



**MEMORANDUM**

To: Trace Howell, North Carolina Department of Transportation

From: Craig R. Gresham, P.E.  
Clearbox Forecast Group, PLLC

Date: September 26<sup>th</sup>, 2023

Subject: Traffic Forecast – Cape Fear Memorial Bridge Replacement (NCDOT Project HB-0039)

Please find attached an amended 2023/2050 traffic forecast for NCDOT Project HB-0039. This forecast was originally reviewed and approved by NCDOT Transportation Planning Division on May 15<sup>th</sup>, 2023. **This amended forecast updates through volumes at South 5<sup>th</sup> Avenue and Wooster/Dawson Street for Future Build 2 scenario only. No other forecast volumes have been updated as a part of this amendment.**

This forecast provides 2023 Base Year Build and 2050 Future Year Build for two six-lane build scenarios for the replacement of the existing bridge. Previously prepared Traffic Forecasts for NCDOT Projects U-4738 and U-5734 were consulted during the development of this forecast.

This forecast assumes all projects documented in the adopted 2045 “Cape Fear Moving Forward 2045” Metropolitan Transportation Plan (MTP) for the Wilmington area. This forecast was requested for use in the project development activities associated with the project. This traffic forecast includes Average Annual Daily Traffic (AADT) estimates for the three scenarios for the 2023 Base Year and 2050 Future Year listed in Table 1.

**Table 1. Traffic Forecast Scenarios**

Forecast Scenario		Year	Forecast Scenario
1	Base Year No-Build (BYNB)	2023	Existing Road Network
2	Future Year Build 1 (FYBD1)	2050	Existing Road Network plus 2045 Wilmington MPO MTP Fiscally-Constrained Projects and Subject Project (Widen Cape Fear Memorial Bridge to Six Lanes)
3	Future Year Build 2 (FYBD2)	2050	Existing Road Network plus 2045 Wilmington MPO MTP Fiscally-Constrained Projects and Subject Project (Widen Cape Fear Memorial Bridge to Six Lanes) with no access at S. 3 <sup>rd</sup> Street or S. 4 <sup>th</sup> Street



The following basic assumptions were made to complete this forecast.

**Travel Demand Model:** This forecast utilizes the Wilmington MPO 2045 Travel Demand Model (TransCAD 7) as a tool to determine Base Year and Future Year volumes.

**Fiscally Constrained:** The Wilmington MPO Model was run using the Wilmington 2045 MTP adopted on November 18<sup>th</sup>, 2020. 2045 MTP Projects in the vicinity of the study area were reviewed and considered as part of the traffic forecast development.

**Forecast Methodology:** The 2023 base year build and 2050 future year build volumes generally included the development of diversion rates between like model years with different scenarios. The compound annual growth rates or diversion rates were then applied to the AADT volumes from another scenario to develop initial volumes for each scenario. Engineering judgment adjustments were applied as needed to prepare balanced forecasts.

**Interpolation:** Straight-line interpolation may be used. AADT volumes may be extrapolated for up to two years immediately following 2050. If it is determined that any of these assumptions have become inconsistent with the project and surrounding area activity, please request updated projections for this project.

Please contact me for any further assistance at 919-651-8010 or [craig@clearboxforecast.com](mailto:craig@clearboxforecast.com)

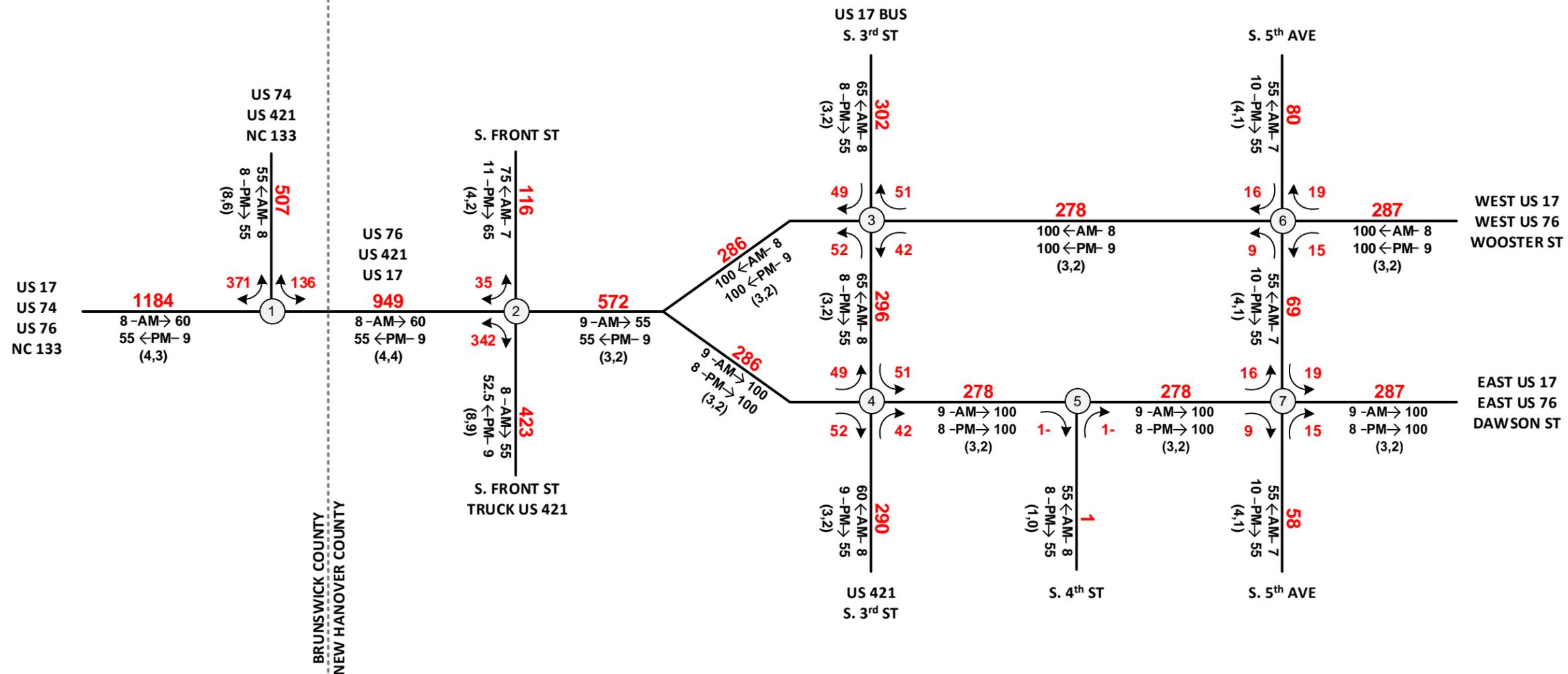
A handwritten signature in black ink that reads "Craig Gresham" followed by a horizontal line.

Craig Gresham, P.E.

Clearbox Forecast Group, PLLC

cc: FILE (Brunswick County, NCDOT TIP Project HB-0039)  
Keith Dixon, NCDOT Transportation Planning Branch





BRUNSWICK COUNTY  
NEW HANOVER COUNTY



**LEGEND**

- ### No. of Vehicles Per Day in 100s
- 1- Less than 50 vpd
- X Movement Prohibited
- K - AM → D  
D ← PM - K  
(d, t)
- K Design Hour Factor (%)
- PM PM Peak Period
- AM AM Peak Period
- D Peak Hour Directional Split (%)
- Indicates Direction of D
- (d, t) Duals, TT-STs (%)



**2050** AVERAGE ANNUAL DAILY TRAFFIC

**FUTURE YEAR BUILD 1**  
SHEET 1 OF 1

**NC TIP: HB-0039**

COUNTY: New Hanover/  
Brunswick **WBS: 50603.1.1**

DATE: May 2023 **DIVISION: 3**

PREPARED BY: Clearbox Forecast Group

LOCATION: WILMINGTON, NC

PROJECT: REPLACE BRIDGE 640013 (CAPE FEAR MEMORIAL BRIDGE) OVER CAPE FEAR RIVER IN NEW HANOVER COUNTY



# HB-0039

## Cape Fear Memorial Bridge Replacement

### Project Level Traffic Forecast

**REPLACE BRIDGE 640013 (CAPE FEAR MEMORIAL BRIDGE) OVER CAPE FEAR  
RIVER IN NEW HANOVER COUNTY**

NCDOT TIP HB-0039

Brunswick and New Hanover Counties

**May 2023**



## Table of Contents

<b>1.0</b>	<b>Project Background</b>	<b>1</b>
1.1	Project Description	1
1.2	Forecast Request Information	1
1.3	Traffic Forecast History	2
1.4	Traffic Forecast Description	3
1.5	Area Information	4
1.6	Route Information	5
1.7	Future Area Roadway Improvements	6
<b>2.0</b>	<b>Sources of Information and Data</b>	<b>7</b>
2.1	Related Forecasts	7
2.2	Historical AADT	7
2.3	Field Data Collection	7
2.4	Field Investigation	7
2.5	Information from Project Stakeholders	8
2.6	Other Sources	9
<b>3.0</b>	<b>2023 Base Year No-Build Traffic Forecast</b>	<b>9</b>
3.1	Assumptions	9
3.2	Methodology	9
3.3	Design Factors	10
<b>4.0</b>	<b>Model Data</b>	<b>11</b>
<b>5.0</b>	<b>2050 Future Build Traffic Forecast</b>	<b>12</b>
5.1	Assumptions	12
5.2	Methodology	12
5.3	Design Factors	12
5.4	Future Year Build Results	12

## FIGURES

Figure 1. Study Area.....	2
Figure 2. Collected Count Data Locations.....	8
Figure 3. WMPO TDM Model Network Representation in Study Area.....	11

## TABLES

Table 1. Traffic Forecast Scenarios.....	3
Table 2. Historical and Projected Population Data.....	5
Table 3. Relevant Planned Developments.....	5
Table 4. Roadways Studied.....	6
Table 5. Future Roadway Projects.....	6
Table 5. Local Contact Information.....	8
Table 6. Study Intersections.....	9

## APPENDICES

### A: BUILD ALTERNATIVES

### B: NCDOT HISTORICAL AADT DATA

B.1. NCDOT Historical AADT Counts, 2002-2021

### C: TRAFFIC COUNT DATA

C.1. Collected Traffic Count Data

### D: LOCAL CONTACT INFORMATION

D.1. Stakeholder Response Summary

### E: TRAFFIC FORECAST TABLES

E.1. Historic AADT and 2023 BYNB Forecast Volumes

E.2. 2023 BYNB Design Data - Truck Percentages

E.3. BYNB Design Data – AM Peak Hour Factors

E.4. BYNB Design Data – PM Peak Hour Factors

## **APPENDICES – CONTINUED**

E.5. BYNB Design Data – AM Directional Distribution Factors

E.6. BYNB Design Data – PM Directional Distribution Factors

E.7. FY Build Forecast Volumes, WMPO Model Diversion, and Previous  
Traffic Forecast Volumes

### **F: ELECTRONIC DATA (PROVIDED IN DIGITAL FORM ONLY)**

F.1. Raw Traffic Count Files

F.2. Traffic Forecast Utility Worksheets

F.3. AADT Trend Analysis Graphs

## 1.0 Project Background

### 1.1 Project Description

The North Carolina Department of Transportation (NCDOT) proposes to replace the Cape Fear Memorial Bridge over the Cape Fear River between Brunswick and New Hanover Counties with a new six-lane bridge between the US 17-74-76/US 74-421 Interchange and S. Front Street in Wilmington NC.

The current NCDOT 2020-2029 State Transportation Improvement Program (STIP) identifies this project as HB-0039: REPLACE BRIDGE 640013 (CAPE FEAR MEMORIAL BRIDGE) OVER CAPE FEAR RIVER IN NEW HANOVER COUNTY. It is programmed for planning and environmental studies and is not funded for right-of-way (ROW) or construction.

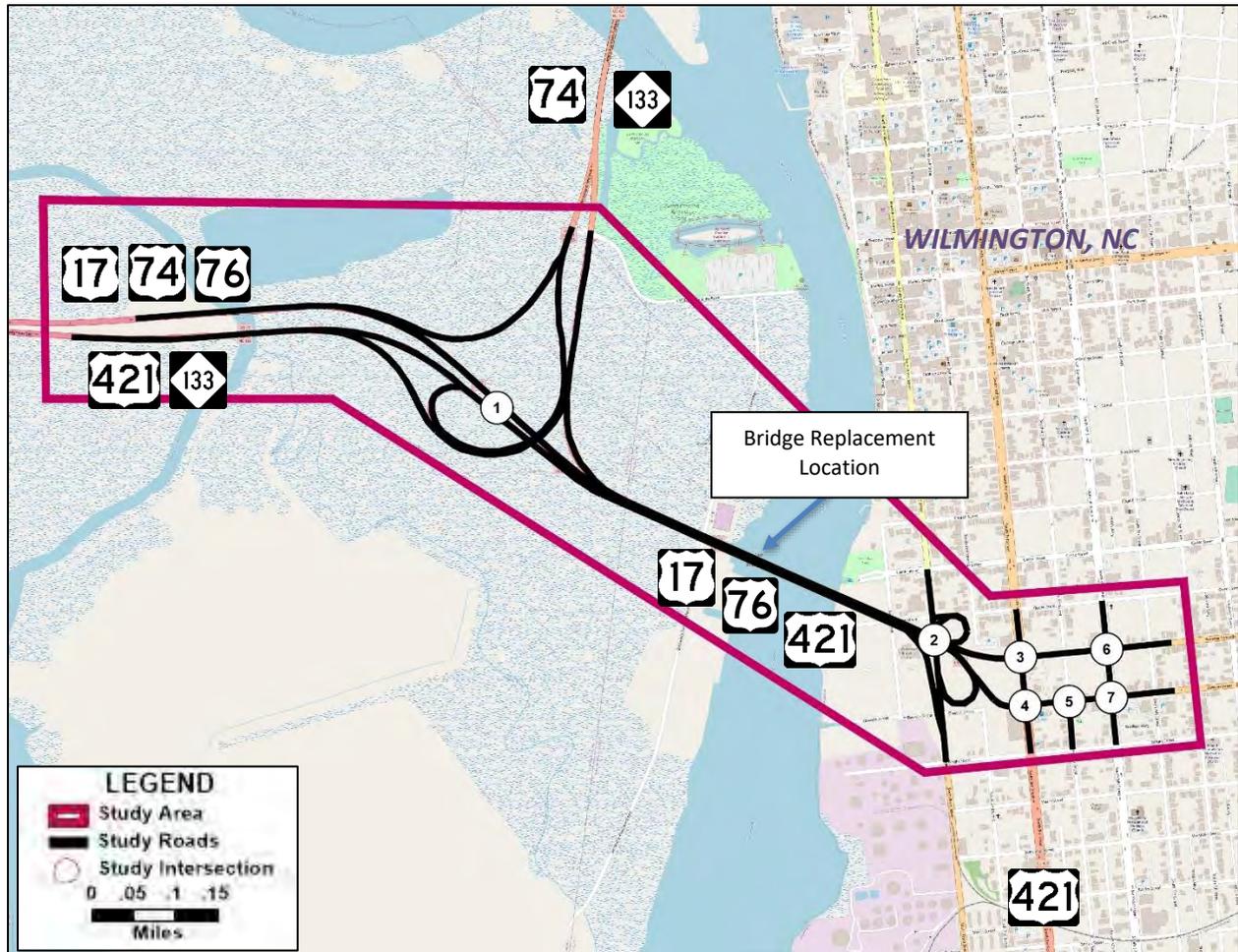
### 1.2 Forecast Request Information

NCDOT's Division Three Project Development Unit requested the traffic forecast for the project design and development. The scope of work for the traffic forecast, prepared by Clearbox Forecast Group, was finalized in March 2023. This forecast represents 2023 Base Year (BY) No-Build (NB) Traffic Estimates and 2050 Future Year (FY) Build (BD) Traffic Estimates.

The purpose of this forecast is to provide a basis for analysis to identify current and future deficiencies in the study area and to support the analysis of the proposed bridge replacement alternatives. Two alternatives (described in **Section 1.4**) are presented in this forecast.

This report includes background information, forecasting methodology, and traffic forecasts for the subject project. **Figure 1** shows the project area and roads studied.

Figure 1. Study Area



### 1.3 Traffic Forecast History

Several traffic forecasts have been previously prepared that encompass either part or all of the study area for this project. A Traffic Forecast was prepared for STIP Project U-4738 (Construct a New Four-Lane Freeway Facility and Bridge over the Cape Fear River) by HNTB in September 2019 which includes the entire study area for HB-0039. The U-4738 forecast includes a Future No-Build scenario that was used for comparison in this report. A traffic forecast was prepared for STIP Projects U-5729 and U-5734 (Upgrade Carolina Beach Road and Widen S Front Street) by SEPI in May 2019. This study included 2040 forecasts for the intersection of Front Street and US 17 in the HB-0039 study area. A traffic forecast was prepared for U-5731: US 74 at US 17/US 421 Intersection Improvement Project that includes the interchange of US 74/US 17 Business, US 74, and US 17 Business at the Cape Fear River Bridge.

### 1.4 Traffic Forecast Description

This project forecast includes a base year (2023) no-build and two proposed future year (2050) build alternatives for the future year for a total of 3 scenarios, which are further detailed in **Table 1**. Build alternatives are displayed in **Appendix A – Build Alternatives**. Both build alternatives replace the existing bridge with a new six-lane bridge crossing the Cape Fear River. Build Alternative 1 maintains the existing interchange with Front Street and intersections with S. 3<sup>rd</sup> Street, S. 4<sup>th</sup> Street and S. 5<sup>th</sup> Avenue east of the Cape Fear River entering Wilmington. Build Alternative 2 maintains the Front Street interchange but closes access to S. 3<sup>rd</sup> Street and S. 4<sup>th</sup> Street and then connects to the intersection at S. 5<sup>th</sup> Avenue. S. 3<sup>rd</sup> Street maintains north-south movements underneath the new bridge and S. 4<sup>th</sup> Avenue has a new cul-se-sac just south of Dawson Street.

**Table 1. Traffic Forecast Scenarios**

Forecast Scenario		Year	Forecast Scenario
1	Base Year No-Build (BYNB)	2023	Existing Road Network
2	Future Year Build 1 (FYBD1)	2050	Existing Road Network plus 2045 Wilmington MPO MTP Fiscally-Constrained Projects and Subject Project (Widen Cape Fear Memorial Bridge to Six Lanes)
3	Future Year Build 2 (FYBD2)	2050	Existing Road Network plus 2045 Wilmington MPO MTP Fiscally-Constrained Projects and Subject Project (Widen Cape Fear Memorial Bridge to Six Lanes) with no access at S. 3 <sup>rd</sup> Street or S. 4 <sup>th</sup> Street

This technical memorandum provides traffic design data for estimated volumes including design hourly volumes (k-factors), directional distribution percentages (D-factors), and truck percentages for single-unit (SU) and tractor-trailer-semi-trucks (TTST). Average Annual Daily Traffic (AADT) estimates for study roads in the project area are presented.

For the HB-0039 traffic forecast, base year and future year forecasts were developed with considerations such as the historical traffic growth in the area over the past 10-20 years, project specific traffic counts, demographic changes in the area, planned developments, and output from the Wilmington MPO (WMPO) Travel Demand Model, which represents the lower Cape Fear region of southeastern North Carolina including New Hanover and Brunswick Counties, from the Wilmington MPO 2045 Metropolitan Transportation Plan (MTP). Future Year estimates assume that the fiscally constrained projects (other than the proposed project) in the Wilmington 2045 MTP are built. In the Base Year and Future Year forecasts, engineering judgment adjustments were applied as needed to develop traffic volumes and balance traffic forecasts through the study area.

## 1.5 Area Information

The Cape Fear Memorial Bridge carries US 17-76-421 across the Cape Fear River between New Hanover County and Brunswick County. The bridge, built in 1969, is the primary connection between the south side of Wilmington and points west, including Leland, Belville, Columbus County, Bladen County and points further west as US 74 provides a multi-lane highway connection to I-95. It serves as a vital connection for both passenger vehicles and freight and is designated as a Strategic Transportation Corridor as it provides access to the Wilmington area, the Wilmington International Airport, and the Port of Wilmington.

Over the past 20 years, the Wilmington, NC area has experienced significant growth in terms of population, economy, and infrastructure. The area has attracted a diverse mix of businesses and industries, including tourism, healthcare, and education, which have contributed to its economic growth. The population has also grown rapidly, with many retirees and young professionals relocating to the area, drawn by its natural beauty, mild climate, and quality of life. The “Cape Fear Moving Forward 2045” report by the Wilmington MPO projects that population in the WMPO planning boundary will grow by 50% between 2015 and 2045. The city has invested heavily in infrastructure, including transportation and public facilities, to support the growing population. In recent years, downtown Wilmington has seen a surge of multi-family/apartment developments along with revitalization and redevelopment of commercial areas while the area west of the Cape Fear River has begun to rapidly develop.

Historical and future population and employment data was reviewed from the US Census Bureau, the NC Office of State Budget and Management (OSBM), the Wilmington MPO and the Wilmington MPO Travel Demand Model (WMPO TDM). **Table 2** shows 2000-2022 population data in the forecast area and historical growth rates and model projections. Both historical and projected population data show modest increases, with historical population growth typically averaging 2.5-3.3% per year and 0.7-1.1% for Brunswick and New Hanover Counties, respectively. Projected WMPO Model 2015-2045 population growth rates range from 1.1% - 1.5% per year as well.

According to the U.S. Bureau of Labor Statistics, between 2010 and 2022 employment in Brunswick and New Hanover Counties has grown by an average of 0.7-0.8%, respectively. Employment forecasts between 2015 and 2045 from the Wilmington Travel Demand Model show similar trends, with higher growth rates in outlying areas such as Leland in Brunswick County than in more established areas such as downtown Wilmington.

**Table 3** shows planned developments in the vicinity of the subject project area. Additional household growth is expected in the study area as current trends point to more urban infill and redevelopment in the downtown area while formerly rural areas such as Leland and Belville receive more multi-family dwelling developments. This information along with site-specific impacts of developments in the study area were considered during the development of the future year traffic estimates along with historic trends and the WMPO TDM growth projections.

**Table 2. Historical and Projected Population Data**

County	County Population Estimates <sup>1</sup>					Historical Annual Growth Rate		Projected Annual Growth Rate <sup>4</sup>
						10-Year <sup>2</sup>	22-Year <sup>3</sup>	
	2000	2010	2020	2022	2050	2010-2020	2000-2022	2015-2045
Brunswick	73,141	107,860	137,789	150,848	260,121	2.5%	3.3%	1.1%
New Hanover	202,667	203,092	226,077	234,245	319,147	1.1%	0.7%	1.5%

(1) NC Office of State Budget and Management (OSBM)

(2) 2010-2020 Annual Growth Rate (AGR)

(3) 2000-2022 AGR

(4) WMPO Model 2015-2045 Population AGR

**Table 3. Relevant Planned Developments**

Development <sup>1</sup>	Location	Date Approved	Build Year	Details
Belville MF Residential	River Rd South of Blackwell Rd	9/16/2021	2024	291 Dwelling Units
Leland Apartments	S Navassa Rd North of Village Rd	5/18/2022	2023	390 Dwelling Units
Villages at Battleship Point	Point Harbor Road of US 421	11/16/2021	2028	1238 DUs, 125 hotel rooms, 49,500 SF Retail/Restaurant
Dram Pointe	712-728 Surry Street	4/29/2022	2024	350 Dwelling Units, 10,000 SF Strip Retail Plaza
Starway Apartments	US 421 N of Shipyard Blvd	11/15/2021	2024	300 Dwelling Units
Barclay West (Northern Tract)	US 421/Independence Blvd	8/23/2022	2024	580 Dwelling Units

(1) Source: City of Wilmington Development Tracker

## 1.6 Route Information

The study area extends from US 17-74-76-421/NC 133 just east of Belville, NC to South Fifth Avenue along Wooster and Dawson Street in Wilmington, NC. Major cross sections along the corridor include interchanges with US 74/NC 133 and S. Front Street (Truck US 421) and at-grade intersections with S 3<sup>rd</sup> Street (US 17 Business/US 421), S. 4<sup>th</sup> Street, and S.5<sup>th</sup> Street. The routes studied are listed below in **Table 4**.

**Table 4. Roadways Studied**

Route	NCDOT Route Designation	NCDOT Functional Classification	Access Control	Typical Section	Posted Speed (mph)
US 17-74-76/NC 133	-	Freeway	Full	4 Lane Divided	55
US 74/NC 133	-	Principal Arterial	Partial	4 Lane Divided	55
US 17-76-421	-	Freeway	Full	4 Lane Divided	45
Wooster Street	US 17-76	Principal Arterial	None	4 Lanes Westbound	35
Dawson Street	US 17-76	Principal Arterial	None	3 Lanes Eastbound	35
S Front St	US 421 (Truck)	Minor Arterial/ Major Collector	None	2 Lanes	35
S. 3 <sup>rd</sup> Street	US 421/US 17 Business	Principal Arterial	Partial	4 Lane Divided	35
S 5 <sup>th</sup> Street	N/A	Local	Partial	4 Lane Divided	25

## 1.7 Future Area Roadway Improvements

There are multiple other projects planned in the area surrounding the proposed bridge replacement project. **Table 5** shows future roadway projects in the vicinity of the subject project along with information from the 2045 Metropolitan Transportation Plan (adopted 11/18/2020). The most notable improvements in the vicinity of the project are US 5729 and US 5734, which improve Front Street and Carolina Beach Road to the south of the study area, and the NC Port North Gate redesign and alignment to Front Street and Greenfield Street. These projects are included in the Future Year Build alternative scenarios in the 2045 WMPO TDM analysis where roadway capacity is affected.

**Table 5. Future Roadway Projects**

Project ID	Project Name	Planning Year
U-5729	US 421/Carolina Beach Road Upgrade	2025
U-5731	US 74/NC133/Isabel Holmes Bridge Flyovers	2025
U-5734	US 421/Front Street Widening	2025
RW-17	US 17/76/Oleander Drive Access Management Improvements	2030
RW-20	US 17-74-76/Causeway Improvements (Phase 2)	2035
RW-55	River Road Realignment near Port South Gate	2045
RW-93	US 17-76/Wooster Street Streetscape Improvements	2030
RW-115	Internal Port Access Road	2035
RW-123	Burnett Blvd Widening	2045
RW-219	US 17 BUS/Market Street Road Diet (I of II)	2025
RW-220	US 17 BUS/Market Street Road Diet (II of II)	2030
RW-226	US 74-421/NC133 & US17-76 Merge Lane Addition	2040
HL-0040*	North Gate Design and NEPA Work, NC Port Authority	**

\* HL-0040 is access to Port of Wilmington from S. Front Street/Greenfield Street.

## 2.0 Sources of Information and Data

### 2.1 Related Forecasts

Project-level Forecasts for U-4738 and U-5734, both completed in 2019, were considered as resources for this forecast and are discussed in **Section 1.3** – Traffic Forecast History.

### 2.2 Historical AADT

Historical AADT between 2002 and 2021 was considered while preparing this forecast. Table B.1 in **Appendix B - Historical AADT** contains the complete 20-year history.

### 2.3 Field Data Collection

The roads used in the forecast represent a simplified version of the transportation system in the study area. The forecast includes only key roads and intersections. **Figure 2** shows the 5 intersections and 12 roadway segments where traffic data was collected. Turning movements for the intersection of Dawson Street and S. 4<sup>th</sup> Street were estimated without count collection due to the low volume on S. 4<sup>th</sup> Street.

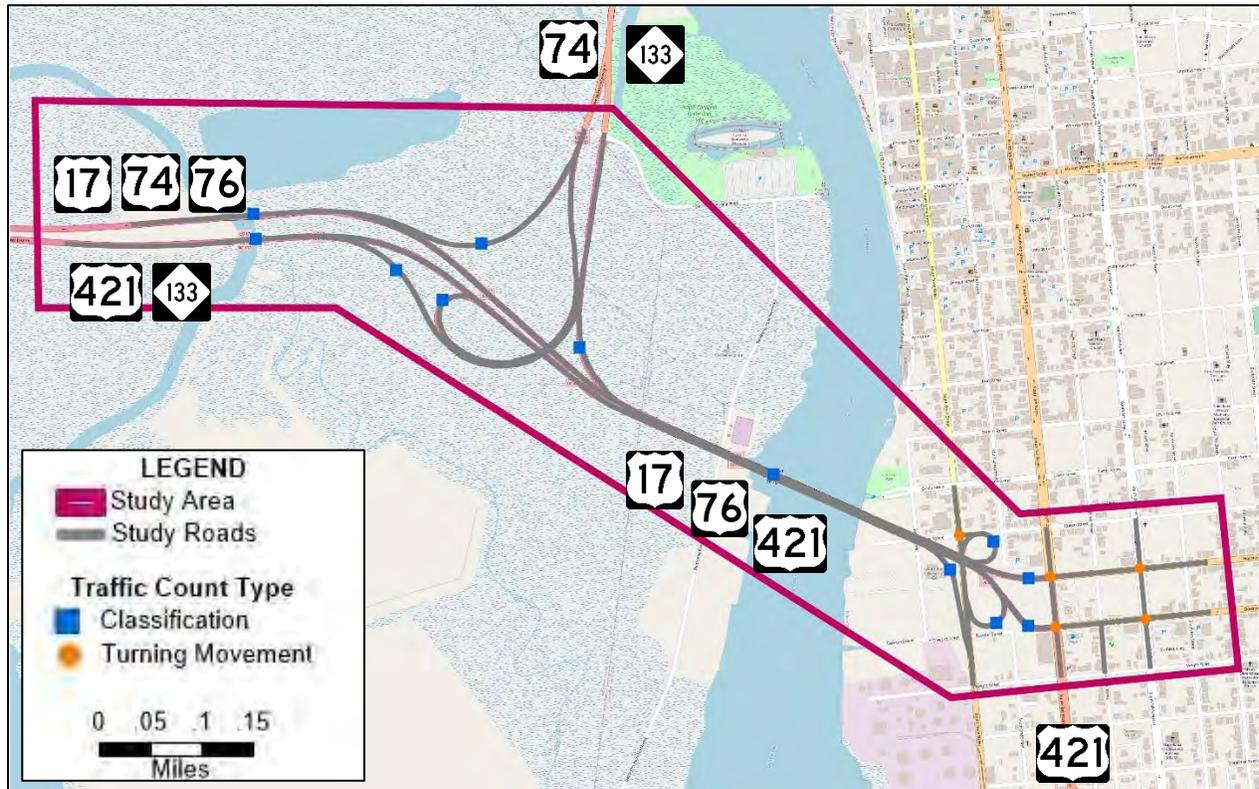
Count data was collected in the January to April of 2023 for the traffic estimates. Traffic counts, listed in **Table C.1. in Appendix C**, were taken in February-May 2023 by The Traffic Group, Inc. and True Direction Traffic Services. Tube counts were over 2-to-7-day periods and collected volume and classification data by direction and hour. Classification was provided in the standard FHWA classification system. No turning movement counts (TMCs) were collected specifically for this forecast; 2019 TMCs collected in May 2019 for the U-4738 forecast were utilized to support the development of the traffic forecast.

Conversion of field data to AADT was completed using seasonal factor data from NCDOT Traffic Survey Group for ATR Group 1 shown in **Table C.1**. For 3-to-7-day tube counts, seasonal factors were developed using the days of the week that each tube count was taken, and weekend counts were omitted. Axle factors were not required since all mainline counts provided classification data. Seasonal Factors for ATR Groups utilized are provided in **Table C.2**. in Appendix C.

### 2.4 Field Investigation

A field trip to observe current conditions was taken on April 14<sup>th</sup>, 2023. Roadway cross-sections, truck traffic and development patterns were noted in the study area. It was noted that heavy truck traffic utilizes S. Front Street (Truck US 421) to/from the Cape Fear Memorial Bridge and that afternoon traffic queues along Front Street south of the study area. In addition, several new smaller developments not listed in **Table 3** were noted in the corridor which appear to have been recently completed.

Figure 2. Collected Count Data Locations



## 2.5 Information from Project Stakeholders

Local stakeholders were interviewed in April of 2023 to provide insight regarding this project, other projects in the vicinity, and development patterns. The most notable takeaway of the interviews is the NC Ports relocating the North Gate at Front Street and Greenfield Streets, which provides more convenient access to trucks coming to/from the port through the project area. The lists of contacted stakeholders are shown in **Table 5** and interview responses are provided in **Appendix D**.

Table 5. Local Contact Information

Name	Agency	Role	Email
Adrienne M. Cox	NCDOT	Division Planning Engineer	amcox1@ncdot
Nazia Sarder	NCDOT	MPO Coordinator	nsarder@ncdot.gov
Mike Kozlosky	Wilmington MPO	Executive Director	mike.kozlosky@wilmingtonnc.gov
Brian Chambers	City of Wilmington	Senior Planner	Brian.Chambers@wilmingtonnc.gov
Abby Lorenzo	City of Wilmington	Deputy Director	abby.lorenzo@wilmingtonnc.gov
Rebekah Roth	New Hanover County	Planning Director	rroth@nhc.gov
Stephanie Ayers	NC Port Authority	Director, Real Estate and Planning	Stephanie.Ayers@ncports.com

## 2.6 Other Sources

In addition to the collected field data and information from stakeholders, the following data sources were used:

- Wilmington MPO 2045 Metropolitan Transportation Plan
- US Census Bureau Population Estimates, 2000-2022
- US Bureau of Labor Statistic County Employment Estimates, 2010-2022
- NCDOT yearly AADT estimates, 2002-2021
- NCDOT Traffic Survey Group MS2 Traffic Portal Data
- City of Wilmington Development Tracker

## 3.0 2023 Base Year No-Build Traffic Forecast

### 3.1 Assumptions

The current conditions and existing roadway network were used to develop the 2023 Base Year No-Build network. No other changes to the network were included. Study intersections are listed in **Table 6**.

**Table 6. Study Intersections**

Intersection	Corridor 1	Corridor 2	Type
1	US 17-74-76-421/NC 133	US 76/NC 133	Interchange
2	US 17-76-421	S. Front Street	Interchange
3	Wooster Street (US 17-76)	S. 3 <sup>rd</sup> Avenue	Intersection
4	Dawson Street (US 17-76)	US 421/S 3 <sup>rd</sup> Avenue	Intersection
5	Dawson Street (US 17-76)	S. 4 <sup>th</sup> Street	Intersection
6	Wooster Street (US 17-76)	S. 5 <sup>th</sup> Street	Intersection
7	Dawson Street (US 17-76)	S. 5 <sup>th</sup> Street	Intersection

### 3.2 Methodology

2023 Base Year No-Build volumes were estimated using field-collected traffic count data, current and historical AADT estimates and engineering judgment. 3-to-7-day mainline classification counts were expanded, annualized, and compared with other count data sources to serve as a basis for the no-build estimates. Seasonal adjustment factors, which vary by facility type, day of week, and month of year, provide adjustments to annualize the project-specific counts. These seasonal factors are included in **Table C.2**. in **Appendix C**.

Turning movement counts (TMC) were utilized from previous traffic forecasts in the area completed in 2019 and supplemented with the 2023 classification count data.

The NCDOT Traffic Forecast Utility (TFU) was utilized to determine the validity of approach volumes, turn volumes, and design factors for each intersection in the forecast. Based on this analysis and engineering judgement, small adjustments were made to the data to provide balanced forecast data. This can then be converted to peak hour volumes using NCDOT's Intersection Breakout Tool. The balanced Base Year No-Build Estimates were compared to current and historical AADT data to determine if the estimates appropriately matched other data sources.

**Table E.1.** in **Appendix E** presents the 2023 Base Year No-Build estimates along with 2013-20121 NCDOT AADT data and project specific/supplemental counts.

### 3.3 Design Factors

2023 design factors are based upon classification and turning movement counts taken during field data collection. Design factors needed for the traffic estimate include:

**Truck Percentages** – Overall truck percentages are broken into two NCDOT standard groupings – Duals (single-unit trucks with at least one dual-tired axle) and TTSTs (multi-unit trucks with single or twin trailers). Truck percentages are based on classification count data, turning movement count data (which included truck information for each approach) and NCDOT classification counts. Percentages are rounded to the nearest integer and a minimum of 1% Duals and 1% TTST were used for design purposes. Truck percentages selected for the 2023 No-Build estimate can be found in **Table E.2.** in **Appendix E.**

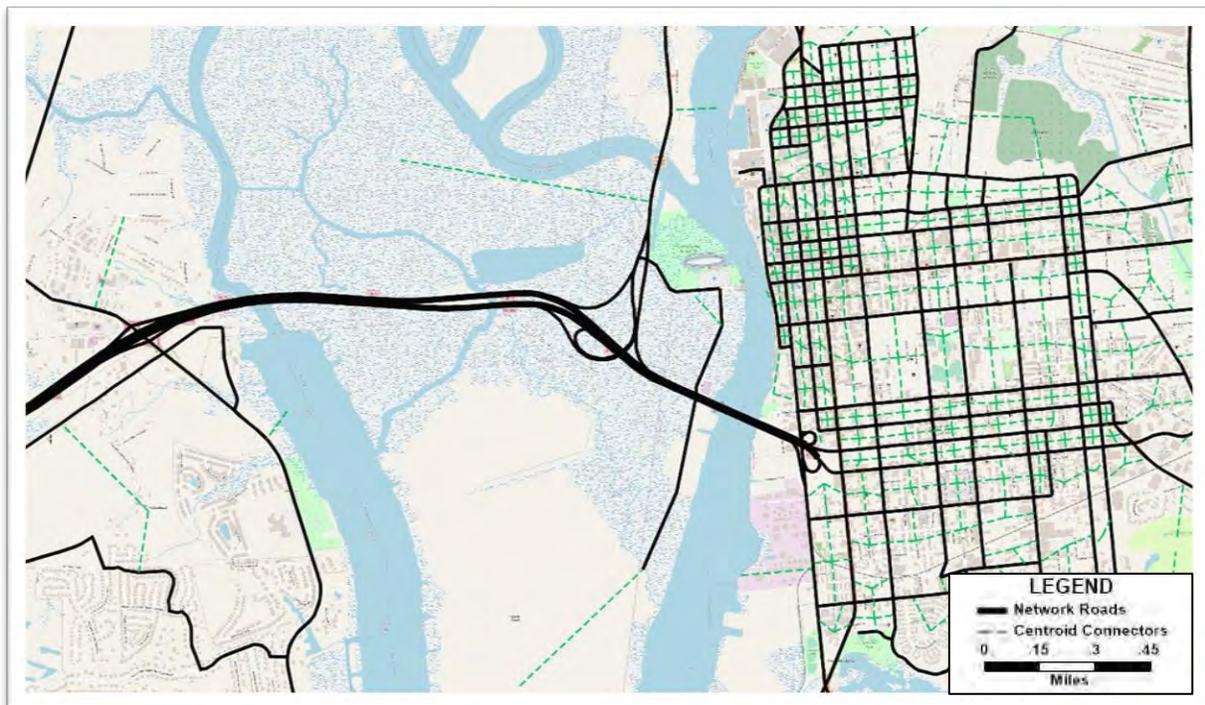
**Peak Hour Factor (K)** – The peak hour (K) factor is based on the percentage of AADT that occurs during the AM and PM peak hours of the day. The K factor is calculated by dividing the highest hourly volume during the morning and evening peaks by the daily average. AM and PM Peak hour factors selected for the 2023 No-Build estimate can be found in **Tables E.3. and E.4.** in **Appendix E,** respectively.

**Directional Distribution (D)** – Directional distribution is based on the direction of flow during the highest observed hourly data for mainline counts and turning movement counts during the AM and PM peaks. In some locations, design factors were revised for better continuity through the corridor and to meet satisfactory conditions in the TFU. Directional percentages were rounded to the nearest 2.5% increment with a minimal directional percentage of 52.5%. AM and PM Directional distribution factors selected for the 2023 No-Build estimate can be found in **Tables E.5. and E.6.** in **Appendix E,** respectively.

## 4.0 Model Data

The Wilmington MPO Model (Calibrated in 2019 and updated February 2020), was the main tool used to develop this forecast. The WMPO TDM model utilizes TransCAD (version 7), has a 2015 base year and 2045 future year and provides output of average weekday daily traffic (AWDT). The WMPO TDM model network for the 2045 MTP was used and includes fiscally constrained future projects and the most up-to-date land use forecasts. **Figure 3** shows a representation of the model network in the study area. The subject project and associated improvements were not included in the No-Build alternatives.

**Figure 3. WMPO TDM Model Network Representation in Study Area**



A comparison of the model volumes and AADTs in the area show that the model reasonably estimates traffic in the study area. Differences that occur between AADT and the model volumes were considered when utilizing the model to prepare base and future year estimates. While the base year forecast is for 2023, the model represents 2015 conditions, and natural fluctuations in volumes along with impacts of Covid-19 on traffic growth patterns had to be considered when preparing the forecast. **Table E.7.** in **Appendix E** compares the 2015 model calibration to AADT, 2023 no-build volumes, 2045 model volumes, and 2050 Build forecast volumes.

## 5.0 2050 Future Build Traffic Forecast

### 5.1 Assumptions

The 2050 FY Build scenarios assume that the MTP projects incorporated in the WMPO TDM 2045 model are in place along with the subject project. Two alternatives were considered for the future build alternatives:

1. Future Year Build 1 (FYBD1): Existing Road Network plus 2045 Wilmington MPO MTP Fiscally-Constrained Projects and Subject Project (Widen Cape Fear Memorial Bridge to Six Lanes)
2. Future Year Build 2 (FYBD2): Existing Road Network plus 2045 Wilmington MPO MTP Fiscally-Constrained Projects and Subject Project (Widen Cape Fear Memorial Bridge to Six Lanes) with no access at S. 3rd Street or S. 4th Street

### 5.2 Methodology

2050 Build AADT estimates were prepared using growth rates derived from the WMPO TDM 2015 and 2045 models along with projected historical AADT data. Historical growth was calculated using linear regression for 10- and 20-year time periods. Model diversions were calculated between the two build alternatives using 2045 WMPO TDM model daily volumes with the two proposed build scenarios. Model growth was calculated using the following compound annual growth rate (CAGR) formula:

$$\text{CAGR} = ((\text{Future Volume}/\text{Base Volume})^{1/(\text{Future Year} - \text{Base Year})}) - 1$$

Growth in the study area was also compared with absolute 2045 model volumes for reasonableness.

Local stakeholders identified planned developments (discussed in **Appendix D**) and indicated that, in general, the 2045 WMPO TDM captures the projected development in the area. Therefore, the model volumes were used as a primary indicator of traffic growth rates along with local knowledge of planned developments and urban infill in the project area.

Unbalanced AADT were balanced using the NCDOT TPD Intersection Analysis Breakout Tool. AADT adjustments were made based on knowledge of existing land use and engineering judgement, resulting in adjusted growth percentages in the project forecast.

### 5.3 Design Factors

Based on a review of the forecasted volumes and growth in the study area, design factors for the 2050 Build scenarios are assumed to be the same as the 2023 No-Build, including truck percentages (Duals, TTST), peak K-factors, and directional factors.

### 5.4 Future Year Build Results

Future year Build volumes with historic growth rates, model growth rate, and chosen growth rates are presented in **Table E.7.** in **Appendix E.**

## **APPENDICES**

### **A: PROJECT ALTERNATIVES**

### **B: NCDOT HISTORICAL AADT DATA**

B.1. NCDOT Historic AADT Counts, 2002-2021

### **C: TRAFFIC COUNT DATA**

C.1. Collected Count Data

C.2. Seasonal Adjustment Factors

### **D: LOCAL CONTACT INFORMATION**

D.1. Compiled Traffic Questionnaire Responses

### **E: TRAFFIC FORECAST TABLES**

E.1. Historic AADT and BYNB Forecast Volumes

E.2. 2023 BYNB Design Data - Truck Percentages

E.3. 2023 BYNB Design Data – AM Peak Hour Factors

E.4. 2023 BYNB Design Data – PM Peak Hour Factors

E.5. 2023 BYNB Design Data – AM Directional Distribution

E.6. 2023 BYNB Design Data – PM Directional Distribution

E.7. FY Build Forecast Volumes, WMPO TDM Model Diversion,  
and Previous Forecast Volumes

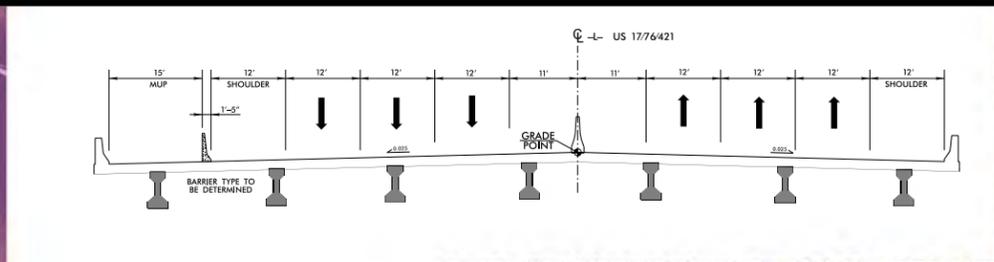
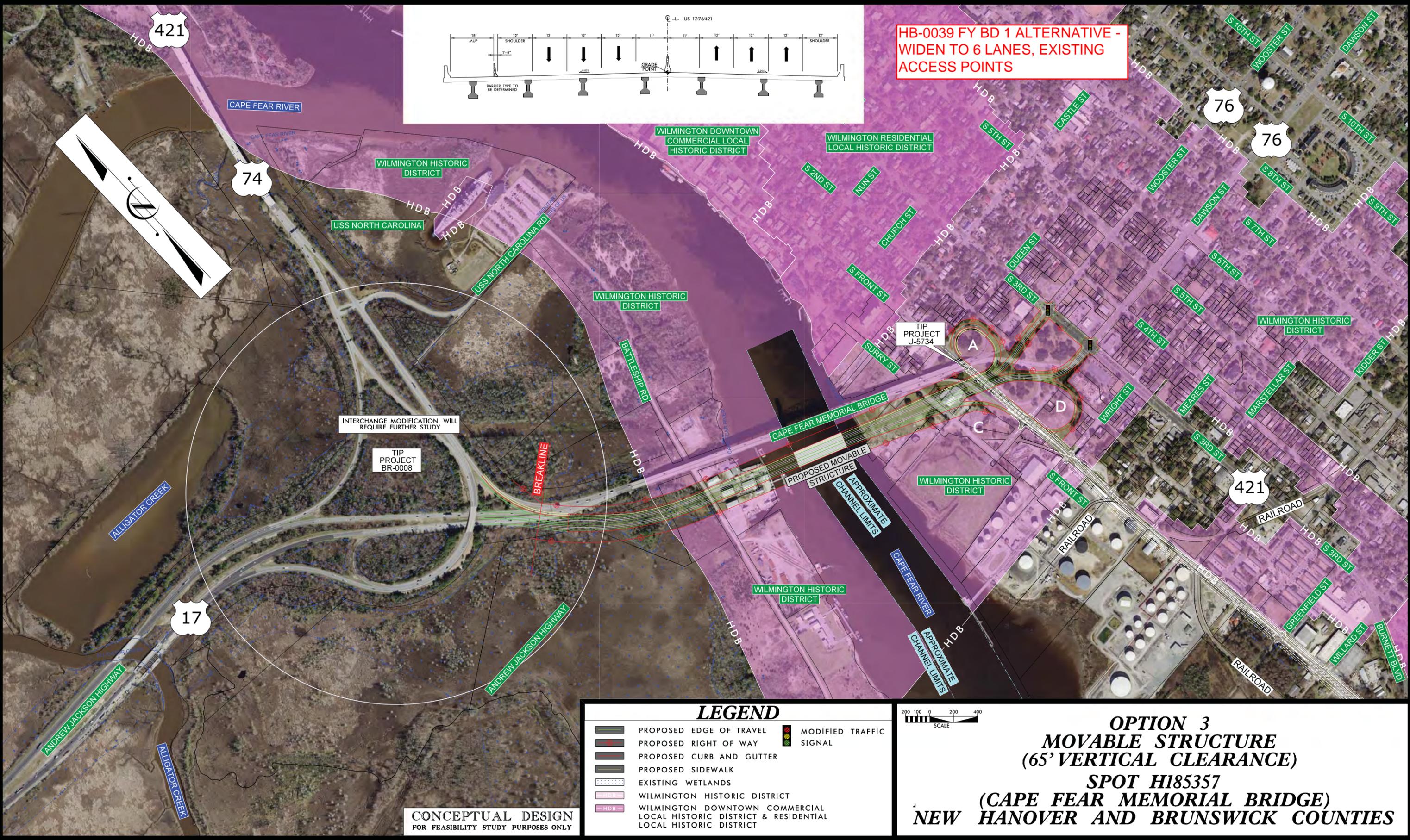
*This page intentionally left blank*



# APPENDIX A

## Build Alternatives





**HB-0039 FY BD 1 ALTERNATIVE -  
WIDEN TO 6 LANES, EXISTING  
ACCESS POINTS**

INTERCHANGE MODIFICATION WILL  
REQUIRE FURTHER STUDY

TIP  
PROJECT  
BR-0008

TIP  
PROJECT  
U-5734

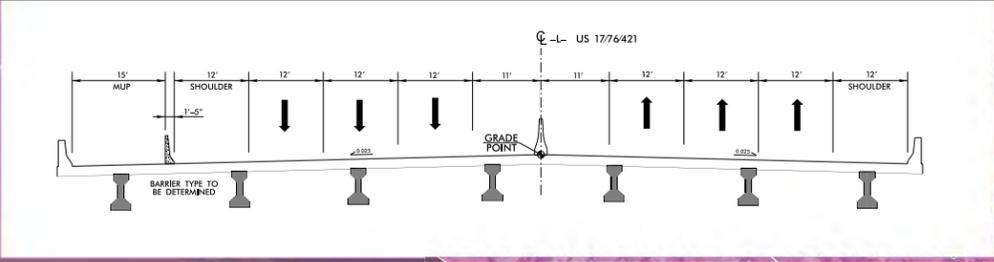
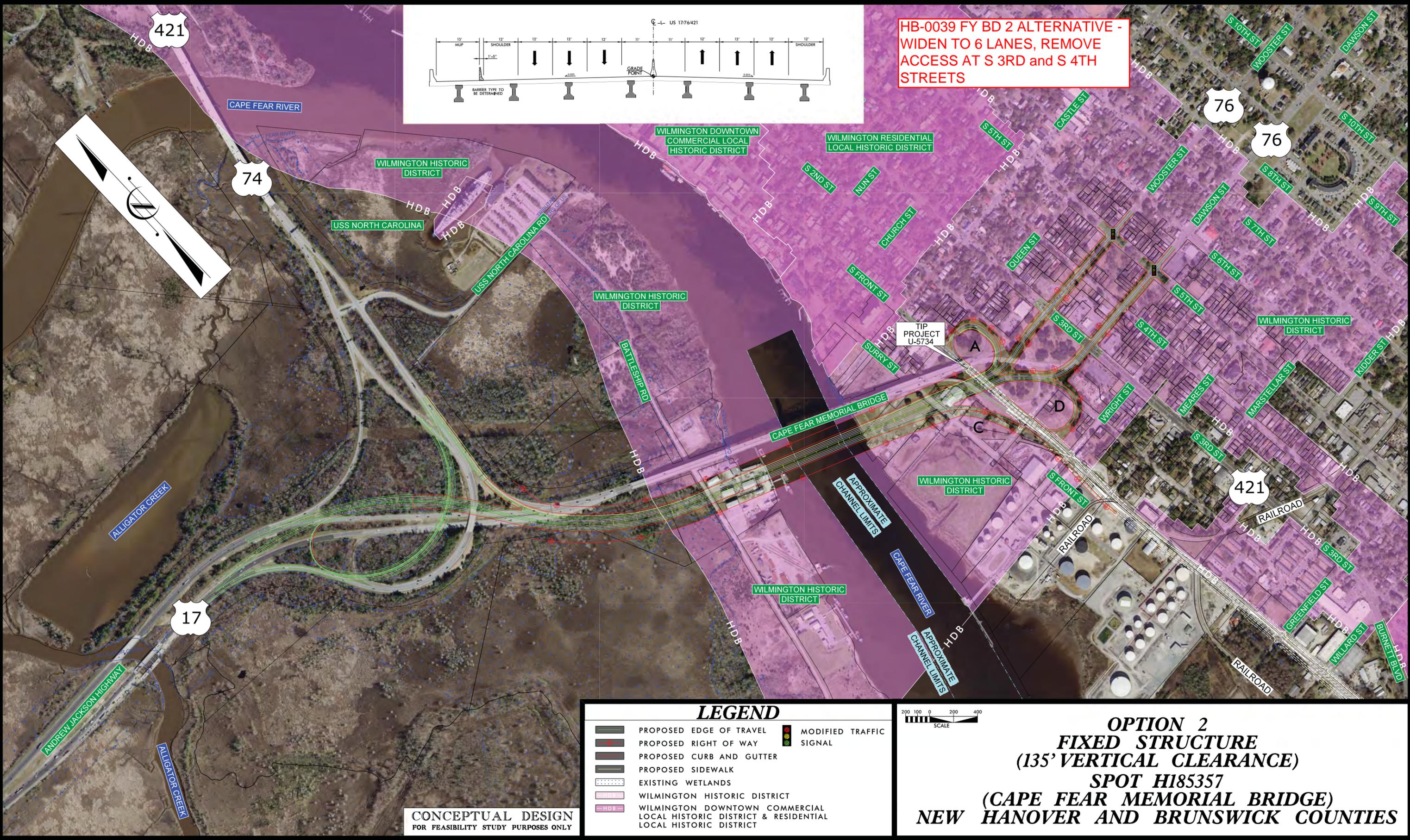
**CONCEPTUAL DESIGN  
FOR FEASIBILITY STUDY PURPOSES ONLY**

**LEGEND**

	PROPOSED EDGE OF TRAVEL		MODIFIED TRAFFIC SIGNAL
	PROPOSED RIGHT OF WAY		
	PROPOSED CURB AND GUTTER		
	PROPOSED SIDEWALK		
	EXISTING WETLANDS		
	WILMINGTON HISTORIC DISTRICT		
	WILMINGTON DOWNTOWN COMMERCIAL LOCAL HISTORIC DISTRICT & RESIDENTIAL LOCAL HISTORIC DISTRICT		



**OPTION 3  
MOVABLE STRUCTURE  
(65' VERTICAL CLEARANCE)  
SPOT H185357  
(CAPE FEAR MEMORIAL BRIDGE)  
NEW HANOVER AND BRUNSWICK COUNTIES**

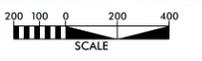


**HB-0039 FY BD 2 ALTERNATIVE - WIDEN TO 6 LANES, REMOVE ACCESS AT S 3RD and S 4TH STREETS**

TIP PROJECT U-5734

**LEGEND**

	PROPOSED EDGE OF TRAVEL		MODIFIED TRAFFIC SIGNAL
	PROPOSED RIGHT OF WAY		
	PROPOSED CURB AND GUTTER		
	PROPOSED SIDEWALK		
	EXISTING WETLANDS		
	WILMINGTON HISTORIC DISTRICT		
	WILMINGTON DOWNTOWN COMMERCIAL LOCAL HISTORIC DISTRICT & RESIDENTIAL LOCAL HISTORIC DISTRICT		



**OPTION 2  
FIXED STRUCTURE  
(135' VERTICAL CLEARANCE)  
SPOT H185357  
(CAPE FEAR MEMORIAL BRIDGE)  
NEW HANOVER AND BRUNSWICK COUNTIES**

**CONCEPTUAL DESIGN  
FOR FEASIBILITY STUDY PURPOSES ONLY**



# APPENDIX B

## Historical AADT Data



**Table B.1. NCDOT Historic AADT Counts, 2002-2021**

Location	Station ID	2021	2019	2017	2015	2013	2011	2009	2007	2005	2003	2001	2021 - 2001 AGR <sup>1</sup>	2019 - 2009 AGR <sup>1</sup>
US 421/US 74/NC 133 – North of US 17/US 74/US 76/NC 133 (Ocean Highway)	0650000035	33,000	38,000	36,000	38,000	34,000	35,000	34,000	36,000	21,000	19,000	19,000	2.97%	1.08%
US 17 /US 74/US 76/NC 133 (Ocean Highway) - Village Road (SR 1472)/NC 133 (River Road) to US 421/NC 133/US 74	0100000329	69,000	68,000	72,000		65,000	63,000	63,000	67,000	57,000	59,000		0.97%	1.17%
US 17/US 76 West (Wooster Street) – West of US 17 Business (South 3rd Street)	0650000030	17,500	15,000	15,000	15,000	15,000			15,000	17,000	16,000	15,000	0.05%	0.00%
US 17/US 76 East (Dawson Street) – West of US 421 (South 3rd Street)	0650000103	17,500	17,000	14,000	15,000	13,000			16,000	17,000	18,000	14,000	-0.01%	3.82%
US 17/US 76 West (Wooster Street) – US 17 Business (South 3rd Street) to South 5th Avenue	0650000153	15,000	19,000	16,000	15,000	14,000	13,000	13,000	13,000	16,000	16,000	15,000	0.52%	3.93%
US 17/US 76 East (Dawson Street) – US 421 (South 3rd Street) to South 5th Avenue	0650000108	16,500	16,500	14,000	15,000	15,000	14,000			18,000	17,000	17,000	-0.59%	1.16%
US 17/US 76 West (Wooster Street) – East of South 5th Avenue	0650000087	15,500	17,000	16,000	16,000	15,000	14,000	15,000	13,000	17,000	17,000	16,000	0.01%	1.58%
US 17/US 76 East (Dawson Street) – East of South 5th Avenue	0650000104	18,000	18,000		17,000	16,000	15,000	16,000	15,000	19,000	18,000	17,000	0.08%	1.57%
US 17 Business (South 3rd Street) – North of US 17/US 76 West (Wooster Street)	0650000136	18,500	18,500		17,000	16,000	20,000		20,000	19,000	20,000	17,000	-0.23%	-0.36%
South Front Street – South of US 17 Business/US 76/US 421	0650000351	25,500	25,000		24,000	22,000	21,000	22,000				17,000	1.99%	1.66%
US 421 (South 3rd Street) – South of US 17/US 76 East (Dawson Street)	0650000088	17,000	17,500	18,000	19,000	16,000	18,000	16,000	19,000	16,000	16,000	16,000	0.45%	0.87%

(1) 10- and 20-year annual growth rates derived from linear regression projections of all available historic AADT from 2001 – 2021 and 2009 – 2019, respectively



# APPENDIX C

## Traffic Count Data



Table C.1. Collected Traffic Count Data

Count ID	Count Type <sup>1</sup>	Road Name	Direction	Description	Start Date	End Date	ATR Group	Daily Factor <sup>2</sup>	Seasonal Factor <sup>3</sup>
EB1	7 Day VSC	US-17	EB	Mainline W of US 74/Cape Fear Bridge	2/21/2023	2/27/2023	1	1	**
WB1	7 Day VSC	US-17	WB	Mainline W of US 74/Cape Fear Bridge	2/21/2023	2/27/2023	1	1	**
2-1	7 Day VSC	US 17/76 (Cape Fear Bridge)	EB	@ Cape Fear River	2/21/2023	2/27/2023	1	1	**
2-2	7 Day VSC	US 17/76 (Cape Fear Bridge)	WB	@ Cape Fear River	2/21/2023	2/27/2023	1	1	**
EB6	3 Day VSC	US-17	EB	Off to S 3rd St	2/14/2023	2/16/2023	1	1	**
WB5	3 Day VSC	US-17	WB	On Ramp fr S 3rd St	2/14/2023	2/16/2023	1	1	**
10376	2 Day VSC	Dawson Street	EB	East of S 3rd Street	4/25/2023	4/26/2023	1	1	.943/930
10377	2 Day VSC	Wooster Street	WB	East of S 3rd Street	4/25/2023	4/26/2023	1	1	.943/930
10378	2 Day VSC	Front Street	Both	South of Wright Street	5/8/2023	5/9/2023	1	1	.968/.963
6-3	7 Day VSC	US 74	SB	S of US 421	2/21/2023	2/27/2023	1	1	**
6-4	7 Day VSC	US 74	NB	S of US 421	2/21/2023	2/27/2023	1	1	**
5-5	3 Day VSC	S 3rd St	SB	S of US 17	2/14/2023	2/16/2023	4	1	**
5-6	3 Day VSC	S 3rd St	NB	S of US 17	2/14/2023	2/16/2023	4	1	**
EB2	3 Day VSC	US-17	EB	Off Ramp to US 74	2/14/2023	2/16/2023	4	1	**
EB3	3 Day VSC	US-17	EB	On Ramp fr US 74	2/14/2023	2/16/2023	4	1	**
EB4	3 Day VSC	US-17	EB	Off to S Front St SB	2/14/2023	2/16/2023	4	1	**
EB5	3 Day VSC	US-17	EB	Off to S Front St NB	2/14/2023	2/16/2023	4	1	**
WB2	3 Day VSC	US-17	WB	On Ramp fr US 74	2/14/2023	2/16/2023	4	1	**
WB3	3 Day VSC	US-17	WB	Off Ramp to US 74	2/14/2023	2/16/2023	4	1	**
WB4	3 Day VSC	US-17	WB	On Ramp fr S Front St	2/14/2023	2/16/2023	4	1	**
14976423	13-Hour TMC	US 74 / US 421	n/a	US 74 / NC 133	5/15/2019	5/15/2019	1	*	0.95
14976482	13-Hour TMC	South Front Street	n/a	at Queen Street / US 17 Business Westbound On-Ramp	5/15/2019	5/15/2019	1	*	0.95
14976427	13-Hour TMC	US 76 West (Wooster Street)	n/a	at US 17 Business (South 3rd Street)	5/15/2019	5/15/2019	1	*	0.95
14976428	13-Hour TMC	US 76 East (Dawson Street)	n/a	at US 17 Business (South 3rd Street)	5/15/2019	5/15/2019	1	*	0.95
14976429	13-Hour TMC	US 76 West (Wooster Street)	n/a	at South 5th Avenue	5/15/2019	5/15/2019	1	*	0.95
14976430	13-Hour TMC	US 76 East (Dawson Street)	n/a	at South 5th Avenue	5/15/2019	5/15/2019	1	*	0.95

1) TMC = Turning Movement Count, VSC = Volume/Speed/Classification Count

2) 13-hour-to-24-hour partial weekday adjustment factor

\*Combination of various 13-hour to 24-hour weekday adjustment factors were used:

- 0.8144 used for SR/Local Road movements (Traffic Survey Group default value)
- 0.8290 used for NC Route movements (Traffic Survey Group default value)
- 0.8259 used for US Route movements (Traffic Survey Group default value)
- 0.7886 used for Interstate Route movements (Traffic Survey Group default value)

3) Seasonal Adjustment Factor to AADT based on table provided by NCDOT Traffic Survey Group as of February 8, 2023.

\*\*3 Day and 7 Day counts used factors based on day of week (Monday-Friday) and ATR Group shown in Appendix Table C.2.

**Table C.2. NCDOT 2021 Volume Seasonal Factors**

**Factoring from Daily Volume to AADT by Day of Week by Month**

*Provided by NCDOT Traffic Survey Group as of February 8, 2023.*

Season/ Factor (SF) Group	Month	Sunday (1)	Monday (2)	Tuesday (3)	Wednesday (4)	Thursday (5)	Friday (6)	Saturday (7)
1	1	1.525	1.127	1.104	1.089	1.053	0.988	1.250
1	2	1.432	1.118	1.063	1.026	1.028	0.999	1.208
1	3	1.293	1.011	1.007	0.982	0.966	0.899	1.088
1	4	1.178	0.953	0.943	0.930	0.902	0.851	1.046
1	5	1.166	0.968	0.963	0.954	0.907	0.853	1.016
1	6	1.148	0.965	0.958	0.936	0.935	0.862	0.978
1	7	1.176	0.983	0.965	0.939	0.914	0.863	0.992
1	8	1.206	0.965	0.978	0.957	0.916	0.859	1.034
1	9	1.178	0.961	0.945	0.955	0.913	0.817	0.996
1	10	1.166	0.947	0.944	0.919	0.898	0.826	1.001
1	11	1.207	0.966	0.951	0.925	0.926	0.847	1.058
1	12	1.292	0.984	0.982	0.968	0.924	0.860	1.061
2	1	1.541	1.412	1.435	1.415	1.338	1.160	1.460
2	2	1.353	1.374	1.352	1.297	1.255	1.141	1.428
2	3	1.102	1.160	1.226	1.158	1.075	0.900	1.120
2	4	0.906	1.021	1.083	1.023	0.956	0.815	1.031
2	5	0.847	0.989	1.092	1.042	0.925	0.782	0.841
2	6	0.767	0.930	1.017	0.973	0.889	0.741	0.647
2	7	0.729	0.925	1.006	0.948	0.859	0.715	0.608
2	8	0.774	0.965	1.078	1.018	0.911	0.759	0.694
2	9	0.857	1.067	1.150	1.111	1.005	0.817	0.846
2	10	1.013	1.106	1.182	1.126	1.041	0.864	1.041
2	11	1.160	1.195	1.235	1.206	1.129	0.988	1.224
2	12	1.413	1.259	1.298	1.296	1.197	1.036	1.296
4	1	1.681	1.045	1.016	1.016	0.995	0.964	1.281
4	2	1.582	1.028	0.981	0.959	0.966	0.943	1.215
4	3	1.450	0.948	0.945	0.929	0.922	0.874	1.141
4	4	1.390	0.917	0.905	0.905	0.879	0.850	1.145
4	5	1.397	0.925	0.903	0.908	0.881	0.855	1.113
4	6	1.404	0.940	0.922	0.908	0.902	0.869	1.104
4	7	1.440	0.961	0.930	0.916	0.901	0.876	1.122
4	8	1.423	0.939	0.939	0.922	0.897	0.864	1.136
4	9	1.438	0.918	0.918	0.911	0.884	0.845	1.122
4	10	1.405	0.926	0.906	0.897	0.887	0.840	1.132
4	11	1.450	0.929	0.908	0.901	0.908	0.860	1.162
4	12	1.486	0.930	0.921	0.915	0.890	0.848	1.150



# APPENDIX D

## Local Contact Information



## Appendix D - HB-0039 Traffic Forecast – Local Contact Information

*Answers have been compiled from all local contact responses.*

- 1) Are you aware of any additional roadway projects that could impact traffic growth patterns on the Cape Fear Memorial Bridge and/or Front Street/US 421 from U.S. 17 Business/U.S. 76/ U.S. 421 (Cape Fear Memorial Bridge) to Shipyard Blvd?
  - RW-127: Cape Fear Memorial Bridge Replacement (MTP Planning Year 2040).
  - RW-115: Internal Port Access Road (MTP Planning Year 2035)
  - RW-55: River Road Realignment – near Port South Gate (MTP Planning Year 2045)
  - RW-124: US117/Shipyard Blvd Speed Sensors & Warning System (MTP Planning Year 2035)
  - U-4738: Cape Fear Crossing (MTP Planning Year 2045+)
  - HL-0040 North Gate Design and NEPA Work, NC Port Authority. Access to Port of Wilmington from S. Front Street/Greenfield Street. Only design and environmental phases of project funded currently but NC Port Authority is seeking discretionary grants to fund implementation.
  - Carolina Beach Road Streetscape Project (Wilmington 2014 Transportation Bond Project). Coordination with NCDOT to integrate proposed aesthetic improvements into U-5729
  - HL-0109 and HL-0110: S 3<sup>rd</sup> St/Ann St and S 3<sup>rd</sup> St/Orange St traffic signals installation.

- 2) Are you aware of any additional developments that may not have been approved along the project corridor that could impact traffic growth patterns for these two projects?

The official 2045 Travel Demand Model was also created to test projects in the MTP. From an MTP and model perspective it looks like you have done that thoroughly and have the latest and greatest adopted plan information. Therefore, I have nothing further to add to your research.

Based on the developments you've described, I don't think there are any additional approved developments within the County's planning jurisdiction that would impact the project, but our jurisdiction only covers some of the land on the western side of the Cape Fear and Northeast Cape Fear Rivers.

I have copied Linda Painter with the City of Wilmington, as projects with the City's planning jurisdiction which encompasses the majority of the area around the area you describe below. I have also copied Abby Lorenzo with the WMPO as she may have better information on the traffic count information that you are looking for.

- 3) Any observations or comments regarding growth of traffic crossing the Cape Fear River along the Bridge and/or Front Street/US 421 to the south of the bridge?

NC Ports relocation of North Gate:

- Concept plan attached
- NC Port plans to add full access to the port at Greenfield Street and Front Street, with scales and security providing access to US 17 Bridge via Front Street. Access to be located at intersection of Front and Greenfield Streets.



# APPENDIX E

## Traffic Forecast Tables



Table E.1. Historic AADT and 2023 Base Year No-Build Forecast Data

Forecast Location	NCDOT AADT					AADT Extrapolated to 2023 <sup>(2)</sup>	Project Specific Count Data <sup>(3)</sup>		Wilmington MPO Traffic Counts <sup>(7)</sup>	Forecast Estimate		BY NB Forecast Volume
	2013	2015	2017	2019	2021		TMC <sup>(4)(5)</sup>	VSC <sup>(6)</sup>		VSC	U-4738	U-5734
											2019	2019
US 74/US 17 Bus west of US 17/US 421-US 74 interchange	65,000		72,000	68,000	69,000	73,400		89,000		84,400		85,800
US 17 Bus at Cape Fear River Bridge							54,500	65,200	70,200	60,900	58,600	65,200
US 74 North of US 74/US 17 Business	34,000	38,000	36,000	38,000	33,000	39,400	39,000	42,600	62,100	39,100		39,800
Dawson Street east of S Front Street	13,000	15,000	14,000	17,000	17,500	17,200	19150/15550	20,400		19,100	16,050	20,700
Dawson Street east of S 3rd Street	15,000	15,000	14,000	16,500	16,500	16,300	19900/20300	7,500	31,400	18,700		20,100
Dawson Street east of S 5th Street	16,000	17,000		18,000	18,000	18,900	21,100		25,500	19,400		20,800
Wooster Street east of S Front Street	15,000	15,000	15,000	15,000	17,500	15,700	19150/15550	20,800		19,100	16,050	20,700
Wooster Street east of S 3rd Street	14,000	15,000	16,000	19,000	15,000	20,400	17400/17700	6,900	23,500	18,700		20,100
Wooster Street east of S 5th Street	15,000	16,000	16,000	17,000	15,500	16,700	18,400		21,600	19,400		20,800
S Front Street north of Bus 17									2,700	4,700	5,800	5,500
S Front Street south of Bus 17	22,000	24,000		25,000	25,500	26,500	26,200	16,400	26,400	24,400	26,700	26,900
3rd Street north of Wooster Street	16,000	17,000		18,500	18,500	17,600	21,000		24,400	21,000		22,400
3rd Street south of Dawson Street	16,000	19,000	18,000	17,500	17,000	18,400	20,800	20,600		20,600		21,600
5th Street north of Wooster Street							3,100		3,900	3,200		3,600
5th Street south of Dawson Street							2,200		3,000	2,200		2,600

- Notes:**
- (1) Historic AADT counts prior to 2013 can be found in Appendix F (Digital Data)
  - (2) Historic AADT was extrapolated to 2023 utilizing projections from the NCDOT Traffic Forecast Utility Tool. The extrapolation calculations were based on 10 and 20 Year NCDOT historic AADT data trends from 2002-2021.
  - (3) Project specific counts were factored to AADT values using Seasonal adjustment factors
  - (4) Turning Movement Counts were collected May 2019 for the U-4738 Forecast and in March 2019 for the U-5734 Forecast
  - (5) Turning Movement Counts were expanded from 13 hours to 24 hours using Project and NCDOT expansion factors shown in Appendix Table C.2.
  - (6) Volume-Speed-Classification (VSC) Counts were collected in February-May 2023
  - (7) Traffic Counts collected by the Wilmington MPO during 2021/2022, seasonally adjusted to AADT and axle factor applied

Table E.2. 2023 Base Year No-Build Design Data - Truck Percentages

Forecast Location	Previous Forecasts		Project Specific Count Data				Selected 2023 BY NB Value
	Truck %	TIP Project	TMC <sup>(1)</sup>	Mainline <sup>(2)</sup>			
US 74/US 17 Bus west of US 17/US 421-US 74 interchange	4,3	U-4738		2,2			4,3
US 17 Bus at Cape Fear River Bridge	5,4/3,3	U-4738/U-5734		3,4			4,4
US 74 North of US 74/US 17 Business	10,6	U-4738	6,5	4,4			8,6
Dawson Street east of S Front Street	3,2/2,1	U-4738/U-5734	2,1	2,1			3,2
Dawson Street east of S 3rd Street	3,2	U-4738	2,1				3,2
Dawson Street east of S 5th Street	3,2	U-4738	3,1				3,2
Wooster Street east of S Front Street	3,2/2,1	U-4738/U-5734	3,1	2,1			3,2
Wooster Street east of S 3rd Street	3,2	U-4738	3,1				3,2
Wooster Street east of S 5th Street	3,2	U-4738	3,1				3,2
S Front Street north of Bus 17	5,2/4,1	U-4738/U-5734	4,1				4,2
S Front Street south of Bus 17	8,9/5,8	U-4738/U-5734	5,9	4,10			8,9
3rd Street north of Wooster Street	3,2	U-4738	3,0				3,2
3rd Street south of Dawson Street	3,2	U-4738	3,0	2,1			3,2
5th Street north of Wooster Street	4,1	U-4738	3,0				4,1
5th Street south of Dawson Street	4,1	U-4738	4,0				4,1

Notes:

1) Counts collected in 2019 for U-4738 and U-5734

2) 2023 Classification Counts

Table E.3. 2023 Base Year No-Build Design Data - AM Peak Hour Factors

Forecast Location	Previous Forecasts		Project Specific Count Data		Selected 2023 BY NB Value
	Peak Hour Factor	TIP Project	TMC <sup>(1)</sup>	Mainline <sup>(2)</sup>	
US 74/US 17 Bus west of US 17/US 421-US 74 interchange	8	U-4738		8	8
US 17 Bus at Cape Fear River Bridge	8/8	U-4738/U-5734		8	8
US 74 North of US 74/US 17 Business	8	U-4738	8	8	8
Dawson Street east of S Front Street	8/7	U-4738/U-5734	7	8	9
Dawson Street east of S 3rd Street	8	U-4738	9		9
Dawson Street east of S 5th Street	8	U-4738	9		9
Wooster Street east of S Front Street	8/7	U-4738/U-5734	7	8	8
Wooster Street east of S 3rd Street	8	U-4738	6		8
Wooster Street east of S 5th Street	8	U-4738	6		8
S Front Street north of Bus 17	7/7	U-4738/U-5734	5	6	7
S Front Street south of Bus 17	9/8	U-4738/U-5734	8	9	8
3rd Street north of Wooster Street	8	U-4738	8		8
3rd Street south of Dawson Street	8	U-4738	8	8	8
5th Street north of Wooster Street	7	U-4738	8		7
5th Street south of Dawson Street	7	U-4738	6		7

Notes:

1) Counts collected in 2019 for U-4738 and U-5734

2) 2023 Classification Counts

Table E.4. 2023 Base Year No-Build Design Data - PM Peak Hour Factors

Forecast Location	Previous Forecasts		Project Specific Count Data		Selected 2023 BY NB Value
	Peak Hour Factor	TIP Project	TMC <sup>(1)</sup>	Mainline <sup>(2)</sup>	
US 74/US 17 Bus west of US 17/US 421-US 74 interchange	9	U-4738		9	9
US 17 Bus at Cape Fear River Bridge	9/8	U-4738/U-5734		9	9
US 74 North of US 74/US 17 Business	8	U-4738	8	8	8
Dawson Street east of S Front Street	9/7	U-4738/U-5734	7	9	8
Dawson Street east of S 3rd Street	8	U-4738	7		8
Dawson Street east of S 5th Street	8	U-4738	7		8
Wooster Street east of S Front Street	9/7	U-4738/U-5734	9	9	9
Wooster Street east of S 3rd Street	8	U-4738	9		9
Wooster Street east of S 5th Street	8	U-4738	9		9
S Front Street north of Bus 17	11/11	U-4738/U-5734	11	11	11
S Front Street south of Bus 17	9/9	U-4738/U-5734	9	9	9
3rd Street north of Wooster Street	8	U-4738	8		8
3rd Street south of Dawson Street	8	U-4738	8	9	9
5th Street north of Wooster Street	10	U-4738	8		10
5th Street south of Dawson Street	10	U-4738	11		10

Notes:

1) Counts collected in 2019 for U-4738 and U-5734

2) 2023 Classification Counts

Table E.5. 2023 Base Year No-Build Design Data - AM Directional Distribution Factors

Forecast Location	Previous Forecasts		Project Specific Count Data			Selected 2023 BY NB Value
	D	TIP Project	TMC <sup>(1)</sup>	Mainline <sup>(2)</sup>		
US 74/US 17 Bus west of US 17/US 421-US 74 interchange	60 EB	U-4738		61 EB		60 EB
US 17 Bus at Cape Fear River Bridge	60 EB/75 EB	U-4738/U-5734		60 EB		60 EB
US 74 North of US 74/US 17 Business	55 NB	U-4738	57 NB	56 NB		55 NB
Dawson Street east of S Front Street	100 EB	U-4738/U-5734				100 EB
Dawson Street east of S 3rd Street	100 EB	U-4738				100 EB
Dawson Street east of S 5th Street	100 EB	U-4738				100 EB
Wooster Street east of S Front Street	100 WB	U-4738/U-5734				100 WB
Wooster Street east of S 3rd Street	100 WB	U-4738				100 WB
Wooster Street east of S 5th Street	100 WB	U-4738				100 WB
S Front Street north of Bus 17	75 NB/75 NB	U-4738/U-5734	73 NB			75 NB
S Front Street south of Bus 17	55 NB/55 SB	U-4738/U-5734	52 NB			55 SB
3rd Street north of Wooster Street	65 NB	U-4738	65 NB			65 NB
3rd Street south of Dawson Street	60 NB	U-4738	59 NB	60 NB		60 NB
5th Street north of Wooster Street	55 NB	U-4738	55 NB			55 NB
5th Street south of Dawson Street	55 NB	U-4738	52 NB			55 NB

Notes:

1) Counts collected in 2019 for U-4738 and U-5734

2) 2023 Classification Counts

Table E.6. 2023 Base Year No-Build Design Data - PM Directional Distribution Factors

Forecast Location	Previous Forecasts		Project Specific Count Data <sup>(1)</sup>			Selected 2023 BY NB Value
	D	TIP Project	TMC <sup>(1)</sup>	Mainline <sup>(2)</sup>		
US 74/US 17 Bus west of US 17/US 421-US 74 interchange	55 WB	U-4738		56 WB		55 WB
US 17 Bus at Cape Fear River Bridge	55 WB/60 EB	U-4738/U-5734		56 WB		55 WB
US 74 North of US 74/US 17 Business	55 SB	U-4738	51 SB	53 SB		55 SB
Dawson Street east of S Front Street	100 EB	U-4738/U-5734				100 EB
Dawson Street east of S 3rd Street	100 EB	U-4738				100 EB
Dawson Street east of S 5th Street	100 EB	U-4738				100 EB
Wooster Street east of S Front Street	100 WB	U-4738/U-5734				100 WB
Wooster Street east of S 3rd Street	100 WB	U-4738				100 WB
Wooster Street east of S 5th Street	100 WB	U-4738				100 WB
S Front Street north of Bus 17	65 SB/65 SB	U-4738/U-5734	65 SB	66 SB		65 SB
S Front Street south of Bus 17	55 SB/55 SB	U-4738/U-5734	51 SB	53 NB		52.5 NB
3rd Street north of Wooster Street	55 SB	U-4738	57 SB			55 SB
3rd Street south of Dawson Street	55 SB	U-4738	50 SB	53 SB		55 SB
5th Street north of Wooster Street	55 SB	U-4738	57 SB			55 SB
5th Street south of Dawson Street	60 SB	U-4738	60 NB			55 SB

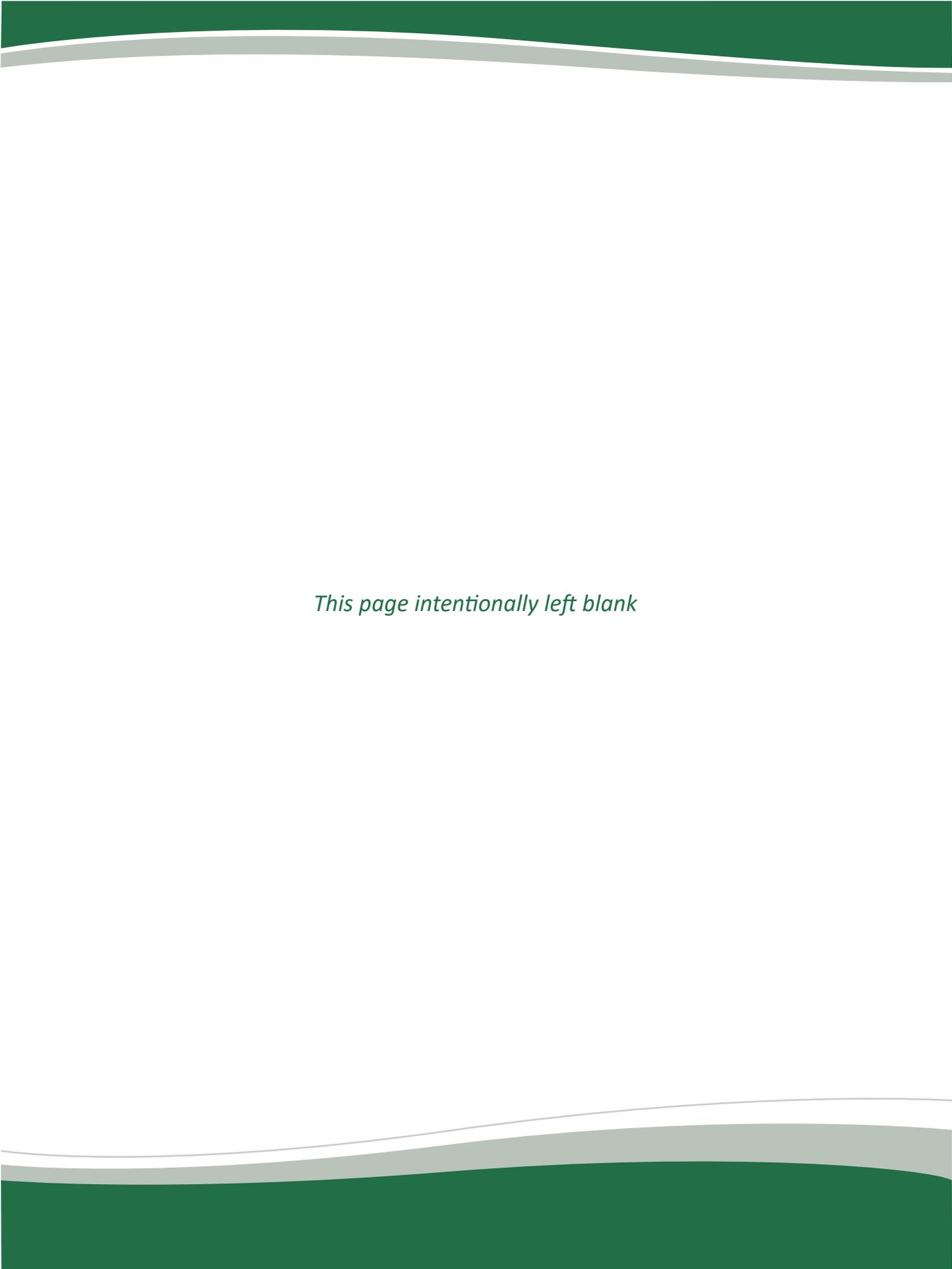
Notes:

1) Counts collected in 2019 for U-4738 and U-5734

2) 2023 Classification Counts

Table E.7. 2045 Future Year Build Traffic Volumes and Model Comparison

Figure	Forecast Location	WMPO Model Volume			NCDOT AADT		Reference Calculated Annual Growth Rate (CAGR)				Applied CAGR		Forecast FYBD Volume			Previous Traffic Forecast Comparison					
		2015 NB	2045 FYBD1	2045 FYBD2	2015	2050 Extrapolated	10-Year Historic	20-Year Historic	2015-2045 Model FYBD1	2015-2045 Model BD2	2050 FYBD1	2050 FYBD2	2023 BYNB Selected AADT	2050 FYBD1 Selected AADT	2050 FYBD2 Selected AADT	HNTB 2019 U-4738	HNTB 2045 U-4738	SEPI 2019 U-5734	SEPI 2040 U-5734	U-4738 AGR	U-5734 AGR
1	US 74/US 17 Bus west of US 17/US 421-US 74 interchange	96,942	139,031	142,274	68,500 <sup>1</sup>	115,900	2.2%	2.6%	1.2%	1.3%	1.2%	1.2%	85,800	118,400	118,400	84,400	111,500			0.9%	
1	US 17 Bus at Cape Fear River Bridge	64,626	104,831	110,788	-				1.6%	1.8%	1.4%	1.4%	65,200	94,900	94,900	60,900	81,900	58,600	67,200	1.0%	0.7%
1	US 74 North of US 74/US 17 Business	36,588	36,796	35,094	38,000	51,200	1.1%	3.0%	0.0%	-0.1%	0.9%	0.9%	39,800	50,700	50,700	39,100	50,600			0.9%	
1	Dawson Street east of S Front Street	20,778	30,322	33,330	15,000	21,600	3.8%	0.0%	1.3%	1.6%	1.2%	1.04%	20,700	28,600	27,400	19,100	25,400	16,050	15,200	1.0%	-0.3%
1	Dawson Street east of S 3rd Street	19,963	27,213	33,330	15,000	21,500	1.2%	-0.6%	1.0%	1.7%	1.21%	1.15%	20,100	27,800	27,400	18,700	25,000			1.0%	
1	Dawson Street east of S 5th Street	21,501	32,271	32,940	17,000	21,600	1.6%	0.1%	1.4%	1.4%	1.2%	1.16%	20,800	28,700	28,400	19,400	26,000			1.0%	
1	Wooster Street east of S Front Street	26,206	36,354	41,538	15,000	15,800	0.0%	0.1%	1.1%	1.5%	1.2%	1.04%	20,700	28,600	27,400	19,100	25,400	16,050	15,200	1.0%	-0.3%
1	Wooster Street east of S 3rd Street	21,862	28,212	41,538	15,000	26,800	3.9%	0.5%	0.9%	2.2%	1.21%	1.15%	20,100	27,800	27,400	18,700	25,000			1.0%	
2	Wooster Street east of S 5th Street	19,562	26,834	28,217	16,000	20,000	1.6%	0.0%	1.1%	1.2%	1.2%	1.16%	20,800	28,700	28,400	19,400	26,000			1.0%	
2	S Front Street north of Bus 17	10,109	16,414	16,147	-				1.6%	1.6%	2.8%	2.8%	5,500	11,600	11,600	4,700	10,700	5,800	13,600	2.8%	4.1%
2	S Front Street south of Bus 17	15,002	29,401	28,914	24,000	40,700	1.7%	2.0%	2.3%	2.2%	1.69%	2.0%	26,900	42,300	45,900	24,400	37,200	26,700	43,400	1.4%	2.3%
2	3rd Street north of Wooster Street	22,370	29,060	24,709	17,000	19,000	-0.4%	-0.2%	0.9%	0.3%	1.11%	(0.1%)	22,400	30,200	21,600	21,000	23,800			0.4%	
2	3rd Street south of Dawson Street	19,346	29,258	24,680	19,000	23,400	0.9%	0.5%	1.4%	0.8%	1.1%	-	21,600	29,000	21,600	20,600	23,400			0.4%	
2	5th Street north of Wooster Street	7,360	15,977	19,392	-				2.6%	3.3%	3.0%	5.5%	3,600	8,000	15,400	3,200	5,600			1.9%	
2	5th Street south of Dawson Street	3,120	9,406	13,668	-				3.7%	5.0%	3.0%	5.7%	2,600	5,800	11,600	2,200	4,400			2.3%	



*This page intentionally left blank*