wetlands are crucial ecosystems in our environment. They help regulate and maintain the hydrology of our rivers, lakes, and streams by slowly storing and releasing floodwaters. They help maintain the quality of our water by storing nutrients, reducing sediment loads, and reducing erosion. They are also critical to fish and wildlife populations. Wetlands provide an important habitat for about one third of the plant and animal species that are federally listed as threatened or endangered.

The impacts to wetlands can be evaluated using the National Wetlands Inventory Mapping, available from the U. S. Fish and Wildlife Service. Wetland impacts will be avoided or minimized to the greatest extent possible while preserving the integrity of the thoroughfare plan.

Threatened and Endangered Species

A preliminary review of Federally Listed Threatened and Endangered Species within Beaufort County was done to determine the effect new corridors could have on wildlife. Threatened or endangered species were identified using mapping from the North Carolina Department of Environment, Health, and Natural Resources.

The Threatened and Endangered Species Act of 1973 allows the U. S. Fish and Wildlife Service to impose measures for mitigation of the environmental impacts of a road project on endangered plants and animals and critical wildlife habitats. By locating rare species in the planning stage of road construction, avoidance or minimization of these impacts is possible.

There were various sightings of rare plants and animals throughout Beaufort County. Projects of particular concern with respect to rare plants and animals include:

- US 17 Widening
- US 264 Widening

A detailed field investigation of these corridors is recommended prior to construction of any highway project in this area.

Historic Sites

The locations of historic sites in Beaufort County were investigated to determine the possible impacts of the various projects studied. The federal government has issued guidelines requiring all state transportation departments to make special efforts to preserve historic sites. In addition, the State of North Carolina has issued its own guidelines for the preservation of historic sites. These two pieces of legislation are described below.

National Historic Preservation Act - Section 106 of this act requires state departments of transportation to identify historic properties listed in the National Register of Historic Places and properties eligible to be listed. State departments of transportation must consider the impacts of its road projects on these properties and consult with the Federal Advisory Council on Historic Preservation.

NC General Statute 121-12(a) - This statute requires the NCDOT to identify historic properties listed on the National Register, but not necessarily those eligible to be listed. NCDOT must consider impacts and consult with the North Carolina Historical Commission, but is not bound by their recommendations.

The State Plan for Historic Preservation was used to identify sites within Beaufort County. Many of these sites are located in the rural areas of the county. The historic districts of Bath, Belhaven, Pantego, and Washington are listed on the National Register of Historical Properties. Zion Episcopal Church, located on the south side of US 264, 0.2 miles east of SR 1601, is on the Study List to be considered a registered historical property. All reasonable efforts will be made to minimize the impact to identified historic sites and natural settings when widening existing roadways or constructing new facilities. None of the other properties should be affected by the projects proposed on the thoroughfare plan. However, care should be taken to make certain that all historic sites and natural settings are preserved. Therefore, a more detailed study should be done in regard to local historic sites prior to construction of any project.

Archaeology

The only significant archaeological site is Windmill Point, located in the Bath Township. None of the proposed projects should have an impact on this site. However, all efforts will be made to avoid or minimize any impacts to archaeological sites prior to any roadway improvements or construction. Therefore, a more detailed study should be done in regard to local historic sites prior to construction of any project.

APPENDICES

Appendix A
Thoroughfare Planning Principles

There are many advantages to thoroughfare planning, but the primary objective is to assure that the road system will be progressively developed to serve future travel desires. Thus, the main consideration in thoroughfare planning is to make provisions for street and highway improvements so that, when the need arises, feasible opportunities to make improvements exist.

Benefits of Thoroughfare Planning

There are two major benefits derived from thoroughfare planning. First, each road is designed to perform a specific function and provide a specific level of service. This permits savings in right-of-way, construction, and maintenance costs. It also protects residential neighborhoods and encourages stability in travel and land use patterns. Second, thoroughfare planning allows local officials to be informed of future improvements and enables them to incorporate this information into planning and policy decisions. This permits developers to design subdivisions in a non-conflicting manner, enables school and park officials to better locate their facilities, and minimizes the damage to property values and community appearance that could otherwise be associated with roadway improvements.

County Thoroughfare Planning Concepts

The purpose of the thoroughfare planning is to provide a functional roadway system that permits direct, efficient, and safe travel. Different elements in the system are designed to have specific functions and levels of service, thus minimizing the traffic and land service conflict.

In a county thoroughfare plan, elements are either urban or rural. In an urban planning area, the local municipality generally has planning jurisdiction. Outside the urban planning area, the county has planning jurisdiction. In those urban areas where no urban thoroughfare plan exists, elements are rural and are under the planning jurisdiction of the county.

Within both urban and rural systems, transportation elements are classified according to the specific function they are designed to perform. A discussion of the elements and functions of the two systems follows.

Thoroughfare Classification Systems

Roads perform two primary functions, traffic service and land access. These functions can be served effectively when both traffic volumes and demand to access land are low. However, when traffic volumes are high, conflicts created by uncontrolled and intensely developed abutting property may lead to intolerable traffic flow friction and congestion.

The underlying concept of a thoroughfare plan is that it provides a functional system of roads that permits travel from origins to destinations with directness, ease, and safety. Different roads in this system are designed to perform specific functions, thus minimizing the conflict between traffic service and land access.

Urban Classification

For urban thoroughfare plans, roadways are classified as major thoroughfares, minor thoroughfares, or local access streets.

Major Thoroughfares
These routes are the primary traffic arteries of the urban area and they accommodate traffic movements within, around, and through the area.

Minor Thoroughfares
Roadways classified as this type collect traffic from the local access streets and carry it to the major thoroughfare system.

Local Access Streets
This classification includes all streets that have a primary purpose of providing access to the abutting property. This category is further classified as either residential, commercial and/or industrial, depending upon the type of land use that is served.

Due to the limited amount of detail that can be shown on a county thoroughfare plan, only urban major thoroughfares are shown.

Rural Classification

A rural classification system is used for county thoroughfare plans, which also show the major thoroughfares within urban thoroughfare planning boundaries. There are four major systems in the rural classification system: principal arterials, minor arterials, major and minor collectors, and local roads.

Rural Principal Arterial System
The principal arterial system is a connected network of continuous routes that serve corridor movements having substantial statewide or interstate travel characteristics. Longer trip lengths and greater travel densities characterize this type of travel. The principal arterial system should serve all urban areas of over 50,000 in population and most of those with a population greater than 5,000. The interstate system constitutes a significant portion of the principal arterial system.

Rural Minor Arterial System
The minor arterial system forms a network that links cities, large towns, and other major traffic generators, such as large resorts. The minor arterial system generally serves intrastate and intercounty travel and travel corridors with trip lengths and travel densities somewhat less than the principal arterial system.

Rural Collector Road System

The rural collector routes generally serve intracounty travel. These routes serve travel whose distances are shorter than on the arterial routes. The rural collector road system is subclassified into major and minor collector roads.

Major Collector Roads

These routes provide service to most sizable towns not directly served by the higher systems and to other traffic generators of equivalent intracounty importance, such as consolidated schools, shipping points, county parks, significant mining and agricultural areas, etc. Major collector roads also link these places to routes of higher classification and serve the more important intracounty travel corridors.

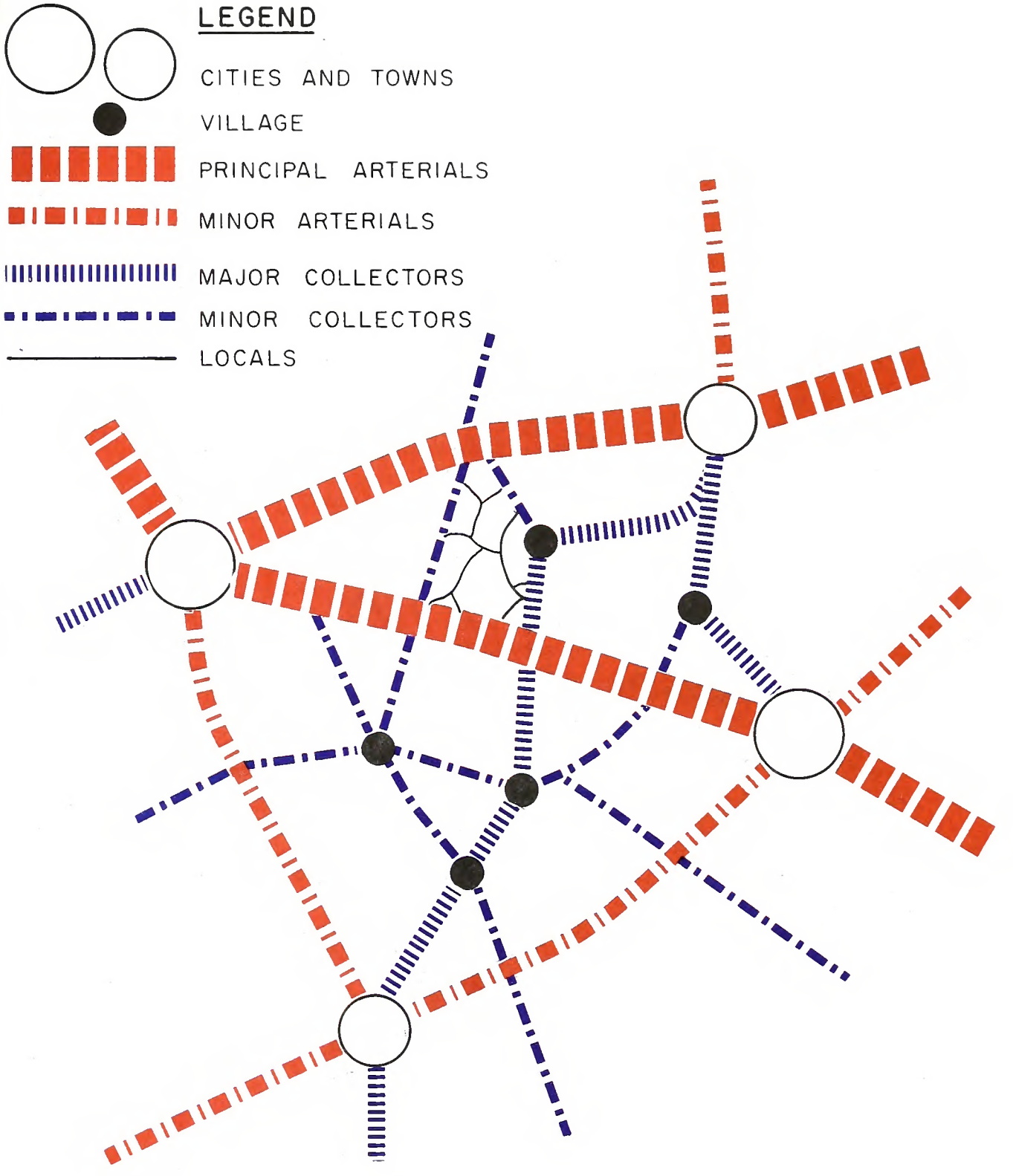
Minor Collector Roads

These roads collect traffic from local roads and provide a link within a reasonable distance to a major collector road. Minor collectors also provide service to the remaining smaller communities and link rural areas to the locally important traffic generators.

Rural Local Road System

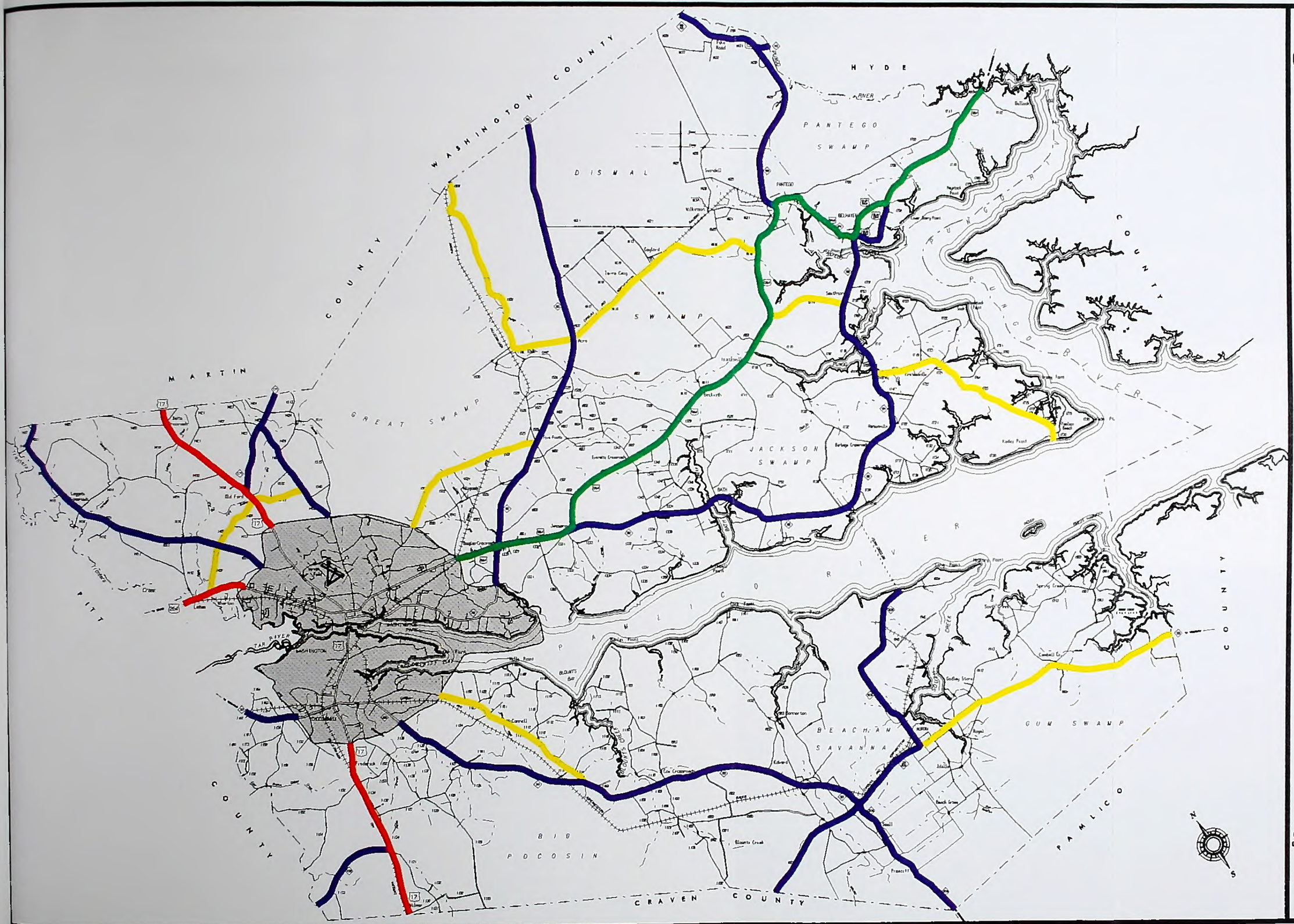
The local road system consists of all facilities not on a higher system. Local residential streets and residential collector streets are elements of this system. Facilities designated as local residential streets are either cul-de-sacs, loop streets less than 2,500 feet in length, or streets less than one mile in length. These streets do not connect thoroughfares or serve major traffic generators and do not collect traffic from more than one hundred dwelling units. Residential collector streets serve as the connecting street system between local residential streets and the thoroughfare system.

Figure A-1 gives a schematic illustration of the functional classification of a rural highway system. The functional classification for Beaufort County is shown in Figure A-2.



SCHEMATIC ILLUSTRATION
OF FUNCTIONALLY CLASSIFIED
RURAL HIGHWAY NETWORK

FIGURE A-1



FUNCTIONAL CLASSIFICATION

LEGEND

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

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0 .5 1 2 3 4 5
SCALE IN MILES

Base map dated 9-27-99 **FIGURE A-2**

Objectives of Thoroughfare Planning

Thoroughfare planning is the process public officials use to assure the development of the most appropriate roadway system to meet existing and future travel desires within the urban area or county. The primary aim of a thoroughfare plan is to guide the development of the roadway system in a manner consistent with changing traffic patterns. Thoroughfare planning enables road improvements to be made as traffic demands increase and ensure only needed improvements are implemented, eliminating the expense of unnecessary projects. By developing the roadway system to keep pace with increasing traffic demands, maximum utilization of the system can be attained, requiring a minimum amount of land for transportation purposes. In addition to providing for traffic needs, urban thoroughfare plans should embody those details of good urban planning necessary to present a pleasing and efficient urban community. The present and future population dispersion, as well as commercial and industrial development, affect major street and highway locations. Conversely, the location of major streets and highways within a given area influences the local development pattern.

Objectives of a thoroughfare plan include:

- To provide for the orderly development of an adequate major roadway system as land development occurs;
- To reduce travel and transportation costs;
- To reduce the cost of major roadway improvements to the public through the coordination of the roadway system with private action;
- To enable private interest to plan their actions, improvements, and development with full knowledge of public intent;
- To minimize disruption and displacement of people and businesses through long range advance planning for major roadway improvements;
- To reduce environmental impacts, such as air pollution, resulting from transportation, and
- To increase travel safety.

These objectives are achieved through improving both the operational efficiency of thoroughfares, and improving the system efficiency through system coordination and layout.

Operational Efficiency

The operational efficiency of a road is improved by increasing the capability of the street to carry more vehicular traffic and people. In terms of vehicular traffic, a road's capacity is defined by the maximum number of vehicles that can pass a given point on a road during a given time period under prevailing roadway and traffic conditions. Capacity is affected by the physical features of the roadway, prevailing traffic characteristics, and weather.

Physical ways to improve vehicular capacity include:

- **Roadway widening** - Widening of a road from two to four lanes more than doubles the capacity of the road by providing additional maneuverability for traffic.
- **Intersection improvements** - Increasing the turning radii, adding exclusive turn lanes, and channelizing movements can improve the capacity of an existing intersection.
- **Improving vertical and horizontal alignment** - Alignment improvements reduce congestion caused by slow moving vehicles.
- **Eliminating roadside obstacles** - Improving lateral clearance reduces side friction and improves a driver's field of sight.

Operational ways to improve a road's capacity include:

- **Control of Access** - A roadway with complete access control can often carry three times the traffic handled by a non-controlled access road with identical width and number of lanes.
- **Parking removal** - Capacity is increased by providing additional roadway width for traffic flow and reducing friction to flow caused by parking and unparking vehicles.
- **One-way operation** - The capacity of a street can be increased by 20 -50%, depending upon turning movements and overall street width, by initiating one-way traffic operations. One-way streets can also improve traffic flow by decreasing potential traffic conflicts and simplifying traffic signal coordination.
- **Reversible lanes** - Reversible traffic lanes may be used to increase street capacity in situations where heavy directional flows occur during peak periods.
- **Signal phasing and coordination** - Uncoordinated signals and poor signal phasing restrict traffic flow by creating excessive stop-and-go operation.

Altering travel demand is a third way to improve the efficiency of existing streets. Travel demand can be reduced in the following ways:

- **Carpools** - Encouraging the formation of carpools and vanpools for journeys to work and other trip purposes reduces the number of vehicles on the roadway and raises the people carrying capability of the street system.
- **Alternate mode** - Encouragement of transit and bicycle use reduces vehicular congestion.
- **Work hours** - Programs by industries, businesses, and institutions to stagger work hours or establish variable work hours for employees spreads peak travel over a longer time period and thus reduces peak hour demand.
- **Land use** - Planning land use can control development or redevelopment in a more travel efficient manner.

System Efficiency

Another means for altering travel demand on existing facilities is the development of a more efficient system of roads that will better serve travel desires. A more efficient transportation system can reduce travel distances, time, and user costs. Improvements in system efficiency can be achieved through the concept of functional classification of roads and development of a coordinated major street system.

Application of Thoroughfare Planning Principles

The concepts presented in the discussion of thoroughfare classification systems, operational efficiency and system efficiency, are conceptual tools available to aid in developing a thoroughfare plan. However, in practice thoroughfare planning is done for established urban areas or counties and is constrained by existing land use and street patterns, existing public attitudes and goals, and current expectations of future land use. Compromises must be made because of these and the many other factors that affect road locations.

Through the thoroughfare planning process it is necessary, from a practical viewpoint, that certain basic principles be followed as closely as possible. These principles are listed below.

1. The plan should be derived from a thorough knowledge of existing travel - its component parts, and the factors that contribute to it, limit it, and modify it.

2. Traffic demands must be sufficient to warrant the designation and development of each facility. The thoroughfare plan should be designed to accommodate a large portion of major traffic movements on a few roads.

3. The plan should conform to and provide for the land development plan for the area.

4. Certain considerations must be given to development beyond the current planning period. Particularly in outlying or sparsely developed areas that have development potential, it is necessary to designate thoroughfares on a long-range planning basis to protect rights-of-way for future thoroughfare development.

5. While being consistent with the above principles and realistic in terms of travel trends, the thoroughfare plan must be economically feasible.

Appendix B
Thoroughfare Plan Street Tabulation and Recommendations

This appendix includes a detailed tabulation of all roads identified as elements of the Beaufort County Thoroughfare Plan. The table includes a description of the roads by sections, as well as the length, cross section, and right-of-way for each section. Also included are the existing and projected average daily traffic volumes, the practical roadway capacity, and the recommended ultimate lane configuration. It should be noted that the practical capacities for rural roadways are based on a level of service of B for roads functionally classified as arterials and level of service C for all other roads. The practical capacity for all roads in urban areas are based on a level of service B. Refer to
Chapter 4 for a description and illustration of the levels of service and Figure A-2 for the functional classification of Beaufort County roads. Due to space constraints, the recommended cross-sections are given in the following form: number of lanes/ alphabetic code. A detailed description and illustrative figure for each of the alphabetic codes for cross sections can be found in Appendix C.

The following index of terms may be helpful in interpreting the table:

ADQ – Adequate
Co. – County
DIST – Distance
EXIST. – Existing
N/A – Not Available
No. – Number
REC. – Recommended
RDWY – Roadway
ROW – Right-of-Way
WUPB – Washington Urban Planning Boundary

Table B-1

Thoroughfare Plan Street Tabulation and Recommendations

FACILITY & SECTION	EXISTING CROSS SECTION				AVERAGE DAILY TRAFFIC		PRACTICAL CAPACITY		RECOMMENDED CROSS-SECTION		
	DIST mi	NO. LANES	RDWY ft	ROW ft	1997	2030	EXIST.	REC.	NO. LANES	RDWY	ROW ft
US 17 (Martin Co - Craven Co.)											
Martin County - SR 1418	4.50	2	28	100	4,800	8,000	6,000	33,300	4	F	110
SR 1418 -Northern WUPB	0.90	2	28	100	6,900	11,900	6,000	33,300	4	F	110
Southern WUPB - NC 102	5.50	2	25	80	6,400	8,700	6,000	33,300	4	F	110
NC 102 - Craven County	2.40	2	25	80	5,700	8,500	6,000	33,300	4	F	110
US 264 (Pitt Co. - Hyde Co.)											
Pitt County - SR 1409	1.00	4	54	160	13,900	25,300	33,300	ADQ			
SR 1409 - Western WUPB	1.00	5	58	100	13,900	25,300	33,300	ADQ			
Eastern WUPB - SR 1522	1.20	5	69	150	10,800	20,300	33,300	ADQ			
SR 1522 - NC 32	1.60	5	69	150	9,400	16,500	33,300	ADQ			
NC 32 - US 264 / NC 92 SPLIT	2.60	2	24	100	4,900	7,700	6,000	33,300	4	F	110
US 264/NC 92 SPLIT - SR 1718	9.50	2	24	100	4,500	7,300	6,000	33,300	4	F	110
SR 1718 - SR 1616	4.50	2	24	100	2,300	3,100	6,000	33,300	4	F	110
SR 1616 - SR 1628	1.00	2	24	100	5,000	7,600	6,000	33,300	4	F	110
SR 1628 - SR 1628 (LOOP)	0.50	2	24	100	5,000	7,600	6,000	33,300	4	F	110
SR 1628 - SR 1700 (264/99)	0.80	2	28	60	4,500	6,100	6,000	33,300	4	F	110
SR 1700 - NC 99 (BYP 264)	3.10	2	28	60	4,300	6,700	6,100	33,300	4	F	110
NC 99 (BYP 264) - BUS 264	0.50	2	28	100	6,100	10,100	6,100	33,300	4	F	110
BUS 264 - BYP / BUS 264 MERGE	2.30	2	28	100	2,900	4,100	6,000	ADQ			
BYP/BUS 264 - Hyde County Line	5.50	2	24	100	3,600	4,800	6,000	ADQ			
BUS 264	*See NC 99*										
NC 32 (Washington Co. - US 17)											
Washington County - SR 1612	8.40	2	20	100	2,200	3,100	8,300	9,700	2	K	100
SR 1612 - WUPB	8.40	2	22	100	2,800	3,700	9,100	ADQ			
NC 33 (Pitt Co. - Pamlico County)											
Pitt County - Western WUPB	2.30	2	26	60	7,600	13,700	9,700	34,000	4	G/PS[4]	70
Eastern WUPB - SR 1124	3.20	2	22	100	3,600	5,400	9,100	9,700	2	K	100
SR 1124 - SR 1117	4.50	2	22	100	3,800	6,000	9,100	9,700	2	K	100
SR 1117 - SR 1952	5.90	2	22	60	2,200	4,800	9,100	9,700	2	K	100
SR 1952 - SR 1947	4.60	2	24	60	3,600	6,000	9,700	ADQ			
SR 1947 - SR 1003	1.30	2	24	60	3,600	6,300	9,700	ADQ			
SR 1003 - NC 33/306 Split	3.10	2	24	100	6,000	10,800	9,700	34,000	4	P/PS[4]	70
NC 33/306 Split - South Creek	1.30	2	26	80	2,600	3,800	9,800	ADQ			
South Creek - SR 1002	0.20	2	24	100	580	800	9,700	ADQ			
SR 1002 - Pamlico County	8.80	2	24	100	310	400	9,700	ADQ			

Table B-1

Thoroughfare Plan Street Tabulation and Recommendation

FACILITY & SECTION	EXISTING CROSS SECTION				AVERAGE DAILY TRAFFIC		PRACTICAL CAPACITY		RECOMMENDED CROSS-SECTION		
	DIST mi	NO. LANES	RDWY ft	ROW ft	1997	2030	EXIST.	REC.	NO. LANES	RDWY	ROW ft
NC 92/99 (US 264 - BYP 264)											
US 264 - SR 1339	5.60	2	24	100	3,300	5,900	9,700	ADQ			
SR 1339 - SR 1741	2.60	2	24	100	3,300	5,300	11,000	ADQ			
SR 1741 - SR 1746	8.50	2	20	100	2,200	3,500	8,300	9,700	2	O	100
SR 1746 - SR 1718	3.00	2	22	60	1,100	1,900	9,100	9,700	2	O	100
SR 1718 - SR 1714	1.80	2	26	60	2,500	3,600	9,700	ADQ			
SR 1714 - US 264	0.60	2	18	60	5,000	7,800	6,800	9,700	2	O	100
US 264 - BUS 264	1.70	2	40	60	6,000	10,000	9,700	34,000	4	P/PS[5]	70
BUS 264 - BYP 264	1.10	2	26	70	1,000	1,400	9,700	ADQ			
NC 99 / US 264	*See US 264*										
US 264 - SR 1625	0.50	2	20	60	2,200	2,900	9,200	ADQ			
SR 1625 - Hyde County	9.80	2	22	60	1,800	2,600	9,100	ADQ			
NC 102 (Pitt County - US 17)											
Pitt County - US 17	3.79	2	18	100	1,100	1,600	6,800	ADQ			
NC 171 (Martin Co. - US 17)											
Martin County - US 17	4.10	2	20	60	2,300	4,100	8,300	9,700	2	K	100
NC 306 (SR 1004 - Craven Co.)											
SR 1004 - NC 33	7.10	2	24	100	3,000	5,400	9,700	ADQ			
NC 33/306	*See NC 33*										
NC 33 - SR 1003	0.10	2	24	60	1,800	2,800	9,700	ADQ			
SR 1003 - Craven County	5.80	2	18	60	1,500	2,400	6,800	9,700	2	K	100
SR 1725 (SR 1722 - SR 1730)											
SR 1722 - SR 1730	5.50	2	20	60	1,300	1,800	8,300	ADQ			
SR 1718 (NC 99 - SR 1732)											
NC 99 - SR 1732	5.50	2	20	60	1,400	2,000	8,300	ADQ			
SR 1714 (NC 99 - US 264)											
NC 99 - US 264	3.00	2	22	60	2,500	4,300	9,100	ADQ			
SR 1616 (US 264 - SR 1612)											
US 264 - SR 1612	3.60	2	22	60	940	1,400	9,100	ADQ			
SR 1612 (NC 32 - SR 1616)											
NC 32 - SR 1616	4.80	2	22	60	1,600	2,800	9,100	ADQ			

Table B-1

Thoroughfare Plan Street Tabulation and Recommendation

FACILITY & SECTION	EXISTING CROSS SECTION				AVERAGE DAILY TRAFFIC		PRACTICAL CAPACITY		RECOMMENDED CROSS-SECTION		
	DIST mi	NO. LANES	RDWY ft	ROW ft	1997	2030	EXIST.	REC.	NO. LANES	RDWY	ROW ft
SR 1532 (SR 1508 - NC 32)											
SR 1508 - NC 32	2.40	2	20	60	600 [2]	1,100	8,300	ADQ			
SR 1511 (US 17 - SR 1422)											
US 17 - SR 1422	2.10	2	22	60	640	1,300	9,100	ADQ			
SR 1508 (Washington Co. - SR 1532)											
Washington County - SR 1532	7.20	2	22	60	800	1,100	9,100	ADQ			
SR 1507 (NC 32 - SR 1501)											
NC 32 - SR 1522	5.60	2	24	60	1,100	2,600	9,700	ADQ			
SR 1522 - WUPB	0.20	2	24	60	2400 [3]	4,800	9,700	ADQ			
SR 1501 (US 264 - SR 1522)	*SEE WUTP*										
SR 1422 (US 264 - NC 171)											
WUPB - NC 171	2.40	2	22	60	1,000	2,000	5,600	ADQ			
SR 1416 (Pitt Co. - SR 1001)											
Pitt County - SR 1001	0.40	2	22	60	2,300	4,200	9,100	ADQ			
SR 1409 (US 264 - US 17)											
SR 1409 - US 264	0.10	2	22	60	2,600	4,900	9,100	ADQ			
US 264 - SR 1001	1.80	2	22	60	2,200	4,400	9,100	ADQ			
SR 1001 - US 17	2.30	2	22	60	1,800	3,100	9,100	ADQ			
SR 1352 (US 264 - NC 32)	*SEE WUTP*										
SR 1311 (NC 32 - SR 1313)	*SEE WUTP*										
SR 1306 (US 17 - US 264)	*SEE WUTP*										
SR 1303 (US 264 - NC 32)	*SEE WUTP*										
SR 1300 (NC 32 - Broad Creek)	*SEE WUTP*										
SR 1123 (NC 33 - SR 1124)											
WUPB - SR 1124	0.90	2	22	60	800	1,600	9,100	ADQ			

Table B-1

Thoroughfare Plan Street Tabulation and Recommendation

FACILITY & SECTION	EXISTING CROSS SECTION				AVERAGE DAILY TRAFFIC		PRACTICAL CAPACITY		RECOMMENDED CROSS-SECTION		
	DIST mi	NO. LANES	RDWY ft	ROW ft	1997	2030	EXIST.	REC.	NO. LANES	RDWY	ROW ft
SR 1114 (SR 1124 - NC 33)											
SR 1124 - SR 1112	1.60	2	22	60	330[3]	700	9,100	ADQ			
SR 1112 - SR 1115	2.20	2	22	60	410[3]	900	9,100	ADQ			
SR 1115 - NC 33	0.60	2	22	60	440[3]	900	9,100	ADQ			
SR 1003 (NC 33 - Craven Co.)											
NC 33 - SR 1932	1.50	2	19	60	1,100	2,000	6,800	9,700	2	O	100
SR 1932 - Craven County	3.40	2	19	60	1,100	2,000	6,800	9,700	2	O	100
SR 1001 (Martin Co. - US 17)											
Martin County - SR 1416	0.30	2	22	60	590	1,200	9,100	ADQ			
SR 1416 - SR 1410	7.60	2	22	60	710	1,300	9,100	ADQ			
SR 1410 - WUPB	1.30	2	22	60	1,100	2,000	9,100	ADQ			
Notes:											
1 - Base year 1993											
2 - Base year 1995											
3 - Base year 1996											
4 - (PS) Paved Shoulders											
5 - Paved Shoulders & No Median											

Appendix C
Typical Thoroughfare Cross Sections

Cross section requirements for thoroughfares vary according to the desired capacity and level of service to be provided. Universal standards in the design of thoroughfares are not practical. Each roadway section must be individually analyzed and its cross section determined based on the volume and type of projected traffic, existing capacity, desired level of service, and available right-of-way. Based on this criteria, recommended typical cross-sections are given in Appendix B, Table B-1. Typical cross section recommendations are shown in Figure C-1. These cross sections are typical for facilities on new location and where right-of-way constraints are not critical. For widening projects and urban projects with limited right-of-way, special cross sections should be developed that meet the needs of the project.

On all existing and proposed major thoroughfares delineated on the thoroughfare plan, adequate right-of-way should be protected or acquired for the recommended cross sections. In addition to cross-section and right-of-way recommendations for improvements, Table B-1 may recommend ultimate needed right-of-way for the following situations:

- thoroughfares which may require widening after the current planning period,
- thoroughfares which are borderline adequate and accelerated traffic growth could render them deficient, and
- thoroughfares where an urban curb and gutter cross section may be locally desirable because of urban development or redevelopment.

Recommended design standards relating to grades, sight distances, degree of curve, super elevation, and other considerations for thoroughfares are given in Appendix D. The typical cross sections are described below.

A - Four Lanes Divided with Median - Freeway

Cross-section "A" is typical for four lane divided highways in rural areas that may have only partial or no control of access. The minimum median width for this cross section is 46 feet, but a wider median is desirable.

B - Seven Lanes - Curb & Gutter

Cross section "B" is typically not recommended for new projects. When the conditions warrant six lanes, cross section "D" should be recommended. Cross section "B" should be used only in special situations such as when widening from a five-lane section and right-of-way is limited. Even in these situations, consideration should be given to converting the center turn lane to a median so that cross section "D" is the final cross section.

C - Five Lanes - Curb & Gutter

Typical for major thoroughfares, cross section "C" is desirable where frequent left turns are anticipated as a result of abutting development or frequent street intersections.

D - Six Lanes Divided with Raised Median - Curb & Gutter/ E - Four Lanes Divided with Raised Median - Curb and Gutter

Cross sections "D" and "E" are typically used on major thoroughfares where left turns and intersection streets are not as frequent. Left turns would be restricted to a few selected intersections. The 16 ft median is the minimum recommended for an urban boulevard type cross section. In most instances, monolithic construction should be utilized due to greater cost effectiveness, ease and speed of placement, and reduced future maintenance requirements. In special cases, grassed or landscaped medians result in greatly increased maintenance costs and an increase in danger to maintenance personnel. Non-monolithic medians should only be recommended when the above concerns are addressed.

F - Four Lanes Divided - Boulevard, Grass Median

Cross-section "F" is typically recommended for urban boulevards or parkways to enhance the urban environment and to improve the compatibility of major thoroughfares with residential areas. A minimum median width of 24 ft is recommended with 30 ft being desirable.

G - Four Lanes - Curb & Gutter

Cross section "G" is recommended for major thoroughfares where projected travel indicates a need for four travel lanes but traffic is not excessively high, left turning movements are light, and right-of-way is restricted. An additional left turn lane would probably be required at major intersections. This cross section should be used only if the above criteria is met. If right-of-way is not restricted, future strip development could take place and the inner lanes could become de facto left turn lanes.

H - Three Lanes - Curb & Gutter

In urban environments, thoroughfares which are proposed to function as one-way traffic carriers would typically require cross section "H".

I - Two Lanes - C&G, Parking both sides: J - Two Lanes - C&G, Parking one side

Cross sections "I" and "J" are usually recommended for urban minor thoroughfares since these facilities usually serve both land service and traffic service functions. Cross section "I" would be used on those minor thoroughfares where parking on both sides is needed as a result of more intense development.

K - Two Lanes - Paved Shoulder

Cross section "K" is used in rural areas or for staged construction of a wider multi-lane cross section. On some thoroughfares, projected traffic volumes may indicate that two travel lanes will adequately serve travel for a considerable period of time. For areas that are growing and future widening will be necessary, the full right-of-way of 100 ft should be required. In some instances, local ordinances may not allow the full 100 ft. In those cases, 70 ft should be preserved with the understanding that the full 70 ft will be preserved by use of building setbacks and future street line ordinances.

L - Six Lanes Divided with Grass Median - Freeway

Cross section "L" is typical for controlled access freeways. The 46 ft grassed median is the minimum desirable median width, but there could be some variation from this depending upon design considerations. Right-of-way requirements would typically vary upward from 228 ft depending upon cut and fill requirements.

M - Eight Lanes Divided with Raised Median - Curb & Gutter

Also used for controlled access freeways, cross section "M" may be recommended for freeways going through major urban areas or for routes projected to carry very high volumes of traffic.

N - Five Lanes/C&G, Widened Curb Lanes; O - Two Lane/Shoulder Section; P - Four Lanes Divided/Raised Median, C&G, Widened Curb Lanes

If there is sufficient bicycle travel along the thoroughfare to justify a bicycle lane or bikeway, additional right-of-way may be required to contain the bicycle facilities. The North Carolina Bicycle Facilities Planning and Design Guidelines should be consulted for design standards for bicycle facilities. Cross sections "N", "O", and "P" are typically used to accommodate bicycle travel.

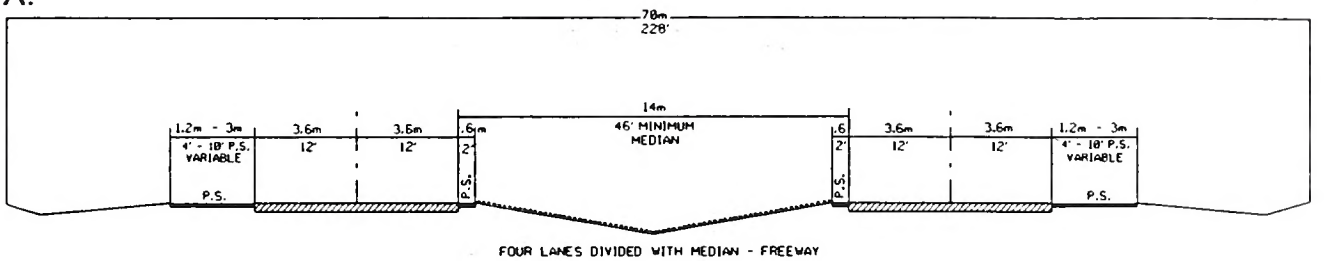
General

The urban curb and gutter cross sections all illustrate the sidewalk adjacent to the curb with a buffer or utility strip between the sidewalk and the minimum right-of-way line. This permits adequate setback for utility poles. If it is desired to move the sidewalk farther away from the street to provide additional separation for pedestrians or for aesthetic reasons, additional right-of-way must be provided to insure adequate setback for utility poles.

The right-of-way shown for each typical cross section is the minimum amount required to contain the street, sidewalks, utilities, and drainage facilities. Cut and fill requirements may require either additional right-of-way or construction easements. Obtaining construction easements is becoming the more common practice for urban thoroughfare construction.

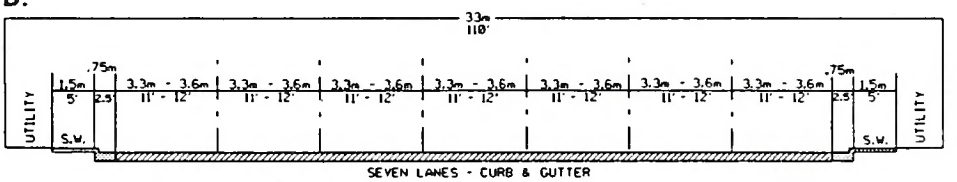
TYPICAL THOROUGHFARE CROSS SECTIONS

A.



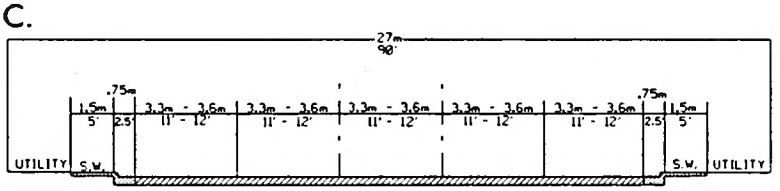
FOUR LANES DIVIDED WITH MEDIAN - FREEWAY

B.



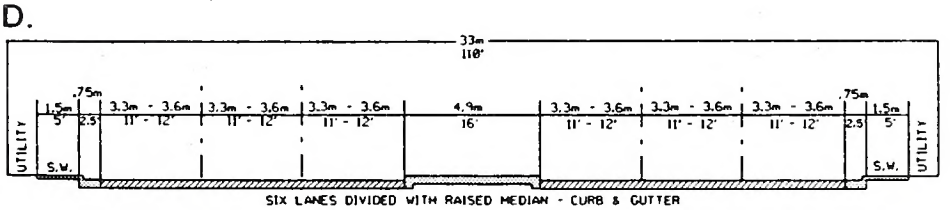
SEVEN LANES - CURB & GUTTER

C.



FIVE LANES - CURB & GUTTER

D.

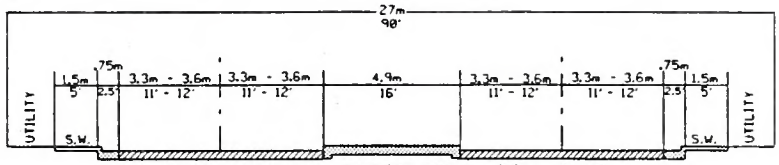


SIX LANES DIVIDED WITH RAISED MEDIAN - CURB & GUTTER

FIGURE C-1

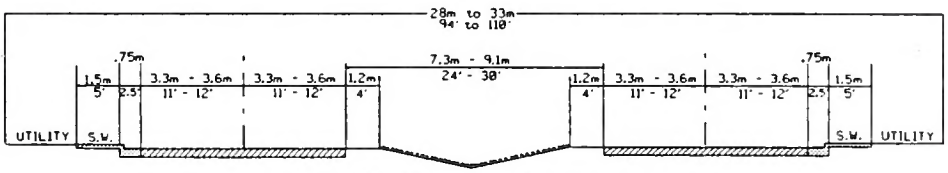
TYPICAL THOROUGHFARE CROSS SECTIONS

E.



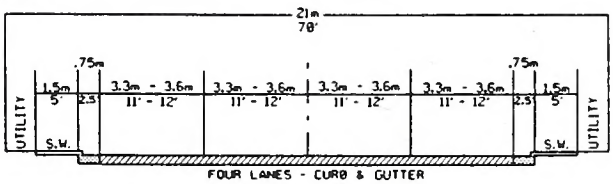
FOUR LANES DIVIDED WITH RAISED MEDIAN - CURB & GUTTER

F.



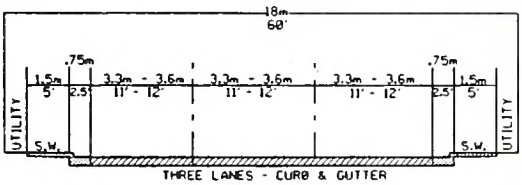
FOUR LANES DIVIDED - BOULEVARD
GRASS MEDIAN

G.



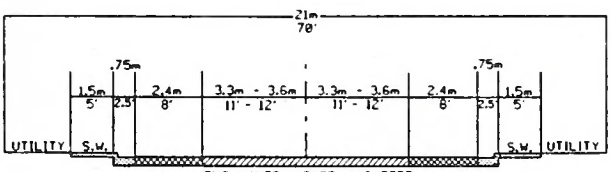
FOUR LANES - CURB & GUTTER

H.



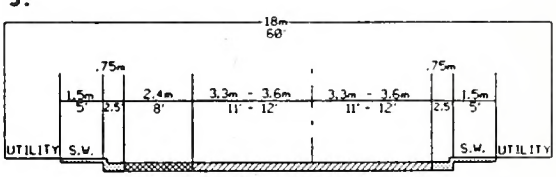
THREE LANES - CURB & GUTTER

I.



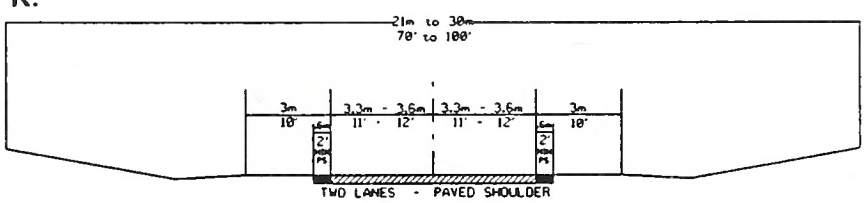
TWO LANES - CURB & GUTTER
PARKING ON EACH SIDE

J.



TWO LANES - CURB & GUTTER
PARKING ON ONE SIDE

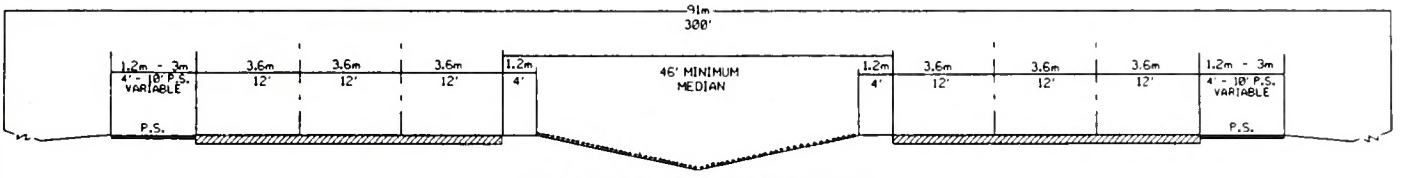
K.



TWO LANES - PAVED SHOULDER

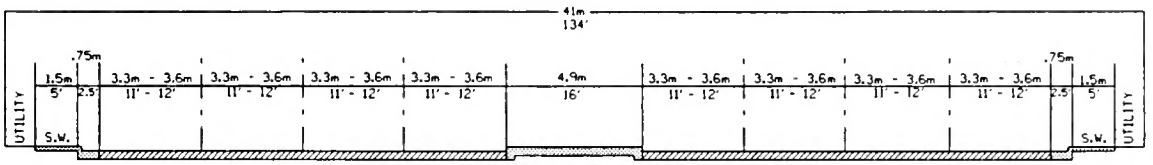
TYPICAL THOROUGHFARE CROSS SECTIONS

L.



SIX LANES DIVIDED WITH GRASS MEDIAN - FREEWAY

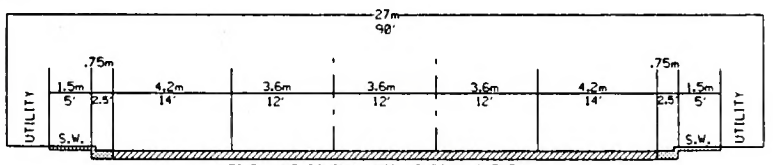
M.



EIGHT LANES DIVIDED WITH RAISED MEDIAN - CURB & GUTTER

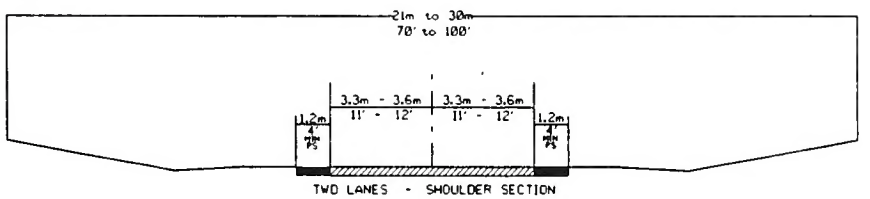
TYPICAL THOROUGHFARE CROSS SECTIONS FOR ACCOMMODATING BICYCLES

N.



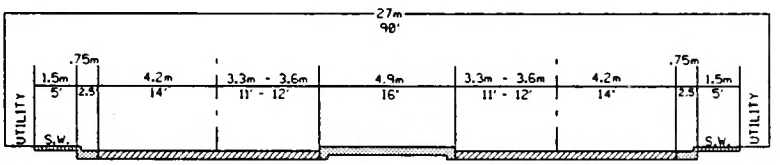
FIVE-LANE ROADWAY WITH CURB & GUTTER,
STANDARD INSIDE LANES & WIDENED CURB LANES

O.



TWO LANES - SHOULDER SECTION

P.



FOUR LANES DIVIDED WITH RAISED MEDIAN - CURB & GUTTER,
STANDARD INSIDE LANES & WIDENED CURB LANES

Appendix D
Recommended Subdivision Ordinances

Definitions

Streets and Roads

Rural Roads

1. *Principal Arterial* - A rural link in a highway system serving travel, and having characteristics indicative of substantial statewide or interstate travel and existing solely to serve traffic. This network would consist of interstate routes and other routes designated as principal arterials.

2. *Minor Arterial* - A rural roadway joining cities and larger towns and providing intrastate and intercounty service at relatively high overall travel speeds with minimum interference to through movement.

3. *Major Collector* - A road which serves major intracounty travel corridors and traffic generators and provides access to the arterial system.

4. *Minor Collector* - A road which provides service to small local communities and traffic generators and provides access to the major collector system.

5. *Local Road* - A road which serves primarily to provide access to adjacent land, over relatively short distances.

Urban Streets

1. *Major Thoroughfares* - Major thoroughfares consist of interstate, other freeway, expressway, or parkway roads, and major streets that provide for the expeditious movement of high volumes of traffic within and through urban areas.

2. *Minor Thoroughfares* - Minor thoroughfares perform the function of collecting traffic from local access streets and carrying it to the major thoroughfare system. Minor thoroughfares may be used to supplement the major thoroughfare system by facilitating minor through traffic movements and may also serve abutting property.

3. *Local Street* - A local street is any street not on a higher order urban system and serves primarily to provide direct access to abutting land.

Specific Type Rural or Urban Streets

1. *Freeway, expressway, or parkway* - Divided multilane roadways designed to carry large volumes of traffic at high speeds. A *freeway* provides for continuous flow of vehicles with no direct access to abutting property and with access to selected crossroads only by way of interchanges. An *expressway* is a facility with full or partial control of access and generally

with grade separations at major intersections. A *parkway* is for non-commercial traffic, with full or partial control of access.

2. *Residential Collector Street* - A local street which serves as a connector street between local residential streets and the thoroughfare system. Residential collector streets typically collect traffic from 100 to 400 dwelling units.

3. *Local Residential Street* - Cul-de-sacs, loop streets less than 2500 feet in length, or streets less than 1.0 miles in length that do not connect thoroughfares, or serve major traffic generators, and do not collect traffic from more than 100 dwelling units.

4. *Cul-de-sac* - A short street having only one end open to traffic and the other end being permanently terminated and a vehicular turn-around provided.

5. *Frontage Road* - A road that is parallel to a partial or full access controlled facility and provides access to adjacent land.

6. *Alley* - A strip of land, owned publicly or privately, set aside primarily for vehicular service access to the back side of properties otherwise abutting on a street.

Property

1. Building Setback Line - A line parallel to the street in front of which no structure shall be erected.

2. Easement - A grant by the property owner for use by the public, a corporation, or person(s), of a strip of land for a specific purpose.

3. Lot - A portion of a subdivision, or any other parcel of land, which is intended as a unit for transfer of ownership or for development or both. The word "lot" includes the words "plat" and "parcel".

Subdivision

- Subdivider - Any person, firm, corporation or official agent thereof, who subdivides or develops any land deemed to be a subdivision.

- Subdivision - All divisions of a tract or parcel of land into two or more lots, building sites, or other divisions for the purpose, immediate or future, of sale or building development and all divisions of land involving the dedication of a new street or change in existing streets.

  The following shall not be included within this definition nor subject to these regulations:

  * the combination or re-combination of portions of previously platted lots where the total number of lots is not increased and the resultant lots are equal to or exceed the standards contained herein,
  * the division of land into parcels greater then 10 acres where no street right-of-way dedication is involved,
  * the public acquisition, by purchase, of strips of land for the widening or the opening of streets, and

* the division of a tract in single ownership whose entire area is no greater than 2 acres into not more than three lots, where no street right-of-way dedication is involved and where the resultant lots are equal to or exceed the standards contained herein.

- Dedication - A gift, by the owner, of his property to another party without any consideration being given for the transfer. The dedication is made by written instrument and is completed with an acceptance.

- Reservation - Reservation of land does not involve any transfer of property rights. It constitutes an obligation to keep property free from development for a stated period of time.

Roadway Design Standards

The design of all roads within a planning area shall be in accordance with the accepted policies of the North Carolina Department of Transportation, Division of Highways, as taken or modified from the American Association of State Highway & Transportation Officials' (AASHTO) manuals.

The provision of right-of-way for roads shall conform and meet the recommendations of the thoroughfare plan, as adopted by the municipality or county. The proposed street layout shall be coordinated with the existing street system of the surrounding area. Normally, the proposed streets should be the extension of existing streets if possible.

Right-of-Way Widths

Right-of-way (ROW) widths shall not be less than the following and shall apply except in those cases where ROW requirements have been specifically set out in the thoroughfare plan.

The subdivider will only be required to dedicate a maximum of 100 feet of ROW. In cases where over 100 feet of right-of-way is desired, the subdivider will be required only to reserve the amount in excess of 100 feet. In all cases in which ROW is sought for a fully controlled access facility, the subdivider will only be required to make a reservation. It is strongly recommended that subdivisions provide access to properties from internal streets, and that direct property access to major thoroughfares, principle and minor arterials, and major collectors be avoided. Direct property access to minor thoroughfares is also undesirable.

A partial width ROW, not less then 60 feet, may be dedicated when adjoining undeveloped property is owned or controlled by the subdivider. This is provided that the width of a partial dedication is such as to permit the installation of such facilities as may be necessary to serve abutting lots. When the said adjoining property is sub-divided, the remainder of the full required right-of-way shall be dedicated.

Table D-1

Minimum Right-of-way Requirements

Area Classification	Functional Classification	Minimum ROW
RURAL	Principle Arterial	Freeways- 350 ft Other- 200 ft
	Minor Arterial	100 ft
	Major Collector	100 ft
	Minor Collector	80 ft
	Local Road	60 ft[1]
URBAN	Major Thoroughfare	90 ft
	Minor Thoroughfare	70 ft
	Local Street	60 ft[1]
	Cul-de-sac	variable[2]

[1] The desirable minimum ROW is 60 ft. If curb and gutter is provided, 50 ft of ROW is adequate on local residential streets.

[2] The ROW dimension will depend on radius used for vehicular turn around. Distance from edge of pavement of turn around to ROW should not be less than distance from edge of pavement to ROW on street approaching turn around.

Street Widths

Widths for street and road classifications other than local shall be as recommended by the thoroughfare plan. Width of local roads and streets shall be as follows:

- ***Local Residential***
  - * Curb and Gutter section: 26 feet, face to face of curb
  - * Shoulder section: 20 feet to edge of pavement, 4 feet for shoulders

- ***Residential Collector***
  - * Curb and Gutter section: 34 feet, face to face of curb
  - * Shoulder section: 20 feet to edge of pavement, 6 feet for shoulders

Geometric Characteristics

The standards outlined below shall apply to all subdivision streets proposed for addition to the State Highway System or Municipal Street System. In cases where a subdivision is sought adjacent to a proposed thoroughfare corridor, the requirements of dedication and reservation discussed under the 'Right-of-Way Widths' section shall apply.

1. *Design Speed* - The design speed for a roadway should be a minimum of 5 mph greater than the posted speed limit. The design speeds for subdivision type streets are shown in Table D-2.

2. *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 parameters set forth in Table D-3.

3. *Superelevation* - Table D-4 shows the minimum radius and the related maximum superelevation for design speeds. The maximum rate of roadway superelevation (e) for rural roads with no curb and gutter is 0.08. The maximum rate of superelevation for urban streets with curb and gutter is 0.06, with 0.04 being desirable.

4. *Maximum and Minimum Grades* - The maximum grades in percent are shown in Table D-5. Minimum grade should not be less then 0.5%. Grades for 100 feet each way from intersections (measured from edge of pavement) should not exceed 5%.

Table D-2

Design Speeds

Facility Type	Design Speed (mph) Desirable	Minimum Level	Minimum Rolling
RURAL			
Minor Collector Roads (ADT Over 2000)	60	50	40
Local Roads[1] (ADT Over 400)	50	*50	*40
URBAN			
Major Thoroughfares[2]	60	50	40
Minor Thoroughfares	40	30	30
Local Streets	30	**30	**20

Note: *Based on ADT of 400-750. Where roads serve a limited area and small number of units, can reduce minimum design speed. **Based on projected ADT of 50-250. (Reference NCDOT Roadway Design Manual page 1-1B)

[1] Local Roads including Residential Collectors and Local Residential.

[2] Major Thoroughfares other than Freeways or Expressways.

Table D-3

Sight Distance

Design Speed (mph)	Stopping Sight Distance (feet)		Minimum K[1] Values (feet)		Passing Sight Distance (feet)
	Desirable	Minimum	Crest Curve	Sag Curve	For 2-lanes
30	200	200	30	40	1100
40	325	275	60	60	1500
50	475	400	110	90	1800
60	650	525	190	120	2100

Note: General practice calls for vertical curves to be multiples of 50 feet. Calculated lengths shall be rounded up in each case. (Reference NCDOT Roadway Design Manual page 1-12 T-1)

[1]K is a coefficient by which the algebraic difference in grade may be multiplied to determine the length of the vertical curve, which will provide the desired sight distance. Sight distance provided for stopped vehicles at intersections should be in accordance with "A Policy on Geometric Design of Highways and Streets, 1990".

Table D-4

Superelevation

Design Speed (mph)	Minimum Radius of Maximum e[1]			Maximum Degree of Curve		
	e=0.04	e=0.06	e=0.08	e=0.04	e=0.06	e=0.08
30	302	273	260	19 00'	21 00'	22 45'
60	573	521	477	10 00'	11 15'	12 15'
80	955	955	819	6 00'	6 45'	7 30'
100	1,637	1,432	1,146	3 45'	4 15'	4 45'

[1] e = rate of roadway superelevation, foot per foot

Note: (Reference NCDOT Roadway Design Manual page 1-12 T-6 thru T-8)

Table D-5

Maximum Vertical Grade

Facility Type and Design Speed (mph)		Minimum Grade in Percent		
		Flat	Rolling	Mountainous
RURAL				
Minor Collector Roads*				
	20	7	10	12
	30	7	9	10
	40	7	8	10
	50	6	7	9
	60	5	6	8
	70	4	5	6
Local Roads*[1]				
	20	-	11	16
	30	7	10	14
	40	7	9	12
	50	6	8	10
	60	5	6	-
URBAN				
Major Thoroughfares[2]				
	30	8	9	11
	40	7	8	10
	50	6	7	9
	60	5	6	8
Minor Thoroughfares*				
	20	9	12	14
	30	9	11	12
	40	9	10	12
	50	7	8	10
	60	6	7	9
	70	5	6	7
Local Streets*				
	20	-	11	16
	30	7	10	14
	40	7	9	12
	50	6	8	10
	60	5	6	-

Note: *For streets and roads with projected annual average daily traffic less than 250 or short grades less than 500 ft long, grades may be 2% steeper than the values in the above table. (Reference NCDOT Roadway Metric Design Manual page 1-12 T-3)

[1] Local Roads including Residential Collectors and Local Residential.

[2] Major Thoroughfares other than Freeways or Expressways.

Intersections

1. Streets shall be laid out so as to interest as nearly as possible at right angles, and no street should intersect any other street at an angle less than sixty-five (65) degrees.

2. 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.

3. Offset intersections are to be avoided. Intersections that cannot be aligned should be separated by a minimum length of 200 feet between survey centerlines.

Cul-de-sacs

Cul-de-sacs shall not be more than 500 feet in length. The distance from the edge of pavement on the vehicular turn around to the right-of-way line should not be less than the distance from the edge of pavement to right-of-way line on the street approaching the turn around. Cul-de-sacs should not be used to avoid connection with an existing street or to avoid the extension of an important street.

Alleys

1. Alleys shall be required to serve lots used for commercial and industrial purposes except that this requirement may be waived where other definite and assured provisions are mode for service access. Alleys shall not be provided in residential subdivisions unless necessitated by unusual circumstances.

2. The width of an alley shall be at least 20 feet.

3. Dead-end alleys shall be avoided where possible, but if unavoidable, shall be provided with adequate turn around as may be required by the planning board.

Permits for Connection to State Roads

An approved permit is required for connection to any existing state system road. This permit is required prior to any construction on the street or road. The application is available at the office of the District Engineer of the Division of Highways.

Offsets To Utility Poles

Poles for overhead utilities should be located clear of roadway shoulders, preferably a minimum of at least 30 feet form the edge of pavement. On streets with curb and gutter, utility poles shall be set back a minimum distance of 6 feet from the face of curb.

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.

Horizontal Width on Bridge Deck

The clear roadway widths for new and reconstructed bridges serving two-lane, two-way traffic should be as follows:

- shoulder section approach:
    * under 800 ADT design year - minimum 28 feet width face to face of parapets, rails, or pavement width plus 10 feet, whichever is greater,
    * 800 - 2000 ADT design year - minimum 34 feet width face to face of parapets, rails, or pavement width plus 12 feet, whichever is greater,
    * over 2000 ADT design year - minimum width of 40 feet, desirable width of 44 feet width face to face of parapets or rails;
- curb and gutter approach:
    * under 800 ADT design year - minimum 24 feet face to face of curbs,
    * over 800 ADT design year - width of approach pavement measured face to face of curbs,
    * where curb and gutter sections are used on roadway approaches, curbs on bridges shall match the curbs on approaches in height, in width of face to face curbs, and in crown drop; the distance from face of curb tc face of parapet or rail shall be a minimum of 1.5 feet, or greater if sidewalks are required.

The clear roadway widths for new and reconstructed bridges having 4 or more lanes serving undivided two-way traffic should be as follows:

- shoulder section approach - width of approach pavement plus width of usable shoulders on the approach left and right. (shoulder width 8 feet minimum, 10 feet desirable)
- curb and gutter approach - width of approach pavement measured face to face of curbs.

Appendix E
Index for Secondary Road Numbers

- SR 1001 – Cherry Run Road
- SR 1003 – Tunstall Swamp Road
- SR 1114 – Clay Bottom School Road
- SR 1123 – Old Blounts Creek Road
- SR 1300 – River Road
- SR 1303 – Brick Kiln Road
- SR 1306 – Fifteenth Street
- SR 1311 – S. Asbury Church Road
- SR 1352 – Hudnell Street
- SR 1409 – Wharton Station Road
- SR 1416 – Sheppard Mill Road
- SR 1422 – Market Street Extension
- SR 1501 – Old Bath Highway
- SR 1507 – Slatestone Road
- SR 1508 – Long Ridge Road
- SR 1511 – Mill Road
- SR 1532 – Ripp Highway
- SR 1612 – Terra Ceia Road
- SR 1616 – White Six Road
- SR 1714 – Seed Tick Neck Road
- SR 1718 – Yeatesville Road
- SR 1725 – Pamlico Beach Road

Appendix F
Transportation Improvement Program
Project Request Process

The process for requesting projects to be included in the Transportation Improvement Program (TIP) is described briefly in this appendix.

The local representatives should first decide which projects from the thoroughfare plan they would like funded in the TIP. A TIP request for a few carefully selected projects is likely to be more effective than requesting all the projects proposed in the thoroughfare plan. These projects should be prioritized by the local representatives and summarized briefly, as shown on Appendix Page F-3.

After determining which projects are the highest priority for the area, a TIP project request should be sent to the Board of Transportation Member from the municipality's or county's respective district. The TIP project request should include a letter with a prioritized summary of requested projects, as well as a TIP candidate project request form and a project location map for each project. An example of each of these items is included in this appendix.

Example

* *Note: This is not an official request submitted to the Board of Transportation. This is intended to be an example of a Transportation Improvement Program (TIP) Request.*

Month ##, Year

North Carolina Board Member
N. C. Board of Transportation
N. C. Department of Transportation
P. O. Box 25201
Raleigh, NC 27611-5201

Dear Board Member:

SUBJECT: 2000-2006 TIP Project Requests for *Generic* County

Enclosed find the projects requested by *Generic* County for consideration in the next TIP update. The list is presented by priority, as approved by the *Generic* County Commissioners at their *Month* meeting.

Generic County also endorsed the existing schedule of projects contained in the current TIP for the county, with one request. The county requests that TIP Project R-*XXXX* remain as a high priority and kept on the existing schedule.

We thank you for the opportunity to participate in development of the State TIP. Please contact us immediately if additional information is needed concerning any of the enclosed project requests.

Sincerely,

John Q. Public

cc: Division Engineer
Enclosure

Generic County
County Commissioners
2000 Proposed Highway Projects (Final)

1) **SR 1111 (Town Street) & SR 1112 (Industry Drive) TIP Project R-XXXX**
   - From SR 1113 (Country Road) to NC 11
   - Widen roadway to a multilane facility, with some new location

2) **US 11**
   - From SR 1112 (Industry Drive) to SR 1113 (Country Road)
   - Widen roadway to a multilane facility

3) **NC 11**
   - From SR 1114 (Any Road) to the existing four lane section just south of I-85
   - Widen roadway to a multilane facility

4) **US 11 Business (Business Road)**
   - From SR 1115 (Some Road) to NC 12
   - Widen facility to a five lane cross section

5) **New Connector**
   - From US 11 to US 112 Business (City Street)
   - New Facility

Highway Program
TIP Candidate Project Request

(Please Provide Information if Available)

Date ##/##/## Priority No. #

County *Generic* City/Town

Requesting Agency *County Commissioners* NCTIP No. *R-####* (if available)

Route (US, NC, SR/Local Name) *SR 1111(Town Street) and SR 1112(Industry Drive)*

Project Location (From/To/Length) *From SR 1113 (Country Road) to NC 11, #.# miles*

Type of Project (Widening, New Facility, Bridge Replacement, Signing, Safety, Rail Crossing, Bicycle, Enhancement, etc.)
Widen roadway to a multi-lane facility, with some new location.

Existing Cross Section *24* Feet, Type

Existing Row *60 to 80* Feet Existing ADT *8,000 (1996)*

Estimated Cost, ROW $ *900,000* Construction $ *4,000,000*

Brief Justification for Project *As a major thoroughfare, this facility carries increasing traffic volumes between the industial sites along this route to NC 11 and the I-85 corridor. In the adopted thoroughfare plan for Generic County, it is recommended that this facility should be widen to a multi-lane cross section due to the increasing volume and the potential for more development in this area. The county requests that this project continue to be funded.*

Project Supported By (Agency/Group)

Other Information/ Justification

- ☒ Part of Thoroughfare Plan
- ☐ Part of Comprehensive Plan
- ☐ Serves School
- ☐ Serves Hospital
- ☐ Obsolete Facility
- ☐ Serves Park
- ☐ High Accident (#)
- ☐

(Please Attach Map Showing Project Location)