

MID-CURRITUCK BRIDGE STUDY

STATEMENT OF PURPOSE AND NEED

STATE PROJECT No. 6.049002T
STIP No. R-2576
CURRITUCK COUNTY
DARE COUNTY

Prepared by
Parsons Brinckerhoff
909 Aviation Parkway, Suite 1500
Morrisville, North Carolina 27560

for the
 **NORTH CAROLINA**
Turnpike Authority
Raleigh, North Carolina

October 2008

Table of Contents

1.0	PURPOSE OF AND NEED FOR ACTION	1
1.1	Project Area	1
1.2	Project Needs.....	1
1.3	Project Purpose	6
1.4	Project Description.....	7
1.4.1	Setting and Land Use.....	7
1.4.2	Project History	8
1.5	System Linkage.....	11
1.5.1	Existing Road Network	11
1.5.2	Sidewalks, Bicycles Routes, and Pedestrian Movements	12
1.5.3	Modal Interrelationships.....	13
1.6	Social and Economic Conditions.....	14
1.6.1	Permanent Population Growth	14
1.6.2	Housing Growth.....	14
1.6.3	Recreational Facilities	15
1.6.4	Land Use Plans	15
1.7	Transportation Planning.....	16
1.7.1	Overview of the Thoroughfare Planning Process.....	16
1.7.2	Currituck and Dare County Thoroughfare Planning.....	16
1.7.3	Other Proposed Road Improvements.....	17
1.7.4	North Carolina Strategic Highway Corridor System.....	17
1.7.5	North Carolina Intrastate System	22
1.8	Transportation Network and Operating Characteristics	23
1.8.1	Roadway Characteristics and Posted Speeds.....	23
1.8.2	Traffic Volumes	25
1.8.3	Level of Service and Congestion.....	25
1.9	Travel Time	38
1.10	Hurricane Clearance Time	39

List of Tables

Table 1-1.	Currituck/Dare Permanent Population Growth.....	14
Table 1-2.	Housing Units.....	15
Table 1-3.	Base Year Daily Traffic Volumes (2006).....	26
Table 1-4.	Future Daily Traffic Volumes (2035).....	27
Table 1-5.	Percent Growth in Traffic Volumes from 2006 to 2035.....	32
Table 1-6.	Roadway Level of Service Definitions	33
Table 1-7.	Level of Service for Road Links in 2006 and 2035	34
Table 1-8.	Existing and Future Road Network Congestion	37
Table 1-9.	2007 and 2035 Hurricane Evacuation Clearance Times.....	40

List of Figures

Figure 1-1.	Regional Project Map.....	2
Figure 1-2.	Project Study Area	3
Figure 1-3.	Road Improvements in NCDOT's 2009-2015 STIP.....	18
Figure 1-4.	North Carolina Strategic Highway Corridor System	21
Figure 1-5.	AADT Traffic Forecasts and LOS for 2006 and 2035.....	28
Figure 1-6.	Non-Summer Weekday Traffic Forecasts and LOS for 2006 and 2035.....	29
Figure 1-7.	Summer Weekday Traffic Forecasts and LOS for 2006 and 2035.....	30
Figure 1-8.	Summer Weekend Traffic Forecasts and LOS for 2006 and 2035.....	31
Figure 1-9.	Extent of Summer Congestion for 2035.....	36

1.0 Purpose of and Need for Action

The North Carolina Turnpike Authority (NCTA), in cooperation with the Federal Highway Administration (FHWA) and the North Carolina Department of Transportation (NCDOT), is evaluating proposed improvements in the Currituck Sound area. The proposed study area includes US 158 from NC 168 to NC 12 (including the Wright Memorial Bridge) and NC 12 north of its intersection with US 158 to its terminus in Currituck County. The proposed action is included in NCDOT's 2007-2013 State Transportation Improvement Program (STIP), as well as NCDOT's 2009-2015 STIP, the North Carolina Intrastate System, the North Carolina Strategic Highway Corridor Plan, and the Thoroughfare Plan for Currituck County.

This statement of purpose and need explains why improvements to the transportation system in the project area (the proposed action) should be identified and implemented.

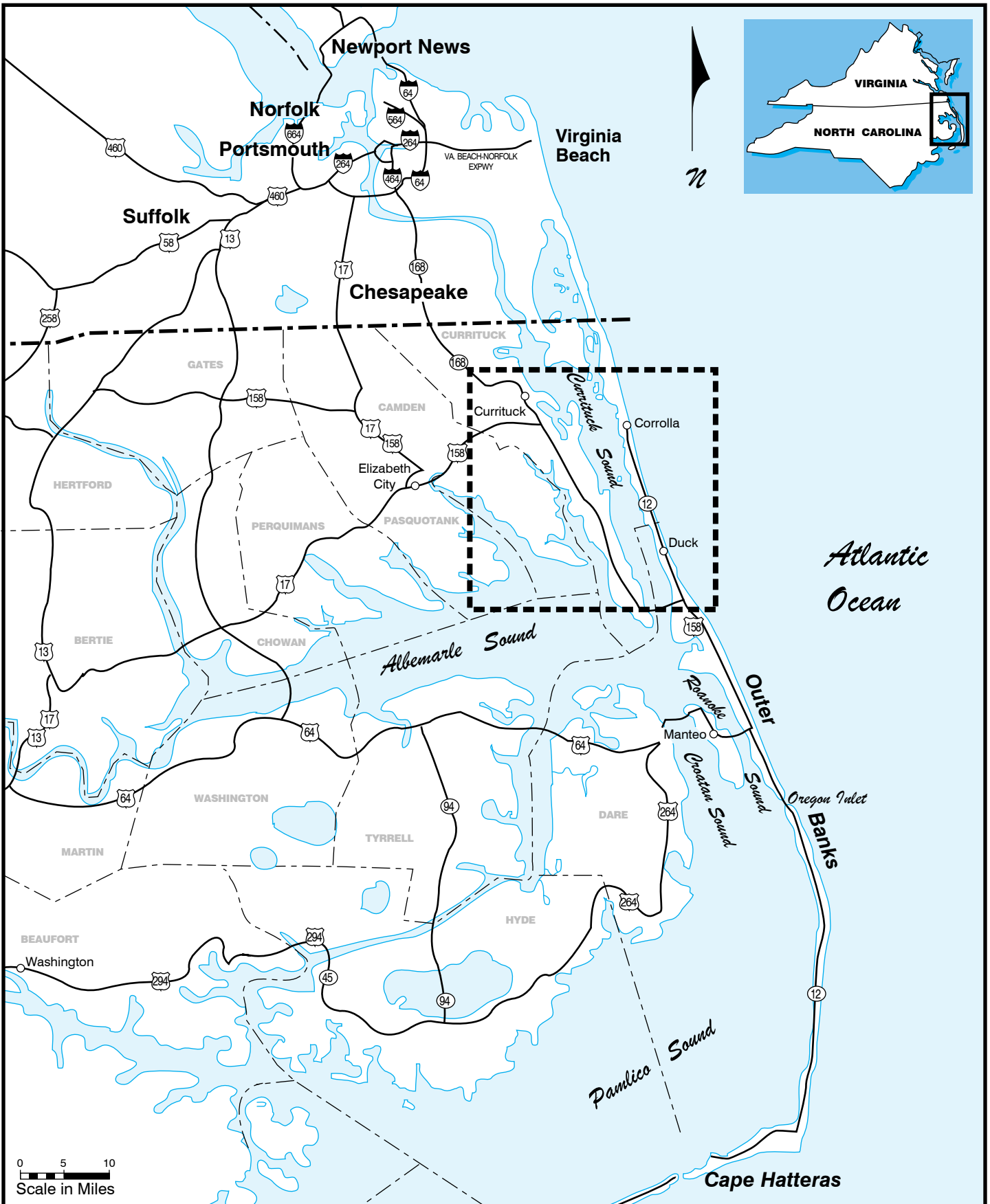
1.1 Project Area

The project area is in northeastern North Carolina (see Figure 1-1) and includes the Currituck County peninsula on the mainland and its Outer Banks, as well as the Dare County Outer Banks north of Kitty Hawk (see Figure 1-2). The Currituck County peninsula is bounded by the North River on the west, Albemarle Sound on the south, and Currituck Sound on the east. The Outer Banks are bounded by Currituck Sound on the west and Atlantic Ocean on the east. The Outer Banks attracts millions of vacationers each year.

The project area is south of the Virginia Beach-Norfolk, Virginia (Hampton Roads) metropolitan area. The project area encompasses two thoroughfares, US 158 from NC 168 to NC 12 (including the Wright Memorial Bridge) and NC 12 north of its intersection with US 158 to its terminus. US 158 is the primary north-south route on the mainland. NC 12 is the primary north-south route on the Outer Banks. The Wright Memorial Bridge connects the mainland with the Outer Banks.

1.2 Project Needs

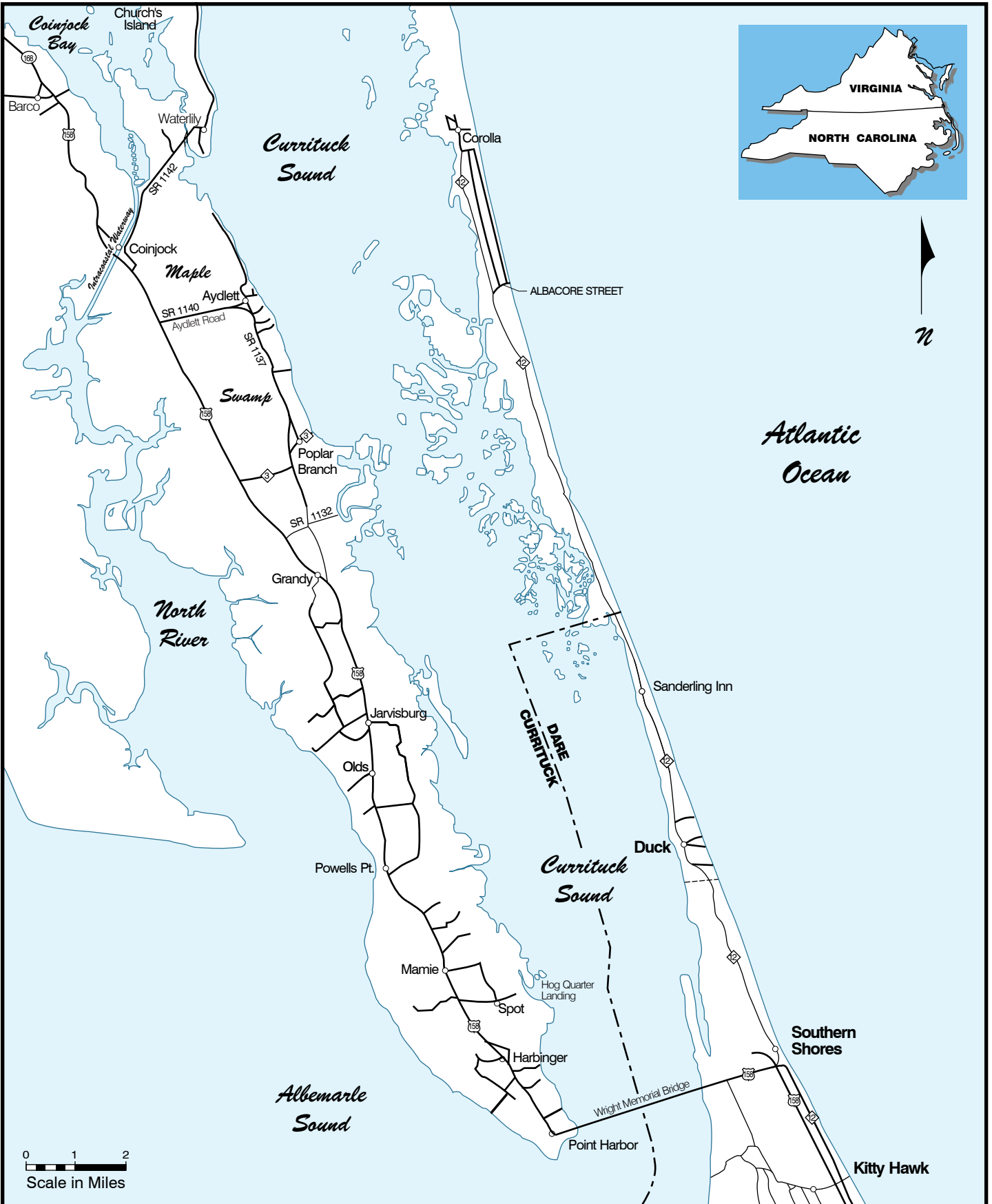
The proposed action responds to three underlying needs in the project area. These needs were identified through an iterative process, which included several rounds of agency coordination and public involvement. This process was initiated by the NCDOT in 1995 and was transitioned to the NCTA in 2006. FHWA has been involved



<p>LEGEND</p> <p> Project Study Area</p>
--

<p>Regional Project Map</p>

<p>Figure</p> <p>1-1</p>



LEGEND

--- County Boundaries

Project Area

Figure

1-2

throughout the process as the lead federal agency. These needs are based on the following travel conditions and planning activities:

The project area's main thoroughfares (US 158 and NC 12) are becoming increasingly congested, and congestion will become even more severe in the future.

The extent of the congestion problems existing and expected on US 158 and NC 12 in the project area can be summarized as follows:

- Current level of service (LOS) E and F (congested) operations occur on all segments of NC 12 between the US 158/NC 12 intersection and Corolla during summer weekend conditions, with exception of the northernmost link near Corolla. The worst segments are on NC 12 just south of Southern Shores and Duck, respectively, where LOS E and F conditions also occur on the summer weekday.
- In 2035, LOS F operations will occur on all project area segments of NC 12 and US 158 east of the Wright Memorial Bridge during summer weekday and weekend conditions, with the exception of the northern links in Currituck County, which would be LOS D or E. On the summer weekend, LOS F operations also will occur on all US 158 segments between NC 168 and NC 12.
- In 2035, on the summer weekday, US 158 east of the Wright Memorial Bridge and NC 12 in Southern Shores and parts of Duck will operate at a poor LOS F (30 percent above capacity or more) for 6 to 7 hours per day with demand 81 percent above the capacity of US 158 and as much as 54 percent above the capacity of NC 12.
- In 2035, on the summer weekend, US 158 in Currituck County between NC 168 and the Wright Memorial Bridge will operate at LOS F for 10 to 11 hours a day with demand 16 to 19 percent above the capacity of US 158.
- In 2035, on the summer weekend, US 158 east of the Wright Memorial Bridge and NC 12 in Dare County will operate at a poor LOS F for 15 to 18 hours per day with demand 117 percent above the capacity of US 158 and as much as 62 percent above the capacity of NC 12.

From the perspective of the thoroughfare network in 2035, the above factors will combine to result in the annual vehicle-miles of travel under congested conditions (LOS E/F) on US 158 and NC 12 increasing from 5.4 million (2006) to 66.1 million (2035). Miles of road with traffic operating at LOS F in the summer is expected to increase from a weighted average of 3.9 miles to 22.9 miles. The weighted average miles operating at a poor LOS F in the summer is expected to rise from zero to 6.3 miles.

Section 1.8 describes traffic forecasts and level of service findings in detail, including definitions of the various levels of service.

Increasing congestion is causing travel time between the Currituck County mainland and the Currituck County Outer Banks to increase, especially during the summer.

The trip between Aydlett Road (SR 1140) on US 158 (on the Currituck County mainland) and Albacore Street (SR 1402) on NC 12 (on the Currituck County Outer Banks) is a distance of 40.9 miles. The uncongested travel time for this trip, allowing for stops at signalized intersections, is approximately 1 hour.

Under existing (2006) conditions, this trip takes approximately 1 hour and 8 minutes on a summer weekday, but takes approximately 1 hour and 42 minutes on a summer weekend. In 2035, travel time for this trip is expected to be just over 2 hours on the summer weekday and more than 3 hours and 53 minutes on the summer weekend. Increases in travel time would result from increasing peak period congestion. These travel times would be worse when accidents occur or if back-ups occur at signalized intersections. Section 1.9 describes these changes in detail.

Evacuation times for residents and visitors who use US 158 and NC 168 as an evacuation route far exceed the State-designated standard of 18 hours.

The State of North Carolina's statewide hurricane evacuation clearance time standard is 18 hours (NC General Statutes § 136-102.7, "Hurricane Evacuation Standard"), which is applied to a Category 3 storm with 75 percent tourist occupancy. Clearance times begin when the first evacuating vehicle enters a roadway segment in a given evacuation corridor and ends when the last vehicle leaving the corridor reaches a point of safety.

The state standard is already exceeded at 27 hours in 2007 for evacuees that choose to leave the Outer Banks via NC 168 and US 158. If the STIP projects shown in Figure 1-3 (see Section 1.8.1) are implemented, the 2035 clearance time would be 36.3 hours, 102 percent over the 18-hour criteria. Section 1.10 describes the hurricane evacuation analysis in detail.

These travel conditions and planning activities underlie the following needs:

- **The need to substantially improve traffic flow on the project area's thoroughfares (US 158 and NC 12).**
- **The need to substantially reduce travel time for persons traveling between the Currituck County mainland and the Currituck County Outer Banks.**
- **The need to substantially reduce evacuation times from the Outer Banks for residents and visitors who use US 158 and NC 168 as an evacuation route.**

1.3 Project Purpose

Given the needs described above, the purposes of the proposed action are:

To substantially improve traffic flow on the project area's thoroughfares.

Thoroughfares in the project area are NC 12 and US 158.

The ability of alternatives to achieve this purpose is measured in terms of:

- The percent reduction in annual millions of vehicle-miles traveled under congested condition (at LOS E and F, at LOS F, and at a poor LOS F) on the project area's thoroughfares in 2035 (LOS E and F are considered congested);
- The percent reduction in miles of NC 12 and US 158 operating at LOS F on the summer weekday and summer weekend in 2035; and
- The percent reduction in miles of NC 12 and US 158 operating at a poor LOS F on the summer weekday and summer weekend in 2035.

These network congestion measures reflect the focus of this purpose on the thoroughfare network and its total operation as opposed to achieving a particular level of service on each individual road link in the network. A single LOS goal applied to all road segments also was not used recognizing that potential environmental impact and the availability of funds, combined with high future travel demand, could make it undesirable or impractical to build a project that would eliminate all future summer congestion on the thoroughfare network.

In this case and with the second and third purposes, an improvement is considered substantial as opposed to minor if the improvement is great enough to be largely noticeable to typical users of the transportation system and if the improvement offers some benefit across much of the network as opposed to a few offering only localized benefits. Alternatives that provide only minor as opposed to substantial improvement would not achieve these purposes.

To substantially reduce travel time for persons traveling between the Currituck County mainland and the Currituck County Outer Banks.

The ability of alternatives to achieve this purpose is measured in terms of the percent reduction in summer travel time (weekday and weekend) in 2035 between Aydlett Road (SR 1140) on the Currituck County mainland and Albacore Street (SR 1402) on the Currituck Outer Banks via the Wright Memorial Bridge. The two locations are the approximate endpoints of a Mid-Currituck Bridge and this travel time was selected as representative of potential travel times for all trips that occur along this route, whether one is traveling part of or all of the route. The travel time in 2035 associated with the

direct link a Mid-Currituck Bridge would create between the mainland and the Outer Banks also is considered.

To substantially reduce hurricane clearance time for residents and visitors who use NC 168 and US 158 during a coastal evacuation.

The ability of alternatives to achieve this purpose is measured in terms the potential reduction in hurricane clearance time in 2035, as compared to North Carolina’s legislated (NC Gen. Stat. § 136-102.7, “Hurricane Evacuation Standard”) standard of an 18-hour clearance time. Clearance time is used because it both is connected with the legislated standard and is a factor in the decision of emergency management of when to order an evacuation.

1.4 Project Description

1.4.1 Setting and Land Use

Currituck County is the most northeastern county in North Carolina. The mainland in the project area consists of a peninsula bounded on the west by the North River, on the south by the Albemarle Sound and on the east by the Currituck Sound. Currituck County’s northern beach strand or Outer Banks separates Currituck Sound from the Atlantic Ocean (see Figure 1-2). The beaches attract millions of vacationers each year (Currituck County, March 25, 2002). US 158 is the only means of north-south travel on the Currituck peninsula. From its intersection with NC 168 at Barco, US 158 traverses the peninsula south to the Wright-Memorial Bridge, which connects the mainland to the Outer Banks at Kitty Hawk in Dare County. The land use on the peninsula is predominately rural agrarian with scattered residences and service oriented businesses. NC 12 serves as the primary route on the Outer Banks side of the county, and is characterized by high-end residential resort developments consisting of single-family homes, townhomes, condominiums, and nodes of commercial development comprised of small stand alone shops and medium-sized shopping centers.

Dare County is south and adjacent to Currituck County. Most of Dare County is outside the project area. Commercial uses line US 158 within the Town of Kitty Hawk from the Wright Memorial Bridge to its intersection with NC 12. Land use along the Dare County Outer Banks both north and south of the intersection of US 158 and NC 12 includes a mix of single-family homes, hotels, and condominiums. Much of this area developed before the similar development in Currituck County.

1.4.2 Project History

On July 6, 1995, FHWA published a Notice of Intent to prepare an environmental impact statement (EIS) for a Mid-Currituck Sound Bridge in Currituck County, North Carolina. This section describes key milestones associated with the project since that time.

1.4.2.1 Early History

On April 4, 1975, at Currituck County's request, the NCDOT Board of Transportation adopted a resolution identifying an east-west bridge crossing of Currituck Sound as the most desirable access route to the Currituck Outer Banks. No further action on this proposal was made at that time.

A Mid-Currituck Bridge was discussed as an alternative in the 1981 *Outer Banks Access Environmental Impact Statement*. The extension of NC 12 to Corolla was selected as the preferred alternative and subsequently completed.

In 1989, the NCDOT's report, *Transportation Access Over Currituck Sound: A Feasibility Study* concluded that the first phase of any transportation improvement for Currituck Sound should be widening the two-lane Wright Memorial Bridge. A new two-lane parallel structure was completed in 1995. The study also concluded that a two-lane bridge in Currituck County in conjunction with a four-lane Wright Memorial Bridge would serve hurricane evacuation and intra-county access needs better than a six-lane Wright Memorial Bridge. The 1989 study further stated that a new two-lane bridge in Currituck County would be more expensive and harmful environmentally than a six-lane Wright Memorial Bridge.

A potential terminus for a Mid-Currituck Bridge on the Currituck Outer Banks was identified in 1991 and is protected under the provisions of the Roadway Corridor Official Map Act. The Act gives the State the opportunity to comment on development that could affect the terminus site. A parcel on this site measuring 1.7 acres was purchased by NCDOT in 1995 in order to prevent its development.

1.4.2.2 1998 DEIS

A Draft Environmental Impact Statement (DEIS) was circulated to federal and state agencies for informal comment in March of 1996. FHWA, in cooperation with NCDOT, issued the DEIS in January 1998. The associated notice of intent and this DEIS was withdrawn in 2008.

The project area for the 1998 DEIS focused on an area near Aydlett on the mainland and near the Whalehead Beach subdivision on the Currituck Outer Banks. The purpose and need of the proposed action was defined as:

- Primary Purpose: To reduce road user costs and travel time for travel between Currituck County's Outer Banks and its mainland.

- Secondary Purpose: To provide Currituck County Outer Banks residents and visitors with more efficient public services.

Concerns raised during resource and regulatory agency review of the DEIS included:

- Community and natural resource direct, indirect, and cumulative impacts;
- Widening existing roads (US 158 and NC 12) should be considered and evaluated in addition to a proposed bridge;
- The proposed bridge project did not reduce hurricane evacuation times when comparing 1994 to 2010 clearance times because of additional development facilitated by the increased road capacity provided by the bridge (although more evacuees were served during the same time period); and
- The omission of congestion as a purpose for the project and the finding that congestion would remain on NC 12 even with the presence of a bridge.

Public hearings were conducted for the project on May 26 and 27, 1998. The majority of the speakers, and written comments received, expressed opposition to a Mid-Currituck Bridge because of natural resource impacts, the belief that the project would not solve hurricane evacuation needs, and the expectation that the project would facilitate development on the Outer Banks. Improving public services on the Outer Banks and widening NC 12 were suggested as alternatives to a Mid-Currituck Bridge. Those who favored the bridge felt emergency evacuation and traffic congestion would be improved with a bridge and the absence of a bridge would not stop development. Following the public hearings, the study process under the National Environmental Policy Act (NEPA) was paused to provide an opportunity for NCDOT and FHWA to re-assess the project scope and purpose in light of comments on the DEIS.

Since 1998, there have been several important developments, which have resulted in modifications to the Statement of Purpose and Need. These developments are summarized below.

1.4.2.3 Expansion of Study Scope and Alternatives Analysis

The project was reactivated in October 2000. In 2001, FHWA and NCDOT expanded the study to include conceptual alternatives that would involve improvements to existing NC 12 and US 158, in addition to bridge alternatives, and allow for consideration of a wider range of alternatives. This broad-scale assessment of transportation needs was referred to as the “Currituck Sound Area Transportation Study.”

1.4.2.4 Continued Development of Purpose and Need

In 2003, as part of the expanded study, NCDOT, FHWA and state and federal environmental regulatory and resource agencies reached tentative agreement under

North Carolina's NEPA/Section 404 Merger Process on a Statement of Purpose and Need for the project. At that time, the Statement of Purpose and Need included three goals: improving traffic flow on NC 12 and US 158 in the project area; reducing travel times to the Currituck County Outer Banks; and improving hurricane clearance times. However, inclusion of the third goal was contingent on completing the then-ongoing development of a model for estimating future hurricane clearance times and the model in turn demonstrating that future hurricane clearance times were long enough to create a transportation improvement need in the project area. This effort was completed in September 2005, when NCDOT issued the *State Hurricane Evacuation Study* (PBS&J, 2005) report.

In addition to the clearance time model, NCDOT leadership, with input from local and state law enforcement and emergency management personnel, considered an appropriate maximum clearance time to set as a statewide goal or standard. Based on this work, the North Carolina General assembly established by law a statewide hurricane evacuation clearance time standard of 18 hours (NC General Statutes § 136-102.7, "Hurricane Evacuation Standard"). The statewide study yielded evacuation clearance times in 2035 greater than the 18-hour standard, affirming the third need adopted in 2003.

1.4.2.5 Creation of the NCTA and the Inclusion of a Mid-Currituck Bridge as a Part of its Responsibilities

In 2002, the North Carolina General Assembly passed legislation creating the NCTA. The legislation authorized NCTA to construct, operate and maintain toll roads and bridges in North Carolina [House Bill (H.B.) 644 (2002); NC Gen. Stat. 136-89.180 *et seq.*]. In 2005, the Legislature amended NCTA's enabling legislation to include a provision authorizing NCTA to design, construct, operate, and maintain "a bridge of more than two miles in length going from the mainland to a peninsula bordering the State of Virginia" [H.B. 253 (2005); NC Gen. Stat. § 136-89.183(a)(2)].

This amendment affirmed legislation passed in 1993 that stated NCDOT "may charge a toll for the use of a bridge that is included in the Highway Trust Fund Intrastate System Projects, which are listed in G.S. 136-179, and is at least three and one-half miles in length..." [S.B. 917 (1993); NC Gen. Stat. § 136-82.2]. This legislation was inclusive of a Mid-Currituck Bridge.

The legislation passed in 2005 further directed NCTA to "contract with a single private firm to design, obtain all necessary permits for, and construct the toll bridge described in NC Gen. Stat. § 136-89.183(a)(2), a bridge of more than two miles in length going from the mainland to a peninsula bordering the State of Virginia, in order to provide accelerated, efficient and cost-effective completion of the project" [H.B. 253 (2005); NC Gen. Stat. § 136-89.183A(a)]. In 2006, the project was officially adopted by NCTA as a candidate toll project.

In July 2004, following the establishment of NCTA, the General Assembly amended the North Carolina Intrastate System statute – which had included a bridge over the Currituck Sound as part of the Intrastate System since 1989 – to designate the bridge over the Currituck Sound as a “toll bridge.” With the 2004 amendment, the Intrastate System statute (NC Gen. Stat. 136-178) now includes a “New route from US 158 to NC 12, including a new toll bridge over the Currituck Sound in Currituck County” as part of the Intrastate System.

1.4.2.6 Rescission of the 1998 DEIS

Since the 1998 DEIS, there have been several changes in the project, as discussed above. These changes led to the decision to rescind the 1995 notice of intent and the 1998 DEIS (Federal Register Vol. 73, No. 107, page 31733) and to issue a new notice of intent (Federal Register Vol. 73, No. 116, page 34065).

1.4.2.7 Strategic Highway Corridor (SHC) System

On September 2, 2004, the North Carolina Board of Transportation adopted a Vision Plan that designates a system of Strategic Highway Corridors in North Carolina. This plan includes “a Mid-Currituck Bridge: NC 12 to US 158” as a boulevard (designed to accommodate moderate mobility with limited or partial control access from adjoining properties). US 158 also is included as a boulevard from NC 168 to NC 12. NC 12 is included as a thoroughfare (designed to accommodate moderate mobility with no control of access to adjoining properties) from the Hatteras Ferry Terminal at the southern end of Hatteras Island to the proposed Mid-Currituck Bridge.

1.4.2.8 North Carolina’s State Transportation Improvement Program (STIP)

The Mid-Currituck Bridge project was first included in North Carolina’s STIP for 1990 to 1996. The project has continued to be a part to the STIP through the current 2009 to 2015 STIP. Toll or alternate financing for project construction rather than state tax revenues was assumed beginning in the 1996 to 2002 STIP. Tax funding for project construction was included beginning in the 2004 to 2010 STIP. The project was listed as under study by NCTA beginning with the 2007 to 2013 TIP. In the 2009 to 2015 STIP, the funding source is listed as Highway Trust Funds and “others” as opposed to tax revenues. In the case of this project, “others” is NCTA.

1.5 System Linkage

1.5.1 Existing Road Network

Figure 1-2 shows the traffic network in the project area. US 158 and NC 12 are the project area’s two thoroughfares. US 158, with the exception of the Joseph P. Knapp Bridge over the Intracoastal Waterway at Coinjock, is a five-lane road south from its

intersection with NC 168 and through the entire project area. West of its intersection with NC 168, US 158 is two lanes. NC 168 north of its intersection with US 158 is a five-lane road all the way to Virginia. US 158 continues south of the project area serving Kitty Hawk, Kill Devil Hills, and Nags Head. US 158 enters the Outer Banks over the Wright Memorial Bridge, which consists of two two-lane bridges. It ends at the intersection of US 64 at Whalebone, an east-west thoroughfare. NC 12 is a two-lane road that runs the length of the Outer Banks from the southern end of Ocracoke Island in Dare County to just north of Corolla in Currituck County.

In the 1989 Highway Trust Fund Act, the North Carolina State legislature designated a network of US and North Carolina highways as intrastate corridors. The Intrastate System was established to connect major population centers and provide safe, convenient travel for motorists. US 158 from Winston Salem in Forsyth County to Whalebone in Dare County is part of the intrastate system. This corridor is defined as a principal east-west arterial route connecting the central Piedmont region with northern tier counties and northeastern North Carolina. A Mid-Currituck Bridge also is included as an eligible Highway Trust Fund project.

US 158, NC 168, and NC 12 comprise North Carolina Strategic Highway Corridor 55. It includes: NC 168 from the Virginia State Line to US 158, US 158 from NC 168 to NC 12, NC 12 from the southern end of Hatteras Island to a Mid-Currituck Bridge, and a Mid-Currituck Bridge.

1.5.2 Sidewalks, Bicycles Routes, and Pedestrian Movements

There are no sidewalks or bicycle trails along US 158 west of the Wright Memorial Bridge, and US 158 west of the Wright Memorial Bridge has no appreciable pedestrian traffic. Sidewalks or walking trails exist at various locations east of the bridge and west of the US 158/NC 12 intersection. The Town of Kitty Hawk is planning a pedestrian path along the south side of US 158.

Pedestrian travel along NC 12 is concentrated at the Town of Southern Shores, the Town of Duck and the resort subdivisions of Sanderling, Monterey Shores/Whalehead Beach, and Corolla Village. A bicycle/pedestrian trail either parallels or is a part of the NC 12 shoulder from Southern Shores to NC 12's northern terminus. The trail begins at the US 158/NC 12 intersection on the west side of NC 12. It is composed of asphalt and is 7 feet wide. The trail maintains a 6-foot to 10-foot separation from the edge of pavement of NC 12. Just south of the Town of Duck (at Dogwood Trail), the lane shifts to the east side of NC 12. A dedicated bicycle trail is designated by pavement markings on both sides of NC 12 through the Duck business area. North of the Duck business area to the Currituck County line, the trail continues on the east side of the road. The separated trail ends at the Pine Island subdivision. From Pine Island to the Corolla Village subdivision, the NC 12 shoulders are 3 to 4 feet wide and serve as a trail for bicycles and

pedestrians. An 8-foot wide multi-use path begins at Whalehead Beach on the west side of NC 12 and extends north to the Monterey Shores subdivision.

1.5.3 Modal Interrelationships

There is no fixed route transit or intercity bus service in the project area. One public transportation system operates in the project area, the Inter County Public Transportation Authority. It is based in Elizabeth City and serves the Currituck County area, but it has limited service to the Outer Banks. Some businesses provide vehicles to encourage workers to vanpool to jobs on the Outer Banks.

Several private transportation entities provide the remainder of the available service to the project area: a subdivision-specific private shuttle system (Corolla Light Shuttle), taxi services, for-hire limousines (Island Limousine), tour/charter service (Sandy Beach Tours), and paratransit for the elderly and handicapped (The Connection).

The Currituck County Airport is a publicly owned, general aviation airport at 290 Airport Road (SR 1379) in the town of Maple. The airport is approximately two miles west of the junction of US 158 and NC 168. The airport predominately serves small private planes and occasionally smaller "Citation" or corporate jets. There are no air tours or charter services operating out of Currituck County Airport. Future plans include construction of corporate hangars, additional T-hangars, and a terminal building. The aviation-integrated Maple Industrial Park and other properties zoned "Residential Airpark" are under development adjacent to the airport site. The *Airport Layout Plan Update* (master plan) (Currituck County, December 2000), calls for the expansion of the existing 4,000-foot runway to 5,500 feet, a parallel taxiway, and other improvements. The improvements will allow the airport to handle larger "Citation" or corporate jets whose passengers would ideally utilize the adjacent business park.

Dare County Regional Airport is a publicly owned, general aviation airport at 410 Airport Road in Manteo, North Carolina. It has two runways (4,400 feet and 3,300 feet) with radio-controlled lighting, a modern terminal building, hangars, and navigational equipment. The airport is capable of serving most regional jets. Predominate uses of the airport include charter flights, corporate transit services, and air tours. Approximately three to four charter flights arrive daily at Dare County Regional Airport. Additionally, three companies fly charter services out of the airport. Corporate jets provide transit service for clients to the airport but maintain no set schedule or frequency. Air tours average at least 20 flights per day during summer months. Auto rental and taxi services are available at the airport.

There are three publicly owned airstrips for private aircraft on the Outer Banks. One is near the project area, the First Flight Airstrip next to the Wright Brothers Memorial in Kill Devil Hills. The other two are further south on Hatteras and Ocracoke Islands.

Each of these airstrips are owned and managed by the National Park Service and operate during daylight hours only. Each airstrip is 3,000 feet in length.

There is one privately owned airstrip within the project area, Pine Island Airport. Located in the Pine Island Community in the Currituck County Outer Banks, this airstrip serves private aircraft and is generally restricted to property owners and guests of the Pine Island community. From May to September, FlightGest offers air shuttles between Norfolk, Virginia and Pine Island Airport with a single flight on Fridays, Saturdays, and Sundays.

1.6 Social and Economic Conditions

1.6.1 Permanent Population Growth

Table 1-1 displays the permanent population for Currituck and Dare counties for each census year from 1970 to 2000 and a forecast for 2030. The permanent population of Currituck County grew by 161 percent between 1970 and 2000 and is projected to grow another 122 percent between 2000 and 2030, the next 30-year period. The permanent population of Dare County grew by 328 percent between 1970 and 2000 and is projected to grow another 80 percent between 2000 and 2030. In the past, Currituck County grew fastest between 1990 and 2000. Dare County gained the most population between 1980 and 1990, and growth slowed between 1990 and 2000.

Table 1-1. Currituck/Dare Permanent Population Growth

County	1970	1980	1990	2000	2030 Forecast ¹
Currituck	6,976	11,089	13,736	18,190	40,369
Dare	6,995	13,377	22,746	29,967	53,843

¹Source: North Carolina State Data Center, March 2007. County population forecasts for 2035 are not available.

1.6.2 Housing Growth

US Census permanent population numbers do not provide an accurate reflection of the building trends or the seasonal populations on the Outer Banks. Table 1-2 shows an increase of 29 percent (28,934 to 37,358) in the number of housing units for both Dare and Currituck counties between 1990 and 2000. In addition, the table contains the increase in housing units that were designated for seasonal, recreational, or occasional

Table 1-2. Housing Units

County	Total Housing Units			Vacant Units for Rent			Units for Seasonal, Recreational, or Occasional Use		
	1990	2000	Change	1990	2000	Change	1990	2000	Change
Dare	21,567	26,671	5,104 (24%)	3,726	277	-3,449 (-93%)	6,415	13,355	6,940 ¹ (108%)
Currituck	7,367	10,687	3,320 (45%)	849	96	-753 (-89%)	1,096	3,297	2,201 (201%)
Total	28,934	37,358	8,424 (29%)	4,575	373	-4,202 (-92%)	7,511	16,652	9,141 (122%)

¹The increase in the number of seasonal units in Dare County is greater than the increase in total housing units because of the conversion of existing units used by permanent residents to seasonal units.

Source: US Census of Housing 1990 and 2000.

use for the same period, 122 percent (7,511 to 16,652). The number of vacant units for rent decreased 92 percent (4,573 to 373).

1.6.3 Recreational Facilities

The focus of recreational facilities in the project area is private vacation homes. Existing public recreation opportunities in the project area include the beach along the Atlantic Ocean. The beach can be used by the public, but most of the beachfront is lined with private homes. Corolla includes the Whalehead Club and Currituck Lighthouse complex. The Whalehead Club building is a waterfowl museum. There are three hotels in the project area, The Sanderling (88 rooms) in northern Duck, Hampton Inn (123 rooms) in southern Currituck County on the Outer banks, and The Inn at Corolla Lighthouse (42 rooms). Currituck County has six golf courses and 16 public beach access points. The county has a total of 30 public parking spaces for beach access users.

1.6.4 Land Use Plans

The *Currituck County Land Use Plan* (Currituck County, 2006) describes economic and land use development goals for the county. Much of the local economic activity in Currituck County is based on tourism and tourism-related industries, such as construction and retail trade. Additionally, the development category of finance, insurance, real estate, accommodation, and food services has become a major employment sector. The main theme for Currituck County's economic and land use

development goals are to expand the economic base of Currituck County and to improve employment opportunities, while preserving the character and natural beauty of the county.

The Dare County Land Use Plan, 2003 Update (Dare County, 2003) was completed and certified by the North Carolina Coastal Resources Commission (NCCRC) in July 2003. The plan emphasizes preserving the historical, cultural, and natural resources of the county; maintenance of the county's coastal village atmosphere with an emphasis on residential development and small locally owned commercial establishments; a preference for detached low density homes; and connection of various population nodes with means for pedestrian and bicycle movement.

1.7 Transportation Planning

1.7.1 Overview of the Thoroughfare Planning Process

The thoroughfare planning process is a comprehensive transportation planning process that integrates urban area planning practices with local, regional, and statewide transportation planning practices. The process identifies transportation planning needs by evaluating land development and population growth trends in rural counties and urbanized areas. The process begins through a cooperative effort between NCDOT's Transportation Planning Branch and local planning officials. Socio-economic data is collected, including business and residential area inventories, existing street inventories, identification of environmental constraints, and historical growth information of the area. A base (existing) year transportation model is built. Utilizing input from local planning officials, land development and population growth trends are projected and applied to the model. Through this modeling process and local knowledge of the area's socio-economic conditions, the thoroughfare planning team identifies transportation deficiencies and determines short- and long-term solutions for eliminating or diminishing those deficiencies.

1.7.2 Currituck and Dare County Thoroughfare Planning

Within the project area, the *Thoroughfare Plan for Currituck County* (NCDOT, March 1999) recommends a new Mid-Currituck Bridge across Currituck Sound. The plan also recommends that US 158 be widened to a six lane road with a median from its intersection with NC 168 to the proposed Mid-Currituck Bridge and that NC 12 be widened from the Dare County line to the proposed Mid-Currituck Bridge. The widened NC 12 would be four lanes with a raised 16-foot median.

The *Dare County Thoroughfare Plan* (NCDOT, July 1988) recommended widening the Wright Memorial Bridge to four lanes and improving US 158 from the bridge east to the US 158/NC 12 intersection. These projects were completed during the 1990s. From the

US 158/NC 12 intersection north to the Currituck County line, the plan also recommended widening NC 12 from two lanes to three lanes with paved shoulders for pedestrians and bicycles. The center lane would be used for a left turn lane. This proposal has since been dropped from the plan.

No updates to these plans are underway at this time.

1.7.3 Other Proposed Road Improvements

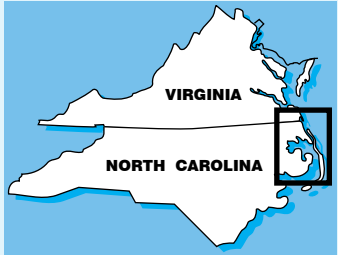
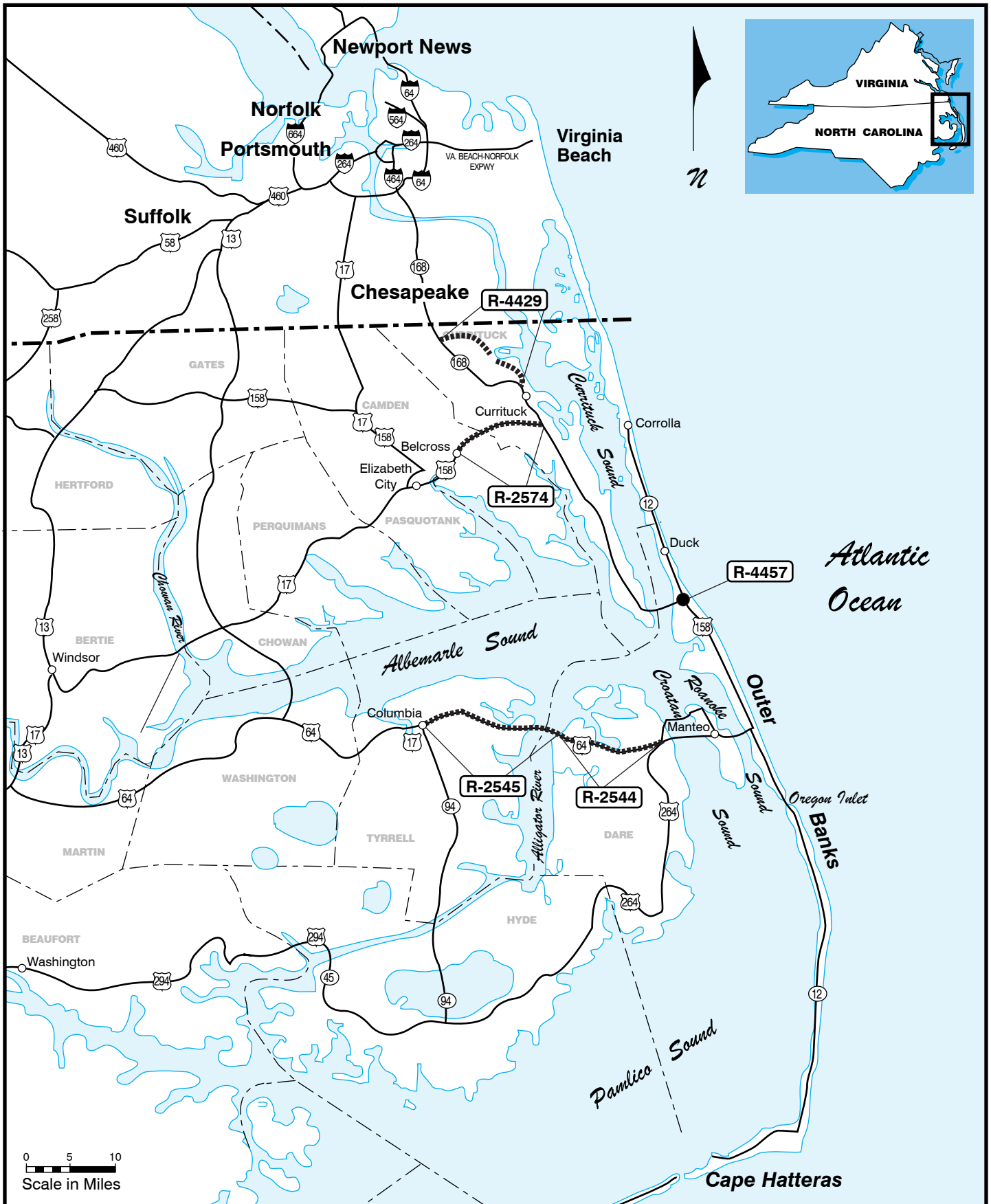
The project is included as STIP Project No. R-2576 in the *2009-2015 State Transportation Improvement Program* for the period from Federal Fiscal Year (FFY) 2009 to FFY 2015. Right-of-way acquisition is scheduled for FFY 2011 and construction scheduled for FFY 2013. The 2009-2015 STIP includes \$5 million for right of way acquisition in FFY 2011 for this project. Toll revenues are assumed to be the source of financing for construction.

The following additional major transportation improvement projects listed in the STIP associated with the network serving or feeding the project area are in Dare, Currituck, and adjoining counties (See Figure 1-3):

- R-4457 Convert the existing at-grade intersection of US 158 and NC 12 at Southern Shores to an interchange. The planning and design for this project is currently underway. The project, however, is not funded for either right-of-way acquisition or construction.
- R-2545 Widen US 64 to multi-lanes east of Columbia to east of the Alligator River. Planning and design for the project is currently underway and right-of-way acquisition, mitigation, and structures related work is scheduled for FFY 2012. Construction is unfunded.
- R-2544 Widen US 64 to multi-lanes east of the Alligator River to US 264. Right-of-way acquisition is scheduled for FFY 2012. Construction is unfunded.
- R-2574 Widen US 158 to multi-lanes east of NC 34 at Belcross in Camden County to NC 168 in Currituck County. The project is not funded.
- R-4429 Upgrade NC 168 to north of SR 1232 and SR 1213 to SR 1216. This project is partially complete and construction is underway for the rest of the project.

1.7.4 North Carolina Strategic Highway Corridor System

The North Carolina Board of Transportation has established a vision that includes a balanced system of roadways and bridges to protect and maximize the mobility and connectivity on a core set of highway corridors throughout North Carolina. The North Carolina Board of Transportation adopted a statewide Vision Plan pursuant to North



0 5 10
Scale in Miles

LEGEND

 } TIP Project Locations
 }

**Road Improvements
in NCDOT's
2009-2015 STIP**

**Figure
1-3**

Carolina's SHC initiative. The Vision Plan includes a Strategic Highway Corridor from Hatteras to the Virginia line that includes the project area and classifies area major roads by their function and the minimum level of mobility they are to provide. Within the project area, the Vision Plan identifies NC 12 and US 158 as a thoroughfare and a boulevard, respectively. The proposed Mid-Currituck Bridge also is listed in the Vision Plan as a boulevard and is the one link in the project area's strategic corridor that does not currently exist.

1.7.4.1 Strategic Highway Corridor Initiative

On September 2, 2004, the North Carolina Board of Transportation established a system of Strategic Highway Corridors for North Carolina as part of the State's Long-Range, Multi-Modal Statewide Transportation Plan.

In October 2005, NCDOT issued a Concept Development Report for the statewide network of SHC routes. The SHC report explained that the primary purpose of the SHC Concept is to "provide a safe, reliable, and high-speed network of highways that connect to travel destinations throughout and just outside of North Carolina." A related goal is to use the SHC concept as a tool to influence and affect ongoing planning and project related decisions in order to realize the facility type vision.

NCDOT, the North Carolina Department of Commerce (NCDOC), and the North Carolina Department of Environmental and Natural Resources (NCDENR) collaborated in developing the SHC report and the process of selecting the Strategic Highway Corridors. Consideration of impacts to the environment played a substantial role in developing the SHC concept. Environmental stewardship is one of the three key themes (along with mobility and connectivity, and economic prosperity) that characterize the SHC concept. The SHC report recognizes that the SHC concept "striv[es] to preserve and enhance our natural and cultural resources," and while it is not feasible in all cases, "the intent of the SHC Concept is to make the most out of the State's existing infrastructure and limit (to the extent possible) construction on a new location." Consideration of the environment was facilitated through NCDENR's role in developing the SHC report and the process of selecting the strategic highway corridors, and identifying and engaging environmental organizations as targeted stakeholders.

Central to the SHC initiative was identifying Strategic Highway Corridors that are a set of highways vital to moving people and goods to destinations within and just outside of the state. Primary criteria utilized to select the SHCs included:

- Mobility. Whether the corridor serves or has the potential to expeditiously move large volumes of traffic.
- Connectivity. Whether a corridor provides a vital link between activity centers, which include urban areas (with populations of 200,000 or greater), state seaports, major airports, major intermodal terminals, major military bases, University of North Carolina campuses, trauma centers, and major tourist attractions.

- Interstate Connectivity. Whether a corridor provides an important connection between existing and/or planned interstates.
- Interstate Relievers. Whether a corridor currently serves or has the potential to serve as a reliever route to an existing interstate facility.

For each SHC corridor, a corridor Vision Plan was established by NCDOT that identified transportation improvements in the corridor and facility types (including minimum preferred characteristics) for the existing and new roads in each corridor. The facility types are primarily based upon the function of the roadway, level of mobility and access, and whether the facility has (or will have) traffic signals, driveways and/or medians. The facility types on the SHC system are: Freeway, Expressway, Boulevard, and Thoroughfare. Freeways and expressways provide high-speed travel between major destinations statewide. A boulevard accommodates moderate mobility with limited or partial control access from adjoining properties. A thoroughfare accommodates moderate mobility with no control of access to adjoining properties. The function of these types of roads is focused on moving people and goods efficiently to local destinations within a region.

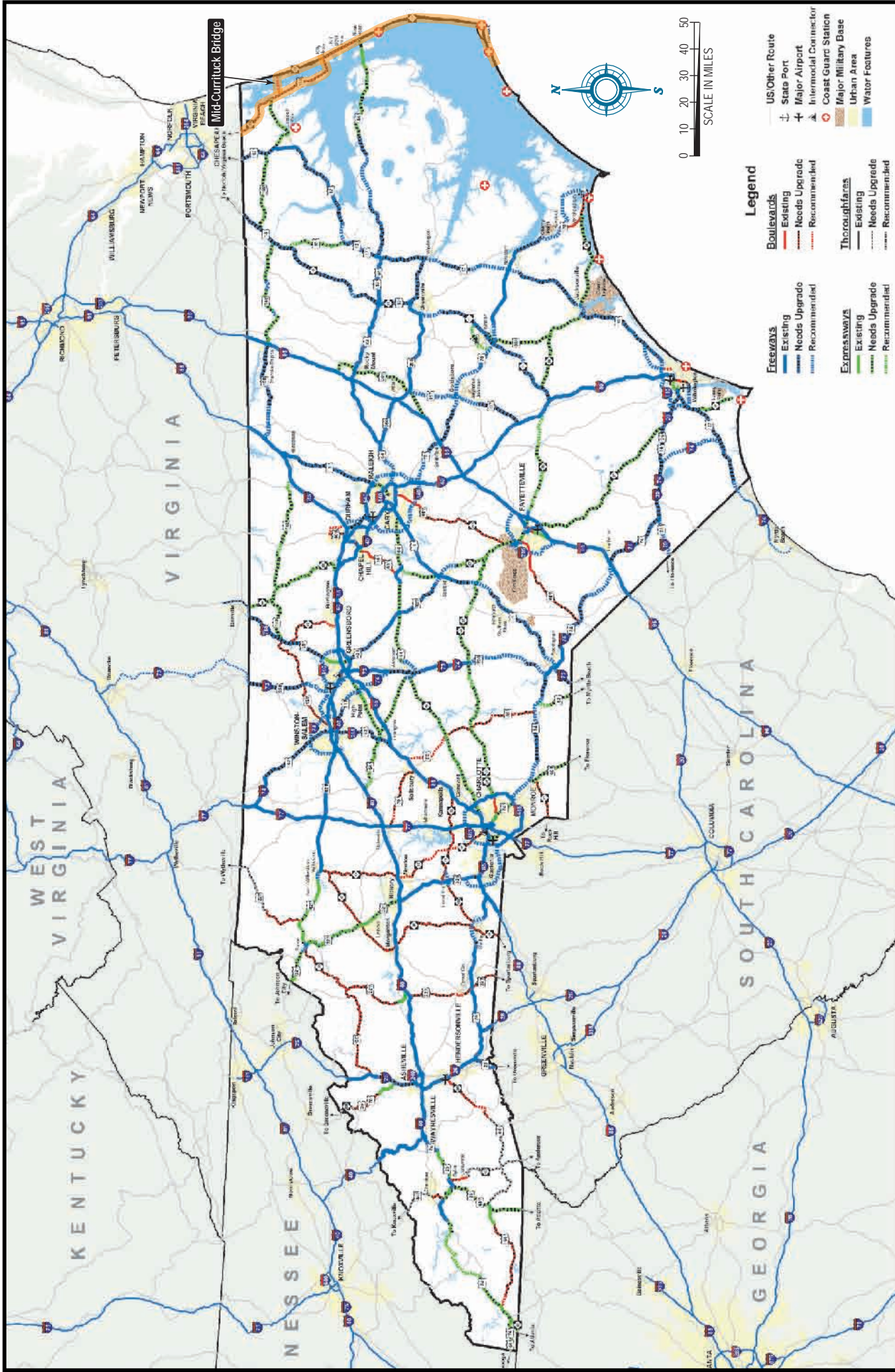
1.7.4.2 Strategic Highway Corridor Vision Plan for the Project Area

As part of the SHC initiative, NCDOT designated 55 corridors throughout the state. The SHC map is shown in Figure 1-4. Strategic Highway Corridor number 55 runs from Hatteras to the Virginia line and includes NC 12, US 158, and NC 168. The corridor includes “NC 12/Mid-Currituck Bridge” as a spur. Spurs connect parent corridors to activity centers or destinations. The Mid-Currituck Bridge component of the spur connects US 158, the strategic corridor on the mainland peninsula to NC 12, the primary road serving the Outer Banks portion of the project area. The corridor Vision Plan designates the Mid-Currituck Bridge as a boulevard. The corridor Vision Plan also designates US 158 (from NC 12 to NC 168) as boulevard and designates NC 12 (from the Hatteras Island Ferry terminal on Hatteras Island to the Mid-Currituck Bridge) as a thoroughfare.

1.7.4.3 Implementation of the Strategic Highway Corridor Vision

A critical step in the Strategic Highway Corridor implementation process is incorporating recommendations from the corridor Vision Plans into individual projects. This is to be accomplished by local and statewide transportation planners incorporating Strategic Highway Corridors and associated designations into the statewide and regional transportation planning process and into a project’s development process, including its National Environmental Policy Act (NEPA) study.

According to the SHC report, existing STIP projects along Strategic Highway Corridors should be examined and modified for consistency with the corridor vision. New STIP projects should be developed from the beginning of the project development process in



Corridors

North Carolina Strategic Highway Corridor System

Figure 1-4

a manner that considers the long-term vision and goals of the SHC concept. The SHC states that:

Engineers should develop project scopes and make design decisions that are consistent with the corridor vision, including the preparation of Purpose and Need Statements and the development and evaluation of alternatives. Purpose and Need Statements should demonstrate how the project meets the criteria set forth in the Strategic Highway Corridor concept and describes the need for improvements to corridor as they relate to corridor's function and vision. Alternatives should be developed and analyzed in a manner which reflects the mobility and connectivity goals of the vision, while attempting to maximize the use of existing infrastructure. (NCDOT, October 2005, page 68)

As contemplated by the SHC Report, the Mid-Currituck Bridge component of the Corridor 55 Vision Plan is included in the 2009-2015 STIP.

1.7.5 North Carolina Intrastate System

The Intrastate System was established by statute in North Carolina (NC Gen. Stat. § 136-178). The purpose of the Intrastate System is to provide "high-speed, safe travel service throughout the State." As defined in statute, the Intrastate System:

- "connects major population centers both inside and outside the State";
- "provides safe, convenient, through-travel for motorists"; and
- "is designed to support statewide growth and development objectives and to connect to major highways of adjoining states."

The routes included on the Intrastate System are designated in statute.

In July 1989, the North Carolina State General Assembly enacted legislation designating a bridge over the Currituck Sound as a part of the Intrastate System [House Bill (HB) 399 (1989); North Carolina Gen. Stat. § 136-178]. This designation was further refined in July 2004, the General Assembly amended the Intrastate System statute to designate the bridge over the Currituck Sound as a "toll bridge" [HB 1414 (2004)]. With the 2004 amendment, the project is now designated as a "New route from US 158 to NC 12, including a new toll bridge over the Currituck Sound in Currituck County" as part of the Intrastate System (NC Gen. Stat. 136-178). It is also listed in NC Gen. Stat. 136-179, which includes the Intrastate System projects that are to receive funding priority, as a "New toll bridge over Currituck Sound."

1.8 Transportation Network and Operating Characteristics

1.8.1 Roadway Characteristics and Posted Speeds

US 158 is primarily a five lane rural arterial road with no access control from the US 158/NC 168 intersection south to the Wright Memorial Bridge. From the US 158/NC 168 junction, south to the Joseph P. Knapp Bridge over the Intracoastal Waterway, the travelway consists of four lanes, 12 feet wide, plus a continuous center turn lane, also 12 feet wide. The road is a curb and gutter facility and the posted speed limit is 45 miles per hour (mph). This segment of US 158 is the most heavily developed. The Currituck County High School/Middle School, and several small businesses and residences are in this area.

The US 158 travelway is reduced to a four-lane divided facility at the Joseph P. Knapp Bridge, including the north and south approaches. The 12-foot lane width is maintained and the shoulder varies from 2 feet to 4 feet. The posted speed limit is 55 mph. A barrier separates the two directions of travel on the bridge.

From the Joseph P. Knapp Bridge to the Wright Memorial Bridge, the travelway consists of four lanes, 12-feet in width, plus a continuous center turn lane, also 12-feet in width. The road shoulders vary from 1 foot to 2 feet. This segment of US 158 is sparsely populated with residences and small business. The posted speed is 55 mph with the exception of the Grandy community where the posted speed drops to 50 mph.

US 158 at the Wright Memorial Bridge consists of two two-lane spans, one for eastbound travel and one for westbound travel. The eastbound bridge was completed in 1995. The westbound bridge was built in the early 1920s. The lanes are 12 feet wide. The bridge is posted at 55 mph. The shoulder sections are 3 feet (inside shoulder)/6 feet (outside shoulder) for the eastbound bridge and 1 foot/1 foot for the westbound bridge. The eastbound span has a 35-foot vertical navigation clearance and a 40-foot horizontal navigation clearance. The navigation clearance for the westbound span exceeds the eastbound span.

East of the Wright Memorial Bridge, US 158 enters the Town of Kitty Hawk. This section of highway begins with a four-lane typical section, but returns to the predominant four-lane with center turn lane typical section as it enters a stretch of heavily commercialized frontage with access control for shopping centers on either side of the road. The posted speed is reduced to 50 mph east of the bridge and 35 mph in the school zone during posted hours at Kitty Hawk Elementary School.

The geometry of the intersection of US 158 and NC 12 is complex. The main component of the intersection is signalized and serves heavy traffic volumes traveling on US 158 from the west (Wright Memorial Bridge) to the southeast (towards Kitty Hawk and

Nags Head). The Aycock Brown Welcome Center is south of the intersection and the north leg of the intersection (SR 1493) connects to an adjacent NC 12 intersection. Also complicating this intersection is a signalized intersection connecting north and south movements from NC 12 that is approximately 150 feet from the connection to the north.

The US 158 approach to the US 158/NC 12 intersection includes dedicated dual left turn lanes for eastbound US 158 traffic turning onto NC 12, dedicated dual right turn lanes for westbound US 158 traffic turning onto NC 12 (with a 3-foot raised concrete shoulder along the inside of the turn bay), and a dedicated US 158 westbound lane for access to the visitors center. The driveway for the visitors center forms the approach to the intersection opposite NC 12. The entrance and exit ramps for the visitors center are east and west of the intersection.

The NC 12 approach includes a dedicated left turn for NC 12 southbound traffic, as well as a dedicated ramp for NC 12 southbound traffic to westbound US 158, part of which is a two-way street allowing eastbound traffic to exit the Southern Shores Municipal Center.

North of its intersection with US 158 to its terminus, NC 12 has a two-lane typical section (10 to 12 feet wide) with a 1- to 2-foot shoulder and a primary posted speed limit of 45 mph. NC 12 at Southern Shores is characterized by medium to heavy residential development with numerous cross streets and direct connections from single-family homes.

At the Town of Duck, NC 12 widens to a three-lane typical section with a center turn lane 10 feet in width. The posted speed is 25 mph. The village is characterized in this three-lane section by commercial development made up of both small stand-alone shops and medium-sized shopping centers containing shops and restaurants. Vehicular, pedestrian, and bicycle traffic dominate NC 12 at Duck (particularly during the summer months). North of Duck, NC 12 returns to a two-lane typical section with 1- to 3-foot shoulders. Continuing north to Currituck County, NC 12 bisects the Sanderling Resort. No direct driveways for single-family homes occur along this portion of NC 12.

In Currituck County, driveway connections for single-family homes are limited as most homes are in large planned unit development-type subdivisions. Access is provided to side streets through left and right turn lanes and with unsignalized T-intersections. At Albacore Street (at the south end of the Whalehead Beach subdivision at a concentration of commercial development), NC 12 widens to three lanes (10 feet in width) with a center turn lane and 1- to 2-foot shoulders. The intersection of NC 12 and Albacore Street is signalized. North of the commercial concentration to its terminus, NC 12 has a two-lane cross section with lanes 10 to 12 feet in width. The posted speed limit is 35 mph from Corolla to NC 12's terminus.

1.8.2 Traffic Volumes

Table 1-3 and Table 1-4, as well as Figure 1-5. through Figure 1-8. , show each major link for the base year 2006 and projected year 2035 Average Annual Daily Traffic (AADT) and daily traffic for three peak travel periods along US 158 and NC 12. The volumes for the three peak travel periods, non-summer weekday, summer weekday, and summer weekend were derived from the AADT using daily factors from hourly traffic counts made 24-hours a day/365 days per year on the Wright Memorial Bridge. The summer weekend period has the highest daily traffic volumes.

Forecasts for 2035 took into account the following:

- Historic traffic growth and development trends on mainland Currituck and Dare counties;
- An assumed full development of subdivided lots on the Outer Banks accessible to NC 12, some additional development on the Outer Banks north of the terminus of NC 12 based on past development trends;
- Current trip generation rates for dwelling units on the Outer Banks; and
- Current trip distributions for local and through trips.

Table 1-5 shows the percent growth in daily traffic from 2006 to 2035. All road segments of US 158 and NC 12 are expected to experience substantial growth from 2006 to 2035. The greatest percent growth (113 percent) is anticipated on US 158 near Bertha.

1.8.3 Level of Service and Congestion

Level of service (LOS) is a qualitative measure of the quality of traffic, ranging from LOS A, representing unconstricted flow, to LOS F, representing severe delays and congestion. Table 1-6 presents the level of service concept as summarized in the 2000 *Highway Capacity Manual* (Transportation Research Board, 2000) and definitions for each level of service. In North Carolina, a maximum peak period LOS C is considered desirable in rural areas. In rural areas with seasonal peaks in traffic, the acceptable level of service can drop to D but is not considered ideal. Level of service E and F are considered congested based on the conditions describe for those levels of service in Table 1-6.

Level of service is normally calculated for the peak period on an average day of the year. This approach is typical of most urban areas where traffic volumes vary only slightly throughout the year and a distinct peaking of traffic occurs during the morning and afternoon rush hours when most commuting trips occur. In contrast, the Outer Banks has much higher traffic volumes in the summer than in the non-summer and the peak

Table 1-3. Base Year Daily Traffic Volumes (2006)

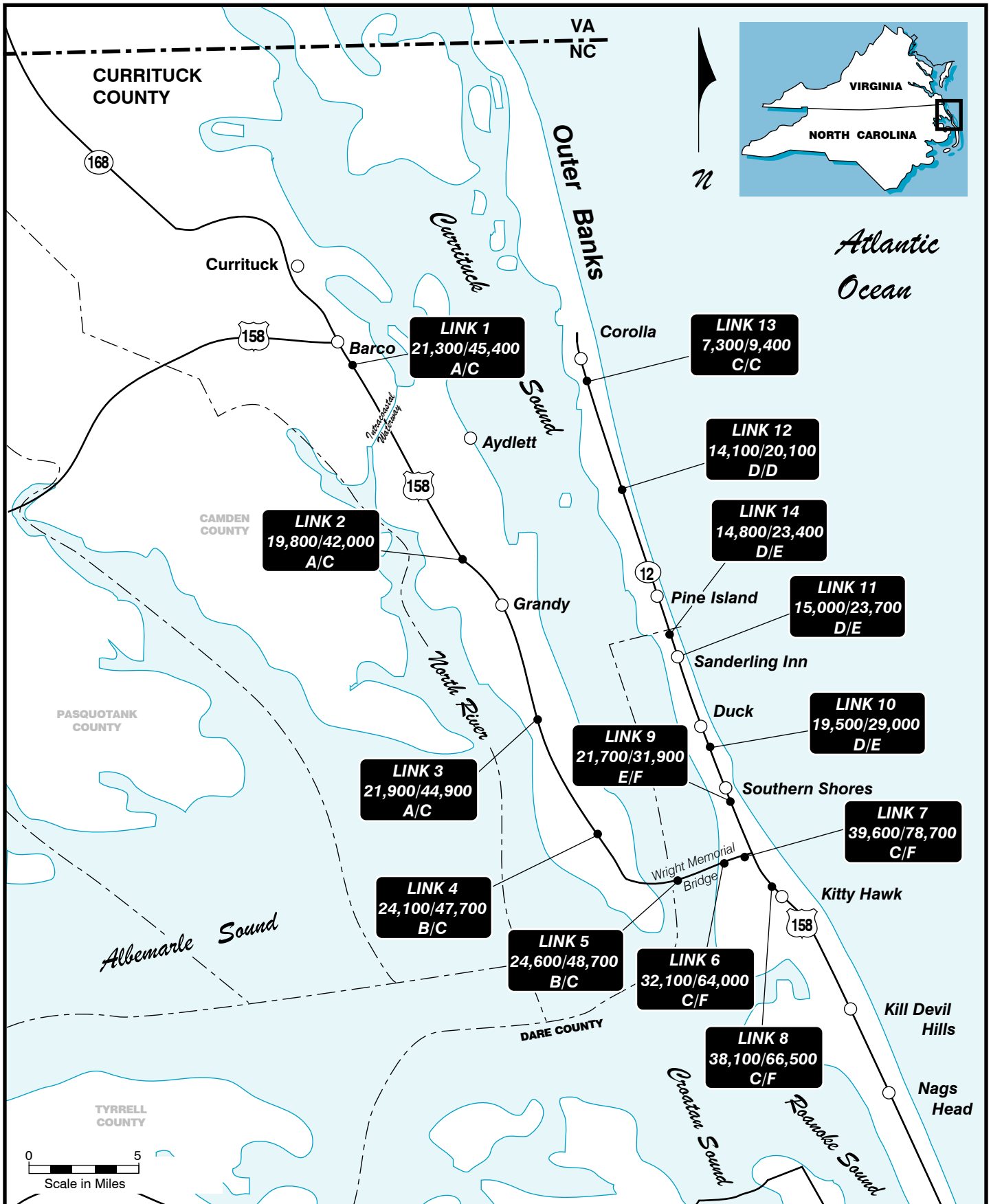
Link	Name	AADT*	Non-Summer Weekday**	Summer Weekday **	Summer Weekend **
1	US 158 south of Barco	21,300	18,600	27,000	50,600
2	US 158 near Bertha	19,800	17,400	23,300	49,400
3	US 158 near Jarvisburg	21,900	19,300	25,200	49,900
4	US 158 near Mamie	24,100	21,100	26,500	50,700
5	US 158 at Wright Memorial Bridge	24,600	21,600	29,500	47,000
6	US 158 between Wright Memorial Bridge and NC 12	32,100	28,100	41,600	59,300
7	US 158 just west of NC 12 intersection	39,600	34,700	52,100	71,700
8	US 158 just south of NC 12 intersection	38,100	33,400	54,800	59,900
9	NC 12 just north of US 158 intersection	21,700	19,400	29,100	32,300
10	NC 12 in Duck business area	19,500	17,400	24,000	28,800
11	NC 12 in Sanderling Inn area	15,000	13,400	18,100	22,800
14	NC 12 at Dare/Currituck County Line	14,800	13,300	18,000	22,400
12	NC 12 at Corolla south	14,100	12,600	17,000	20,900
13	NC 12 at Corolla north	7,300	6,500	8,700	9,700

* From NCDOT

** Interpolated from AADT using daily factors from hourly traffic counts on the Wright Memorial Bridge

Table 1-4. Future Daily Traffic Volumes (2035)

Link	Name	AADT	Non-Summer Weekday	Summer Weekday	Summer Weekend
1	US 158 south of Barco	45,400	37,400	54,300	92,600
2	US 158 near Bertha	42,000	35,200	47,400	89,900
3	US 158 near Jarvisburg	44,900	38,600	50,800	90,300
4	US 158 near Mamie	47,700	42,100	53,300	91,400
5	US 158 at Wright Memorial Bridge	48,700	43,100	58,900	84,600
6	US 158 between Wright Memorial Bridge and NC 12	64,000	55,700	82,500	108,200
7	US 158 just west of NC 12 intersection	78,700	68,200	102,800	131,700
8	US 158 just south of NC 12 intersection	66,500	57,200	93,600	104,500
9	NC 12 just north of US 158 intersection	31,900	28,800	43,100	47,400
10	NC 12 in Duck business area	29,000	26,500	36,500	44,100
11	NC 12 in Sanderling Inn area	23,700	21,900	29,700	36,200
14	NC 12 at Dare/Currituck County Line	23,400	21,500	28,900	35,700
12	NC 12 at Corolla south	20,100	18,200	25,300	31,400
13	NC 12 at Corolla north	9,400	8,600	11,600	13,900



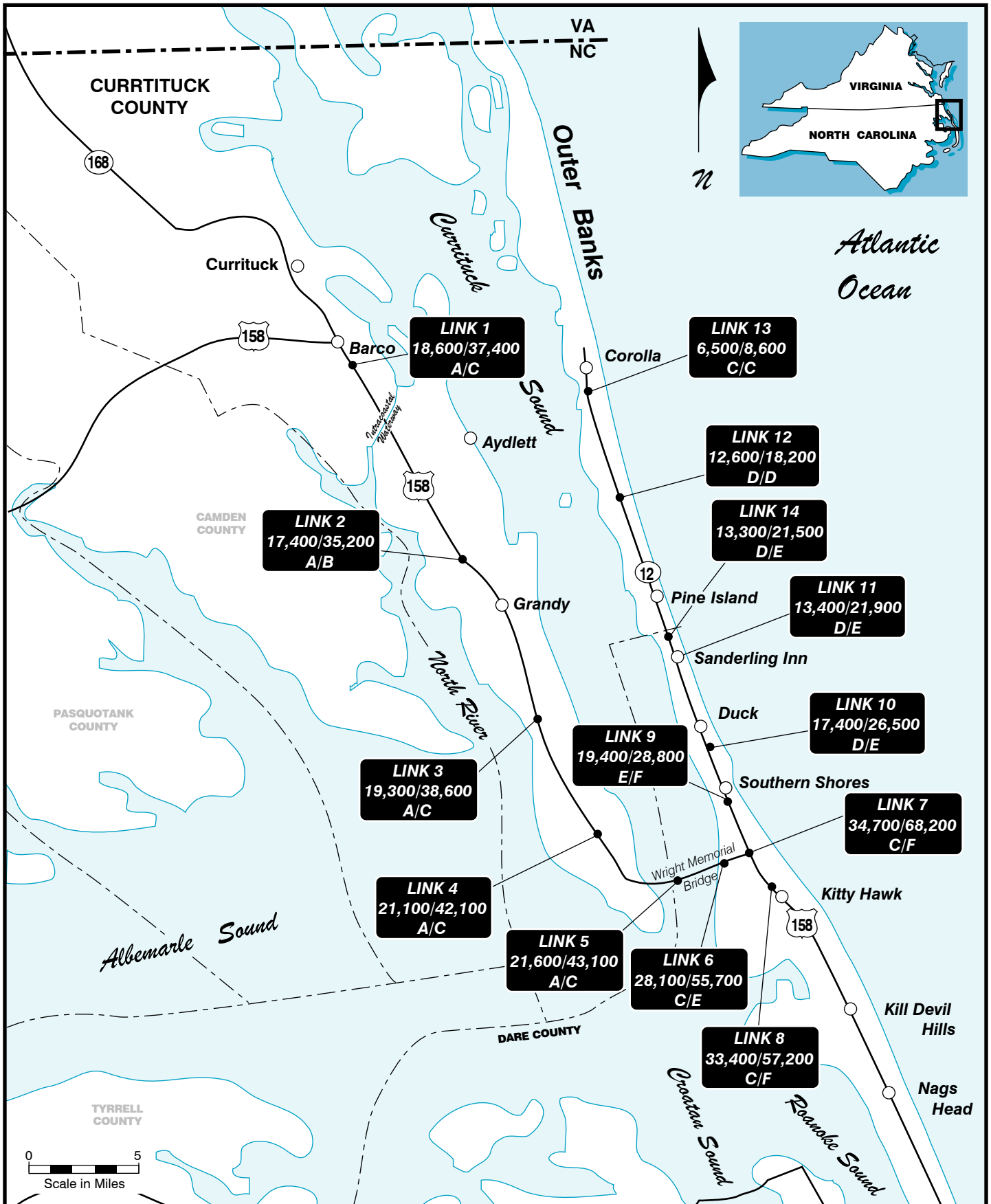
LEGEND

----- County Boundaries

AADT Traffic Forecasts and LOS for 2006 and 2035

Figure

1-5

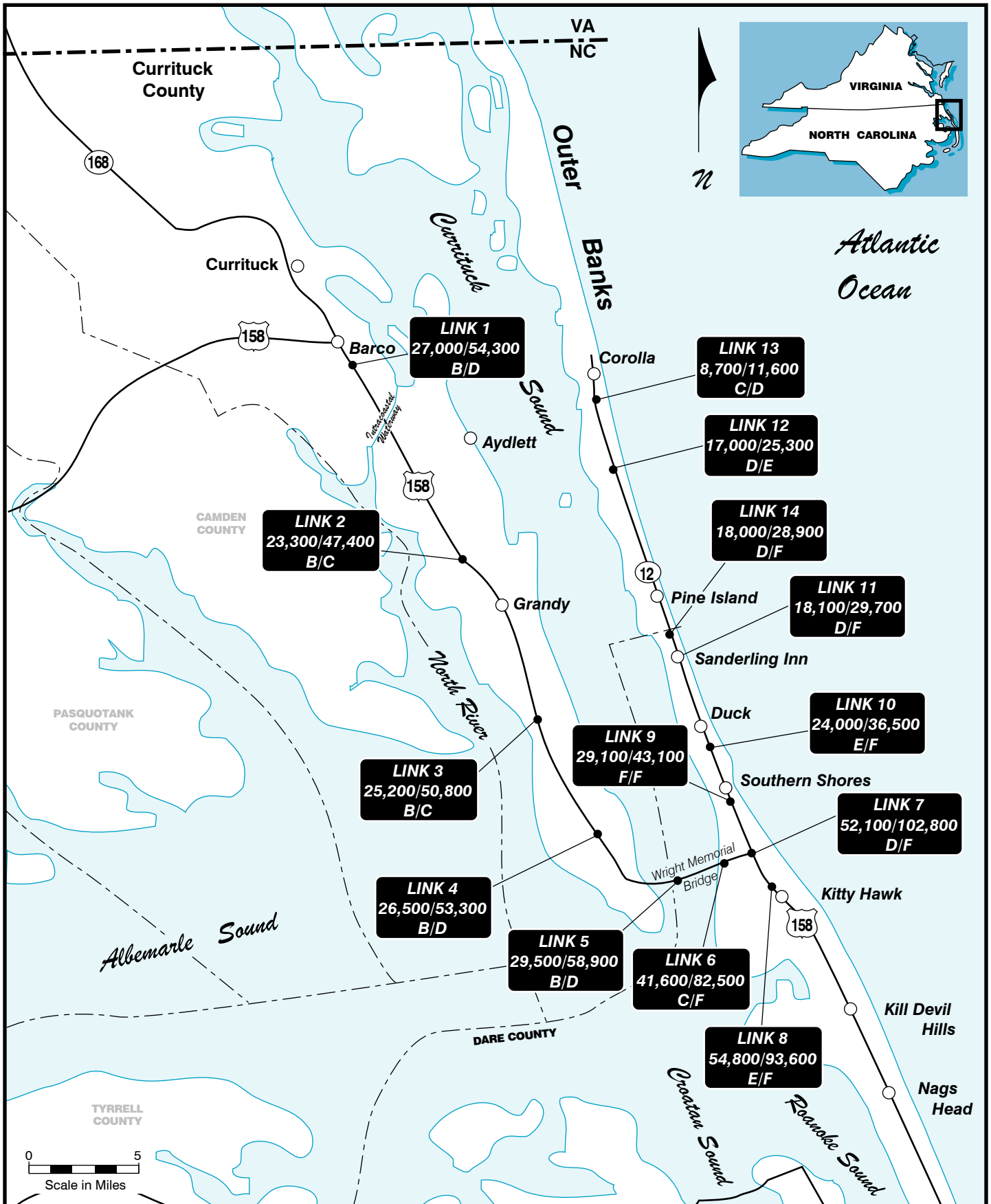


LEGEND

--- County Boundaries

**Non-Summer Weekday
Traffic Forecasts and LOS
for 2006 and 2035**

**Figure
1-6**



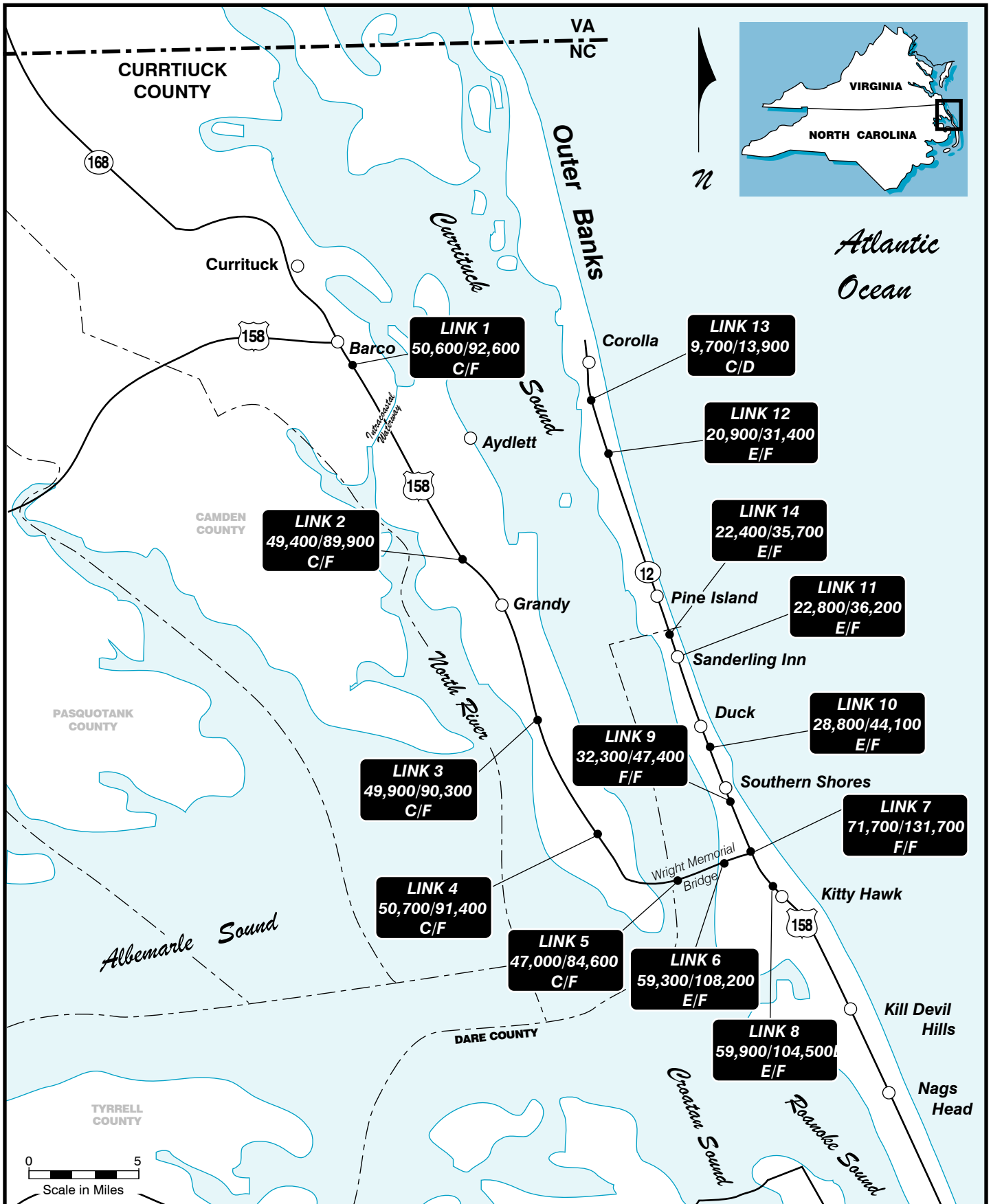
LEGEND

----- County Boundaries

**Summer Weekday
Traffic Forecasts and LOS
for 2006 and 2035**

Figure

1-7



LEGEND

----- County Boundaries

**Summer Weekend
Traffic Forecasts and LOS
for 2006 and 2035**

**Figure
1-8**

Table 1-5. Percent Growth in Traffic Volumes from 2006 to 2035

Link	Name	AADT	Non-Summer Weekday Period	Summer Weekday Period	Summer Weekend Period
1	US 158 south of Barco	113%	101%	101%	83%
2	US 158 near Bertha	112%	102%	103%	82%
3	US 158 near Jarvisburg	105%	100%	102%	81%
4	US 158 near Mamie	98%	100%	101%	80%
5	US 158 at Wright Memorial Bridge	98%	100%	100%	80%
6	US 158 between Memorial Bridge and NC 12	99%	98%	98%	82%
7	US 158 just west of NC 12 intersection	99%	97%	97%	84%
8	US 158 just south of NC 12 intersection	75%	71%	71%	74%
9	NC 12 just north of US 158 intersection	47%	48%	48%	47%
10	NC 12 in Duck business area	49%	52%	52%	53%
11	NC 12 in Sanderling Inn area	58%	63%	64%	59%
14	NC 12 at Dare/Currituck County Line	58%	62%	61%	59%
12	NC 12 at Corolla south	43%	44%	49%	50%
13	NC 12 at Corolla north	29%	32%	33%	43%

Table 1-6. Roadway Level of Service Definitions

Level of Service Classification	Roadway Expected Flow Characteristics
A	Free flowing traffic.
B	A stable flow with few restrictions on operating speed.
C	Stable flow but with more restrictions on speed and lane changing.
D	Approaches unstable conditions and passing becomes extremely difficult. Motorists are delayed an average of 75 percent of the time. Average highway speeds are less than 45 mph.
E	The capacity of a roadway. Passing is virtually impossible and average highway speeds can be as low as 25 mph when slow vehicles or other interruptions are encountered.
F	Heavily congested flow with traffic demand exceeding the capacity of the highway.

period occurs on the weekend rather than during weekdays. Therefore, three peak periods were examined. Level of service results in the project area are shown in Table 1-7, as well as Figure 1-5. through Figure 1-8.

1.8.3.1 Existing Levels of Service

As shown in Table 1-7 and Figure 1-5. through Figure 1-8. , US 158 west of the Wright Memorial Bridge operated at LOS C or better in the base year (2006) during the average annual, non-summer weekday, summer weekday and even summer weekend peak periods. East of the Wright Memorial Bridge near US 158's intersection with NC 12, however, the peak period level of service for US 158 dropped to LOS F during the summer weekend peak period.

The annual average peak period level of service on the two-lane NC 12 ranged in 2006 from LOS E at Southern Shores to LOS C in the Corolla area in Currituck County. The non-summer peak period level of service on NC 12 was LOS E in the Southern Shores area, LOS D from the Duck area to Corolla, and LOS C in the Corolla area. During the average weekday summer peak period, the level of service dropped to LOS F at Southern Shores and LOS E at Duck. On summer weekends, the peak period level of service dropped to LOS F at Southern Shores and LOS E on most of the rest of NC 12.

Since LOS F reflects traffic volumes greater than the capacity of the road, it indicates high delays, with no passing opportunities during peak travel periods.

Table 1-7. Level of Service for Road Links in 2006 and 2035

Annual Average Daily Traffic (see Figure 1-5.)				Summer Weekday Traffic (see Figure 1-7.)			
Link	Description	2006 ¹	2035 ¹	Link	Description	2006 ¹	2035 ¹
1	US 158 south of Barco	A	C	1	US 158 south of Barco	B	D
2	US 158 near Bertha	A	C	2	US 158 near Bertha	B	C
3	US 158 near Jarvisburg	A	C	3	US 158 near Jarvisburg	B	C
4	US 158 near Mamie	B	C	4	US 158 near Mamie	B	D
5	US 158 at Wright Memorial Bridge	B	C	5	US 158 at Wright Memorial Bridge	B	D
6	US 158 west of NC 12	C	F	6	US 158 west of NC 12	C	F ²
7	US 158 just west of NC 12	C	F	7	US 158 just west of NC 12	D	F ²
8	US 158 just south of NC 12	C	F	8	US 158 just south of NC 12	E	F ²
9	NC 12 just north of US 158	E	F	9	NC 12 just north of US 158	F	F ²
10	NC 12 in Duck business area	D	E	10	NC 12 in Duck business area	E	F
11	NC 12 in Sanderling Inn area	D	E	11	NC 12 in Sanderling Inn area	D	F
14	NC 12 at Dare/Currituck County Line	D	E	14	NC 12 at Dare/Currituck County Line	D	F
12	NC 12 at Corolla south	D	D	12	NC 12 at Corolla south	D	E
13	NC 12 at Corolla north	C	C	13	NC 12 at Corolla north	C	D

Non-Summer Weekday Traffic (see Figure 1-6.)				Summer Weekend Traffic (see Figure 1-8.)			
Link	Description	2006 ¹	2035 ¹	Link	Description	2006 ¹	2035 ¹
1	US 158 south of Barco	A	C	1	US 158 south of Barco	C	F
2	US 158 near Bertha	A	B	2	US 158 near Bertha	C	F
3	US 158 near Jarvisburg	A	C	3	US 158 near Jarvisburg	C	F
4	US 158 near Mamie	A	C	4	US 158 near Mamie	C	F
5	US 158 at Wright Memorial Bridge	A	C	5	US 158 at Wright Memorial Bridge	C	F
6	US 158 west of NC 12	C	E	6	US 158 west of NC 12	E	F ²
7	US 158 just west of NC 12	C	F	7	US 158 just west of NC 12	F	F ²
8	US 158 just south of NC 12	C	F	8	US 158 just south of NC 12	E	F ²
9	NC 12 just north of US 158	E	F	9	NC 12 just north of US 158	F	F ²
10	NC 12 in Duck business area	D	E	10	NC 12 in Duck business area	E	F ²
11	NC 12 in Sanderling Inn area	D	E	11	NC 12 in Sanderling Inn area	E	F
14	NC 12 at Dare/Currituck County Line	D	E	14	NC 12 at Dare/Currituck County Line	E	F
12	NC 12 at Corolla south	D	D	12	NC 12 at Corolla south	E	F
13	NC 12 at Corolla north	C	C	13	NC 12 at Corolla north	C	D

¹ Level of service for the year indicated

² Experiences a poor level of service F or a peak hourly travel demand that is 30 percent higher than the hourly capacity of the road. This number is calculated by dividing peak hour travel demand by hourly road capacity. Both demand and capacity are measured in terms of vehicles per hour. This ratio is customarily called a volume to capacity ratio or (V/C). A V/C ratio of 1.3 means that peak hourly travel demand is 30 percent higher than the hourly capacity of the road.

1.8.3.2 2035 No-Build Levels of Service

As shown in Table 1-7, substantial congestion will occur in the project area along both NC 12 and US 158 in 2035. Along US 158 on the mainland, congestion problems will be confined to the summer weekend peak period. US 158 on the mainland has the capacity to operate at an acceptable LOS D or better on the summer weekday through the 2035 project design year. However, the link of US 158 between the Wright Memorial Bridge and NC 12 would be LOS E and F under non-summer weekday conditions and US 158 between the Wright Memorial Bridge and NC 12 will be a poor LOS F on both summer weekdays and summer weekends.

In general, NC 12 will be congested during all peak periods, with congestion being at its worst in the summer. For the 2035 annual average peak period and non-summer peak period, NC 12 would operate with LOS F in Southern Shores and generally LOS E to the north. In the summer, almost all of NC 12 would operate at LOS F during both the summer weekday and the summer weekend peak period.

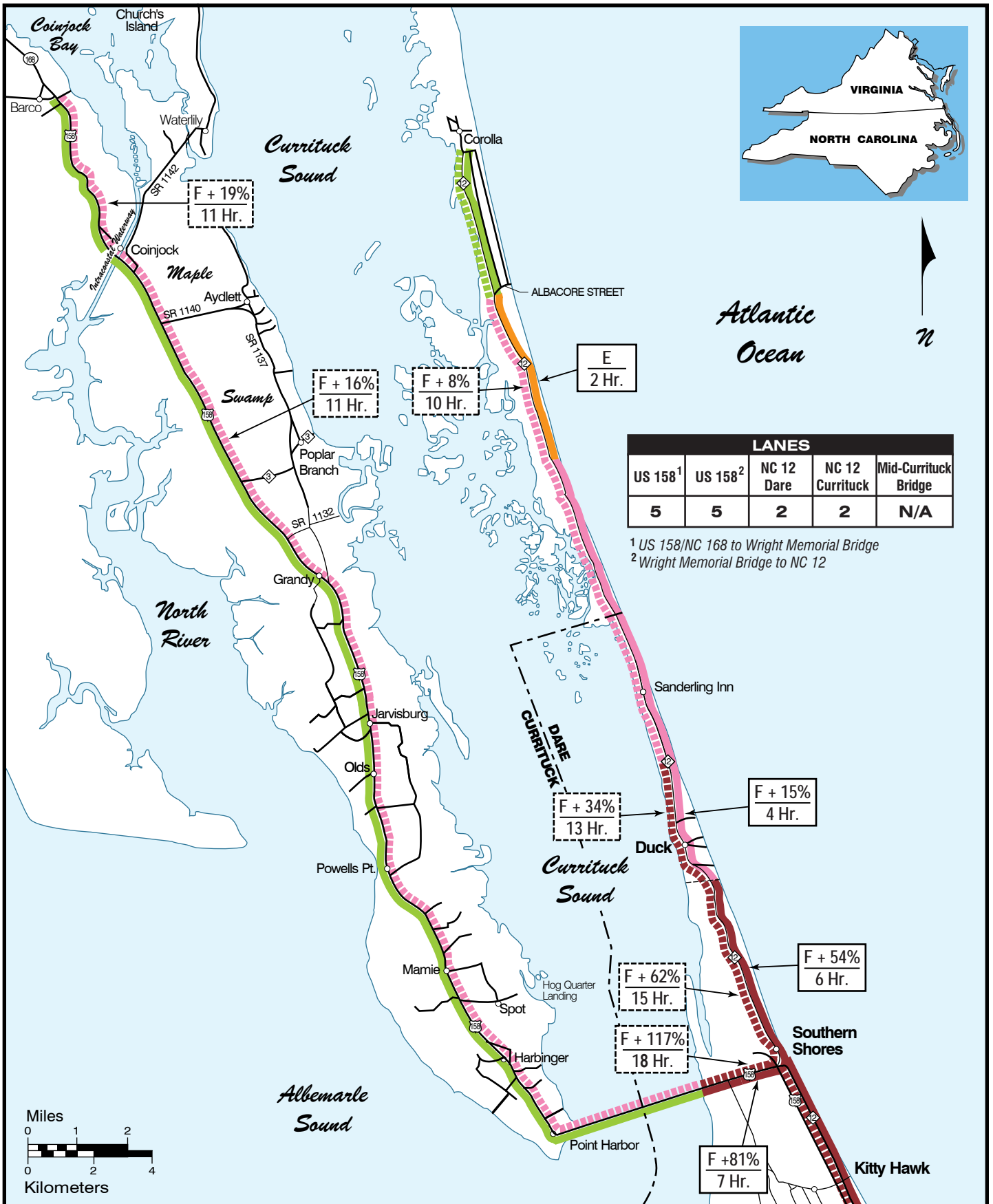
Table 1-7 also indicates that the worst congestion will occur in 2035 on US 158 east of the Wright Memorial Bridge and NC 12 in Dare County during the summer. These road segments will experience a poor LOS F. The severity of summer congestion in 2035 is further highlighted in Figure 1-9. . On the summer weekday, peak hour travel demand will exceed the capacity of the roads between 54 percent and 81 percent east of the Wright Memorial Bridge on US 158 and on NC 12 within Southern Shores. On the summer weekend, demand over capacity east of the Wright Memorial Bridge on US 158 and on NC 12 within Southern Shores would increase to 62 to 117 percent. When demand exceeds capacity the duration of peak congestion lengthens, as described in the next section.

In addition, the levels of service discussed here are link levels of service and do not consider the effect of intersection failures on other road links. For example, a poor level of service at the US 158/NC 12 intersection could back-up southbound traffic on US 158 into Currituck County, even when US 158 has the capacity to operate at a desirable level of service without the intersection back-up.

1.8.3.3 Duration of Congestion in 2035

The level of service for each link is not the only indication of congestion in the corridor. Another performance measure is the number of congested hours of operations (LOS E/F) under existing and future conditions. Figure 1-9. indicates that in 2035:

- On the summer weekend, the Currituck County section of US 158 between NC 168 and the Wright Memorial Bridge will operate at LOS F for 10 to 11 hours a day (traffic will not be congested on the summer weekday);



LEGEND

LOS + % Over Capacity
Hours of Congestion

- Summer Weekend LOS (2035)
- Summer Weekday LOS (2035)
- LOS A-D
- LOS E
- LOS F (1.0 < V/C < 1.3)
- LOS F (V/C > 1.3)

Extent of Summer Congestion for 2035

Figure 1-9

- On the summer weekday, US 158 east of the Wright Memorial Bridge and most of NC 12 will operate at LOS F for seven hours per day; and
- On the summer weekend, US 158 east of the Wright Memorial Bridge and most of NC 12 will operate at LOS F for 10 to 18 hours per day.

Also, during the summer weekend in 2035, the peak periods could be extended by any incident, such as an accident. In addition to the initial delays associated with the accident, queues would immediately form that would resolve slowly, even after the accident is cleared from the roadway. Peak periods also could be extended by a poor level of service (LOS F) at signalized intersections.

1.8.3.4 Annual Vehicle-Miles Traveled under Congested Conditions

As shown in Table 1-8, in 2006, the total vehicle-miles traveled on US 158 and NC 12 in the project area was 355.1 million. Of that total, approximately 5.4 million vehicle-miles were traveled under congested conditions (LOS E or F).

Table 1-8. Existing and Future Road Network Congestion

	2006	2035
Vehicle Miles Traveled (VMT)		
Total Annual Million Vehicle Miles Traveled (VMT)	355.1	663.9
Annual Million VMT by Level of Service		
LOS D or Better	349.7	597.8
LOS E	2.2	5.5
LOS F (V/C >1.0)	3.2	44.8
Poor LOS F (V/C >1.3)	0	15.8
Congested Annual Million VMT by Level of Service		
LOS E, F and Poor LOS F	5.4	66.1
LOS F and Poor LOS F	3.2	60.6
Poor LOS F (V/C >1.3)	0	15.8
Miles of Road Operating at LOS F		
Summer Weekday (SWD)	3.7	14.7
Summer Weekend (SWE)	4.5	43.5
Weighted Average of SWD & SWE	3.9	22.9
Miles of Road Operating at Poor LOS F		
SWD	0	5.7
SWE	0	7.9
Weighted Average of SWD & SWE	0	6.3

Note: V/C=volume/capacity ratio with a ratio of 1.0 indicating that peak hourly demand is equal to road capacity and 1.3 indicating that peak hourly demand is 30 percent higher than road capacity.

By 2035, the total vehicle-miles traveled on these roads in the project area is expected to increase to 663.9 million—almost doubling the existing (2006) traffic volumes. By 2035, it is expected that congested vehicle-miles traveled will increase to 66.1 million, 12.2 times the 2006 miles.

The average miles of US 158 and NC 12 operating at LOS F in the summer is expected to rise from 3.9 miles in 2006 to 22.9 miles in 2035 or 47 percent of the 49 miles of US 158 and NC 12 in the project area (US 158/NC 168 intersection to the northern end of NC 12 via the Wright Memorial Bridge). For a poor level of service F (30 percent over road capacity), the average number of miles experiencing such a severe level of summer congestion is expected to rise from zero miles in 2006 to 6.3 miles of 49 miles (13 percent) in 2035.

1.9 Travel Time

Travel time is a function of distance, vehicle speed, and delay at intersections. This analysis presents travel time along US 158 to NC 12 under current (2006) and future (2035) conditions for the summer weekday and summer weekend.

For purposes of this analysis, travel time was calculated for a trip between Aydlett Road (SR 1140) on US 158 (on the Currituck County mainland) and Albacore Street (SR 1402) on NC 12 (on the Currituck County Outer Banks). These roads are shown on Figure 1-2. With existing roads, this trip requires travel on US 158 on the mainland; travel on US 158 across the Wright Memorial Bridge to NC 12; and then travel on NC 12 on the Outer Banks. The total distance of this trip is 40.9 miles. Under uncongested conditions, the travel time for this trip is approximately 1 hour.

In 2006, during the summer travel periods, average travel time from Aydlett Road to Albacore Street was:

- 68 minutes (1 hour and 8 minutes) on a summer weekday and
- 102 minutes (1 hour and 42 minutes) on a summer weekend.

This is 8 and 42 minutes greater, respectively, than the travel time under uncongested conditions. In 2035, with increased traffic and congestion, these average travel times will have risen to:

- 122 minutes (2 hours and 2 minutes) a summer weekday and
- 233 minutes (3 hours and 53 minutes) on a summer weekend.

This is approximately 1 hour and 3 hours greater, respectively, than the travel time under uncongested conditions and a 79 and 228 percent increase, respectively, over 2006 travel times.

1.10 Hurricane Clearance Time

A hurricane evacuation model was developed for NCDOT for the North Carolina coast (PBS&J, March 2008). This model was used to develop evacuation clearance time estimates for 2007 and 2035. The clearance time is defined as the time from when the first evacuee leaves until all evacuees reach a point of safety prior to the arrival of gale-force winds. The clearance times were determined for three levels of storm intensity and four levels of tourist occupancy. Model development was accomplished in conjunction with an oversight committee consisting of representatives from NCDOT, FHWA, state and federal environmental resource and regulatory agencies, and North Carolina's coastal counties.

The oversight committee and law enforcement and emergency management meetings were held to define a preferred maximum clearance time, as well as the tourist occupancy and level of storm intensity, that would be used in the hurricane evacuation model to establish the preferred maximum clearance time. Law enforcement and emergency management indicated a preference for an 18-hour maximum that would allow for:

- Evacuations to be conducted mostly during daylight hours;
- Limiting the amount of personnel that North Carolina law enforcement would have to commit to one shift for an evacuation; and
- Issuance of evacuation advisories within the National Hurricane Center's warning period as opposed to issuance of evacuation notices during a hurricane watch period when the forecast track is much less certain.

It was agreed that this 18-hour standard would be applied to a Category 3 storm with 75 percent tourist occupancy. The 18-hour standard was adopted by the North Carolina Legislature in 2005 (NC Gen. Stat. § 136-102.7, "Hurricane Evacuation Standard").

Table 1-9 presents current and forecast hurricane evacuation clearance times for those evacuating via NC 168 and US 158. Evacuation times for a Category 3 storm at 75 percent tourist occupancy currently exceed the state's 18-hour clearance time standard. The 2035 clearance time (taking into consideration the implementation of the STIP projects illustrated in Figure 1-3) would be 36.3 hours, 102 percent over the 18-hour standard.

Table 1-9. 2007 and 2035 Hurricane Evacuation Clearance Times

Year	By Tourist Occupancy and By Year in Hours							
	2007				2035 (with STIP projects shown in Figure 1-3)			
Tourist Occupancy	35%	50%	75%	95%	35%	50%	75%	95%
Category 1-2	14.5	17.7	23.5	27.9	18.9	23.1	30.7	36.3
Category 3-5	17.9	21.2	27.1	31.4	24.6	28.9	36.3	42.0

References

- Currituck County. December 2000. Airport Layout Plan Update.
- Currituck County. November 2006. Currituck County Land Use Plan.
- Currituck County. March 25, 2002. <http://www.co.currituck.nc.us/Profile.html>.
- Dare County. 2003. Dare County Land Use Plan, 2003 Update.
- North Carolina Department of Transportation. July 1988. Dare County Thoroughfare Plan.
- North Carolina Department of Transportation. March 1999. Thoroughfare Plan for Currituck County.
- North Carolina Department of Transportation (NCDOT). September 2004. NCDOT Facility Type & Control of Access Definitions.
- North Carolina Department of Transportation (NCDOT). October 2005. Strategic Highway Corridors Concept Development Report.
- North Carolina Department of Transportation (NCDOT). 2007. Statewide Transportation Improvement Program, 2007 to 2013.
- North Carolina Department of Transportation (NCDOT). 2008. Statewide Transportation Improvement Program, 2009 to 2015.
- National Hurricane Center (NHC). 2002. <http://www.nhc.noaa.gov/HAW/day4/errors.htm>
- Parsons Brinckerhoff Quade & Douglas, Inc. (PBQ&D). November 1995. Constrained Traffic Report. Prepared for the North Carolina Department of Transportation.
- Parsons Brinckerhoff Quade & Douglas, Inc. (PBQ&D). November 2001. Route 168 Chesapeake Expressway – Toll Operations/Plaza Modifications Traffic Study. Prepared for the City of Chesapeake.
- Post, Buckley, Schuh and Jernigan (PBS&J). September 2005. North Carolina Department of Transportation State Hurricane Evacuation Study. Prepared for the North Carolina Department of Transportation.

Post, Buckley, Schuh and Jernigan (PBS&J). March 2008. Mid-Currituck Bridge Corridor Study Hurricane Evacuation Analysis. Prepared for the North Carolina Department of Transportation.

Transportation Research Board, National Research Council. 2000. Highway Capacity Manual (HCM 2000). Washington, DC.