MID-CURRITUCK BRIDGE STUDY

2035
TRAFFIC ALTERNATIVES REPORT

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STIP NO. R-2576
CURRITUCK COUNTY
DARE COUNTY

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1.0 Introduction

This report is the 2035 Traffic Alternatives Report for the Mid-Currituck Bridge Environmental Impact Statement (EIS) study being conducted by the North Carolina Turnpike Authority (NCTA). The study is examining a new seven-mile bridge connecting US 158 near Aydlett to NC 12 south of Corolla on the Currituck County Outer Banks. The project study area includes US 158 between Barco and Southern Shores and follows NC 12 north from Southern Shores to Corolla as shown in Figure 1.

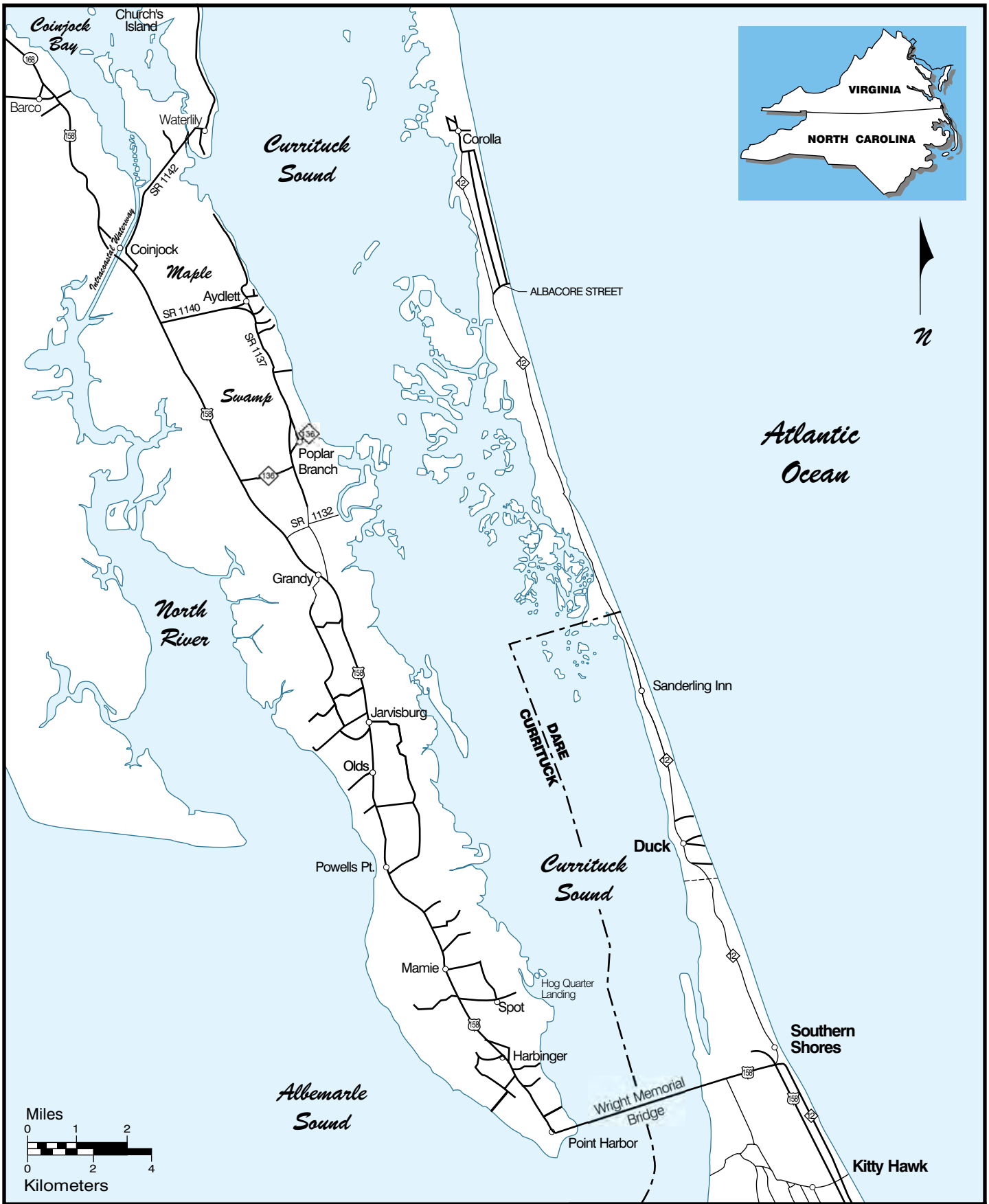
1.1 Chronology of Traffic Studies

This traffic report is a result of a series of traffic reports (dating back to 2002) originally included as part of a similar study conducted for the North Carolina Department of Transportation (NCDOT). The process has been an iterative process with revised alternatives, forecasts, measures of effectiveness, and issues that have been raised during the course of completing the project. A chronology of various stages of traffic studies for the project is outlined below:

- The initial traffic analysis for this phase of the EIS was completed and submitted to NCDOT as the *Traffic Needs Analysis* in July 2002. The report documented the methodology, assumptions, and findings for existing (2001) traffic conditions, future (2025) No-Build traffic conditions, and hurricane evacuation clearance times. The 2025 No-Build traffic conditions included analysis of thirteen roadway links and two intersections. Hereinafter, the July 2002 main report will be referred to as the *Traffic Needs Report* (or TNR).

- Building upon the No-Build analysis, follow-up analysis was developed to look at 2025 traffic forecasts and traffic capacity under potential alternatives including widening and Build Bridge scenarios. This analysis step included traffic information for a new link, the Mid-Currituck Bridge. In addition, non-highway alternatives were investigated, including a sketch-level examination of reversible lanes. The findings were initially presented in a draft report in March 2004 to NCDOT, but were finalized and incorporated into the *2025 Traffic Alternatives Report* (May 2007) submitted to the NCTA.

- Additional 2025 alternatives analysis was conducted to address issues identified in the first stage of the alternatives analysis. The first issue was to determine the year that traffic flow is expected to reach LOS E and LOS F under different roadway typical sections for the peak summer traffic seasons. The second issue was to examine the operational feasibility of a reversible third lane on NC 12 for



Project Study Area

Figure 1

use on summer weekends when tourists are arriving and departing beach houses as well as during a hurricane evacuation. The findings were initially presented in a draft report to NCDOT in December 2005, but were finalized and incorporated into the *2025 Traffic Alternatives Report.*

- This report is entitled the *2035 Traffic Alternatives Report*. It is an update of the *2025 Traffic Alternatives Report* to update traffic volumes to year 2035. In addition, the updated analysis examines the impact of expected toll diversion on traffic volumes. As with previous analyses, this analysis is built upon all previous alternatives analysis and draft reports. Although new assumptions were utilized in some cases, the majority of this analysis assumed that the previous traffic studies were applicable. The additional analysis focused on new information related to traffic operations.

1.2 Alternatives Under Consideration

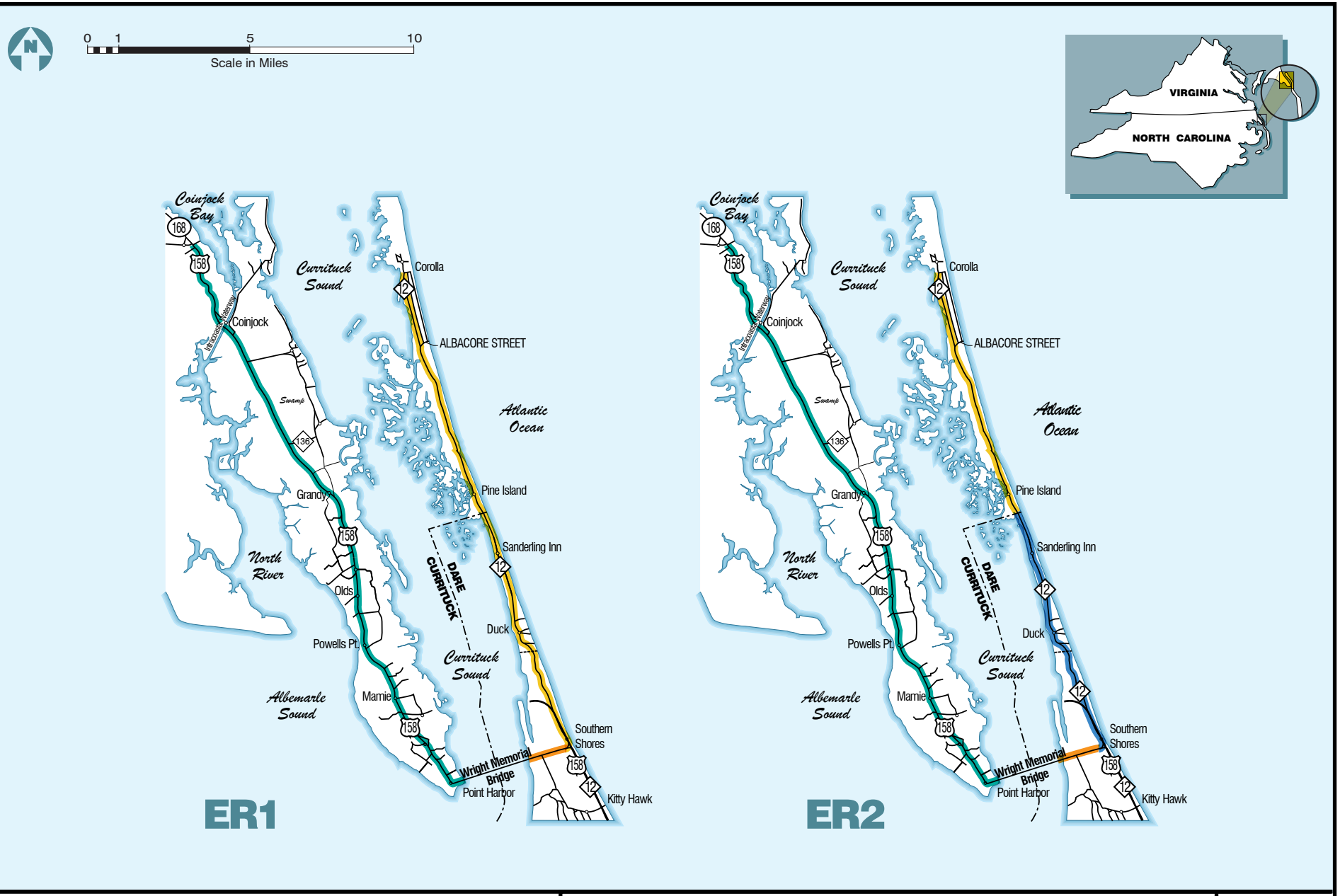
This section discusses the alternatives being evaluated for this report. The analysis focuses primarily on two sets of roadway improvement alternatives: alternatives that improve existing roads without building a new bridge (ER1 and ER2) and alternatives that involve constructing a new Mid-Currituck Bridge in combination with improvements to existing roads (MCB1, MCB2, MCB3, and MCB4). The concept screening process also involved analysis of several other non-roadway strategies including: Shifting Rental Start Times; Transportation Systems Management (TSM); Bus Transit; and Ferry service.

The highway improvement alternatives are examined in Section 3.4 and Section 3.4.1. The other alternatives are examined in Section 5.0.

1.2.1 Existing Road Improvement (ER) Alternatives

Two alternatives were developed to examine the reasonableness of improving existing NC 12 and US 158, without building a new Mid-Currituck Bridge. These alternatives were ER1 and ER2, with the initials ER standing for "existing road." Figure 2 shows the locations of the improvements associated with each alternative. ER1 was developed in an attempt to achieve a desirable LOS D throughout the study area road network for the summer weekday. ER2 was developed to achieve maximum transportation benefits using the existing roadways while minimizing impacts to communities. The basic features of these two alternatives are:

- **ER1**
  - Widening US 158 to eight lanes between the Wright Memorial Bridge and the NC 12 intersection;



LEGEND

- Eight Lanes
- Six Lanes
- Four Lanes
- Three Lanes
- Third Northbound Lane or Contraflow Lane

Highway Improvement Alternatives ER1 and ER2

Figure

2

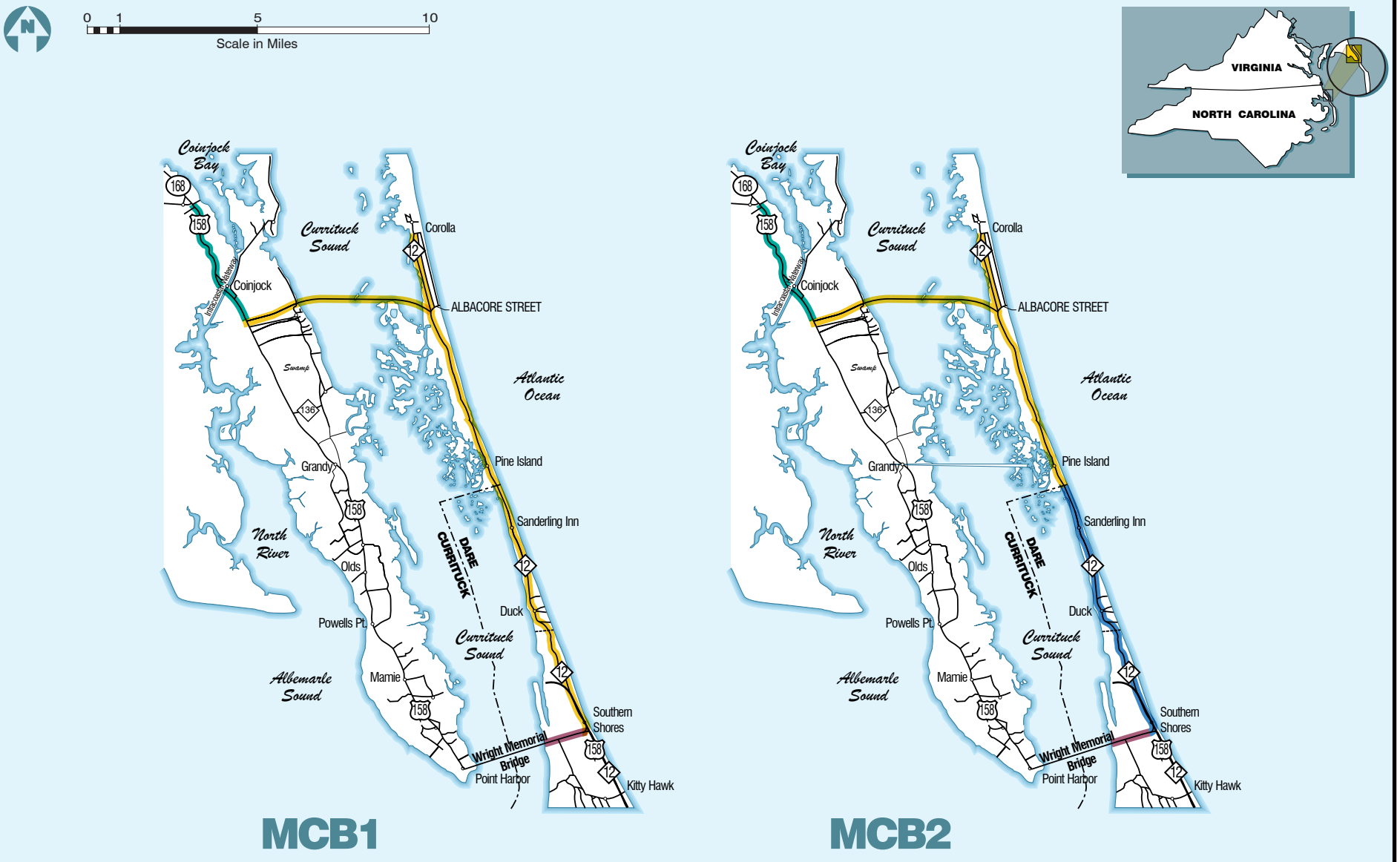
  - Widening NC 12 to four lanes between US 158 and Corolla; and
  - Adding a third northbound lane on US 158 from NC 168 to the Wright Memorial Bridge as a hurricane evacuation improvement or using the center turn lane as a third northbound evacuation lane.
- **ER2**
  - Widening US 158 to eight lanes between the Wright Memorial Bridge and the NC 12 intersection;
  - Widening NC 12 to three lanes between US 158 and the Dare-Currituck County Line and to four lanes between the Dare-Currituck County Line and Corolla; and
  - Adding a third northbound lane on US 158 from NC 168 to the Wright Memorial Bridge as a hurricane evacuation improvement or using the center turn lane as a third northbound evacuation lane.
- ER1 and ER2 differ only in that ER1 widens NC 12 to four lanes in Dare County whereas ER2 widens NC 12 to three lanes in Dare County.

1.2.2 Mid-Currituck Bridge (MCB) Alternatives

Four alternatives involving the construction of a bridge over Currituck Sound were considered. These alternatives are MCB1, MCB2, MCB3, and MCB4, with the initials MCB standing for "Mid-Currituck Bridge." Figure 3 and Figure 4 show the alternatives and their related highway improvements.

MCB1 and MCB2 consider the potential additional travel benefits of combining a Mid-Currituck Bridge with NC 12 and US 158 improvements. Thus, MCB1 and MCB2 include the road improvements similar to ER1 and ER2, respectively, plus a Mid-Currituck Bridge.

MCB3 and MCB4 were considered in order to identify the extent to which network congestion and travel time could be improved, as well as other associated benefits, if only a Mid-Currituck Bridge were built. This is the project as defined in the NCDOT's *2007 to 2013 State Transportation Improvement Program (TIP)* as well as county and state transportation improvement plans. Limited existing road improvements were added to the bridge project, which are needed to ensure that southbound traffic stopped at traffic signals on NC 12 would not queue back onto the bridge on the summer weekend. These improvements also would ensure that the project purpose of substantially reducing hurricane clearance time was met. The two alternatives differ in terms of the extent of their hurricane evacuation improvements.



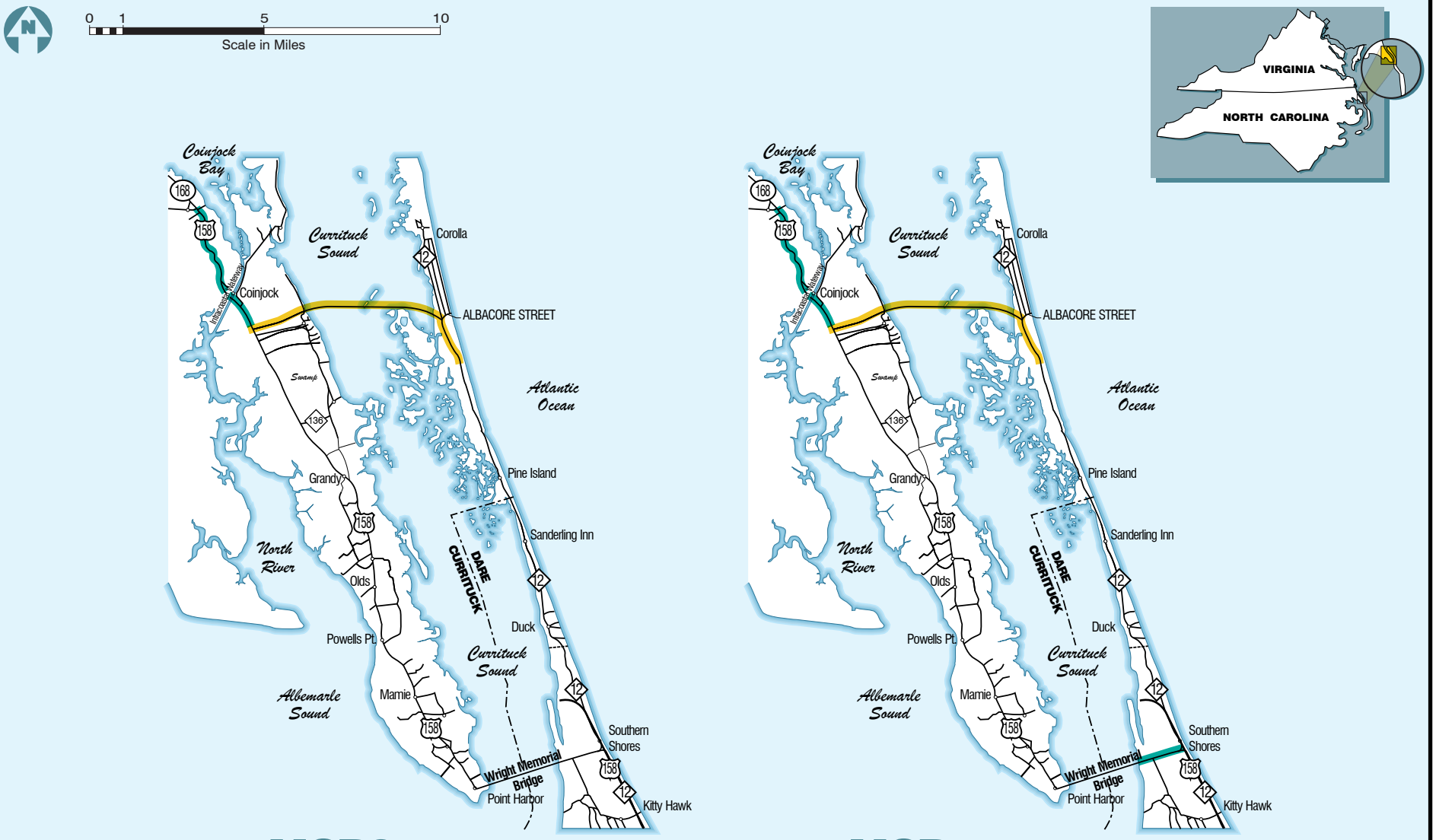
LEGEND

- Eight Lanes
- Six Lanes
- Four Lanes
- Three Lanes
- Third Northbound Lane or Contraflow Lane

Bridge Alternatives MCB1 and MCB2

Figure

3



LEGEND

- Eight Lanes
- Six Lanes
- Four Lanes
- Three Lanes
- Third Northbound Lane or Contraflow Lane

Bridge Alternatives MCB3 and MCB4

Figure

4

The basic features of the four Mid-Currituck Bridge alternatives are:

- **MCB1**
  - Constructing a two-lane toll bridge across the Currituck Sound;
  - Widening US 158 to six lanes between the Wright Memorial Bridge and the Juniper Trail/Wal-Mart entrance and eight lanes from the Juniper Trail/Wal-Mart entrance to the NC 12 area;
  - Widening NC 12 to four lanes between US 158 and Corolla; and
  - Adding a third northbound lane on US 158 from NC 168 to Aydlett Road (SR 1140) as a hurricane evacuation improvement or using the center turn lane as a third northbound evacuation lane.
- **MCB2**
  - Constructing a two-lane toll bridge across the Currituck Sound;
  - Widening US 158 to six lanes between the Wright Memorial Bridge and the Jupiter Trail/Wal-Mart entrance and eight lanes from the Jupiter Trail/Wal-Mart entrance to the NC 12 area;
  - Widening NC 12 to three lanes between US 158 and the Dare-Currituck County Line and to four lanes between the Dare-Currituck County Line and Corolla; and
  - Adding a third northbound lane on US 158 from NC 168 to Aydlett Road (SR 1140) as a hurricane evacuation improvement or using the center turn lane as a third northbound evacuation lane.
- **MCB3**
  - Constructing a two-lane toll bridge across the Currituck Sound;
  - Widening NC 12 to four lanes for two to four miles south of the intersection with a Mid-Currituck Bridge.
  - Adding a third northbound lane on US 158 from NC 168 to Aydlett Road (SR 1140) as a hurricane evacuation improvement or using the center turn lane as a third northbound evacuation lane; and
- **MCB4**
  - All components of MCB3 plus a third northbound lane on US 158 between the NC 12 and the Wright Memorial Bridge (or using the center turn lane as a third northbound evacuation lane) as an additional hurricane evacuation improvement.

Note that for each MCB alternative, specific bridge alignments were not evaluated for the MCB alternatives in this report because the traffic flow benefits would be the same

for different bridge locations. The *2035 Traffic Design Report* examines differences in design requirements for specific bridge alignments and tie-in points.

1.2.3 Non-Roadway Alternatives

In addition to the highway improvement alternatives, a series of non-roadway based alternatives are examined in Section 5.0. These alternatives are divided into Low Capital Investment and Operations alternatives and Ferry alternatives. Note that the measures of effectiveness for the non-roadway alternatives focused on the network congestion measures as presented in Section 5.3. The specific alternatives are described in the following sections:

1.2.3.1 Low Capital Investment and Operational Alternatives

Three Low Capital Investment and Operational alternatives were examined. These focused on relieving congestion while minimizing construction impacts and costs. The three alternatives are:

- Shifting of Rental Times – Congestion in the region occurs primarily on the summer weekend due to the departure and arrival of tourists with weekly house rentals. This strategy examined the impact of shifting some of these rental periods from the weekend to the weekday. This strategy is examined in Section 5.1.1.

- Transportation Systems Management (TSM) – This alternative assumed that minor improvements would be applied to the existing roadway network including isolated intersection improvements and signal coordination. This strategy is discussed in Section 5.1.2.

- Bus Transit – This alternative examined the potential impact of bus transit along NC 12 for relieving peak summer congestion. This strategy is discussed in Section 5.1.2.

1.2.3.2 Ferry Alternatives

Four ferry alternatives were examined as an alternative to constructing a bridge. For each alternative, it was assumed that three typical NCDOT ferry operations would be established to allow passage across the Currituck Sound in Currituck County.

The four ferry alternatives were defined as F1, F2, F3, and F4. The assumed US 158 and NC 12 roadway improvements with the ferry alternatives correlate directly with the MCB1, MCB2, MCB3, and MCB4 alternatives, respectively. Thus, F1 and F2 include the same roadway improvements as MCB1 and MCB2 (as well as ER1 and ER2), respectively. The only difference is that instead of creating a bridge link a ferry connection is provided.

2.0 Traffic Forecasts

This section summarizes the results of the 2035 traffic forecasting effort that is detailed in a separate technical memorandum, the *2035 Traffic Forecast Report*. This report identified the methods and assumptions in developing the 2035 No-Build and Build Bridge forecasts. The forecasting analysis assumes that tolls will be in place on the proposed Mid-Currituck Bridge.

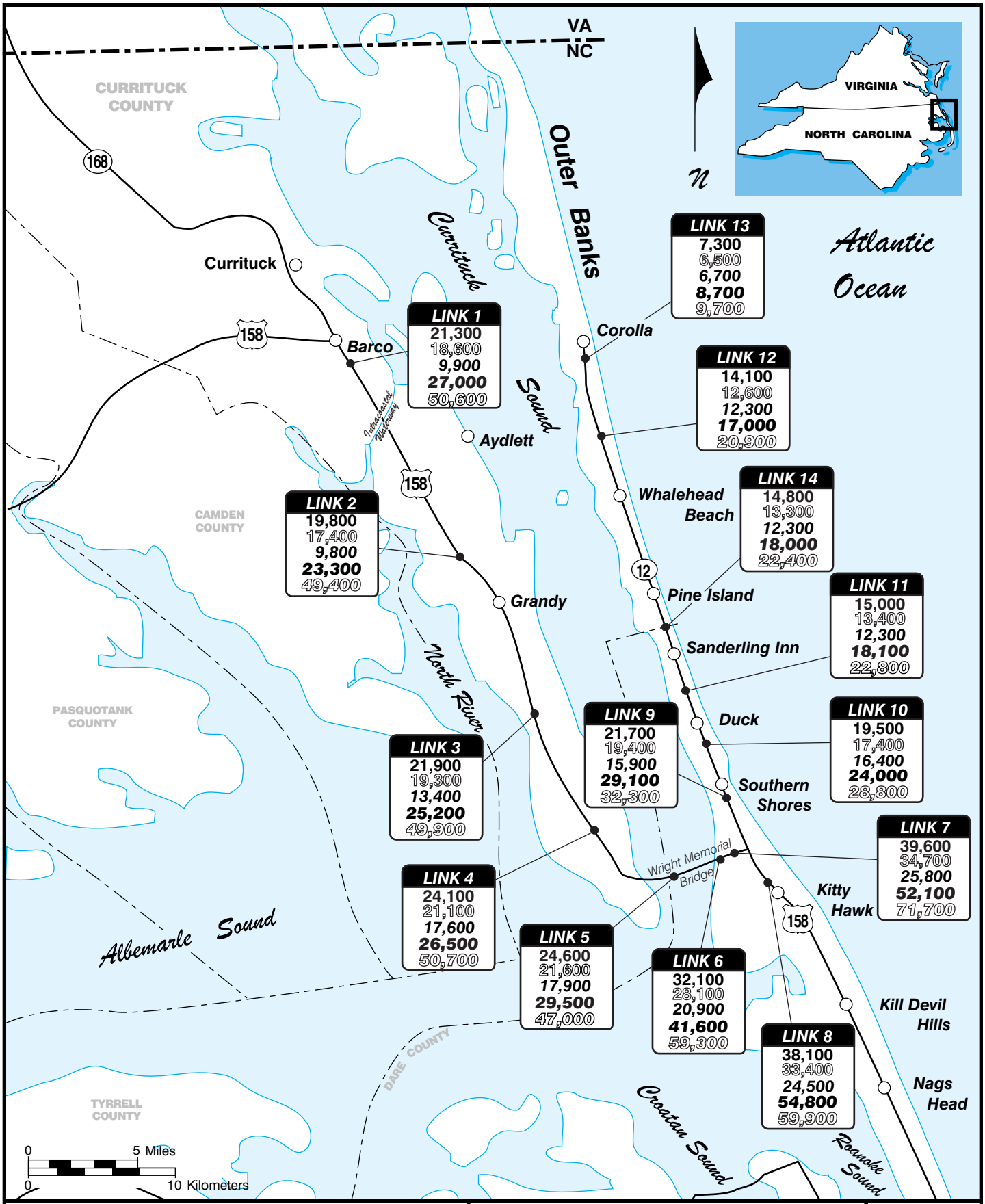
2.1 2006 Existing Conditions

Existing traffic volumes were initially prepared based on 2001 data for the study corridor as part of previous analyses in the project process. For the update to 2035 traffic volumes, it was determined that the 2001 existing base year should be updated to 2006 as part of the environmental analysis and overview. The *2035 Traffic Forecast Report* summarizes the assumptions in the development of 2006 volumes. The 2006 existing volumes are summarized in Table 1 and Figure 5.

Table 1. Existing (2006) Daily Traffic Volumes without a Mid-Currituck Bridge

Link #	Roadway Link	Vehicles per day				
		AADT	Non-Summer Weekday	Non-Summer Weekend	Summer Weekday	Summer Weekend
1	US 158 south of Barco	21,300	18,600	9,900	27,000	50,600
2	US 158 near Bertha	19,800	17,400	9,800	23,300	49,400
3	US 158 near Jarvisburg	21,900	19,300	13,400	25,200	49,900
4	US 158 near Mamie	24,100	21,100	17,600	26,500	50,700
5	US 158 at Wright Memorial Bridge	24,600	21,600	17,900	29,500	47,000
6	US 158 between the Wright Memorial Bridge and NC 12	32,100	28,100	20,900	41,600	59,300
7	US 158 just west of NC 12 intersection	39,600	34,700	25,800	52,100	71,700
8	US 158 just south of NC 12 intersection	38,100	33,400	24,500	54,800	59,900
9	NC 12 just north of US 158 intersection	21,700	19,400	15,900	29,100	32,300
10	NC 12 at Duck	19,500	17,400	16,400	24,000	28,800
11	NC 12 in Sanderling	15,000	13,400	12,300	18,100	22,800
14	NC 12 at Dare/ Currituck County Line	14,800	13,300	12,300	18,000	22,400
12	NC 12 just south of Albacore Street	14,100	12,600	12,300	17,000	20,900
13	NC 12 just south of Corolla	7,300	6,500	6,700	8,700	9,700

Note: Link 14 is listed to more accurately reflect it's location along NC 12.



LEGEND

38,100 - Annual Average Daily Traffic
33,400 - Non-Summer Weekday Traffic
21,900 - Non-Summer Weekend Traffic
54,800 - Summer Weekday Traffic
59,800 - Summer Weekend Traffic

Existing (2006) Daily Traffic Volumes without a Mid-Currituck Bridge

Figure 5

2.2 2035 Traffic Forecasts

Traffic forecasts for 2035 were developed for the following scenarios:

- No-Build Scenario – This analysis assumes that the Mid-Currituck Bridge is not completed. These traffic volumes are used for the No-Build, ER1, and ER2 alternatives. (See Table 2 and Figure 6.)

- Build Bridge Scenario with 4-lane NC 12 in Dare County with Tolls – A traffic forecast analysis was developed assuming that the Mid-Currituck Bridge is completed and in operation. This scenario assumes that NC 12 is widened to four lanes in Dare County removing congestion from this approach to the Currituck Outer Banks. This traffic forecast assumes tolls are in place and applies to the MCB1 alternative. (See Table 3 and Figure 7.)

- Build Bridge Scenario with 2/3-lane NC 12 in Dare County with Tolls – In 2006, a new scenario was developed assuming that NC 12 is not widened to 4 lanes in Dare County. As a result, some traffic that would likely use NC 12 as a preferred route under uncongested conditions is diverted to US 158 and the proposed Mid-Currituck Bridge as an alternate route. This traffic forecast assumes tolls are in place and applies to the MCB2, MCB3, and MCB4 alternatives. (See Table 3 and Figure 8.)

The 2035 daily forecasts were completed for 15 roadway links on US 158, NC 12, and the proposed Mid-Currituck Bridge. For each link, traffic forecasts were developed for multiple time periods including the Average Annual Daily Traffic (AADT), Non-Summer Weekday, Non-Summer Weekend, Summer Weekday, and Summer Weekend. This detail is provided to reflect the impact of tourist traffic in the summer and on weekends. In general, the summer weekday is the design period for the project, although reducing congestion on summer weekends is also a benefit to be considered.

Note that the primary focus of these traffic forecasts was to support the alternatives analysis. The traffic analysis for the alternatives analysis estimates roadway capacity using volume to capacity ratios. Therefore, turn movement balancing using daily traffic volumes was not developed as part of the traffic forecast process of the 15 system roadway links for the alternatives analysis. Turn movement balancing was performed and utilized for the intersection analysis in the *2035 Design Traffic Report* (April 2008) which examines improvements in the design study area.

Table 2. Future (2035) Daily Traffic Volumes without a Mid-Currituck Bridge

Link #	Roadway Link	Vehicles per Day (vpd)				
		AADT	Non-Summer Weekday	Non-Summer Weekend	Summer Weekday	Summer Weekend
1	US 158 south of Barco	45,400	37,400	35,800	54,300	92,600
2	US 158 near Bertha	42,000	35,200	32,600	47,400	89,900
3	US 158 near Jarvisburg	44,900	38,600	34,800	50,800	90,300
4	US 158 near Mamie	47,700	42,100	37,300	53,300	91,400
5	US 158 at Wright Mem. Br.	48,700	43,100	37,000	58,900	84,600
6	US 158 between Wright Mem. Br. and NC 12	64,000	55,700	47,300	82,500	108,200
7	US 158 just west of NC 12 intersection	78,700	68,200	58,500	102,800	131,700
8	US 158 just south of NC 12 intersection	66,500	57,200	47,100	93,600	104,500
9	NC 12 just north of US 158 intersection	31,900	28,800	22,300	43,100	47,400
10	NC 12 in Duck business area	29,000	26,500	21,300	36,500	44,100
11	NC 12 in Sanderling Inn area	23,700	21,900	16,900	29,700	36,200
14	NC 12 at Dare/Currituck County Line	23,400	21,500	17,700	28,900	35,700
12	NC 12 at Corolla south	20,100	18,200	14,800	25,300	31,400
13	NC 12 at Corolla north	9,400	8,600	7,200	11,600	13,900
15	Mid-Currituck Bridge	Not Applicable – Proposed Bridge				

Note: Applies to No Build, ER1, and ER2 alternatives.

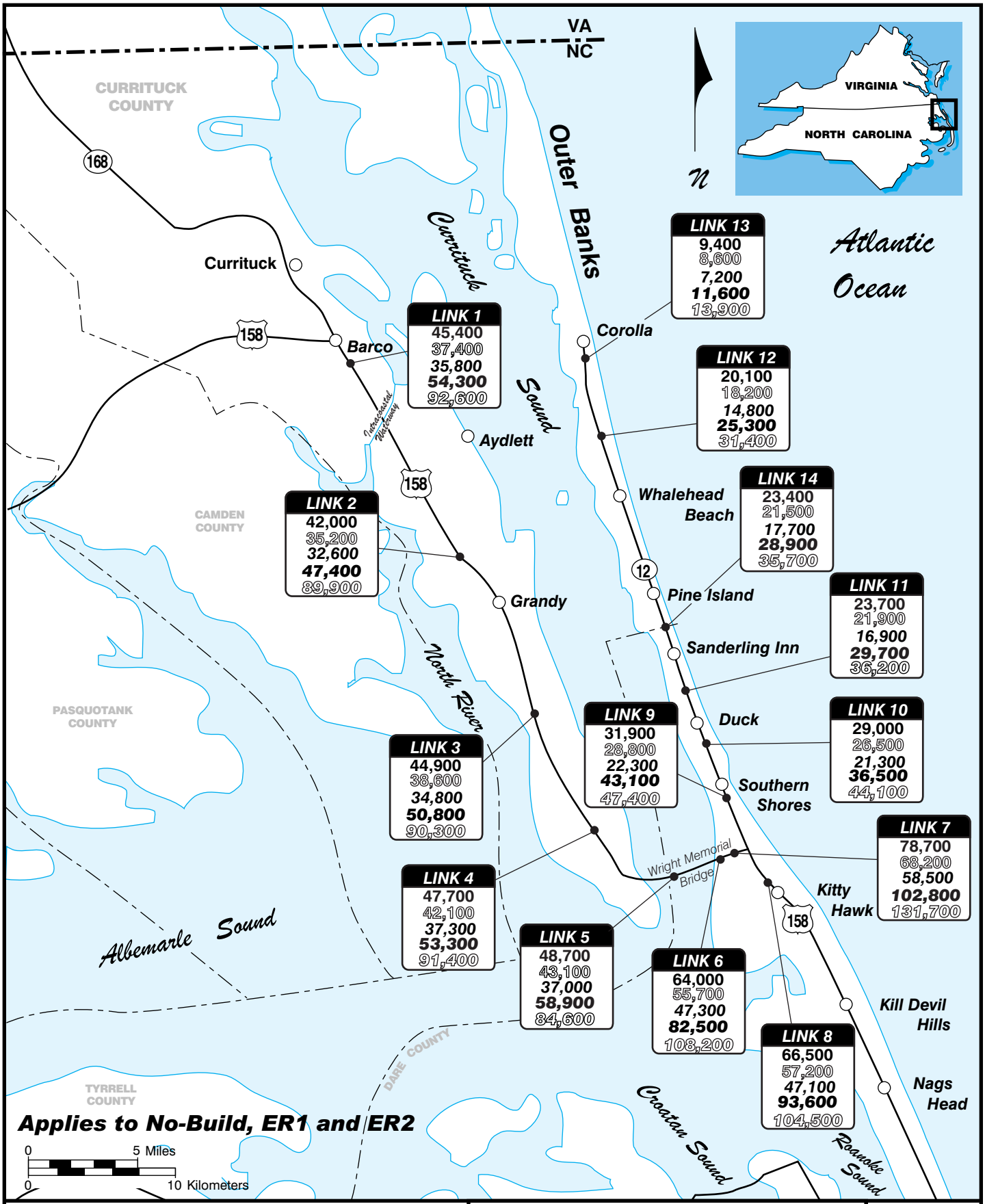
Table 3. Future (2035) Daily Traffic Volumes with a Mid-Currituck Bridge and Tolls

Link #	Roadway Link	With a Mid-Currituck Bridge and 4-lane NC 12 in Dare County with Tolls* (vehicles per day)					With a Mid-Currituck Bridge and 2- or 3-lane NC 12 in Dare County with Tolls** (vehicles per day)				
		AADT	Non-Summer Weekday	Non-Summer Weekend	Summer Weekday	Summer Weekend	AADT	Non-Summer Weekday	Non-Summer Weekend	Summer Weekday	Summer Weekend
1	US 158 south of Barco	45,400	37,400	35,800	54,300	92,600	45,400	37,400	35,800	54,300	92,600
2	US 158 near Bertha	33,300	27,700	25,800	37,400	72,500	33,700	28,000	25,800	37,800	74,200
3	US 158 near Jarvisburg	34,500	29,500	26,700	38,900	70,300	34,800	29,800	26,700	39,300	72,000
4	US 158 near Mamie	36,500	32,100	28,600	40,500	70,200	36,800	32,400	28,600	40,900	71,800
5	US 158 at Wright Mem. Br.	37,100	32,900	28,100	45,700	63,000	37,400	33,100	28,100	46,000	64,500
6	US 158 between Wright Mem. Br and NC 12	52,500	45,500	38,600	69,200	86,800	52,700	45,700	38,600	69,500	88,000
7	US 158 just west of NC 12 intersection	67,500	58,200	49,900	89,900	111,200	67,700	58,400	49,900	90,100	112,000
8	US 158 just south of NC 12 intersection	66,500	57,200	47,100	93,600	104,500	66,500	57,200	47,100	93,600	104,500
9	NC 12 just north of US 158 intersection	23,300	21,100	15,700	32,100	33,400	23,000	20,800	15,700	30,200	31,300
10	NC 12 in Duck business area	22,100	20,300	16,000	27,300	32,400	21,700	20,000	16,000	27,900	30,600
11	NC 12 in Sanderling Inn area	19,400	17,900	13,900	23,300	29,600	19,000	17,600	13,900	23,800	27,800
14	NC 12 at Dare/Currituck County Line	20,400	18,700	15,400	25,200	31,200	20,000	18,400	15,400	24,800	29,400
12	NC 12 at Corolla south	22,000	20,100	15,600	27,100	36,200	21,700	19,900	15,600	26,800	34,600
13	NC 12 at Corolla north	9,400	8,600	7,200	11,600	13,900	9,400	8,600	7,200	11,600	13,900
15	Mid-Currituck Bridge	12,600	11,300	9,200	14,700	23,400	12,600	11,200	9,200	14,500	22,500

Notes:

* Applies to MCB1 alternative

** Applies to MCB2, MCB3, and MCB4 alternatives

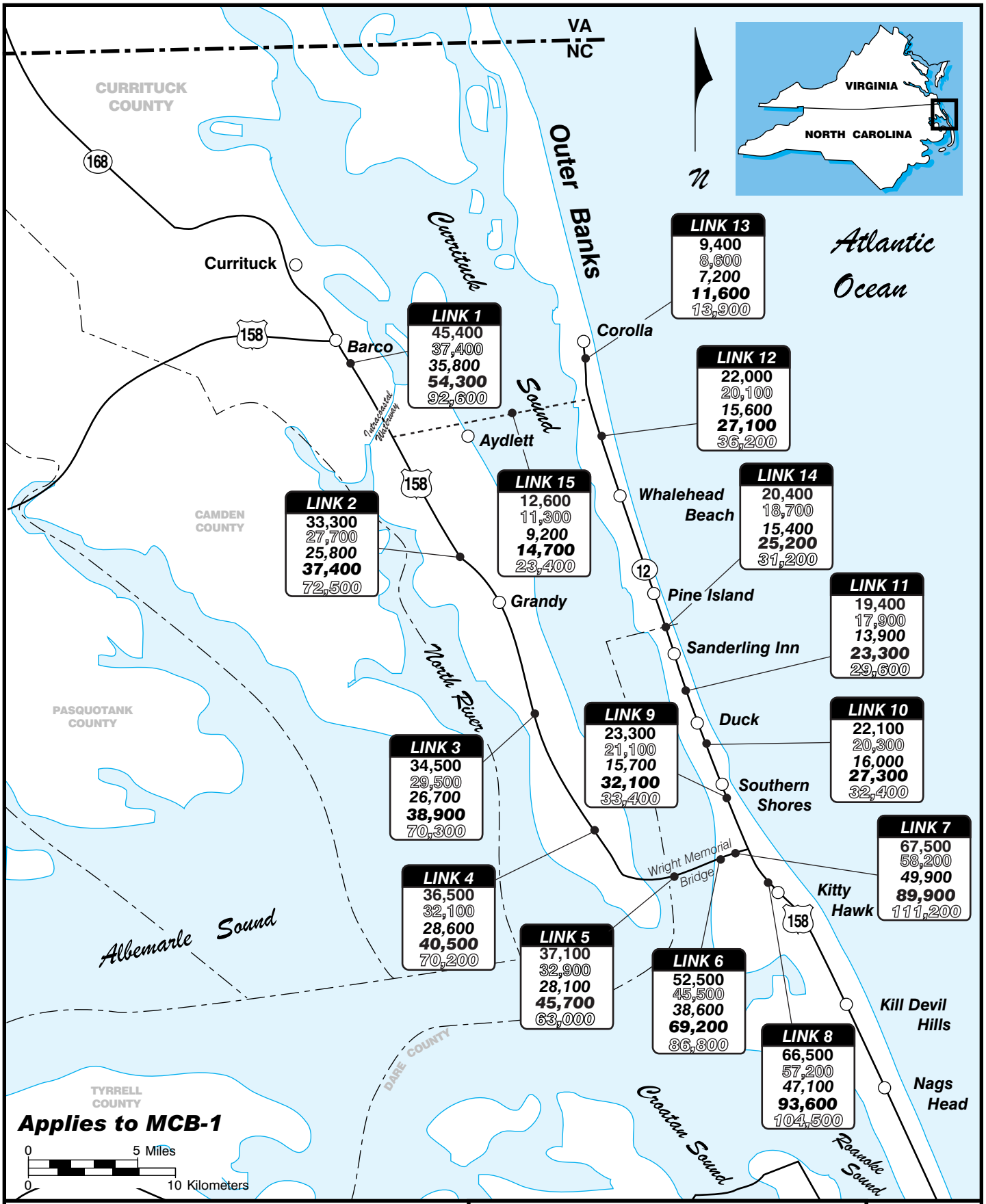


LEGEND

38,100 - Annual Average Daily Traffic
33,400 - Non-Summer Weekday Traffic
21,900 - Non-Summer Weekend Traffic
54,800 - Summer Weekday Traffic
59,800 - Summer Weekend Traffic

Future (2035) Daily Traffic Volumes without a Mid-Currituck Bridge

Figure 6



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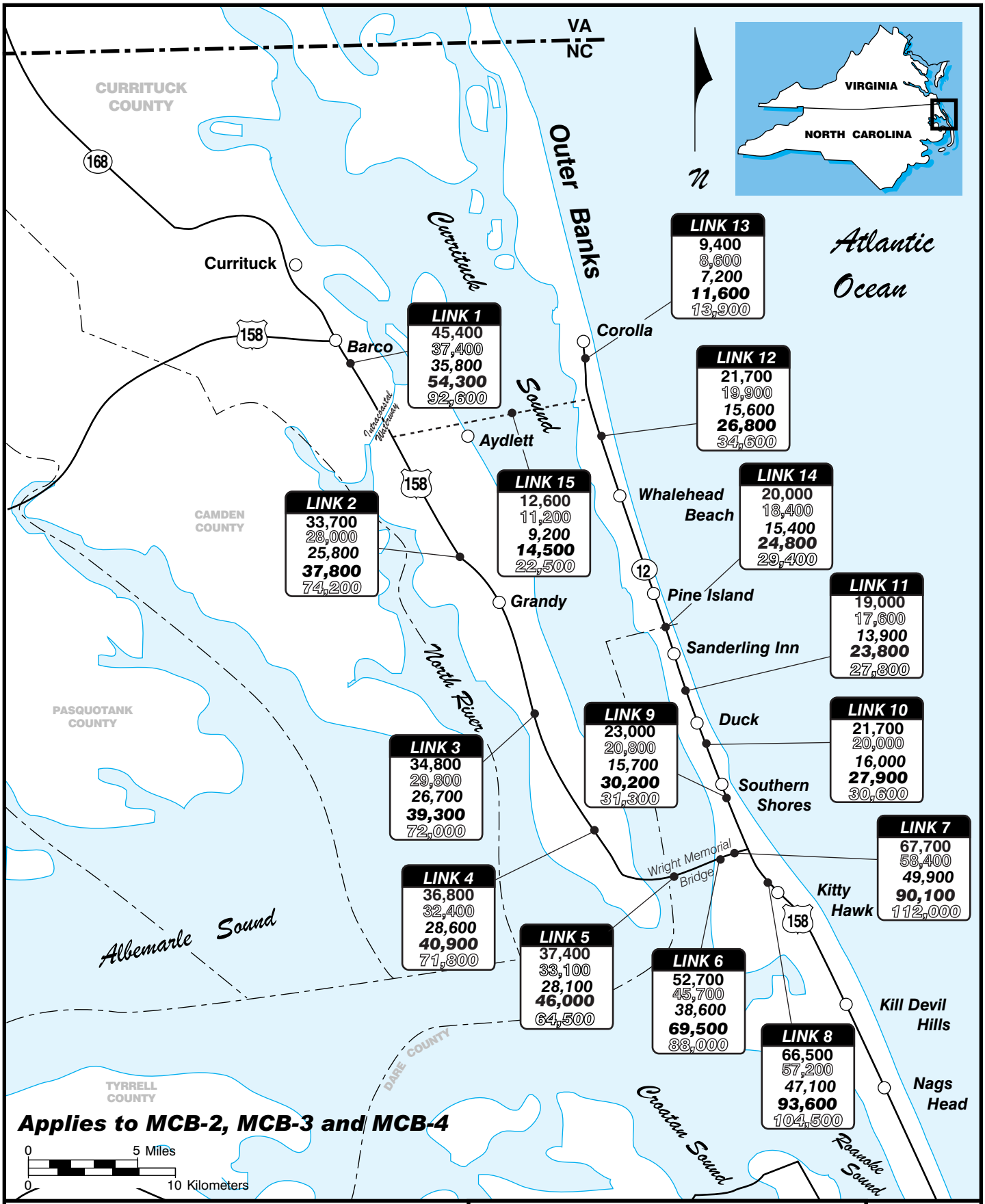
Future (2035) Daily Traffic Volumes with a Mid-Currituck Bridge and 4-Lane NC 12 in Dare County with Tolls

Figure

7



LEGEND

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54,800 - Summer Weekday Traffic
59,800 - Summer Weekend Traffic

Future (2035) Daily Traffic Volumes with a Mid-Currituck Bridge and 2-Lane NC 12 in Dare County with Tolls

Figure

8

2.3 Peak Hour Traffic Forecast

The daily forecasts provided were developed for 15 critical links identified in previous phases of the study. In order to provide capacity analysis for the roadway links, peaking characteristics and other traffic flow characteristics were identified in the *2035 Traffic Forecast Report*. The details impacting the capacity analysis are summarized in this section.

2.3.1 Peaking Characteristics of Roadway Network

The traffic analyses for this project utilized traffic peaking factors derived from year 2001 traffic counts. The 2001 traffic counts were obtained from the NCDOT's continuous count station number A2703 on the Wright Memorial Bridge, and were supplemented by an analysis of the 2006 volumes. This analysis was further supplemented by daily traffic counts taken at several US 158 and NC 12 locations during August 2001. These bi-directional counts provided the basis for refining the peaking characteristics along NC 12 during alternatives analysis.

The temporal distribution of traffic counts along NC 12 (south of Duck) and US 158 (east of the Wright Memorial Bridge) were analyzed for NC 12 and US 158 as documented in the *2025 Traffic Alternatives Report (May 2007)*. General findings included:

- During Summer Weekday conditions, traffic volumes along NC 12 have a traditional AM and PM peak although traffic volumes throughout the day are only slightly less than the peak hour flows. On summer Saturdays, traffic volumes along NC 12 are up to 30 percent higher than on weekdays and peak period traffic volumes exceed weekday peak period volumes for a longer time-frame, from 8 AM to 8 PM. On summer Sundays, NC 12 traffic volumes are less than Saturdays, but still exceed peak weekday levels from 10 AM to 5 PM.

- In comparison, traffic volumes along US 158 increase earlier, around 9 AM, and remain heavy until 5 PM during Summer Weekday conditions. On summer Saturdays, US 158 carries double the traffic volumes compared to weekdays, and the traffic flows exceed the peak hourly weekday flow (excluding Friday) for most of the day, from 7 AM to 8 PM. On summer Sundays, traffic volumes on US 158 decrease by 30 percent compared to Saturday traffic volumes, but still remain substantially higher than weekday traffic volumes. The Sunday hourly flows exceed the weekday peak hour from 8 AM to 5 PM.

2.3.2 Computation of Peak Hour Traffic Forecasts – Roadway Links

Using the traffic data collected and the analysis of peaking and temporal distribution, traffic flow characteristics were identified for inclusion in the capacity analysis of roadway links.

The design hour factor represents the percent of daily traffic occurring on a roadway during the peak hour of the day. For this study, the design hour factor varies depending upon the time of year and day of the week as well as the roadway. As defined in the *2035 Traffic Forecast Report*, the design hour factors for the study are summarized in Table 4.

Table 4. Traffic Flow Characteristics – Design Hour Factor

Capacity Analysis Element	Methodology and Input Parameters		
	US 158	NC 12	Mid-Currituck Bridge
AADT	7.6%	7.6%	7.6%
Non-Summer Weekday & Weekend	8.1%	7.9%	8.0%
Summer Weekday	8.1%	7.9%	8.0%
Summer Weekend	7.6%	7.6%	7.6%

Trucks and heavy vehicles impact traffic flow and are factored into the analysis. Based upon classification counts, the heavy vehicle factors for the project study area have been summarized in Table 5. Note that for purposes of this analysis, it is assumed that the daily heavy vehicle percentages are relatively constant throughout the day and that the daily and peak hour truck percentages are similar. This assumption is consistent with an area with lower percentages of commuters.

In addition to heavy vehicle percentages, Table 5 also provides estimates for directional split, peak hour factor, and a population factor adjustment. The directional split indicates the percent of traffic travelling in one direction during the peak period. The peak hour factor accounts for variations in traffic flow throughout the peak hour. The population factor adjustment is included to address the heavy presence of tourists in the roadway system.

Table 5. Traffic Flow Characteristics

Capacity Analysis Element	Methodology and Input Parameters		
	US 158	NC 12	Mid-Currituck Bridge
Trucks and Buses*	3%	2%	3%
Recreational Vehicles*	4%	5%	4%
Directional Split	60-40	65-35	65-35
Peak Hour Factor	0.90	0.90	0.90
Population Factor	0.95	0.95	0.95

*For analysis purposes, the peak hour and daily heavy vehicle (trucks, buses, and recreational) percentages were assumed to be the same. This is more reflective of actual conditions, due to lower percentages of commuters than in a typical urban area, particularly in the peak summer months.

2.3.3 Computation of Peak Hour Traffic Forecasts – Intersection Turn Movements

The 2035 alternatives analysis does not include a detailed analysis of peak hour traffic operations at traffic signals. Therefore, a formal analysis of future turn movements during the peak period was not developed. As part of the analysis for travel times, however, the 2025 Synchro models were adjusted to estimate intersection delays in 2035. In all, 22 signalized intersections were analyzed for the purpose of estimating travel time through the network. Steps in developing turn movements included:

- Utilized July and August 2006 turn movement counts at 39 intersections on NC 12 and US 158 as summarized in the report *Traffic Count Data Summary – Summer 2006* (November 2006).

- Developed 2025 turn movement traffic forecast for the Summer Weekday and Summer Weekend PM peaks. The PM peak was examined since it corresponds with the highest travel times in the study area. It was determined using travel time surveys collected in 2006 and a comparison of AM and PM peak travel flows.

- The 2025 turn movement forecasts were increased to 2035 using percent increase in the forecast volumes on the roadway links.

Note that for the *2035 Design Traffic Report*, balanced daily traffic turn movements were developed and analyzed for the AM and PM peak periods in the design study area.

3.0 Roadway Level of Service Analysis for Build Alternatives

3.1 Methodology

Level of service (LOS) is a performance measure indicating the quality of traffic flow. The LOS performance measure used in this project is based on definitions outlined in the *Highway Capacity Manual 2000 (HCM 2000)* (Transportation Research Board, National Research Council, 2000) in the chapters titled Urban Streets (Chapter 15), Two-Lane Highways (Chapter 20), Multilane Highways (Chapter 21), and Signalized Intersections (Chapter 16).

HCM 2000 LOS methodology ranks the quality of traffic flow using a lettering system ranging from LOS A to LOS F. In this measurement scale, LOS A represents free-flow traffic conditions and LOS F represents forced or breakdown traffic flow. LOS E represents traffic operations at or near capacity. Table 6 presents the level of service concept as summarized in the *HCM 2000* and definitions for each level of service.

In general, American Association of State Highway and Transportation Officials (AASHTO) guidelines indicate that LOS C is considered desirable in rural areas, but in urban areas the desirable LOS could drop to D, but is not considered ideal. LOS E is generally considered less than desirable. In addition, the *AASHTO Policy on Geometric Design of Highways and Streets* acknowledges that design LOS may vary for specific circumstances and projects at the discretion of the designer.

For this project, it is acknowledged that there are special circumstances related to tourist traffic, particularly on summer weekends. For this reason, the design period has been identified as the summer weekday with consideration of summer weekend operations. Taking this into account, the goal of this project is to achieve LOS D for the summer weekday and at least LOS E on the summer weekend. Despite these goals, it is acknowledged that other issues (such as relocations or environmental impacts) may require consideration of LOS operations less than identified in this project goal.

For this study, the 2035 peak period LOS was estimated on US 158 and NC 12 for the average summer weekend day, the average summer weekday, the average non-summer weekday, the average non-summer weekend day, and the average annual day. For the study area, the goal was to test roadway alternatives and non-highway strategies to maintain LOS D traffic operations during a typical summer weekday.

Table 6. Level of Service Definitions

Level of Service Classification	Roadway Expected Flow Characteristics	Signalized Intersections Stopped Delay per Vehicle
A	Free flowing traffic.	Most vehicles do not stop; average control delay per vehicle less than or equal to 10 seconds.
B	A stable flow with few restrictions on operating speed.	More vehicles stop, but good progression and short cycle lengths. Average control delay per vehicle is between 10.1 and 20.0 seconds.
C	Stable flow but with more restrictions on speed and lane changing.	A large number of vehicles are stopped, although many still pass through. Individual cycle failures[1] may appear. Average control delay per vehicle is between 20.1 and 35.0 seconds.
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.	The proportion of vehicles stopping continues to rise. Individual cycle failures are noticeable. Average control delay per vehicle is between 35.1 and 55 seconds.
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.	The limit of acceptable delay. Individual cycle failures are frequent occurrences. Average control delay per vehicle is between 55.1 and 80 seconds.
F	Heavily congested flow with traffic demand exceeding the capacity of the highway.	Arrival flow rate exceeds the capacity of the intersection. Average control delay per vehicle exceeds 80 seconds.

[1]A cycle failure occurs when an individual vehicle has to wait through more than one red phase.

The LOS analysis methodology involved five primary steps:

- Developing representative input parameters for highway capacity analysis for US 158, NC 12, and a Mid-Currituck Bridge, based on current and future lane configurations;
- Running the *Highway Capacity Software 2000* (*HCS 2000)* (University of Florida, McTrans Center, 2003) for US 158, NC 12, and a Mid-Currituck Bridge to obtain capacities for different roadway configurations;
- Estimating capacity values for special three-lane roadway configurations for which the *HCS 2000* model could not be applied;

- Calculating LOS and Volume-to-Capacity (V/C) ratios related to the five time periods analyzed for the 15 study area roadway links based on different roadway configurations; and

- Calculating LOS and V/C ratios related to the five time periods analyzed for the four study area intersections based on different roadway configurations.

Table 7 provides a summary of input parameters used in the highway capacity analysis for both NC 12 and the Mid-Currituck Bridge. Table 8 provides a summary of input parameters used in the highway capacity analysis for US 158. These values were defined based on a combination of field data, local insights, and standard traffic engineering practice.

3.2 Roadway Level of Service Peak Hour Thresholds

Using the input parameters and assumptions, the *HCS 2000* was utilized to develop a look-up table that could be applied to determine roadway level of service. The *HCS 2000* was utilized for multiple iterations to determine LOS thresholds and develop a capacity lookup table. This table identifies the peak hour capacity thresholds between specific LOS grades. Appendix A includes the *HCS 2000* outputs utilized in determining these thresholds.

3.2.1 NC 12

Table 9 illustrates the peak hour LOS thresholds for NC 12 typical sections. These were developed using the assumptions outlined in Table 7.

As needed, these were adjusted to account for special situations when the *HCS 2000* model could not be applied. For example, the capacity for three-lane roadway configurations utilized estimates based on research findings [(McCormick and Wilson, 1983; McCoy, Ballard, and Wijaya, 1982); and National Cooperative Highway Research Program, April 2003) and engineering judgment. Note that for the 2035 analysis, it was assumed that a three-lane roadway would be configured with a continuous two-way left-turn lane (TWLTL). Based upon this overview of research findings, it was determined that a TWLTL configuration could provide a 13 percent capacity increase over a typical two-lane roadway capacity. This factor was applied directly in order to compute the three lane NC 12 capacity table shown in Table 9.

Table 7. NC 12 and Mid-Currituck Bridge Input Parameters

Capacity Analysis Element	Methodology and Input Parameters			
	Two-Lane NC 12	Four-Lane NC 12	Two-Lane Mid-Currituck Bridge	Four-Lane Mid-Currituck Bridge
HCM 2000 Methodology	Two-Lane	Multi-Lane	Two-Lane	Multi-Lane
Highway Class	2	-	1	-
Lanes in each direction	1	2	1	2
Lane Width (feet)	12	12	12	12
Shoulder Width (feet)	2	6	6	6
Terrain	Level	Level	Level	Level
Access Points/Mile*	25	25	0	0
Median Type	-	Divided	-	Undivided**
Free Flow Speed (mph)	52	52	60	60
Trucks and Buses***	2%	2%	3%	3%
Recreational Vehicles***	5%	5%	4%	4%
Directional Split	65-35	65-35	65-35	65-35
Peak Hour Factor	0.90****	0.90	0.90****	0.90
No-Passing Zone	100%	-	100%	-
Driving Population Adjustment	0.95****	0.95	0.95****	0.95

Notes:
The elements that are not required for a specific methodology are marked with a dash.
* Access points per mile were estimated to allow for *HCS 2000* analysis of roadway section. Final design would require more detailed examination of access points. All access points, particularly at-grade intersection and traffic signal locations, would be subject to NCDOT review and approval based on current standards.
** Analysis as an undivided section was prepared to provide a conservative basis for the capacity review of the bridge. All sections are anticipated to operate at LOS C or better for all scenarios with an undivided section. Using a divided median would improve safety and further improve operations although there would be no change in the planning level conclusions of the analysis.
*** For analysis purposes, the peak hour and sum of the daily heavy vehicle percentages (trucks, buses and recreational) were assumed to be the same. This is more reflective of actual conditions, due to lower percentages of commuters than in a typical urban area, particularly in the peak summer months.
**** For analysis purposes, it was assumed that a 0.95 population factor would be applied for all capacity scenarios to represent the impact of tourists on traffic flow. For the two-lane roadways, the 0.90 peak hour factor and 0.95 population factor were combined by inputting a 0.85 value into the *HCS 2000* software for peak hour factor.

Table 8. US 158 Input Parameters

Capacity Analysis Element	Methodology and Input Parameters				
	Five-Lane US 158	Five-Lane US 158 Arterial	Six-Lane US 158 Arterial	Eight-Lane US 158 Arterial	Six-Lane US 158 Superstreet
HCM 2000 Methodology	Multi-Lane	Urban Street (Planning)	Urban Street (Planning)	Urban Street (Planning)	Factored Urban Street (Planning)
Highway Class	-	1	1	1	-
Lanes in each direction	2	2	3	4	3
Lane Width (feet)	12	12	12	12	12
Shoulder Width (feet)	6	-	-	-	-
Terrain	Level	Level	Level	Level	Level
Access Points/Mile*	12	-	-	-	-
Median Type	Divided	Divided	Divided	Divided	Divided
Free Flow Speed (mph)	60	50	50	50	50
Trucks and Buses**	3%	3%	3%	3%	3%
Recreational Vehicles**	4%	4%	4%	4%	4%
Directional Split	60-40	60-40	60-40	60-40	60-40
Peak Hour Factor	0.90	0.90****	0.90****	0.90****	0.90****
No-Passing Zone	-	-	-	-	-
Driving Population Adjustment	0.95	0.95***	0.95***	0.95***	0.95***

Notes:
The elements that are not required for a specific methodology are marked with a dash.
* Access points per mile were estimated to allow for *HCS 2000* analysis of roadway section. Final design would require more detailed examination of access points. All access points, particularly at-grade intersection and traffic signal locations, would be subject to NCDOT review and approval based on current standards.
** For analysis purposes, the peak hour and sum of the daily heavy vehicle percentages (trucks, buses and recreational) were assumed to be the same. This is more reflective of actual conditions, due to lower percentages of commuters than in a typical urban area, particularly in the peak summer months.
*** For analysis purposes, it was assumed that a 0.95 population factor would be applied for all capacity scenarios to represent the impact of tourists on traffic flow. For the arterial capacities, the 0.90 peak hour factor and 0.95 population factor were combined by inputting a 0.85 value into the *HCS 2000* software for peak hour factor.

Table 9. NC 12 Peak Hour Capacity Minimum Thresholds

Level of Service	Two-Lane NC 12 (vph)	Three-Lane NC 12* (TWLTL) (vph)	Four-Lane NC 12 (vph)
	(2 way)	(2 way)	(1 way)
A	0	0	0
B	161	182	845
C	385	435	1,382
D	822	929	1,996
E	1,529	1,728	2,644
F	≥ 2,218	≥ 2,506	≥ 3,119
Directional Split	65-35	65-35	65-35

* As part of earlier analysis phases, two three-lane configurations were considered: a two-way left-turn Lane (TWLTL) and a 2+1 alternating lane. The 2035 analysis assumes a TWLTL section.

3.2.2 US 158

A peak hour capacity look-up table was also developed for US 158 as shown in Table 10. The analysis was divided between a multi-lane US 158 section located north of the Wright Memorial Bridge and the two mile arterial section between the Wright Memorial Bridge and NC 12. The mainland section is over 20 miles long through small towns and primarily rural conditions with only four isolated traffic signals. The existing five-lane section was treated as a four-lane roadway with a divided median using the *HCS 2000* multi-lane analysis.

In contrast, the two-mile section between the Wright Memorial Bridge and NC 12 is highly developed with five traffic signals. In this arterial section, multiple cross-sections were under consideration, including the existing five-lane arterial, a six-lane arterial, an eight-lane arterial, and a six-lane superstreet. For the five-, six-, and eight-lane sections, the capacities were estimated using the *HCS 2000* planning level urban street methodology and assumptions detailed in Table 8. Note that the capacity of an arterial is lower than a multi-lane highway, recognizing that traffic signal operations introduce delays to mainline traffic.

In addition to the standard divided arterials, a six-lane superstreet was evaluated as a possible solution. Note that a superstreet analysis would typically require detailed signal analysis and simulation review. Since the analysis of the superstreet was for comparative purposes only, this level of analysis was not deemed appropriate. In order to determine a planning level estimate of capacity, the *Outer Banks Transportation Study* (Hummer, 2005) was utilized. The study cites a LOS D/E daily capacity of 70,000 vpd for

Table 10. US 158 Peak Hour Capacity Minimum Thresholds

Level of Service	Five-Lane US 158 (vph)	Five Lane US 158 Arterial (vph)	Six- Lane US 158 Arterial (vph)	Eight Lane US 158 Arterial (vph)	Six-Lane US 158 Superstreet (vph)
	(1 way)	(1 way)	(1 way)	(1 way)	(1 way)
A	0	0	0	0	0
B	1,050	0	0	0	0
C	1,717	1,328	2,048	2,772	2,560
D	2,469	2,442	3,695	4,948	4,619
E	3,185	2,606	3,912	5,218	4,890
F	≥ 3,539	≥ 2,766	≥ 4,149	≥ 5,533	≥ 5,186
Directional Split	60-40	60-40	60-40	60-40	60-40

Note: Multi-lane analysis applies to sections of US 158 from the northern project limit near Barco to the Wright Memorial Bridge. Arterial (and/or superstreet) analysis applies to two-mile section of US 158 south of the Wright Memorial Bridge.

the six-lane superstreet, which is 25 percent higher than the 56,000 vpd cited for a typical six-lane roadway. Therefore, the hourly LOS thresholds for a six-lane superstreet were estimated by increasing the six-lane roadway capacity by 25 percent for this planning level capacity exercise.

3.2.3 Mid-Currituck Bridge

Table 11 illustrates the peak hour LOS thresholds for the Mid-Currituck Bridge. These thresholds were developed using the assumptions outlined in Table 7. A three lane section was not applicable since there are no turns on the bridge. The determination of whether the proposed bridge should be two or four lanes depends both upon the hourly capacity thresholds and the time of year. Note that a four lane undivided section was tested for the bridge recognizing that this would be conservative for capacity analysis. If a divided section were provided, the capacity would increase slightly. A discussion of the bridge cross-section and design capacity thresholds is included in Section 3.3.4.2.

Table 11. Mid-Currituck Bridge Peak Hour Capacity Minimum Thresholds

Level of Service	Two-Lane Mid-Currituck Bridge (vph)	Four-Lane Mid-Currituck Bridge (vph)
	(2 way)	(1 way)
A	0	0
B	98	1,075
C	303	1,759
D	678	2,525
E	1,237	3,247
F	≥ 2,216	≥ 3,604
Directional Split	65-35	65-35

3.3 Roadway Level of Service Findings by Section

This section of the report provides LOS and V/C ratio results and findings. The information is presented for five corridor segments: 1) US 158 from Barco to the Wright Memorial Bridge; 2) US 158 from east of the Wright Memorial Bridge to just south of NC 12; 3) NC 12 in Dare County; 4)NC 12 in Currituck County; and 5) a Mid-Currituck Bridge. The first corridor segment includes five link locations on US 158 on the mainland (Links 1 through 5). The second corridor segment includes US 158 in the Outer Banks commercial area (Links 6 through 8). The third corridor segment includes NC 12 in Dare County (Links 9 through 11), with the fourth segment being NC 12 in Dare County (Links 14, 12, and 13). Finally, the fifth corridor segment is a Mid-Currituck Bridge (Link 15).

For this study, the peak period LOS was estimated on US 158 and NC 12 roadway sections for AADT, Non-Summer Weekday, Non-Summer Weekend, Summer Weekday, and Summer Weekend conditions. This method was based upon comparing the peak hour traffic volume to the peak hour capacity threshold identified for each link. The method does not consider operation at specific traffic signals. The LOS F capacities in Table 9, Table 10, and Table 11 were used to develop V/C ratios.

3.3.1 US 158 from Barco to the Wright Memorial Bridge

Table 12 provides year 2035 peak hour LOS and V/C ratios for five links on US 158 from Barco to the Wright Memorial Bridge. This 28-mile long corridor segment currently is five lanes with a mix of agricultural, residential, and commercial land uses. Retail development also occurs along this roadway section, particularly in towns such as Grandy. The segment is projected to operate at an acceptable LOS (i.e., LOS D or better) in the year 2035 during non-summer conditions as well as the summer weekday without any improvements or a new bridge. However, during summer conditions this corridor segment will have traffic congestion problems (i.e., LOS E or F) in 2035 if no improvements are made to the existing road or a Mid-Currituck Bridge is not built.

With a Mid-Currituck Bridge, the Summer Weekend traffic flow conditions would improve because of traffic re-routing to the bridge from US 158. The effect of operations at specific locations includes:

- North of the new bridge (Link 1), traffic volumes and operations on US 158 remain the same as the No-Build condition with LOS F congestion on the summer weekend. This indicates potential long-term improvement needs on US 158 to the north of the Mid-Currituck Bridge and the project study area, regardless of the presence of a Mid-Currituck Bridge. Regardless, the section operates at an acceptable LOS D for the Summer Weekday design period.

- The section of US 158 south of the proposed bridge termini to the Wright Memorial Bridge (Links 2-4) operates at LOS F during the 2035 Summer Weekend with no Mid-Currituck Bridge. The construction of the new bridge would improve traffic operations in this section to LOS E during the 2035 Summer Weekend due to trips diverted from US 158 to the new bridge. On the Summer Weekday, construction of the new bridge reduces the V/C ratio along this section and provides LOS C on these links, as opposed to LOS C and D with the No-Build alternative.

- On the Wright Memorial Bridge (Link 5), LOS F operations are forecast for the 2035 Summer Weekend without a Mid-Currituck Bridge and LOS D/E with the Mid-Currituck Bridge in place. On the Summer Weekday, construction of the Mid-Currituck Bridge would improve operation from LOS D to LOS C. Although the current four-lane section is forecast to be adequate through 2035 with the Mid-Currituck Bridge, queues will continue to impact the bridge unless the section between the Wright Memorial Bridge and NC 12 (east of the bridge) is improved to service the high traffic volumes and multiple traffic signals in that section.

Note that the above analysis does not specifically examine traffic signal operations. The 2025 analysis did indicate that additional improvements may be required at two traffic signals in Grandy as part of future NCDOT corridor improvements. In addition, signal operations just east of the Wright Memorial Bridge could result in queuing that extends onto the Wright Memorial Bridge.

Table 12. Future 2035 LOS & V/C Ratio – US 158 (Barco to Wright Memorial Bridge)

Link #	Description	AADT		Non-Summer Weekday		Non-Summer Weekend		Summer Weekday		Summer Weekend	
		LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C
Existing 5-Lane Configuration (2006 Existing Traffic Volumes) - 2006 Existing											
1	US 158 south of Barco	A	0.27	A	0.26	A	0.14	B	0.37	C	0.65
2	US 158 near Bertha	A	0.26	A	0.24	A	0.13	B	0.32	C	0.64
3	US 158 near Jarvisburg	A	0.28	A	0.27	A	0.18	B	0.35	C	0.64
4	US 158 near Mamie	B	0.31	A	0.29	A	0.24	B	0.36	C	0.65
5	US 158 at Wright Mem. Br.	B	0.32	A	0.30	A	0.25	B	0.41	C	0.61
Existing 5-Lane Configuration without a Mid-Currituck Bridge (2035 No-Build Forecast) - 2035 No-Build, ER1, ER2											
1	US 158 south of Barco	C	0.58	C	0.51	C	0.49	D	0.75	F	1.19
2	US 158 near Bertha	C	0.54	B	0.48	B	0.45	C	0.65	F	1.16
3	US 158 near Jarvisburg	C	0.58	C	0.53	B	0.48	C	0.70	F	1.16
4	US 158 near Mamie	C	0.61	C	0.58	C	0.51	D	0.73	F	1.18
5	US 158 at Wright Mem. Br.	C	0.63	C	0.59	C	0.51	D	0.81	F	1.09
Existing 5-Lane Configuration with a Mid-Currituck Bridge (2035 Build Bridge Forecast with 4-lane NC 12 in Dare) - 2035 MCB1											
1	US 158 south of Barco	C	0.58	C	0.51	C	0.49	D	0.75	F	1.19
2	US 158 near Bertha	B	0.43	B	0.38	B	0.35	C	0.51	E	0.93
3	US 158 near Jarvisburg	B	0.44	B	0.41	B	0.37	C	0.53	E	0.91
4	US 158 near Mamie	B	0.47	B	0.44	B	0.39	C	0.56	E	0.90
5	US 158 at Wright Mem. Br.	B	0.48	B	0.45	B	0.39	C	0.63	D	0.81
Existing 5-Lane Configuration with a Mid-Currituck Bridge (2035 Build Bridge Forecast with 2/3-lane NC 12 in Dare) - 2035 MCB2, MCB3, MCB4											
1	US 158 south of Barco	C	0.58	C	0.51	C	0.49	D	0.75	F	1.19
2	US 158 near Bertha	B	0.43	B	0.38	B	0.35	C	0.52	E	0.96
3	US 158 near Jarvisburg	B	0.45	B	0.41	B	0.37	C	0.54	E	0.93
4	US 158 near Mamie	B	0.47	B	0.44	B	0.39	C	0.56	E	0.93
5	US 158 at Wright Mem. Br.	B	0.48	B	0.45	B	0.39	C	0.63	E	0.83

Note: Toll assumed for Mid-Currituck Bridge.

3.3.2 US 158 from East of Wright Memorial Bridge to South of NC 12

Table 13 provides year 2035 peak hour LOS and V/C ratios for three links on US 158 from east of the Wright Memorial Bridge to just south of NC 12. This corridor segment is currently five lanes and serves substantial retail development in addition to providing access to residential developments. This arterial roadway section is approximately two miles long with five traffic signals. Note that the ultimate capacity for an arterial is less than a multi-lane highway because of the time lost as a result of traffic signals. The capacity analysis indicated:

- The current roadway segments operate at LOS E under existing Summer Weekday conditions near the NC 12 intersection with US 158. Congestion on the existing Summer Weekend results in LOS F operations. The existing congestion levels and high traffic signal delays result in queuing and delays during the Summer Weekend that can back up eastbound traffic for several miles.

- Without improvements to US 158, the section is projected to have severe traffic congestion problems (i.e., LOS F with V/C ratios ranging from 1.45 to 1.81 on the Summer Weekday and from 1.79 to 2.17 on the summer weekend) in the year 2035 if a Mid-Currituck Bridge is not built.

- With a Mid-Currituck Bridge, daily traffic volumes would drop along this section of US 158. With or without a bridge, however, traffic congestion is expected to reach LOS F during Summer Weekday and Summer Weekend conditions (although with the bridge the V/C ratio will be lower). In order to address this congestion issue, widening would be required even with a new bridge.

- If the new bridge is built, this section of US 158 would still need to be widened to six lanes, with eight lanes needed in the vicinity of the NC 12 intersection to provide LOS D on the summer weekday. If the new bridge is not built, this section widening this section to eight lanes (or a six-lane superstreet) would provide LOS D on the Summer Weekday, but would still have LOS F on the Summer Weekend.

- A superstreet is a facility that maximizes through capacity on a roadway by restricting access and left turns. The left turns are typically required to make right turns at the intersection, proceed downstream some distance, and take a U-turn at a median break. Note that although the number of lanes is reduced, a six-lane superstreet typically requires a wider median and has a similar right-of-way width as an eight-lane arterial.

Table 13. Future 2035 LOS & V/C Ratio – US 158 (East of WMB to South of NC 12)

Link #	Description	AADT		Non-Summer Weekday		Non-Summer Weekend		Summer Weekday		Summer Weekend	
		LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C
Existing 5-Lane Configuration (2006 Existing Traffic Volumes) - 2006 Existing											
6	US 158 between WMB & NC 12	C	0.53	C	0.49	B	0.37	C	0.73	E	0.98
7	US 158 just west of NC 12 int.	C	0.65	C	0.61	B	0.45	D	0.92	F	1.18
8	US 158 just south of NC 12 int.	C	0.63	C	0.59	B	0.43	E	0.96	E	0.99
Existing 5-Lane Configuration without a Mid-Currituck Bridge (2035 No-Build Forecast) - 2035 No-Build											
6	US 158 between WMB & NC 12	F	1.06	E	0.98	C	0.83	F	1.45	F	1.79
7	US 158 just west of NC 12 int.	F	1.30	F	1.20	F	1.03	F	1.81	F	2.17
8	US 158 just south of NC 12 int.	F	1.10	F	1.01	C	0.83	F	1.65	F	1.72
Existing 5-Lane Configuration with a Mid-Currituck Bridge (2035 Build Bridge Forecast with 4-lane NC 12 in Dare)											
6	US 158 between WMB & NC 12	C	0.87	C	0.80	C	0.68	F	1.22	F	1.43
7	US 158 just west of NC 12 int.	F	1.11	F	1.02	C	0.88	F	1.58	F	1.83
8	US 158 just south of NC 12 int.	F	1.10	F	1.01	C	0.83	F	1.65	F	1.72
Existing 5-Lane Configuration with a Mid-Currituck Bridge (2035 Build Bridge Forecast with 2/3-lane NC 12 in Dare) - 2035 MCB3, MCB4											
6	US 158 between WMB & NC 12	C	0.87	C	0.80	C	0.68	F	1.22	F	1.45
7	US 158 just west of NC 12 int.	F	1.12	F	1.03	C	0.88	F	1.58	F	1.85
8	US 158 just south of NC 12 int.	F	1.10	F	1.01	C	0.83	F	1.65	F	1.72
Proposed 6-Lane Configuration without a Mid-Currituck Bridge (2035 No-Build Forecast)											
6	US 158 between WMB & NC 12	C	0.70	C	0.65	C	0.55	E	0.97	E	1.19
7	US 158 just west of NC 12 int.	C	0.87	C	0.80	C	0.69	F	1.21	F	1.45
8	US 158 just south of NC 12 int.	C	0.73	C	0.67	C	0.55	F	1.10	F	1.15
Proposed 6-Lane Configuration with a Mid-Currituck Bridge (2035 Build Bridge Forecast with 4-lane NC 12 in Dare) - 2035 MCB1											
6	US 158 between WMB & NC 12	C	0.58	C	0.53	B	0.45	C	0.81	E	0.95
7	US 158 just west of NC 12 int.	C	0.74	C	0.68	C	0.58	F	1.05	F	1.22
8	US 158 just south of NC 12 int.	C	0.73	C	0.67	C	0.55	F	1.10	F	1.15
Proposed 6-Lane Configuration with a Mid-Currituck Bridge (2035 Build Bridge Forecast with 2/3-lane NC 12 in Dare) - 2035 MCB2											
6	US 158 between WMB & NC 12	C	0.58	C	0.54	B	0.45	C	0.81	E	0.97
7	US 158 just west of NC 12 int.	C	0.74	C	0.68	C	0.58	F	1.06	F	1.23
8	US 158 just south of NC 12 int.	C	0.73	C	0.67	C	0.55	F	1.10	F	1.15

Note: Toll assumed for Mid-Currituck Bridge.

Table 13 (concluded). Future 2035 LOS & V/C Ratio – US 158 (East of WMB to South of NC 12)

Link #	Description	AADT		Non-Summer Weekday		Non-Summer Weekend		Summer Weekday		Summer Weekend	
		LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C
Proposed 8-Lane Configuration without a Mid-Currituck Bridge (2035 No-Build Forecast) - 2035 ER1, ER2											
6	US 158 between WMB & NC 12	C	0.53	C	0.49	B	0.42	C	0.73	D	0.89
7	US 158 just west of NC 12 int.	C	0.65	C	0.60	C	0.51	D	0.90	F	1.09
8	US 158 just south of NC 12 int.	C	0.55	C	0.50	B	0.41	C	0.82	C	0.86
Proposed 8-Lane Configuration with a Mid-Currituck Bridge (2035 Build Bridge Forecast with 4-lane NC 12 in Dare) - 2035 MCB1											
6	US 158 between WMB & NC 12	B	0.43	B	0.40	B	0.34	C	0.61	C	0.72
7	US 158 just west of NC 12 int.	C	0.56	C	0.51	B	0.44	C	0.79	D	0.92
8	US 158 just south of NC 12 int.	C	0.55	C	0.50	B	0.41	C	0.82	C	0.86
Proposed 8-Lane Configuration with a Mid-Currituck Bridge (2035 Build Bridge Forecast with 2/3-lane NC 12 in Dare) - 2035 MCB2											
6	US 158 between WMB & NC 12	B	0.43	B	0.40	B	0.34	C	0.61	C	0.73
7	US 158 just west of NC 12 int.	C	0.56	C	0.51	B	0.44	C	0.79	D	0.92
8	US 158 just south of NC 12 int.	C	0.55	C	0.50	B	0.41	C	0.82	C	0.86
Proposed 6-Lane Superstreet Configuration without a Mid-Currituck Bridge (2035 No-Build Forecast)											
6	US 158 between WMB & NC 12	C	0.56	C	0.52	B	0.44	C	0.77	E	0.95
7	US 158 just west of NC 12 int.	C	0.69	C	0.64	C	0.55	E	0.96	F	1.16
8	US 158 just south of NC 12 int.	C	0.59	C	0.54	B	0.44	C	0.88	D	0.92
Proposed 6-Lane Superstreet Configuration with a Mid-Currituck Bridge (2035 Build Bridge Forecast with 4-lane NC 12 in Dare)											
6	US 158 between WMB & NC 12	B	0.46	B	0.43	B	0.36	C	0.65	C	0.76
7	US 158 just west of NC 12 int.	C	0.59	C	0.55	B	0.47	C	0.84	E	0.98
8	US 158 just south of NC 12 int.	C	0.59	C	0.54	B	0.44	C	0.88	D	0.92
Proposed 6-Lane Superstreet Configuration with a Mid-Currituck Bridge (2035 Build Bridge Forecast with 2/3-lane NC 12 in Dare)											
6	US 158 between WMB & NC 12	B	0.43	B	0.40	B	0.34	C	0.61	C	0.73
7	US 158 just west of NC 12 int.	C	0.56	C	0.51	B	0.44	C	0.79	D	0.92
8	US 158 just south of NC 12 int.	C	0.55	C	0.50	B	0.41	C	0.82	C	0.86

Note: Toll assumed for Mid-Currituck Bridge.

- Note that operations on this arterial section are controlled ultimately by the multiple signals on the roadway. Most critical is the existing signalized intersection at US 158 and NC 12 which is currently under study by NCDOT for improvement to an interchange as part of the TIP No. R-4457 project. The interchange improvement would also improve operations at adjacent signals by eliminating spillback queuing. Also note that the interchange improvement may require widening on the interchange approaches that could improve roadway operations on Links 7 and 8.

- On this two-mile section, the traffic forecast indicates a distinct increase in traffic volumes from the west (Link 5 at the Wright Memorial Bridge) to the east (Link 7 just west of NC 12). The difference is related to the development patterns and types of trips. At the Wright Memorial Bridge, traffic is comprised of tourists (that typically cross the bridge twice per week). The majority of users that cross the bridge frequently are local. On the eastern portion of this segment, local traffic is combined with tourist traffic. In this area tourist traffic, however, includes both the arrival/departure trip as well as daily tourist trips related to retail, restaurant, and entertainment development located along US 158 on the Outer Banks.

- The section of US 158 south of the NC 12 intersection (Link 8) is outside of the roadway network influenced by a Mid-Currituck Bridge and, therefore, has the same future volumes under all scenarios. South of the NC 12 intersection, a transition from any proposed improvements on US 158 would occur back to the existing five-lane section. As shown, the existing five-lane section would operate at LOS F in the 2035 Summer Weekday and Summer Weekend. This finding indicates the need for future improvements on US 158 in Dare County as part of a separate study by NCDOT.

3.3.3 NC 12 in Dare and Currituck Counties

Table 14 and Table 15 provide year 2035 peak hour LOS and V/C ratios for six links (Links 9 to 14) on NC 12 from Southern Shores to Corolla. The tables are divided based upon county due to different improvements being considered for each corridor.

These corridor segments are projected to have severe traffic congestion problems (i.e., LOS F with V/C ratios exceeding 1.0) in year 2035 for Summer Weekday and Summer Weekend conditions if no improvements are made to NC 12 and if a new bridge is not built. The worst traffic congestion is expected to be along NC 12 in Dare County (Links 9, 10, 11) with V/C ratios exceeding 1.3 and LOS F operations not just limited to the summer months. There are similar congestion problems projected on NC 12 in Currituck County.

Table 14. Future (2035) LOS & V/C Ratio – NC 12 (Dare County)

Link #	Description	AADT		Non-Summer Weekday		Non-Summer Weekend		Summer Weekday		Summer Weekend	
		LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C
Existing 2-Lane Configuration (2006 Existing Traffic Volumes) - 2006 Existing											
9	NC 12 just north of US 158 int.	E	0.74	E	0.69	D	0.57	F	1.04	F	1.11
10	NC 12 in Duck business area	D	0.59	D	0.55	D	0.52	E	0.76	E	0.87
11	NC 12 in Sanderling Inn area	D	0.51	D	0.48	D	0.44	D	0.64	E	0.78
Existing 2-Lane Configuration without a Mid-Currituck Bridge (2035 No-Build Forecast) - 2035 No-Build											
9	NC 12 just north of US 158 int.	F	1.09	F	1.03	E	0.79	F	1.54	F	1.62
10	NC 12 in Duck business area	E	0.88	E	0.84	D	0.67	F	1.15	F	1.34
11	NC 12 in Sanderling Inn area	E	0.81	E	0.78	D	0.60	F	1.06	F	1.24
Existing 2-Lane Configuration with a Mid-Currituck Bridge (2035 Build Bridge Forecast with 2/3-lane NC 12 in Dare) - 2035 MCB3 and MCB4											
9	NC 12 just north of US 158 int.	E	0.79	E	0.74	D	0.56	F	1.07	F	1.08
10	NC 12 in Duck business area	D	0.66	D	0.63	D	0.50	E	0.88	E	0.93
11	NC 12 in Sanderling Inn area	D	0.65	D	0.63	D	0.50	E	0.85	E	0.95
Proposed 3-Lane Configuration without a Mid-Currituck Bridge (2035 No-Build Forecast) 2035 ER2											
9	NC 12 just north of US 158 int.	E	0.97	E	0.91	E	0.70	F	1.36	F	1.44
10	NC 12 in Duck business area	E	0.88	E	0.84	D	0.67	F	1.15	F	1.34
11	NC 12 in Sanderling Inn area	E	0.72	E	0.69	D	0.53	E	0.94	F	1.10
Proposed 3-Lane Configuration with a Mid-Currituck Bridge (2035 Build Bridge Forecast with 2/3-lane NC 12 in Dare) - 2035 MCB2											
9	NC 12 just north of US 158 int.	E	0.70	D	0.66	D	0.49	E	0.95	E	0.96
10	NC 12 in Duck business area	D	0.66	D	0.63	D	0.50	E	0.88	E	0.9.
11	NC 12 in Sanderling Inn area	D	0.58	D	0.55	D	0.44	E	0.75	E	0.84
Proposed 4-Lane Configuration without a Mid-Currituck Bridge (2035 No-Build Forecast) - 2035 ER1											
9	NC 12 just north of US 158 int.	C	0.51	C	0.47	B	0.37	D	0.71	D	0.75
10	NC 12 in Duck business area	B	0.46	B	0.44	B	0.35	C	0.60	D	0.70
11	NC 12 in Sanderling Inn area	B	0.38	B	0.36	B	0.28	C	0.49	C	0.57
Proposed 4-Lane Configuration with a Mid-Currituck Bridge (2035 Build Bridge Forecast with 4-lane NC 12 in Dare) - 2035 MCB1											
9	NC 12 just north of US 158 int.	B	0.37	B	0.35	A	0.26	C	0.53	C	0.53
10	NC 12 in Duck business area	B	0.35	B	0.35	A	0.26	B	0.45	C	0.51
11	NC 12 in Sanderling Inn area	B	0.31	B	0.29	A	0.23	B	0.38	C	0.47

Note: Toll assumed for Mid-Currituck Bridge.

Table 15. Future (2035) LOS & V/C Ratio – NC 12 (Currituck County)

Link #	Description	AADT		Non-Summer Weekday		Non-Summer Weekend		Summer Weekday		Summer Weekend	
		LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C
Existing 2-Lane Configuration (2006 Existing Traffic Volumes) - 2006 Existing											
14	NC 12 just north of County Line	D	0.51	D	0.47	D	0.44	D	0.64	E	0.77
12	NC 12 at Corolla south	D	0.48	D	0.45	D	0.44	D	0.61	E	0.72
13	NC 12 at Corolla north	C	0.25	C	0.23	C	0.24	C	0.31	C	0.33
Existing 2-Lane Configuration without a Mid-Currituck Bridge (2035 No-Build Forecast) - 2035 No-Build, Link 13 for all 2035 Alternatives											
14	NC 12 just north of County Line	E	0.80	E	0.77	D	0.63	F	1.03	F	1.22
12	NC 12 at Corolla south	D	0.69	D	0.65	D	0.53	E	0.90	F	1.08
13	NC 12 at Corolla north	C	0.32	C	0.31	C	0.26	D	0.41	D	0.48
Existing 2-Lane Configuration with a Mid-Currituck Bridge (2035 Build Bridge Forecast with 2/3-lane NC 12 in Dare) - 2035 MCB3 and MCB4 (Link 14 only)											
14	NC 12 just north of County Line	E	0.69	D	0.66	D	0.55	E	0.88	F	1.01
12	NC 12 at Corolla south	E	0.74	E	0.71	D	0.56	E	0.95	F	1.19
13	NC 12 at Corolla north	C	0.32	C	0.31	C	0.23	D	0.41	D	0.48
Proposed 3-Lane Configuration without a Mid-Currituck Bridge (2035 No-Build Forecast)											
14	NC 12 just north of County Line	E	0.71	D	0.68	D	0.56	E	0.91	F	1.08
12	NC 12 at Corolla south	D	0.61	D	0.57	D	0.47	E	0.80	F	0.95
13	NC 12 at Corolla north	C	0.29	C	0.27	C	0.23	C	0.37	D	0.42
Proposed 3-Lane Configuration with a Mid-Currituck Bridge (2035 Build Bridge Forecast with 2/3-lane NC 12 in Dare)											
14	NC 12 just north of County Line	D	0.61	D	0.58	D	0.49	E	0.78	E	0.89
12	NC 12 at Corolla south	D	0.66	D	0.63	D	0.49	E	0.84	E	1.05
13	NC 12 at Corolla north	C	0.29	C	0.27	C	0.23	C	0.37	D	0.42
Proposed 4-Lane Configuration without a Mid-Currituck Bridge (2035 No-Build Forecast) 2035 ER1 and ER2 (Links 14 & 12)											
14	NC 12 just north of County Line	B	0.34	B	0.33	A	0.27	B	0.44	C	0.52
12	NC 12 at Corolla south	B	0.29	B	0.28	A	0.22	B	0.38	C	0.46
13	NC 12 at Corolla north	A	0.14	A	0.13	A	0.11	A	0.18	A	0.20
Proposed 4-Lane Configuration with a Mid-Currituck Bridge (2035 Build Bridge Forecast with 4-lane NC 12 in Dare) - 2035 MCB1 (Link 14 & 12)											
14	NC 12 just north of County Line	B	0.32	B	0.31	A	0.25	B	0.41	C	0.49
12	NC 12 at Corolla south	B	0.35	B	0.33	A	0.26	C	0.45	C	0.57
13	NC 12 at Corolla north	A	0.15	A	0.14	A	0.12	A	0.19	A	0.22

Note: Toll assumed for Mid-Currituck Bridge.

3.3.3.1 NC 12 in Dare County

As shown in Table 14, with a Mid-Currituck Bridge and no other improvements, traffic congestion on NC 12 through Dare County is expected to improve because of traffic diversions. Specific findings include:

- Although the LOS will continue to be LOS F in the summer periods with or without the Mid-Currituck Bridge, the V/C ratio is reduced substantially. For example, on Link 9 the V/C ratio falls from 1.62 without the bridge to 1.08 with the bridge in place. This improvement would be reflected by a reduction in the duration of congestion, particularly on the Summer Weekend.

- Similarly, with a three-lane widening of NC 12 and no new bridge, NC 12 V/C ratios would improve, but overall traffic operations would remain at LOS F during peak periods throughout the year. Compared with the No-Build, V/C ratios would fall by as much as 0.18.

- With a new bridge in place and no widening of NC 12, V/C ratios are lower and traffic operations are better than with a three-lane section with no bridge.

- A four-lane section would improve operations to LOS D or better on the Summer Weekend and Summer Weekday, and to LOS C or better for all other periods, if the Mid-Currituck Bridge is not provided. If the Mid-Currituck Bridge is provided, a four-lane section would result in LOS C or better during the Summer Weekend and Summer Weekday, and LOS B or better for all other time periods.

3.3.3.2 NC 12 in Currituck County

- As shown in Table 15, with a Mid-Currituck Bridge and no other improvements, traffic congestion on NC 12 through Currituck County is expected to increase near the bridge because of trips being attracted to the bridge. Specific findings include:

- With a Mid-Currituck Bridge and no other improvements, traffic congestion on NC 12 through Currituck County is expected to reach LOS E on the Summer Weekday and LOS F on the Summer Weekend.

- With a Mid-Currituck Bridge and no other improvements, traffic congestion will worsen on the section just south of the Mid-Currituck Bridge (Link 12). With two lanes, this segment would operate at LOS E for the Non-Summer Weekday and LOS E for the AADT forecast.

- With a new bridge in place, traffic volumes are increased in northern Currituck County. Traffic signal operation issues at the eastern bridge termini will require widening of NC 12 in northern Currituck County near the bridge to four lanes, however, which will improve operations substantially.

- A four-lane section would improve operations to LOS C or better in all peak periods on NC 12 in Currituck County, with or without a Mid-Currituck Bridge.

3.3.4 Mid-Currituck Bridge

Table 16 provides year 2035 peak hour LOS and V/C ratios for a Mid-Currituck Bridge. A two-lane bridge would operate at LOS D during Non-Summer and Summer Weekday periods, but would operate at LOS E during Summer Weekend periods because of the high traffic volumes that it is projected to carry in 2035. In comparison, a four-lane bridge would operate at LOS A during AADT and Non-Summer Weekday periods, and at LOS B for the Summer Weekend.

3.3.4.1 Bridge Operations

In comparing the two- and four-lane operations, the following characteristics are noted:

- A two-lane bridge provides an adequate LOS for the summer weekday design period.

- On the summer weekend, a two lane bridge operates at LOS E. Table 17 compares operational characteristics (speed and travel time) of a two and four lane bridge section for the Mid-Currituck Bridge.

- As shown in Table 17 for the summer weekend, LOS E reflects a reduction in speed from approximately 54 mph to 43 mph. In other words, crossing the bridge increases from approximately an 8.9 minute trip to a 11.1 minute trip. This additional 2.2 minutes should be compared to the alternate route requiring a 40-mile trip through heavy congestion on US 158 and NC 12 during the same period.

- In addition to reducing speeds, LOS E on a two-lane road typically includes backups and delays at intersections and access points. For the bridge section, however, there are no access points, so this would not occur.

Based upon these observations, a two-lane bridge is a viable bridge section for the project. It should be noted, however, that this conclusion is based upon the 2035 Build Bridge forecast assuming that a toll is required for crossing the bridge. The previously conducted 2025 analysis actually had higher bridge volumes than the 2035 Build Bridge with Tolls scenario since no toll diversion was included. As a result, if tolls were removed from the bridge in the future, it is likely that a two-lane bridge would have more severe congestion.

Table 16. Future (2035) LOS & V/C Ratio – Mid-Currituck Bridge

Link #	Description	AADT		Non-Summer Weekday		Non-Summer Weekend		Summer Weekday		Summer Weekend	
		LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C
Proposed 2-Lane Mid-Currituck Bridge (2035 Build Bridge Forecast with 4-lane NC 12 in Dare) - 2035 MCB1											
15	Mid-Currituck Bridge	D	0.43	D	0.41	D	0.33	D	0.53	E	0.80
Proposed 2-Lane Mid-Currituck Bridge (2035 Build Bridge Forecast with 2/3-lane NC 12 in Dare) - 2035 MCB2, MCB3, & MCB4											
15	Mid-Currituck Bridge	D	0.43	D	0.40	D	0.33	D	0.52	E	0.77
Proposed 4-Lane Mid-Currituck Bridge (2035 Build Bridge Forecast with 4-lane NC 12 in Dare)											
15	Mid-Currituck Bridge	A	0.17	A	0.16	A	0.13	A	0.21	B	0.32
Proposed 4-Lane Mid-Currituck Bridge (2035 Build Bridge Forecast with 2/3-lane NC 12 in Dare)											
15	Mid-Currituck Bridge	A	0.17	A	0.16	A	0.13	A	0.21	B	0.31

Note: Toll assumed for Mid-Currituck Bridge.

Table 17. Operational Characteristics of Mid-Currituck Bridge (Link 15)

Cross-Section	LOS	V/C	Average Travel Speed (mph)	Travel Time to Cross Bridge (min)
2035 Summer Weekday with Toll – 14,500 vpd				
2-lane	D	0.53	47.5	10.1
4-lane	A	0.21	55.0	8.7
2035 Summer Weekend with Toll – 22,500 vpd				
2-lane	E	0.77	43.2	11.1
4-lane	B	0.31	54.0	8.9

3.3.4.2 Thresholds for Widening Bridge to Four Lanes

The potential congestion issues related to toll policies and future growth may require the consideration of a four-lane bridge improvement in the future. Although additional study would be required at a future date once the bridge is in operation, the thresholds discussed below are proposed for consideration of future widening.

The peak hour LOS thresholds for a two-lane bridge are shown in Table 18. Using this table, a two-lane bridge was determined adequate to provide LOS D operations for the 2035 Summer Weekday and LOS E for the 2035 Summer Weekend as shown in Table 16. Assuming that LOS D and LOS E are acceptable for the Summer Weekday and Summer Weekend, respectively, a daily traffic threshold for a two-lane bridge was developed as detailed in Table 18. If traffic volumes exceed these thresholds, a four lane bridge would likely be needed.

Table 18. Daily Traffic Thresholds for Two-Lane Mid-Currituck Bridge

LOS	Peak Hour Threshold (vph)	Daily Traffic Threshold (vpd)*	Comment
LOS D (just over LOS C)	678	8,500	
LOS E (just over LOS D)	1237	15,500	Maximum volume for Summer Weekday threshold to maintain LOS D operation. For comparison, 2035 Summer Weekday is 14,500 vpd.
LOS F (just over LOS E)	2216	29,200	Maximum volume for Summer Weekend threshold to maintain LOS E operation. For comparison, 2035 Summer Weekend is 22,500 vpd.

* Assumes 8 percent of daily traffic occurs in the peak hour.

3.3.4.3 Bridge Approach Issues

Traffic volumes also require that additional capacity provisions be provided at the Mid-Currituck Bridge's western termini with US 158 and eastern termini with NC 12. Some of these provisions include:

- At the western termini with US 158, an interchange is required to adequately serve traffic on US 158 and the new bridge. In addition, the provision of a toll collection plaza at the western termini would require some widening of the bridge at the western approach to transition from a two-lane bridge to the toll plaza. This transition would likely require additional structure width. Note that on the summer weekend, the toll plaza would be a potential bottleneck, so it is recommended that this component be designed to serve summer weekend traffic.

- On the eastern termini of the proposed bridge, the intersection of NC 12 at the bridge will require a traffic signal. Due to high traffic volumes, this intersection will require multi-lane approaches and dual left-turn lanes. Since this intersection is located less than 1,000 feet from the Sound, the transition from a two-lane bridge will require widening of the basic bridge section to allow tapers and storage bays at the traffic signal. In addition, NC 12 would require widening to four lanes between the new bridge intersection and Currituck Clubhouse Road. Since this intersection is as a potential bottleneck that could cause queuing on the new bridge, it is recommended that it be designed to serve summer weekend traffic.

3.4 Roadway Level of Service Findings by Alternative

The roadway capacity analysis in Section 3.3 focused on testing the capacity at specific roadway links with multiple cross sections. This analysis was utilized as part of the identification of alternatives to identify improvements to be considered. As described in Section 1.2, multiple existing road (ER1 and ER2)) and Mid-Currituck Bridge (MCB1, MCB2, MCB3, and MCB4) alternatives have been defined in addition to the No-Build. Each of these alternatives includes improvements to NC 12 and US 158 in addition to the inclusion of a Mid-Currituck Bridge with the MCB alternatives. These alternatives and the related improvements are shown in Table 19.

Table 20 summarizes the roadway LOS and V/C ratio during the Summer Weekday for each of the alternatives. In reviewing this table, note that the goal of the project is to provide acceptable traffic operations for the 2035 Summer Weekday. In evaluating each alternative, however, it should be noted that widening along specific roadway sections requires additional cost and may cause additional impacts. This analysis examines traffic operations only; the alternatives report examines additional issues applicable to each alternative.

Table 19. Summary of Laneage Provisions for Roadway Alternatives

Alternative	Mid-Currituck Bridge	US 158 – north of MCB	US 158 – MCB to WMB	US 158 – WMB to NC 12	NC 12 in Dare County	NC 12 in Currituck County
	Number of Lanes					
No-Build	NA	5	5	5	2	2
ER1	NA	5 (plus evac. lane*)	5 (plus evac. lane*)	8	4	4
ER2	NA	5 (plus evac. lane*)	5 (plus evac. lane*)	8	3	4
MCB1	2	5 (plus evac. lane*)	5	6/8**	4	4
MCB2	2	5 (plus evac. lane*)	5	6/8**	3	4
MCB3***	2	5 (plus evac. lane*)	5	5	2	2/4
MCB4***	2	5 (plus evac. lane*)	5	5 (plus evac. lane)	2	2/4

Notes:
*The provision of an evacuation lane assumes that a paved shoulder will be provided that can be utilized as an evacuation lane in special circumstances. It is assumed that the evacuation lane will not be utilized to increase capacity during normal operations.
** MCB1 and MCB2 assume a six lane section is provided from the Wright Memorial Bridge east to a point approaching the NC 12/US 158 intersection, where it would be widened to eight lanes.
***MCB3 and MCB4 provide the same basic capacity improvements. The difference in the two alternatives is that MCB4 provides an evacuation lane on US 158 near the Wright Memorial Bridge.

Table 21 summarizes the roadway LOS and V/C ratio during the Summer Weekend for each of the alternatives. In reviewing this table, note that the Summer Weekend is the period with the highest traffic flows and it experiences severe levels of congestion. Although it is desirable to reduce congestion during this period, it is not expected that LOS D operations will be maintained during this period as a result of the proposed project. The presentation of summer weekend data, however, recognizes the importance of traffic congestion during this period in order to determine if specific alternatives offer substantial benefits.

In addition to the tables, Figure 9 through Figure 15 are presented summarizing LOS along US 158 and NC 12 for each of the alternatives for both the Summer Weekday and Summer Weekend. This illustrative overview provides a graphic comparison between alternatives and the impact on specific roadway segments. The figures illustrate congestion based on the color along specific links. In general, green represents LOS D flow or better, orange represents LOS E, pink represents LOS F, and maroon represents a poor LOS F (with a V/C ratio greater than 1.3). The color coding makes it possible to graphically compare congestion levels between multiple alternatives. Note that the solid lines represent Summer Weekday flow, and the dashed lines represent Summer Weekend flow.

Table 20. Future (2035) Traffic Capacity – LOS and V/C Ratio (Summer Weekday)

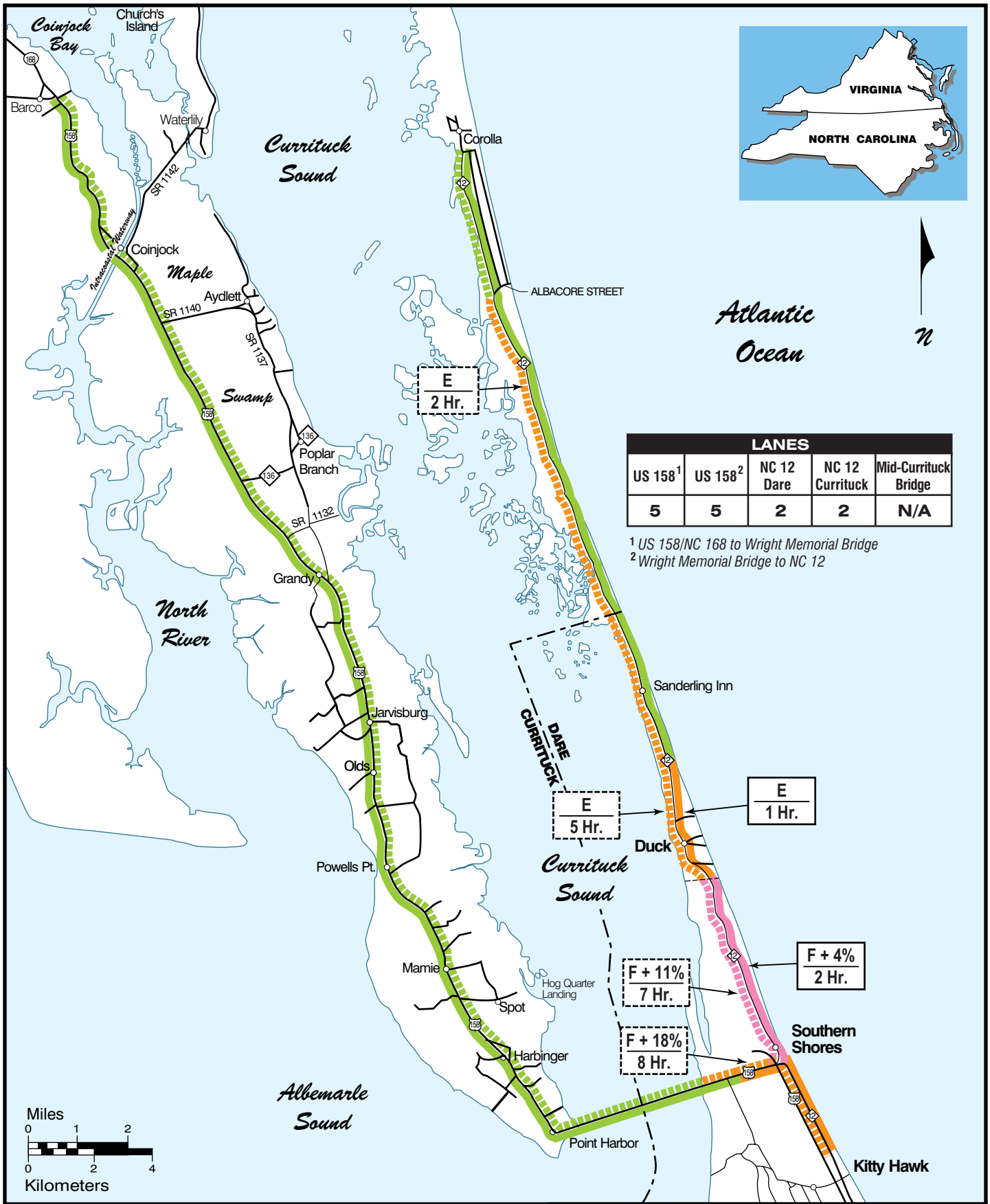
Link #	Roadway Link	2006 Existing		2035 No-Build		2035 ER1		2035 ER2		2035 MCB1		2035 MCB2		2035 MCB3 & MCB4	
		LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C
	US 158 Barco to Wright Memorial Bridge	**5 lanes**		**5 lanes**		**5 lanes**		**5 lanes**		**5 lanes**		**5 lanes**		**5 lanes**	
1*	US 158 south of Barco	B	0.37	D	0.78	D	0.78	D	0.78	D	0.75	D	0.75	D	0.75
2	US 158 near Bertha	B	0.32	C	0.68	C	0.68	C	0.68	C	0.51	C	0.58	C	0.52
3	US 158 near Jarvisburg	B	0.35	C	0.73	C	0.73	C	0.73	C	0.53	C	0.59	C	0.54
4	US 158 near Mamie	B	0.36	D	0.76	D	0.76	D	0.76	C	0.56	C	0.56	C	0.56
5	US 158 at Wright Mem. Br.	B	0.41	D	0.84	D	0.84	D	0.84	C	0.63	C	0.63	C	0.63
	US 158 from Wright Memorial Bridge to NC 12	**5 lanes**		**5 lanes**		**8 lanes**		**8 lanes**		**6/8 lanes**		**6/8 lanes**		**5 lanes**	
6	US 158 between WMB & NC 12	C	0.73	F	1.45	C	0.73	C	0.73	C	0.81	C	0.81	F	1.24
7	US 158 just west of NC 12 int.	D	0.92	F	1.81	D	0.90	D	0.90	C	0.79	C	0.79	F	1.58
8**	US 158 just south of NC 12 int.	E	0.96	F	1.65	C	0.82	C	0.82	C	0.82	C	0.82	F	1.65
	NC 12 in Dare County	**2 lanes**		**2 lanes**		**4 lanes**		**3 lanes**		**4 lanes**		**3 lanes**		**2 lanes**	
9	NC 12 just north of US 158 int.	F	1.04	F	1.54	D	0.71	F	1.36	C	0.53	E	0.95	F	1.07
10***	NC 12 in Duck business area	E	0.76	F	1.15	C	0.60	F	1.15	C	0.45	E	0.88	E	0.88
11	NC 12 in Sanderling Inn area	D	0.64	F	1.06	C	0.49	E	0.94	B	0.38	E	1.75	E	0.85
	NC 12 in Currituck County	**2 lanes**		**2 lanes**		**4 lanes**		**4 lanes**		**4 lanes**		**4 lanes**		**2/4 lanes (4 near bridge)**	
14	NC 12 at Dare/Currituck County Line	D	0.64	F	1.03	B	0.44	B	0.44	B	0.41	B	0.41	E	0.88
12	NC 12 at Corolla south (4 lanes with bridge)	D	0.61	E	0.90	B	0.38	B	0.38	D	0.45	C	0.45	C	0.45
13****	NC 12 at Corolla north (2 lanes in all scenarios)	C	0.31	D	0.41	D	0.41	D	0.41	D	0.41	D	0.41	D	0.41
	Proposed Bridge	**No bridge**		**No bridge**		**No bridge**		**No bridge**		**2 lanes**		**2 lanes**		**2 lanes**	
15	Mid-Currituck Bridge	N/A - Proposed Bridge		N/A - Proposed Bridge		N/A - Proposed Bridge		N/A - Proposed Bridge		D	0.53	D	0.52	D	0.52

Notes:
*Link 1 is north of the proposed project and would remain 5-lanes for all alternatives.
**Link 8 is south of the proposed project and represents the capacity of the widened laneage that is transitioned to the existing 5-lane section.
***Link 10 has an existing 3-lane section.
****Link 13 is north of the proposed project and would remain 2-lanes for all alternatives.

Table 21. Future (2035) Traffic Capacity – LOS and V/C Ratio (Summer Weekend)

Link #	Roadway Link	2006 Existing		2035 No-Build		2035 ER1		2035 ER2		2035 MCB1		2035 MCB2		2035 MCB3 & MCB4	
		LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C
	US 158 Barco to Wright Memorial Bridge	**5 lanes**		**5 lanes**		**5 lanes**		**5 lanes**		**5 lanes**		**5 lanes**		**5 lanes**	
1*	US 158 south of Barco	C	0.65	F	1.19	F	1.19	F	1.19	F	1.19	F	1.19	F	1.19
2	US 158 near Bertha	C	0.69	F	1.16	F	1.16	F	1.16	E	0.93	E	0.96	E	0.96
3	US 158 near Jarvisburg	C	0.64	F	1.16	F	1.16	F	1.16	E	0.91	E	0.93	E	0.93
4	US 158 near Mamie	C	0.65	F	1.18	F	1.18	F	1.18	E	0.90	E	0.93	E	0.93
5	US 158 at Wright Mem. Br.	C	0.61	F	1.09	F	1.09	F	1.09	D	0.81	D	0.83	D	0.83
	US 158 from Wright Memorial Bridge to NC 12	**5 lanes**		**5 lanes**		**8 lanes**		**8 lanes**		**6/8 lanes**		**6/8 lanes**		**5 lanes**	
6	US 158 between WMB & NC 12	E	0.98	F	1.79	D	0.89	D	0.89	E	0.95	E	0.97	F	1.45
7	US 158 just west of NC 12 int.	F	118	F	2.17	F	1.09	F	1.09	D	0.90	D	0.92	F	1.85
8**	US 158 just south of NC 12 int.	E	0.99	F	1.72	C	0.86	C	0.86	C	0.86	C	0.86	F	1.72
	NC 12 in Dare County	**2 lanes**		**2 lanes**		**4 lanes**		**3 lanes**		**4 lanes**		**3 lanes**		**2 lanes**	
9	NC 12 just north of US 158 int.	F	1.11	F	1.62	D	0.75	F	1.44	C	0.53	E	0.96	F	1.08
10***	NC 12 in Duck business area	E	0.87	F	1.34	D	0.70	F	1.39	C	0.51	E	0.93	E	0.93
11	NC 12 in Sanderling Inn area	E	0.78	F	1.24	C	0.57	F	1.10	C	0.47	E	0.84	E	0.95
	NC 12 in Currituck County	**2 lanes**		**2 lanes**		**4 lanes**		**4 lanes**		**4 lanes**		**4 lanes**		**2/4 lanes (4 near bridge)**	
14	NC 12 at Dare/Currituck County Line	E	0.77	F	1.22	C	0.52	C	0.52	C	0.49	C	0.49	F	1.01
12	NC 12 at Corolla south (4 lanes with bridge)	E	0.72	F	1.08	C	0.46	C	0.46	C	0.57	C	0.57	C	0.57
13****	NC 12 at Corolla north (2 lanes in all scenarios)	C	0.33	D	0.48	D	0.48	D	0.48	D	0.48	D	0.48	D	0.48
	Proposed Bridge	**No bridge**		**No bridge**		**No bridge**		**No bridge**		**2 lanes**		**2 lanes**		**2-lanes**	
15	Mid-Currituck Bridge	N/A - Proposed Bridge		N/A - Proposed Bridge		N/A - Proposed Bridge		N/A - Proposed Bridge		E	0.80	E	0.77	E	0.77

Notes:
*Link 1 is north of the proposed project and would remain 5-lanes for all alternatives.
**Link 8 is south of the proposed project and represents the capacity of the widened laneage that is transitioned from the proposed section to the existing 5-lane section.
***Link 10 has an existing 3-lane section.
****Link 13 is north of the proposed project and would remain 2-lanes for all alternatives.



LANES				
US 158[1]	US 158[2]	NC 12 Dare	NC 12 Currituck	Mid-Currituck Bridge
5	5	2	2	N/A

[1] *US 158/NC 168 to Wright Memorial Bridge*
[2] *Wright Memorial Bridge to NC 12*

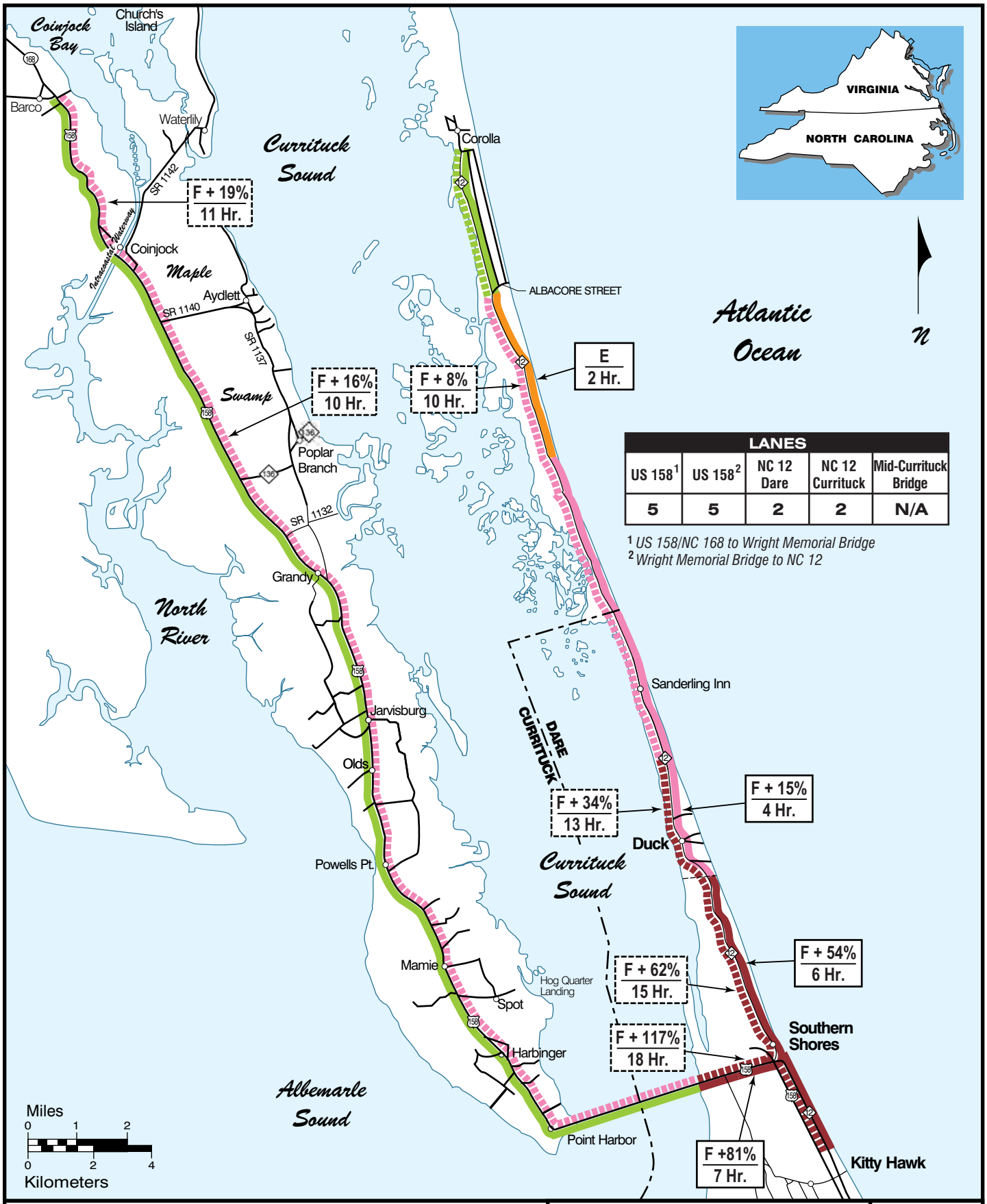
LEGEND

LOS + % Over Capacity
Hours of Congestion

- Summer Weekend LOS (2006)
- Summer Weekday LOS (2006)
- LOS A-D
- LOS E
- LOS F (1.0 < V/C < 1.3)
- LOS F (V/C > 1.3)

2006 LOS Corridor Analysis Existing Conditions

Figure 9



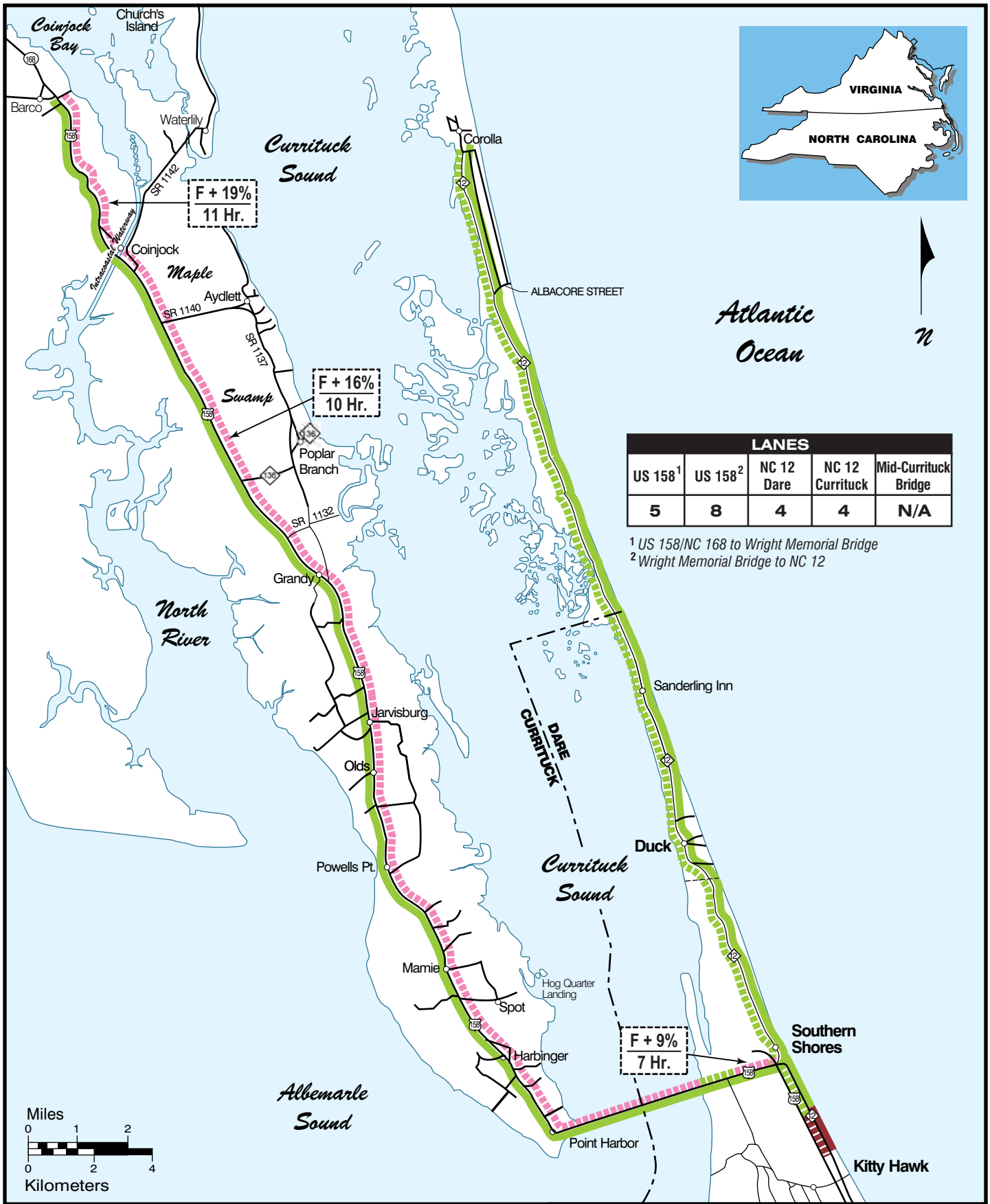
LEGEND

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)

2035 LOS Corridor Analysis No-Build Alternative

Figure 10



LANES				
US 158[1]	US 158[2]	NC 12 Dare	NC 12 Currituck	Mid-Currituck Bridge
5	8	4	4	N/A

[1] *US 158/NC 168 to Wright Memorial Bridge*
[2] *Wright Memorial Bridge to NC 12*

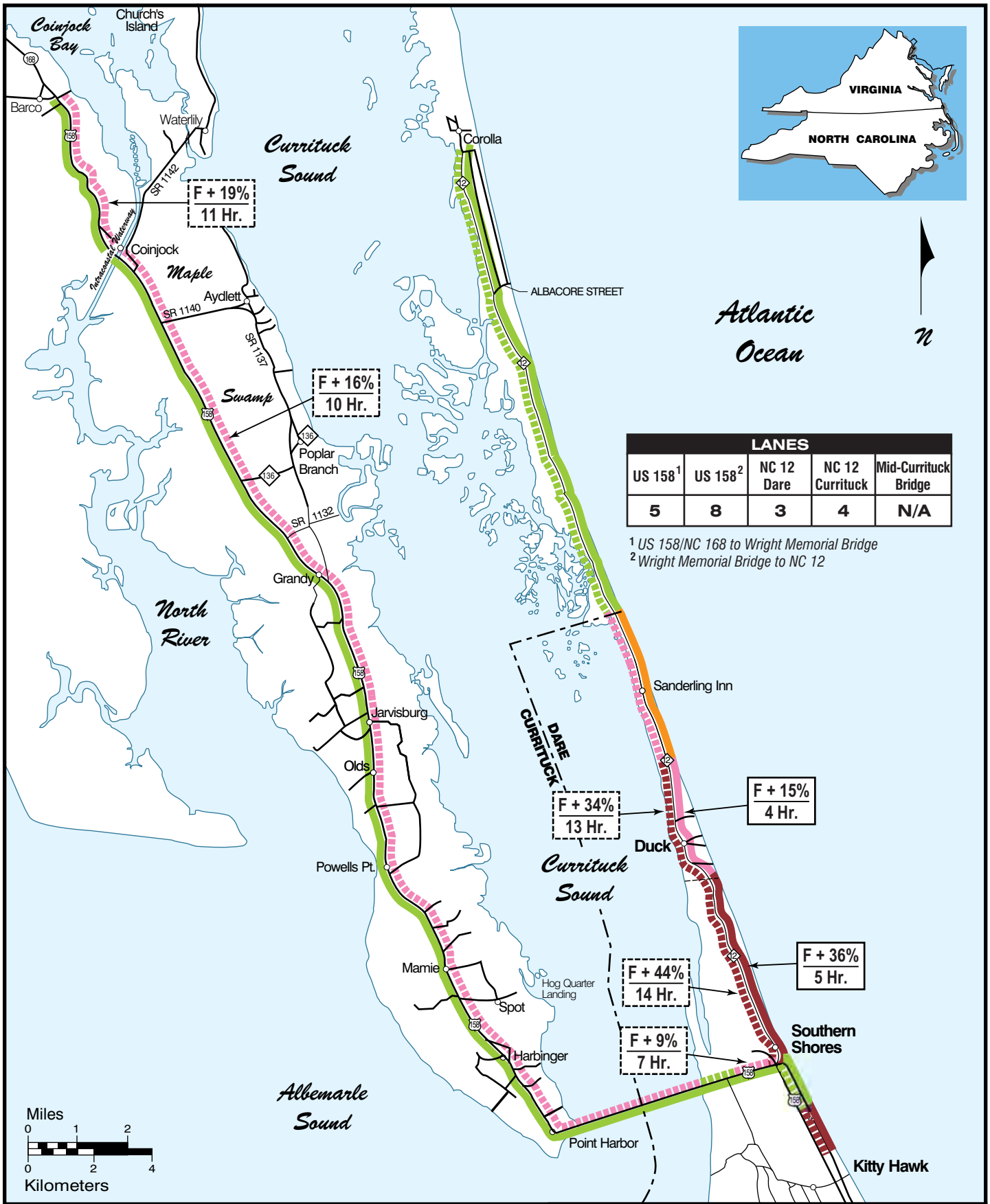
LEGEND

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)

2035 LOS Corridor Analysis Alternative ER1

Figure 11



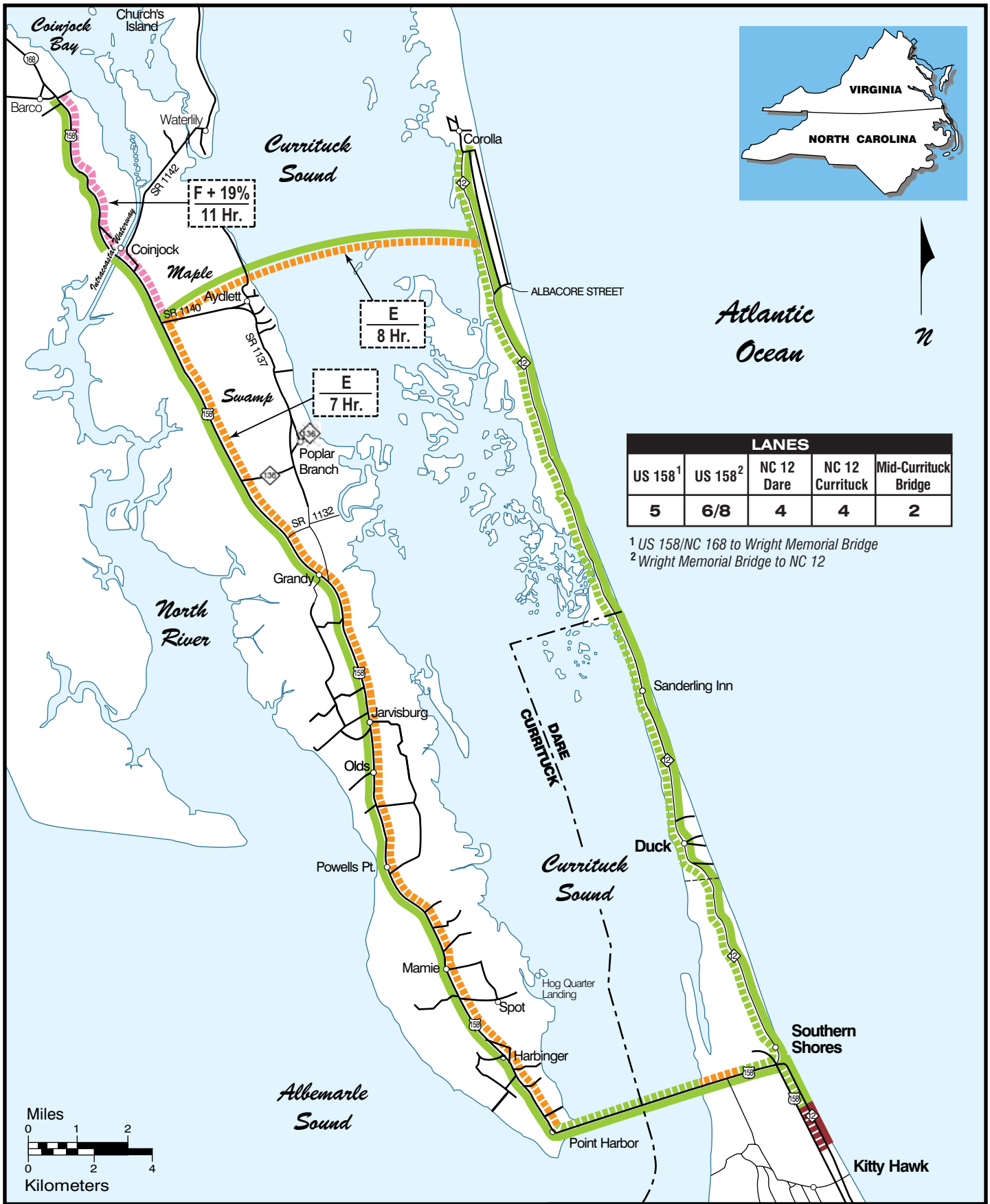
LEGEND

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)

2035 LOS Corridor Analysis Alternative ER2

Figure 12



LANES				
US 158[1]	US 158[2]	NC 12 Dare	NC 12 Currituck	Mid-Currituck Bridge
5	6/8	4	4	2

[1] *US 158/NC 168 to Wright Memorial Bridge*
[2] *Wright Memorial Bridge to NC 12*

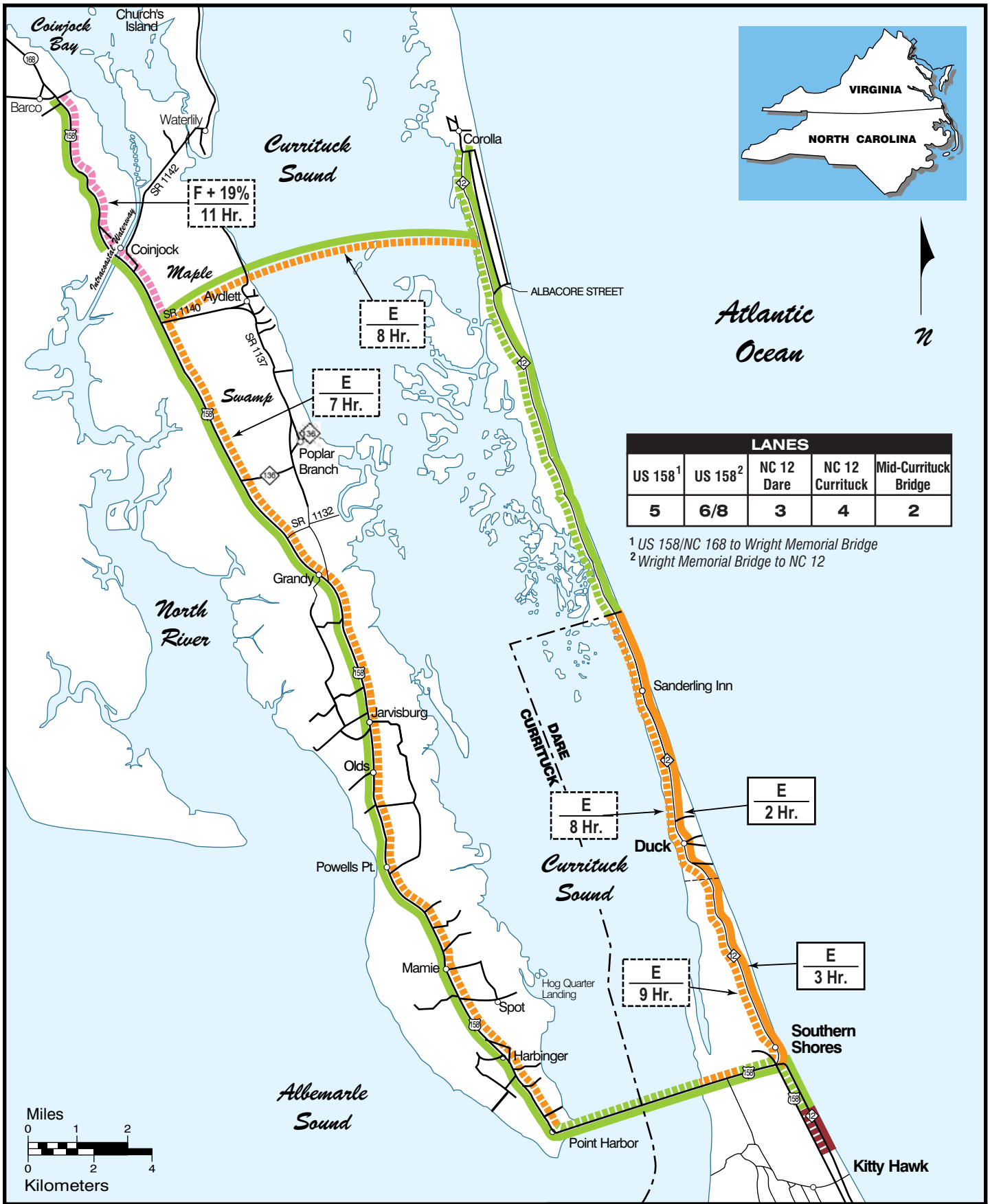
LEGEND

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)

2035 with Toll LOS Corridor Analysis Alternative MCB1

Figure 13



LANES				
US 158[1]	US 158[2]	NC 12 Dare	NC 12 Currituck	Mid-Currituck Bridge
5	6/8	3	4	2

[1] *US 158/NC 168 to Wright Memorial Bridge*
[2] *Wright Memorial Bridge to NC 12*

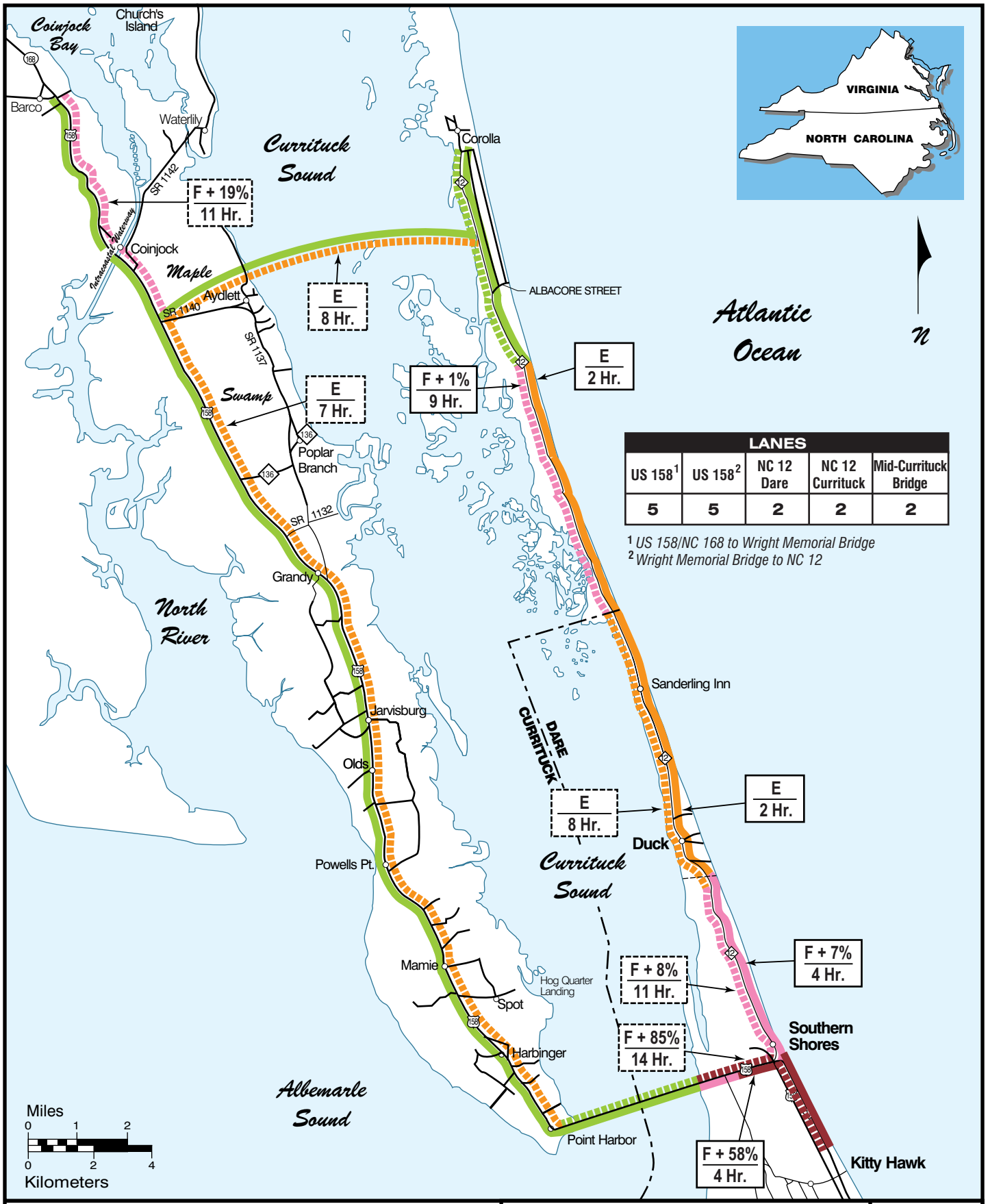
LEGEND

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)

2035 with Toll LOS Corridor Analysis Alternative MCB2

Figure 14



2035 with Toll LOS Corridor Analysis Alternatives MCB3 & MCB4

Figure 15

3.4.1 No-Build and Existing Roads(ER) Alternatives

The text below provides a discussion of LOS and V/C ratios findings for the existing conditions, No-Build, and Existing Road (ER) alternatives:

- 2006 Existing – Figure 9 provides a LOS summary for existing conditions. It illustrates that summer weekday operations are currently at LOS D or better on most roadways except for NC 12 in Dare County where LOS E and F occur in Southern Shores and Duck. Summer weekend traffic has more congestion with LOS E operations on US 158 between the Wright Memorial Bridge and NC 12 , as well as LOS E and F operations on NC 12 in Dare and Currituck counties. Also, summer weekend congestion at the intersection of NC 12 and US 158 results in major queues impacting signals along US 158 and traffic flow on NC 12. Improvements at this intersection are being examined by NCDOT as part of TIP No. R-4457.

- 2035 No-Build – As shown in Figure 10, very high levels of congestion are forecast by 2035 if no improvements are made to the regional network. NC 12 is forecast to have poor LOS F from Southern Shores north to Duck for both the summer weekday and summer weekend, restricting flow to Currituck County. Along US 158, poor LOS F is forecast between the Wright Memorial Bridge and NC 12 due to overall traffic volumes and signal delays. West of the Wright Memorial Bridge, US 158 is forecast to operate at LOS F on summer weekends.

- 2035 ER1 – As shown in Figure 11, ER1 addresses summer weekday and summer weekend conditions by widening NC 12 to four lanes. US 158 from the Wright Memorial Bridge to NC 12 is assumed widened to eight lanes reducing congestion although LOS F is still forecast near the NC 12 intersection on the summer weekend. West of the Wright Memorial Bridge, however, no improvements are planned, resulting in LOS F on the summer weekend.

- 2035 ER2 – As shown in Figure 12, ER2 addresses congestion on the Currituck County portion of NC 12 through a widening to four lanes. In Dare County, widening NC 12 to three lanes reduces congestion slightly although poor LOS F is still expected in Southern Chores on both the summer weekday and summer weekend. US 158 between the Wright Memorial Bridge and NC 12 is assumed widened to eight lanes reducing congestion although LOS F is still forecast on the summer weekend near the NC 12 intersection. West of the Wright Memorial Bridge, however, no improvements are planned (same as for No-Build and ER1) resulting in LOS F on the summer weekend.

3.4.2 Mid-Currituck Bridge (MCB) Alternatives

The text below provides a discussion of LOS and V/C ratio findings for each of the Build Bridge alternatives:

- 2035 MCB1 – As shown in Figure 13, MCB1 substantially reduces congestion compared with the No-Build. Widening NC 12 to four lanes eliminates LOS E and LOS F operations along NC 12. Widening along US 158 from the Wright Memorial Bridge to NC 12 (six lanes near the Wright Memorial Bridge and eight lanes near the NC 12 intersection) results in LOS D or better on the summer weekday, although LOS E is still observed on the summer weekend. West of the Wright Memorial Bridge to the new bridge, volumes are reduced because of traffic diverted to the new bridge. As a result, the summer weekend traffic improves to LOS E, compared with LOS F with the No-Build and ER alternatives. North of the new bridge, LOS F is anticipated on US 158. With a two-lane Mid-Currituck Bridge, LOS E is anticipated in the summer weekend.

- 2035 MCB2 – As shown in Figure 14, MCB2 has a similar traffic congestion pattern to MCB1 except along NC 12 in Dare County. With MCB2, NC 12 is widened to three lanes in Dare County improving operations to LOS E (as compared to a poor LOS F with ER2 which also widens NC 12 to three lanes). The improvement compared to ER2 results from diversions to the new bridge. Widening along US 158 from the Wright Memorial Bridge to NC 12 to six and eight lanes addresses LOS F congestion, but LOS E is still observed on the six-lane link near the Wright Memorial Bridge. West of the Wright Memorial Bridge to the new bridge, volumes are reduced because of traffic diverted to the new bridge, resulting in LOS E compared with LOS F with the No Build and ER alternatives. North of the new bridge, LOS F is anticipated on US 158. With a two-lane Mid-Currituck Bridge, LOS E is anticipated in the summer weekend on the bridge.

- 2035 MCB3 and MCB4 – As shown in Figure 15, MCB3 and MCB4 (which only provide the new bridge and widening along two to four miles of NC 12) reduce congestion less than the other MCB alternatives. On NC 12 in Currituck County, LOS F is expected south of the proposed widening, partially due to increased traffic volumes in Currituck County due to the bridge. In Dare County, LOS F is expected in Southern Shores, and LOS E is expected for Duck to points north. It should be noted that with MCB3 and MCB4, traffic operations are better in Dare County than with ER2 which has sections of poor LOS F despite the provision of three lanes. Not widening US 158 between the Wright Memorial Bridge and NC 12 results in poor LOS F on the summer weekend. On US 158 west of the Wright Memorial Bridge, summer weekend traffic flow operates at LOS E north to the new bridge, and at LOS F north of the new bridge. With a two-lane bridge, LOS E is anticipated in the summer weekend.

4.0 Network Congestion Measures

In addition to examining specific roadway links for LOS and V/C ratios to identify possible improvements, measures examining congestion on a network basis were employed. The measures of effectiveness analyzed were miles of congested roadway, congested and total vehicle miles traveled, and travel time.

In order to assess network congestion measures, assumptions were made to define specific network alternatives. For this analysis, the 2035 No-Build, 2035 Existing Roads alternatives (ER1 and ER2), and the Build Bridge alternatives (MCB1 through MCB4) were examined.

4.1 Miles of Congested Roadway

Table 22 provides a summary of traffic operations for each alternative in 2035. Instead of focusing on individual roadway segments, however, this table provides a calculation of the total mileage of roadway that operates at either LOS E, LOS F, or poor LOS F. For the purposes of this analysis, a poor LOS F was defined as segments with a V/C ratio exceeding 1.30. In general, LOS F occurs on segments with a V/C ratio exceeding 1.00. The V/C ratio for LOS E operations is more difficult to define and varies depending upon the typical section of the roadway.

An overview of Table 22 includes the following:

- Without improvements, LOS F is forecast on almost the entire roadway network for the 2035 summer weekend.
- MCB1 and ER1 eliminate a major portion of congestion by widening NC 12.
- If LOS E is used as the threshold to define congestion, differences between the alternatives are difficult to ascertain. It should be noted, however, that although the Build Bridge alternatives have more LOS E congested miles on the summer weekend than some alternatives, this includes inclusion of the Mid-Currituck Bridge as a LOS E congested link.
- If LOS F (V/C ratio greater than 1.0) is used to define congestion, it becomes apparent that the Build Bridge alternatives have fewer miles with LOS F operations.
- If poor LOS F (V/C ratio greater than 1.3) is used to define congestion, the Build Bridge alternatives have very low mileage operating at poor LOS F. This operation is limited to the section of US 158 between the Wright Memorial Bridge and NC 12 with the MCB3 and MCB4 alternatives.

Table 22. Miles of Congested Roadway for Roadway Alternatives (2035)

Time Period	Existing (2006)	No-Build	Highway Improvement Alternatives		Bridge Alternatives			
			ER1	ER2	MCB1	MCB2	MCB3	MCB4
Miles of Road Operating at LOS E, F, or Poor LOS F								
Summer Weekday	5.9	16.8	0.0	11.5	0.0	11.5	14.7	14.7
Summer Weekend	7.9	43.5	27.5	39.0	24.5	36.0	37.9	37.9
Miles of Road Operating at LOS F or Poor LOS F								
Summer Weekday	3.7	14.7	0.0	5.9	0.0	0.0	5.7	5.7
Summer Weekend	4.5	43.5	27.5	39.0	4.8	4.8	11.7	11.7
Miles of Road Operating at Poor LOS F								
Summer Weekday	0.0	5.7	0.0	3.7	0.0	0.0	0.8	0.8
Summer Weekend	0.0	7.9	0.0	5.9	0.0	0.0	2.0	2.0

Notes:
1. All data is for 2035 except for Existing 2006 conditions.
2. Existing, No-Build, and ER scenarios are based on 47.5-mile network. MCB alternatives (assuming addition of new bridge) are based on 54.4-mile network.

4.2 Duration of Congestion

Duration of congestion is a performance measure defined to assess how peak traffic congestion spreads out over a day, as well as over the entire year. For the purposes of this study, this measure was defined to analyze the number of hours that a facility remains at LOS E or LOS F over an entire year.

The study methodology involved stratifying the 365 days in a year into four categories based on peak and off-peak traffic conditions: Non-Summer Weekday, Non-Summer Weekend, Summer Weekday, and Summer Weekend. For Non-Summer Weekday and Non-Summer Weekend conditions, it was assumed that the study area roadway network will experience a two-hour peak hour spreading by year 2035. For Summer Weekday and Summer Weekend conditions, peak hour spreading was considered at a much higher level (two to six hours on the Summer Weekday and six to 16 hours on the Summer Weekend), and was defined based on projected 2035 traffic volumes, roadway capacity values for LOS E and LOS F, V/C ratios, and traffic distribution by time of day.

The duration of congestion on isolated segments operating at LOS E or LOS F is shown on Figure 9 through Figure 15 as a comparison between alternatives. Duration of congestion was examined in detail in the *2025 Traffic Alternatives Report* as a measure of congestion on specific links, but the 2035 alternatives analysis utilizes congested vehicle

miles traveled to more effectively compare overall congestion from a network perspective.

4.3 Vehicle Miles Traveled – Total & Congested

In order to examine overall network operations, the total vehicle miles traveled (VMT) were estimated for each alternative across the entire roadway network. VMT is a performance measure that measures all traffic flow and trips based upon the number of miles traveled by vehicles. The lengths of roadway links are taken into account as well as the number of vehicles on the roadway, thereby more effectively measuring travel. For the purposes of this study, total VMT as well as congested VMT were analyzed.

4.3.1 Methodology

The study methodology to compute VMT involved multiplying the 2035 forecast volumes on each link (from Table 2 or Table 3 as appropriate for each alternative) times the length of the roadway link. This measure (VMT for each link) was computed for non-summer and summer periods, as well as weekday and weekend periods to account for all days of the year. The sum of all of these time periods resulted in an estimate of total annual VMT in 2035.

Congested VMT was computed by multiplying the number of vehicles on each link that experienced congestion for each time period by the length of each link. The number of vehicles in congestion on each link was estimated by taking the number of forecast trips on each link and subtracting the daily number of vehicles that could be served at LOS D for the particular link and cross-section. The totals for all links and time periods were used to calculate the annual congested VMT in 2035.

For this analysis, congested VMT was assumed to represent LOS E and LOS F operations. Percent of congested travel was computed by dividing congested VMT by total VMT. (Note that in Section 6.1.3, additional calculations were conducted to identify the percent of LOS F and poor LOS F congested travel as part of the report conclusions.)

4.3.2 Findings

The VMT analysis was performed for the 2006 Existing and 2035 No-Build, Existing Road (ER1 and ER2), and Build Bridge (MCB1, MCB2, MCB3, and MCB4) alternatives as summarized in Table 23.

Table 23. Total and Congested VMT by Roadway Alternative (2035)

	2006 Existing	2035 No-Build	ER1	ER2	MCB1	MCB2	MCB3 & MCB4
Total Network							
Total VMT (mvm)	**355.1**	**663.9**	**663.9**	**663.9**	**577.7**	**578.3**	**578.3**
Congested VMT (mvm)	**5.4**	**66.1**	**29.6**	**51.4**	**22.3**	**31.4**	**40.2**
Percent VMT Congested	**1.5%**	**10.0%**	**4.5%**	**7.7%**	**3.9%**	**5.4%**	**6.9%**
US 158 West of Wright Memorial Bridge							
Number of Lanes	5	5	5	5	5	5	5
Total VMT (mvm)	214.4	438.6	438.6	438.6	355.4	358.2	358.2
Congested VMT (mvm)	0.0	28.7	28.7	28.7	16.9	17.2	17.2
Percent VMT Congested	0.0%	6.6%	6.6%	6.6%	4.8%	4.8%	4.8%
US 158 East of Wright Memorial Bridge							
Number of Lanes	5	5	8	8	6/8	6/8	5
Total VMT (mvm)	38.0	72.6	72.6	72.6	64.4	64.6	64.6
Congested VMT (mvm)	1.6	9.2	0.9	0.9	0.9	0.9	6.9
Percent VMT Congested	4.3%	12.7%	1.2%	1.2%	1.4%	1.5%	10.8%
NC 12 (Dare &Currituck)							
Number of Lanes	2 & 2	2 & 2	4 & 4	3 & 4	4 & 4	3 & 4	2 & 2/4
Total VMT (mvm)	102.6	152.7	152.7	152.7	126.5	124.6	124.6
Congested VMT (mvm)	3.7	28.1	0.0	21.8	0.0	9.0	11.8
Percent VMT Congested	3.6%	18.4%	0.0%	14.3%	0.0%	7.2%	9.4%
New Bridge							
Number of Lanes	No New Bridge				2	2	2
Total VMT (mvm)	NA	NA	NA	NA	31.4	31.0	31.0
Congested VMT (mvm)	NA	NA	NA	NA	4.5	4.3	4.3
Percent VMT Congested	NA	NA	NA	NA	14.3%	13.9%	13.9%

Notes:
1. VMT shown in million vehicle miles (mvm) traveled.
2. On NC 12, number of lanes shown is shown for Dare/Currituck counties.

A review of Table 23 indicates the following:

- The total VMT with a bridge is approximately 578 million vehicle miles in 2035 (MCB1 through MCB4). This is approximately 13 percent less than the 663.9 million vehicle miles without the bridge (No-Build, ER1, and ER2). This reduction in total vehicle miles is indicative of a more efficient roadway system which could result in less gasoline usage and emission of fewer vehicular related pollutants.

- The provision of a bridge reduces congested VMT most effectively on US 158 between the new bridge and the Wright Memorial Bridge as well as NC 12.

- Widening of NC 12 eliminates congested VMT on NC 12 with or without (MCB1 and ER1) the bridge.

- With the construction of a Mid-Currituck Bridge and no other widening improvements (MCB3 or MCB4), congested VMT is reduced by 40 to 50 percent compared with the No-Build scenario.

- With MCB-3 or MCB-4, congested VMT is projected to be 30 to 35 percent less than ER-2. The reduction is greater than 50 percent if the section of US 158 east of the Wright Memorial Bridge to NC 12 is improved (as in MCB-2).

4.4 Travel Time

Travel time is a function of distance, vehicle speed, and traffic signal delays. The following analysis presents travel time for years 2006 and 2035 for each of the roadway alternatives. The travel time analysis was developed for Summer Weekday and Summer Weekend conditions.

4.4.1 Methodology

In order to compute travel times during the current alternatives analysis stage of the project, a spreadsheet methodology was utilized. The analysis was completed for a single vehicle traveling from the proposed western terminus of a new Mid-Currituck Bridge (near Aydlett Road) to the proposed eastern terminus on NC 12 near the intersection with Albacore Street, a distance of approximately 41 miles.

The methodology treated the 41 mile roadway network under study as an arterial. Running times corresponding with travel speeds between intersections were combined with estimated future traffic signal operations along the corridor. For the analysis, both inbound (i.e., from the western end of the proposed bridge, south on US 158, east over the Wright Memorial Bridge, and north on NC 12) and outbound travel times were estimated. Inbound travel times were utilized because the analysis indicated that inbound flows had lower travel speeds overall and were critical for the alternatives comparison.

Multiple steps were involved in this analysis including:

- Travel time surveys were taken in the summer of 2006 for both Summer Weekend and Summer Weekday conditions. These results were used to initially check the existing model and to identify appropriate speed reductions on the network during periods of heavy congestion. The results indicated that Summer Weekday conditions have minor delays with higher delays due to congestion on the Summer Weekend. Also note that the travel time surveys were an average of multiple runs and, therefore, do not reflect the worst-case travel time observed.

- Using V/C ratios from the critical link analysis and the existing travel speed runs, speed reductions were assigned for the running speed between intersections. In

general, roadways with higher V/C ratios were assigned a greater decrease in speed resulting from congestion. In addition, locations with reduced intersection spacing were anticipated to operate slower. The speed reductions were developed separately for each alternative, reflecting the specific cross-section. Separate estimates were produced for Summer Weekday and Summer Weekend traffic.

- Signal delays were estimated for the through movements in the inbound direction for each of the roadway alternatives using a Synchro model. The Synchro model used the 2025 turn movements developed for the *2025 Traffic Alternatives Report* with growth rates assigned based upon the 2035 forecasts. These turn movement forecasts were originally based upon peak hour turn movement counts collected for the corridor (instead of balanced daily traffic forecasts).

- The running time between intersections was added to the signal delays from Synchro using a spreadsheet. These times were added to determine total travel time on the specific links.

- The travel times on specific links were added to compute total travel time. Travel speeds were estimated by utilizing the travel time on each link and the length of each link.

- All 2035 travel time analysis assumes that an interchange will be constructed at NC 12 and US 158 by NCDOT as part of TIP No. R-4457. It is assumed this improvement would be in place before 2035. If implemented, this improvement would substantially reduce delays at this critical intersection.

4.4.2 Travel Time Findings

Table 24 and Table 25 present the inbound travel times from the Aydlett Road intersection with US 158 (approximate proposed location of the western bridge termini) to the Albacore Street intersection with NC 12 (approximate proposed location of the eastern bridge termini) for the Summer Weekday and Summer Weekend periods, respectively. The analysis was conducted for 2006 existing conditions, as well as for the project alternatives. The tables break up travel time and average travel speeds for four roadway segments – two on US 158 and two on NC 12.

Specific conclusions that can be observed include:

- The new bridge route is approximately 8 miles long, compared with 41 miles for the existing route on US 158 and NC 12, resulting in a much faster alternative

Table 24. Summer Weekday Travel Times – Inbound Only (2035)

Summer Weekday		Uncon-gested	Existing (2006)	No-Build	ER1	ER2	MCB1	MCB2	MCB3 & MCB4
Inbound Segment	**Distance (mi)**	**Travel Time (minutes)**							
US 158 SB - New Bridge to WMB	22.9	25.5	25.6	30.4	28.4	28.8	27.7	28.1	29.4
US 158 SB - WMB to NC 12	1.3	2.6	3.4	21.9	9.3	9.4	8.8	8.2	16.8
NC 12 NB - US 158 to County Line	9.8	17.6	18.0	53.4	20.8	53.2	18.5	28.7	35.5
NC 12 NB - County Line to New Bridge	7.0	13.0	13.0	16.2	13.2	15.5	13.5	14.6	17.0
Total	**41.0**	**58.7**	**60.0**	**121.9**	**71.7**	**106.9**	**68.5**	**79.5**	**98.7**
Inbound Segment	**Distance (mi)**	**Average Travel Speed (mph)**							
US 158 SB - New Bridge to WMB	22.9	54	54	45	48	48	50	49	47
US 158 SB - WMB to NC 12	1.3	31	24	4	9	9	9	10	5
NC 12 NB - US 158 to County Line	9.8	33	33	11	28	11	32	20	17
NC 12 NB - County Line to New Bridge	7.0	32	32	26	32	27	31	29	25
Total	**41.0**	**42**	**41**	**20**	**34**	**23**	**36**	**31**	**25**

Notes:

1. For the Summer Weekday, the alternative travel time using a new Mid-Currituck Bridge is estimated to be approximately 9 minutes with a four-lane bridge and 10 minutes with a two-lane bridge.
2. Travel time analysis assumes interchange in place at NC 12 and US 158 for 2035 alternatives.

Table 25. Summer Weekend Travel Times – Inbound Only (2035)

Summer Weekend		Uncon-gested	Existing (2006)	No-Build	ER1	ER2	MCB1	MCB2	MCB3 & MCB4
Inbound Segment	**Distance (mi)**	**Travel Time (minutes)**							
US 158 SB - New Bridge to WMB	22.9	25.5	29.4	57.5	50.0	50.8	35.9	38.9	40.3
US 158 SB - WMB to NC 12	1.3	2.6	5.5	41.8	14.5	14.6	13.9	11.8	25.4
NC 12 NB - US 158 to County Line	9.8	17.6	31.1	110.3	20.6	86.1	19.9	34.7	41.3
NC 12 NB - County Line to New Bridge	7.0	13.0	13.0	23.5	13.5	18.8	13.8	16.4	19.3
Total	**41.0**	**58.7**	**79.0**	**233.1**	**98.6**	**170.4**	**83.4**	**101.8**	**126.3**
Inbound Segment	**Distance (mi)**	**Average Travel Speed (mph)**							
US 158 SB - New Bridge to WMB	22.9	54	47	24	27	27	38	35	34
US 158 SB - WMB to NC 12	1.3	31	15	2	6	5	6	7	3
NC 12 NB - US 158 to County Line	9.8	33	19	5	28	7	29	17	14
NC 12 NB - County Line to New Bridge	7.0	32	34	18	31	22	31	26	22
Total	**41.0**	**42**	**31**	**11**	**25**	**14**	**30**	**24**	**20**

Notes:

1. For the Summer Weekday, the alternative travel time using a new Mid-Currituck Bridge is estimated to be approximately 9 minutes with a four-lane bridge and 10 minutes with a two-lane bridge.
2. Travel time analysis assumes interchange in place at NC 12 and US 158 for 2035 alternatives.

route even under relatively uncongested conditions. Note that not all users of the bridge will save the maximum travel time. Of the 22,500 vpd forecast to use the new bridge on the 2035 summer weekend, it is estimated that 28 percent would eliminate the entire 41 mile trip on the existing roads, and an additional 18 percent would save at least 36 miles of travel on the existing roads. The remainder of vehicles using the bridge would save less than 36 miles of travel.

- As previously determined in the 2025 analysis, inbound travel flow times are slightly longer than outbound flow times. The primary location of additional delays for inbound flows are along US 158 between the Wright Memorial Bridge and NC 12 where inbound (i.e., US 158 southbound) traffic gets caught in delays, particularly at the US 158/NC 12 intersection and the Juniper Trail/Wal-Mart intersection.

- In 2006, the total travel time was estimated to be 60.0 minutes on the Summer Weekday and 79.0 minutes on the Summer Weekend (compared with a forecasted time for uncongested conditions of 58.7 minutes.) By 2035 with no roadway improvements and no Mid-Currituck Bridge, the travel time is forecast to increase to 121.9 minutes (approximately 2 hours) on the Summer Weekday and 233.1 minutes (almost 4 hours) on the Summer Weekend.

- Alternatives that widen NC 12 to four lanes (as included in ER1 and MCB1) have the lowest 2035 travel times on the corridor since they widen NC 12 as well as US 158 east of the Wright Memorial Bridge.

- If NC 12 remains two or three lanes in Dare County (ER2, MCB2, MCB3, and MCB4), the building of a Mid-Currituck Bridge provides the most effective travel time reduction for the existing route using NC 12 and US 158. This improvement on the existing roads is due to a diversion of up to 20,000 trips to the new bridge and off of the existing route utilizing the Wright Memorial Bridge.

- The construction of a new bridge, in addition to relieving congestion and increasing average travel speeds on the existing roadways, will provide an alternate route choice. The travel time across a new Mid-Currituck Bridge is estimated to be approximately 10 minutes on the summer weekday and 14 minutes on the summer weekend with a two-lane bridge.

5.0 Potential Effects of Non-Roadway Strategies

This section documents the sketch-level planning analysis conducted with non-roadway strategies such as transit, shifting rental unit start times, and ferry service. The purpose was to assess the potential effects of these strategies on roadway LOS and V/C ratios. In order to compare the roadway and non-roadway alternatives, the same network measures of effectiveness examined in Section 3.4.1 were investigated.

5.1 Low Capital Investment and Operational Alternatives

The Low Capital Investment and Operational Alternatives would involve no substantial investment in highway infrastructure, such as widening roads or building bridges. These alternatives would seek to improve the efficiency of the existing road system. They consist of shifting rental times to alter the peaking characteristics of travel in the project area, transportation systems management (TSM), and bus transit.

5.1.1 Shift Rental Times Alternative

The project area includes a substantial number of vacation rental properties that commonly rent by the week with their peak use being in the summer (June to August). The distribution of rental unit check-ins and check-outs in the project area is 70 percent on Saturday, 25 percent on Sunday, and 5 percent on Friday. It is on the summer weekend during rental unit check-out and check-in that the highest traffic volumes in the project area occur. The Shift Rental Times alternative assumes that shifting arrival times and check-ins to an even distribution amongst Friday, Saturday, and Sunday would improve the project area traffic flow.

The 2035 traffic forecast for the Shift Rental Times alternative was developed using the 2035 No-Build traffic projections as a base. The summer weekday traffic volumes were adjusted by computing the anticipated increase in traffic at Link 9 and distributing this traffic increase onto both US 158 and NC 12. Based upon the analysis, it was determined that the summer weekday increase in traffic was approximately 4.7 percent of Link 9 traffic (i.e., 2,026 vpd).

For the summer weekend, Link 9 was also used to determine the expected decrease in rental traffic due to shifted rental times. Based upon the analysis, it was determined that the summer weekend decrease in traffic was approximately 9.1 percent of Link 9 traffic (i.e., 4,313 vpd).

Table 26 illustrates the traffic forecast for the Shift Rental Times alternative.

Table 26. Future (2035) Daily Traffic Volumes for the Shift Rental Times Alternative

Link #	Roadway Link	Vehicles per day				
		AADT	Non-Summer Weekday	Non-Summer Weekend	Summer Weekday	Summer Weekend
1	US 158 south of Barco	45,400	37,400	35,800	56,300	88,300
2	US 158 near Bertha	42,000	35,200	32,600	49,400	85,600
3	US 158 near Jarvisburg	44,900	38,600	34,800	52,800	86,000
4	US 158 near Mamie	47,700	42,100	37,300	55,300	87,100
5	US 158 at Wright Memorial Bridge	48,700	43,100	37,000	60,900	80,300
6	US 158 between the Wright Memorial Bridge and NC 12	64,000	55,700	47,300	84,500	103,900
7	US 158 just west of NC 12 intersection	78,700	68,200	58,500	104,800	127,400
8	US 158 just south of NC 12 intersection	66,500	57,200	47,100	93,600	104,500
9	NC 12 just north of US 158 intersection	31,900	28,800	22,300	45,100	43,100
10	NC 12 at Duck	29,000	26,500	21,300	38,200	40,100
11	NC 12 in Sanderling	23,700	21,900	16,900	31,100	32,900
14	NC 12 at Dare/ Currituck County Line	23,400	21,500	17,700	30,300	32,500
12	NC 12 just south of Albacore Street	20,100	18,200	14,800	26,500	28,500
13.	NC 12 just south of Corolla	9,800	9,200	7,200	12,700	13,500

5.1.2 Transportation Systems Management (TSM) Alternative

TSM is defined as improvements that seek to maximize the efficiency of the existing transportation system without a major capital investment. The TSM alternative includes:

- Optimizing signal timing on US 158 and NC 12 in the project area to improve traffic flow through signalized intersections;
- Improving major intersections on NC 12 (those that service numerous homes) with left-turn lanes and/or traffic signals; and

- Restricting side-road access on some other intersections, generally in the form of "right in-right out" turns only from local streets and, where alternate access is available, intersection closures to reduce the number of points where drivers would slow to make turns.

In addition, this alternative includes provisions for reversing lanes on US 158 from NC 168 in Currituck County to NC 12 in Dare County during a hurricane evacuation, which is an approach to facilitating hurricane evacuation that focuses on maximizing the efficiency of the current road system.

The traffic forecast for the TSM alternative is the same as for the No-Build alternative and is shown in Table 27.

Table 27. Future (2035) Daily Traffic Volumes for the TSM Alternative

Link #	Roadway Link	Vehicles per day				
		AADT	Non-Summer Weekday	Non-Summer Weekend	Summer Weekday	Summer Weekend
1	US 158 south of Barco	45,800	37,400	37,500	54,300	92,600
2	US 158 near Bertha	43,300	35,200	38,500	47,400	89,900
3	US 158 near Jarvisburg	47,500	38,600	46,700	50,800	90,300
4	US 158 near Mamie	51,700	42,100	55,300	53,300	91,400
5	US 158 at Wright Memorial Bridge	53,100	43,100	57,200	58,900	84,600
6	US 158 between the Wright Memorial Bridge and NC 12	67,600	55,700	63,900	82,500	108,200
7	US 158 just west of NC 12 intersection	81,800	68,200	72,500	102,800	131,700
8	US 158 just south of NC 12 intersection	68,000	57,200	53,700	93,600	104,500
9	NC 12 just north of US 158 intersection	36,000	28,800	40,900	43,100	47,400
10	NC 12 at Duck	32,600	26,500	37,900	36,500	44,100
11	NC 12 in Sanderling	26,800	21,900	32,200	29,700	36,200
14	NC 12 at Dare/ Currituck County Line	26,300	21,500	29,900	28,900	35,700
12	NC 12 just south of Albacore Street	20,800	17,200	23,000	23,300	29,400
13	NC 12 just south of Corolla	10,800	9,200	11,500	12,100	14,800

Note: The TSM alternative has the same traffic volumes as the No-Build alternative.

5.1.3 Bus Transit Alternative

This alternative would introduce bus transit into the project area with the objective of reducing the number of private vehicles traveling throughout the project area. In considering the Bus Transit Alternative, the following items were taken into account:

- Existing bus transit service is minimal and no plans for public transit exist within the project area.
- FHWA guidance (Technical Advisory T 6640.8A) indicates that customarily transit is "considered as a potential alternative on proposed major highway projects in urbanized areas over 200,000 population." This project is not in such an urbanized area.
- There is no single concentrated destination where most trips go, such as a central business district in an urban area. Rather, people go to and from many scattered destinations.
- Transit service in resort areas usually involves transit circulating in an area of concentrated activity, such as an area of high-rise hotels and night clubs, which the project area does not have and neither does the Outer Banks as a whole.
- Even in urban areas (that already have a transit system) with a single concentrated destination conducive to public transit, national trends indicate that only about 10 percent of total trips in these areas use transit.

There are two types of trips to try to capture so transit could potentially make a contribution to reducing congestion in the study area – long distance and local trips.

5.1.3.1 Long Distance Trips

On the summer weekend, long distance tourist trips arrive in the area and depart the area to return home. It was concluded that these trips could not be captured by transit for the following reasons:

- Visitors to the project area predominantly come by automobile carrying personal items needed for up to a week-long stay. They also bring children.
- In order to capture these travelers, they would have to be willing to: spend the time to load their luggage and other personal items into a bus; ride a bus with multiple stops along the way; walk with their luggage from the bus to the real estate office to check-in; board another bus with luggage to get into the general vicinity of their final destination (buses could not stop at every beach home); and finally walk with their luggage to their beach home or other destination. This clearly would be very time consuming and inconvenient.

- No benefits of transit exist that would offset the time and inconvenience described in the previous bullet to make transit attractive.

5.1.3.2 Local Trips

Of local trips on the roadway network (either permanent residents or tourists that have already checked into their rental property), it was assumed that, optimistically, bus transit could capture one percent of the trips in the project area. This conclusion was based on the following:

- On the summer weekday, the predominant type of trip is people moving between low density, dispersed origins and destinations. As noted above, even in urban areas with land use patterns that facilitate transit, one cannot expect to capture more than 10 percent of the trips. In the Raleigh-Durham Metropolitan area, 2 to 3 percent of the work trips are on transit. Thus, it is expected that the number of summer weekday trips that could be captured would be something less than – probably substantially less than – 2 to 3 percent.

- Most transit users use transit because it will save them time, parking at their destination is unavailable or expensive, incentives are offered by employers, or they do not own or have access to an automobile. Only travel time would apply on the Outer Banks, and bus transit service on the Outer Banks would operate on the same congested roads as other traffic.

- In order to get an estimate of the percent of trips that could be attracted to transit, the travel time on a bus under uncongested conditions was estimated for a trip on NC 12 from the US 158/NC 12 intersection to Albacore Street in Currituck County (approximately 16.8 miles). The analysis included estimates for the amount of time required for passengers to walk to the bus (7.5 minutes), wait for the bus (15 minutes, assuming 30-minute headways), ride the bus with the bus stopping every one-half mile for one minute to take on passengers, and walk to their destination (7.5 minutes).

- Based on the methodology above, it was found that bus travel times under uncongested conditions were greater (94 minutes) than automobile travel times on a 2035 summer weekday under congested conditions (55 to 65 minutes depending on the direction of travel). Thus, it is likely that bus transit would be little used if provided. It was felt, however, that at least some use might occur, so it was assumed that one percent of trips on NC 12 would use bus transit if provided.

Specific design and operational characteristics of the Bus Transit Alternative were not developed pending a finding on whether or not the potential benefits of transit make it an option worth pursuing in further detail.

5.1.3.3 Traffic Forecast with Transit

In order to determine traffic forecasts for the Bus Transit alternative, the 2035 No-Build alternative was used as a base. From this forecast, peak hour estimates of the percentage split between local (could use transit) and long distance (unwilling to use transit) trips were computed. From this split, it was assumed that up to one percent of local trips may opt to use transit. This traffic was removed from the traffic forecasts for the links on NC 12 and US 158 south of the NC 12 intersection (the transit service was assumed to extend south of the study area on US 158). The peak hour diversions were adjusted to reflect transit operation throughout the day and the traffic forecasts were estimated as shown in Table 28.

Table 28. Future (2035) Daily Traffic Volumes for Bus Transit Alternative

Link #	Roadway Link	Vehicles per day				
		AADT	Non-Summer Weekday	Non-Summer Weekend	Summer Weekday	Summer Weekend
1	US 158 south of Barco	45,400	37,400	35,800	54,300	92,600
2	US 158 near Bertha	42,000	35,200	32,600	47,400	89,900
3	US 158 near Jarvisburg	44,900	38,600	34,800	50,800	90,300
4	US 158 near Mamie	47,700	42,100	37,300	53,300	91,400
5	US 158 at Wright Memorial Bridge	48,700	43,100	37,000	58,900	84,600
6	US 158 between the Wright Memorial Bridge and NC 12	64,000	55,700	47,300	82,500	108,200
7	US 158 just west of NC 12 intersection	78,700	68,200	58,500	102,800	131,700
8	US 158 just south of NC 12 intersection	66,300	57,000	46,900	93,200	104,400
9	NC 12 just north of US 158 intersection	31,700	28,600	22,100	42,700	47,300
10	NC 12 at Duck	28,800	26,300	21,100	36,200	44,000
11	NC 12 in Sanderling	23,500	21,700	16,800	29,400	36,100
14	NC 12 at Dare/ Currituck County Line	23,200	21,300	17,500	28,700	35,600
12	NC 12 just south of Albacore Street	20,000	18,100	14,700	25,100	31,300
13	NC 12 just south of Corolla	9,700	9,100	7,100	12,000	14,800

Note that the traffic volumes for the Bus Transit alternative are very similar to the 2035 No-Build alternative forecast with reductions in volume limited to NC 12.

5.2 Ferry Alternatives

A ferry was considered as a possible alternative to a Mid-Currituck Bridge. Four ferry alternatives were assessed: F1, F2, F3, and F4. Each alternative includes the same improvements as MCB1, MCB2, MCB3, and MCB4, respectively, except that a ferry is used instead of a Mid-Currituck Bridge. The basic features of the ferry alternatives are:

- **F1**
  - Provides ferry service across Currituck Sound in Currituck County ;
  - Adds a third northbound lane on US 158 from NC 168 to the Wright Memorial Bridge as a hurricane evacuation improvement or using the center turn lane as a third northbound evacuation lane;
  - Widens US 158 to eight lanes between the Wright Memorial Bridge and the NC 12 intersection; and
  - Widens NC 12 to four lanes between the Wright Memorial Bridge and Corolla.
- **F2**
  - Provides a ferry service across Currituck Sound in Currituck County ;
  - Adds a third northbound lane on US 158 from NC 168 to the Wright Memorial Bridge as a hurricane evacuation improvement or using the center turn lane as a third northbound evacuation lane;
  - Widens US 158 to eight lanes between the Wright Memorial Bridge and the NC 12 intersection; and
  - Widens NC 12 to three lanes between the Wright Memorial Bridge and the Dare-Currituck County Line and to four lanes between the Dare-Currituck County Line and Corolla.
- **F3**
  - Provides a ferry service across Currituck Sound in Currituck County ; and
  - Adds a third northbound lane on US 158 from NC 168 to the Wright Memorial Bridge as a hurricane evacuation improvement or using the center turn lane as a third northbound evacuation lane.

- **F4**
  - Implements the components of F3; and
  - Adds a third northbound lane on US 158 between the Wright Memorial Bridge and NC 12 as an additional hurricane evacuation improvement.

5.2.1 Ferry Service Assumptions

The ferry alternatives analysis evaluated the number and size of ferries that could be realistically provided instead of a bridge. After evaluation, it was determined that it would not be feasible to provide a ferry service that would serve travel demand similar to a Mid-Currituck Bridge without substantial cost and potential for environmental impact. Therefore, the following assumptions were used in defining the ferry component of the ferry alternatives:

- Based upon NCDOT's many years of experience in operating ferry service in North Carolina, the proposed ferry alternatives are assumed to have the equipment and operating characteristics best suited for North Carolina waters.
- A typical NCDOT ferry service operation includes four operating ferries with a combined capacity of 80 vehicles per hour in the peak direction (2 trips per direction x 40 vehicles per ferry trip) operating out of two ferry terminals, one at the origin and one at the destination.
- Assuming that in order for the ferry alternatives to be viable alternatives to a bridge, the ferry system should not cost substantially more than the total cost (capital, operation, and maintenance) of a four-lane bridge over 50 years.

Based upon these assumptions, it was determined that three typical ferry services operating over 50 years would be roughly equivalent to the cost of building, operating, and maintaining a Mid-Currituck Bridge over the same period. Thus, three sets of typical ferry service operations were assumed to be in place for the ferry component of F1 to F4.

5.2.2 Ferry Traffic Forecasts

In order to determine the traffic forecast impact of the ferry service, the 2035 No-Build alternative forecast was used a base. It was assumed that the three ferry service operations noted above would operate at full capacity for the summer weekday and summer weekend with an hourly capacity of 240 vph in the peak direction (3 ferry service operations x 80 vehicles per hour) and 160 vph in the non-peak direction (assumed 60-40 split). For the non-summer periods, it was assumed that only one ferry service would operate with a capacity of 80 vph in the peak direction. This level of

hourly operation was assumed to occur for 10 to 16 hours per day, depending upon the time period, with an adjustment to account for lower usage during non-peak periods.

Using these assumptions, the forecast ferry traffic was removed from US 158 and from sections of NC 12 to reflect the trip diversion. The traffic forecast is shown in Table 29.

Table 29. Future (2035) Daily Traffic Volumes for Ferry Alternatives

Link #	Roadway Link	Vehicles per day				
		AADT	Non-Summer Weekday	Non-Summer Weekend	Summer Weekday	Summer Weekend
1	US 158 south of Barco	45,400	37,400	35,800	54,300	92,600
2	US 158 near Bertha	40,300	34,700	31,600	42,900	84,100
3	US 158 near Jarvisburg	43,200	38,100	33,800	46,300	84,500
4	US 158 near Mamie	46,000	41,600	36,300	48,800	85,600
5	US 158 at Wright Memorial Bridge	47,000	42,600	36,000	54,400	78,800
6	US 158 between the Wright Memorial Bridge and NC 12	62,300	55,200	46,300	78,000	102,400
7	US 158 just west of NC 12 intersection	77,000	67,700	57,500	98,300	125,900
8	US 158 just south of NC 12 intersection	64,800	56,700	46,100	89,100	98,700
9	NC 12 just north of US 158 intersection	30,200	28,300	21,300	38,600	41,600
10	NC 12 at Duck	27,800	26,100	20,600	33,400	40,100
11	NC 12 in Sanderling	23,000	21,700	16,500	27,900	33,900
14	NC 12 at Dare/Currituck County Line2	23,400	21,500	17,700	28,900	35,700
12	NC 12 just south of Albacore Street	21,300	18,600	15,500	28,400	35,400
13	NC 12 just south of Corolla	9,800	9,200	7,200	12,100	14,800

5.3 Network Congestion Measures

In order to compare the roadway and non-roadway alternatives, the same network congestion measures examined in Section 3.4.1 were investigated. The analysis is included in the following sections.

5.3.1 Miles of Congested Roadway

In Section 4.1, an analysis of the miles of congested roadway was summarized for both the ER and MCB roadway alternatives. It summarized the miles of roadway expected to operate under congested conditions in 2035 during both the summer weekday and the summer weekend. The analysis provided three methods for measuring congested roadways – the miles of roadway operating at LOS E or worse, the mile of roadway operating at LOS F or worse, and the miles of roadway operating at a poor LOS F (V/C greater than 1.3). The data was summarized in Table 22 for the roadway alternatives.

Table 30 provides a summary of the same information for the non-roadway alternatives. It indicates the miles of roadway operating under congested conditions with three thresholds for defining congestion: LOS E or worse, LOS F (including poor LOS F), and poor LOS F only. For the purposes of this analysis, a poor LOS F was estimated as segments with a V/C ratio exceeding 1.30. In general, LOS F occurs on segments with a V/C ratio exceeding 1.00. The V/C ratio for LOS E operations is more difficult to define and varies depending upon the cross-section of the roadway.

Table 30. Miles of Congested Roadway for Non-Roadway Alternatives (2035)

Time Period		Low Capital Investment & Operational Strategies			Ferry Alternatives			
	No-Build	Shifting Rental Times	TSM	Bus Transit	F1	F2	F3	F4
Miles of Road Operating at LOS E, F, or poor LOS F								
Summer Weekday	16.8	16.8	16.8	16.8	0.0	11.5	14.7	14.7
Summer Weekend	43.5	43.5	43.5	43.5	28.7	40.2	41.4	41.4
Miles of Road Operating at LOS F or poor LOS F								
Summer Weekday	14.7	14.7	13.5	14.7	0.0	5.9	9.1	9.1
Summer Weekend	43.5	41.4	43.5	43.5	28.7	40.2	41.4	41.4
Miles of Road Operating at Poor LOS F								
Summer Weekday	5.7	5.7	5.7	5.7	0.0	0.0	5.7	5.7
Summer Weekend	7.9	5.7	7.9	7.9	0.0	0.0	5.7	5.7

Notes:
1. All data is for 2035.
2. No-Build and non-bridge alternatives are based on 47.5 mile network.

Comparing the low capital investment alternatives with the No-Build alternative indicates very little difference, although the miles of roadway operating at a poor LOS F is reduced. The ferry alternatives do reduce the mileage of congested roadways compared with the No-Build alternative using all three congestion thresholds.

A comparison between Table 30 and Table 22 indicates, however, that the MCB alternatives reduced the mile of congested roadway more effectively. The effectiveness of the MCB alternatives at reducing congested roadway miles is most apparent when comparing miles of congested roadway at the LOS F and the poor LOS F thresholds.

5.3.2 Vehicle Miles Traveled – Total & Congested

In Section 4.3, an analysis of VMT was summarized for both the ER and MCB roadway alternatives. VMT is a performance measure that measures all traffic flow and trips based upon the number of miles traveled by vehicles. The summary identified both the total and congested annual vehicle mile traveled for the year 2035. Assuming LOS E as congested, vehicle miles were evaluated for non-summer and summer peak periods on US 158, NC 12, and the new bridge. The data was summarized in Table 23 for the roadway alternatives.

A similar analysis was conducted for the non-roadway alternatives and is summarized in Table 31. In comparison with the 2035 No-Build alternative, the low capital investment alternatives do not reduce total VMT and provide only minimal reductions in congested VMT.

The ferry alternatives do reduce total VMT and congested VMT. However, if compared with the respective MCB alternatives (i.e., compare F1 to MCB1, F2 to MCB2, etc.) in Table 23, the reduction in total VMT is four times more for the MCB alternatives. In addition, the MCB alternatives more effectively reduce congested VMT than the ferry alternatives.

5.3.3 Travel Time

In Section 4.4, an analysis of travel times on the existing 40-mile US 158 and NC 12 alternate to the proposed Mid-Currituck Bridge was summarized for both the ER and MCB roadway alternatives. Both the travel time and average travel speeds on the route were identified for inbound traffic in 2035. The data was summarized in Table 24 and Table 25 for the roadway alternatives.

Table 32 presents the same information for the non-roadway alternatives. The analysis focuses on the total travel time from the Aydlett Road intersection at US 158 (approximate location of the western terminus of a new bridge) to the Albacore Street intersection with NC 12 (approximate location of the eastern terminus of a new bridge) for the Summer Weekday and Summer Weekend periods in 2035.

Table 31. Total and Congested VMT for Non-Roadway Alternatives (2035)

	Existing (2006)	No-Build	Shifting Rental Times	TSM	Bus Transit	F1	F2	F3 & F4
Total Network								
Total VMT (mvm)	355.1	663.9	664.6	663.9	662.7	643.9	643.9	643.9
Congested VMT (mvm)	5.4	66.1	65.1	62.9	66.0	29.0	46.5	56.4
Percent VMT Congested	1.5%	10.0%	9.8%	9.5%	10.0%	4.5%	7.2%	8.8%
US 158 West of Wright Memorial Bridge								
Number of Lanes	5	5	5	5	5	5	5	5
Total VMT (mvm)	214.4	438.6	439.1	438.6	438.6	424.4	424.4	424.4
Congested VMT (mvm)	0.0	28.7	28.7	28.7	28.7	26.6	26.6	26.6
Percent VMT Congested	0.0%	6.6%	6.5%	6.6%	6.6%	6.3%	6.3%	6.3%
US 158 East of Wright Memorial Bridge								
Number of Lanes	5	5	5	5	5	5	5	5
Total VMT (mvm)	38.0	72.6	72.6	72.6	72.5	70.7	70.7	70.7
Congested VMT (mvm)	1.6	9.2	9.2	9.2	9.2	2.4	2.4	8.6
Percent VMT Congested	4.3%	12.7%	12.6%	12.7%	12.7%	3.4%	3.4%	12.2%
NC 12 (Dare & Currituck)								
Number of Lanes	2 & 2	2 & 2	2 & 2	2 & 2	2 & 2	2 & 2	2 & 2	2 & 2
Total VMT (mvm)	102.6	152.7	152.9	152.7	151.6	148.8	148.8	148.8
Congested VMT (mvm)	3.7	28.1	27.2	24.9	28.1	0.0	17.5	21.2
Percent VMT Congested	3.6%	18.4%	17.8%	16.3%	18.5%	0.0%	11.8%	14.2%

Notes:
1. VMT shown in million vehicle miles (mvm) traveled.
2. On NC 12, number of lanes shown is for Dare & Currituck counties.

In general, the low capital investment alternatives provide a minimal reduction in travel times on existing US 158 and NC 12. The ferry alternatives F1 and F2 provide a more substantial reduction, but F3 and F4 provides only a 10 minute travel time reduction on the summer weekday and approximately 35 minutes on the summer weekend. In comparison, the MCB alternatives have more than double the time savings on the existing route. It should also be noted that the ferry crossing of the Currituck Sound would be expected to take close to one hour on average compared to approximately 10 to 14 minutes over a bridge.

Table 32. Travel Times for Non-Roadway Alternatives – Inbound Only (2035)

Time Period	Uncongested	Existing (2006)	No-Build	Shifting Rental Times	TSM	Bus Transit	F1	F2	F3 & F4
Inbound Segment	**Travel Time (minutes)**								
Summer Weekday	58.7	59.6	122.0	134.2	112.2	122.0	70.8	101.2	111.8
Summer Weekend	58.7	78.5	233.1	197.6	200.1	233.0	91.8	144.3	197.6
Inbound Segment	**Average Travel Speed (mph)**								
Summer Weekday	42	41	20	18	22	20	35	24	22
Summer Weekend	42	31	11	12	12	11	27	17	12

Notes:

1. For the Summer Weekday, the alternative travel time using a new Mid-Currituck Bridge is estimated to be approximately 9 minutes with a four-lane bridge and 10 minutes with a two-lane bridge.
2. Travel time analysis assumes interchange in place at NC 12 and US 158 for 2035 alternatives.
3. Roadway network used for travel time analysis is 41.0 miles.
4. For the non-roadway alternatives, travel times were not calculated on a per segment basis.

6.0 Conclusions

6.1 Primary Findings and Comparison of Alternatives

The purpose of the 2035 Traffic Alternatives Report is to provide traffic measures of effectiveness to facilitate the comparison of alternatives. These alternative include the No-Build, six roadway alternatives (ER1, ER2, MCB1, MCB2, MCB3, and MCB4), three low capital investment and operational alternatives (Shifting Rental Times, TSM, and Bus Transit), and four ferry alternatives (F1, F2, F3, and F4). A similar analysis was conducted using 2025 data, but the analysis was expanded to more thoroughly investigate the non-roadway alternatives, as well as to expand the analysis to factor in 2035 forecasts, including the impact of tolls.

Table 33 was developed to focus on comparing the alternatives including No-Build, Low Capital Investment and Operational, Widening, Build Bridge, and Ferry alternatives. The traffic measures of effectiveness included in Table 33 have been refined to examine those measures providing meaningful comparisons between alternatives. This includes the development of a weighted average to factor both Summer Weekday and Summer Weekend results into a single measure.

6.1.1 Traffic Forecasts (See Section 2.0)

- Summer Weekday traffic is the design period for this project. Despite this, operations during the Summer Weekend are a consideration since the highest volumes of traffic occur during this period.

- Traffic volumes are highest during the summer, and particularly the Summer Weekend. In addition, the Summer Weekend traffic has a non-standard peaking pattern with high volumes resulting in congested flow for 8 to 16 hours. Weekday traffic has a more traditional pattern than the weekend with an AM and PM peak period, although volumes are high throughout the day.

- The 2035 forecast included growth since the previous 2025 forecasts. In addition, toll diversion was computed to determine the amount of traffic that would be diverted from the proposed new bridge as a result of toll. It should be noted that the 2035 forecast with tolls on the new bridge is lower that the 2025 forecast without tolls.

Table 33. Summary of Alternatives – Traffic Measures of Effectiveness (2035)

Congestion Measures	No-Build	Low Capital Investment & Operational Alternatives			Widening Alternatives		Bridge Alternatives				Ferry Alternatives			
		Shifting Rental Times	TSM	Bus Transit	ER1	ER2	MCB1	MCB2	MCB3	MCB4	F1	F2	F3	F4
Vehicle Miles Traveled (VMT)														
Total Vehicle Miles Traveled (VMT)	663.9	664.6	663.9	662.7	663.9	663.9	577.7	578.3	578.3	578.3	643.9	643.9	643.9	643.9
Congested Annual Millions of VMT (LOS E, F, & poor LOS F)	66.1	65.1	62.9	66.0	29.6	51.4	22.3	31.4	40.2	40.2	29.0	46.5	56.4	56.4
Congested Annual Millions of VMT (LOS F & poor LOS F)	60.6	57.8	55.3	60.6	29.6	44.4	5.3	5.3	17.7	17.7	29.0	41.7	48.5	48.5
Congested Annual Millions of VMT (poor LOS F)	15.8	13.6	15.7	15.8	0.0	8.9	0.0	0.0	4.9	4.9	0.0	0.0	12.4	12.4
Mile of Road Operating at LOS E, F, or poor LOS F														
Summer Weekday (SWD)	16.8	16.8	16.8	16.8	0.0	11.5	0.0	11.5	14.7	14.7	0.0	11.5	14.7	14.7
Summer Weekend (SWE)	43.5	43.5	43.5	43.5	27.5	39.0	24.5	36.0	37.9	37.9	28.7	40.2	41.4	41.4
Weighted Average of SWD & SWE	24.4	24.4	24.4	24.4	7.9	19.4	7.0	18.5	21.3	21.3	8.2	19.7	22.3	22.3
Mile of Road Operating at LOS F (V/C > 1.0)														
Summer Weekday (SWD)	14.7	14.7	13.5	14.7	0.0	5.9	0.0	0.0	5.7	5.7	0.0	5.9	9.1	9.1
Summer Weekend (SWE)	43.5	41.4	43.5	43.5	27.5	39.0	4.8	4.8	11.7	11.7	28.7	40.2	41.4	41.4
Weighted Average of SWD & SWE	22.9	22.3	22.1	22.9	7.9	15.4	1.4	1.4	7.4	7.4	8.2	15.7	18.3	18.3
Mile of Road Operating at Poor LOS F (V/C > 1.3)														
Summer Weekday (SWD)	5.7	5.7	5.7	5.7	0.0	3.7	0.0	0.0	0.8	0.8	0.0	0.0	5.7	5.7
Summer Weekend (SWE)	7.9	5.7	7.9	7.9	0.0	5.9	0.0	0.0	2.0	2.0	0.0	0.0	5.7	5.7
Weighted Average of SWD & SWE	6.3	5.7	6.3	6.3	0.0	4.3	0.0	0.0	1.1	1.1	0.0	0.0	5.7	5.7
Travel Time in Minutes - Aydlett Road to Albacore Street via Wright Memorial Bridge														
Summer Weekday (SWD)	122.0	134.2	112.2	122.0	72.0	107.0	69.0	80.0	99.0	99.0	70.8	101.2	111.8	111.8
Summer Weekend (SWE)	233.1	197.6	200.1	233.1	99.0	170.0	83.0	102.0	126.0	126.0	91.8	144.3	197.6	197.6
Weighted average of SWD & SWE	153.7	152.3	137.3	153.7	79.7	125.0	73.0	86.3	106.7	106.7	76.8	113.5	136.3	136.3
Travel Time in Minutes - Aydlett Road to Albacore Street via Mid-Currituck Bridge														
Summer Weekday (SWD)	NA	NA	NA	NA	NA	NA	10	10	10	10	63	63	63	63
Summer Weekend (SWE)	NA	NA	NA	NA	NA	NA	14	14	14	14	63	63	63	63
Weighted average of SWD & SWE	NA	NA	NA	NA	NA	NA	11	11	11	11	63	63	63	63

6.1.2 Capacity and Level of Service (See Section 3.0)

- On US 158 north of the new bridge (Link 1), traffic volumes are the same with or without a bridge. On this section, LOS D is expected for the 2035 Summer Weekday, but LOS F operations are expected to occur on the Summer Weekend.

- The 23-mile section of US 158 between the new bridge and the Wright Memorial Bridge (Links 2 through 5) is projected to operate at LOS D on the Summer Weekday and LOS F on the Summer Weekend without a Mid-Currituck Bridge. The provision of a Mid-Currituck Bridge would improve operations to LOS C or better on the Summer Weekday and LOS E on the Summer Weekend.

- The two-mile section of US 158 between the Wright Memorial Bridge and NC 12 (Links 6 through 8) will have extreme congestion by 2035 if the road is not widened due to the highest traffic volumes in the study corridor, multiple traffic signals, and a substantial amount of development. If a new bridge is constructed, this roadway section would require a combination of six and eight lanes to provide LOS D on the summer weekday. With no new bridge, widening to eight lanes will still result in LOS F operations on the summer weekday. Note that if the roadway (Link 7) remains a five lane section, it will operate at a poor LOS F with or without a Mid-Currituck Bridge, although the bridge would divert traffic and reduce the V/C ratio by approximately 30 percent (from 2.17 in No-Build to 1.85 with MCB-3), a substantial improvement in operations. Even with the widening, some signal congestion will occur in the peak summer weekends.

- Although not part of this project, the intersection of NC 12 and US 158 should be upgraded to a grade separated interchange or similar improvement. Traffic volumes at this intersection are resulting in deficient traffic operations and queuing under existing conditions, especially when combined with close signal spacing along US 158. As part of the interchange project, consideration should be given to improving the traffic signal at adjacent signals and providing an adequate transition lane to the interchange ramps. The intersection is currently being investigated by NCDOT as part of TIP No. R-4457. This report assumes that this improvement is in place by 2035.

- On NC 12 in Dare County (Links 9 through 11), widening to four lanes would resolve congestion problems with or without a new bridge. Recognizing that widening is not a preferred solution for this roadway section (due to required impacts and relocations), it is noted that with a new Mid-Currituck Bridge, traffic volumes are reduced by 10,000-15,000 vpd on this section of roadway. As a result, the V/C ratio could be reduced up to 45 percent (from 1.62 in No-Build to 1.08 with MCB-3) on the southernmost section of NC 12 (Links 9 and 10) by building a new bridge.

- On NC 12 in Currituck County, a new bridge increases traffic volumes. In addition, with a new bridge it is more critical that adequate capacity be provided on NC 12 to limit congestion or queuing on the bridge. A review was conducted examining a two-lane section on NC 12 and simulations indicated that if the widening is not provided, traffic queues from Currituck Clubhouse Drive could extend onto the new bridge during the Summer Weekend. Therefore, it is recommended that NC 12 be widened to four lanes from the bridge connection at NC 12 south to Currituck Clubhouse Drive, a distance of between two to four miles depending upon the final bridge alignment.

- A two-lane Mid-Currituck Bridge will operate acceptably (LOS D) for the 2035 Summer Weekday, but will be congested (LOS E) on the Summer Weekend in 2035. Regardless of the bridge section, transition to a four-lane section on NC 12 would be required for efficient intersection operations. Similarly, the western end of the bridge would need to be flared into the US 158 area toll plaza and interchange for adequate laneage at these locations. Note that this level of operations assumes that a toll is in place, resulting in diversions from the new bridge.

- No formal toll plaza analysis was conducted at this stage of analysis. It will be examined by the NCTA as part of the toll plaza design. US 158 interchange analysis at the western end of the bridge has been analyzed as part of the *2035 Design Capacity Analysis*.

6.1.3 Network Measures of Effectiveness (See Section 3.4.1)

- Congested miles of roadway were compared between alternatives. In general, the alternatives that widened NC 12 to four lanes (ER1 and MCB1) minimized congested miles of roadway. If it is assumed that NC 12 would not be widened to four lanes in Dare County, however, the Build Bridge alternatives (MCB2, MCB3, and MCB4) have less mileage with LOS F and poor LOS F operations. (See Section 4.1.)

- The provision of a Mid-Currituck Bridge results in a 13 percent reduction in total VMT for the entire network. This reduction in total VMT results in fewer miles driven, less gasoline burned, and reduced emissions, in addition to less travel time on the roadway network. In addition, congested VMT is lower with a Build Bridge alternative when compared to similar Widening alternatives, and is less than half the No-Build alternative if NC 12 is not widened (No-Build with 66.1 mvm congested VMT, ER2 with 51.4 mvm congested VMT, and MCB2 with 31.4 mvm congested VMT). Note that the comparison data in Table 33 was expanded from the analysis in Table 23 to examine three different definitions of congestion (i.e., (1)LOS E, LOS F, and poor LOS F, (2) LOS F and poor LOS F, and (3)poor LOS F only). (See Section 4.3.)

- Using the new bridge would result in major travel time savings (2035 crossing time 10-14 minutes) compared with the No-Build alternative on existing US 158 and NC 12 (approximately 2 hours on 2035 Summer Weekday and almost 4 hours on 2035 Summer Weekend). The provision of a new bridge would also result in reduced delays on the existing roadway (over 30 minutes on the Summer Weekday and more than 90 minutes on the Summer Weekend). (See Section 4.4.)

6.1.4 Non-Roadway Improvement Alternatives (See Section 5.0)

- A review of the network measure of effectiveness indicates that the Shifting Rental Times, TSM, and Bus Transit alternatives yielded minimal net traffic benefits as compared with the No-Build alternative. In addition, it can be noted that the MCB alternatives were much more effective at reducing total VMT – typically a strength of travel demand and transit strategies.

- Ferry service was analyzed as a potential alternative to a new bridge. Assuming three typical ferry services could be provided (at a similar cost to a new bridge), the ferry alternatives serve less than 50 percent of the volume carried by a bridge. As a result, additional congestion is noted on existing US 158 and NC 12, in addition to increased travel times, compared with the MCB alternatives.

6.2 Additional Studies

The next incremental step is to identify design requirements for the selected alternatives. Design requirements are provided as part of a separate document, the *2035 Traffic Design Report*. Issues to be examined in design traffic review include intersection operations in the design corridor and US 158 interchange operations as required for the functional design in order to meet NCDOT traffic analysis guidelines.

As part of this analysis, however, other congestion-related issues have been identified that are not improved directly by a new bridge. In some cases, a new bridge would reduce congestion and possibly delay the need for improvements, but the following roadway sections may need consideration for future improvements as part of independent improvements from the Mid-Currituck Bridge:

- Under all alternatives, US 158 north of the new bridge is anticipated to operate under congested conditions. US 158 improvements may need to be made to fully address congestion between Barco and the new bridge.

- Future congestion is expected in varying degrees on multiple roadway sections including US 158 in Grandy, US 158 between the Wright Memorial Bridge and NC 12, and along NC 12 in both Dare and Currituck counties. The proposed bridge provides congestion relief on all of these segments which would help minimize the duration and severity of congestion in the peak period. Regardless, these roadway

sections could be considered for future improvements by NCDOT and local planning agencies as part of independent projects to the Mid-Currituck Bridge.

- The intersection of US 158 at NC 12 is currently experiencing major capacity restrictions on the summer weekend. This congestion is resulting in queuing on both US 158 and NC 12, which restricts flow on these facilities below their typical capacity. NCDOT is examining this project as part of the TIP No. R-4457 environmental analysis. In addition to the intersection itself, interchange improvements may need to extend onto US 158 and NC 12 to provide adequate transitions and capacity at the interchange.

- Under all alternatives, US 158 south of NC 12 is anticipated to operate under congested conditions without improvements. US 158 improvements may need to be made to fully address congestion south of Southern Shores to Kill Devil Hills and Kitty Hawk.

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Appendix A

Level of Service Thresholds and Look-Up Tables

APPENDIX A: LEVEL OF SERVICE THRESHOLDS & LOOKUP TABLES

Table 1. NC 12 Level of Service Analysis Peak Hour Capacity Minimum Thresholds

Level of Service	Two-Lane NC 12 (vph)	Three-Lane NC 12* (TWLTL) (vph)	Four-Lane NC 12 (vph)
	(2 way)	(2 way)	(1 way)
A	0	0	0
B	161	182	845
C	385	435	1,382
D	822	929	1,996
E	1,529	1,728	2,644
F	≥ 2,218	≥ 2,506	≥ 3,119
Directional Split	65-35	65-35	65-35

As part of earlier analysis phases, two three-lane configurations were considered: a two-way left-turn Lane (TWLTL) and a 2+1 alternating lane. The 2035 analysis assumes a TWLTL section.

Table 2. US 158 Level of Service Analysis Peak Hour Capacity Minimum Thresholds

Level of Service	Five-Lane US 158 (vph)	Five Lane US 158 Arterial (vph)	Six- Lane US 158 Arterial (vph)	Eight Lane US 158 Arterial (vph)	Six-Lane US 158 Superstreet (vph)
	(1 way)	(1 way)	(1 way)	(1 way)	(1 way)
A	0	0	0	0	0
B	1,050	0	0	0	0
C	1,717	1,328	2,048	2,772	2,560
D	2,469	2,442	3,695	4,948	4,619
E	3,185	2,606	3,912	5,218	4,890
F	≥ 3,539	≥ 2,766	≥ 4,149	≥ 5,533	≥ 5,186
Directional Split	60-40	60-40	60-40	60-40	60-40

Note: Multi-lane analysis applies to sections of US 158 from the northern project limit near Barco to the Wright Memorial Bridge. Arterial (and/or superstreet) analysis applies to two-mile section of US 158 south of the Wright Memorial Bridge.

Table 3. Mid-Currituck Bridge Level of Service Analysis Peak Hour Capacity Minimum Thresholds

Level of Service	Two-Lane Mid-Currituck Bridge (vph)	Four-Lane Mid-Currituck Bridge (vph)
	(2 way)	(1 way)
A	0	0
B	98	1,075
C	303	1,759
D	678	2,525
E	1,237	3,247
F	≥ 2,216	≥ 3,604
Directional Split	65-35	65-35

2-LANE NC 12

H
PB
F
F
F
Phone: F Fax: F
E-Mail: F

Two-Way Two-Lane Highway Segment Analysis

Analyst	MJF
Agency/Co.	PB
Date Performed	10/22/2003
Analysis Time Period	Look Up table - Upper LOS A
Highway	NC 12 - 2 ln existing
From/To	
Jurisdiction	
Analysis Year	2035
Description	Mid-Currituck Bridge EIS

Input Data

Highway class	Class 2				
Shoulder width	2.0	ft	Peak-hour factor, PHF	0.85	
Lane width	12.0	ft	% Trucks and buses	2	%
Segment length	16.8	mi	% Recreational vehicles	5	%
Terrain type	Level		% No-passing zones	100	%
Grade: Length		mi	Access points/mi	25	/mi
Up/down		%			

Two-way hourly volume, V	160		veh/h
Directional split	65	/ 35	%

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.7	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.986	
Two-way flow rate,(note-1) vp	191	pc/h
Highest directional split proportion (note-2)	124	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	52.0	mi/h
Adj. for lane and shoulder width, fLS	2.6	mi/h
Adj. for access points, fA	6.3	mi/h
Free-flow speed, FFS	43.2	mi/h
Adjustment for no-passing zones, fnp	3.3	mi/h
Average travel speed, ATS	38.3	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.0*	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	
Two-way flow rate,(note-1) vp	188	pc/h
Highest directional split proportion (note-2)	122	
Base percent time-spent-following, BPTSF	15.2	%
Adj.for directional distribution and no-passing zones, fd/np	24.7	
Percent time-spent-following, PTSF	39.9	%

Level of Service and Other Performance Measures

Level of service, LOS	A	
Volume to capacity ratio, v/c	0.06	
Peak 15-min vehicle-miles of travel, VMT15	791	veh-mi
Peak-hour vehicle-miles of travel, VMT60	2688	veh-mi
Peak 15-min total travel time, TT15	20.6	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

* These items have been entered or edited to override calculated value

H
PB
F
F
F
Phone: F Fax: F
E-Mail: F

Two-Way Two-Lane Highway Segment Analysis

Analyst	MJF
Agency/Co.	PB
Date Performed	10/22/2003
Analysis Time Period	Look Up table - Lower LOS B
Highway	NC 12 - 2 ln existing
From/To	
Jurisdiction	
Analysis Year	2035
Description	Mid-Currituck Bridge EIS

Input Data

Highway class	Class 2				
Shoulder width	2.0	ft	Peak-hour factor, PHF	0.85	
Lane width	12.0	ft	% Trucks and buses	2	%
Segment length	16.8	mi	% Recreational vehicles	5	%
Terrain type	Level		% No-passing zones	100	%
Grade: Length		mi	Access points/mi	25	/mi
Up/down		%			

Two-way hourly volume, V	161	veh/h	
Directional split	65 / 35	%	

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.7	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.986	
Two-way flow rate,(note-1) vp	192	pc/h
Highest directional split proportion (note-2)	125	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	52.0	mi/h
Adj. for lane and shoulder width, fLS	2.6	mi/h
Adj. for access points, fA	6.3	mi/h
Free-flow speed, FFS	43.2	mi/h
Adjustment for no-passing zones, fnp	3.4	mi/h
Average travel speed, ATS	38.3	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.0*	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	
Two-way flow rate,(note-1) vp	189	pc/h
Highest directional split proportion (note-2)	123	
Base percent time-spent-following, BPTSF	15.3	%
Adj.for directional distribution and no-passing zones, fd/np	24.7	
Percent time-spent-following, PTSF	40.0	%

Level of Service and Other Performance Measures

Level of service, LOS	B	
Volume to capacity ratio, v/c	0.06	
Peak 15-min vehicle-miles of travel, VMT15	796	veh-mi
Peak-hour vehicle-miles of travel, VMT60	2705	veh-mi
Peak 15-min total travel time, TT15	20.8	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

* These items have been entered or edited to override calculated value

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Two-Way Two-Lane Highway Segment Analysis

Analyst	MJF
Agency/Co.	PB
Date Performed	10/22/2003
Analysis Time Period	Look Up table - Upper LOS B
Highway	NC 12 - 2 ln existing
From/To	
Jurisdiction	
Analysis Year	2035
Description	Mid-Currituck Bridge EIS

Input Data

Highway class	Class 2				
Shoulder width	2.0	ft	Peak-hour factor, PHF	0.85	
Lane width	12.0	ft	% Trucks and buses	2	%
Segment length	16.8	mi	% Recreational vehicles	5	%
Terrain type	Level		% No-passing zones	100	%
Grade: Length		mi	Access points/mi	25	/mi
Up/down		%			

Two-way hourly volume, V	384	veh/h	
Directional split	65 / 35	%	

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.7	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.986	
Two-way flow rate,(note-1) vp	458	pc/h
Highest directional split proportion (note-2)	298	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	52.0	mi/h
Adj. for lane and shoulder width, fLS	2.6	mi/h
Adj. for access points, fA	6.3	mi/h
Free-flow speed, FFS	43.2	mi/h
Adjustment for no-passing zones, fnp	4.3	mi/h
Average travel speed, ATS	35.3	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.0*	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	
Two-way flow rate,(note-1) vp	452	pc/h
Highest directional split proportion (note-2)	294	
Base percent time-spent-following, BPTSF	32.8	%
Adj.for directional distribution and no-passing zones, fd/np	22.2	
Percent time-spent-following, PTSF	55.0	%

Level of Service and Other Performance Measures

Level of service, LOS	B	
Volume to capacity ratio, v/c	0.14	
Peak 15-min vehicle-miles of travel, VMT15	1897	veh-mi
Peak-hour vehicle-miles of travel, VMT60	6451	veh-mi
Peak 15-min total travel time, TT15	53.8	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

* These items have been entered or edited to override calculated value

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Two-Way Two-Lane Highway Segment Analysis

Analyst	MJF
Agency/Co.	PB
Date Performed	10/22/2003
Analysis Time Period	Look Up table - Lower LOS C
Highway	NC 12 - 2 ln existing
From/To	
Jurisdiction	
Analysis Year	2035
Description	Mid-Currituck Bridge EIS

Input Data

Highway class	Class 2				
Shoulder width	2.0	ft	Peak-hour factor, PHF	0.85	
Lane width	12.0	ft	% Trucks and buses	2	%
Segment length	16.8	mi	% Recreational vehicles	5	%
Terrain type	Level		% No-passing zones	100	%
Grade: Length		mi	Access points/mi	25	/mi
Up/down		%			

Two-way hourly volume, V	385	veh/h	
Directional split	65 / 35	%	

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.7	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.986	
Two-way flow rate,(note-1) vp	459	pc/h
Highest directional split proportion (note-2)	298	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	52.0	mi/h
Adj. for lane and shoulder width, fLS	2.6	mi/h
Adj. for access points, fA	6.3	mi/h
Free-flow speed, FFS	43.2	mi/h
Adjustment for no-passing zones, fnp	4.3	mi/h
Average travel speed, ATS	35.3	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.0*	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	
Two-way flow rate,(note-1) vp	453	pc/h
Highest directional split proportion (note-2)	294	
Base percent time-spent-following, BPTSF	32.8	%
Adj.for directional distribution and no-passing zones, fd/np	22.2	
Percent time-spent-following, PTSF	55.0	%

Level of Service and Other Performance Measures

Level of service, LOS	C	
Volume to capacity ratio, v/c	0.14	
Peak 15-min vehicle-miles of travel, VMT15	1902	veh-mi
Peak-hour vehicle-miles of travel, VMT60	6468	veh-mi
Peak 15-min total travel time, TT15	53.9	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

* These items have been entered or edited to override calculated value

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Two-Way Two-Lane Highway Segment Analysis

Analyst	MJF
Agency/Co.	PB
Date Performed	10/22/2003
Analysis Time Period	Look Up table - Upper LOS C
Highway	NC 12 - 2 ln existing
From/To	
Jurisdiction	
Analysis Year	2035
Description	Mid-Currituck Bridge EIS

Input Data

Highway class	Class 2				
Shoulder width	2.0	ft	Peak-hour factor, PHF	0.85	
Lane width	12.0	ft	% Trucks and buses	2	%
Segment length	16.8	mi	% Recreational vehicles	5	%
Terrain type	Level		% No-passing zones	100	%
Grade: Length		mi	Access points/mi	25	/mi
Up/down		%			

Two-way hourly volume, V	821	veh/h	
Directional split	65 / 35	%	

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.2	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.996	
Two-way flow rate,(note-1) vp	970	pc/h
Highest directional split proportion (note-2)	631	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	52.0	mi/h
Adj. for lane and shoulder width, fLS	2.6	mi/h
Adj. for access points, fA	6.3	mi/h
Free-flow speed, FFS	43.2	mi/h
Adjustment for no-passing zones, fnp	2.7	mi/h
Average travel speed, ATS	33.0	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.0*	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	
Two-way flow rate,(note-1) vp	966	pc/h
Highest directional split proportion (note-2)	628	
Base percent time-spent-following, BPTSF	57.2	%
Adj.for directional distribution and no-passing zones, fd/np	12.8	
Percent time-spent-following, PTSF	70.0	%

Level of Service and Other Performance Measures

Level of service, LOS	C	
Volume to capacity ratio, v/c	0.30	
Peak 15-min vehicle-miles of travel, VMT15	4057	veh-mi
Peak-hour vehicle-miles of travel, VMT60	13793	veh-mi
Peak 15-min total travel time, TT15	123.1	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

* These items have been entered or edited to override calculated value

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Two-Way Two-Lane Highway Segment Analysis

Analyst	MJF
Agency/Co.	PB
Date Performed	10/22/2003
Analysis Time Period	Look Up table - Lower LOS D
Highway	NC 12 - 2 ln existing
From/To	
Jurisdiction	
Analysis Year	2035
Description	Mid-Currituck Bridge EIS

Input Data

Highway class	Class 2				
Shoulder width	2.0	ft	Peak-hour factor, PHF	0.85	
Lane width	12.0	ft	% Trucks and buses	2	%
Segment length	16.8	mi	% Recreational vehicles	5	%
Terrain type	Level		% No-passing zones	100	%
Grade: Length		mi	Access points/mi	25	/mi
Up/down		%			

Two-way hourly volume, V	822		veh/h
Directional split	65	/ 35	%

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.2	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.996	
Two-way flow rate,(note-1) vp	971	pc/h
Highest directional split proportion (note-2)	631	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	52.0	mi/h
Adj. for lane and shoulder width, fLS	2.6	mi/h
Adj. for access points, fA	6.3	mi/h
Free-flow speed, FFS	43.2	mi/h
Adjustment for no-passing zones, fnp	2.7	mi/h
Average travel speed, ATS	33.0	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.0*	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	
Two-way flow rate,(note-1) vp	967	pc/h
Highest directional split proportion (note-2)	629	
Base percent time-spent-following, BPTSF	57.3	%
Adj.for directional distribution and no-passing zones, fd/np	12.7	
Percent time-spent-following, PTSF	70.0	%

Level of Service and Other Performance Measures

Level of service, LOS	D	
Volume to capacity ratio, v/c	0.30	
Peak 15-min vehicle-miles of travel, VMT15	4062	veh-mi
Peak-hour vehicle-miles of travel, VMT60	13810	veh-mi
Peak 15-min total travel time, TT15	123.3	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

* These items have been entered or edited to override calculated value

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Two-Way Two-Lane Highway Segment Analysis

Analyst	MJF
Agency/Co.	PB
Date Performed	10/22/2003
Analysis Time Period	Look Up table - Upper LOS D
Highway	NC 12 - 2 ln existing
From/To	
Jurisdiction	
Analysis Year	2035
Description	Mid-Currituck Bridge EIS

Input Data

Highway class	Class 2				
Shoulder width	2.0	ft	Peak-hour factor, PHF	0.85	
Lane width	12.0	ft	% Trucks and buses	2	%
Segment length	16.8	mi	% Recreational vehicles	5	%
Terrain type	Level		% No-passing zones	100	%
Grade: Length		mi	Access points/mi	25	/mi
Up/down		%			

Two-way hourly volume, V	1528	veh/h	
Directional split	65 / 35	%	

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.998	
Two-way flow rate,(note-1) vp	1801	pc/h
Highest directional split proportion (note-2)	1171	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	52.0	mi/h
Adj. for lane and shoulder width, fLS	2.6	mi/h
Adj. for access points, fA	6.3	mi/h
Free-flow speed, FFS	43.2	mi/h
Adjustment for no-passing zones, fnp	1.3	mi/h
Average travel speed, ATS	27.9	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.0*	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	
Two-way flow rate,(note-1) vp	1798	pc/h
Highest directional split proportion (note-2)	1169	
Base percent time-spent-following, BPTSF	79.4	%
Adj.for directional distribution and no-passing zones, fd/np	5.6	
Percent time-spent-following, PTSF	85.0	%

Level of Service and Other Performance Measures

Level of service, LOS	D	
Volume to capacity ratio, v/c	0.56	
Peak 15-min vehicle-miles of travel, VMT15	7550	veh-mi
Peak-hour vehicle-miles of travel, VMT60	25670	veh-mi
Peak 15-min total travel time, TT15	270.8	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

* These items have been entered or edited to override calculated value

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Two-Way Two-Lane Highway Segment Analysis

Analyst	MJF
Agency/Co.	PB
Date Performed	10/22/2003
Analysis Time Period	Look Up table - Lower LOS E
Highway	NC 12 - 2 ln existing
From/To	
Jurisdiction	
Analysis Year	2035
Description	Mid-Currituck Bridge EIS

Input Data

Highway class	Class 2				
Shoulder width	2.0	ft	Peak-hour factor, PHF	0.85	
Lane width	12.0	ft	% Trucks and buses	2	%
Segment length	16.8	mi	% Recreational vehicles	5	%
Terrain type	Level		% No-passing zones	100	%
Grade: Length		mi	Access points/mi	25	/mi
Up/down		%			

Two-way hourly volume, V	1529	veh/h	
Directional split	65 / 35	%	

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.998	
Two-way flow rate,(note-1) vp	1802	pc/h
Highest directional split proportion (note-2)	1171	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	52.0	mi/h
Adj. for lane and shoulder width, fLS	2.6	mi/h
Adj. for access points, fA	6.3	mi/h
Free-flow speed, FFS	43.2	mi/h
Adjustment for no-passing zones, fnp	1.3	mi/h
Average travel speed, ATS	27.9	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.0*	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	
Two-way flow rate,(note-1) vp	1799	pc/h
Highest directional split proportion (note-2)	1169	
Base percent time-spent-following, BPTSF	79.4	%
Adj.for directional distribution and no-passing zones, fd/np	5.6	
Percent time-spent-following, PTSF	85.0	%

Level of Service and Other Performance Measures

Level of service, LOS	E	
Volume to capacity ratio, v/c	0.56	
Peak 15-min vehicle-miles of travel, VMT15	7555	veh-mi
Peak-hour vehicle-miles of travel, VMT60	25687	veh-mi
Peak 15-min total travel time, TT15	271.1	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

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Two-Way Two-Lane Highway Segment Analysis

Analyst	MJF
Agency/Co.	PB
Date Performed	10/22/2003
Analysis Time Period	Look Up table - Upper LOS E
Highway	NC 12 - 2 ln existing
From/To	
Jurisdiction	
Analysis Year	2035
Description	Mid-Currituck Bridge EIS

Input Data

Highway class	Class 2				
Shoulder width	2.0	ft	Peak-hour factor, PHF	0.85	
Lane width	12.0	ft	% Trucks and buses	2	%
Segment length	16.8	mi	% Recreational vehicles	5	%
Terrain type	Level		% No-passing zones	100	%
Grade: Length		mi	Access points/mi	25	/mi
Up/down		%			

Two-way hourly volume, V	2217	veh/h	
Directional split	65 / 35	%	

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.998	
Two-way flow rate,(note-1) vp	2613	pc/h
Highest directional split proportion (note-2)	1698	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	52.0	mi/h
Adj. for lane and shoulder width, fLS	2.6	mi/h
Adj. for access points, fA	6.3	mi/h
Free-flow speed, FFS	43.2	mi/h
Adjustment for no-passing zones, fnp	1.0	mi/h
Average travel speed, ATS	21.9	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.0*	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	
Two-way flow rate,(note-1) vp	2608	pc/h
Highest directional split proportion (note-2)	1695	
Base percent time-spent-following, BPTSF	89.9	%
Adj.for directional distribution and no-passing zones, fd/np	3.2	
Percent time-spent-following, PTSF	93.1	%

Level of Service and Other Performance Measures

Level of service, LOS	E	
Volume to capacity ratio, v/c	0.82	
Peak 15-min vehicle-miles of travel, VMT15	10955	veh-mi
Peak-hour vehicle-miles of travel, VMT60	37246	veh-mi
Peak 15-min total travel time, TT15	500.7	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

* These items have been entered or edited to override calculated value

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Two-Way Two-Lane Highway Segment Analysis

Analyst	MJF
Agency/Co.	PB
Date Performed	10/22/2003
Analysis Time Period	Look Up table - Lower LOS F
Highway	NC 12 - 2 ln existing
From/To	
Jurisdiction	
Analysis Year	2035
Description	Mid-Currituck Bridge EIS

Input Data

Highway class	Class 2				
Shoulder width	2.0	ft	Peak-hour factor, PHF	0.85	
Lane width	12.0	ft	% Trucks and buses	2	%
Segment length	16.8	mi	% Recreational vehicles	5	%
Terrain type	Level		% No-passing zones	100	%
Grade: Length		mi	Access points/mi	25	/mi
Up/down		%			

Two-way hourly volume, V	2218	veh/h	
Directional split	65 / 35	%	

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.998	
Two-way flow rate,(note-1) vp	2615	pc/h
Highest directional split proportion (note-2)	1700	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	52.0	mi/h
Adj. for lane and shoulder width, fLS	2.6	mi/h
Adj. for access points, fA	6.3	mi/h
Free-flow speed, FFS	43.2	mi/h
Adjustment for no-passing zones, fnp	1.0	mi/h
Average travel speed, ATS	21.9	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.0*	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	
Two-way flow rate,(note-1) vp	2609	pc/h
Highest directional split proportion (note-2)	1696	
Base percent time-spent-following, BPTSF	89.9	%
Adj.for directional distribution and no-passing zones, fd/np	3.2	
Percent time-spent-following, PTSF	93.1	%

Level of Service and Other Performance Measures

Level of service, LOS	F	
Volume to capacity ratio, v/c	0.82	
Peak 15-min vehicle-miles of travel, VMT15	10960	veh-mi
Peak-hour vehicle-miles of travel, VMT60	37262	veh-mi
Peak 15-min total travel time, TT15	501.3	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

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4-LANE NC 12

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Parsons Brinckerhoff
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Morrisville, NC 27560
Phone: 919-467-7272 Fax: 919-467-7322
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OPERATIONAL ANALYSIS

Analyst:	MJF
Agency/Co:	PB
Date:	3/28/08
Analysis Period:	Look Up Table (LOS A-B)
Highway:	NC 12 - 4 lane
From/To:	
Jurisdiction:	
Analysis Year:	2035
Project ID:	Currituck Traffic Report

FREE-FLOW SPEED

Direction	1		2	
Lane width	12.0	ft	12.0	ft
Lateral clearance:				
Right edge	6.0	ft	6.0	ft
Left edge	6.0	ft	6.0	ft
Total lateral clearance	12.0	ft	12.0	ft
Access points per mile	25		25	
Median type	Divided		Divided	
Free-flow speed:	Base		Base	
FFS or BFFS	52.0	mph	52.0	mph
Lane width adjustment, FLW	0.0	mph	0.0	mph
Lateral clearance adjustment, FLC	0.0	mph	0.0	mph
Median type adjustment, FM	0.0	mph	0.0	mph
Access points adjustment, FA	6.3	mph	6.3	mph
Free-flow speed	45.8	mph	45.8	mph

VOLUME

Direction	1		2	
Volume, V	844	vph	845	vph
Peak-hour factor, PHF	0.90		0.90	
Peak 15-minute volume, v15	234		235	
Trucks and buses	2	%	2	%
Recreational vehicles	5	%	5	%
Terrain type	Level		Level	
Grade	0.00	%	0.00	%
Segment length	0.00	mi	0.00	mi
Number of lanes	2		2	
Driver population adjustment, fP	0.95		0.95	
Trucks and buses PCE, ET	1.5		1.5	
Recreational vehicles PCE, ER	1.2		1.2	
Heavy vehicle adjustment, fHV	0.980		0.980	
Flow rate, vp	503	pcphpl	504	pcphpl

RESULTS

Direction	1		2	
Flow rate, vp	503	pcphpl	504	pcphpl
Free-flow speed, FFS	45.8	mph	45.8	mph
Avg. passenger-car travel speed, S	45.8	mph	45.8	mph
Level of service, LOS	A		B	
Density, D	11.0-	pc/mi/ln	11.0+	pc/mi/ln

Overall results are not computed when free-flow speed is less than 45 mph.

PB
Parsons Brinckerhoff
909 Aviation Parkway
Suite 1500
Morrisville, NC 27560
Phone: 919-467-7272 Fax: 919-467-7322
E-mail:

OPERATIONAL ANALYSIS

Analyst:	MJF
Agency/Co:	PB
Date:	3/28/08
Analysis Period:	Look Up Table (LOS B-C)
Highway:	NC 12 - 4 lane
From/To:	
Jurisdiction:	
Analysis Year:	2035
Project ID:	Currituck Traffic Report

FREE-FLOW SPEED

Direction	1		2	
Lane width	12.0	ft	12.0	ft
Lateral clearance:				
Right edge	6.0	ft	6.0	ft
Left edge	6.0	ft	6.0	ft
Total lateral clearance	12.0	ft	12.0	ft
Access points per mile	25		25	
Median type	Divided		Divided	
Free-flow speed:	Base		Base	
FFS or BFFS	52.0	mph	52.0	mph
Lane width adjustment, FLW	0.0	mph	0.0	mph
Lateral clearance adjustment, FLC	0.0	mph	0.0	mph
Median type adjustment, FM	0.0	mph	0.0	mph
Access points adjustment, FA	6.3	mph	6.3	mph
Free-flow speed	45.8	mph	45.8	mph

VOLUME

Direction	1		2	
Volume, V	1381	vph	1382	vph
Peak-hour factor, PHF	0.90		0.90	
Peak 15-minute volume, v15	384		384	
Trucks and buses	2	%	2	%
Recreational vehicles	5	%	5	%
Terrain type	Level		Level	
Grade	0.00	%	0.00	%
Segment length	0.00	mi	0.00	mi
Number of lanes	2		2	
Driver population adjustment, fP	0.95		0.95	
Trucks and buses PCE, ET	1.5		1.5	
Recreational vehicles PCE, ER	1.2		1.2	
Heavy vehicle adjustment, fHV	0.980		0.980	
Flow rate, vp	823	pcphpl	824	pcphpl

RESULTS

Direction	1		2	
Flow rate, vp	823	pcphpl	824	pcphpl
Free-flow speed, FFS	45.8	mph	45.8	mph
Avg. passenger-car travel speed, S	45.8	mph	45.8	mph
Level of service, LOS	B		C	
Density, D	18.0-	pc/mi/ln	18.0+	pc/mi/ln

Overall results are not computed when free-flow speed is less than 45 mph.

PB
Parsons Brinckerhoff
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E-mail:

OPERATIONAL ANALYSIS

Analyst:	MJF
Agency/Co:	PB
Date:	3/28/08
Analysis Period:	Look Up Table (LOS C-D)
Highway:	NC 12 - 4 lane
From/To:	
Jurisdiction:	
Analysis Year:	2035
Project ID:	Currituck Traffic Report

FREE-FLOW SPEED

Direction	1		2	
Lane width	12.0	ft	12.0	ft
Lateral clearance:				
Right edge	6.0	ft	6.0	ft
Left edge	6.0	ft	6.0	ft
Total lateral clearance	12.0	ft	12.0	ft
Access points per mile	25		25	
Median type	Divided		Divided	
Free-flow speed:	Base		Base	
FFS or BFFS	52.0	mph	52.0	mph
Lane width adjustment, FLW	0.0	mph	0.0	mph
Lateral clearance adjustment, FLC	0.0	mph	0.0	mph
Median type adjustment, FM	0.0	mph	0.0	mph
Access points adjustment, FA	6.3	mph	6.3	mph
Free-flow speed	45.8	mph	45.8	mph

VOLUME

Direction	1		2	
Volume, V	1995	vph	1996	vph
Peak-hour factor, PHF	0.90		0.90	
Peak 15-minute volume, v15	554		554	
Trucks and buses	2	%	2	%
Recreational vehicles	5	%	5	%
Terrain type	Level		Level	
Grade	0.00	%	0.00	%
Segment length	0.00	mi	0.00	mi
Number of lanes	2		2	
Driver population adjustment, fP	0.95		0.95	
Trucks and buses PCE, ET	1.5		1.5	
Recreational vehicles PCE, ER	1.2		1.2	
Heavy vehicle adjustment, fHV	0.980		0.980	
Flow rate, vp	1189	pcphpl	1190	pcphpl

RESULTS

Direction	1		2	
Flow rate, vp	1189	pcphpl	1190	pcphpl
Free-flow speed, FFS	45.8	mph	45.8	mph
Avg. passenger-car travel speed, S	45.8	mph	45.8	mph
Level of service, LOS	C		D	
Density, D	26.0-	pc/mi/ln	26.0+	pc/mi/ln

Overall results are not computed when free-flow speed is less than 45 mph.

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OPERATIONAL ANALYSIS

Analyst:	MJF
Agency/Co:	PB
Date:	3/28/08
Analysis Period:	Look Up Table (LOS D-E)
Highway:	NC 12 - 4 lane
From/To:	
Jurisdiction:	
Analysis Year:	2035
Project ID:	Currituck Traffic Report

FREE-FLOW SPEED

Direction	1		2	
Lane width	12.0	ft	12.0	ft
Lateral clearance:				
Right edge	6.0	ft	6.0	ft
Left edge	6.0	ft	6.0	ft
Total lateral clearance	12.0	ft	12.0	ft
Access points per mile	25		25	
Median type	Divided		Divided	
Free-flow speed:	Base		Base	
FFS or BFFS	52.0	mph	52.0	mph
Lane width adjustment, FLW	0.0	mph	0.0	mph
Lateral clearance adjustment, FLC	0.0	mph	0.0	mph
Median type adjustment, FM	0.0	mph	0.0	mph
Access points adjustment, FA	6.3	mph	6.3	mph
Free-flow speed	45.8	mph	45.8	mph

VOLUME

Direction	1		2	
Volume, V	2643	vph	2644	vph
Peak-hour factor, PHF	0.90		0.90	
Peak 15-minute volume, v15	734		734	
Trucks and buses	2	%	2	%
Recreational vehicles	5	%	5	%
Terrain type	Level		Level	
Grade	0.00	%	0.00	%
Segment length	0.00	mi	0.00	mi
Number of lanes	2		2	
Driver population adjustment, fP	0.95		0.95	
Trucks and buses PCE, ET	1.5		1.5	
Recreational vehicles PCE, ER	1.2		1.2	
Heavy vehicle adjustment, fHV	0.980		0.980	
Flow rate, vp	1576	pcphpl	1577	pcphpl

RESULTS

Direction	1		2	
Flow rate, vp	1576	pcphpl	1577	pcphpl
Free-flow speed, FFS	45.8	mph	45.8	mph
Avg. passenger-car travel speed, S	45.0	mph	45.0	mph
Level of service, LOS	D		E	
Density, D	35.0-	pc/mi/ln	35.0+	pc/mi/ln

Overall results are not computed when free-flow speed is less than 45 mph.

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E-mail:

OPERATIONAL ANALYSIS

Analyst:	MJF
Agency/Co:	PB
Date:	3/28/08
Analysis Period:	Look Up Table (LOS E-F)
Highway:	NC 12 - 4 lane
From/To:	
Jurisdiction:	
Analysis Year:	2035
Project ID:	Currituck Traffic Report

FREE-FLOW SPEED

Direction	1		2	
Lane width	12.0	ft	12.0	ft
Lateral clearance:				
Right edge	6.0	ft	6.0	ft
Left edge	6.0	ft	6.0	ft
Total lateral clearance	12.0	ft	12.0	ft
Access points per mile	25		25	
Median type	Divided		Divided	
Free-flow speed:	Base		Base	
FFS or BFFS	52.0	mph	52.0	mph
Lane width adjustment, FLW	0.0	mph	0.0	mph
Lateral clearance adjustment, FLC	0.0	mph	0.0	mph
Median type adjustment, FM	0.0	mph	0.0	mph
Access points adjustment, FA	6.3	mph	6.3	mph
Free-flow speed	45.8	mph	45.8	mph

VOLUME

Direction	1		2	
Volume, V	3118	vph	3119	vph
Peak-hour factor, PHF	0.90		0.90	
Peak 15-minute volume, v15	866		866	
Trucks and buses	2	%	2	%
Recreational vehicles	5	%	5	%
Terrain type	Level		Level	
Grade	0.00	%	0.00	%
Segment length	0.00	mi	0.00	mi
Number of lanes	2		2	
Driver population adjustment, fP	0.95		0.95	
Trucks and buses PCE, ET	1.5		1.5	
Recreational vehicles PCE, ER	1.2		1.2	
Heavy vehicle adjustment, fHV	0.980		0.980	
Flow rate, vp	1859	pcphpl	1860	pcphpl

RESULTS

Direction	1		2	
Flow rate, vp	1859	pcphpl	1860	pcphpl
Free-flow speed, FFS	45.8	mph	45.8	mph
Avg. passenger-car travel speed, S	43.3	mph		mph
Level of service, LOS	E		F	
Density, D	43.0-	pc/mi/ln		pc/mi/ln

Overall results are not computed when free-flow speed is less than 45 mph.

5-LANE US 158

Phone: Fax:
E-mail:

OPERATIONAL ANALYSIS

Analyst: MJF
Agency/Co: PB
Date: 3/29/2008
Analysis Period: Look Up Table (LOS A-B)
Highway: US 158 5 lanes
From/To: North of WMB
Jurisdiction:
Analysis Year: 2035
Project ID: Mid-Currituck Bridge EIS

FREE-FLOW SPEED

Direction	1		2	
Lane width	12.0	ft	12.0	ft
Lateral clearance:				
Right edge	6.0	ft	6.0	ft
Left edge	6.0	ft	6.0	ft
Total lateral clearance	12.0	ft	12.0	ft
Access points per mile	12		12	
Median type	Divided		Divided	
Free-flow speed:	Base		Base	
FFS or BFFS	60.0	mph	60.0	mph
Lane width adjustment, FLW	0.0	mph	0.0	mph
Lateral clearance adjustment, FLC	0.0	mph	0.0	mph
Median type adjustment, FM	0.0	mph	0.0	mph
Access points adjustment, FA	3.0	mph	3.0	mph
Free-flow speed	57.0	mph	57.0	mph

VOLUME

Direction	1		2	
Volume, V	1049	vph	1050	vph
Peak-hour factor, PHF	0.90		0.90	
Peak 15-minute volume, v15	291		292	
Trucks and buses	3	%	3	%
Recreational vehicles	4	%	4	%
Terrain type	Level		Level	
Grade	0.00	%	0.00	%
Segment length	0.00	mi	0.00	mi
Number of lanes	2		2	
Driver population adjustment, fP	0.95		0.95	
Trucks and buses PCE, ET	1.5		1.5	
Recreational vehicles PCE, ER	1.2		1.2	
Heavy vehicle adjustment, fHV	0.978		0.978	
Flow rate, vp	627	pcphpl	628	pcphpl

RESULTS

Direction	1		2	
Flow rate, vp	627	pcphpl	628	pcphpl
Free-flow speed, FFS	57.0	mph	57.0	mph
Avg. passenger-car travel speed, S	57.0	mph	57.0	mph
Level of service, LOS	A		B	
Density, D	11.0	pc/mi/ln	11.0+	pc/mi/ln

Overall results are not computed when free-flow speed is less than 45 mph.

Phone: Fax:
E-mail:

OPERATIONAL ANALYSIS

Analyst: MJF
Agency/Co: PB
Date: 3/29/2008
Analysis Period: Look Up Table (LOS B-C)
Highway: US 158 5 lanes
From/To: North of WMB
Jurisdiction:
Analysis Year: 2035
Project ID: Mid-Currituck Bridge EIS

FREE-FLOW SPEED

Direction	1		2	
Lane width	12.0	ft	12.0	ft
Lateral clearance:				
Right edge	6.0	ft	6.0	ft
Left edge	6.0	ft	6.0	ft
Total lateral clearance	12.0	ft	12.0	ft
Access points per mile	12		12	
Median type	Divided		Divided	
Free-flow speed:	Base		Base	
FFS or BFFS	60.0	mph	60.0	mph
Lane width adjustment, FLW	0.0	mph	0.0	mph
Lateral clearance adjustment, FLC	0.0	mph	0.0	mph
Median type adjustment, FM	0.0	mph	0.0	mph
Access points adjustment, FA	3.0	mph	3.0	mph
Free-flow speed	57.0	mph	57.0	mph

VOLUME

Direction	1		2	
Volume, V	1716	vph	1717	vph
Peak-hour factor, PHF	0.90		0.90	
Peak 15-minute volume, v15	477		477	
Trucks and buses	3	%	3	%
Recreational vehicles	4	%	4	%
Terrain type	Level		Level	
Grade	0.00	%	0.00	%
Segment length	0.00	mi	0.00	mi
Number of lanes	2		2	
Driver population adjustment, fP	0.95		0.95	
Trucks and buses PCE, ET	1.5		1.5	
Recreational vehicles PCE, ER	1.2		1.2	
Heavy vehicle adjustment, fHV	0.978		0.978	
Flow rate, vp	1026	pcphpl	1027	pcphpl

RESULTS

Direction	1		2	
Flow rate, vp	1026	pcphpl	1027	pcphpl
Free-flow speed, FFS	57.0	mph	57.0	mph
Avg. passenger-car travel speed, S	57.0	mph	57.0	mph
Level of service, LOS	B		C	
Density, D	18.0	pc/mi/ln	18.0+	pc/mi/ln

Overall results are not computed when free-flow speed is less than 45 mph.

Phone: Fax:
E-mail:

OPERATIONAL ANALYSIS

Analyst: MJF
Agency/Co: PB
Date: 3/29/2008
Analysis Period: Look Up Table (LOS C-D)
Highway: US 158 5 lanes
From/To: North of WMB
Jurisdiction:
Analysis Year: 2035
Project ID: Mid-Currituck Bridge EIS

FREE-FLOW SPEED

Direction	1		2	
Lane width	12.0	ft	12.0	ft
Lateral clearance:				
Right edge	6.0	ft	6.0	ft
Left edge	6.0	ft	6.0	ft
Total lateral clearance	12.0	ft	12.0	ft
Access points per mile	12		12	
Median type	Divided		Divided	
Free-flow speed:	Base		Base	
FFS or BFFS	60.0	mph	60.0	mph
Lane width adjustment, FLW	0.0	mph	0.0	mph
Lateral clearance adjustment, FLC	0.0	mph	0.0	mph
Median type adjustment, FM	0.0	mph	0.0	mph
Access points adjustment, FA	3.0	mph	3.0	mph
Free-flow speed	57.0	mph	57.0	mph

VOLUME

Direction	1		2	
Volume, V	2468	vph	2469	vph
Peak-hour factor, PHF	0.90		0.90	
Peak 15-minute volume, v15	686		686	
Trucks and buses	3	%	3	%
Recreational vehicles	4	%	4	%
Terrain type	Level		Level	
Grade	0.00	%	0.00	%
Segment length	0.00	mi	0.00	mi
Number of lanes	2		2	
Driver population adjustment, fP	0.95		0.95	
Trucks and buses PCE, ET	1.5		1.5	
Recreational vehicles PCE, ER	1.2		1.2	
Heavy vehicle adjustment, fHV	0.978		0.978	
Flow rate, vp	1476	pcphpl	1477	pcphpl

RESULTS

Direction	1		2	
Flow rate, vp	1476	pcphpl	1477	pcphpl
Free-flow speed, FFS	57.0	mph	57.0	mph
Avg. passenger-car travel speed, S	56.8	mph	56.8	mph
Level of service, LOS	C		D	
Density, D	26.0-	pc/mi/ln	26.0+	pc/mi/ln

Overall results are not computed when free-flow speed is less than 45 mph.

Phone: Fax:
E-mail:

OPERATIONAL ANALYSIS

Analyst: MJF
Agency/Co: PB
Date: 3/29/2008
Analysis Period: Look Up Table (LOS D-E)
Highway: US 158 5 lanes
From/To: North of WMB
Jurisdiction:
Analysis Year: 2035
Project ID: Mid-Currituck Bridge EIS

FREE-FLOW SPEED

Direction	1		2	
Lane width	12.0	ft	12.0	ft
Lateral clearance:				
Right edge	6.0	ft	6.0	ft
Left edge	6.0	ft	6.0	ft
Total lateral clearance	12.0	ft	12.0	ft
Access points per mile	12		12	
Median type	Divided		Divided	
Free-flow speed:	Base		Base	
FFS or BFFS	60.0	mph	60.0	mph
Lane width adjustment, FLW	0.0	mph	0.0	mph
Lateral clearance adjustment, FLC	0.0	mph	0.0	mph
Median type adjustment, FM	0.0	mph	0.0	mph
Access points adjustment, FA	3.0	mph	3.0	mph
Free-flow speed	57.0	mph	57.0	mph

VOLUME

Direction	1		2	
Volume, V	3184	vph	3185	vph
Peak-hour factor, PHF	0.90		0.90	
Peak 15-minute volume, v15	884		885	
Trucks and buses	3	%	3	%
Recreational vehicles	4	%	4	%
Terrain type	Level		Level	
Grade	0.00	%	0.00	%
Segment length	0.00	mi	0.00	mi
Number of lanes	2		2	
Driver population adjustment, fP	0.95		0.95	
Trucks and buses PCE, ET	1.5		1.5	
Recreational vehicles PCE, ER	1.2		1.2	
Heavy vehicle adjustment, fHV	0.978		0.978	
Flow rate, vp	1904	pcphpl	1905	pcphpl

RESULTS

Direction	1		2	
Flow rate, vp	1904	pcphpl	1905	pcphpl
Free-flow speed, FFS	57.0	mph	57.0	mph
Avg. passenger-car travel speed, S	54.4	mph	54.4	mph
Level of service, LOS	D		E	
Density, D	35.0-	pc/mi/ln	35.0+	pc/mi/ln

Overall results are not computed when free-flow speed is less than 45 mph.

Phone: Fax:
E-mail:

OPERATIONAL ANALYSIS

Analyst: MJF
Agency/Co: PB
Date: 3/29/2008
Analysis Period: Look Up Table (LOS E-F)
Highway: US 158 5 lanes
From/To: North of WMB
Jurisdiction:
Analysis Year: 2035
Project ID: Mid-Currituck Bridge EIS

FREE-FLOW SPEED

Direction	1		2	
Lane width	12.0	ft	12.0	ft
Lateral clearance:				
Right edge	6.0	ft	6.0	ft
Left edge	6.0	ft	6.0	ft
Total lateral clearance	12.0	ft	12.0	ft
Access points per mile	12		12	
Median type	Divided		Divided	
Free-flow speed:	Base		Base	
FFS or BFFS	60.0	mph	60.0	mph
Lane width adjustment, FLW	0.0	mph	0.0	mph
Lateral clearance adjustment, FLC	0.0	mph	0.0	mph
Median type adjustment, FM	0.0	mph	0.0	mph
Access points adjustment, FA	3.0	mph	3.0	mph
Free-flow speed	57.0	mph	57.0	mph

VOLUME

Direction	1		2	
Volume, V	3538	vph	3539	vph
Peak-hour factor, PHF	0.90		0.90	
Peak 15-minute volume, v15	983		983	
Trucks and buses	3	%	3	%
Recreational vehicles	4	%	4	%
Terrain type	Level		Level	
Grade	0.00	%	0.00	%
Segment length	0.00	mi	0.00	mi
Number of lanes	2		2	
Driver population adjustment, fP	0.95		0.95	
Trucks and buses PCE, ET	1.5		1.5	
Recreational vehicles PCE, ER	1.2		1.2	
Heavy vehicle adjustment, fHV	0.978		0.978	
Flow rate, vp	2116	pcphpl	2117	pcphpl

RESULTS

Direction	1		2	
Flow rate, vp	2116	pcphpl	2117	pcphpl
Free-flow speed, FFS	57.0	mph	57.0	mph
Avg. passenger-car travel speed, S	52.9	mph		mph
Level of service, LOS	E		F	
Density, D	40.0	pc/mi/ln		pc/mi/ln

Overall results are not computed when free-flow speed is less than 45 mph.

5-LANE US 158 ARTERIAL

Phone: Fax:
E-Mail:

PLANNING ANALYSIS

Analyst:	MJF
Agency/Co.:	
Date Performed:	3/28/2008
Analysis Time Period:	Look Up Table (Lower LOS B)
Urban Street:	US 158 east of WMB (5 LANES)
Direction of Travel:	
Jurisdiction:	
Analysis Year:	2035
Project ID:	Mid-Currituck EIS

Traffic Characteristics

Annual average daily traffic, AADT	1	vpd
Planning analysis hour factor, K	0.080	
Directional distribution factor, D	0.600	
Peak-hour factor, PHF	0.850	
Adjusted saturation flow rate	1800	pcphgpl
Percent turns from exclusive lanes	20	%

Roadway Characteristics

Number of through lanes one direction, N	2	
Free flow speed, FFS	50	mph
Urban class	1	
Section length	2.10	miles
Median	Yes	
Left-turn bays	Yes	

Signal Characteristics

Signalized intersections	4	
Arrival type, AT	3	
Signal type (k = 0.5 for planning)	Actuated	
Cycle length, C	150.0	sec
Effective green ratio, g/C	0.650	

Results

Annual average daily traffic, AADT	1	vpd
Two-way hourly volume	0	vph
Hourly directional volume	0	vph
Through-volume 15-min. flow rate	0	v
Running time	163.2	sec
v/c ratio	0.00	
Through capacity	2340	vph
Progression factor, PF	1.000	
Uniform delay	9.2	sec
Filtering/metering factor, I	1.000	
Incremental delay	0.0	sec
Control delay	9.2	sec/v
Total travel speed, Sa	37.8	mph
Total urban street LOS	B	

Phone: Fax:
E-Mail:

PLANNING ANALYSIS

Analyst:	MJF
Agency/Co.:	
Date Performed:	3/28/2008
Analysis Time Period:	Look Up Table (Upper LOS B)
Urban Street:	US 158 east of WMB (5 LANES)
Direction of Travel:	
Jurisdiction:	
Analysis Year:	2035
Project ID:	Mid-Currituck EIS

Traffic Characteristics

Annual average daily traffic, AADT	27666	vpd
Planning analysis hour factor, K	0.080	
Directional distribution factor, D	0.600	
Peak-hour factor, PHF	0.850	
Adjusted saturation flow rate	1800	pcphgpl
Percent turns from exclusive lanes	20	%

Roadway Characteristics

Number of through lanes one direction, N	2	
Free flow speed, FFS	50	mph
Urban class	1	
Section length	2.10	miles
Median	Yes	
Left-turn bays	Yes	

Signal Characteristics

Signalized intersections	4	
Arrival type, AT	3	
Signal type (k = 0.5 for planning)	Actuated	
Cycle length, C	150.0	sec
Effective green ratio, g/C	0.650	

Results

Annual average daily traffic, AADT	27666	vpd
Two-way hourly volume	2213	vph
Hourly directional volume	1327	vph
Through-volume 15-min. flow rate	1248	v
Running time	163.2	sec
v/c ratio	0.53	
Through capacity	2340	vph
Progression factor, PF	1.000	
Uniform delay	14.1	sec
Filtering/metering factor, I	0.831	
Incremental delay	0.7	sec
Control delay	14.8	sec/v
Total travel speed, Sa	34.0	mph
Total urban street LOS	B	

Phone: Fax:
E-Mail:

PLANNING ANALYSIS

Analyst:	MJF
Agency/Co.:	
Date Performed:	3/28/2008
Analysis Time Period:	Look Up Table (Lower LOS C)
Urban Street:	US 158 east of WMB (5 LANES)
Direction of Travel:	
Jurisdiction:	
Analysis Year:	2035
Project ID:	Mid-Currituck EIS

Traffic Characteristics

Annual average daily traffic, AADT	27676	vpd
Planning analysis hour factor, K	0.080	
Directional distribution factor, D	0.600	
Peak-hour factor, PHF	0.850	
Adjusted saturation flow rate	1800	pcphgpl
Percent turns from exclusive lanes	20	%

Roadway Characteristics

Number of through lanes one direction, N	2	
Free flow speed, FFS	50	mph
Urban class	1	
Section length	2.10	miles
Median	Yes	
Left-turn bays	Yes	

Signal Characteristics

Signalized intersections	4	
Arrival type, AT	3	
Signal type (k = 0.5 for planning)	Actuated	
Cycle length, C	150.0	sec
Effective green ratio, g/C	0.650	

Results

Annual average daily traffic, AADT	27676	vpd
Two-way hourly volume	2214	vph
Hourly directional volume	1328	vph
Through-volume 15-min. flow rate	1249	v
Running time	163.2	sec
v/c ratio	0.53	
Through capacity	2340	vph
Progression factor, PF	1.000	
Uniform delay	14.1	sec
Filtering/metering factor, I	0.831	
Incremental delay	0.7	sec
Control delay	14.8	sec/v
Total travel speed, Sa	34.0	mph
Total urban street LOS	C	

Phone: Fax:
E-Mail:

PLANNING ANALYSIS

Analyst:	MJF
Agency/Co.:	
Date Performed:	3/28/2008
Analysis Time Period:	Look Up Table (Upper LOS C)
Urban Street:	US 158 east of WMB (5 LANES)
Direction of Travel:	
Jurisdiction:	
Analysis Year:	2035
Project ID:	Mid-Currituck EIS

Traffic Characteristics

Annual average daily traffic, AADT	50870	vpd
Planning analysis hour factor, K	0.080	
Directional distribution factor, D	0.600	
Peak-hour factor, PHF	0.850	
Adjusted saturation flow rate	1800	pcphgpl
Percent turns from exclusive lanes	20	%

Roadway Characteristics

Number of through lanes one direction, N	2	
Free flow speed, FFS	50	mph
Urban class	1	
Section length	2.10	miles
Median	Yes	
Left-turn bays	Yes	

Signal Characteristics

Signalized intersections	4	
Arrival type, AT	3	
Signal type (k = 0.5 for planning)	Actuated	
Cycle length, C	150.0	sec
Effective green ratio, g/C	0.650	

Results

Annual average daily traffic, AADT	50870	vpd
Two-way hourly volume	4069	vph
Hourly directional volume	2441	vph
Through-volume 15-min. flow rate	2297	v
Running time	163.2	sec
v/c ratio	0.98	
Through capacity	2340	vph
Progression factor, PF	1.000	
Uniform delay	25.4	sec
Filtering/metering factor, I	0.134	
Incremental delay	3.8	sec
Control delay	29.2	sec/v
Total travel speed, Sa	27.0	mph
Total urban street LOS	C	

Phone: Fax:
E-Mail:

PLANNING ANALYSIS

Analyst:	MJF
Agency/Co.:	
Date Performed:	3/28/2008
Analysis Time Period:	Look Up Table (Lower LOS D)
Urban Street:	US 158 east of WMB (5 LANES)
Direction of Travel:	
Jurisdiction:	
Analysis Year:	2035
Project ID:	Mid-Currituck EIS

Traffic Characteristics

Annual average daily traffic, AADT	50880	vpd
Planning analysis hour factor, K	0.080	
Directional distribution factor, D	0.600	
Peak-hour factor, PHF	0.850	
Adjusted saturation flow rate	1800	pcphgpl
Percent turns from exclusive lanes	20	%

Roadway Characteristics

Number of through lanes one direction, N	2	
Free flow speed, FFS	50	mph
Urban class	1	
Section length	2.10	miles
Median	Yes	
Left-turn bays	Yes	

Signal Characteristics

Signalized intersections	4	
Arrival type, AT	3	
Signal type (k = 0.5 for planning)	Actuated	
Cycle length, C	150.0	sec
Effective green ratio, g/C	0.650	

Results

Annual average daily traffic, AADT	50880	vpd
Two-way hourly volume	4070	vph
Hourly directional volume	2442	vph
Through-volume 15-min. flow rate	2298	v
Running time	163.2	sec
v/c ratio	0.98	
Through capacity	2340	vph
Progression factor, PF	1.000	
Uniform delay	25.4	sec
Filtering/metering factor, I	0.133	
Incremental delay	3.8	sec
Control delay	29.2	sec/v
Total travel speed, Sa	27.0	mph
Total urban street LOS	D	

Phone: Fax:
E-Mail:

PLANNING ANALYSIS

Analyst:	MJF
Agency/Co.:	
Date Performed:	3/28/2008
Analysis Time Period:	Look Up Table (Upper LOS D)
Urban Street:	US 158 east of WMB (5 LANES)
Direction of Travel:	
Jurisdiction:	
Analysis Year:	2035
Project ID:	Mid-Currituck EIS

Traffic Characteristics

Annual average daily traffic, AADT	54290	vpd
Planning analysis hour factor, K	0.080	
Directional distribution factor, D	0.600	
Peak-hour factor, PHF	0.850	
Adjusted saturation flow rate	1800	pcphgpl
Percent turns from exclusive lanes	20	%

Roadway Characteristics

Number of through lanes one direction, N	2	
Free flow speed, FFS	50	mph
Urban class	1	
Section length	2.10	miles
Median	Yes	
Left-turn bays	Yes	

Signal Characteristics

Signalized intersections	4	
Arrival type, AT	3	
Signal type (k = 0.5 for planning)	Actuated	
Cycle length, C	150.0	sec
Effective green ratio, g/C	0.650	

Results

Annual average daily traffic, AADT	54290	vpd
Two-way hourly volume	4343	vph
Hourly directional volume	2605	vph
Through-volume 15-min. flow rate	2451	v
Running time	163.2	sec
v/c ratio	1.05	
Through capacity	2340	vph
Progression factor, PF	1.000	
Uniform delay	26.2	sec
Filtering/metering factor, I	0.090	
Incremental delay	22.8	sec
Control delay	49.0	sec/v
Total travel speed, Sa	21.0	mph
Total urban street LOS	D	

Phone: Fax:
E-Mail:

PLANNING ANALYSIS

Analyst:	MJF
Agency/Co.:	
Date Performed:	3/28/2008
Analysis Time Period:	Look Up Table (Lower LOS E)
Urban Street:	US 158 east of WMB (5 LANES)
Direction of Travel:	
Jurisdiction:	
Analysis Year:	2035
Project ID:	Mid-Currituck EIS

Traffic Characteristics

Annual average daily traffic, AADT	54310	vpd
Planning analysis hour factor, K	0.080	
Directional distribution factor, D	0.600	
Peak-hour factor, PHF	0.850	
Adjusted saturation flow rate	1800	pcphgpl
Percent turns from exclusive lanes	20	%

Roadway Characteristics

Number of through lanes one direction, N	2	
Free flow speed, FFS	50	mph
Urban class	1	
Section length	2.10	miles
Median	Yes	
Left-turn bays	Yes	

Signal Characteristics

Signalized intersections	4	
Arrival type, AT	3	
Signal type (k = 0.5 for planning)	Actuated	
Cycle length, C	150.0	sec
Effective green ratio, g/C	0.650	

Results

Annual average daily traffic, AADT	54310	vpd
Two-way hourly volume	4344	vph
Hourly directional volume	2606	vph
Through-volume 15-min. flow rate	2452	v
Running time	163.2	sec
v/c ratio	1.05	
Through capacity	2340	vph
Progression factor, PF	1.000	
Uniform delay	26.2	sec
Filtering/metering factor, I	0.090	
Incremental delay	23.0	sec
Control delay	49.2	sec/v
Total travel speed, Sa	21.0	mph
Total urban street LOS	E	

Phone: Fax:
E-Mail:

PLANNING ANALYSIS

Analyst:	MJF
Agency/Co.:	
Date Performed:	3/28/2008
Analysis Time Period:	Look Up Table (Upper LOS E)
Urban Street:	US 158 east of WMB (5 LANES)
Direction of Travel:	
Jurisdiction:	
Analysis Year:	2035
Project ID:	Mid-Currituck EIS

Traffic Characteristics

Annual average daily traffic, AADT	57620	vpd
Planning analysis hour factor, K	0.080	
Directional distribution factor, D	0.600	
Peak-hour factor, PHF	0.850	
Adjusted saturation flow rate	1800	pcphgpl
Percent turns from exclusive lanes	20	%

Roadway Characteristics

Number of through lanes one direction, N	2	
Free flow speed, FFS	50	mph
Urban class	1	
Section length	2.10	miles
Median	Yes	
Left-turn bays	Yes	

Signal Characteristics

Signalized intersections	4	
Arrival type, AT	3	
Signal type (k = 0.5 for planning)	Actuated	
Cycle length, C	150.0	sec
Effective green ratio, g/C	0.650	

Results

Annual average daily traffic, AADT	57620	vpd
Two-way hourly volume	4609	vph
Hourly directional volume	2765	vph
Through-volume 15-min. flow rate	2602	v
Running time	163.2	sec
v/c ratio	1.11	
Through capacity	2340	vph
Progression factor, PF	1.000	
Uniform delay	26.2	sec
Filtering/metering factor, I	0.090	
Incremental delay	51.1	sec
Control delay	77.3	sec/v
Total travel speed, Sa	16.0	mph
Total urban street LOS	E	

Phone: Fax:
E-Mail:

PLANNING ANALYSIS

Analyst:	MJF
Agency/Co.:	
Date Performed:	3/28/2008
Analysis Time Period:	Look Up Table (Lower LOS F)
Urban Street:	US 158 east of WMB (5 LANES)
Direction of Travel:	
Jurisdiction:	
Analysis Year:	2035
Project ID:	Mid-Currituck EIS

Traffic Characteristics

Annual average daily traffic, AADT	57630	vpd
Planning analysis hour factor, K	0.080	
Directional distribution factor, D	0.600	
Peak-hour factor, PHF	0.850	
Adjusted saturation flow rate	1800	pcphgpl
Percent turns from exclusive lanes	20	%

Roadway Characteristics

Number of through lanes one direction, N	2	
Free flow speed, FFS	50	mph
Urban class	1	
Section length	2.10	miles
Median	Yes	
Left-turn bays	Yes	

Signal Characteristics

Signalized intersections	4	
Arrival type, AT	3	
Signal type (k = 0.5 for planning)	Actuated	
Cycle length, C	150.0	sec
Effective green ratio, g/C	0.650	

Results

Annual average daily traffic, AADT	57630	vpd
Two-way hourly volume	4610	vph
Hourly directional volume	2766	vph
Through-volume 15-min. flow rate	2603	v
Running time	163.2	sec
v/c ratio	1.11	
Through capacity	2340	vph
Progression factor, PF	1.000	
Uniform delay	26.2	sec
Filtering/metering factor, I	0.090	
Incremental delay	51.3	sec
Control delay	77.5	sec/v
Total travel speed, Sa	16.0	mph
Total urban street LOS	F	

6-LANE US 158 ARTERIAL

Phone: Fax:
E-Mail:

PLANNING ANALYSIS

Analyst:	MJF
Agency/Co.:	
Date Performed:	3/28/2008
Analysis Time Period:	Look Up Table (Lower LOS B)
Urban Street:	US 158 east of WMB (6 lanes)
Direction of Travel:	
Jurisdiction:	
Analysis Year:	2035
Project ID:	Mid-Currituck EIS

Traffic Characteristics

Annual average daily traffic, AADT	1	vpd
Planning analysis hour factor, K	0.080	
Directional distribution factor, D	0.600	
Peak-hour factor, PHF	0.850	
Adjusted saturation flow rate	1800	pcphgpl
Percent turns from exclusive lanes	20	%

Roadway Characteristics

Number of through lanes one direction, N	3	
Free flow speed, FFS	50	mph
Urban class	1	
Section length	2.10	miles
Median	Yes	
Left-turn bays	Yes	

Signal Characteristics

Signalized intersections	4	
Arrival type, AT	3	
Signal type (k = 0.5 for planning)	Actuated	
Cycle length, C	150.0	sec
Effective green ratio, g/C	0.650	

Results

Annual average daily traffic, AADT	1	vpd
Two-way hourly volume	0	vph
Hourly directional volume	0	vph
Through-volume 15-min. flow rate	0	v
Running time	163.2	sec
v/c ratio	0.00	
Through capacity	3509	vph
Progression factor, PF	1.000	
Uniform delay	9.2	sec
Filtering/metering factor, I	1.000	
Incremental delay	0.0	sec
Control delay	9.2	sec/v
Total travel speed, Sa	37.8	mph
Total urban street LOS	B	

Phone: Fax:
E-Mail:

PLANNING ANALYSIS

Analyst:	MJF
Agency/Co.:	
Date Performed:	3/28/2008
Analysis Time Period:	Look Up Table (Upper LOS B)
Urban Street:	US 158 east of WMB (6 lanes)
Direction of Travel:	
Jurisdiction:	
Analysis Year:	2035
Project ID:	Mid-Currituck EIS

Traffic Characteristics

Annual average daily traffic, AADT	42660	vpd
Planning analysis hour factor, K	0.080	
Directional distribution factor, D	0.600	
Peak-hour factor, PHF	0.850	
Adjusted saturation flow rate	1800	pcphgpl
Percent turns from exclusive lanes	20	%

Roadway Characteristics

Number of through lanes one direction, N	3	
Free flow speed, FFS	50	mph
Urban class	1	
Section length	2.10	miles
Median	Yes	
Left-turn bays	Yes	

Signal Characteristics

Signalized intersections	4	
Arrival type, AT	3	
Signal type (k = 0.5 for planning)	Actuated	
Cycle length, C	150.0	sec
Effective green ratio, g/C	0.650	

Results

Annual average daily traffic, AADT	42660	vpd
Two-way hourly volume	3412	vph
Hourly directional volume	2047	vph
Through-volume 15-min. flow rate	1926	v
Running time	163.2	sec
v/c ratio	0.55	
Through capacity	3509	vph
Progression factor, PF	1.000	
Uniform delay	14.3	sec
Filtering/metering factor, I	0.818	
Incremental delay	0.5	sec
Control delay	14.8	sec/v
Total travel speed, Sa	34.0	mph
Total urban street LOS	B	

Phone: Fax:
E-Mail:

PLANNING ANALYSIS

Analyst:	MJF
Agency/Co.:	
Date Performed:	3/28/2008
Analysis Time Period:	Look Up Table (Lower LOS C)
Urban Street:	US 158 east of WMB (6 lanes)
Direction of Travel:	
Jurisdiction:	
Analysis Year:	2035
Project ID:	Mid-Currituck EIS

Traffic Characteristics

Annual average daily traffic, AADT	42680	vpd
Planning analysis hour factor, K	0.080	
Directional distribution factor, D	0.600	
Peak-hour factor, PHF	0.850	
Adjusted saturation flow rate	1800	pcphgpl
Percent turns from exclusive lanes	20	%

Roadway Characteristics

Number of through lanes one direction, N	3	
Free flow speed, FFS	50	mph
Urban class	1	
Section length	2.10	miles
Median	Yes	
Left-turn bays	Yes	

Signal Characteristics

Signalized intersections	4	
Arrival type, AT	3	
Signal type (k = 0.5 for planning)	Actuated	
Cycle length, C	150.0	sec
Effective green ratio, g/C	0.650	

Results

Annual average daily traffic, AADT	42680	vpd
Two-way hourly volume	3414	vph
Hourly directional volume	2048	vph
Through-volume 15-min. flow rate	1927	v
Running time	163.2	sec
v/c ratio	0.55	
Through capacity	3509	vph
Progression factor, PF	1.000	
Uniform delay	14.3	sec
Filtering/metering factor, I	0.817	
Incremental delay	0.5	sec
Control delay	14.8	sec/v
Total travel speed, Sa	34.0	mph
Total urban street LOS	C	

Phone: Fax:
E-Mail:

PLANNING ANALYSIS

Analyst:	MJF
Agency/Co.:	
Date Performed:	3/28/2008
Analysis Time Period:	Look Up Table (Upper LOS C)
Urban Street:	US 158 east of WMB (6 lanes)
Direction of Travel:	
Jurisdiction:	
Analysis Year:	2035
Project ID:	Mid-Currituck EIS

Traffic Characteristics

Annual average daily traffic, AADT	76980	vpd
Planning analysis hour factor, K	0.080	
Directional distribution factor, D	0.600	
Peak-hour factor, PHF	0.850	
Adjusted saturation flow rate	1800	pcphgpl
Percent turns from exclusive lanes	20	%

Roadway Characteristics

Number of through lanes one direction, N	3	
Free flow speed, FFS	50	mph
Urban class	1	
Section length	2.10	miles
Median	Yes	
Left-turn bays	Yes	

Signal Characteristics

Signalized intersections	4	
Arrival type, AT	3	
Signal type (k = 0.5 for planning)	Actuated	
Cycle length, C	150.0	sec
Effective green ratio, g/C	0.650	

Results

Annual average daily traffic, AADT	76980	vpd
Two-way hourly volume	6158	vph
Hourly directional volume	3694	vph
Through-volume 15-min. flow rate	3476	v
Running time	163.2	sec
v/c ratio	0.99	
Through capacity	3509	vph
Progression factor, PF	1.000	
Uniform delay	25.8	sec
Filtering/metering factor, I	0.113	
Incremental delay	3.4	sec
Control delay	29.2	sec/v
Total travel speed, Sa	27.0	mph
Total urban street LOS	C	

Phone: Fax:
E-Mail:

PLANNING ANALYSIS

Analyst:	MJF
Agency/Co.:	
Date Performed:	3/28/2008
Analysis Time Period:	Look Up Table (Lower LOS D)
Urban Street:	US 158 east of WMB (6 lanes)
Direction of Travel:	
Jurisdiction:	
Analysis Year:	2035
Project ID:	Mid-Currituck EIS

Traffic Characteristics

Annual average daily traffic, AADT	76990	vpd
Planning analysis hour factor, K	0.080	
Directional distribution factor, D	0.600	
Peak-hour factor, PHF	0.850	
Adjusted saturation flow rate	1800	pcphgpl
Percent turns from exclusive lanes	20	%

Roadway Characteristics

Number of through lanes one direction, N	3	
Free flow speed, FFS	50	mph
Urban class	1	
Section length	2.10	miles
Median	Yes	
Left-turn bays	Yes	

Signal Characteristics

Signalized intersections	4	
Arrival type, AT	3	
Signal type (k = 0.5 for planning)	Actuated	
Cycle length, C	150.0	sec
Effective green ratio, g/C	0.650	

Results

Annual average daily traffic, AADT	76990	vpd
Two-way hourly volume	6159	vph
Hourly directional volume	3695	vph
Through-volume 15-min. flow rate	3477	v
Running time	163.2	sec
v/c ratio	0.99	
Through capacity	3509	vph
Progression factor, PF	1.000	
Uniform delay	25.8	sec
Filtering/metering factor, I	0.112	
Incremental delay	3.4	sec
Control delay	29.2	sec/v
Total travel speed, Sa	27.0	mph
Total urban street LOS	D	

Phone: Fax:
E-Mail:

PLANNING ANALYSIS

Analyst:	MJF
Agency/Co.:	
Date Performed:	3/28/2008
Analysis Time Period:	Look Up Table (Upper LOS D)
Urban Street:	US 158 east of WMB (6 lanes)
Direction of Travel:	
Jurisdiction:	
Analysis Year:	2035
Project ID:	Mid-Currituck EIS

Traffic Characteristics

Annual average daily traffic, AADT	81500	vpd
Planning analysis hour factor, K	0.080	
Directional distribution factor, D	0.600	
Peak-hour factor, PHF	0.850	
Adjusted saturation flow rate	1800	pcphgpl
Percent turns from exclusive lanes	20	%

Roadway Characteristics

Number of through lanes one direction, N	3	
Free flow speed, FFS	50	mph
Urban class	1	
Section length	2.10	miles
Median	Yes	
Left-turn bays	Yes	

Signal Characteristics

Signalized intersections	4	
Arrival type, AT	3	
Signal type (k = 0.5 for planning)	Actuated	
Cycle length, C	150.0	sec
Effective green ratio, g/C	0.650	

Results

Annual average daily traffic, AADT	81500	vpd
Two-way hourly volume	6519	vph
Hourly directional volume	3911	vph
Through-volume 15-min. flow rate	3680	v
Running time	163.2	sec
v/c ratio	1.05	
Through capacity	3509	vph
Progression factor, PF	1.000	
Uniform delay	26.3	sec
Filtering/metering factor, I	0.090	
Incremental delay	22.9	sec
Control delay	49.1	sec/v
Total travel speed, Sa	21.0	mph
Total urban street LOS	D	

Phone: Fax:
E-Mail:

PLANNING ANALYSIS

Analyst:	MJF
Agency/Co.:	
Date Performed:	3/28/2008
Analysis Time Period:	Look Up Table (Lower LOS E)
Urban Street:	US 158 east of WMB (6 lanes)
Direction of Travel:	
Jurisdiction:	
Analysis Year:	2035
Project ID:	Mid-Currituck EIS

Traffic Characteristics

Annual average daily traffic, AADT	81510	vpd
Planning analysis hour factor, K	0.080	
Directional distribution factor, D	0.600	
Peak-hour factor, PHF	0.850	
Adjusted saturation flow rate	1800	pcphgpl
Percent turns from exclusive lanes	20	%

Roadway Characteristics

Number of through lanes one direction, N	3	
Free flow speed, FFS	50	mph
Urban class	1	
Section length	2.10	miles
Median	Yes	
Left-turn bays	Yes	

Signal Characteristics

Signalized intersections	4	
Arrival type, AT	3	
Signal type (k = 0.5 for planning)	Actuated	
Cycle length, C	150.0	sec
Effective green ratio, g/C	0.650	

Results

Annual average daily traffic, AADT	81510	vpd
Two-way hourly volume	6520	vph
Hourly directional volume	3912	vph
Through-volume 15-min. flow rate	3681	v
Running time	163.2	sec
v/c ratio	1.05	
Through capacity	3509	vph
Progression factor, PF	1.000	
Uniform delay	26.3	sec
Filtering/metering factor, I	0.090	
Incremental delay	23.0	sec
Control delay	49.3	sec/v
Total travel speed, Sa	21.0	mph
Total urban street LOS	E	

Phone: Fax:
E-Mail:

PLANNING ANALYSIS

Analyst:	MJF
Agency/Co.:	
Date Performed:	3/28/2008
Analysis Time Period:	Look Up Table (Upper LOS E)
Urban Street:	US 158 east of WMB (6 lanes)
Direction of Travel:	
Jurisdiction:	
Analysis Year:	2035
Project ID:	Mid-Currituck EIS

Traffic Characteristics

Annual average daily traffic, AADT	86430	vpd
Planning analysis hour factor, K	0.080	
Directional distribution factor, D	0.600	
Peak-hour factor, PHF	0.850	
Adjusted saturation flow rate	1800	pcphgpl
Percent turns from exclusive lanes	20	%

Roadway Characteristics

Number of through lanes one direction, N	3	
Free flow speed, FFS	50	mph
Urban class	1	
Section length	2.10	miles
Median	Yes	
Left-turn bays	Yes	

Signal Characteristics

Signalized intersections	4	
Arrival type, AT	3	
Signal type (k = 0.5 for planning)	Actuated	
Cycle length, C	150.0	sec
Effective green ratio, g/C	0.650	

Results

Annual average daily traffic, AADT	86430	vpd
Two-way hourly volume	6914	vph
Hourly directional volume	4148	vph
Through-volume 15-min. flow rate	3903	v
Running time	163.2	sec
v/c ratio	1.11	
Through capacity	3509	vph
Progression factor, PF	1.000	
Uniform delay	26.3	sec
Filtering/metering factor, I	0.090	
Incremental delay	51.0	sec
Control delay	77.2	sec/v
Total travel speed, Sa	16.0	mph
Total urban street LOS	E	

Phone: Fax:
E-Mail:

PLANNING ANALYSIS

Analyst:	MJF
Agency/Co.:	
Date Performed:	3/28/2008
Analysis Time Period:	Look Up Table (Lower LOS F)
Urban Street:	US 158 east of WMB (6 lanes)
Direction of Travel:	
Jurisdiction:	
Analysis Year:	2035
Project ID:	Mid-Currituck EIS

Traffic Characteristics

Annual average daily traffic, AADT	86440	vpd
Planning analysis hour factor, K	0.080	
Directional distribution factor, D	0.600	
Peak-hour factor, PHF	0.850	
Adjusted saturation flow rate	1800	pcphgpl
Percent turns from exclusive lanes	20	%

Roadway Characteristics

Number of through lanes one direction, N	3	
Free flow speed, FFS	50	mph
Urban class	1	
Section length	2.10	miles
Median	Yes	
Left-turn bays	Yes	

Signal Characteristics

Signalized intersections	4	
Arrival type, AT	3	
Signal type (k = 0.5 for planning)	Actuated	
Cycle length, C	150.0	sec
Effective green ratio, g/C	0.650	

Results

Annual average daily traffic, AADT	86440	vpd
Two-way hourly volume	6915	vph
Hourly directional volume	4149	vph
Through-volume 15-min. flow rate	3904	v
Running time	163.2	sec
v/c ratio	1.11	
Through capacity	3509	vph
Progression factor, PF	1.000	
Uniform delay	26.3	sec
Filtering/metering factor, I	0.090	
Incremental delay	51.1	sec
Control delay	77.4	sec/v
Total travel speed, Sa	16.0	mph
Total urban street LOS	F	

8-LANE US 158 ARTERIAL

Phone: Fax:
E-Mail:

PLANNING ANALYSIS

Analyst:	MJF
Agency/Co.:	
Date Performed:	3/28/2008
Analysis Time Period:	Look Up Table (Lower LOS B)
Urban Street:	US 158 east of WMB (8 lanes)
Direction of Travel:	
Jurisdiction:	
Analysis Year:	2035
Project ID:	Mid-Currituck EIS

Traffic Characteristics

Annual average daily traffic, AADT	1	vpd
Planning analysis hour factor, K	0.080	
Directional distribution factor, D	0.600	
Peak-hour factor, PHF	0.850	
Adjusted saturation flow rate	1800	pcphgpl
Percent turns from exclusive lanes	20	%

Roadway Characteristics

Number of through lanes one direction, N	4	
Free flow speed, FFS	50	mph
Urban class	1	
Section length	2.10	miles
Median	Yes	
Left-turn bays	Yes	

Signal Characteristics

Signalized intersections	4	
Arrival type, AT	3	
Signal type (k = 0.5 for planning)	Actuated	
Cycle length, C	150.0	sec
Effective green ratio, g/C	0.650	

Results

Annual average daily traffic, AADT	1	vpd
Two-way hourly volume	0	vph
Hourly directional volume	0	vph
Through-volume 15-min. flow rate	0	v
Running time	163.2	sec
v/c ratio	0.00	
Through capacity	4679	vph
Progression factor, PF	1.000	
Uniform delay	9.2	sec
Filtering/metering factor, I	1.000	
Incremental delay	0.0	sec
Control delay	9.2	sec/v
Total travel speed, Sa	37.8	mph
Total urban street LOS	B	

Phone: Fax:
E-Mail:

PLANNING ANALYSIS

Analyst:	MJF
Agency/Co.:	
Date Performed:	3/28/2008
Analysis Time Period:	Look Up Table (Upper LOS B)
Urban Street:	US 158 east of WMB (8 lanes)
Direction of Travel:	
Jurisdiction:	
Analysis Year:	2035
Project ID:	Mid-Currituck EIS

Traffic Characteristics

Annual average daily traffic, AADT	57740	vpd
Planning analysis hour factor, K	0.080	
Directional distribution factor, D	0.600	
Peak-hour factor, PHF	0.850	
Adjusted saturation flow rate	1800	pcphgpl
Percent turns from exclusive lanes	20	%

Roadway Characteristics

Number of through lanes one direction, N	4	
Free flow speed, FFS	50	mph
Urban class	1	
Section length	2.10	miles
Median	Yes	
Left-turn bays	Yes	

Signal Characteristics

Signalized intersections	4	
Arrival type, AT	3	
Signal type (k = 0.5 for planning)	Actuated	
Cycle length, C	150.0	sec
Effective green ratio, g/C	0.650	

Results

Annual average daily traffic, AADT	57740	vpd
Two-way hourly volume	4619	vph
Hourly directional volume	2771	vph
Through-volume 15-min. flow rate	2607	v
Running time	163.2	sec
v/c ratio	0.56	
Through capacity	4679	vph
Progression factor, PF	1.000	
Uniform delay	14.4	sec
Filtering/metering factor, I	0.810	
Incremental delay	0.4	sec
Control delay	14.8	sec/v
Total travel speed, Sa	34.0	mph
Total urban street LOS	B	

Phone: Fax:
E-Mail:

PLANNING ANALYSIS

Analyst:	MJF
Agency/Co.:	
Date Performed:	3/28/2008
Analysis Time Period:	Look Up Table (Lower LOS C)
Urban Street:	US 158 east of WMB (8 lanes)
Direction of Travel:	
Jurisdiction:	
Analysis Year:	2035
Project ID:	Mid-Currituck EIS

Traffic Characteristics

Annual average daily traffic, AADT	57760	vpd
Planning analysis hour factor, K	0.080	
Directional distribution factor, D	0.600	
Peak-hour factor, PHF	0.850	
Adjusted saturation flow rate	1800	pcphgpl
Percent turns from exclusive lanes	20	%

Roadway Characteristics

Number of through lanes one direction, N	4	
Free flow speed, FFS	50	mph
Urban class	1	
Section length	2.10	miles
Median	Yes	
Left-turn bays	Yes	

Signal Characteristics

Signalized intersections	4	
Arrival type, AT	3	
Signal type (k = 0.5 for planning)	Actuated	
Cycle length, C	150.0	sec
Effective green ratio, g/C	0.650	

Results

Annual average daily traffic, AADT	57760	vpd
Two-way hourly volume	4620	vph
Hourly directional volume	2772	vph
Through-volume 15-min. flow rate	2608	v
Running time	163.2	sec
v/c ratio	0.56	
Through capacity	4679	vph
Progression factor, PF	1.000	
Uniform delay	14.4	sec
Filtering/metering factor, I	0.810	
Incremental delay	0.4	sec
Control delay	14.8	sec/v
Total travel speed, Sa	34.0	mph
Total urban street LOS	C	

Phone: Fax:
E-Mail:

PLANNING ANALYSIS

Analyst:	MJF
Agency/Co.:	
Date Performed:	3/28/2008
Analysis Time Period:	Look Up Table (Upper LOS C)
Urban Street:	US 158 east of WMB (8 lanes)
Direction of Travel:	
Jurisdiction:	
Analysis Year:	2035
Project ID:	Mid-Currituck EIS

Traffic Characteristics

Annual average daily traffic, AADT	103080	vpd
Planning analysis hour factor, K	0.080	
Directional distribution factor, D	0.600	
Peak-hour factor, PHF	0.850	
Adjusted saturation flow rate	1800	pcphgpl
Percent turns from exclusive lanes	20	%

Roadway Characteristics

Number of through lanes one direction, N	4	
Free flow speed, FFS	50	mph
Urban class	1	
Section length	2.10	miles
Median	Yes	
Left-turn bays	Yes	

Signal Characteristics

Signalized intersections	4	
Arrival type, AT	3	
Signal type (k = 0.5 for planning)	Actuated	
Cycle length, C	150.0	sec
Effective green ratio, g/C	0.650	

Results

Annual average daily traffic, AADT	103080	vpd
Two-way hourly volume	8246	vph
Hourly directional volume	4947	vph
Through-volume 15-min. flow rate	4655	v
Running time	163.2	sec
v/c ratio	0.99	
Through capacity	4679	vph
Progression factor, PF	1.000	
Uniform delay	26.0	sec
Filtering/metering factor, I	0.102	
Incremental delay	3.2	sec
Control delay	29.2	sec/v
Total travel speed, Sa	27.0	mph
Total urban street LOS	C	

Phone: Fax:
E-Mail:

PLANNING ANALYSIS

Analyst:	MJF
Agency/Co.:	
Date Performed:	3/28/2008
Analysis Time Period:	Look Up Table (Lower LOS D)
Urban Street:	US 158 east of WMB (8 lanes)
Direction of Travel:	
Jurisdiction:	
Analysis Year:	2035
Project ID:	Mid-Currituck EIS

Traffic Characteristics

Annual average daily traffic, AADT	103090	vpd
Planning analysis hour factor, K	0.080	
Directional distribution factor, D	0.600	
Peak-hour factor, PHF	0.850	
Adjusted saturation flow rate	1800	pcphgpl
Percent turns from exclusive lanes	20	%

Roadway Characteristics

Number of through lanes one direction, N	4	
Free flow speed, FFS	50	mph
Urban class	1	
Section length	2.10	miles
Median	Yes	
Left-turn bays	Yes	

Signal Characteristics

Signalized intersections	4	
Arrival type, AT	3	
Signal type (k = 0.5 for planning)	Actuated	
Cycle length, C	150.0	sec
Effective green ratio, g/C	0.650	

Results

Annual average daily traffic, AADT	103090	vpd
Two-way hourly volume	8247	vph
Hourly directional volume	4948	vph
Through-volume 15-min. flow rate	4656	v
Running time	163.2	sec
v/c ratio	1.00	
Through capacity	4679	vph
Progression factor, PF	1.000	
Uniform delay	26.0	sec
Filtering/metering factor, I	0.102	
Incremental delay	3.2	sec
Control delay	29.2	sec/v
Total travel speed, Sa	27.0	mph
Total urban street LOS	D	

Phone: Fax:
E-Mail:

PLANNING ANALYSIS

Analyst:	MJF
Agency/Co.:	
Date Performed:	3/28/2008
Analysis Time Period:	Look Up Table (Upper LOS D)
Urban Street:	US 158 east of WMB (8 lanes)
Direction of Travel:	
Jurisdiction:	
Analysis Year:	2035
Project ID:	Mid-Currituck EIS

Traffic Characteristics

Annual average daily traffic, AADT	108700	vpd
Planning analysis hour factor, K	0.080	
Directional distribution factor, D	0.600	
Peak-hour factor, PHF	0.850	
Adjusted saturation flow rate	1800	pcphgpl
Percent turns from exclusive lanes	20	%

Roadway Characteristics

Number of through lanes one direction, N	4	
Free flow speed, FFS	50	mph
Urban class	1	
Section length	2.10	miles
Median	Yes	
Left-turn bays	Yes	

Signal Characteristics

Signalized intersections	4	
Arrival type, AT	3	
Signal type (k = 0.5 for planning)	Actuated	
Cycle length, C	150.0	sec
Effective green ratio, g/C	0.650	

Results

Annual average daily traffic, AADT	108700	vpd
Two-way hourly volume	8695	vph
Hourly directional volume	5217	vph
Through-volume 15-min. flow rate	4910	v
Running time	163.2	sec
v/c ratio	1.05	
Through capacity	4679	vph
Progression factor, PF	1.000	
Uniform delay	26.3	sec
Filtering/metering factor, I	0.090	
Incremental delay	22.9	sec
Control delay	49.2	sec/v
Total travel speed, Sa	21.0	mph
Total urban street LOS	D	

Phone: Fax:
E-Mail:

PLANNING ANALYSIS

Analyst:	MJF
Agency/Co.:	
Date Performed:	3/28/2008
Analysis Time Period:	Look Up Table (Lower LOS E)
Urban Street:	US 158 east of WMB (8 lanes)
Direction of Travel:	
Jurisdiction:	
Analysis Year:	2035
Project ID:	Mid-Currituck EIS

Traffic Characteristics

Annual average daily traffic, AADT	108720	vpd
Planning analysis hour factor, K	0.080	
Directional distribution factor, D	0.600	
Peak-hour factor, PHF	0.850	
Adjusted saturation flow rate	1800	pcphgpl
Percent turns from exclusive lanes	20	%

Roadway Characteristics

Number of through lanes one direction, N	4	
Free flow speed, FFS	50	mph
Urban class	1	
Section length	2.10	miles
Median	Yes	
Left-turn bays	Yes	

Signal Characteristics

Signalized intersections	4	
Arrival type, AT	3	
Signal type (k = 0.5 for planning)	Actuated	
Cycle length, C	150.0	sec
Effective green ratio, g/C	0.650	

Results

Annual average daily traffic, AADT	108720	vpd
Two-way hourly volume	8697	vph
Hourly directional volume	5218	vph
Through-volume 15-min. flow rate	4911	v
Running time	163.2	sec
v/c ratio	1.05	
Through capacity	4679	vph
Progression factor, PF	1.000	
Uniform delay	26.3	sec
Filtering/metering factor, I	0.090	
Incremental delay	23.0	sec
Control delay	49.3	sec/v
Total travel speed, Sa	21.0	mph
Total urban street LOS	E	

Phone: Fax:
E-Mail:

PLANNING ANALYSIS

Analyst:	MJF
Agency/Co.:	
Date Performed:	3/28/2008
Analysis Time Period:	Look Up Table (Upper LOS E)
Urban Street:	US 158 east of WMB (8 lanes)
Direction of Travel:	
Jurisdiction:	
Analysis Year:	2035
Project ID:	Mid-Currituck EIS

Traffic Characteristics

Annual average daily traffic, AADT	115260	vpd
Planning analysis hour factor, K	0.080	
Directional distribution factor, D	0.600	
Peak-hour factor, PHF	0.850	
Adjusted saturation flow rate	1800	pcphgpl
Percent turns from exclusive lanes	20	%

Roadway Characteristics

Number of through lanes one direction, N	4	
Free flow speed, FFS	50	mph
Urban class	1	
Section length	2.10	miles
Median	Yes	
Left-turn bays	Yes	

Signal Characteristics

Signalized intersections	4	
Arrival type, AT	3	
Signal type (k = 0.5 for planning)	Actuated	
Cycle length, C	150.0	sec
Effective green ratio, g/C	0.650	

Results

Annual average daily traffic, AADT	115260	vpd
Two-way hourly volume	9220	vph
Hourly directional volume	5532	vph
Through-volume 15-min. flow rate	5206	v
Running time	163.2	sec
v/c ratio	1.11	
Through capacity	4679	vph
Progression factor, PF	1.000	
Uniform delay	26.3	sec
Filtering/metering factor, I	0.090	
Incremental delay	51.0	sec
Control delay	77.3	sec/v
Total travel speed, Sa	16.0	mph
Total urban street LOS	E	

Phone: Fax:
E-Mail:

PLANNING ANALYSIS

Analyst:	MJF
Agency/Co.:	
Date Performed:	3/28/2008
Analysis Time Period:	Look Up Table (Lower LOS F)
Urban Street:	US 158 east of WMB (8 lanes)
Direction of Travel:	
Jurisdiction:	
Analysis Year:	2035
Project ID:	Mid-Currituck EIS

Traffic Characteristics

Annual average daily traffic, AADT	115280	vpd
Planning analysis hour factor, K	0.080	
Directional distribution factor, D	0.600	
Peak-hour factor, PHF	0.850	
Adjusted saturation flow rate	1800	pcphgpl
Percent turns from exclusive lanes	20	%

Roadway Characteristics

Number of through lanes one direction, N	4	
Free flow speed, FFS	50	mph
Urban class	1	
Section length	2.10	miles
Median	Yes	
Left-turn bays	Yes	

Signal Characteristics

Signalized intersections	4	
Arrival type, AT	3	
Signal type (k = 0.5 for planning)	Actuated	
Cycle length, C	150.0	sec
Effective green ratio, g/C	0.650	

Results

Annual average daily traffic, AADT	115280	vpd
Two-way hourly volume	9222	vph
Hourly directional volume	5533	vph
Through-volume 15-min. flow rate	5207	v
Running time	163.2	sec
v/c ratio	1.11	
Through capacity	4679	vph
Progression factor, PF	1.000	
Uniform delay	26.3	sec
Filtering/metering factor, I	0.090	
Incremental delay	51.1	sec
Control delay	77.4	sec/v
Total travel speed, Sa	16.0	mph
Total urban street LOS	F	

2-LANE BRIDGE

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Two-Way Two-Lane Highway Segment Analysis

Analyst	MJF
Agency/Co.	PB
Date Performed	3/28/08
Analysis Time Period	Look Up Table - Lower LOS B
Highway	2-lane bridge MCB
From/To	
Jurisdiction	
Analysis Year	2035
Description	Mid-Currituck Bridge EIS

Input Data

Highway class	Class 1				
Shoulder width	6.0	ft	Peak-hour factor, PHF	0.85	
Lane width	12.0	ft	% Trucks and buses	3	%
Segment length	7.2	mi	% Recreational vehicles	4	%
Terrain type	Level		% No-passing zones	100	%
Grade: Length		mi	Access points/mi	0	/mi
Up/down		%			

Two-way hourly volume, V	98		veh/h
Directional split	65	/ 35	%

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.7	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.979	
Two-way flow rate,(note-1) vp	118	pc/h
Highest directional split proportion (note-2)	77	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	60.0	mi/h
Adj. for lane and shoulder width, fLS	0.0	mi/h
Adj. for access points, fA	0.0	mi/h
Free-flow speed, FFS	60.0	mi/h
Adjustment for no-passing zones, fnp	2.1	mi/h
Average travel speed, ATS	57.0	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	0.997	
Two-way flow rate,(note-1) vp	116	pc/h
Highest directional split proportion (note-2)	75	
Base percent time-spent-following, BPTSF	9.7	%
Adj.for directional distribution and no-passing zones, fd/np	25.4	
Percent time-spent-following, PTSF	35.1	%

Level of Service and Other Performance Measures

Level of service, LOS	B	
Volume to capacity ratio, v/c	0.04	
Peak 15-min vehicle-miles of travel, VMT15	208	veh-mi
Peak-hour vehicle-miles of travel, VMT60	706	veh-mi
Peak 15-min total travel time, TT15	3.6	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

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Two-Way Two-Lane Highway Segment Analysis

Analyst	MJF
Agency/Co.	PB
Date Performed	3/28/08
Analysis Time Period	Look Up Table - Upper LOS B
Highway	2-lane bridge MCB
From/To	
Jurisdiction	
Analysis Year	2035
Description	Mid-Currituck Bridge EIS

Input Data

Highway class	Class 1				
Shoulder width	6.0	ft	Peak-hour factor, PHF	0.85	
Lane width	12.0	ft	% Trucks and buses	3	%
Segment length	7.2	mi	% Recreational vehicles	4	%
Terrain type	Level		% No-passing zones	100	%
Grade: Length		mi	Access points/mi	0	/mi
Up/down		%			

Two-way hourly volume, V	302	veh/h	
Directional split	65 / 35	%	

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.7	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.979	
Two-way flow rate,(note-1) vp	363	pc/h
Highest directional split proportion (note-2)	236	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	60.0	mi/h
Adj. for lane and shoulder width, fLS	0.0	mi/h
Adj. for access points, fA	0.0	mi/h
Free-flow speed, FFS	60.0	mi/h
Adjustment for no-passing zones, fnp	4.3	mi/h
Average travel speed, ATS	52.9	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	0.997	
Two-way flow rate,(note-1) vp	356	pc/h
Highest directional split proportion (note-2)	231	
Base percent time-spent-following, BPTSF	26.9	%
Adj.for directional distribution and no-passing zones, fd/np	23.1	
Percent time-spent-following, PTSF	50.0	%

Level of Service and Other Performance Measures

Level of service, LOS	B	
Volume to capacity ratio, v/c	0.11	
Peak 15-min vehicle-miles of travel, VMT15	640	veh-mi
Peak-hour vehicle-miles of travel, VMT60	2174	veh-mi
Peak 15-min total travel time, TT15	12.1	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

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Two-Way Two-Lane Highway Segment Analysis

Analyst	MJF
Agency/Co.	PB
Date Performed	3/28/08
Analysis Time Period	Look Up Table - Lower LOS C
Highway	2-lane bridge MCB
From/To	
Jurisdiction	
Analysis Year	2035
Description	Mid-Currituck Bridge EIS

Input Data

Highway class	Class 1				
Shoulder width	6.0	ft	Peak-hour factor, PHF	0.85	
Lane width	12.0	ft	% Trucks and buses	3	%
Segment length	7.2	mi	% Recreational vehicles	4	%
Terrain type	Level		% No-passing zones	100	%
Grade: Length		mi	Access points/mi	0	/mi
Up/down		%			

Two-way hourly volume, V	303	veh/h	
Directional split	65 / 35	%	

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.7	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.979	
Two-way flow rate,(note-1) vp	364	pc/h
Highest directional split proportion (note-2)	237	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	60.0	mi/h
Adj. for lane and shoulder width, fLS	0.0	mi/h
Adj. for access points, fA	0.0	mi/h
Free-flow speed, FFS	60.0	mi/h
Adjustment for no-passing zones, fnp	4.3	mi/h
Average travel speed, ATS	52.9	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	0.997	
Two-way flow rate,(note-1) vp	358	pc/h
Highest directional split proportion (note-2)	233	
Base percent time-spent-following, BPTSF	27.0	%
Adj.for directional distribution and no-passing zones, fd/np	23.1	
Percent time-spent-following, PTSF	50.1	%

Level of Service and Other Performance Measures

Level of service, LOS	C	
Volume to capacity ratio, v/c	0.11	
Peak 15-min vehicle-miles of travel, VMT15	642	veh-mi
Peak-hour vehicle-miles of travel, VMT60	2182	veh-mi
Peak 15-min total travel time, TT15	12.1	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

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Two-Way Two-Lane Highway Segment Analysis

Analyst	MJF
Agency/Co.	PB
Date Performed	3/28/08
Analysis Time Period	Look Up Table - Upper LOS C
Highway	2-lane bridge MCB
From/To	
Jurisdiction	
Analysis Year	2035
Description	Mid-Currituck Bridge EIS

Input Data

Highway class	Class 1				
Shoulder width	6.0	ft	Peak-hour factor, PHF	0.85	
Lane width	12.0	ft	% Trucks and buses	3	%
Segment length	7.2	mi	% Recreational vehicles	4	%
Terrain type	Level		% No-passing zones	100	%
Grade: Length		mi	Access points/mi	0	/mi
Up/down		%			

Two-way hourly volume, V	677	veh/h	
Directional split	65 / 35	%	

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.2	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.994	
Two-way flow rate,(note-1) vp	801	pc/h
Highest directional split proportion (note-2)	521	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	60.0	mi/h
Adj. for lane and shoulder width, fLS	0.0	mi/h
Adj. for access points, fA	0.0	mi/h
Free-flow speed, FFS	60.0	mi/h
Adjustment for no-passing zones, fnp	3.0	mi/h
Average travel speed, ATS	50.8	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	0.997	
Two-way flow rate,(note-1) vp	799	pc/h
Highest directional split proportion (note-2)	519	
Base percent time-spent-following, BPTSF	50.5	%
Adj.for directional distribution and no-passing zones, fd/np	14.5	
Percent time-spent-following, PTSF	65.0	%

Level of Service and Other Performance Measures

Level of service, LOS	C	
Volume to capacity ratio, v/c	0.25	
Peak 15-min vehicle-miles of travel, VMT15	1434	veh-mi
Peak-hour vehicle-miles of travel, VMT60	4874	veh-mi
Peak 15-min total travel time, TT15	28.2	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

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Two-Way Two-Lane Highway Segment Analysis

Analyst	MJF
Agency/Co.	PB
Date Performed	3/28/08
Analysis Time Period	Look Up Table - Lower LOS D
Highway	2-lane bridge MCB
From/To	
Jurisdiction	
Analysis Year	2035
Description	Mid-Currituck Bridge EIS

Input Data

Highway class	Class 1				
Shoulder width	6.0	ft	Peak-hour factor, PHF	0.85	
Lane width	12.0	ft	% Trucks and buses	3	%
Segment length	7.2	mi	% Recreational vehicles	4	%
Terrain type	Level		% No-passing zones	100	%
Grade: Length		mi	Access points/mi	0	/mi
Up/down		%			

Two-way hourly volume, V	678	veh/h	
Directional split	65 / 35	%	

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.2	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.994	
Two-way flow rate,(note-1) vp	802	pc/h
Highest directional split proportion (note-2)	521	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	60.0	mi/h
Adj. for lane and shoulder width, fLS	0.0	mi/h
Adj. for access points, fA	0.0	mi/h
Free-flow speed, FFS	60.0	mi/h
Adjustment for no-passing zones, fnp	3.0	mi/h
Average travel speed, ATS	50.8	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	0.997	
Two-way flow rate,(note-1) vp	800	pc/h
Highest directional split proportion (note-2)	520	
Base percent time-spent-following, BPTSF	50.5	%
Adj.for directional distribution and no-passing zones, fd/np	14.5	
Percent time-spent-following, PTSF	65.0	%

Level of Service and Other Performance Measures

Level of service, LOS	D	
Volume to capacity ratio, v/c	0.25	
Peak 15-min vehicle-miles of travel, VMT15	1436	veh-mi
Peak-hour vehicle-miles of travel, VMT60	4882	veh-mi
Peak 15-min total travel time, TT15	28.3	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

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Two-Way Two-Lane Highway Segment Analysis

Analyst	MJF
Agency/Co.	PB
Date Performed	3/28/08
Analysis Time Period	Look Up Table - Upper LOS D
Highway	2-lane bridge MCB
From/To	
Jurisdiction	
Analysis Year	2035
Description	Mid-Currituck Bridge EIS

Input Data

Highway class	Class 1				
Shoulder width	6.0	ft	Peak-hour factor, PHF	0.85	
Lane width	12.0	ft	% Trucks and buses	3	%
Segment length	7.2	mi	% Recreational vehicles	4	%
Terrain type	Level		% No-passing zones	100	%
Grade: Length		mi	Access points/mi	0	/mi
Up/down		%			

Two-way hourly volume, V	1236	veh/h	
Directional split	65 / 35	%	

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.997	
Two-way flow rate,(note-1) vp	1458	pc/h
Highest directional split proportion (note-2)	948	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	60.0	mi/h
Adj. for lane and shoulder width, fLS	0.0	mi/h
Adj. for access points, fA	0.0	mi/h
Free-flow speed, FFS	60.0	mi/h
Adjustment for no-passing zones, fnp	1.6	mi/h
Average travel speed, ATS	47.0	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.0	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	
Two-way flow rate,(note-1) vp	1454	pc/h
Highest directional split proportion (note-2)	945	
Base percent time-spent-following, BPTSF	72.1	%
Adj.for directional distribution and no-passing zones, fd/np	7.8	
Percent time-spent-following, PTSF	80.0	%

Level of Service and Other Performance Measures

Level of service, LOS	D	
Volume to capacity ratio, v/c	0.46	
Peak 15-min vehicle-miles of travel, VMT15	2617	veh-mi
Peak-hour vehicle-miles of travel, VMT60	8899	veh-mi
Peak 15-min total travel time, TT15	55.6	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

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Two-Way Two-Lane Highway Segment Analysis

Analyst	MJF
Agency/Co.	PB
Date Performed	3/28/08
Analysis Time Period	Look Up Table - Lower LOS E
Highway	2-lane bridge MCB
From/To	
Jurisdiction	
Analysis Year	2035
Description	Mid-Currituck Bridge EIS

Input Data

Highway class	Class 1				
Shoulder width	6.0	ft	Peak-hour factor, PHF	0.85	
Lane width	12.0	ft	% Trucks and buses	3	%
Segment length	7.2	mi	% Recreational vehicles	4	%
Terrain type	Level		% No-passing zones	100	%
Grade: Length		mi	Access points/mi	0	/mi
Up/down		%			

Two-way hourly volume, V	1237	veh/h	
Directional split	65 / 35	%	

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.997	
Two-way flow rate,(note-1) vp	1460	pc/h
Highest directional split proportion (note-2)	949	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	60.0	mi/h
Adj. for lane and shoulder width, fLS	0.0	mi/h
Adj. for access points, fA	0.0	mi/h
Free-flow speed, FFS	60.0	mi/h
Adjustment for no-passing zones, fnp	1.6	mi/h
Average travel speed, ATS	47.0	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.0	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	
Two-way flow rate,(note-1) vp	1455	pc/h
Highest directional split proportion (note-2)	946	
Base percent time-spent-following, BPTSF	72.2	%
Adj.for directional distribution and no-passing zones, fd/np	7.8	
Percent time-spent-following, PTSF	80.0	%

Level of Service and Other Performance Measures

Level of service, LOS	E	
Volume to capacity ratio, v/c	0.46	
Peak 15-min vehicle-miles of travel, VMT15	2620	veh-mi
Peak-hour vehicle-miles of travel, VMT60	8906	veh-mi
Peak 15-min total travel time, TT15	55.7	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

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Two-Way Two-Lane Highway Segment Analysis

Analyst	MJF
Agency/Co.	PB
Date Performed	3/28/08
Analysis Time Period	Look Up Table - Upper LOS E
Highway	2-lane bridge MCB
From/To	
Jurisdiction	
Analysis Year	2035
Description	Mid-Currituck Bridge EIS

Input Data

Highway class	Class 1				
Shoulder width	6.0	ft	Peak-hour factor, PHF	0.85	
Lane width	12.0	ft	% Trucks and buses	3	%
Segment length	7.2	mi	% Recreational vehicles	4	%
Terrain type	Level		% No-passing zones	100	%
Grade: Length		mi	Access points/mi	0	/mi
Up/down		%			

Two-way hourly volume, V	2215	veh/h	
Directional split	65 / 35	%	

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.997	
Two-way flow rate,(note-1) vp	2614	pc/h
Highest directional split proportion (note-2)	1699	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	60.0	mi/h
Adj. for lane and shoulder width, fLS	0.0	mi/h
Adj. for access points, fA	0.0	mi/h
Free-flow speed, FFS	60.0	mi/h
Adjustment for no-passing zones, fnp	1.0	mi/h
Average travel speed, ATS	38.7	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.0	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	
Two-way flow rate,(note-1) vp	2606	pc/h
Highest directional split proportion (note-2)	1694	
Base percent time-spent-following, BPTSF	89.9	%
Adj.for directional distribution and no-passing zones, fd/np	3.2	
Percent time-spent-following, PTSF	93.1	%

Level of Service and Other Performance Measures

Level of service, LOS	E	
Volume to capacity ratio, v/c	0.82	
Peak 15-min vehicle-miles of travel, VMT15	4691	veh-mi
Peak-hour vehicle-miles of travel, VMT60	15948	veh-mi
Peak 15-min total travel time, TT15	121.1	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

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Two-Way Two-Lane Highway Segment Analysis

Analyst	MJF
Agency/Co.	PB
Date Performed	3/28/08
Analysis Time Period	Look Up Table - Lower LOS F
Highway	2-lane bridge MCB
From/To	
Jurisdiction	
Analysis Year	2035
Description	Mid-Currituck Bridge EIS

Input Data

Highway class	Class 1				
Shoulder width	6.0	ft	Peak-hour factor, PHF	0.85	
Lane width	12.0	ft	% Trucks and buses	3	%
Segment length	7.2	mi	% Recreational vehicles	4	%
Terrain type	Level		% No-passing zones	100	%
Grade: Length		mi	Access points/mi	0	/mi
Up/down		%			

Two-way hourly volume, V	2216	veh/h	
Directional split	65 / 35	%	

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.997	
Two-way flow rate,(note-1) vp	2615	pc/h
Highest directional split proportion (note-2)	1700	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	60.0	mi/h
Adj. for lane and shoulder width, fLS	0.0	mi/h
Adj. for access points, fA	0.0	mi/h
Free-flow speed, FFS	60.0	mi/h
Adjustment for no-passing zones, fnp	1.0	mi/h
Average travel speed, ATS	38.7	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.0	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	
Two-way flow rate,(note-1) vp	2607	pc/h
Highest directional split proportion (note-2)	1695	
Base percent time-spent-following, BPTSF	89.9	%
Adj.for directional distribution and no-passing zones, fd/np	3.2	
Percent time-spent-following, PTSF	93.1	%

Level of Service and Other Performance Measures

Level of service, LOS	F	
Volume to capacity ratio, v/c	0.82	
Peak 15-min vehicle-miles of travel, VMT15	4693	veh-mi
Peak-hour vehicle-miles of travel, VMT60	15955	veh-mi
Peak 15-min total travel time, TT15	121.2	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

4-LANE BRIDGE

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OPERATIONAL ANALYSIS

Analyst:	MJF
Agency/Co:	PB
Date:	3/28/08
Analysis Period:	Look Up Table (LOS A-B)
Highway:	4 lane MCB - w/o median
From/To:	
Jurisdiction:	
Analysis Year:	2035
Project ID:	Mid-Currituck Bridge EIS

FREE-FLOW SPEED

Direction	1		2	
Lane width	12.0	ft	12.0	ft
Lateral clearance:				
Right edge	6.0	ft	6.0	ft
Left edge	2.0	ft	2.0	ft
Total lateral clearance	12.0	ft	12.0	ft
Access points per mile	0		0	
Median type	Undivided		Undivided	
Free-flow speed:	Base		Base	
FFS or BFFS	60.0	mph	60.0	mph
Lane width adjustment, FLW	0.0	mph	0.0	mph
Lateral clearance adjustment, FLC	0.0	mph	0.0	mph
Median type adjustment, FM	1.6	mph	1.6	mph
Access points adjustment, FA	0.0	mph	0.0	mph
Free-flow speed	58.4	mph	58.4	mph

VOLUME

Direction	1		2	
Volume, V	1074	vph	1075	vph
Peak-hour factor, PHF	0.90		0.90	
Peak 15-minute volume, v15	298		299	
Trucks and buses	3	%	3	%
Recreational vehicles	4	%	4	%
Terrain type	Level		Level	
Grade	0.00	%	0.00	%
Segment length	0.00	mi	0.00	mi
Number of lanes	2		2	
Driver population adjustment, fP	0.95		0.95	
Trucks and buses PCE, ET	1.5		1.5	
Recreational vehicles PCE, ER	1.2		1.2	
Heavy vehicle adjustment, fHV	0.978		0.978	
Flow rate, vp	642	pcphpl	643	pcphpl

RESULTS

Direction	1		2	
Flow rate, vp	642	pcphpl	643	pcphpl
Free-flow speed, FFS	58.4	mph	58.4	mph
Avg. passenger-car travel speed, S	58.4	mph	58.4	mph
Level of service, LOS	A		B	
Density, D	11.0-	pc/mi/ln	11.0+	pc/mi/ln

Overall results are not computed when free-flow speed is less than 45 mph.

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OPERATIONAL ANALYSIS

Analyst:	MJF
Agency/Co:	PB
Date:	3/28/08
Analysis Period:	Look Up Table (LOS B-C)
Highway:	4 lane MCB - w/o median
From/To:	
Jurisdiction:	
Analysis Year:	2035
Project ID:	Mid-Currituck Bridge EIS

FREE-FLOW SPEED

Direction	1		2	
Lane width	12.0	ft	12.0	ft
Lateral clearance:				
Right edge	6.0	ft	6.0	ft
Left edge	2.0	ft	2.0	ft
Total lateral clearance	12.0	ft	12.0	ft
Access points per mile	0		0	
Median type	Undivided		Undivided	
Free-flow speed:	Base		Base	
FFS or BFFS	60.0	mph	60.0	mph
Lane width adjustment, FLW	0.0	mph	0.0	mph
Lateral clearance adjustment, FLC	0.0	mph	0.0	mph
Median type adjustment, FM	1.6	mph	1.6	mph
Access points adjustment, FA	0.0	mph	0.0	mph
Free-flow speed	58.4	mph	58.4	mph

VOLUME

Direction	1		2	
Volume, V	1758	vph	1759	vph
Peak-hour factor, PHF	0.90		0.90	
Peak 15-minute volume, v15	488		489	
Trucks and buses	3	%	3	%
Recreational vehicles	4	%	4	%
Terrain type	Level		Level	
Grade	0.00	%	0.00	%
Segment length	0.00	mi	0.00	mi
Number of lanes	2		2	
Driver population adjustment, fP	0.95		0.95	
Trucks and buses PCE, ET	1.5		1.5	
Recreational vehicles PCE, ER	1.2		1.2	
Heavy vehicle adjustment, fHV	0.978		0.978	
Flow rate, vp	1051	pcphpl	1052	pcphpl

RESULTS

Direction	1		2	
Flow rate, vp	1051	pcphpl	1052	pcphpl
Free-flow speed, FFS	58.4	mph	58.4	mph
Avg. passenger-car travel speed, S	58.4	mph	58.4	mph
Level of service, LOS	B		C	
Density, D	18.0-	pc/mi/ln	18.0+	pc/mi/ln

Overall results are not computed when free-flow speed is less than 45 mph.

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OPERATIONAL ANALYSIS

Analyst:	MJF
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Date:	3/28/08
Analysis Period:	Look Up Table (LOS B-C)
Highway:	4 lane MCB - w/o median
From/To:	
Jurisdiction:	
Analysis Year:	2035
Project ID:	Mid-Currituck Bridge EIS

FREE-FLOW SPEED

Direction	1		2	
Lane width	12.0	ft	12.0	ft
Lateral clearance:				
Right edge	6.0	ft	6.0	ft
Left edge	2.0	ft	2.0	ft
Total lateral clearance	12.0	ft	12.0	ft
Access points per mile	0		0	
Median type	Undivided		Undivided	
Free-flow speed:	Base		Base	
FFS or BFFS	60.0	mph	60.0	mph
Lane width adjustment, FLW	0.0	mph	0.0	mph
Lateral clearance adjustment, FLC	0.0	mph	0.0	mph
Median type adjustment, FM	1.6	mph	1.6	mph
Access points adjustment, FA	0.0	mph	0.0	mph
Free-flow speed	58.4	mph	58.4	mph

VOLUME

Direction	1		2	
Volume, V	2524	vph	2525	vph
Peak-hour factor, PHF	0.90		0.90	
Peak 15-minute volume, v15	701		701	
Trucks and buses	3	%	3	%
Recreational vehicles	4	%	4	%
Terrain type	Level		Level	
Grade	0.00	%	0.00	%
Segment length	0.00	mi	0.00	mi
Number of lanes	2		2	
Driver population adjustment, fP	0.95		0.95	
Trucks and buses PCE, ET	1.5		1.5	
Recreational vehicles PCE, ER	1.2		1.2	
Heavy vehicle adjustment, fHV	0.978		0.978	
Flow rate, vp	1509	pcphpl	1510	pcphpl

RESULTS

Direction	1		2	
Flow rate, vp	1509	pcphpl	1510	pcphpl
Free-flow speed, FFS	58.4	mph	58.4	mph
Avg. passenger-car travel speed, S	58.0	mph	58.0	mph
Level of service, LOS	C		D	
Density, D	26.0-	pc/mi/ln	26.0+	pc/mi/ln

Overall results are not computed when free-flow speed is less than 45 mph.

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OPERATIONAL ANALYSIS

Analyst:	MJF
Agency/Co:	PB
Date:	3/28/08
Analysis Period:	Look Up Table (LOS D-E)
Highway:	4 lane MCB - w/o median
From/To:	
Jurisdiction:	
Analysis Year:	2035
Project ID:	Mid-Currituck Bridge EIS

FREE-FLOW SPEED

Direction	1		2	
Lane width	12.0	ft	12.0	ft
Lateral clearance:				
Right edge	6.0	ft	6.0	ft
Left edge	2.0	ft	2.0	ft
Total lateral clearance	12.0	ft	12.0	ft
Access points per mile	0		0	
Median type	Undivided		Undivided	
Free-flow speed:	Base		Base	
FFS or BFFS	60.0	mph	60.0	mph
Lane width adjustment, FLW	0.0	mph	0.0	mph
Lateral clearance adjustment, FLC	0.0	mph	0.0	mph
Median type adjustment, FM	1.6	mph	1.6	mph
Access points adjustment, FA	0.0	mph	0.0	mph
Free-flow speed	58.4	mph	58.4	mph

VOLUME

Direction	1		2	
Volume, V	3246	vph	3247	vph
Peak-hour factor, PHF	0.90		0.90	
Peak 15-minute volume, v15	902		902	
Trucks and buses	3	%	3	%
Recreational vehicles	4	%	4	%
Terrain type	Level		Level	
Grade	0.00	%	0.00	%
Segment length	0.00	mi	0.00	mi
Number of lanes	2		2	
Driver population adjustment, fP	0.95		0.95	
Trucks and buses PCE, ET	1.5		1.5	
Recreational vehicles PCE, ER	1.2		1.2	
Heavy vehicle adjustment, fHV	0.978		0.978	
Flow rate, vp	1941	pcphpl	1942	pcphpl

RESULTS

Direction	1		2	
Flow rate, vp	1941	pcphpl	1942	pcphpl
Free-flow speed, FFS	58.4	mph	58.4	mph
Avg. passenger-car travel speed, S	55.5	mph	55.5	mph
Level of service, LOS	D		E	
Density, D	35.0-	pc/mi/ln	35.0+	pc/mi/ln

Overall results are not computed when free-flow speed is less than 45 mph.

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OPERATIONAL ANALYSIS

Analyst:	MJF
Agency/Co:	PB
Date:	3/28/08
Analysis Period:	Look Up Table (LOS E-F)
Highway:	4 lane MCB - w/o median
From/To:	
Jurisdiction:	
Analysis Year:	2035
Project ID:	Mid-Currituck Bridge EIS

FREE-FLOW SPEED

Direction	1		2	
Lane width	12.0	ft	12.0	ft
Lateral clearance:				
Right edge	6.0	ft	6.0	ft
Left edge	2.0	ft	2.0	ft
Total lateral clearance	12.0	ft	12.0	ft
Access points per mile	0		0	
Median type	Undivided		Undivided	
Free-flow speed:	Base		Base	
FFS or BFFS	60.0	mph	60.0	mph
Lane width adjustment, FLW	0.0	mph	0.0	mph
Lateral clearance adjustment, FLC	0.0	mph	0.0	mph
Median type adjustment, FM	1.6	mph	1.6	mph
Access points adjustment, FA	0.0	mph	0.0	mph
Free-flow speed	58.4	mph	58.4	mph

VOLUME

Direction	1		2	
Volume, V	3603	vph	3604	vph
Peak-hour factor, PHF	0.90		0.90	
Peak 15-minute volume, v15	1001		1001	
Trucks and buses	3	%	3	%
Recreational vehicles	4	%	4	%
Terrain type	Level		Level	
Grade	0.00	%	0.00	%
Segment length	0.00	mi	0.00	mi
Number of lanes	2		2	
Driver population adjustment, fP	0.95		0.95	
Trucks and buses PCE, ET	1.5		1.5	
Recreational vehicles PCE, ER	1.2		1.2	
Heavy vehicle adjustment, fHV	0.978		0.978	
Flow rate, vp	2155	pcphpl	2156	pcphpl

RESULTS

Direction	1		2	
Flow rate, vp	2155	pcphpl	2156	pcphpl
Free-flow speed, FFS	58.4	mph	58.4	mph
Avg. passenger-car travel speed, S	53.9	mph		mph
Level of service, LOS	E		F	
Density, D	40.0-	pc/mi/ln		pc/mi/ln

Overall results are not computed when free-flow speed is less than 45 mph.