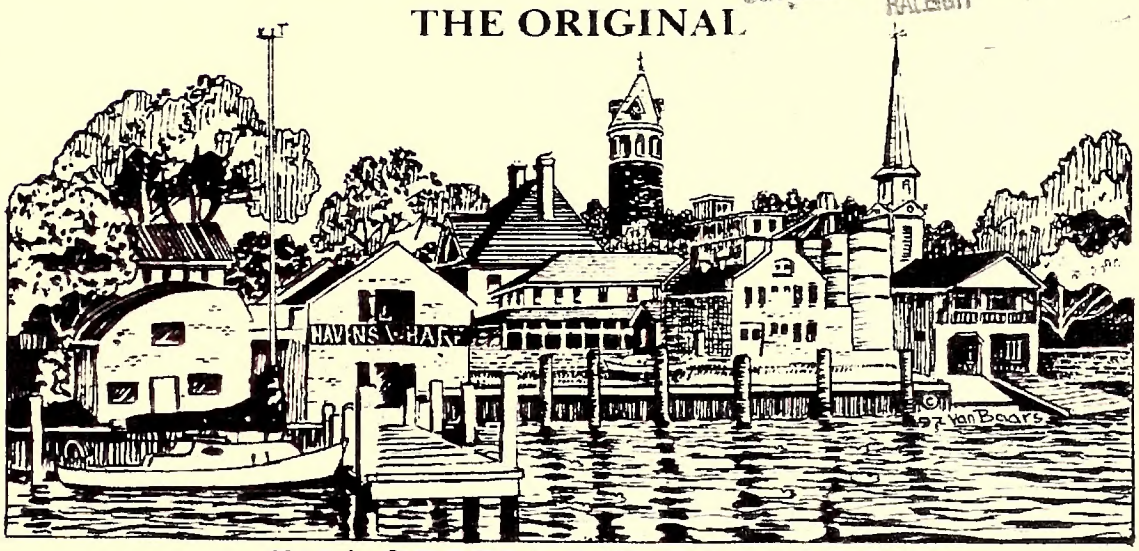
North Carolina Department of Transportation
Statewide Planning Branch
Small Urban Planning Unit

Thoroughfare Plan for the City of Washington



WASHINGTON, NC

September, 2000

City of Washington Thoroughfare Plan

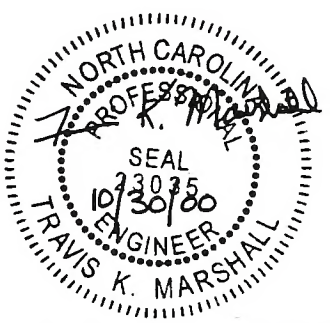
Prepared by the:

Statewide Planning Branch
Division of Highways
North Carolina Department of Transportation

In Cooperation With:

The City of Washington
The Federal Highway Administration
U.S. Department Of Transportation

September, 2000



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Executive Summary

This Plan documents the findings of a thoroughfare study for the City of Washington. Recommendations for this study are shown in Figure 3 and listed below with a brief description. A more detailed discussion of these recommendations can be found in Chapter 2.

Major Thoroughfares

- **US 264 Bypass** - Construction on new location of a two-lane facility from US 264 west of SR 1406 (Tranter Creek Estate Road) to US 264 at SR 1317 (River Acres Road). This facility should be constructed on four-lane right-of-way in anticipation of future widening. This alternate route would reduce traffic on the existing US 264 by moving local and through traffic out of the central business district.

- **US 17 Bypass (TIP Projects R-2510, R-2511, R-2513)** - Construction of a multi-lane facility on new location which would bypass the City of Washington and the Town of Chocowinity. This route would reduce traffic on US 264 and US 17 by moving local and through traffic out of the central business districts.

- **NC 33** - Widen roadway to a multi-lane facility from the proposed US 17 Bypass to the eastern planning boundary. This improvement would increase the capacity of the roadway with minimal damage to adjacent development.

- **NC 32 (TIP Project R-1014)** - Widen roadway to a multi-lane facility from SR 1300 (Christian Service Camp Road) to SR 1300 (River Road). This improvement would increase the capacity of the roadway with minimal damage to adjacent development.

  Replace bridge #103 (TIP Project B-4019) and improve horizontal alignment of the roadway from Runyon Creek Bridge to Walnut Street in the Town of Washington Park. These improvements would increase safety and reduce flooding along the roadway with minimal adverse effects.

- **Radial Connector** - Construction on new location of a two-lane connector from SR 1504 (Avon Avenue) connecting to SR 1501 (Highland Drive), SR 1422 (Market Street), US 17, and US 264. This facility would be constructed on multi-lane right-of-way in anticipation of future widening. It would provide an alternate for US 264 and Fifteenth Street, thus reducing traffic on both roadways.

  This new radial connector incorporates Avon Avenue into its alignment. Avon Avenue should be widened to two 12-foot lanes from US 264 to SR 1501 (Highland Drive). Right-of-way should be reserved for a multi-lane facility.

- **SR 1507 (Slatestone Road)** - Widen roadway from a two-lane facility to a three-lane facility from SR 1501 (Old Bath Highway) to SR 1518 (Corsica Road/CBH Lodge Road). This improvement will help with the morning and afternoon traffic trying to access the high school

and alleviate traffic congestion due to back-ups created by left turns into the high school parking lot.

Widen roadway to two 12-foot lanes from SR 1518 (Corsica Road/CBH Lodge Road) to SR 1520 (Terrapin Track Road). This improvement will improve safety conditions and increase the capacity of the roadway.

- **SR 1501 (Highland Drive; TIP Project U-2723)** - Widen roadway to a multi-lane facility from SR 1306 (W. Fifteenth Street) to SR 1507 (Slatestone Road). A multi-lane section is recommended because of the existing commercial development and capacity deficiencies. This improvement would provide access to adjacent land use without interruption to traffic flow due to turning vehicles.

- **SR 1403 (Clarks Neck Road)** - Widen from a two-lane facility to a four-lane facility from US 264 (Pactolus Road) to the Beaufort/Pitt county line. A four-lane section is recommended because of the existing commercial development and capacity deficiencies. This improvement would provide access to adjacent land use without interruption to traffic flow due to turning vehicles.

Minor Thoroughfares

- **Springs Road Extension** - Construction on new location of a two-lane connector from US 17 to US 264. This improvement would provide a continuous route from US 264 to SR 1422 (Market Street), thus reducing traffic on US 264 and Fifteenth Street.

- **Brick Kiln Road Extension** - Construction on new location of a two-lane connector from US 264 to SR 1501 (Highland Drive). This facility would provide an alternate route for accessing the high school located on SR 1507 (Slatestone Road). It would also reduce traffic on US 264 by moving local traffic out of the central business district.

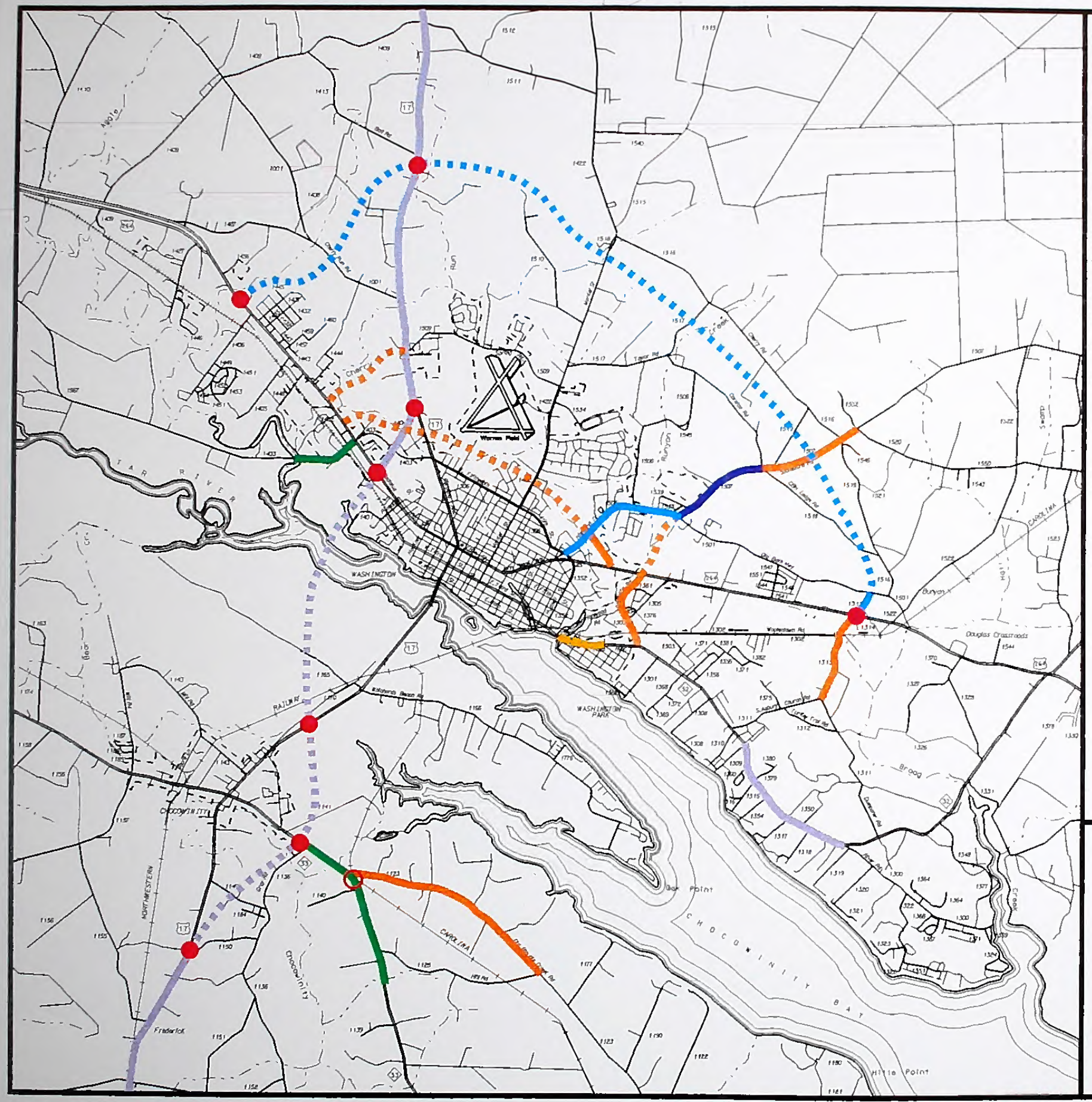
- **SR 1313 (N. Asbury Church Road)** - Widen roadway to two 12-foot lanes from SR 1311 (S. Asbury Church Road) to US 264. This improvement will improve safety conditions and increase the capacity of the roadway.

- **SR 1303 (Brick Kiln Road)** - Widen roadway to two 12-foot lanes from US 264 to NC 32. This improvement will improve safety conditions and increase the capacity of the roadway.

- **SR 1123 (Old Blounts Creek Road)** - Widen roadway to two 12-foot lanes from NC 33 to SR 1125 (Hill Road). This improvement will improve safety conditions and increase the capacity of the roadway.

Intersection Improvements

- **SR 1123 (Old Blounts Creek Road) & NC 33** - Install left and right turn lanes on SR 1123 (Old Blounts Creek Road) and a left turn lane on NC 33. This would improve safety conditions and improve the flow of traffic through the intersection.



RECOMMENDATIONS

LEGEND

# OF LANES (12 FT WIDE)	WIDENING	PROPOSED
2		
3		
4		
TIP Projects (Unfunded)		
TIP Projects (Funded)		
Safety Improvement		

	EXISTING	PROPOSED
Interchange		
Intersection Improvement		

N

S

CITY OF WASHINGTON

BEAUFORT COUNTY
NORTH CAROLINA

PREPARED BY THE

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

SCALE

0 1 2 3 miles

MAP DATE: MARCH 29, 2000

FIGURE 3

Priority List for Projects in Planning Area

City of Washington

1. **US 17 Bypass (TIP Projects R-2510, R-2511, R-2513)** - Construction of a multi-lane facility on new location which would bypass the City of Washington and the Town of Chocowinity.

2. **Highland Drive (SR 1501; TIP Project U-2723)** - Widen roadway to a multi-lane facility from SR 1306 (W. Fifteenth Street) to SR 1507 (Slatestone Road).

   AND

   SR 1507 (Slatestone Road) - Widen roadway from a two-lane facility to a three-lane facility from SR 1501 (Old Bath Highway) to SR 1518 (Corsica Road/CBH Lodge Road).

3. **Radial Connector** - Construction on new location of a two-lane connector from SR 1504 (Avon Avenue) connecting to SR 1501 (Highland Drive), SR 1422 (Market Street), US 17, and US 264. This facility would be constructed on multi-lane right-of-way in anticipation of future widening.

4. **SR 1504 (Avon Avenue)** - Widen roadway to two 12-foot lanes from US 264 to SR 1501 (Highland Drive). Right-of-way should be reserved for a multi-lane facility.

5. **SR 1507 (Slatestone Road)** - Widen roadway to two 12-foot lanes from SR 1518 (Corsica Road/CBH Lodge Road) to SR 1520 (Terrapin Track Road).

6. **SR 1303 (Brick Kiln Road)** - Widen existing roadway to two 12-foot lanes from US 264 to NC 32. Extension of Brick Kiln Road on new location, a two-lane connector from US 264 to SR 1501 (Highland Drive).

7. **NC 32 (TIP Project R-1014)** - Widen roadway to a multi-lane facility from SR 1309 (Christian Service Camp Road) to SR 1300 (River Road).

8. **SR 1313 (N. Asbury Church Road)** - Widen roadway to two 12-foot lanes from SR 1311 (S. Asbury Church Road) to US 264.

9. **SR 1403 (Clarks Neck Road)** - Widen from a two-lane facility to a four-lane facility from US 264 (Pactolus Road) to the Beaufort/Pitt County line.

10. **US 264 Bypass** - Construction on new location of a two-lane facility from US 264 west of SR 1406 (Tranter Creek Estate Road) to US 264 at SR 1317 (River Acres Road). This facility should be constructed on four-lane right-of-way in anticipation of future widening.

11. **Springs Road Extension** - Construction on new location of a two-lane connector from US 17 to US 264.

Town of Chocowinity

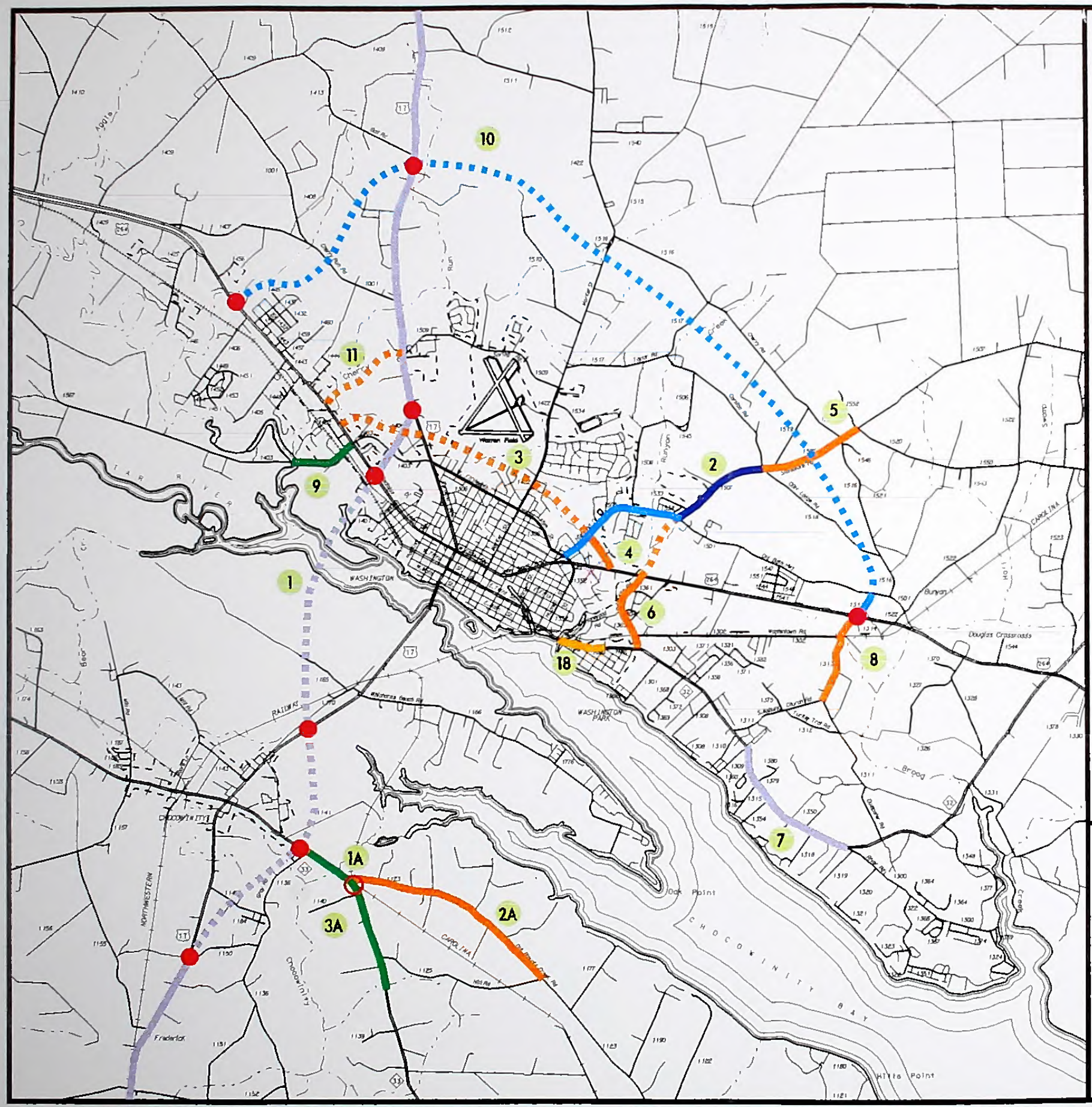
1A. **SR 1123 (Old Blounts Creek Road) & NC 33** - Install left and right turn lanes on SR 1123 (Old Blounts Creek Road) and a left turn lane on NC 33.

2A. **Old Blounts Creek Road (SR 1123)** - Widen roadway to two 12-foot lanes from NC 33 to SR 1125 (Hill Road).

3A. **NC 33** - Widen roadway to a multi-lane facility from the proposed US 17 Bypass to the eastern planning boundary.

Town of Washington Park

1B. **NC 32** - Replace bridge #103 (TIP Project B-4019) and improve horizontal alignment of roadway from Runyon Creek Bridge to Walnut Street.



CITY OF WASHINGHTON PRIORITY LIST FOR RECOMMENDED PROJECTS

LEGEND

# OF LANES (12 FT WIDE)	WIDENING	PROPOSED
2		
3		
4		
TIP Projects (Unfunded)		
TIP Projects (Funded)		
Sofety Improvement		

	EXISTING	PROPOSED
Interchange	●	●
Intersection Improvement		○
Priority		#

N

S

CITY OF WASHINGTON

BEAUFORT COUNTY
NORTH CAROLINA

PREPARED BY THE

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
STATEWIDE PLANNING BRANCH

IN COOPERATION WITH THE

U.S.DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

SCALE

0 1 2 3 miles

MAP DATE: MAY 3, 2000

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Chapter 1
Introduction

This report documents the findings of a study by the North Carolina Department of Transportation (NCDOT) to update the 1979 Washington-Washington Park Thoroughfare Plan. This study was initiated in March of 1997 in response to a request from local officials to evaluate the increased congestion on US 17 and US 264 in the Central Business District. The study culminated in the mutual adoption of an updated thoroughfare plan. The geographic location of the City of Washington is shown in Figure 1.

Thoroughfare planning enables a transportation system to be progressively developed to adequately meet the transportation needs of a community, as land development and traffic volumes increase. Planning for future transportation needs prevents unnecessary costs and impacts to the physical, social, and economic environment. Thoroughfare plan studies are conducted based on the principles outlined in Appendix A.

The purpose of this study is to reexamine the present and future transportation needs of the Washington area in order to develop a revised thoroughfare plan. The recommendations proposed herein are based on existing roadway conditions and projected growth for the urban area over a thirty-year planning period. Since actual growth rates and patterns may differ from those anticipated, it may become necessary to accelerate or retard the implementation of recommendations or to revise the proposals. It is therefore desirable to have the thoroughfare plan updated regularly in order to revise growth projections and amend the thoroughfare plan, as necessary. Further, a more detailed analysis will be conducted prior to construction of any project, to determine the specific location and design requirements.

The City of Washington, the Town of Chocowinity, the Town of Washington Park* and the NCDOT share responsibility for the proposed thoroughfare improvements. The mutually adopted Washington Thoroughfare Plan serves as a guide for providing a coordinated, adequate, and economical major street system. For the planning efforts to be effective, the city and the state must procure in advance or protect, by various legal means, the rights-of-way needed for future roadway improvements. Local officials and citizens are also responsible for initiating the implementation of improvements. Since transportation needs throughout the state exceed available funding, local areas should aggressively pursue funding for desired projects.

* *For the remainder of this report, the City of Washington, the Town of Chocowinity, and the Town of Washington Park will be referred to as the City or the Washington Planning Area.*

GEOGRAPHIC LOCATION
FOR
WASHINGTON, NORTH CAROLINA

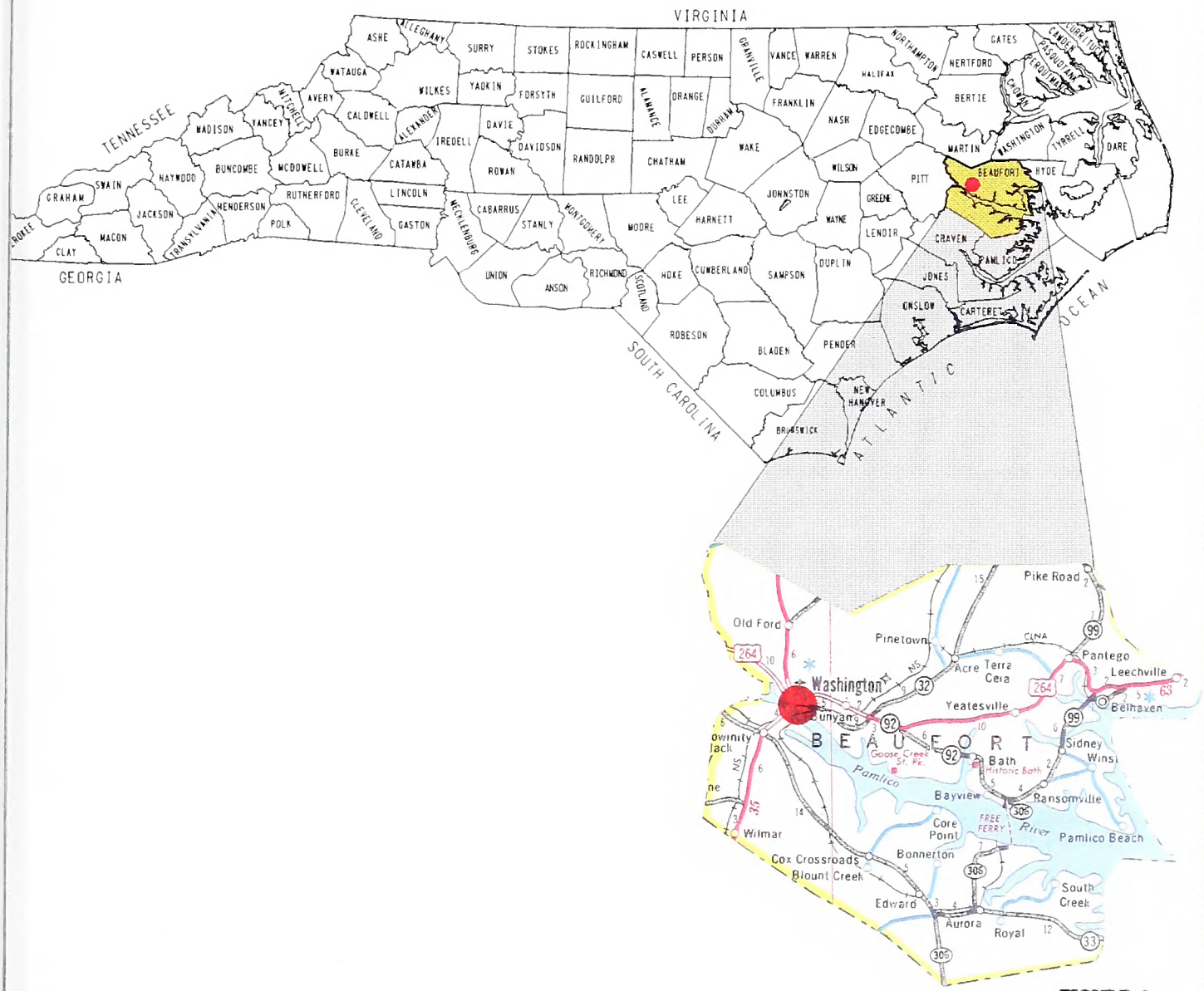

FIGURE 1

Chapter 2
Recommended Thoroughfare Plan

Intent of the Thoroughfare Plan

A thoroughfare plan study uncovers the need for new facilities, plus identifies existing and future deficiencies in the transportation system. The thoroughfare plan is a representation of the existing highway system by functional use, e.g., major thoroughfares, minor thoroughfares plus any new facilities that are needed (Refer to Figure 2 for Thoroughfare Plan map). The planning methodology enables identification of deficiencies in the existing system, allowing compilation of a list of needed improvements (Refer to Figure 3 for Recommendations map).

This chapter presents an analysis and makes recommendations based on the ability of the existing street system to serve the present and future travel desires as the area continues to grow. The usefulness of transportation planning is in the analysis of different highway configurations for their efficiency in serving the area. The recommended plan sets forth a system of thoroughfares to serve the anticipated traffic and land development needs for the City of Washington planning area. The need to eliminate existing and projected system deficiencies that cause traffic congestion is the primary objective of the plan.

This plan is an updated version of the January 1979 Thoroughfare Plan. The recommended revisions are based on the results of a traffic forecast model that uses data on traffic counts, population, housing, employment, and vehicle ownership to simulate travel patterns. With this model, each major street and highway in the planning area is analyzed to determine its ability to serve existing and future traffic demands. In the development of an updated thoroughfare plan some proposals from the old thoroughfare plan have been implemented, some were found inadequate for current problems and were dropped and some new proposals were added.

Major Thoroughfares

Major thoroughfares are designed to provide for the expeditious movement of high volumes of traffic within and through urban areas. This system of thoroughfares includes interstates, other freeways, expressways, and parkways, as well as major streets. Listed below are the major thoroughfares, as designated in the 2000 Washington Thoroughfare Plan.

- US 264
- US 17
- NC 33
- NC 32
- SR 1507 - Slatestone Road
- SR1501 - Highland Drive
- SR 1422 - Market Street
- SR 1403 - Clarks Neck Road
- SR 1306 - Fifteenth Street
- Proposed Radial Connector
- Proposed US 264 Bypass
- Proposed US 17 Bypass

Minor Thoroughfares

Minor thoroughfares function as collectors for traffic from local access streets to major thoroughfares. Minor thoroughfares supplement the major thoroughfare system by facilitating minor through traffic movements and by providing access to abutting property. The minor thoroughfares in the Washington planning area are listed below.

- SR 1509 - Springs Road
- SR 1313 - N. Asbury Church Road
- SR 1311 - S. Asbury Church Road
- SR 1303 - Brick Kiln Road
- SR 1300 - River Road
- SR 1166 - Wichards Beach Road
- SR 1123 - Old Blounts Creek Road
- Proposed Springs Road Connector
- Proposed Brick Kiln Road Connector

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. Refer to Chapter 7 for documentation of the analysis involved in developing the recommendations for the City of Washington planning area. 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 thoroughfare plan recommendations.

Major Thoroughfares

US 17 Bypass - Purpose and Need

- **Project Recommendation:** It is recommended that US 17 be widened to a four-lane divided facility from US 264 (following Whispering Pines Road) to the northern planning boundary and from SR 1150 (Harding Road) to the southern planning boundary. The portion of this facility on new location lies between US 264 and SR 1150 (Harding Road), bypassing the City of Washington and the Town of Chocowinity. The project limits combine for a total of approximately 9.60 miles. This project is included in the 2000 - 2006 Transportation Improvement Program (TIP) as project R-2510. It is being developed in conjunction with the widening of US 17, TIP projects R-2511 and R-2513. Planning is currently in progress for this project with the purchase of right-of-way scheduled for the fiscal years 2004 - 2006. The estimated cost of the project is $186.7 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 8,400 to 24,000 vehicles per day (vpd). For some portions of US 17, the existing

traffic already exceeds the average capacity of the road, which varies from 10,400 to 28,600 vpd. Additionally, US 17 carries over 10 percent trucks, which further impedes the traffic flow. The 2030 projected average daily traffic of 16,800 to 55,800 vpd will result in the majority of US 17 being over capacity. US 17 is currently operating at level of service (LOS) of C to D. (Refer to Chapter 4 for an explanation of level of service). Without any improvements, the level of service by 2030 will range from D to F, 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 on the existing US 17 to range from A to B.

- **Safety Issues:** Several sections of US 17 are ranked among City's highest accident locations. The intersections of US 17 with NC 33 and Fifteenth Street are among the highest accident intersections within the planning area. The majority of accidents on these sections of US 17 are due to angle accidents. 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 and the proposed bypass 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 be full control of access. Bypasses of Washington and Chocowinity are more beneficial than widening the 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 the existing US 17.

- **Social Demands and Economic Development:** The western portion of the planning area, which is primarily served by US 17, has the highest growth expectations, specifically in Washington and Chocowinity. The US 17 corridor has been identified by the City of Washington 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 to spur further economic development in this area. Economic development in any portion of the planning area will increase the tax base, which can be used to improve public services throughout the area, thereby inducing other industries to locate in the area. 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 the City of Washington, 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. 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 Beaufort and Martin Counties as Transportation Improvement Program Project R-2511 and is included in the 1995 Martin County Thoroughfare Plan and the 2000 Beaufort County Thoroughfare Plan. The proposed multilane widening also follows US 17 southward into Beaufort and Craven Counties as TIP Project R-2513 and is included in the 1992 Craven County Thoroughfare Plan and the 2000 Beaufort County Thoroughfare Plan.

US 264 Bypass - Purpose and Need

- **Project Recommendation:** It is recommended that a two-lane facility be constructed from US 264 west of SR 1406 (Tranter Creek Estate Road) to US 264 at SR 1317 (River Acres Road), for a total of approximately 9.0 miles. In anticipation of future widening, right-of-way should be reserved for a multi-lane facility. This project is included in the 2000 - 2006 Transportation Improvement Program (TIP) as project R-3422, which is currently designated as an unfunded project. The estimated cost of this project is $86.5 million, as reported in the 2000 - 2006 TIP.

- **Transportation Demand:** The portion of US 264 from the western planning boundary to SR 1303 (Brick Kiln Road) is functionally classified as a principal arterial, primarily serving statewide and interstate travel. US 264, from SR 1303 (Brick Kiln Road) to the eastern planning boundary 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 movement. 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 5,000 to 20,300 vehicles per day (vpd). The capacity of the existing roadway ranges from 22,200 to 32,200 vpd. Additionally, US 264 carries over 10 percent trucks, which further impedes the traffic flow. The 2030 projected average daily traffic of 10,000 to 44,500 vpd will result in sections of US 264 being over capacity. US 264 is currently operating at a 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 range from D to F, if traffic growth continues as expected. The proposed bypass cross section, a two-lane facility (on four-lane right-of-way), will provide a capacity of approximately 12,500 vpd and will improve the level of service on the existing US 264 to range from A to B.

- **Safety Issues:** Several sections of US 264 are ranked among the City's highest accident locations. The intersections of US 264 with Fifteenth Street, Plymouth Street, and US 17 are among the highest accident intersections in the planning area. The accidents on this section of US 264 are predominantly due to angle accidents and accidents involving left turns of the same roadway. If no improvements are made, the resulting increase in congestion will result in the potential for increased accident rates. However, the proposed bypass will provide the existing US 264 with 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 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:** The City 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 proposed US 264 Bypass, 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 planning area will increase the tax base, which can be used to improve public services throughout the area, thereby inducing other industries to locate in the area. Further, the goal of providing a bypass facility for 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:** Implementing a bypass of US 264 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 the City of Washington, 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). Due to this designation, bicycle traffic should

be expected along this section of US 264. The recommended bypass of US 264, north 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 proposed multilane widening of US 264 extends eastward into Beaufort County as Transportation Improvement Program Project R-2601 and is included in the 2000 Beaufort County Thoroughfare Plan.

NC 33 - Purpose and Need

- **Project Recommendation:** It is recommended that NC 33 be widened to a four-lane divided facility from the proposed US 17 Bypass to the planning area boundary, for a total length of 2.3 miles.

- **Transportation Demand:** Within the planning area, NC 33 is functionally classified as a major collector, which primarily serves intracounty travel and local traffic generators in addition to providing access to the arterial 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, connecting Chocowinity and Aurora.

- **Roadway Capacity and Deficiencies:** The current average daily traffic on NC 33 ranges from 5,400 to 10,200 vpd. The capacity of the existing roadway ranges from 9,200 to 13,800 vpd. The projected average daily traffic of 11,200 to 25,200 vpd will result in portions of NC 33 in the planning area being over capacity by the year 2030. Portions of NC 33 are currently operating at level of service (LOS) B to D and, without any improvements, will be at LOS D to F by the year 2030, based on traffic growth projections. The proposed cross section, a four-lane divided facility, will provide a capacity of approximately 32,500 vpd and will improve the level of service to range from A to B.

- **Safety Issues:** The intersection of US 17 with NC 33 is among the highest accident intersections within the planning area. The majority of accidents on this section of NC 33 are due to angle accidents. 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 planning area.

- **Relationship to Other Plans:** Proposed improvements made in the City of Washington Thoroughfare Plan complement the recommended improvements in the 2000 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.

NC 32 - Purpose and Need

- **Project Recommendation:** It is recommended that this facility be widened to a multi-lane facility from SR 1309 (Christian Service Camp Road) to SR 1300 (River Road), for a total of approximately 1.5 miles. This project is included in the 2000 - 2006 Transportation Improvement Program (TIP) as project R-1014. The estimated cost of this project is $7.0 million, as reported in the 2000 - 2006 TIP.

  A safety improvement is also recommended along NC 32 from the Runyon Creek Bridge to Walnut Street in the Town of Washington Park. Horizontal alignment improvements are recommended in order to increase safety and reduce flooding. The replacement of bridge #103 over Runyon Creek is included in the 2000 - 2006 TIP as project B-4019. The estimated cost of the bridge replacement project is $2.8 million, as reported in the 2000 - 2006 TIP.

- **Transportation Demand:** The portion of NC 32 from US 17 to Runyon Creek 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 the through movement. NC 32, from Runyon Creek to the planning area boundary is functionally classified as a major collector, which primarily serves intracounty travel and local traffic generators in addition to providing access to the arterial system. It is a north-south route in the eastern part of the state, connecting cities such as Edenton, Plymouth, and Washington. NC 32 serves as one of the primary east-west routes in the eastern part of the planning area, connecting Washington and Washington Park.

- **Roadway Capacity and Deficiencies:** The current average daily traffic on NC 32 ranges from 2,600 to 8,100 vpd. The capacity of the existing roadway is 6,100 vpd. The projected average daily traffic of 6,700 to 14,900 vpd will result in a portion of NC 32 being over capacity by the year 2030. NC 32 is currently operating at level of service (LOS) A to B and, without any improvements, will be at LOS C to D by the year 2030, based on traffic growth projections. The proposed cross section, a multi-lane facility, will provide capacity of approximately 27,500 vpd and will improve the level of service to A.

- **Safety Issues:** If no improvements are made to NC 32, increasing traffic congestion will result in the potential for increased accident rates. However, the recommended improvements to NC 32 will provide increased capacity, greater maneuverability, and more control of access, resulting in safer driving conditions. In addition, the portion of NC 32 from the Runyon Creek Bridge to Walnut Street in the Town of Washington Park serves as the town's direct connection to the City of Washington. Recurring flooding in this area frequently shut down this portion of roadway. The recommended horizontal alignment improvements to this facility should alleviate this problem.

- **Social Demands and Economic Development:** NC 32 carries traffic east-northeast through the City of Washington and the Town of Washington Park, located in the central part of planning area. Since much of the outlying area is rural, this route is important for access to shopping and business for both Washington Park 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. The recommended improvements to NC 32, in addition to accommodating the expected traffic increase, may also help to spur economic development.

- **System Linkage:** Because of the significance of NC 32 in serving intercounty as well as intracounty travel, it is important that the highway is kept in good operating condition. Further, NC 32 serves an invaluable role providing direct access to waterfront property. It also serves as the primary route between the City of Washington and the Town of Washington Park.

- **Modal Interrelationships:** Within the planning area, NC 32 is designated as part of NC Bike Route 2 (Mountains to Sea). The portion of NC 32 included is from SR 1352 (Hudnell Street) to SR 1331 (Harvey Road). Due to this designation, bicycle traffic should be expected along this section of NC 32. The recommended improvements to this facility will improve safety to bicyclists by decreasing vehicular congestion on the roadway. Coordination with the NCDOT Division of Bicycle and Pedestrian Transportation is recommended before any improvements are implemented.

- **Relationship to Other Plans:** The 2000 Beaufort County Thoroughfare Plan also includes improvement to NC 32 in the northern portion of the county.

Radial Connector - Purpose and Need

- **Project Recommendation:** It is recommended that a new two-lane radial connector be constructed from SR 1504 (Avon Avenue), crossing SR 1501 (Highland Drive), SR 1422 (Market Street), US 17, and connecting into US 264, for a total project length of approximately 3.3 miles. In anticipation of future widening, right-of-way should be reserved for a multi-lane facility.

- **Transportation Demand:** The proposed connector will more than likely be functionally classified relative to its parallel counterpart (Fifteenth Street), which is functionally classified as a minor arterial. Minor arterials primarily join cities and larger towns and provide intrastate and intercounty service at relatively high overall travel speeds with minimum interference to through movement. This proposed connector is an east-west route in the central part of the City of Washington. It would serve as an alternate route for Fifteenth Street and US 264, which both suffer from traffic congestion.

- **Roadway Capacity and Deficiencies:** The capacity of the proposed roadway is 12,500 vpd. The projected average daily traffic of this facility ranges from 3,700 to 9,000 vpd for the year 2030. Based on traffic growth projections, this facility is expected to be operating at level of service (LOS) B to C in the year 2030. The construction of this facility also lowers the traffic volumes on parallel routes such as Fifteenth Street and US 264, thereby increasing the capacities and levels of service of these roadways.

- **Safety Issues:** If this facility is not constructed, increasing traffic congestion will result in the potential for increased accident rates along parallel routes. However, the proposed facility will provide increased capacity, greater maneuverability, and more control of access, resulting in safer driving conditions.

- **Social Demands and Economic Development:** This facility would carry traffic east-west through the City of Washington. Since development on parallel routes is fairly dense strip and commercial development, this route is important for motorists seeking continuous, uninterrupted traffic flow. The anticipated future development in this area is substantial. Therefore, traffic will continue to increase, especially through traffic, as well as some local traffic. This proposed facility, in addition to accommodating the expected traffic increase, may also help to accommodate the spur in economic development.

- **System Linkage:** The proposed facility plays a significant role in the street system within the City of Washington, serving as an alternate route for Fifteenth Street and US 264.

- **Relationship to Other Plans:** This facility is not directly connected to any other thoroughfare plan.

SR 1507 (Slatestone Road) - Purpose and Need

- **Project Recommendation:** It is recommended that this facility be widened to three twelve-foot lanes from SR 1501 (Old Bath Highway) to SR 1518 (Corsica Road), for a total project length of approximately 1.0 mile.

- **Transportation Demand:** SR 1507 (Slatestone Road) is functionally classified as a minor collector, which provides service to small local communities and local traffic generators and provides access to the major collector system. This facility is an east-northeast route in the eastern portion of the planning area. It directly serves traffic generated by Washington High School, which is a major traffic generator.

- **Roadway Capacity and Deficiencies:** The current average daily traffic on this facility is 3,100 vpd. The capacity of the existing roadway is 9,000 vpd. The projected average daily traffic of this facility is 8,100 vpd for the year 2030. This portion of the roadway is currently operating at level of service (LOS) B and, without any improvements, will be at LOS C by the year 2030, based on traffic growth projections. The proposed cross section, a three-lane facility, will provide capacity of approximately 13,800 vpd.

- **Safety Issues:** Currently, the cross section of this facility consists of two eleven-foot lanes. If this facility is not improved, increasing traffic congestion will result in the potential for increased accident rates along the roadway. However, the proposed improvements will provide increased capacity, greater maneuverability, and more control of access, resulting in safer driving conditions. This upgrade will also increase safety conditions for vehicles making left turns into and out of the high school facility.

- **Social Demands and Economic Development:** This facility carries traffic east-northeast along the eastern portion of the planning area. Since Washington High School is located along this facility, it is important that the roadway is kept in good operating condition. Anticipated future development in this area is moderate; therefore, traffic will continue to increase. Upgrades to this facility will help to accommodate the expected traffic increase.

- **System Linkage:** Since this facility provides the only access route to the high school, it plays a significant role in the street system.

- **Relationship to Other Plans:** This facility is not directly connected to any other thoroughfare plan.

SR 1501 (Highland Drive/Old Bath Highway) - Purpose and Need

- **Project Recommendation:** It is recommended that the roadway be widened to a multi-lane facility from SR 1306 (W. Fifteenth Street) to SR 1507 (Slatestone Road), for a total of approximately 1.4 miles. This project is included in the 2000 - 2006 Transportation Improvement Program (TIP) as project U-2723, which is currently designated as an unfunded project. The estimated cost of this project is $5.6 million, as reported in the 2000 - 2006 TIP.

- **Transportation Demand:** The portion of SR 1501 (Highland Drive) from US 264 to SR 1507 (Slatestone Road) 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 movement. SR 1501 (Old Bath Highway), from SR 1507 (Slatestone Road) to the eastern planning boundary is functionally classified as a minor collector, which provides service to small local communities and local traffic generators and provides access to the major collector system. This facility is an east-west route in the eastern portion of the planning area. It provide direct access between US 264 and SR 1507 (Slatestone Road), which accommodates traffic accessing the high school facility.

- **Roadway Capacity and Deficiencies:** The current average daily traffic on this facility ranges from 4,900 to 9,100 vpd. The capacity of the existing roadway is 10,400 vpd. The projected average daily traffic of this facility ranges from 11,300 to 16,400 vpd for the year 2030. This portion of the roadway is currently operating at level of service (LOS) B to D and, without any improvements, will be at LOS D to E by the year 2030, based on traffic growth projections. The proposed cross section, a multi-lane facility, will provide capacity of approximately 27,500 vpd and will improve the level of service to A to B.

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

- **Social Demands and Economic Development:** This facility carries traffic east-west in the northern sector of the City of Washington. Since Beaufort County Hospital and several other medical venues are established along this facility, it is important that the roadway is kept in good operating condition. Likewise, this facility will also be used to accommodate vehicles accessing Washington High School, located on SR 1507 (Slatestone Road). Anticipated future development in this area is moderate; therefore, traffic will continue to increase. Upgrades to this facility will help to accommodate the expected traffic increase.

- **System Linkage:** The proposed facility plays a significant role in the street system within the planning area, serving as direct connection between SR 1507 (Slatestone Road) and US 264.

- **Relationship to Other Plans:** This facility is not directly connected to any other thoroughfare plan.

SR 1403 (Clarks Neck Road) - Purpose and Need

- **Project Recommendation:** It is recommended that this facility be widened to four twelve-foot lanes from US 264 (Pactolus Road) to the Beaufort/Pitt County line, for a total of approximately 0.7 miles.

- **Transportation Demand:** This facility is a north-south route in the western portion of the planning area. It provides direct access between US 264 and the Beaufort/Pitt County line, which accommodates traffic accessing industrial, commercial and service oriented facilities along this roadway.

- **Roadway Capacity and Deficiencies:** The current average daily traffic on this facility ranges from 4,000 to 10,000 vpd. The capacity of the existing roadway is 9,200 vpd. The projected average daily traffic of this facility ranges from 9,700 to 17,900 vpd for the year 2030. This roadway is currently operating at level of service (LOS) B to D and, without any improvements, will be at LOS C to E by the year 2030, based on traffic growth projections. The proposed cross section, a four-lane facility, will provide capacity of approximately 27,500 vpd and will improve the level of service to A to B.

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

- **Social Demands and Economic Development:** SR 1403 (Clarks Neck Road) carries traffic north-south through the western part of planning area. Since much of the outlying area is rural, this route is important for access to shopping and business for 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. The recommended improvements to this facility, in addition to accommodating the expected traffic increase, may also help to spur economic development.

- **System Linkage:** The proposed facility plays a significant role in the street system within the planning area, serving as direct connection between US 264 and Pitt County.

- **Modal Interrelationships:** Within the planning area, SR 1403 (Clarks Neck Road) is designated as part of NC Bike Route 2 (Mountains to Sea). The portion of SR 1403 included is from Pitt County to US 264. Due to this designation, bicycle traffic should be expected along this section of the roadway. The recommended improvements will improve safety to bicyclists by decreasing vehicular congestion on the SR 1403. Coordination with the NCDOT Division of Bicycle and Pedestrian Transportation is recommended before any improvements are implemented.

- **Relationship to Other Plans:** This facility is not directly connected to any other thoroughfare plan.

Minor Thoroughfares

Springs Road Extension - Purpose and Need

- **Project Recommendation:** It is recommended that a new two-lane connector be constructed from US 17 at SR 1509 (Springs Road) to US 264, for a total project length of approximately 1.1 miles.

- **Transportation Demand:** This proposed connector is an east-northeast route in the western portion of the planning area. It would provide direct access between US 264 and US 17 for through traffic by separating it from local traffic that will continue to use the existing US 17 and US 264.

- **Roadway Capacity and Deficiencies:** The capacity of the proposed connector is 12,500 vpd. The projected average daily traffic of this facility is 8,100 vpd for the year 2030. Based on traffic growth projections, this facility is expected to be operating at level of service (LOS) C in the year 2030. The construction of this facility helps reduce traffic volumes on US 17 and US 264, thereby increasing the capacities and levels of service of these roadways.

- **Safety Issues:** If this facility is not constructed, increasing traffic congestion will result in the potential for increased accident rates along the aforementioned routes. However, the proposed facility will provide increased capacity, greater maneuverability, and more control of access, resulting in safer driving conditions.

- **Social Demands and Economic Development:** This facility would carry traffic east-northeast along the western portion of the planning area. Since development on adjacent routes is fairly dense strip and commercial development, this route is important for motorists seeking continuous, uninterrupted traffic flow. Anticipated future development in this area is moderate; therefore, traffic will continue to increase, especially through traffic, as well as some local traffic. This proposed facility, in addition to accommodating the expected traffic increase, may also help to accommodate the spur in economic development.

- **System Linkage:** The proposed facility plays a significant role in the street system within the planning area, serving as a direct connection between US 17 and US 264. This facility also serves motorists accessing the Warren Field Airport located between SR 1509 (Springs Road) and SR 1422 (Market Street).

- **Relationship to Other Plans:** This facility is not directly connected to any other thoroughfare plan.

Brick Kiln Road Extension - Purpose and Need

- **Project Recommendation:** It is recommended that a new two-lane connector be constructed from US 264 at SR 1303 (Brick Kiln Road) to SR 1501 (Highland Drive), for a total project length of approximately 0.7 miles.

- **Transportation Demand:** SR 1303 (Brick Kiln Road), from NC 32 to US 264 is functionally classified as a minor collector, which provides service to small local communities and large traffic generators and provides access to the major collector system. This proposed connector is a north-south route in the eastern portion of the planning area. It would provide direct access

between NC 32, US 264, and SR 1507 (Slatestone Road) for traffic accessing residential development as well as Washington High School. This connector would also provide greater access and maneuverability to residents in Town of Washington Park and the River Road community.

- **Roadway Capacity and Deficiencies:** The capacity of the proposed connector is 12,500 vpd. Although the projected average daily traffic of this facility is 600 vpd for the year 2030, the construction of this facility provides an alternate route and convenient access to facilities such as Washington High School. This facility would also be instrumental in increasing the capacities and levels of service on other roadways, such as Highland Drive and US 264.

- **Safety Issues:** If not constructed, increasing traffic congestion will result in the potential for increased accident rates along roadways within the City of Washington and the Town of Washington Park. However, the proposed facility will provide increased capacity, greater maneuverability, and more control of access, resulting in safer driving conditions.

- **Social Demands and Economic Development:** This facility would carry traffic north-south in the western planning area from NC 32 to SR 1501 (Highland Drive). Since development on adjacent routes is fairly dense residential, commercial and institutional development, this route is important for motorists seeking continuous, uninterrupted traffic flow. With large traffic generators, such as Washington High School and residential developments, traffic will continue to increase. By providing a direct route and better access, traffic flow will improve and traffic congestion will be reduced. This facility also provides substantial time saving to motorists within the planning area.

- **System Linkage:** The proposed facility plays a significant role in the street system within the planning area, serving as direct connection between NC 32, US 264 and SR 1501.

- **Relationship to Other Plans:** This facility is not directly connected to any other thoroughfare plan.

Widening Projects

The following roadway sections are recommended to be widened to improve safety and increase 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.

- **SR 1123 (Old Blounts Creek Road):** It is recommended that SR 1123 be widened from two 10-foot lanes to two 12-foot lanes from NC 33 to SR 1125 (Hill Road).

- **SR 1303 (Brick Kiln Road):** It is recommended that SR 1303 be widened from two 9-foot lanes to two 12-foot lanes from NC 32 to US 264.

- **SR 1313 (N. Asbury Church Road):** It is recommended that SR 1313 be widened from two 9-foot lanes to two 12-foot lanes from SR 1311 (S. Asbury Church Road) to US 264.

- **SR 1504 (Avon Avenue):** It is recommended that SR 1504 be widened from two 10-foot lanes to two 12-foot lanes from US 264 to SR 1501 (Highland Drive).
- **SR 1507 (Slatestone Road):** It is recommended that SR 1507 be widened from two 11-foot lanes to two 12-foot lanes from SR 1518 (Corsica Road) to SR 1520 (Terrapin Track Road).

Intersection Improvements

The following intersection is recommended for safety improvements.

- **Intersection of NC 33 and SR 1123 (Old Blounts Creek Road):** Due to the large amount of traffic generated by the Cypress Landing Community, it is recommended that left and right turn lanes be installed on SR 1123 and a left tun lane be installed on NC 33. These improvements will provide increased capacity, greater maneuverability, and more control of access, resulting in safer driving conditions.

Bicycle Routes

The City of Washington currently has one designated bicycle route: the Mountains to Sea, NC Bike Route 2. Because of this designation, this facility may be subjected to more bicycle traffic than other facilities of similar design. Due to the shared, or multi-modal, use of this facility, 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.

***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

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

Public Involvement

Based on a request from the Washington City Council, the study to develop a thoroughfare plan for City of Washington 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 City.

City of Washington

On August 12, 1998, Washington City Council members were given a presentation on the City's role in the thoroughfare planning process. They were also presented socioeconomic data projections and given a status report on the thoroughfare plan study. NCDOT representatives, Mayor Rumley and City Manager Willoughby met on October 7, 1999 to develop preliminary recommendations for the thoroughfare plan. These recommendations were presented to the City Council and members of the public on December 13, 1999. These recommendations were reviewed further during the Washington City Council planning conference, which was held February 16 - 17, 2000. On March 8, 2000 a public drop-in session was held, where information on the proposed thoroughfare plan was distributed and NCDOT representatives were available to answer questions and take comments on the recommendations. The proposed thoroughfare plan was presented at the March 13, 2000 Washington City Council meeting, with members of the public present. After a public hearing, the City Council unanimously adopted the 2000 Washington Thoroughfare Plan.

Town of Chocowinity

Preliminary recommendations for the thoroughfare plan, which fall within the town limits of Chocowinity, were presented to the Chocowinity Town Council, their planning board and members of the public on October 18, 1999. These recommendations were reviewed further and revised after the November 9, 1999 Town Council Meeting. The proposed thoroughfare plan was presented at the March 7, 2000 Chocowinity Town Council meeting, with members of the public present. After a public hearing, the Town Council unanimously adopted the 2000 Washington Thoroughfare Plan.

Town of Washington Park

NCDOT representatives and Mayor Richter met on April 4, 2000 to discuss recommendations for the thoroughfare plan, which fall within the town limits of Washington Park. The proposed thoroughfare plan was presented at the June 5, 2000 Washington Park Town Council meeting, with members of the public present. After a public hearing, the Town Council unanimously adopted the 2000 Washington Thoroughfare Plan.

N. C. Board of Transportation

The 2000 Washington thoroughfare plan was adopted by the North Carolina Board of Transportation on July 7, 2000.

THOROUGHFARE PLAN

MARCH 10, 2000

LEGEND

	EXISTING	PROPOSED
MAJOR THOROUGHFARE	———	- - - -
MINOR THOROUGHFARE	———	- - - -
INTERCHANGE	●	◉

ADOPTED BY:

CITY OF WASHINGTON	MARCH 13, 2000
TOWN OF CHOCOWINITY	MARCH 7, 2000
TOWN OF WASHINGTON PARK	JUNE 5, 2000
RECOMMENDED APPROVAL BY STATEWIDE PLANNING BRANCH	JUNE 12, 2000
N. C. DEPARTMENT OF TRANSPORTATION	JULY 7, 2000

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CITY OF WASHINGTON

BEAUFORT COUNTY
NORTH CAROLINA

PREPARED BY THE

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
STATEWIDE PLANNING BRANCH

IN COOPERATION WITH THE

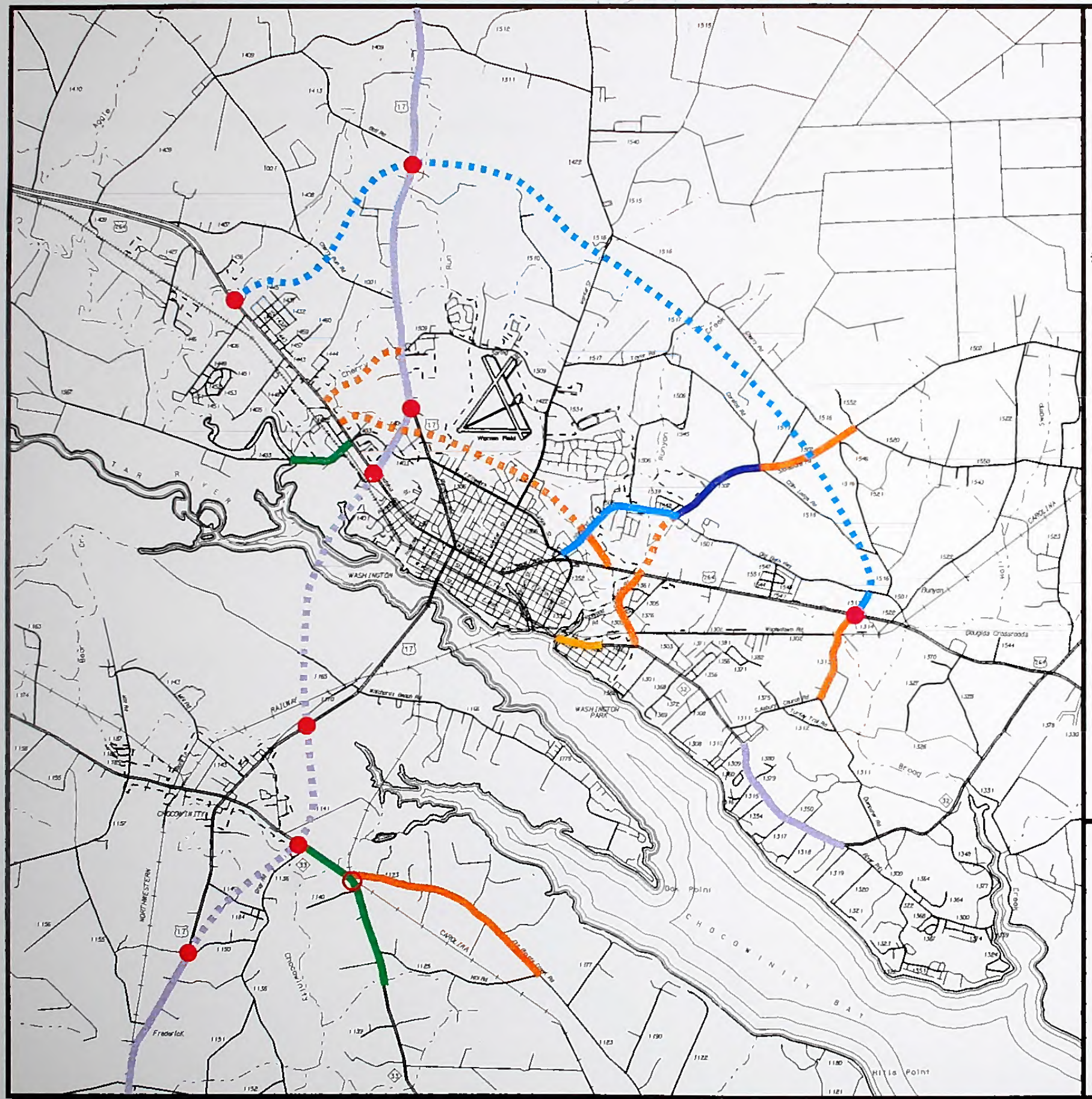
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

scale in feet

0 2000 4000 6000 8000 10000

Base map date
August 1999

FIGURE 2



RECOMMENDATIONS

LEGEND

# OF LANES (12 FT WIDE)	WIDENING	PROPOSED
2		
3		
4		
TIP Projects (Unfunded)		
TIP Projects (Funded)		
Safety Improvement		

	EXISTING	PROPOSED
Interchange		
Intersection Improvement		

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CITY OF WASHINGTON

BEAUFORT COUNTY
NORTH CAROLINA

PREPARED BY THE

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
STATEWIDE PLANNING BRANCH

IN COOPERATION WITH THE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

SCALE

0 1 2 3 miles

MAP DATE: MARCH 29, 2000

FIGURE 3

Chapter 3
Implementation of the Thoroughfare Plan

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 City to assist in the implementation of the thoroughfare plan. They are described in detail in this chapter.

State-Municipal Adoption of the Thoroughfare Plan

The City of Washington, the Town of Chocowinity, the Town of Washington Park and the North Carolina Department of Transportation have mutually approved the thoroughfare plan shown in Figure 2. The mutually adopted plan can now serve as a guide for the Department of Transportation in the development of the transportation system for the City. The approval of this plan by the City also enables standard road regulations and land use controls to be used effectively in the implementation of this plan. As part of the plan, the City and Department of Transportation shall reach agreement on the responsibilities for existing and proposed streets and highways. Facilities which are designated a State responsibility will be constructed and maintained by the Division of Highways. Facilities which are designated a municipal responsibility will be constructed and maintained by the municipality.

Methods Used to Protect the Adopted Thoroughfare Plan

Subdivision Regulations

Subdivision regulations require every subdivider to submit to the City 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 and highways that are to become a part of the thoroughfare plan.

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.

Since some of the proposed thoroughfares are outside the existing Washington City Limits, it is recommended that additional building setbacks and/or right-of-way reservation conforming to the Thoroughfare Plan also be applied in the Beaufort County Thoroughfare Plan. This will allow for the orderly implementation of the plan in the fringe areas of Washington without disrupting adjoining landowners.

Zoning Ordinances

A zoning ordinance can be beneficial to thoroughfare planning by designating appropriate locations of various land use and allowable densities of residential development. This provides a degree of stability on which to make future traffic projections and to plan streets and highways. Other benefits of good zoning ordinance are: (1) the establishment of standards of development which will aid traffic operations on major thoroughfares and (2) the minimization of strip commercial development which creates traffic friction and increases the traffic accident potential.

Future Street Line Ordinances

A municipality with legislative approval may amend its charter to be empowered to adopt future street line ordinances. This ordinance, enacted for selected streets, is particularly beneficial for planned future improvements, such as roadway widening. Through a metes-and-bounds description of a street's future right-of-way requirements, the municipality may prohibit new construction or reconstruction of structures within the future right-of-way. This approach requires specific design hearings to be held as an opportunity for affected property owners to obtain information about what to expect and to make necessary adjustments without undue hardship.

Roadway Corridor Official Maps

A Roadway Corridor Official Map (Official Map) is a document adopted by the North Carolina Board of Transportation which allows the reservation of roadway corridors as provided by General Statutes 136-44.5 through 136-44.53. Official Maps place temporary restrictions on private property rights by prohibiting the issuance of a building permit or the approval of a subdivision on property within an adopted alignment, for up to a three-year period beginning when a request for development is denied. The Official Map in effect serves as notice to developers that the state or municipality intends to acquire specific property. This process is a beneficial tool in directing development so that sites can be reserved for public improvements in anticipation of actual need.

Development Reviews

The District Engineer's office and the Traffic Engineering Branch of the North Carolina Department of Transportation 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

Capital Improvements Program

A capital improvement program makes it easier to build a planned thoroughfare system. It consists of two lists of projects. The first is a list of highway projects that are designated as a municipal responsibility and are to be implemented with municipal funds. The second is a list of local

projects designated as State responsibility to be included in the Transportation Improvement Program.

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.

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 representing their area 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 G 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. In addition to highway construction and widening, TIP funds are available for bridge replacement, highway safety projects, public transit projects, railroad projects, and bicycle facilities.

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 made available to municipalities with qualifying projects on the state system. The maximum amount is one million dollars per year per division. Requests for Small Urban Fund assistance should be directed to the Division Engineer or to the Program Development Branch on NCDOT.

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.

Over the thirty year planning period, the City of Washington should look forward to the paving of most, if not all, of its unpaved roads on the State maintained system. Also, there will be an increase in Washington's Powell Bill Funds if these newly paved roads are in the Washington Corporate Limits.

For more information on the Highway Trust Fund Law, contact the Program Development Branch of the North Carolina Department of Transportation.

Implementation Recommendations

The following table gives recommendations for the most suitable funding sources and methods of implementation for the major project proposals of the City of Washington 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.	Future Street Lines	Develop. Review
US 264 Bypass		X			X	X	X		
US 17 Bypass		X			X	X	X		
NC 32 Widening		X			X				X
NC 32 Safety Imp.		X			X				
NC 33 Widening		X			X				X
SR 1509 Ext.	X			X	X	X	X		
SR 1507 Widening		X			X				X
SR 1501 Widening		X			X				X
SR 1403 Widening		X			X				X
SR 1303 Ext.	X				X	X	X		
Radial Connector		X			X	X	X		X
SR 1123 Intersection Improvement				X	X				

Construction Priorities and Cost Estimates

Construction priorities will vary depending on what criteria are 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 City of Washington 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.

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).

The environmental impact analysis considers the effect of a project on the physical, social/cultural, and economic environment. Below are listed the thirteen items that are considered when evaluating the impacts of the environment. They are: (1) air quality, (2) water resources, (3) soils and geology, (4) wildlife, (5) vegetation, (6) neighborhoods, (7) noise, (8) educational facilities, (9) churches, (10) parks and recreational facilities, (11) historic sites and landmarks, (12) public health and safety and (13) 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 2 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 3.

Table 2

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 3

Benefits Evaluation for Major Projects

Projects	Benefits (millions)	Cost (millions)	Length mi	Benefits Per Mile	Economic Development	Environmental Impact
US 264 Bypass	115.3	33.0	9.0	12.8	0.35	0.23
NC 33 Widening	22.0	5.7	2.3	9.6	0.55	0.38
SR 1509 Ext.	204.8	2.5	1.1	186.1	0.15	0.15
SR 1507 Widening	7.6	2.5	1.0	7.6	0.25	0.38
SR 1501 Widening	31.3	5.6	1.3	24.1	0.55	0.23
SR 1403 Widening	35.6	2.1	0.7	50.9	0.25	0.23
SR 1303 Ext.	3.7	3.3	0.7	5.3	0.15	0.15
Radial Connector	62.1	9.3	3.3	18.8	0.75	0.31

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 4 gives the breakdown of the total project cost into construction and right-of-way costs for the major project proposals of the City of Washington Thoroughfare Plan.

Table 4

Project Cost Estimates for Major Projects

Projects	Construction Cost	Right-of-Way Cost	Total Cost
US 264 Bypass	31,577,000	1,390,000	32,967,000
US 17 Bypass*	170,364,000	16,290,000	186,654,000
NC 32 Widening*	4,060,000	2,921,000	6,981,000
NC 33 Widening	5,141,000	563,000	5,704,000
SR 1509 Ext.	2,310,000	188,000	2,498,000
SR 1507 Widening	1,691,000	777,000	2,468,000
SR 1501 Widening*	3,653,000	1,957,000	5,611,000
SR 1403 Widening	1,722,000	406,000	2,128,000
SR 1303 Ext.	3,208,000	136,000	3,344,000
Radial Connector	7,268,000	2,019,000	9,287,000

* Cost estimates taken from the 2000-2006 Transportation Improvement Program. US 17, NC 32 and SR 1501 designated as projects R-2510, R-1014, and U-2723 respectively.

Chapter 4
Travel Deficiency Analysis of Existing System

This chapter presents an analysis of the ability of the existing street 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 caused by a system deficiency such as a need for a bypass, loop facility, construction of missing links, or additional radials.

Capacity Analysis of the Existing System

An indication of the adequacy of the existing street system is a comparison of traffic volumes versus the ability of the streets to move traffic freely at a desirable speed. In an urban area, a street's ability to move traffic is generally controlled by the spacing of major intersections, access control, width of pavement, and the traffic control devices (such as signals) utilized.

Capacity is the maximum number of vehicles which has a "reasonable expectation" of passing over a given section of a roadway, during a given time period under prevailing roadway and traffic conditions. The relationship of traffic volumes to the capacity of the roadway determines the level of service (LOS) provided. Six levels of service identify the range of possible conditions. They are given letter designations from A to F with LOS A representing the best operating conditions and LOS F the worst. Figure 4 shows the levels of congestion associated with the various levels of service. The following page gives a description of each LOS in accordance with the 1994 Highway Capacity Manual.

Design 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 road or highway section must be individually analyzed and its design requirements determined by the amount and type of projected traffic, existing capacity, desired level of service, and available right-of-way. The recommended improvements and overall design of the Thoroughfare Plan were based on achieving a minimum of LOS D on existing facilities, and LOS C on new facilities. LOS D is considered the "practical capacity" of a facility, or that at which the public begins to express dissatisfaction.

Level of Service

LOS A

Describes primarily free flow conditions. The motorist experiences a high level 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 ft, 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 ft, 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 ft, 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 the driver experiences drastically reduced comfort levels. Minor incidents can be expected to create substantial queuing. At the limit, vehicles are spaced at about 165 ft, or nine car lengths.

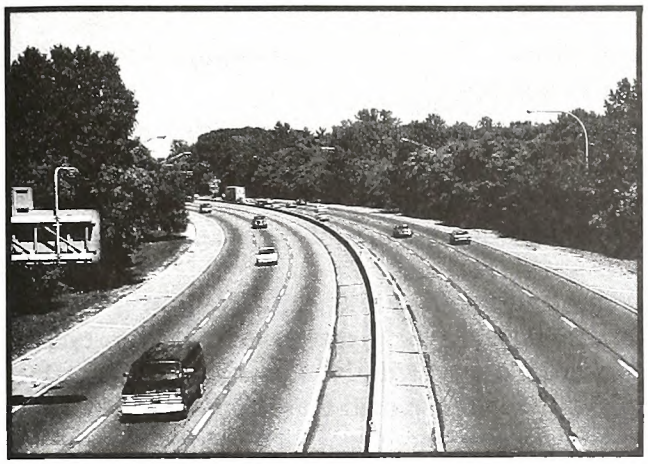
LOS E

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 can 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 six car lengths, leaving little room to maneuver.

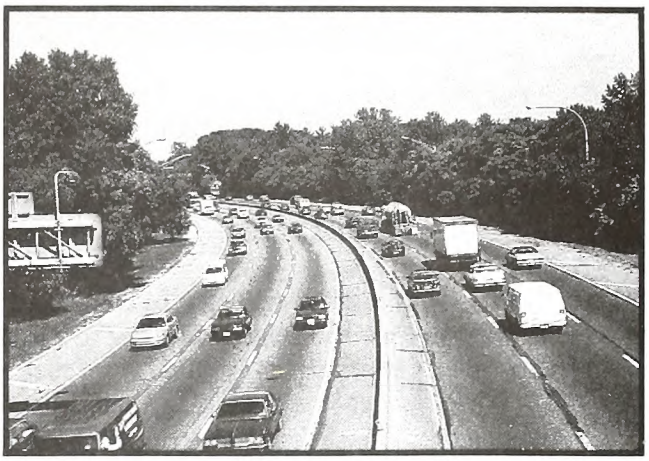
LOS F

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

Source: 1994 Highway Capacity Manual



LOS A.



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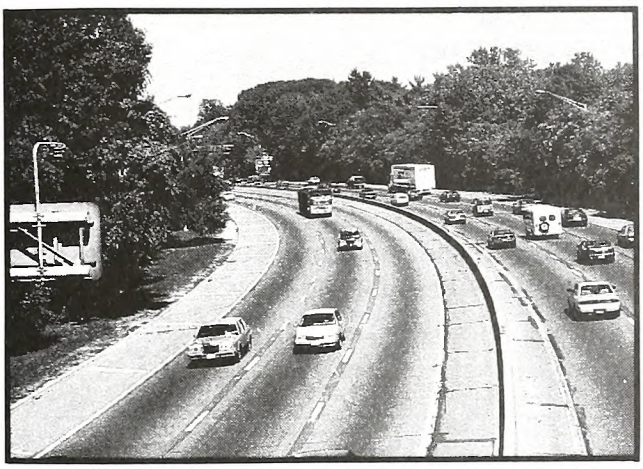
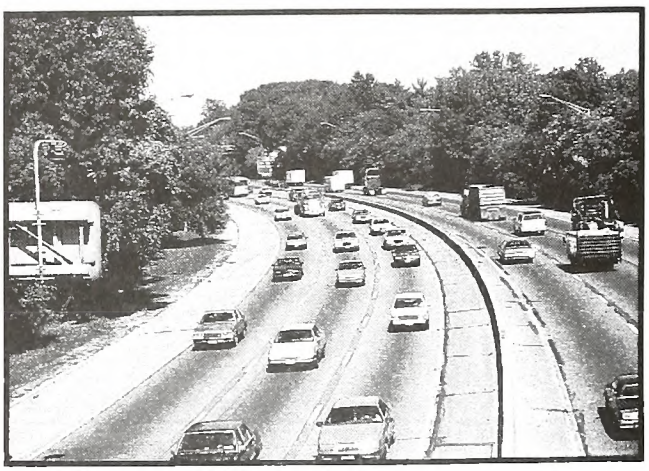
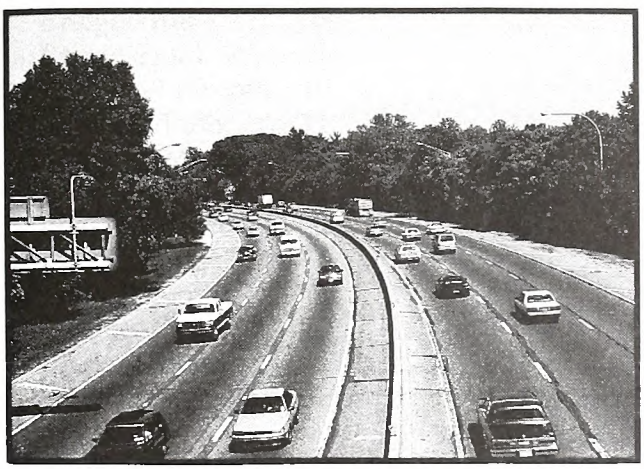


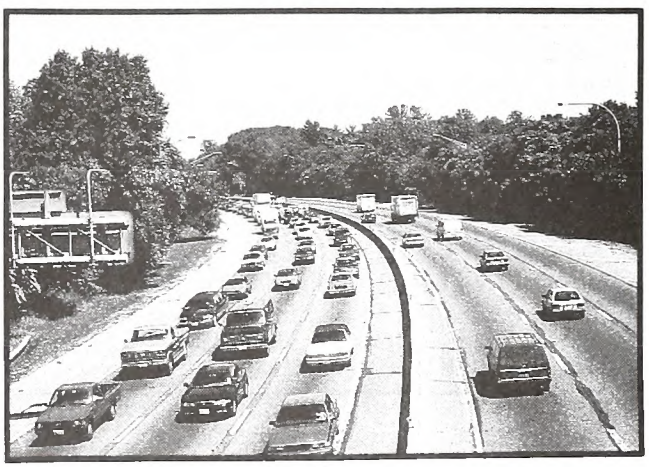
LOS B.



LOS E.



LOS C.



LOS F.

LEVELS OF SERVICE

FIGURE 4

Traffic Accidents

Traffic accident statistics are often used as an indicator for locating congestion problems. This data is reviewed to identify problem locations or deficiencies such as poor design, inadequate signing, ineffective parking, or poor sight distance. Accident patterns identified from analysis of accident data can lead to improvements that will reduce the number of accidents.

Both severity and the number of accidents should be considered when investigating accident data. The severity of every accident is measured with a series of weighting factors developed by NCDOT's Division of Highways. In terms of these factors, a fatal or incapacitating accident is 47.7 times more severe than one involving only property damage, and an accident resulting in minor injury is 11.8 times more sever than one with only property damage. In general, a higher severity index indicates more severe accidents. 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 5 is a summary of the accidents occurring in the Washington Planning Area between January 1996 and December 1998. This table only includes locations with 15 or more accidents. The "Total" column indicates the total number of accidents reported within 200-ft of the intersection during the study period indicated. The severity listed is the average accident severity for that location.

Table 5

Accident Summary January 1, 1996 to December 31, 1998

Locations	Angle	Rear End	Ran Off Road	Left Turn	Right Turn	Other	Total	Severity
US17/NC 33	8	5	1	7	1	4	26	7.99
Bridge/Fifth	6	3	1	8	1	4	23	3.35
Bridge/Third	8	9		6	2	3	28	6.86
Carolina/Fifteenth	10	9		2		2	23	5.09
Fifteenth/Fifth	11	1		3		1	16	7.24
Fifteenth/Market	8	5	1	20		2	36	7.39
15th/Minuteman	6	5		17		3	31	5.33
Fifteenth/Pearce	9	5		10	1	1	26	9.90
15th/Washington	15	11		24	2		52	6.05
Fifth/Plymouth	2	6	1	5		1	15	4.39
Highland/Twelfth	10	5		6	3		24	4.24
Market/Third	8	6	1	2	1	1	19	4.29

To request a more detailed accident analysis for any of the above mentioned intersections, or other intersection of concern, the City should contact the Division 2 Traffic Engineer.

Traffic Capacity Analysis

Capacity Deficiencies – Figure 5 depicts the base year (1997) major street system, and the anticipated design year **VPD** (Vehicles Per Day). A comparison of the base year VPD to capacities reveals several roadways that are expected to be near or over practical capacity (LOS D) by the year 2030. These areas are highlighted in Figure 6, and include:

US 17 - Several sections of US 17 are currently operating near or over capacity. By the year 2030, if no improvements are made to the existing system, the majority of the roadway will be over capacity.

US 264 - US 264 from SR 1406 (Tranter Creek Estate Road) to SR 1403 (Clarks Neck Road) is currently operating near or over capacity. Approximately 20,300 vpd are using this section of roadway. By the year 2030, if no improvements are made to the existing system, the majority of US 264 will be near or over capacity.

NC 32 - NC 32 from Simmons Street to Runyon Creek is currently near or over capacity. The capacity on this section is 10,400 vpd, with approximately 11,000 vpd using the section of roadway. By the year 2030, if no improvements are made to the existing system, the NC 32 corridor from Simmons Street to SR 1303 (Brick Kiln Road) will be near or over capacity. Also, the section of NC 32 from SR 1309 (Christian Service Camp Road) to SR 1300 (River Road) will be over capacity in the year 2030.

NC 33 - NC 33 from US 17 to SR 1136 (Gray Road) is currently near or over capacity. The capacity on this section is 11,600 vpd, with approximately 10,100 vpd using the section of roadway. By the year 2030, if no improvements are made to the existing system, the entire NC 33 corridor will be over capacity.

Slatestone Road (SR 1507) - SR 1507, from SR 1501 (Highland Drive) to the planning area boundary, has a capacity of 9,000 vpd. In 1997 the average daily traffic volume is 3,000 vpd. By the year 2030 volumes are expected to increase to 8,000 vpd, rendering this section of roadway near capacity.

Highland Drive (SR 1501) - SR 1501, from Fifteenth Street to Avon Avenue, is currently near capacity. The capacity on this section is 10,400 vpd, with approximately 9,100 vpd using the section of roadway. By the year 2030, if no improvements are made to the existing system, the SR 1501 from Fifteenth Street to SR 1507 (Slatestone Road) will be over capacity.

Market Street (SR 1422) - SR 1422, from Third Street to Fifth Street (US 264), is currently operating near or over capacity. The capacity on this section is 10,500 vpd, with approximately 10,000 vpd using this section of roadway. If no improvements are made to the roadway, this section will be over capacity by the year 2030. SR 1422, from Fifteenth Street to the city limits, has a capacity of 10,500 vpd. In 1997 the average daily traffic volume is 5,200 vpd. By the year 2030 volumes are expected to increase to 10,600 vpd, rendering this section of roadway over capacity.

Clarks Neck Road (SR 1403) - SR 1403, from US 264 to the city limits, is currently over capacity. The capacity on this section is 9,200 vpd with an average daily traffic volume of 10,000 vpd. By the year 2030, if no improvements are made to the existing system, the entire SR 1403 corridor will be over capacity from US 264 to the Beaufort/Pitt County line.

N. Asbury Church Road (SR 1313) - SR 1313, from SR 1311 (S. Asbury Church Road) to SR 1501 (Old Bath Highway), has a capacity of 7,600 vpd. In 1997 the average daily traffic volume is 2,800 vpd. By the year 2030 volumes are expected to increase to 6,200 vpd, rendering this section of roadway near capacity.

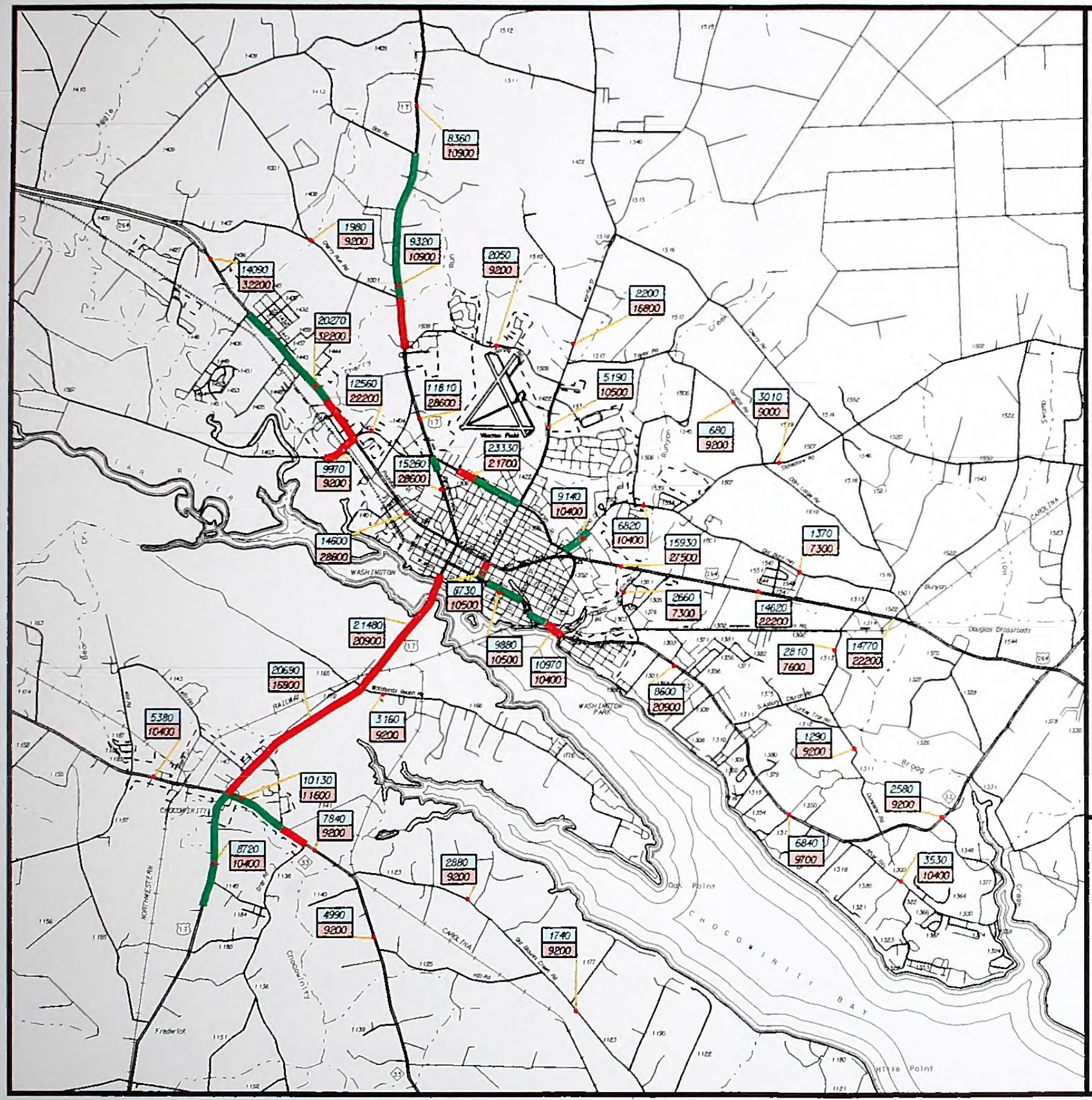
Old Blounts Creek Road (SR 1123) - SR 1123, from NC 33 to SR 1125 (Hill Road), has a capacity of 9,200 vpd. In 1997 the average daily traffic volume is 2,900 vpd. By the year 2030 volumes are expected to increase to 11,200 vpd, rendering a section of the roadway over capacity.

Fifteenth Street - Fifteenth Street, from Minuteman Lane to SR 1422 (Market Street) is currently operating near or over capacity. The capacity on this section is 21,700 vpd, with approximately 23,300 vpd using the section of roadway. By the year 2030, if no improvements are made to the existing system, the entire Fifteenth Street corridor will be over capacity.

Third Street - Third Street, from Bonner Street to Brown Street is currently near capacity. The capacity is 10,500 vpd with approximately 9,900 vpd using this section of roadway. In the future year, Third Street from Market Street to NC 32 is expected to be over capacity and the volumes are expected to increase to 13,700 vpd.

No Build Alternative - Not implementing a thoroughfare plan or elements of it could be called a No-Build Alternative. This means that there would be no new construction or roadway improvements to the Washington thoroughfare system except for routine maintenance. If no improvements are made, primarily bypass routes for US 17 and US 264, during the planning period, the increase traffic volumes and normal growth will result in a dramatic reduction in transportation quality through the central business district. At LOS E the operating speed will drop significantly, and the queues of traffic currently experienced behind slow moving vehicles will get considerably longer. This will reduce the level of service through the city causing operating speeds to drop significantly, and the queues of traffic currently experienced behind slow moving vehicles will get considerably longer.

The absence of adequate highway improvements in the city could negatively impact economic growth in both industry and tourism. Figure 6 shows the existing system assuming that no improvements from the thoroughfare plan are made by the design year.



1997 VOLUMES & ROADWAY DEFICIENCIES

LEGEND

NEAR CAPACITY

OVER CAPACITY

1997 VOLUME
CAPACITY

00000
00000

N

S

CITY OF WASHINGTON

BEAUFORT COUNTY
NORTH CAROLINA

PREPARED BY THE

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
STATEWIDE PLANNING BRANCH

IN COOPERATION WITH THE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

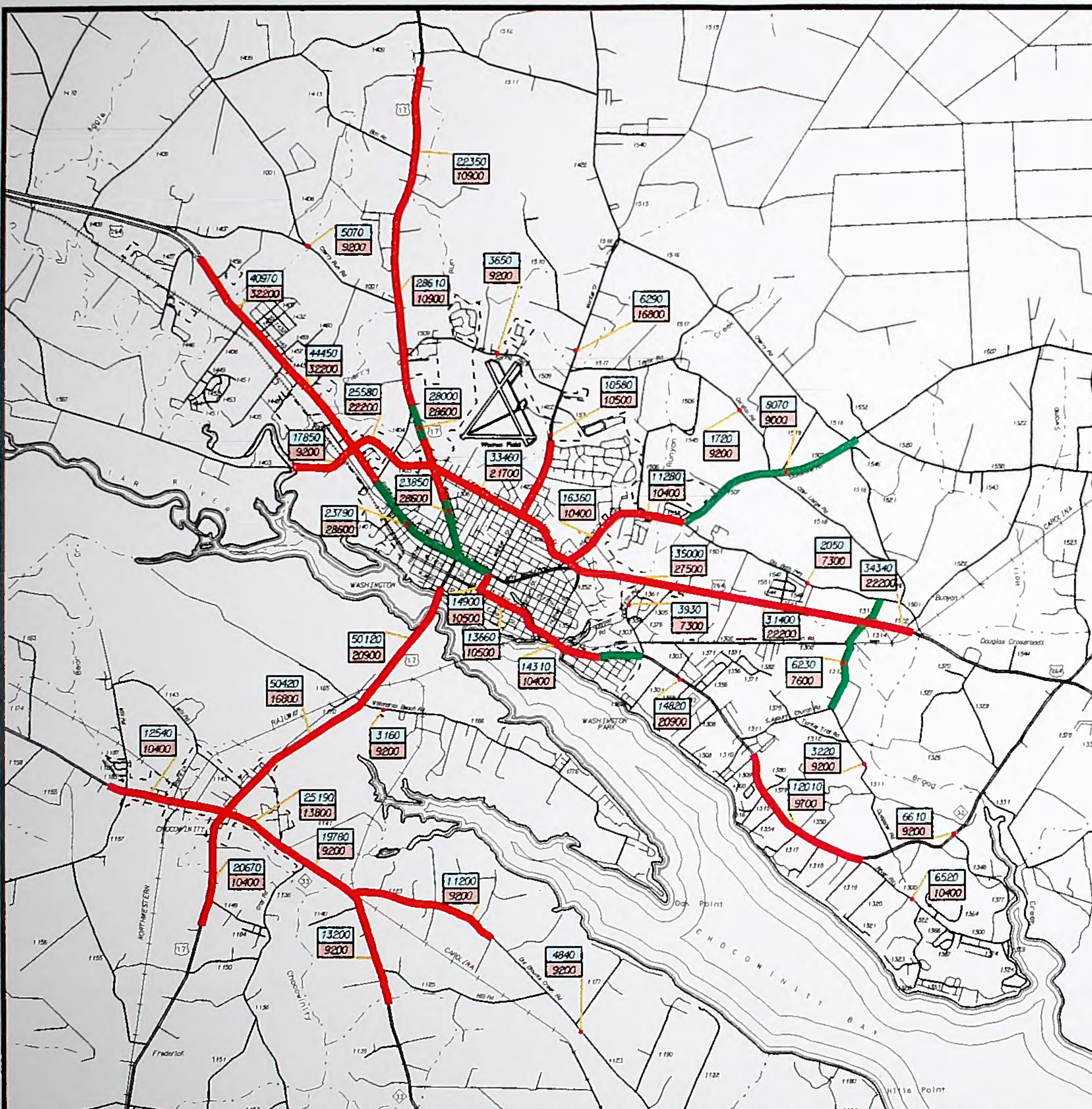
SCALE

0 1 2 3 miles

MAP DATE: SEPTEMBER 15, 1999

FIGURE 5

2030 VOLUMES & ROADWAY DEFICIENCIES



LEGEND

NEAR CAPACITY

OVER CAPACITY

2030 VOLUME 00000

CAPACITY 00000

CITY OF WASHINGTON

BEAUFORT COUNTY
NORTH CAROLINA

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

SCALE
0 1 2 3 miles

MAP DATE: SEPTEMBER 15, 1999

FIGURE 6

Chapter 5
Population, Land Use, and Traffic

Factors Affecting the Future Roadway System

The factors that play a vital role in determining the transportation needs of a city are population, land use and traffic. Examination of these factors helps to explain historic travel patterns and lays the groundwork for thoroughfare planning.

In order to formulate an adequate year 2030 thoroughfare plan, reliable forecasts of future travel characteristics must be achieved. Population, vehicle usage trends, economy and land use play a significant role in determining the transportation needs of the area, and must be carefully analyzed. Additional items may include the effects of legal controls such as subdivision regulations and zoning ordinances, the availability of public utilities and the physical features of the area.

The first step in the development of the thoroughfare plan is to define the planning period and the planning area. The planning period is typically on the order of 30 years. The base year for the Washington study was 1997, and the year 2030 was chosen to be the end point of the study period (33 years). The planning area is generally the limits to which urbanization is expected to occur during the planning period. The planning area is then subdivided into traffic analysis zones. Figure 7 shows the planning area boundary and zones.

Population

Travel is directly related to population. The volume of traffic on any given section of roadway is closely related to the size and distribution of the population that it serves. Because of this relationship, one of the basic steps in planning a transportation system is an in-depth population study. Population trends for the City of Washington and Beaufort County are shown in Table 6.

Table 6

Population Trends for the Washington Planning Area

Year	Washington	Chocowinity	Washington Park	Beaufort County	Planning Area
1970	8,961	566	517	35,980	-
1980	8,418	644	514	40,355	12,700[a]
1990	9,160	624	486	42,283	-
1997	9,943	795	477	43,400	22,236

a: From survey taken in 1977 for the Washington Planning Area

The most important population estimate for development of the thoroughfare plan is that of the planning area. Even though government census data is not available for the transportation planning area, other methods of estimation of population are available. The 1997 housing "windshield" survey for this study area gave a final count of 8,859 homes inside the Washington

Planning Area. The housing count was then multiplied by the average persons per dwelling unit for the planning area (2.51), to give a total planning area population of 22,236. Population projections are shown in Table 7.

Table 7

Population Projections for the Washington Planning Area

Year	Beaufort County	Planning Area
1997	43,400	22,236
2000	43,729	22,550
2010	44,482	23,629
2020	45,879	24,759
2030	46,900	25,943

Economy and Employment

One of the more important factors to be considered in estimating the future traffic growth of an area is its economic base. The number of employers and the employee's income or purchasing power influences how much population can be supported in the area and the number of motor vehicles that will be locally owned and operated. Generally, as the 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 the area is essential to estimating future travel demand.

Factors which will influence economic growth and development in the Washington Planning Area over the planning period is development along the US 17 and US 264 corridors and in the downtown area. The working population of the Washington Planning Area is mainly a mixture of industrial, retail, and service industries. Table 8 was developed using the sum of the estimated jobs of each employer for the base year 1997. An employment to population ratio for the planning area is applied to the projected population to estimate the future amount of employment. The total employment is then distributed into employment categories based on the market share of each in the base year and expected trends in each industry. The employment categories, which are based on Standard Industrial Classification (SIC), are described below.

- **Industrial** - agriculture, construction, manufacturing, transportation
- **Retail** - all types of wholesale and retail trade
- **Special Retail** - gasoline service stations, restaurants
- **Office** - personal, business, health, legal, education, social services
- **Service** - finance, insurance, real estate, public administration

Table 8

Employment Data and Projections for the Washington Planning Area

Type of Employment	Employment 1997	Employment 2030
Industrial	5,111	7,992
Retail	1,036	1,771
Highway Retail	826	1,028
Office	2,990	3,291
Service	1,019	1,019
Total	10,982	15,101

Land Use

Land use refers to the physical patterns of activities and functions within a city or county. Nearly all traffic problems in a specific area are relative to the area's land use. The amount of traffic on a particular roadway is very closely related to its adjacent land use. For example, a large industrial plant might be the cause of congestion during shift change hours as its workers come and go. However, during the remainder of the day few problems, if any, may occur. The spatial distribution of different types of land use (sometimes referred to as traffic generators) is the predominant determinant of when, where, and why congestion occurs. The attraction between different land uses and their association with travel varies depending on the size, type, intensity, and spatial separation of each.

For use in transportation planning, land uses are grouped into four categories:

1. Residential - all land devoted to the housing of people (excludes hotels and motels)

2. Commercial - all land devoted to retail trade including consumer and business service and office

3. Industrial - all land devoted to manufacturing, storage, warehousing, and transportation of products, and

4. Public - all land devoted to social, religious, educational, cultural, and political activities.

Figure 8 shows the planning area's existing land use.

Anticipated future land use is a logical extension of the present spatial distribution. Determination of where expected growth is to occur within the planning area facilitates the location of proposed thoroughfares or the improvements of existing thoroughfares. Areas of anticipated development and growth for the Washington Planning Area are:

Residential - The City of Washington's residential areas are concentrated west and east of the Central Business District along portions of Third, Second, and Main Street. Much of the residential area east of the Central Business District is located within the Historic

District. Additional residential areas are located north of Fifth Street and east of the airport and SR 1422 (Market Street Extension). Since the majority of the land within the planning jurisdiction is zoned for residential usage, residential development is expected to continue throughout the planning area.

Commercial/Retail - Commercial land use is concentrated in the waterfront Central Business District, mainly along US 17 North and US 264 both west and east of the City of Washington. The areas along US 17 and US 264 have been developed with shopping centers and some strip commercialization. Future development is expected to continue along these corridors.

Industrial - Industrial development within the Washington Planning Area is concentrated in six areas. The largest industrial areas are located north and south of US 264 West and east of US 17 North. Any future industrial development is expected to follow similar growth patterns.

Public - The City of Washington has numerous public areas and open spaces within its planning area. The City owns several parks, schools, open play spaces, civic centers, waterfront properties, and a farmer's market.

Future Travel Demand

Travel demand is generally reported in average daily traffic counts. Traffic counts are taken regularly in and around Washington by the North Carolina Department of Transportation. To estimate future travel demand, traffic trends over the past twenty years were studied. The largest growth was noted on lower volume roads, where a given increase will result in a higher percentage. Figures 5 and 6 show existing and expected traffic volumes for the Washington Planning Area. The introduction of new residential and commercial developments in the planning area will cause increases in traffic growth in those immediate areas. Eventually, this increase will level off and follow the growth pattern of the surrounding area. For a summary of travel statistics for the Washington Planning Area, refer to Table 9 in Chapter 7.

ZONE MAP

LEGEND

Zone Line

000 Zone Number

Planning Area Boundary

N

S

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BEAUFORT COUNTY
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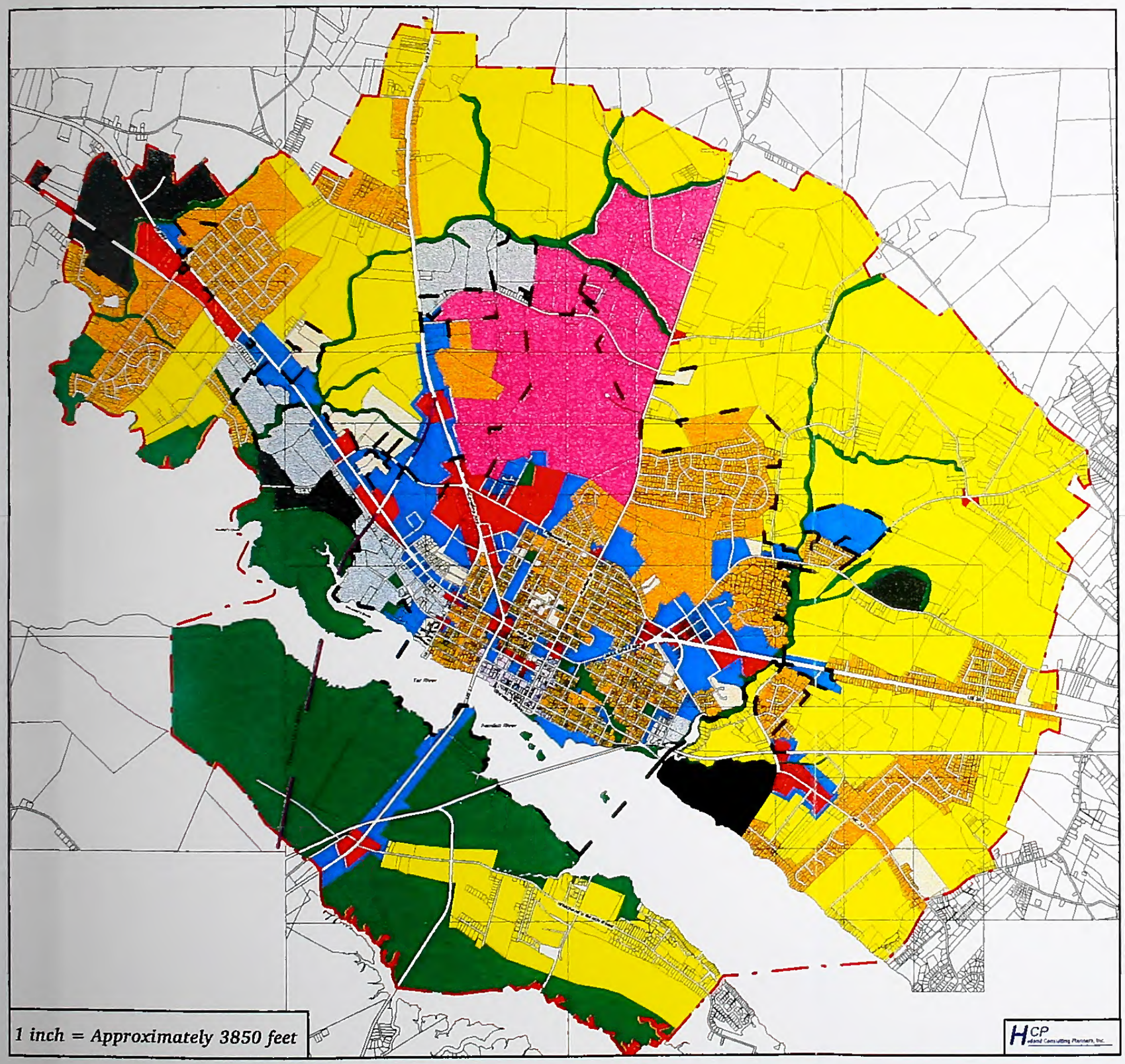
SCALE

0 1 2 3 miles

FIGURE 7

Washington

Future Land Use Map



LEGEND

- Airport Develpoment Zone
- Conservation / Open Space
- Commercial
- Office / Institutional / Multi-Family
- Town of Washington Park
- Mixed Use Downtown
- Light Density Residential
- Medium Density Residential
- High Density Residential
- Light Industrial
- Heavy Industrial
- Corporate Limits
- ETJ
- Proposed US 17 Bypass (Preferred Route)

FIGURE 8

Chapter 6
Environmental Concerns

In recent years, environmental considerations associated with highway 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, or EIS, for road projects that have a significant impact on the environment. Included in an EIS would be the project's impact on wetlands, water quality, historic properties, wildlife, and public lands. While this report does not cover the environmental concerns in as much detail as an EIS would, preliminary research was done on several of these factors and is included below.

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.

In this study, the impacts to wetlands were determined using the National Wetlands Inventory Mapping, available from the U. S. Fish and Wildlife Service. The locations of wetlands throughout the Washington Planning Area are shown in Figure 9.

Wetland impacts have been avoided or minimized to the greatest extent possible while preserving the integrity of the transportation plan.

Threatened and Endangered Species

A preliminary review of the Federally Listed Threatened and Endangered Species within the Washington Planning Area was done to determine the effects that new corridors could have on the wildlife. These 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 on the Department of Transportation to mitigate 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, we are able to avoid or minimize these impacts.

There were several threatened or endangered species identified in the Washington Planning Area, which are listed below and shown in Figure 9. A detailed field investigation is recommended prior to construction of any highway project in this area.

Endangered Species:

Aeschynomene Virginica (Sensitive Jointvetch)
Bidens Coronata (Crowned Beggarticks)
Tofieldia Glabra (Carolina Asphodel)
Platanthera Nivea (Snowy Orchid)
Tidal Freshwater (Natural Community)
Picoides Borealis (Red-cockaded Woodpecker)

Historic Sites

The location of historic sites in Washington was 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 the Department of Transportation to identify historic properties listed in the National Register of Historic Places and properties eligible to be listed. The DOT 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 DOT to identify historic properties listed on the National Register, but not necessarily those eligible to be listed. DOT must consider impacts and consult with the North Carolina Historical Commission, but it is not bound by their recommendations.

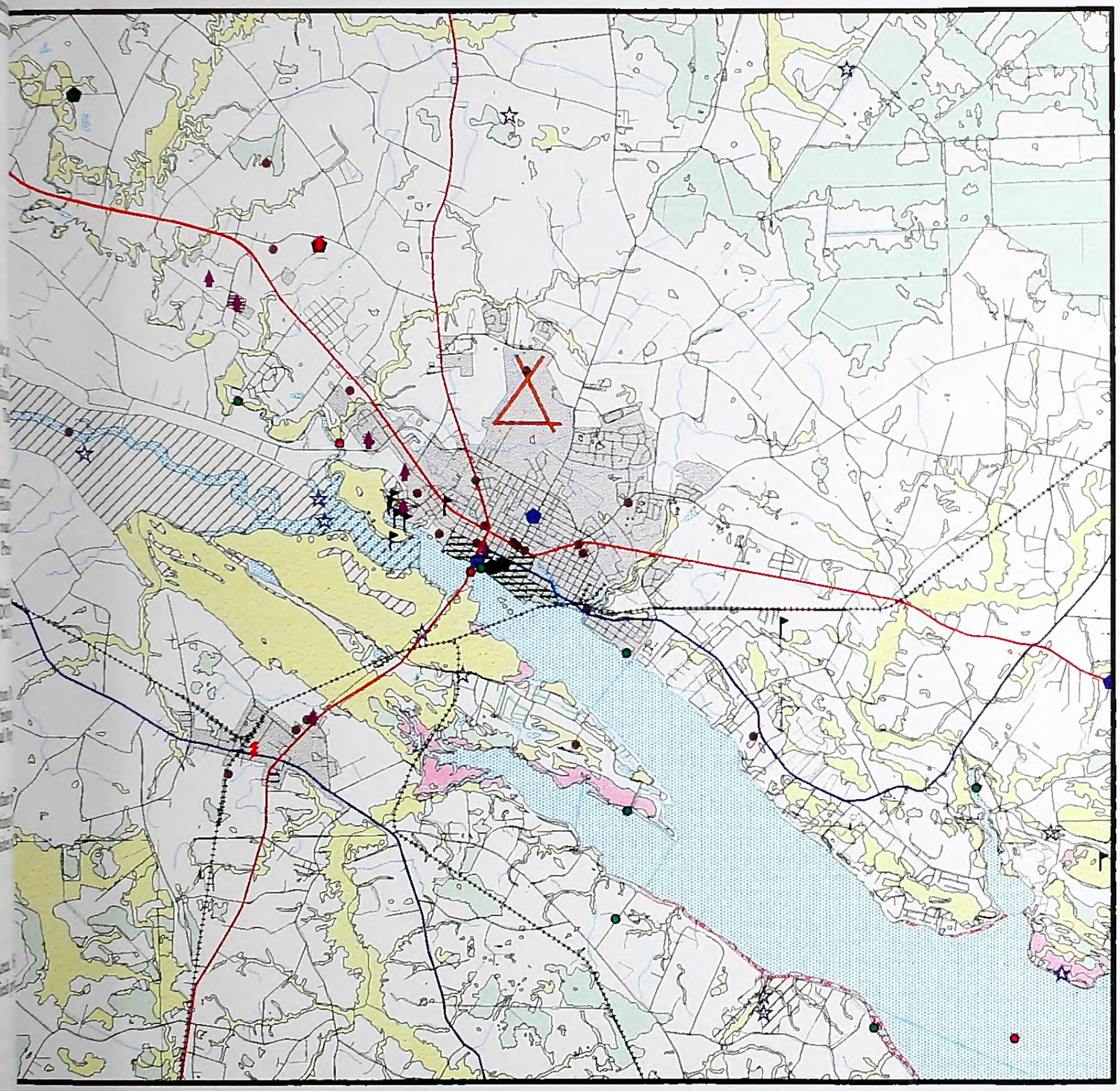
There are currently three historic properties and one historic district in the Washington Planning Area that are listed on the National Register of Historic Places. There are also two historic properties and two historic districts that are actively on the study list for the National Register. These properties are shown in Figure 9.

Some of these properties may 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 closer study should be done in regard to the local historic sites prior to the construction of any proposal.

Archaeology

There were no significant archaeology sites located in the Washington Planning Area. However, care should be taken to make sure that any possible archaeological sites be identified prior to any roadway improvements or construction.

Environmental Data
Washington, NC



0.4 0 0.4 0.8 1.2 1.6 Miles

LEGEND

- Ambient Water Quality Monitoring Sites (100k)
- Citizen Water Quality Monitoring Sites (100k)
- NPDES - Non Discharge Systems (100k)
- NPDES - Point Source Dischargers (24k)
- Surface Water Intakes (100k)
- Groundwater Incidents (100k)
- Nat. Heritage Occursnce Sites (Restricted-100k)
- Hist. Struct.-NR (Restricted-100k)
- Hist. Dist. -NR (Restricted-100k)
- Hist. Struct.-SL(Restricted-100k)
- Hist. Dist.-SL(Restricted-100k)
- Superfund Pts. (Haz. Subs. Dispos. Sites)
- Superfund Areas (Haz. Subs. Dispos. Sites)
- Sub. Root Vesculers (poly-24k)
- Railroads (100k)

Roads (DOT 24k - no attributes)
- Interstate Route
- US
- NC
- SR
- City
- Other
- Unknown
- Roads (100k TIGER w/ attributes)

Airports / Substations
- Airport
- Power Substation
- Prop. Critical Habitat Areas (1 mile buffer-24k)
- Trout Streams (WRC - 100k)
- Trout Streams (DWQ - 100k)
- Anadromous Fish Spawning Areas (100k)

DCM Wetlands
- High Quality Wetlands
- Pocosin (High)
- Medium Quality Wetlands
- Low Quality Wetlands
- NWI (arc-24k)
- Hydro - Rivers/Streams (100k)
- Hydro -Water Bodies (100k)

Water Supply Watersheds (24k)
- Critical
- Protected
- Natural Areas (Restricted-24k)
- Municipal Boundaries (24k)
- River Basins - Major (24k)

N W E S

FIGURE 9

Chapter 7
Traffic Model Development

In order to develop an efficient thoroughfare plan for the Washington Planning Area, it was necessary to develop and calibrate a traffic model of the area. Developing a traffic model requires the following steps: define the study area, collect traffic counts and socioeconomic data, determine the trip generation characteristics of the study area, calibrate the traffic model so that it duplicates patterns of the study area, and project the socioeconomic data to the design year. Once the socioeconomic data has been projected, the model may be used to evaluate various street system problems and alternate solutions to the problems.

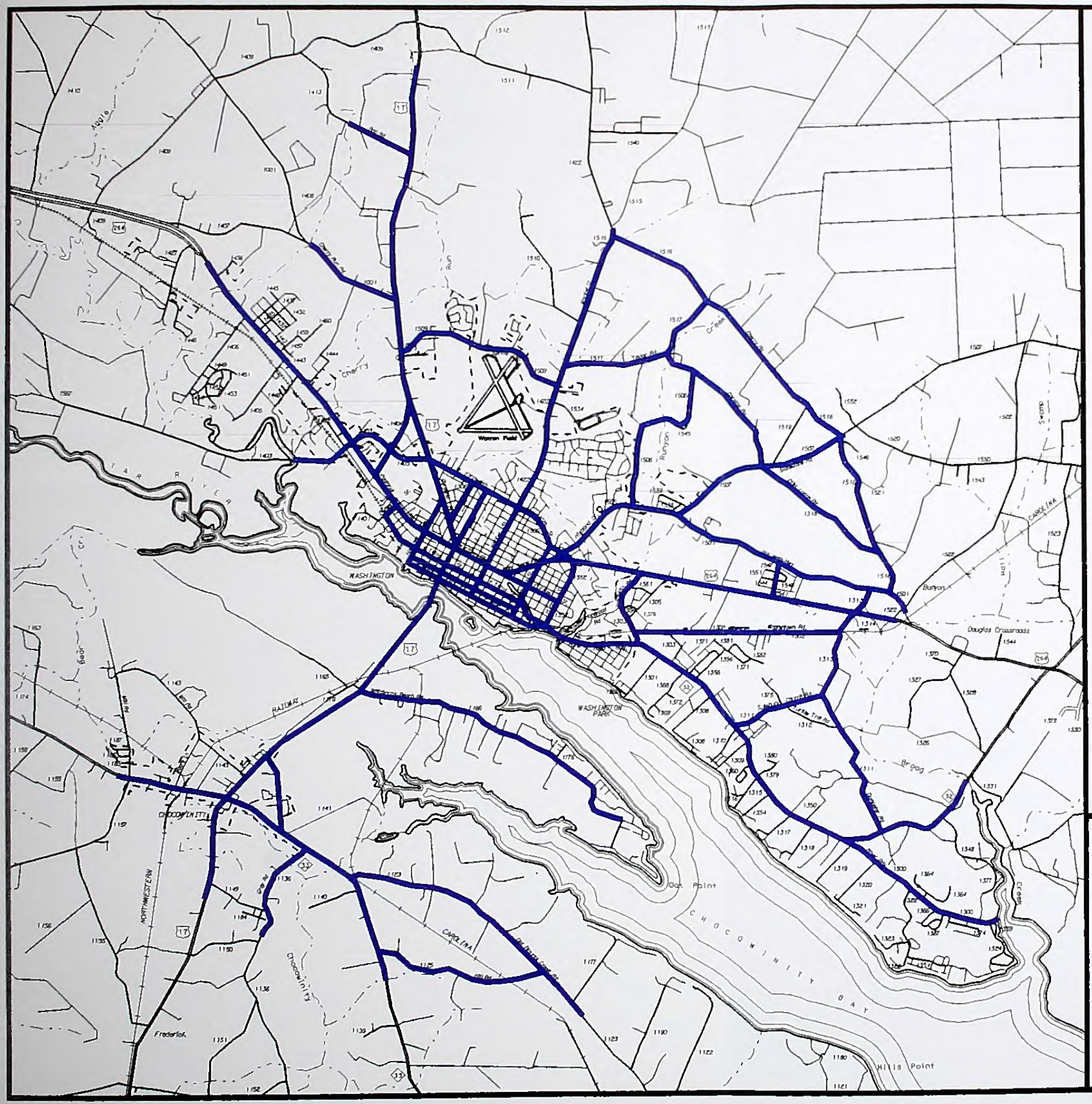
The Study Area

The study area for Washington consists of the City of Washington, the Town of Chocowinity, the Town of Washington Park and some additional outlying areas (Figure 7). This area was divided into 61 zones for data collection and aggregation. These zones reflect similar land use throughout the planning area.

The Base Year Network

The purpose of the traffic model is to replicate the conditions on the city street system. Therefore, it is necessary to represent the existing street system in the model. There is a balance between having too many streets on the model to allow it to be calibrated and not having enough streets to realistically duplicate existing conditions. Generally, all the major arterials and some of the major land access or collector streets need to be represented. Figure 10 shows the modeled network overlaid on the actual street system.

Street capacity is an important component of the model. The volume to capacity ratio (v\c) gives us our best indication of present and future traffic congestion. Speed and distance are the major factors that define the minimum time paths from zone to zone. The model uses the minimum time paths as the basis for assigning traffic to streets. Generally in the Washington model the speeds assigned to links of the street system are at or slightly below the posted speed limit.



TRANPLAN NETWORK

LEGEND

Network Links

N

S

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SCALE

0 1 2 3 miles

FIGURE 10

Data Requirements

In order to produce an adequate traffic model of the study area, two additional types of data are required. First, traffic counts on routes used in the model provide a basis for calibrating the model. These traffic counts show a snapshot of traffic conditions in the study area. Second, socioeconomic data (housing counts and an employment survey) is necessary in order to generate traffic on the model. Housing and socioeconomic data for the model are shown in Appendix E.

Traffic Counts

The model must be calibrated against existing conditions in the study area. In order to calibrate the model traffic counts must be taken at various locations around the study area. In addition, volumes on all routes crossing the planning area boundary were counted. These counts show how much traffic is entering and exiting the study area. Traffic counts for the Washington study area were collected during August and September of 1997 and their locations are shown in Figure 11.

Socioeconomic Data

The required data consists of housing counts and an employment survey. The housing counts are used in the model as the generator of trips and employment is used as the attractor of trips.

The best indicator of the average number of trips made from a household during the course of a day is household income. Since there is no adequate method for determining household income, the type and quality of housing was used as an indicator of household income. The Statewide Planning staff conducted a windshield survey to collect housing and employment data. The housing inventory was divided into five categories: excellent, above average, average, below average, and poor. Each of these categories was assigned a slightly different trip generation rate. Appendix E shows the housing counts for each traffic zone.

The employment data that was collected was broken out by Standard Industrial Code classification and grouped into five categories: Industry, Special Retail, Retail, Office and Services. This data was used with a regression equation developed from an origin and destination survey of a similar size city to produce an attraction factor for each zone. Appendix E shows total employment by traffic analysis zone.

Commercial Vehicles

Commercial vehicles have somewhat different trip generation characteristics than do privately owned vehicles. An inventory of commercial vehicles was done at the same time as the employment and housing inventory for the study area.

TRAFFIC COUNT LOCATION MAP

LEGEND

- ▲ *Classification Count (1–9)*
- ■ *Hourly Count (20–43)*
- ● *Daily Count (60–92)*

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SCALE

0 1 2 3 miles

FIGURE 11

Trip Generation

The trip generation process is the process in which external station volumes, housing data, and employment data are used to generate traffic volumes that duplicate the traffic volumes on the street network. The technical definition of a trip is slightly different than the definition of a trip used by the general public. Technically a trip only has one origin and one destination while the layman will often group, or chain, several short trips together as one longer trip.

Traffic inside the study area has three major components: through trips, internal-external trips, and internal trips. Through trips are produced outside the planning area and pass through en-route to a destination outside the planning area. Internal-external trips have one end of the trip outside of the planning area. Internal trips have both their origin and destination inside the planning area. For clarity, the internal trips are further subdivided into trip purposes. The trip purposes for this study are home-based work, other-home based, and non-home based.

Table 9 gives a summary of each trip purpose and Table 10 illustrates the variables that are considered when determining trip percentages.

Table 9

Travel Data Summary

Type		1997	2030
Average Daily Trips per DU		5.29	5.88
Internal Trips		42,186	61,862
Home Based Work		9,281	13,610
Other Home Based		21,093	30,931
Non-Home Based, Internal		11,812	17,321
NHB Secondary		11,979	32,191
Internal <-> External		46,098	115,660
Through Trips		14,608	37,142
	Total Daily Trips	114,871	246,855

Table 10

Travel Model Input Variables

Trip Percentages by Purpose		Year	Persons/DU	Persons/Veh
Internal of Total	90%			
HBW	22%	1997	2.51	1.27
OHB	50%			
NHB	28%	2030	2.22	1.07

Composite Factor:

$$\text{Composite Factor} = \frac{\text{1997 Persons/Veh}}{\text{2030 Persons/Veh}} \times \text{Usage Factor} \times \frac{\text{2030 Persons/DU}}{\text{1997 Persons/DU}}$$

$$\text{Composite Factor} = \frac{1.27}{1.07} \times .99 \times \frac{2.22}{2.51} = 1.04$$

Increase For Design Year Generation Rates:

Generation Rates = Average 1997 Trip Rate X Composite Factor - Average 1997 Trip Rate

Increase for 2030 Generation Rates (5.29 X 1.04) - 5.29 = 0.21 (Use 0.30)

Secondary NHB Trip Development

Secondary NHB Trips = Total Ext-Int Trips - Ext-Int Trips Garaged Inside Planning Area X NHBS Factor*

1997 Secondary Trips = (46,098 - 4,687) X 0.30 = 11,979

2030 Secondary Trips = (115,660 - 6,874) X 0.30 = 32,191

The breakdown of internal trips by purpose and total of non-home based trips generated externally are shown in Table 9.

*Assumed NHB trip making rate per each one-way external-internal trip by vehicles garaged outside the planning area.

Through Trips

The Through Trip Table for this study was developed based on Statewide Planning Technical Report Number 3 (Synthesized Through Trip Table for Small Urban Areas By Dr. David G. Modlin, Jr.).

Once these volumes were developed, the Fratar balancing method was then used to balance the trip interchanges so that the total number of through trips at each external station is consistent with the

total number of through trips at every other station. Generally five iterations are sufficient to balance the estimate between external zones.

External - Internal

The external-internal trip volume was determined by subtracting the through trip volume at each station from the total traffic volume at that station. Table 11 lists the external-internal and through trip values.

Table 11

Cordon Station Travel

Computer Station	Base Year - 1997			Future Year - 2030		
	Total ADT	Thru Trip End	Ext - Int Trips	Total ADT	Thru Trip End	Ext - Int Trips
70	3,935	668	3,267	9,635	1,650	7,985
71	5,383	1,126	4,257	11,110	2,322	8,788
72	8,714	3,486	5,228	20,662	8,264	12,398
73	1,920	228	1,692	4,961	590	4,371
74	5,035	1,454	3,581	13,838	3,998	9,840
75	1,737	202	1,535	4,322	496	3,826
76	1,815	210	1,605	5,007	584	4,423
77	14,766	8,846	5,920	34,331	20,606	13,725
78	1,692	196	1,496	4,185	474	3,711
79	3,601	586	3,015	8,709	1,416	7,293
80	2,307	266	2,041	5,949	678	5,271
81	8,366	3,354	5,012	22,342	8,928	13,414
82	259	18	241	301	24	277
83	1,979	236	1,743	5,071	612	4,459
84	13,805	8,340	5,465	39,521	23,642	15,879

Internal Data Summary (IDS)

IDS is the process that takes the external-internal traffic volumes, housing data, employment data, generation rates, and regression equations and generates the trip productions and trip attractions required by the gravity model. Housing units were stratified to account for differing trip generation rates for each classification. The individual trip generation rates give an average trip generation rate for the study area of 5.29 trips per dwelling unit (du).

Trip attractions were produced using regression equations. The regression equations consider trip attractions to be related to the employment characteristics of the traffic zones. The regression equations for the Washington study area are:

HBW $Y = 1.0X_1 + 1.0X_2 + 1.0X_3 + 1.0X_4 + 1.0X_5 + 1.0X_8$
OHB $Y = 0.5X_1 + 1.9X_2 + 7.4X_3 + 7.5X_4 + 7.5X_5 + 9.0X_8 + 0.5X_{12}$
NHB $Y = 0.5X_1 + 1.9X_2 + 7.4X_3 + 7.5X_4 + 7.5X_5 + 9.0X_8 + 0.6X_{12}$
EXT $Y = 0.5X_1 + 1.9X_2 + 7.4X_3 + 7.5X_4 + 7.5X_5 + 9.0X_8 + 21.0X_9 + 1.09X_{12}$

Where:
Y = Attraction factor for each zone
X_1 = Industry (SIC codes 1-49)
X_2 = Retail (SIC codes 55,58)
X_3 = Special Retail (SIC codes 50-54, 56, 57, 59)
X_4 = Office (SIC codes 60-67, 91-97)
X_5 = Services (SIC codes 70-76, 78-89, 99)
X_8 = Special Attraction Rate (Shopping)
X_9 = Special Attraction Rate (Hospital)
X_{12} = Attraction caused by housing

The output of the IDS program are trip productions and trip attractions for each zone divided into four trip purposes: home-based work, home-based other, non-home based and external-internal. The trips are segregated into trip purposes because different trip lengths are associated with each trip purpose.

Internal Trip Distribution

Once the number of trips per traffic zone is determined, the trips must still be distributed to other traffic zones. The preferred method of distributing internal and external-internal trips, called the 'Gravity Model', states that the number of trips between Zone A and Zone B is multiplied by a travel time factor. The gravity model takes the form:

$$T_{ij} = \frac{P_i * A_j * F_{ij}}{\text{Sum } x=1,n \text{ of } A_x F_{t,x}}$$

T_{ij} = The number of trips produced in zone i and attracted to zone j.
P_i = The number of trips produced in zone i.
A_j = The number of trips attracted to zone j.
F_{ij} = The travel time factor.
n = The total number of zones.
i = The origin zone number.
j = The destination zone number.
x = Any zone number.

The travel time factor or friction factor (F) is critical to the gravity model distribution and must be derived empirically. The friction factor is dependent on the distance between the traffic zones and the time necessary to travel these distances. This factor is also dependent on the trip purpose. In order to derive this factor, a gravity model calibration program is run with an initial friction factor and trip length frequency curve for each trip purpose. The initial friction factors used in the Washington model were 100 for all trip purposes and time increments. Table 12 shows the actual values used for the friction factors and trip length frequency curves.

Table 12

Friction Factors & Travel Curve Data
Washington

	Friction Factors				Travel Curves			
					% Trips Distributed			
Time Interval	HBW	OHB	NHB	Ext-Int	HBW	OHB	NHB	Ext-Int
1	21418	55730	51358	544922	0.70	1.62	3.17	0.58
2	44835	87582	82411	341582	3.04	5.50	10.53	0.75
3	74599	118035	112911	230313	6.98	9.71	14.19	3.95
4	100827	138317	134088	165806	8.84	10.52	20.25	7.64
5	113133	142894	140114	126512	13.41	12.52	16.08	11.05
6	107701	131955	130783	101556	14.45	14.03	10.12	14.57
7	88902	110436	110695	85136	17.86	13.42	9.04	13.82
8	65030	84933	86249	73987	11.39	10.18	5.64	10.10
9	43080	60858	62800	66163	6.40	5.96	3.84	8.57
10	26414	41194	43379	60436	6.53	5.85	2.99	8.76
11	15319	26707	28857	55973	3.69	3.61	1.82	6.31
12	8589	16816	18768	52175	2.77	3.49	1.36	5.29
13	4758	10425	12114	48590	2.53	2.10	0.52	2.97
14	2661	6452	7878	44877	0.57	0.74	0.25	1.67
15	1536	4043	5240	40801	0.31	0.24	0.07	1.51
16	935	2599	3619	36249	0.22	0.28	0.06	1.31
17	613	1739	2635	31239	0.16	0.09	0.03	0.60
18	443	1228	2052	25921	0.14	0.09	0.02	0.39
19	360	927	1737	20557	0.00	0.00	0.00	0.09
20	337	760	1620	15467	0.01	0.03	0.01	0.07
21	300	684	1600	10960	0.00	0.00	0.01	0.02

Model Calibration

The purpose of a traffic model is to predict the traffic on a street system at some future point in time. However, if the model is not accurate, it is useless for this purpose. Therefore, the model must duplicate the existing traffic pattern. The actual calibration of the model is an iterative process in which incremental changes are made either in the trip generation, trip distribution, or the street network. The purpose of each change is to allow the model to more accurately reflect the real world conditions upon which it is based. Only when the model can adequately reflect the existing traffic pattern should it be used to predict traffic in the future.

Accuracy Checks

There are three checks made on the model. The first is to follow trips through all the steps involved in the model. The purpose of this check is to insure that no trips have been accidentally added to or subtracted from the model, and that no trips have been counted twice.

The second check is to compare the model-generated trips on the screenlines with the ground counts taken at the screenlines. A model is considered to accurately reflect the overall patterns if

the trips it generates are from 95% to 105% of the ground counts on the screenlines. Table 13 compares the ground counts with the model traffic volumes on the screenlines.

Table 13

Actual vs. Modeled Screenline Totals

Screenline	Ground Count	Model Volume	Percent
A (NS)	24231	24553	1.01
B (EW)	29168	30372	1.04

The final check for the model is to match the traffic volumes on the links in the model with the ADT at the same locations. The 'link counts' can be used to find particular places in the network where there are problems. Comparing the link counts with the ground counts for those links did not reveal any significant problems with the model.

Data Projections to the Design Year

In order to make use of the model, the base year data must be modified to reflect assumed conditions in the design year. These projections and the previously developed regression equations were used to produce trip productions and attractions in the same manner as the base year.

Dwelling Unit Projections

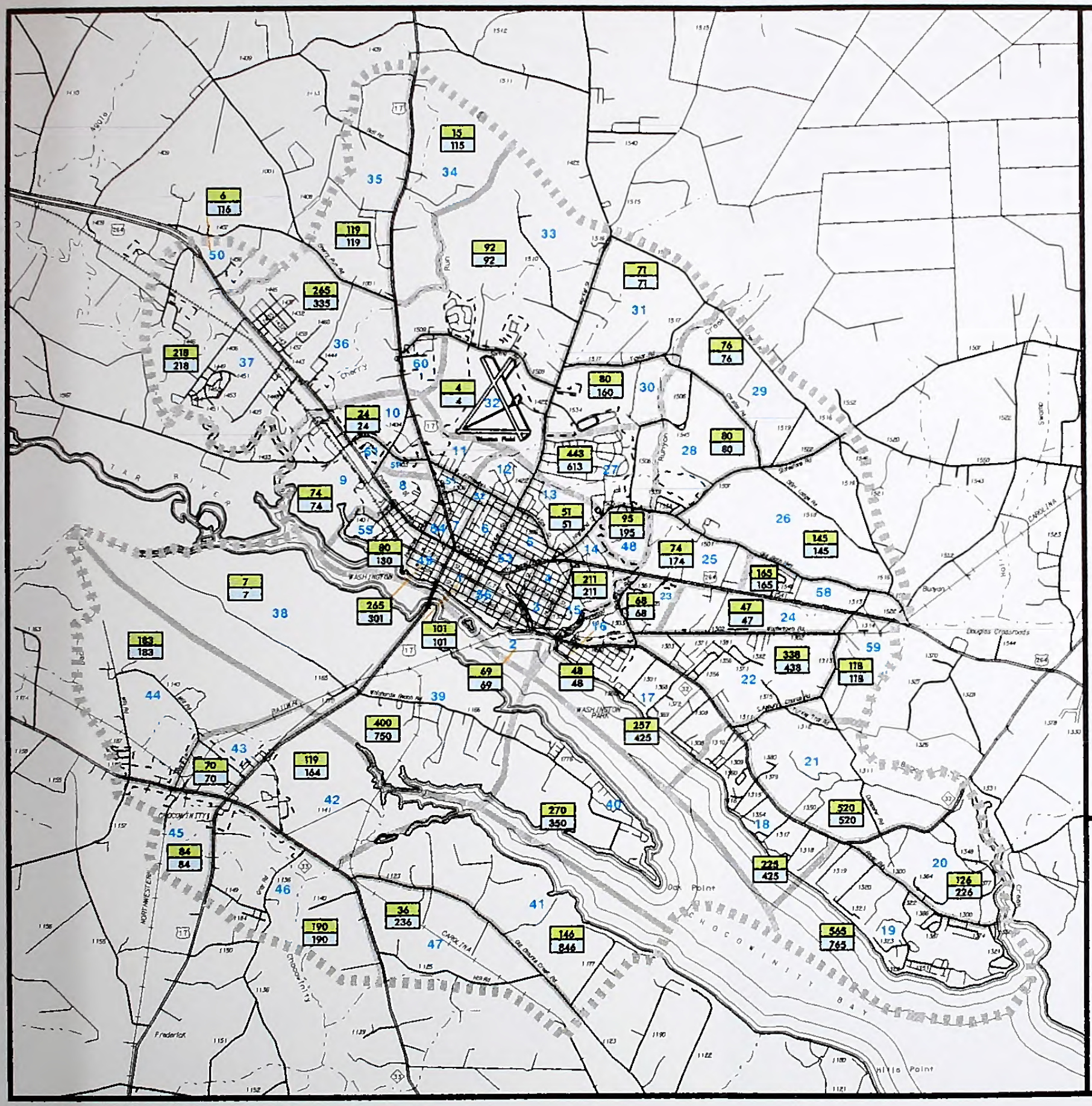
Future dwelling units were determined by extending person per dwelling unit trends for Beaufort County and the City of Washington linearly to the design year. The number of dwelling units is projected to increase by 32%. The Statewide Planning Branch projected residential growth and with the help of the City Planner distributed these houses throughout the planning area. Figure 12 compares the stratification of dwelling units in 1997 with the assumed stratification in 2030.

Employment Projections

The Statewide Planning Branch and the City Planner projected and distributed the 2030 employment to the zones they anticipated employment growth. Those projections were added to the 1997 data. Employment projections throughout the planning area indicated steady growth. Figure 13 compares the stratification of employment data in 1997 with the assumed stratification in 2030.

External and Through Trips

For the design year, external and through trips were projected from the base year using a linear projection of the past growth rate at each external station. Cordon Station Data can be found in Table 11.



HOUSING DATA BY ZONE

LEGEND

PLANNING BOUNDARY

ZONE BOUNDARY

1997 HOUSING
2030 HOUSING
0000
0000

ZONE NUMBER 00

Data Not Shown On Map

ZONE	1997 EMPLOYMENT	2030 EMPLOYMENT
3	177	177
4	304	304
5	213	213
6	410	455
7	177	207
8	199	275
11	75	75
12	111	111
14	82	82
51	27	27
52	61	61
53	199	199
54	99	99
56	334	334
57	0	0
60	10	10

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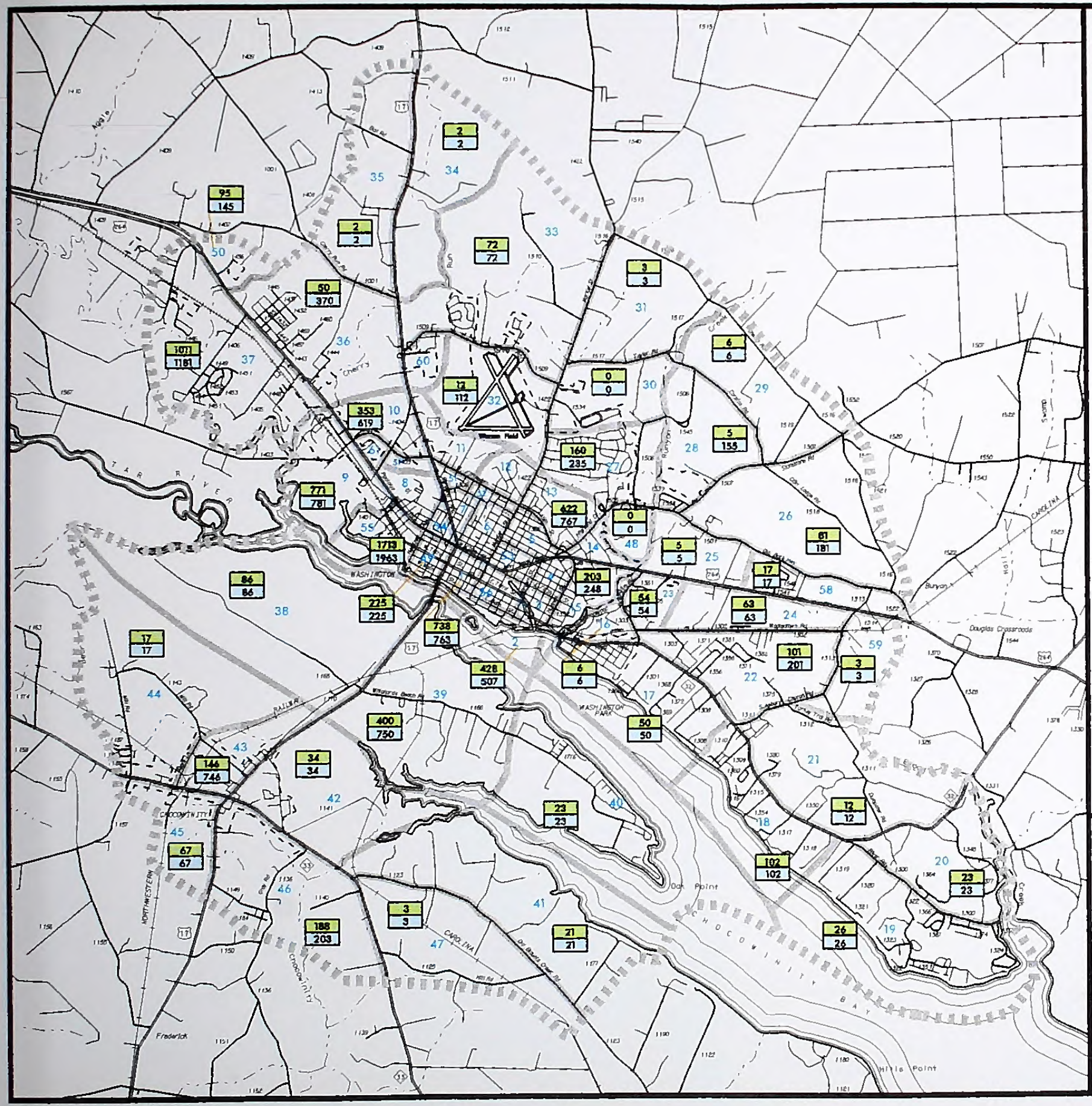
SCALE

0 1 2 3 miles

FIGURE 12



EMPLOYMENT DATA BY ZONE

LEGEND

PLANNING BOUNDARY

ZONE BOUNDARY

1997 EMPLOYMENT
2030 EMPLOYMENT
0000
0000

ZONE NUMBER 00

Data Not Shown On Map

ZONE	1997 EMPLOYMENT	2030 EMPLOYMENT
3	6	6
4	201	182
5	163	163
6	67	67
7	227	227
8	379	429
11	418	729
12	42	67
14	188	188
51	533	1035
52	50	50
53	159	250
54	266	266
56	498	498
57	275	584
60	729	729

N

S

CITY OF WASHINGTON

BEAUFORT COUNTY
NORTH CAROLINA

PREPARED BY THE

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
STATEWIDE PLANNING BRANCH

IN COOPERATION WITH THE

U.S.DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

SCALE

0 1 2 3 miles

FIGURE 13

APPENDICES

Appendix A
Thoroughfare Planning Principles

There are many advantages to thoroughfare planning, but the primary mission 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 or highway can be 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, local officials are informed of future improvements and can incorporate them into planning and policy decisions. This will permit developers to design subdivisions in a non-conflicting manner, direct school and park officials to better locate their facilities, and minimize the damage to property values and community appearance that is sometimes associated with roadway improvements.

Objectives of Thoroughfare Planning

Typically, the urban street system occupies 25 to 30 percent of the total developed land in an urban area. Since the system is permanent and expensive to build and maintain, much care and foresight are needed in its development. Thoroughfare planning is the process public officials use to assure the development of the most appropriate street system that will meet existing and future travel desires within the urban area.

The primary aim of a thoroughfare plan is to guide the development of the urban street system in a manner consistent with the changing traffic patterns. A thoroughfare plan will enable street improvements to be made as traffic demands increase, and it helps eliminate unnecessary improvements, so needless expense can be averted. By developing the urban street system to keep pace with increasing traffic demands, a maximum utilization of the system can be attained, requiring a minimum amount of land for street purposes. In addition to providing for traffic needs the thoroughfare plan should embody those details of good urban planning necessary to present a pleasing and efficient urban community. The location of present and future population along with commercial and industrial development affects major street and highway locations. Conversely, the location of major streets and highways within the urban area will influence the urban development pattern.

Other objectives of a thoroughfare plan include:

- Providing for the orderly development of an adequate major street system as land development occurs;
- Reducing travel and transportation costs;
- Reducing the cost of major street improvements to the public through the coordination of the street system with private action;

- Enabling private interest to plan their actions, improvements, and development with full knowledge of public intent;
- Minimizing disruption and displacement of people and businesses through long range advance planning for major street improvements;
- Reducing environmental impacts, such as air pollution, resulting from transportation, and
- Increasing travel safety.

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

Operational Efficiency

A roadway's operational efficiency is improved by increasing the capability of the roadway to carry more vehicular traffic and people. In terms of vehicular traffic, a roadway's capacity is defined by the maximum number of vehicles that can pass a given point on a roadway during a given time period under prevailing roadway and traffic conditions. Capacity is affected by the physical features of the roadway, nature of traffic, 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 the 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 roadway 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** - Increases capacity 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 road can sometimes be increased 20 -50%, depending upon turning movements and overall roadway 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 lane** - Reversible traffic lanes may be used to increase roadway 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 roads. Travel demand can be reduced or altered 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** - Encouraging the use of transit and bicycle 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 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 streets and development of a coordinated major street system.

Thoroughfare Classification Systems

Streets perform two primary functions, traffic service and land service, which when combined, are basically incompatible. The conflict is not serious if both traffic and land service demands are low. However, when traffic volumes are high, conflicts created by uncontrolled and intensely developed abutting property lead to intolerable traffic flow friction and congestion.

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

Urban Classification

In the urban thoroughfare plan, elements are classified according to the function they serve. Roadways may be classified as major thoroughfares, minor thoroughfares, or local access streets.

Local Access Streets provide access to abutting property. They are not intended to carry heavy volumes of traffic and should be located such that only traffic with origins and destinations of the streets could be served. Local streets may be further classified as residential, commercial, and/or industrial depending upon the type of land use that they serve.

Minor Thoroughfares are more important streets on the city system. They collect traffic from the local access streets and carry it to the major thoroughfares. They may in some instances supplement the major thoroughfare system by facilitating minor through traffic movements. A third function that may be performed is that of providing access to abutting property. They should be designed to serve limited areas so that their development as major thoroughfares will be prevented.

Major Thoroughfares are the primary traffic arteries of the city. Their function is to move intra-city and inter-city traffic. The streets that comprise the major thoroughfare system may also serve abutting property; however, their principle function is to carry traffic. They should not be bordered by uncontrolled strip development because such development significantly lowers the capacity of the thoroughfare to carry traffic and each driveway is a danger and impediment to traffic flow. Major thoroughfares may range from a two-lane street carrying minor traffic volumes to major expressways with four or more traffic lanes. Parking normally should not be permitted on major thoroughfares.

Idealized Major Thoroughfare System

A coordinated system of major thoroughfares forms the basic framework of the urban street system. A major thoroughfare system that is most adaptable to desire lines of travel within an urban area is the radial-loop system. It permits movement between various areas of the city within maximum directness. This system consists of several functional elements: radial streets, cross-town streets, loop system streets, and bypasses (Figure A-1).

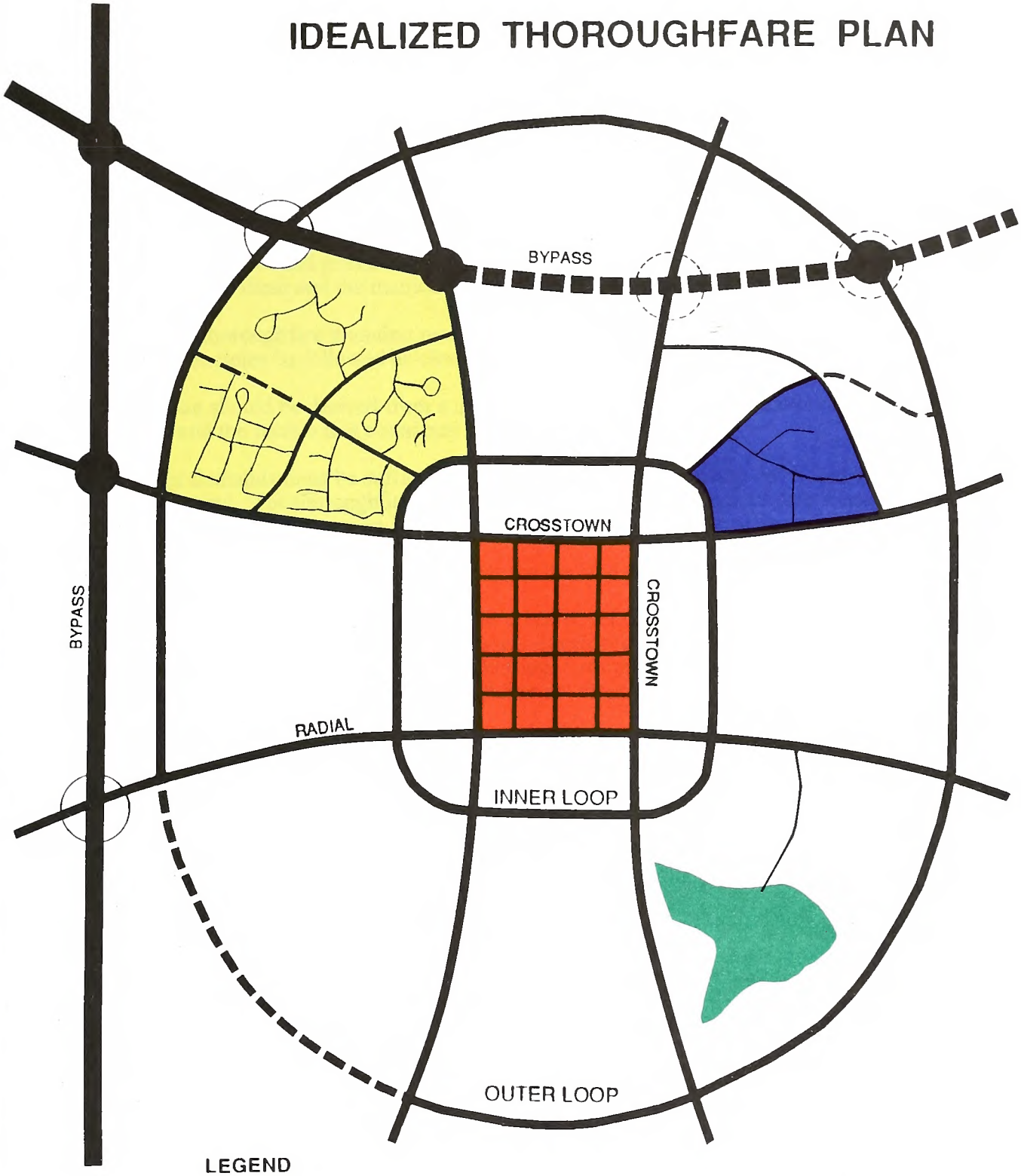
Radial streets provide for traffic movement between points located on the outskirts of the city and the central area. This is a major traffic movement in most cities, and the economic strength of the central business district depends upon the adequacy of this type of thoroughfare.

If all radial streets crossed in the central area, an intolerable congestion problem would result. To avoid this problem, it is very important to have a system of cross-town streets that form a loop around the central business district. This system allows traffic moving from origins on one side of the central area to destinations on the other side to follow the area's border. It also allows central area traffic to circle and then enter the area near a given destination. The effect of a good cross-town system is to free the central area of cross-town traffic, thus permitting the central area to function more adequately in its role as a business or pedestrian shopping area.

Loop system streets move traffic between suburban areas of the city. Although a loop may completely encircle the city, a typical trip may be from an origin near a radial thoroughfare to a destination near another radial thoroughfare. Loop streets do not necessarily carry heavy volumes of traffic, but they function to help relieve central areas. There may be one or more loops, depending on the size of the urban area. They are generally spaced one-half mile to one mile apart, depending on the intensity of land use.

A **bypass** is designed to carry traffic through or around the urban area, thus providing relief to the city street system by removing traffic that has no desire to be in the city. Bypasses are usually designed to through-highway standards, with control of access. Occasionally, a bypass with low traffic volume can be designed to function as a portion of an urban loop. The general effect of bypasses is to expedite the movement of through traffic and to improve traffic conditions within the city. By freeing the local streets for use by shopping and home-to-work traffic, bypasses tend to increase the economic vitality of the local area.

IDEALIZED THOROUGHFARE PLAN



LEGEND

	EXISTING	PROPOSED
MAJOR THOROUGHFARE FREEWAY		
MAJOR OTHER		
MINOR THOROUGHFARE		
LOCAL ROAD		
INTERCHANGE		
GRADE SEPERATION		

LAND USES

- COMMERCIAL/BUSINESS
- RESIDENTIAL
- INDUSTRIAL
- PUBLIC/INSTITUTIONAL

FIGURE A-1

Application of Thoroughfare Planning Principles

The concepts presented in the discussion of operational efficiency, system efficiency, functional classification, and idealized major thoroughfare system are the conceptual tools available to the transportation planner in developing a thoroughfare plan. In actual practice thoroughfare planning is done for established urban areas 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 major street locations.

Throughout the thoroughfare planning process it is necessary from a practical viewpoint that certain basic principles be followed as closely as possible. These principles are as follows:

- The plan should be derived from a thorough knowledge of today's travel - its component parts, and the factors that contribute to it, limit it, and modify it.
- Traffic demands must be sufficient to warrant the designation and development of each major street. The thoroughfare plan should be designed to accommodate a large portion of major traffic movements on relatively few streets.
- The plan should conform to and provide for the land development plan for the area.
- Certain considerations must be given to urban 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 right-of-way for future thoroughfare development.
- While being consistent with the above principles and realistic in terms of travel trends, the plan must be economically feasible.

Appendix B

Thoroughfare Plan Street Tabulation and Recommendations

This appendix includes a detailed tabulation of all streets identified as elements of the City of Washington Thoroughfare Plan. The table includes a description of each section, as well as the length, cross section, and right-of-way for each section. Also included are existing and projected average daily traffic volumes, roadway capacity, and the recommended ultimate lane configuration. Due to space constraints, these recommended cross sections are given in the form of an alphabetic code. A detailed description of each of these codes and an illustrative figure for each can be found in Appendix C.

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

ADQ - Adequate

CL - City Limits

EPB - Eastern Planning Boundary

NPB - Northern Planning Boundary

SPB - Southern Planning Boundary

WPB - Western Planning Boundary

ZL - Zoning Limits

Index for Secondary Road Numbers

- SR 1001 - Cherry Run Road
- SR 1123 - Old Blounts Creek Road
- SR 1125 - Hill Road
- SR 1136 - Gray Road
- SR 1147 - Bragaw Lane
- SR 1166 - Wichards Beach Road
- SR 1302 - Wootentown Road
- SR 1303 - Brick Kiln Road
- SR 1311 - S. Asbury Church Road
- SR 1312 - Dumpster Road
- SR 1313 - N. Asbury Church Road
- SR 1403 - Clarks Neck Road
- SR 1404 - Whispering Pine Road
- SR 1422 - Market Street Extension
- SR 1501 - Old Bath Highway
- SR 1504 - Avon Avenue
- SR 1506 - Keysville Road
- SR 1507 - Slatestone Road
- SR 1509 - Springs Road
- SR 1516 - Cherry Road
- SR 1517 - Taylor Road
- SR 1518 - Corsica Road
- SR 1541 - Nottingham Road

Appendix B
Thoroughfare Plan Street Tabulation and Recommendations

Note: Existing capacities computed using Florida DOT LOS 'D' Charts.

FACILITY & SECTION	DIST. (mi)	EXISTING CONDITIONS RDWY (ft)	ROW (ft)	NO. OF LANES	CAPACITY (vpd)	ADT 1997 (vpd)	2030 (vpd)	RECOMMENDATIONS CROSS SECT.	ROW (ft)	CAPACITY (vpd)	2030 ADT
US 264											
WPB to SR 1456	0.50	64	150	5	32,200	13,900	39,600	ADQ			30,800
SR 1456 to 0.35mi	0.35	64	80	5	32,200	18,100	42,800	ADQ			30,800
0.35mi to 2.64mi	2.29	64	80	5	32,200	20,300	44,500	ADQ			22,700
2.64mi to Hackney Ave.	0.75	52	60	4	28,600	11,200	23,000	ADQ			22,800
Hackney Ave. to US 17	0.30	40	60	4	28,600	13,500	26,000	ADQ			18,300
US 17 to Charlotte St.	1.05	40	60	4	28,600	9,200	17,200	ADQ			24,600
Charlottte St. to Penn Ave.	0.06	74	60	5	28,600	5,000	10,000	ADQ			15,500
Penn Ave. to Hudnell St.	0.14	64	60	5	27,500	5,000	10,000	ADQ			10,100
Hudnell St. to SR 1303	0.70	64	80	5	27,500	16,000	35,000	ADQ			24,800
SR 1303 to EPB	2.75	60	60	5	22,200	14,800	34,400	ADQ			19,500
US 17											
NPB to 3.2mi	3.20	24	100	2	10,900	8,400	23,400	*See US 17 Bypass*			
3.2mi to SR 1404	1.10	68	100	5	28,600	19,900	34,800	*See US 17 Bypass*			
SR 1404 to 5th St.	1.09	68	100	5	28,600	15,300	23,900	ADQ			21,100
5th St. to 4th St.	0.10	58	100	5	28,600	19,900	40,000	ADQ			21,100
4th St. to Main St.	0.30	58	70	5	28,600	22,000	45,700	ADQ			20,800
Main St. to Chocowinity Zoning Limit	1.30	48	100	4	28,600	21,500	50,200	ADQ			20,800
Chocowinity ZL to Chocowinity CL	0.90	48	100	4	28,600	20,700	16,800	ADQ			20,800
Chocowinity CL to NC 33	0.75	52	80	4	28,600	24,000	55,800	ADQ			19,200
NC 33 to 0.2mi	0.20	52	80	4	28,600	9,800	21,900	ADQ			11,100
0.2mi to 0.17mi	0.15	24	80	2	10,400	8,800	20,700	ADQ			9,900
0.17mi to SPB	0.70	24	80	2	10,400	8,800	20,700	*See US 17 Bypass*			
NC 33											
EPB to SR 1147	1.90	21	60	2	9,200	7,300	22,100	F	110	32,500	13,400
SR 1147 to 0.3 mi	0.30	21	60	2	9,200	7,900	19,800	F	110	32,500	12,900
0.3mi to .04mi	0.10	44	80	3	13,800	7,900	19,800	F	110	32,500	22,600
.04mi to US 17	0.40	21	50	3	13,800	10,200	25,200	ADQ			5,200
US 17 to 0.3mi	0.30	21	50	2	10,400	6,600	12,600	ADQ			12,500
0.3mi to WPB	0.80	44	60	2	12,500	5,400	11,200	ADQ			11,200
NC 32											
Edgewater St. to SR 1303	0.75	52	80	4	20,900	8,100	14,400	ADQ			10,800
SR 1303 to 0.4mi	0.40	59	80	4	20,900	7,800	12,700	ADQ			12,700
0.4mi to SR 1309	1.81	59	60	4	20,900	6,900	14,900	ADQ			14,600
SR 1309 to SR 1300[3]	1.50	25	60	2	9,700	6,900	12,100	P	90	27,500	11,800
SR 1300 to EPB	1.40	20	60	2	9,200	2,600	6,700	ADQ			6.700
Cherry Run Rd (SR 1001)											
EPB to US 17	1.18	20	60	2	9,200	2,000	5,100	ADQ			5,100
Old Blounts Creek Rd (SR 1123)											
EPB to NC 32	2.80	20	60	2	9,200	2,900	11,300	K	100	12,500	11,400
Hill Rd (SR 1125)											
NC 33 to SR 1123	1.80	20	60	2	9,200	100	800	ADQ			600

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Gray Road (SR 1136)											
SPB to NC 33	1.10	21	80	2	8,100	3,000	6,200	ADQ			6,600
Bragaw Lane (SR1147)											
NC 33 to US 17	0.80	24	50	2	10,400	5,700	9,300	ADQ			4,800
Whichards Beach Rd (SR 1166)											
US 17 to SR 1182	3.20	22	60	2	9,200	3,200	5,700	ADQ			5,200
Wootentown Rd (SR1302)											
SR 1311 to SR 1303	2.10	19	60	2	7,600	100	100	ADQ			3,000
Brick Kiln Rd (SR 1303)											
NC 32 to US 264	1.35	19	60	2	7,300	2,700	4,400	K	100	12,500	5,800
S. Asbury Church Rd (SR 1311)											
NC 32 to SR 1311	0.95	18	60	2	7,300	1,400	3,500	ADQ			3,600
Dumpster Rd (SR 1312)											
NC 32 to SR 1313	1.65	20	60	2	9,200	1,300	3,300	ADQ			3,400
N. Asbury Church Rd (SR 1313)											
SR 1311 to US 264	1.95	18	60	2	7,600	2,800	6,800	K	100	12,500	7,000
US 264 to SR 1501	0.25	18	60	2	7,600	2,900	7,300	*See US 264 Bypass*			
Clarks Neck Raad (SR 1403)											
EPB to 0.30mi[2]	0.30	21	60	2	9,200	4,000	9,700	P	90	27,500	9,700
0.30mi to US 264[2]	0.40	21	60	2	9,200	10,000	17,900	P	90	27,500	18,000
Whispering Pine (SR 1404)											
US 17 to 15th St.	0.50	22	60	2	10,400	1,900	4,800	*See US 17 Bypass*			
15th St. to US 264	0.29	22	60	2	10,400	1,900	4,800	*See US 17 Bypass*			
Market St. Extensian (SR 1422)											
NPB to SR 1509	1.70	24	60	2	16,800	2,200	6,300	ADQ			5,900
SR 1509 to 0.6mi	0.60	52	80	4	16,800	3,100	7,200	ADQ			6,200
0.6mi to 1.2mi	0.60	52	80	4	16,800	5,400	10,500	ADQ			6,900
1.2mi to 15th St.	0.15	44	80	2	10,500	5,200	10,200	ADQ			5,600
15th St. to Hardin St.	0.65	33	50	2	10,500	2,800	5,200	ADQ			3,500
Hardin St. to 5th St.	0.10	44	50	2	10,500	2,100	3,600	ADQ			2,100
5th St. to Main St.	0.38	44	50	2	10,500	3,500	7,300	ADQ			3,900
Old Bath Highway (SR 1501)											
EPB to 2.1mi	2.10	18	60	2	7,300	2,600	6,600	ADQ			3,700
2.1mi to SR 1507	0.50	18	60	2	7,300	1,800	3,200	ADQ			5,400
SR 1507 to 0.18mi[2]	0.28	32	60	2	10,400	4,900	11,300	N	90	27,500	9,400
0.18mi to 1.19mi[2]	1.02	21	60	2	10,400	6,900	13,800	N	90	27,500	12,000
1.19mi to E. 12th St.[2]	0.10	59	80	3	10,400	9,100	16,400	N	90	27,500	15,800
E. 12th St. to US 264	0.10	60	80	5	28,600	6,000	10,300	ADQ			6,700

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Avon Avenue (SR 1504)											
US 264 to SR 1501	0.43	20	60	2	9,200	900	1,500	*See Radial Connector*			
Keysville Rd (SR 1506)											
SR 1501 to SR 1518	1.80	19	60	2	7,600	100	100	ADQ			200
Slatestone Road (SR 1507)											
SR 1501 to SR 1518[2]	1.03	22	60	2	9,000	3,100	8,100	H	60	13,800	8,600
SR 1518 to EPB	0.90	22	60	2	9,000	3,100	8,100	K	100	12,500	8,700
Springs Rd (SR 1509)											
SR 1422 to US 17	1.85	20	60	2	9,200	2,100	3,700	ADQ			2,800
Cherry Road (SR 1516)											
SR 1501 to SR 1507	1.76	20	60	2	9,200	300	600	ADQ			900
SR 1507 to SR 1422	3.23	20	60	2	9,200	300	500	ADQ			200
Taylor Road (SR 1517)											
SR 1516 to SR 1422	1.78	20	60	2	9,200	600	1,100	ADQ			900
Corsica Road (SR 1518)											
SR 1517 to SR 1507	1.58	20	60	2	9,200	700	1,800	ADQ			1,200
SR 1507 to SR 1516	1.50	20	60	2	9,200	1,500	4,000	ADQ			900
Nottingham Road (SR 1541)											
SR 1501 to US 264	0.38	18	60	2	7,300	500	1,100	ADQ			300
2nd Street											
Brown St. to Bonner St.	0.40	36	50	2	19,900	8,500	3,000	ADQ			2,600
Bonner St. to Gladden St.	0.30	40	50	2	19,900	8,500	3,000	ADQ			2,600
Gladdden St. to US 17	0.18	40	60	2	19,900	4,900	1,100	ADQ			6,400
US 17 to Hackney Ave.	0.30	27	60	2	19,900	800	1,100	ADQ			800
3rd Street											
Plymouth St. to Pierce St.	0.70	44	50	2	10,500	2,100	3,300	ADQ			2,200
Pierce St. to Bridge St.	0.09	36	50	2	10,500	1,700	2,500	ADQ			2,000
Bridge St. to Market St.	0.35	44	50	3	13,900	4,800	6,900	ADQ			6,700
Market St. to .01mi	0.01	30	50	2	10,500	7,300	12,300	ADQ			9,300
.01mi to Main St.	0.81	44	50	2	10,500	9,900	13,700				11,200
Main St. to Egdewater St.	0.20	24	50	2	10,500	11,000	14,400	ADQ			10,400
15th Street											
US 264 to US 17	0.92	59	80	5	22,200	12,600	25,600	ADQ			15,200
US 17 to Brown St.	1.55	48	60	4	21,700	23,400	35,500	ADQ			14,700
Brown Street											
E. 15th St. to US 264	0.20	36	80	2	10,500	2,000	2,300	ADQ			2,200
US 264 to Main St.	1.61	36	50	2	10,500	1,900	3,300	ADQ			3,500

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Bridge Street											
15th St. to US 17	1.04	36	50	2	16,100	3,600	4,900	ADQ			4,600
Hackney Avenue											
US 17 to US 264	0.40	20	50	2	10,200	3,200	4,200	ADQ			7,000
US 264 to Main St.	0.35	30	50	2	12,200	400	800	ADQ			4,500
Hudnell Street											
Park St. to Penn St.	0.75	44	80	2	10,500	3,400	6,100	ADQ			3,600
Penn St. to US 264	0.25	48	80	4	21,700	2,800	5,500	ADQ			3,100
Main Street											
Hackney St. to Gladden St.	0.52	30	50	2	19,900	1,300	2,900	ADQ			2,500
Gladden St. to Hudnell St.	1.08	42	50	2	19,900	1,000	2,200	ADQ			1,900
Washington Avenue											
15th St. to US 17	0.46	36	50	2	16,100	3,000	4,100	ADQ			4,100
NEW LOCATION											
US 264 Bypass [1,3]	9.00										
US 264 @ WPB to US 17								K (F)	110	12,500	11,400
US 17 to SR 1422								K (F)	110	12,500	11,200
SR 1422 to SR 1507								K (F)	110	12,500	11,100
SR 1507 to US 264 @ EPB								K (F)	110	12,500	11,700
US 17 Bypass [3]	9.60										
NPB to US 264 Bypass								F	110	33,300	22,400
US 264 Bypass to SR 1001								F	110	33,300	19,700
SR 1001 to SR 1509								F	110	33,300	23,700
SR 1509 to SR 1404								F	110	33,300	29,200
SR 1404 to US 264								F	110	33,300	11,900
US 264 to NC 33								F	110	33,300	32,200
NC 33 to SPB								F	110	33,300	20,700
Radial Connector [1]	3.30										
US 264 to SR 1501 (*via Avon Ave*)								K (F)	110	12,500	7,600
SR 1501 to SR 1422								K (F)	110	12,500	6,400
SR 1422 to US 17								K (F)	110	12,500	9,000
US 17 to US 264								K (F)	110	12,500	3,700
Springs Road Connector	1.10										
SR 1509 to US 264								K	100	12,500	8,100
Brick Kiln Road Connector	0.70							K	100	12,500	600
US 264 to SR 1501											

Notes: [1] 2-lane on 4-lane right of way

[2] with paved shoulders

[3] TIP Project

Appendix C
Typical 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 street section must be individually analyzed and its cross section requirements determined on the basis of amount and type of projected traffic, existing capacities, desired level of service, and available right-of-way.

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.

Recommended typical cross sections for thoroughfares were derived on the basis of projected traffic, existing capacities, desirable levels of service, and available right-of-way. The recommended typical cross sections for the thoroughfares are given in Appendix B, Table B-1 along with other pertinent information.

On all existing and proposed major thoroughfares delineated on the thoroughfare plan, adequate right-of-way should be protected or acquired for the ultimate cross sections. Ultimate desirable cross sections for each of the thoroughfares are listed as part of the Street Inventory in Appendix B. Recommendations for "ultimate" cross sections are provided for the following:

- 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 maximum and minimum grades, minimum sight distances, maximum degree of curve and related super elevation, and other considerations for thoroughfares are given in Appendix D.

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 criterion 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.

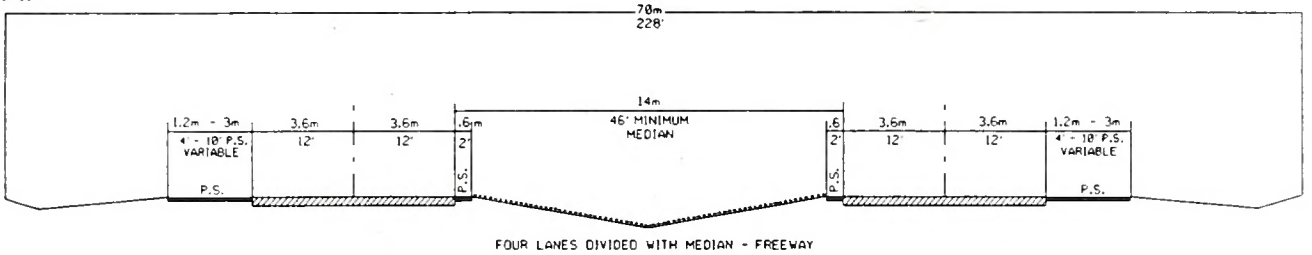
General

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-ways shown for the typical cross sections are the minimum right-of-way 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.

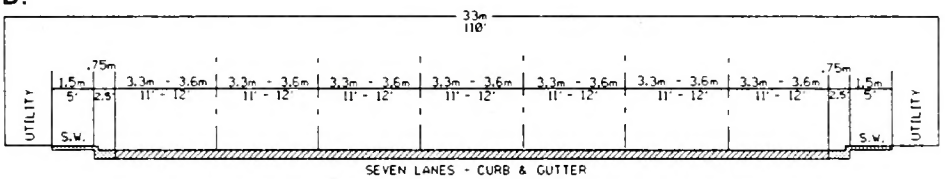
TYPICAL THOROUGHFARE CROSS SECTIONS

A.



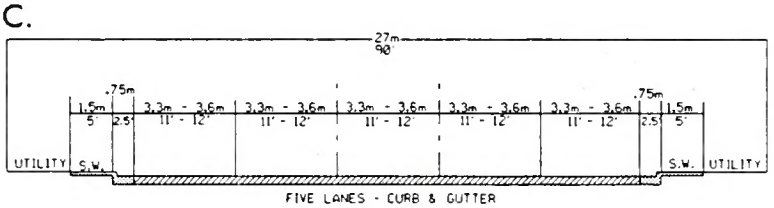
FOUR LANES DIVIDED WITH MEDIAN - FREEWAY

B.



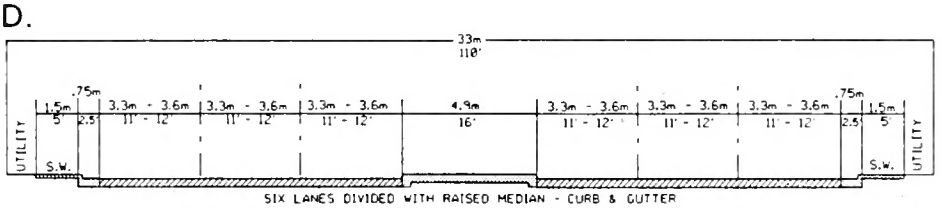
SEVEN LANES - CURB & GUTTER

C.



FIVE LANES - CURB & GUTTER

D.

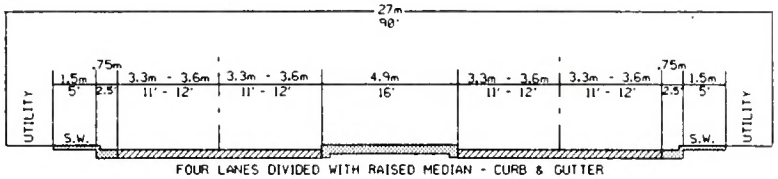


SIX LANES DIVIDED WITH RAISED MEDIAN - CURB & GUTTER

FIGURE C-1

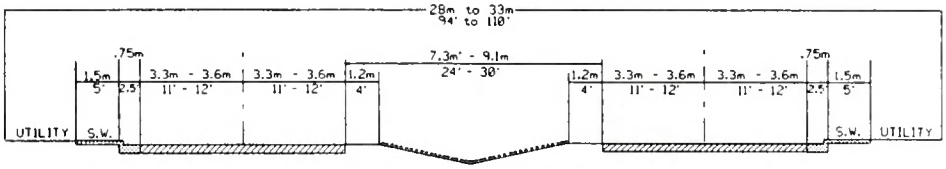
TYPICAL THOROUGHFARE CROSS SECTIONS

E.



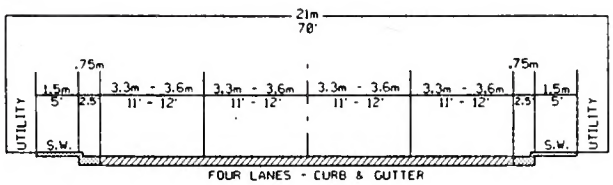
FOUR LANES DIVIDED WITH RAISED MEDIAN - CURB & GUTTER

F.



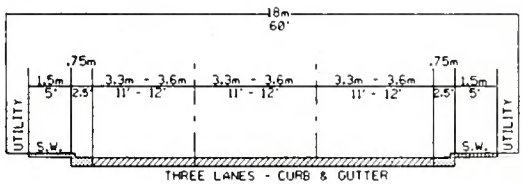
FOUR LANES DIVIDED - BOULEVARD
GRASS MEDIAN

G.



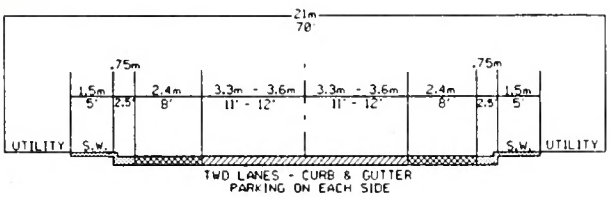
FOUR LANES - CURB & GUTTER

H.



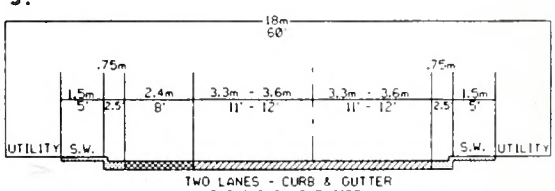
THREE LANES - CURB & GUTTER

I.



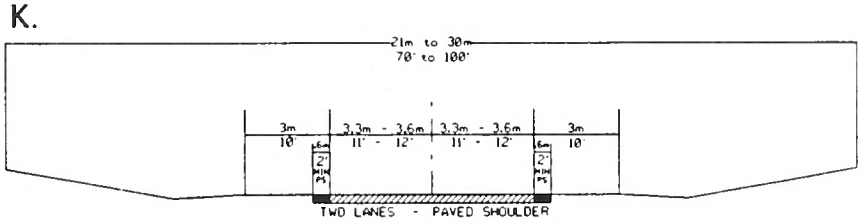
TWO LANES - CURB & GUTTER
PARKING ON EACH SIDE

J.



TWO LANES - CURB & GUTTER
PARKING ON ONE SIDE

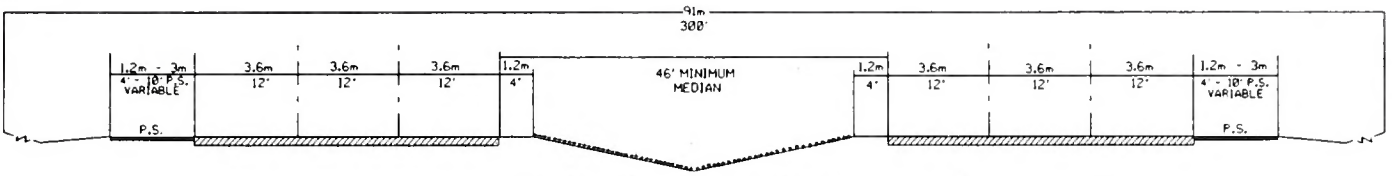
K.



TWO LANES - PAVED SHOULDER

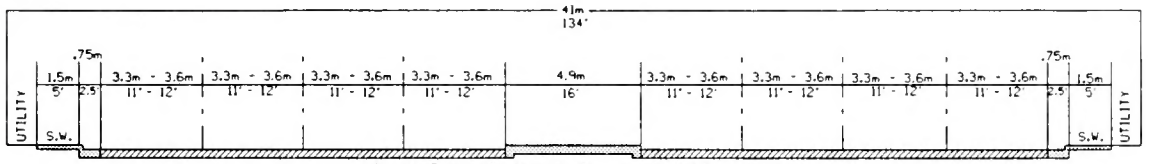
TYPICAL THOROUGHFARE CROSS SECTIONS

L.



SIX LANES DIVIDED WITH GRASS MEDIAN - FREEWAY

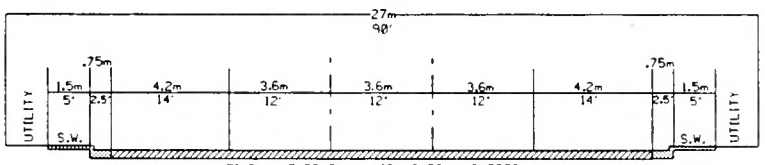
M.



EIGHT LANES DIVIDED WITH RAISED MEDIAN - CURB & GUTTER

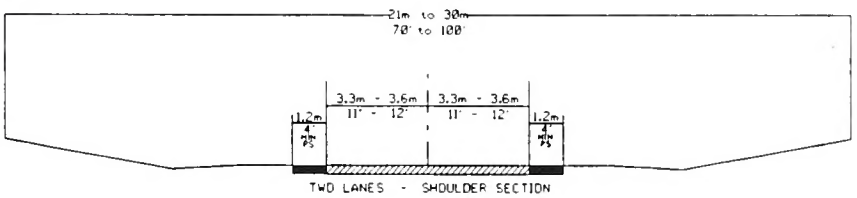
TYPICAL THOROUGHFARE CROSS SECTIONS FOR ACCOMMODATING BICYCLES

N.



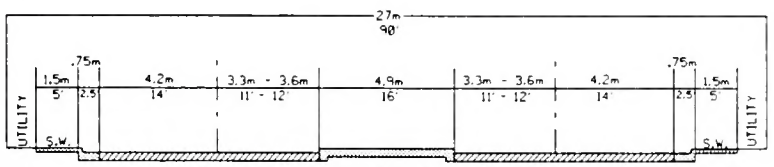
FIVE-LANE ROADWAY WITH CURB & GUTTER,
STANDARD INSIDE LANES & WIDENED CURB LANES

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 to 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

Planning Area Housing and Employment Data

Zone	1997 Employment	2030 Employment	1997 Housing	2030 Housing
1	738	763	101	101
2	428	507	83	83
3	6	6	177	177
4	201	182	304	304
5	163	163	213	213
6	67	67	410	455
7	227	227	177	207
8	379	429	199	275
9	771	781	74	74
10	353	619	24	24
11	418	729	75	75
12	42	67	111	111
13	622	767	51	51
14	188	188	82	82
15	203	248	211	211
16	6	6	48	48
17	50	50	257	492
18	102	102	225	425
19	26	26	565	765
20	23	23	126	226
21	12	12	520	520
22	101	201	338	438
23	54	54	68	68
24	63	63	47	47
25	5	5	74	174
26	81	181	145	145
27	160	235	443	613
28	5	155	80	80
29	6	6	76	76
30	0	0	80	160
31	3	3	71	71
32	12	112	4	4
33	72	72	92	92
34	2	2	15	115
35	2	2	119	119

Appendix E (Continued)

Planning Area Housing and Employment Data

Zone	1997 Employment	2030 Employment	1997 Housing	2030 Housing
36	50	370	265	335
37	1011	1181	218	218
38	86	86	7	7
39	400	750	69	69
40	23	23	270	350
41	21	21	146	846
42	34	34	119	164
43	146	746	70	70
44	17	17	183	183
45	67	67	84	84
46	188	203	190	190
47	3	3	36	236
48	0	0	95	195
49	225	225	265	301
50	95	145	6	116
51	533	1035	27	27
52	50	50	61	61
53	159	250	199	199
54	266	266	99	99
55	1713	1963	80	130
56	498	498	334	334
57	275	584	0	0
58	17	17	165	165
59	3	3	118	118
60	729	729	10	10
61	34	34	58	58

Appendix F

Pedestrian Policy Guidelines

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

Hazards

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

Quantifying the need for Pedestrian Facilities

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

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

Requirements for DOT Funding

Replacing Existing Sidewalks

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

Preventing Hazards

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

Incidental Projects

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

Table F-1

Incidental Projects Cost Participation Break Down

Municipal Population	Participation	
	DOT	Local
> 100,000	50%	50%
50,000 to 100,000	60%	40%
10,000 to 50,000	70%	30%
< 10,000	80%	20%

Funding Caps

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

Independent Projects

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

Right-of-Way

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

Maintenance

Local governments will be responsible for maintaining all pedestrian facilities.

For further information about the Pedestrian Policy Guidelines please contact the following:

Statewide Planning Branch
NC Department of Transportation
1554 Mail Service Center
Raleigh, NC 27699
(919) 733-4705

Appendix G

Transportation Improvement Program Project 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 G-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.

Highway Program
TIP Candidate Project Request

(Please Provide Information if Available)

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

County *Generic* City/Town *Generic*

Requesting Agency *Generic City Council* 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 (1997)*

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 City, it is recommended that this facility should be widened to a multi-lane cross section due to the increasing volume and the potential for more development in this area. The City 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)