# US 17 CORRIDOR STUDY, BRUNSWICK COUNTY

# PHASE III (FUNCTIONAL DESIGNS) FINAL REPORT

# R-4732

**Prepared For:**

**North Carolina Department of Transportation**

**Prepared By:**

**PBS&J**
**1616 East Millbrook Road, Suite 310**
**Raleigh, NC 27609**

October 2005

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# 1 Introduction / Background

Local and regional interest in protecting the integrity and maintaining the mobility of US 17 (Ocean Highway) in conjunction with ever increasing residential and commercial development in Brunswick County dictated the necessity of undertaking a detailed corridor study. Representatives from the North Carolina Department of Transportation (NCDOT), Brunswick County Board of County Commissioners, Brunswick County Planning Department, Cape Fear Regional Planning Organization, and area municipalities began the task of completing a comprehensive corridor study in order to identify future roadway improvement strategies for existing US 17 in Brunswick County.

US 17 carries traffic for approximately 48 miles within Brunswick County, from the North Carolina / South Carolina State Line to the Brunswick County / New Hanover County line at the Cape Fear River. The corridor functions as a vital coastal intrastate highway in North Carolina and a primary coastal interstate route linking North Carolina to South Carolina and Virginia. The US 17 Corridor study area is shown in **Figure 1-1**.

## 1.1 US 17 as a Strategic Highway Corridor

The North Carolina Strategic Highway Corridors (SHC) initiative represents the first major implementation step to be advanced under the update of the state's Long-Range Multimodal Statewide Transportation Plan. The initiative, developed in partnership with the North Carolina Department of Environment and Natural Resources and the North Carolina Department of Commerce, represents a timely initiative to protect and maximize the mobility and connectivity on a core set of highway corridors, while promoting environmental stewardship through maximizing the use of existing facilities to the extent possible, and fostering economic prosperity through the quick and efficient movement of people and goods. The initiative offers NCDOT and its stakeholders an opportunity to consider long-term vision when making land use decisions and design and operational decisions on the highway system. The creation of a long-term vision identifies the ultimately desired facility type (freeway, expressway, boulevard, or thoroughfare) for each corridor. A tri-agency policy statement endorsing the SHC initiative was signed by the Secretaries of the three agencies on December 2, 2004.

**Figure 1-2** identifies the Strategic Highway Corridors as adopted by the North Carolina Board of Transportation (NCBOT) in September 2004. The following general criteria along

with input from the public, NCBOT, and NCDOT staff guided the Strategic Highway Corridors selection process.

- **Mobility:** Corridor currently serves or has the potential to expeditiously move large volumes of traffic.
- **Connectivity:** Corridor provides a connection between activity centers including cities, airports, military bases, seaports, etc.
- **Interstate Connectivity:** The corridor provides connectivity between existing and/or planned Interstates.
- **Interstate Relief:** Corridor serves or has the potential to serve as a reliever route to an existing Interstate facility.
- **Hurricane Evacuation Routes:** Corridor represents a major route within North Carolina's Emergency Management's Coastal Evacuation Route Map
- **Cited in Prominent State Report:** For example, the Rural Prosperity Task Force Report.
- **Part of a National, Statewide, Economic, or Military Highway System:** For example, the National Highway System or STRAHNET.

US 17 is recognized as a Strategic Highway Corridor with the vision of a Freeway type facility. US 17 is identified in the project limits of this study as requiring upgrade to meet the SHC vision for this facility.

## 1.2 Study Objectives

As places such as Wilmington quickly reach their maximum for infill, development areas outside these areas will see an increase in development potential. With improvements to the water and sewer facilities in the Town of Leland, a new sewer system opening in the central part of Brunswick County in 2006 servicing the Town of Supply, and smaller systems already in the southwestern area of the County planning to be expanded, development is becoming attracted to this area and past trends have shown that the availability of a multi-lane high-speed facility is good incentive for development. It is not too late to preserve mobility along the corridor, but, as economic development occurs in this currently rural area, the cost for protection increases and its likelihood decreases. The difference between successful controlled development and uncontrolled development can simply be coordination of land use and corridor transportation plans. Improved flow along the US 17 Corridor will benefit both the traveling public and the surrounding area. A smoother-flowing, safer facility is more attractive than a congested, strip-developed facility. The US 17 Corridor Study

develops alternatives that improve mobility along the corridor and help develop a plan for corridor protection, while keeping in mind the long term vision for US 17 to transition to a Freeway facility.

## 1.3 Study Process

An *Existing Conditions Report* presenting the work completed during Phase I of the study was completed in April 2004.

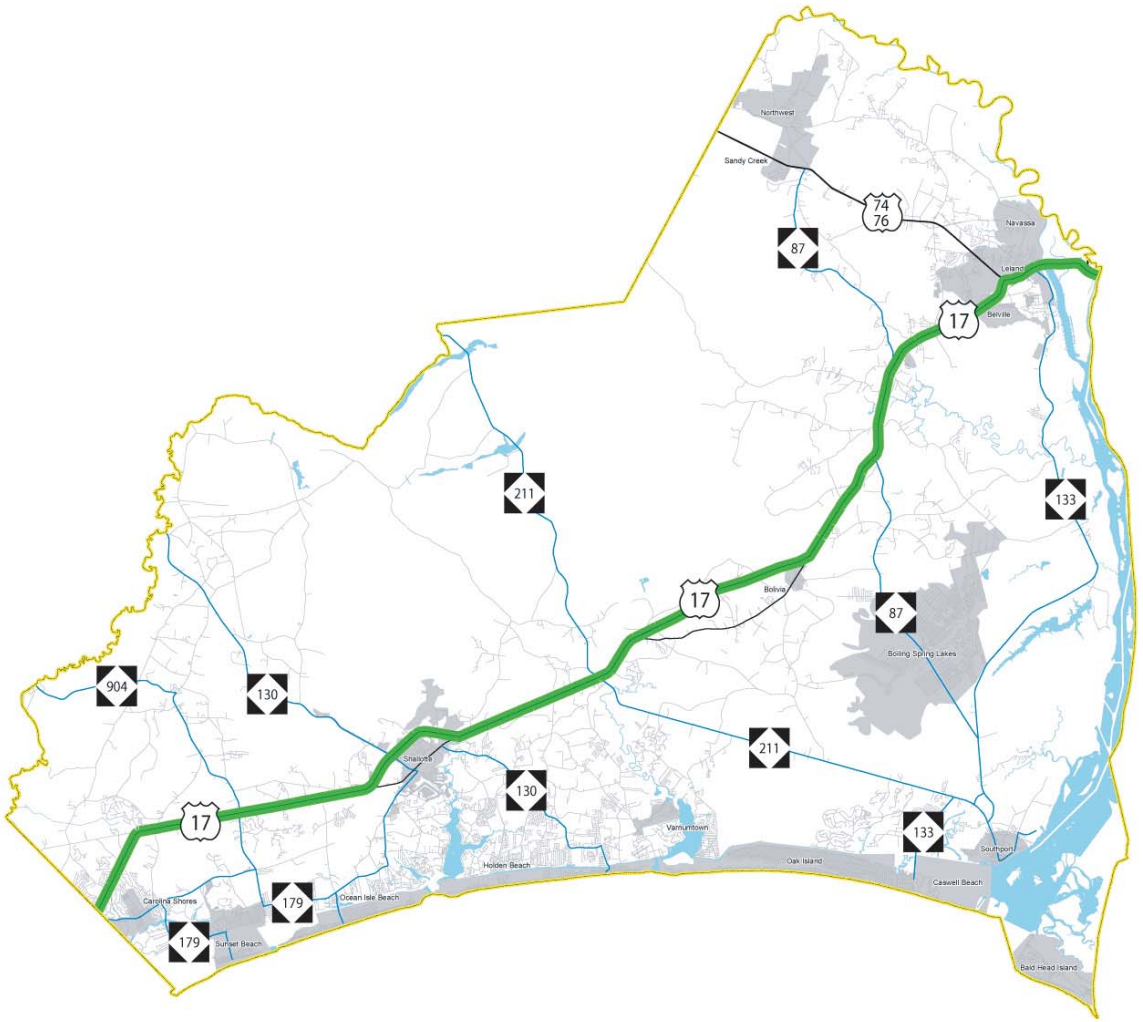
This report presents the work in Phase II of the study, which developed and evaluated alternatives for improving corridor mobility. To evaluate the alternatives, detailed traffic analysis was performed, conceptual designs were developed, and public workshops were held to involve the public in the decision making process. Phase II of the study provides a detailed operations assessment of US 17 improvement alternatives.

For the purpose of this report, US 17 improvement alternatives were evaluated for the entire length of the corridor and were not influenced by other ongoing NCDOT studies, specifically the Carolina Bays Parkway Extension Feasibility Study and the Interstate 74 Feasibility Study. These studies are examining new freeway facilities in Brunswick County. The Carolina Bays Parkway Extension Feasibility Study is examining the extension of the South Carolina portion of the Parkway from the state line approximately five miles north to US 17 in Brunswick County. The terminus of this project along US 17 has not been determined. The I-74 Feasibility Study is evaluating a proposed Interstate corridor that would traverse across North Carolina from the Winston-Salem area to the South Carolina Line near Myrtle Beach. In Brunswick County, several alignments are being proposed for I-74, some of which would share a portion of the US 17 corridor

Phase II of the study was completed in June 2004.

Phase III of the corridor study developed functional design plans for two of the alternatives studied in Phase II.

N.T.S.




## Legend

- Brunswick County Boundary
- US 17 Corridor Study Area

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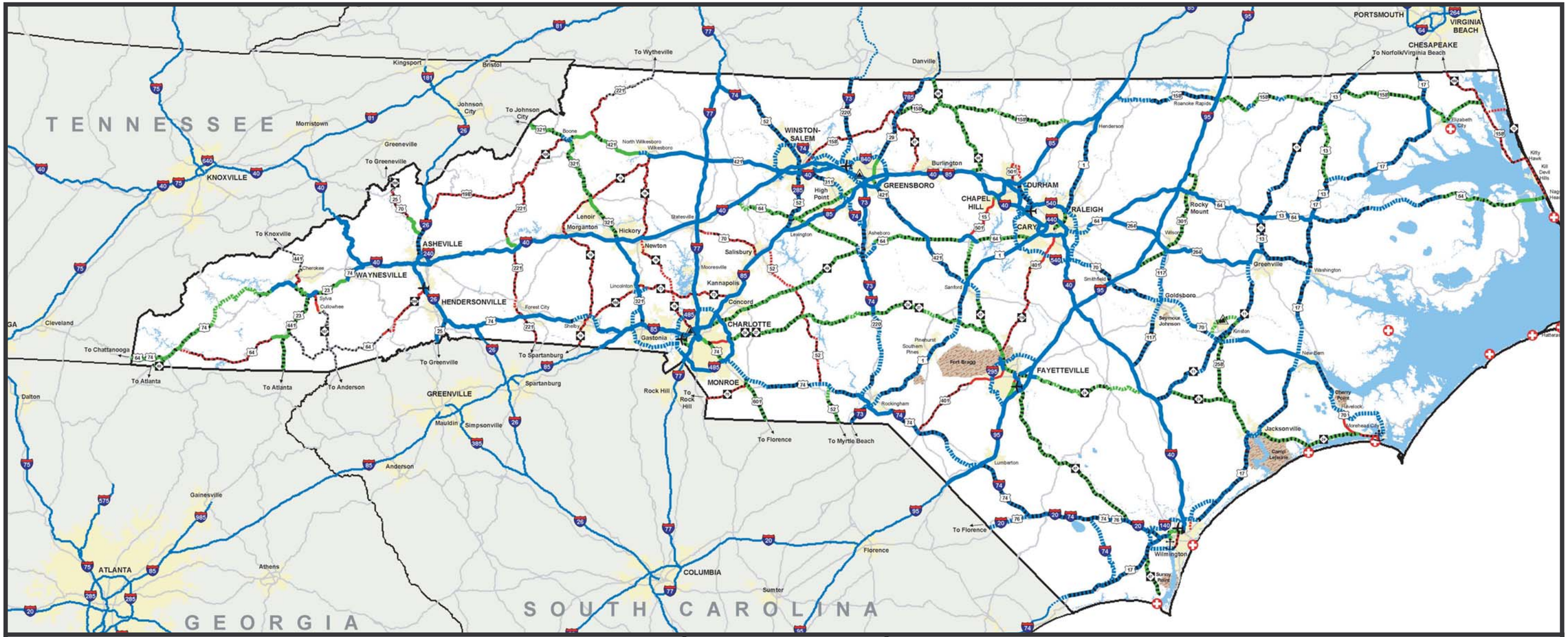
# US 17 CORRIDOR STUDY

**Brunswick County**

Brunswick County and the US 17 Corridor

FIGURE 1-1




Strategic Highway Corridors

north carolina department of transportation

# Vision Plan

**Adopted by The North Carolina Board of Transportation**

**Plan Date: September 2, 2004**

N W E S

Miles

0 5 10 20 30 40 50

Prepared By:
The North Carolina Department of Transportation
Transportation Planning Branch

Base Map Date: March 29, 2004

## Legend

**Freeways**
- Existing
- Needs Upgrade
- Recommended

**Expressways**
- Existing
- Needs Upgrade
- Recommended

**Boulevards**
- Existing
- Needs Upgrade
- Recommended

**Thoroughfares**
- Existing
- Needs Upgrade
- Recommended

- US/Other Route
- State Port
- Major Airport
- Intermodal Connector
- Coast Guard Station
- Major Military Base
- Urban Area
- Water Features

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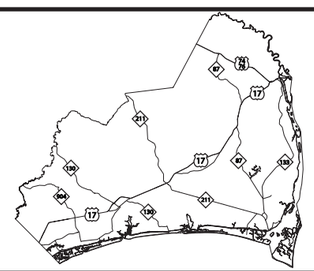


# US 17 CORRIDOR STUDY

**Brunswick County**

NCDOT Strategic Corridors Map

FIGURE 1-2

# 2 Existing Conditions

The US 17 Corridor Study Phase I Report examined traffic conditions along the corridor at a planning-level evaluation that assessed Annual Average Daily Traffic (AADT) volumes only and did not examine the peak hour operating conditions. Operating conditions were measured by assigning a Level of Service to each segment. Level of service (LOS) is a term used to qualitatively describe the operating conditions of a roadway based on factors such as speed, travel time, maneuverability, delay, and safety. The level of service of a facility is designated with a letter, A to F, with A representing the best operating conditions and F the worst.

- Level of Service A describes primarily free-flow operations at average travel speeds. Delay at signalized intersections is minimal.
- Level of Service B describes reasonably unimpeded operations at average travel speeds. Delays at signalized intersections are not significant.
- Level of Service C describes stable operations, however, ability to maneuver and change lanes in midblock locations may be more restricted than at Level of Service B, and longer queues, adverse signal coordination, or both may contribute to lower average travel speeds.
- Level of Service D borders on a range in which small increases in flow may cause substantial increases in delay and decreases in travel speed.
- Level of Service E is characterized by significant delays caused by a combination of adverse progression, high signal density, high volumes, extensive delays at critical intersections and inappropriate signal timing.
- Level of Service F is characterized by urban street flow at extremely low speeds, congested intersections at critical signalized locations, high delays, high volumes, and extensive queuing.

The analysis showed that all segments of US 17 are presently operating at Level of Service (LOS) B or better except for the existing segment between US 74/76 and NC 133, which is operating at LOS D.

For Phase II of the corridor study, intersection capacity analysis was performed for selected intersections from the South Carolina State Line to Blackwell Road and freeway individual element analysis was performed for the freeway section from Blackwell Road to the Cape Fear River Bridge. For this project, the “existing conditions” are represented as roadway geometry and traffic control along US 17 as it existed in the year 2004. Peak hour LOS

results, existing lane geometry, and existing peak hour traffic volumes along the US 17 corridor are shown in **Figures 2-1 to 2-9**. The LOS shown on the figures represents the worst of the AM and PM LOS measurement. Analysis printouts can be found in the Phase II Analysis Results CD attached to this report.

## 2.1 Turning Movement Volumes

### 2.1.1 Segment Volumes Provided by NCDOT

AADT for the year 2004 for mainline segments of US 17 and major cross streets were compiled by NCDOT. In addition, the Department provided daily turning movement volumes for major intersections along US 17. The AADT volume figures provided by NCDOT are provided in **Appendix A**.

### 2.1.2 Peak Hour Turning Movement Volumes

Peak hour turning movement volumes for the intersections and interchanges along US 17 were developed by applying the appropriate K (peak hour) and D (peak direction) factors to the projected year 2004 AADT volumes. The K factors, provided by NCDOT and shown in the volume figures provided in **Appendix A**, represent the proportion of AADT expected to occur in the design hour. The D factors, also provided by NCDOT and shown in the volume figures provided in **Appendix A**, represent the percentage of peak hour two-way traffic traveling in the peak direction of flow. In general, the K factor is 0.10 and the D factor is 0.60. As shown in the AADT figures, the peak direction of travel on US 17 is northbound during the AM peak hour and southbound during the PM peak hour. The peak direction of travel on the cross streets varied by location.

## 2.2 Capacity Analysis

### 2.2.1 Analysis Methodology

AM and PM peak hour unsignalized and signalized intersection analysis was performed for all intersections along the US 17 Corridor where peak hour volumes were determined. Individual element freeway operations analysis was performed for the existing freeway section from Blackwell Road to the Cape Fear River Bridge.

Freeway segments, merge areas, diverge areas, and weaving areas were analyzed using the Highway Capacity Software (HCS) version 2.1d.

Intersection analysis was performed using the Synchro software package, Version 5. Highway Capacity Manual (HCM) Level of Service results were used for all unsignalized and signalized intersections. If field intersection signal timings for the existing conditions were available, those timings were used for the analysis. For unsignalized intersections, the LOS recorded for the intersection was the LOS calculated for the worst stop controlled movement. Since all stop controlled movements at unsignalized intersections along the US 17 Corridor are on the cross street approaches, the LOS indicated for these intersections represent operations for the worst cross street approach. Thru traffic on US 17 will operate with free flow conditions at all unsignalized intersections, regardless of the LOS reported following the HCM methodology. Network and signal timing characteristics used for all intersection analysis were as follows:

- No "right turns on red" allowed.
- Total lost time of five seconds.
- Yellow time of five seconds.
- Red time of two seconds.
- Minimum initial time of seven seconds.
- Minimum through phase time of 17 seconds.
- Minimum left turn phase of 14 seconds.
- For the existing and no-build conditions, signalized left turns were analyzed with the current phasing (permitted only, permitted+protected, or protected only). For the alternatives analysis, signalized left turns were analyzed as protected.

### 2.2.2 Traffic Characteristics

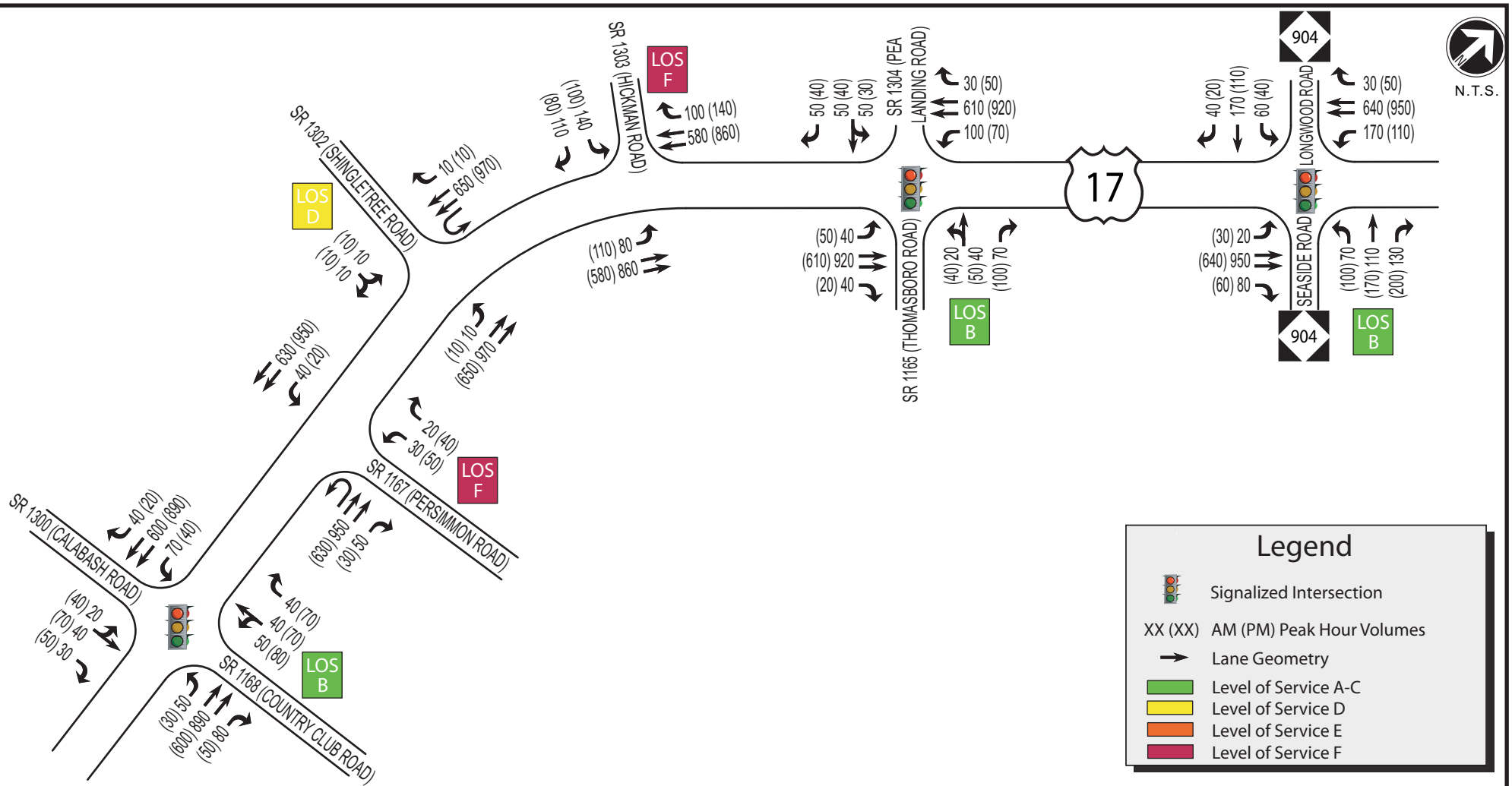
Peak hour heavy vehicle percentages were obtained from the NCDOT AADT traffic forecasts (see **Appendix A**). The heavy vehicle percentages ranged from 5% to 8 %. The peak hour factor was assumed to be 0.90.

### 2.2.3 Freeway Operations

The existing freeway section between Blackwell Road and the Cape Fear River Bridge operates over capacity for year 2004 conditions. Between US 74/76 and NC 133, US 17 operates at a LOS D or better. Between NC 133 and US 421, US 17 experiences very high peak hour volumes and operates at a LOS F. North of US 421, US 17 operates at a LOS E.

### 2.2.4 Intersection Operations

The analysis indicates that of the 43 intersections analyzed, 11 would operate at LOS A, B, or C, one would operate at LOS D, four operate at LOS E, and 27 operate at LOS F. Many of the poorly operating intersections were found to be unsignalized intersections where left turning vehicles from the cross streets do not have adequate gaps in the through US 17 traffic to make the left turn without experiencing high delay times. For these cases, the LOS recorded for the intersection is for the worst movement, however if the delay for all vehicles were considered the overall intersection LOS would be much better than F.

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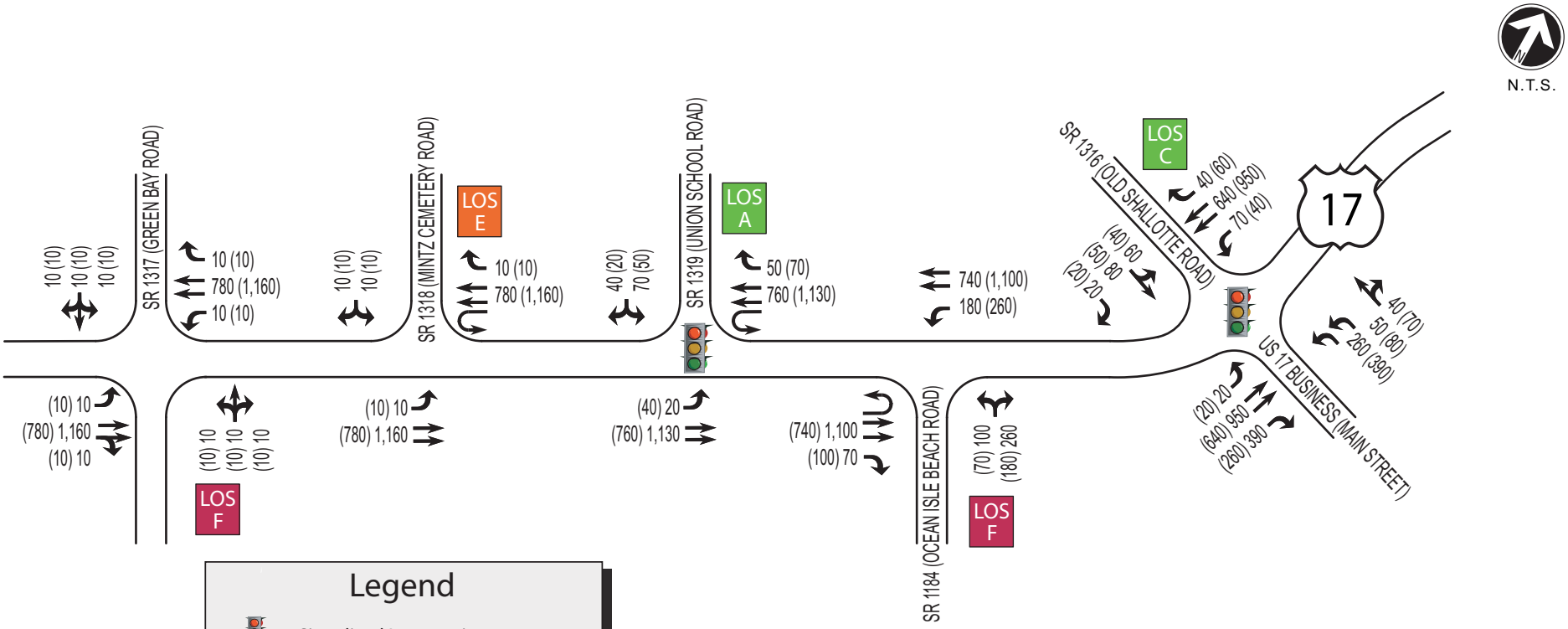
# US 17 CORRIDOR STUDY

**Brunswick County**

2004 Peak Hour Turning Movement Volumes, Geometry, and Levels of Service

FIGURE 2- 1

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# US 17 CORRIDOR STUDY

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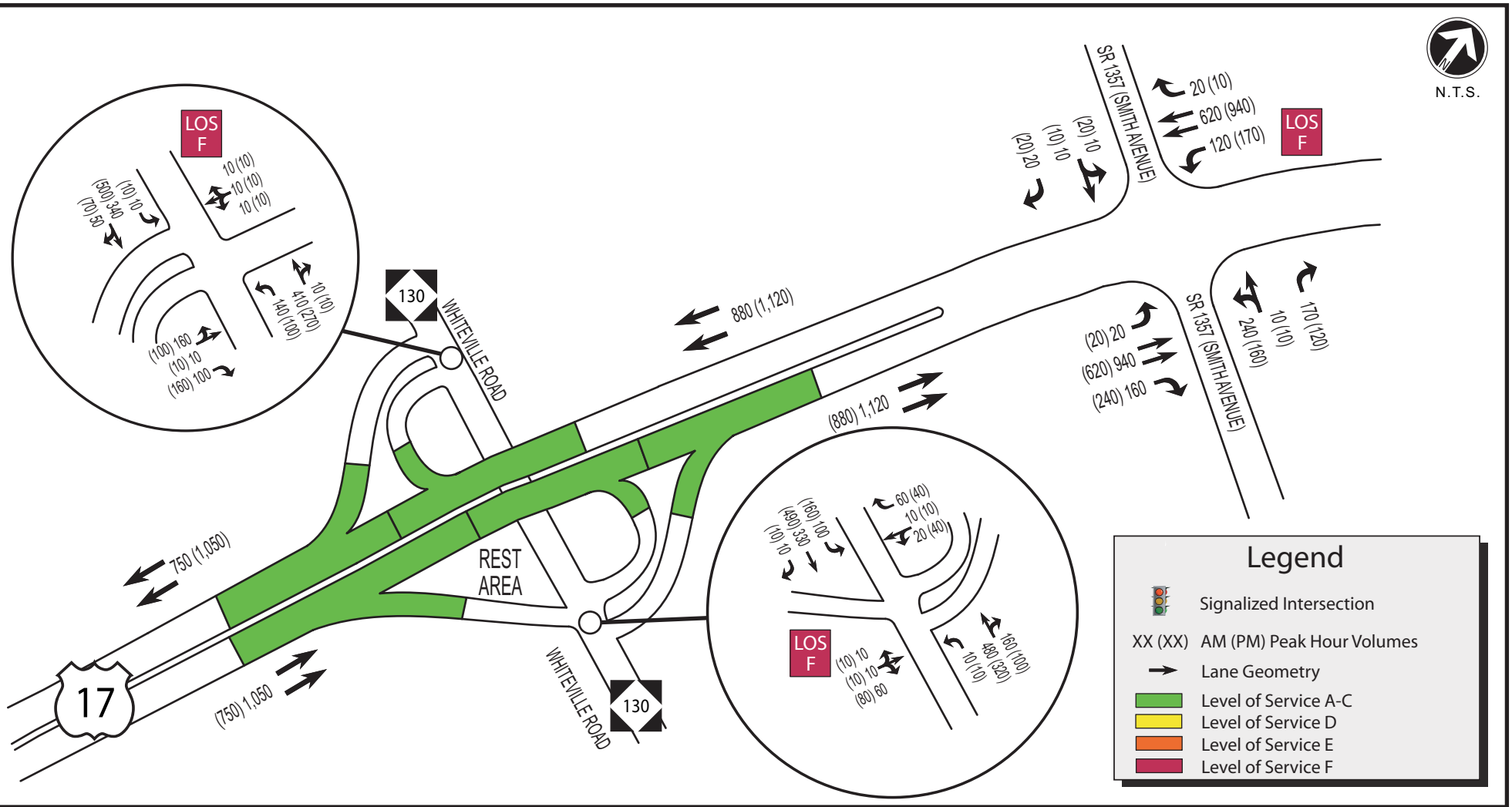
2004 Peak Hour Turning Movement Volumes, Geometry, and Levels of Service

FIGURE 2- 2

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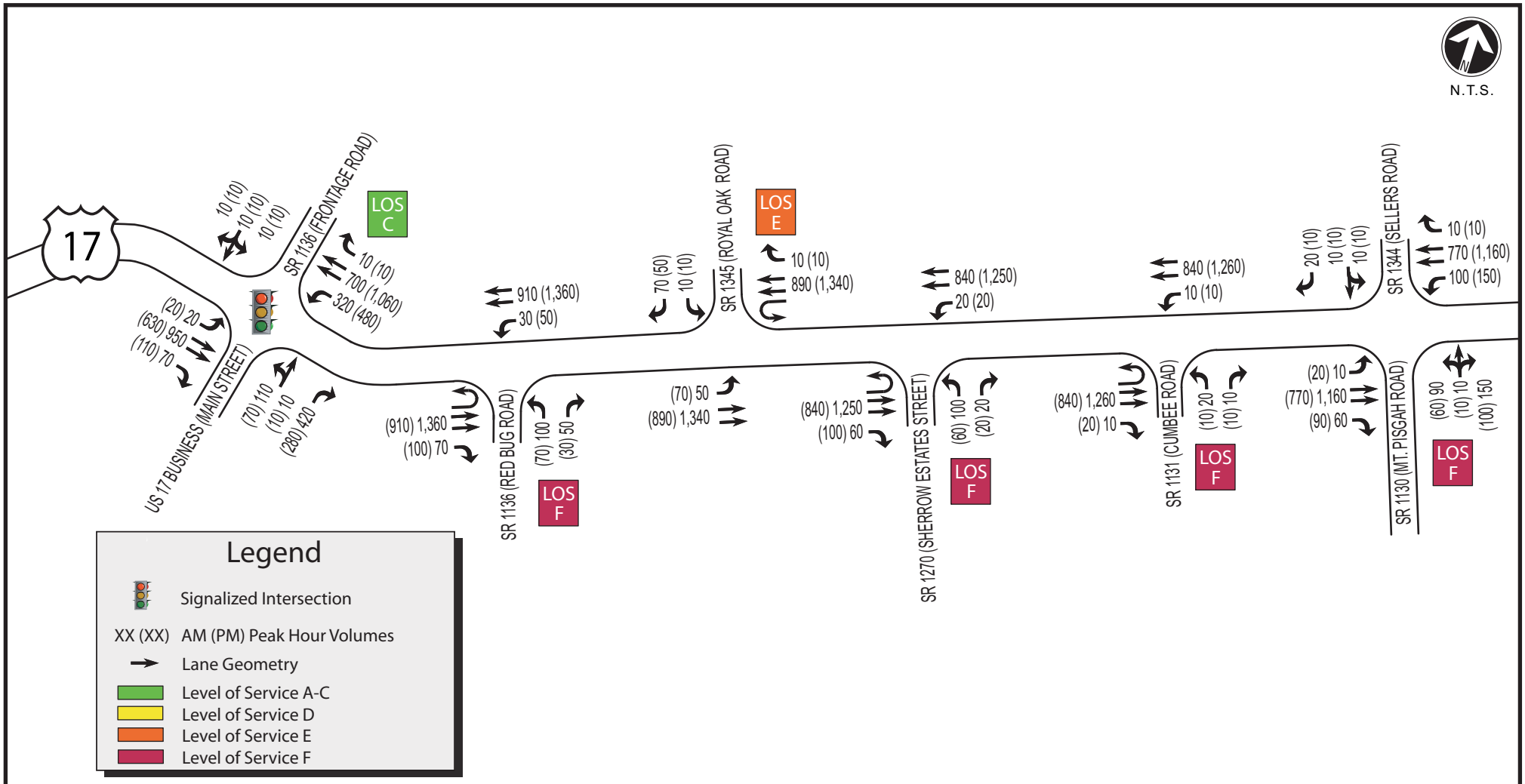
2004 Peak Hour Turning Movement Volumes, Geometry, and Levels of Service

FIGURE 2- 3





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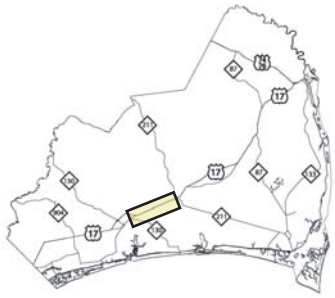

# US 17 CORRIDOR STUDY

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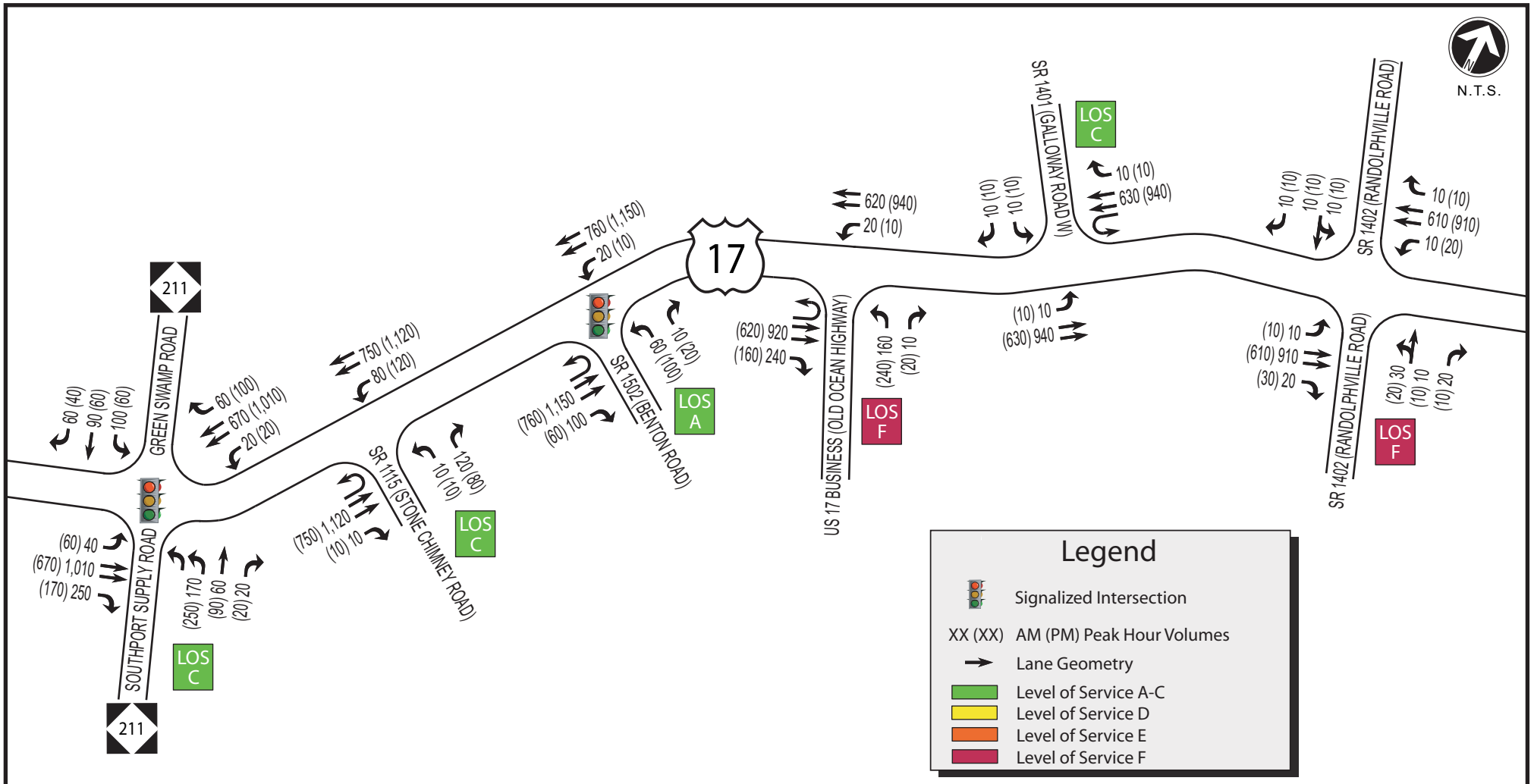
2004 Peak Hour Turning Movement Volumes, Geometry, and Levels of Service

FIGURE 2- 4





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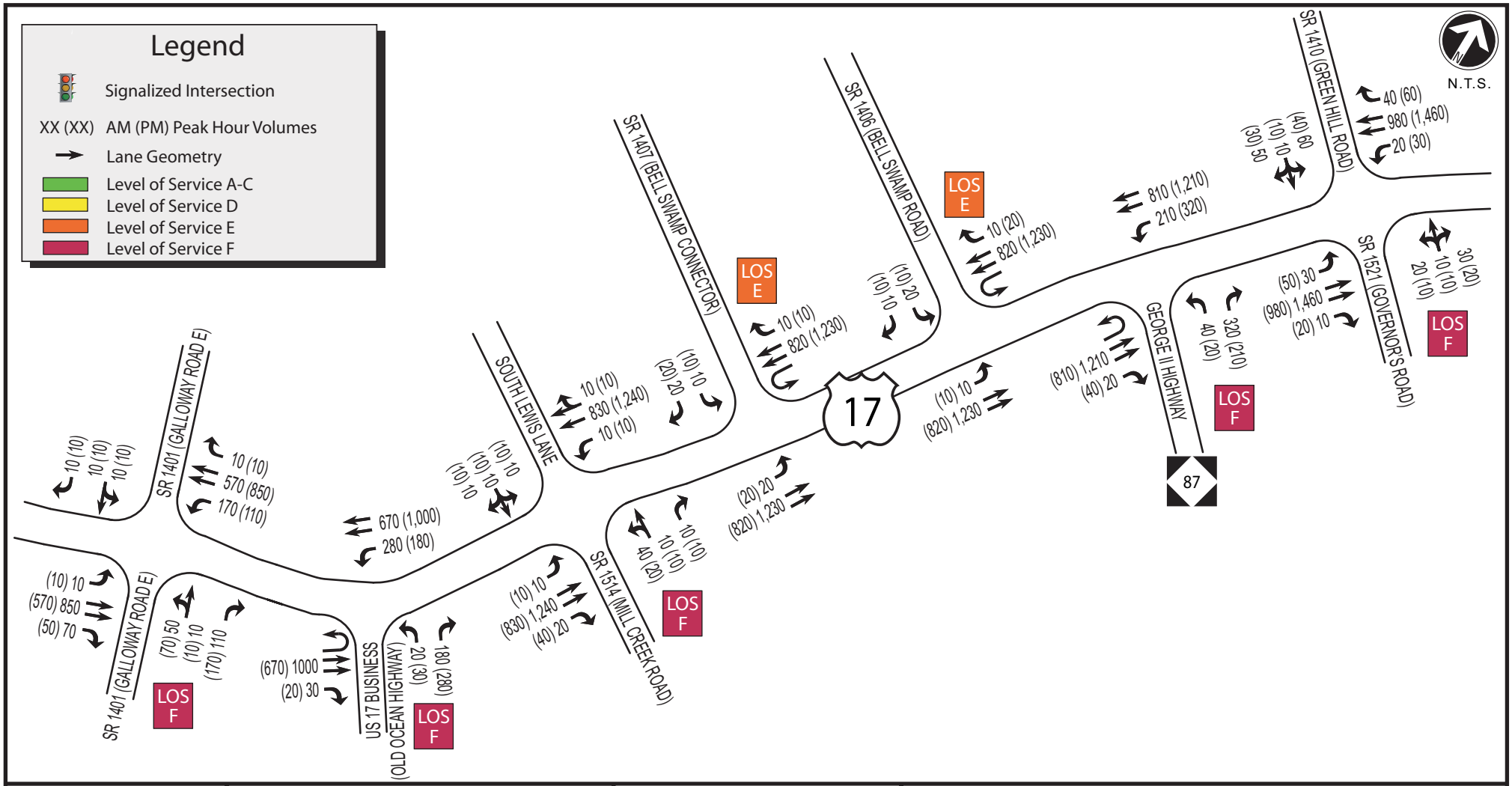
# US 17 CORRIDOR STUDY

**Brunswick County**

2004 Peak Hour Turning Movement Volumes, Geometry, and Levels of Service

FIGURE 2- 5

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# US 17 CORRIDOR STUDY

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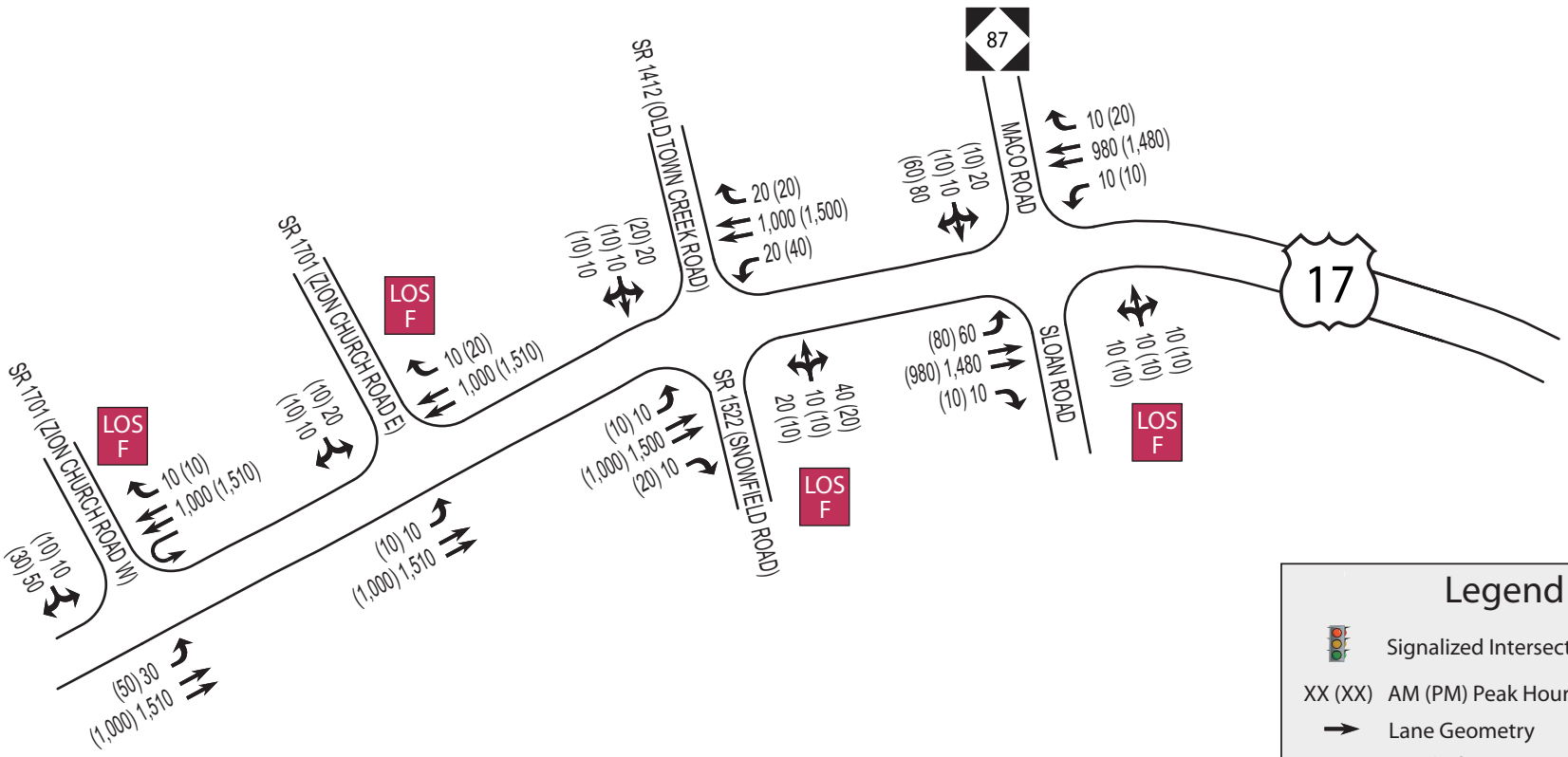
2004 Peak Hour Turning Movement Volumes, Geometry, and Levels of Service

FIGURE 2- 6





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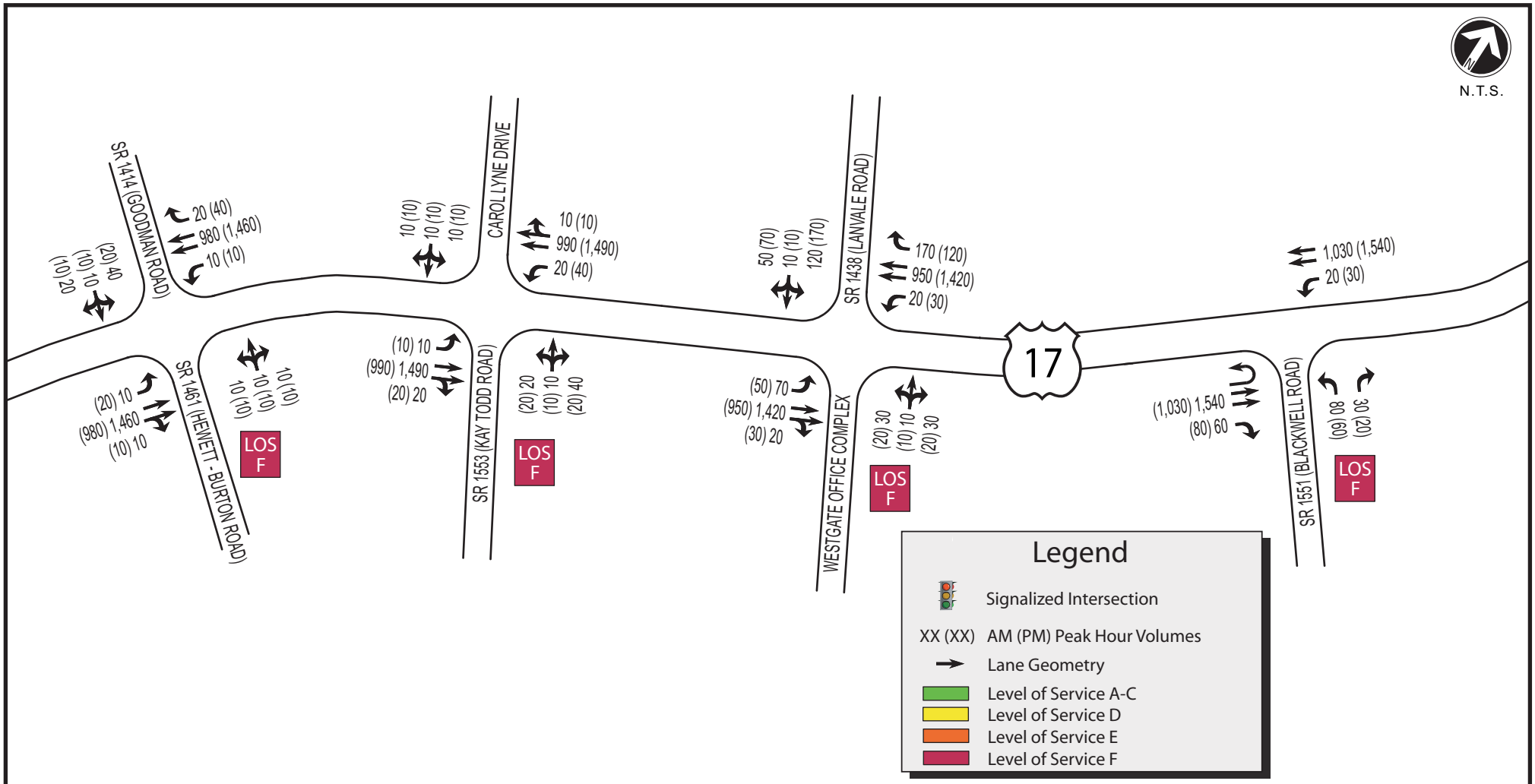
# US 17 CORRIDOR STUDY

**Brunswick County**

2004 Peak Hour Turning Movement Volumes, Geometry, and Levels of Service

FIGURE 2- 7

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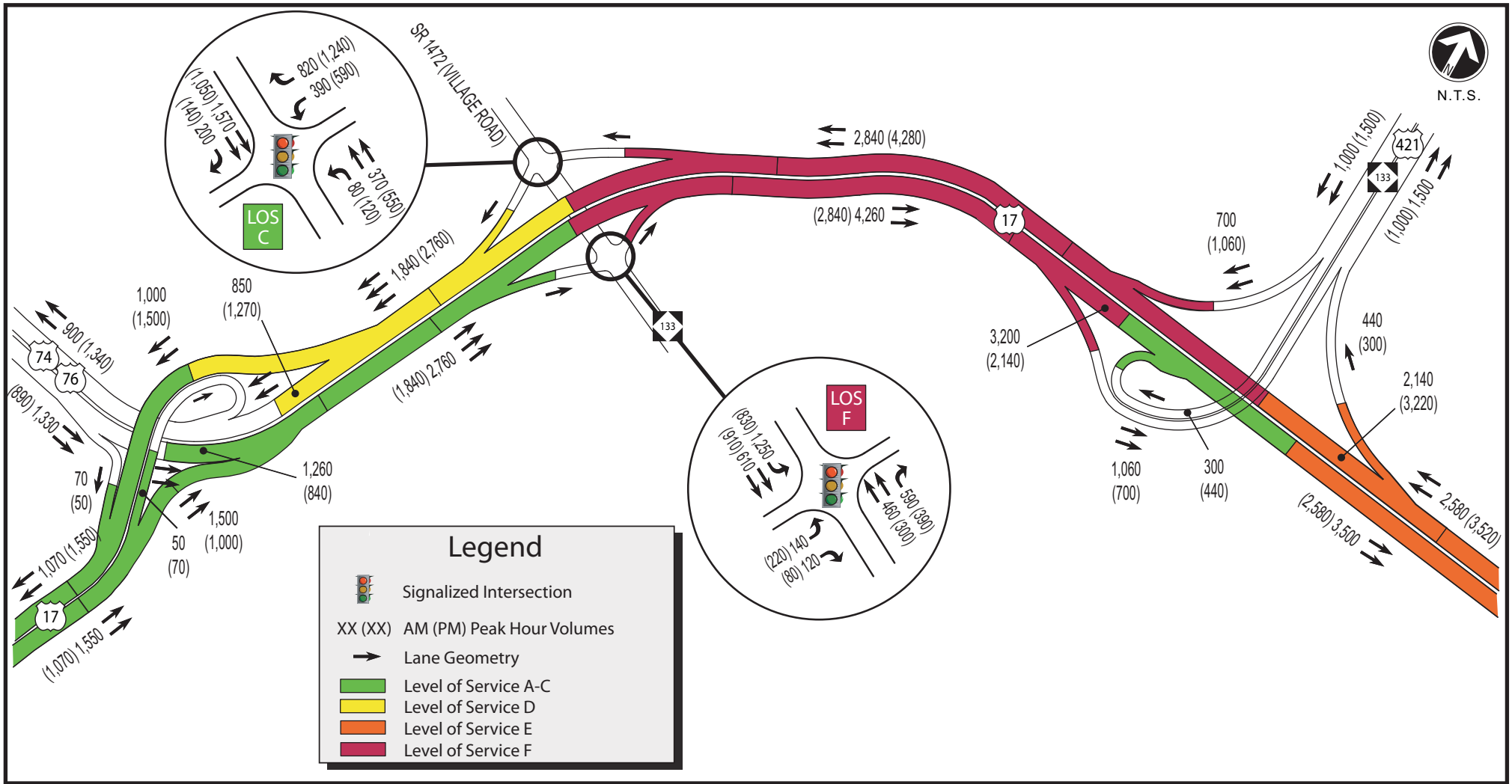
# US 17 CORRIDOR STUDY

**Brunswick County**

2004 Peak Hour Turning Movement Volumes, Geometry, and Levels of Service

FIGURE 2- 8

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2004 Peak Hour Turning Movement Volumes, Geometry, and Levels of Service

FIGURE 2- 9

# 3 No-Build Conditions

Because there are no roadway widening projects currently planned or programmed along US 17, the No-Build conditions were identified as roadway geometry and intersection traffic control along US 17 as it existed in the year 2004. The No-Build conditions on US 17 were analyzed for traffic operations in order to determine whether traffic capacity problems would exist on US 17 by the year 2030. Peak hour LOS results, No-Build conditions lane geometry, and year 2030 No-Build peak hour traffic volumes along the US 17 corridor are shown in **Figures 3-1 to 3-9**.

## 3.1 Turning Movement Volumes

### 3.1.1 Segment Volumes Provided by NCDOT

AADT for the No-Build conditions, year 2030, for mainline segments of US 17 and major cross streets were compiled by NCDOT. Two significant projects on the north end of US 17, the Wilmington Bypass and the Cape Fear Skyway, were assumed to be completed by the year 2030 and were included in the forecast model used to predict the year 2030 segment volumes. Interstate 74, a freeway facility currently in the feasibility study phase was not included in the traffic forecast. The AADT volume figures provided by NCDOT are provided in **Appendix A**.

### 3.1.2 Peak Hour Turning Movement Volumes

Turning movement volumes for the No-Build conditions intersections and interchanges along US 17 were developed by following the same methodology used to calculate the Existing conditions volumes (see **Section 2.1**).

## 3.2 Capacity Analysis

### 3.2.1 Analysis Methodology and Traffic Characteristics

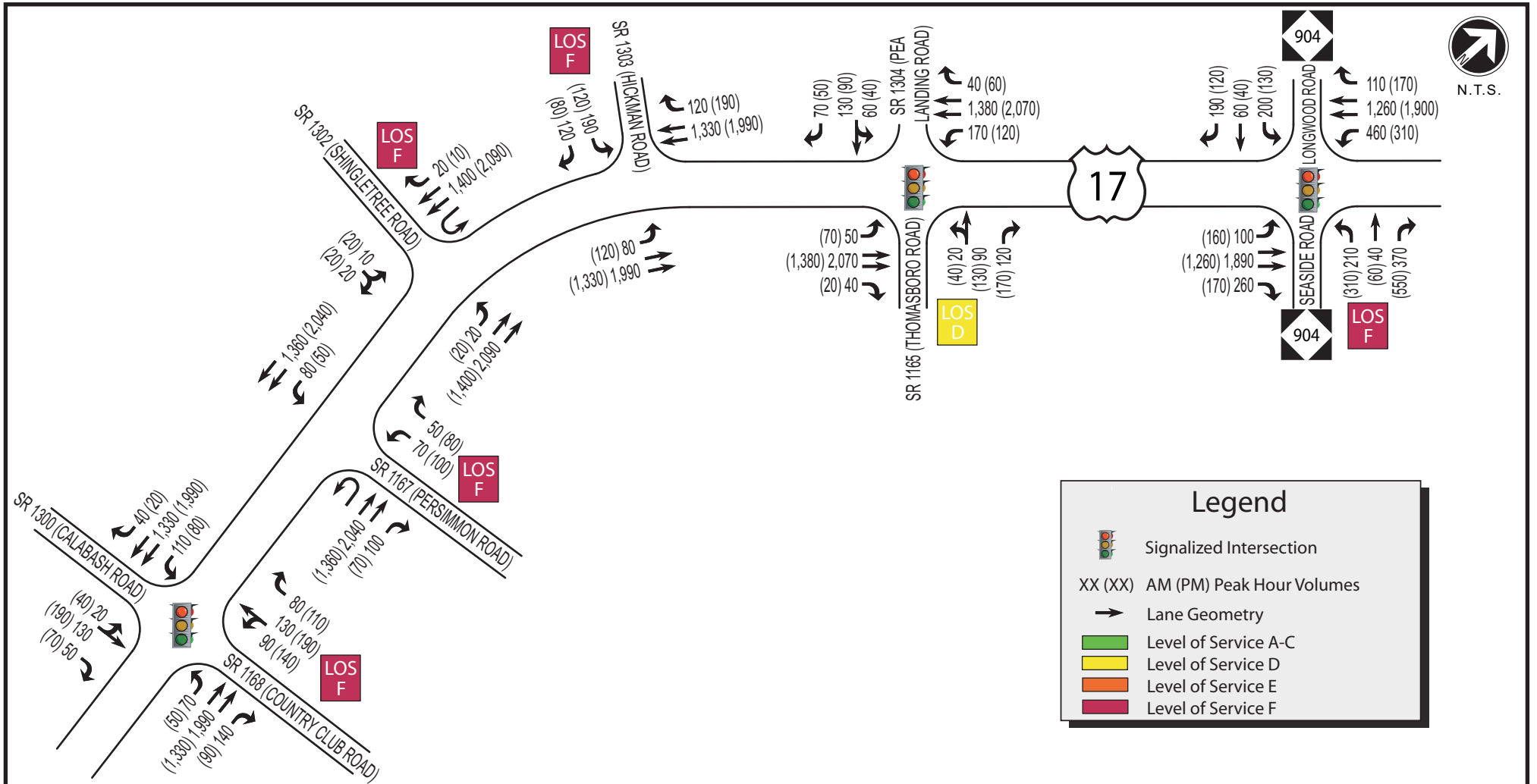
Traffic analysis for the No-Build conditions was performed following the same methodology used to calculate the Existing conditions LOS. Traffic characteristics used were the same as the Existing conditions (see **Section 2.2**).

### 3.2.2 Freeway Operations

Under the No-Build conditions, the freeway section between Blackwell Road and the Cape Fear River Bridge, US 17 would operate over capacity. Between US 74/76 and NC 133, US 17 would operate at a LOS D. North of NC 133, US 17 would operate at a LOS F.

### 3.2.3 Intersection Operations

The analysis indicates that of the 42 intersections analyzed, one would operate at LOS A, B, or C, two would operate at LOS D, and 39 operate at LOS F. Similar to the existing conditions, many of the poorly operating intersections were found to be unsignalized intersections where left turning vehicles from the cross streets do not have adequate gaps in the through US 17 traffic to make the left turn without experiencing high delay times.





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# US 17 CORRIDOR STUDY

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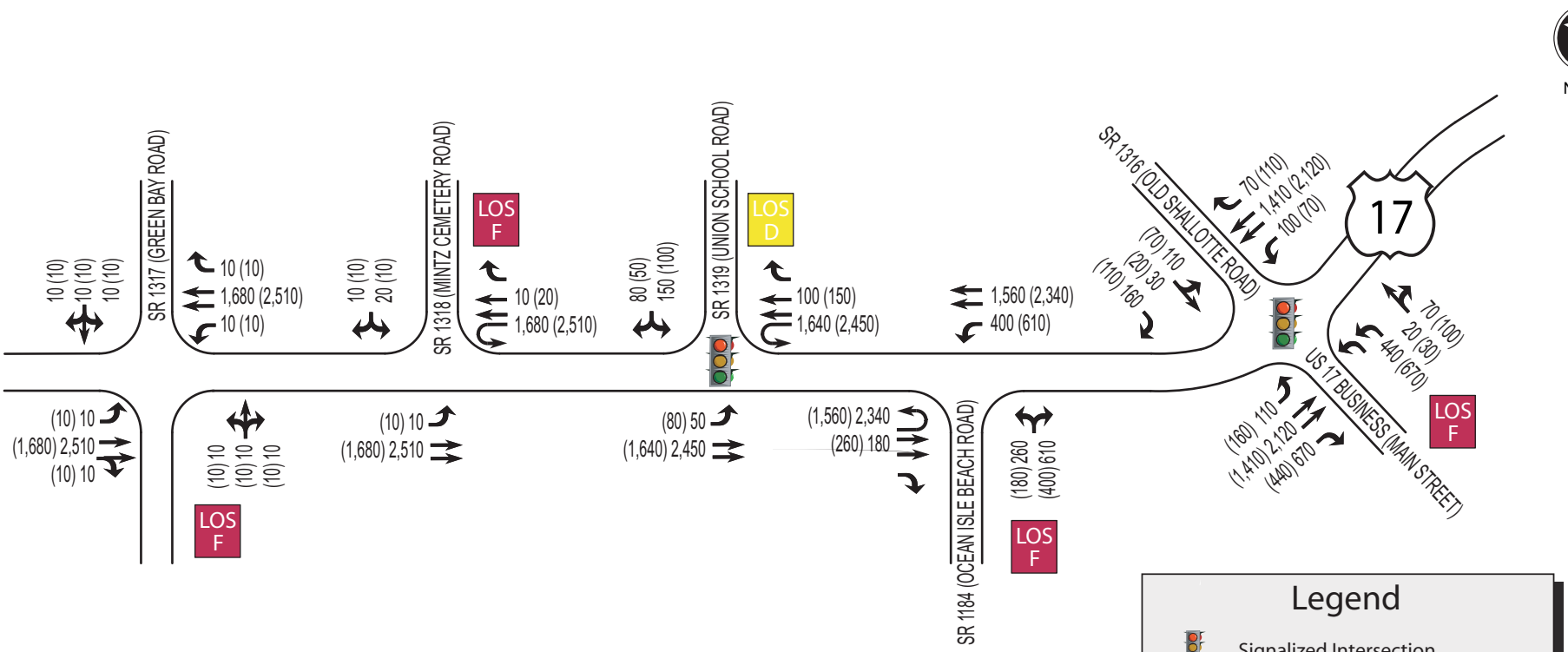
2030 No-Build Peak Hour Turning Movement Volumes, Geometry, and Levels of Service

FIGURE 3- 1

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# US 17 CORRIDOR STUDY

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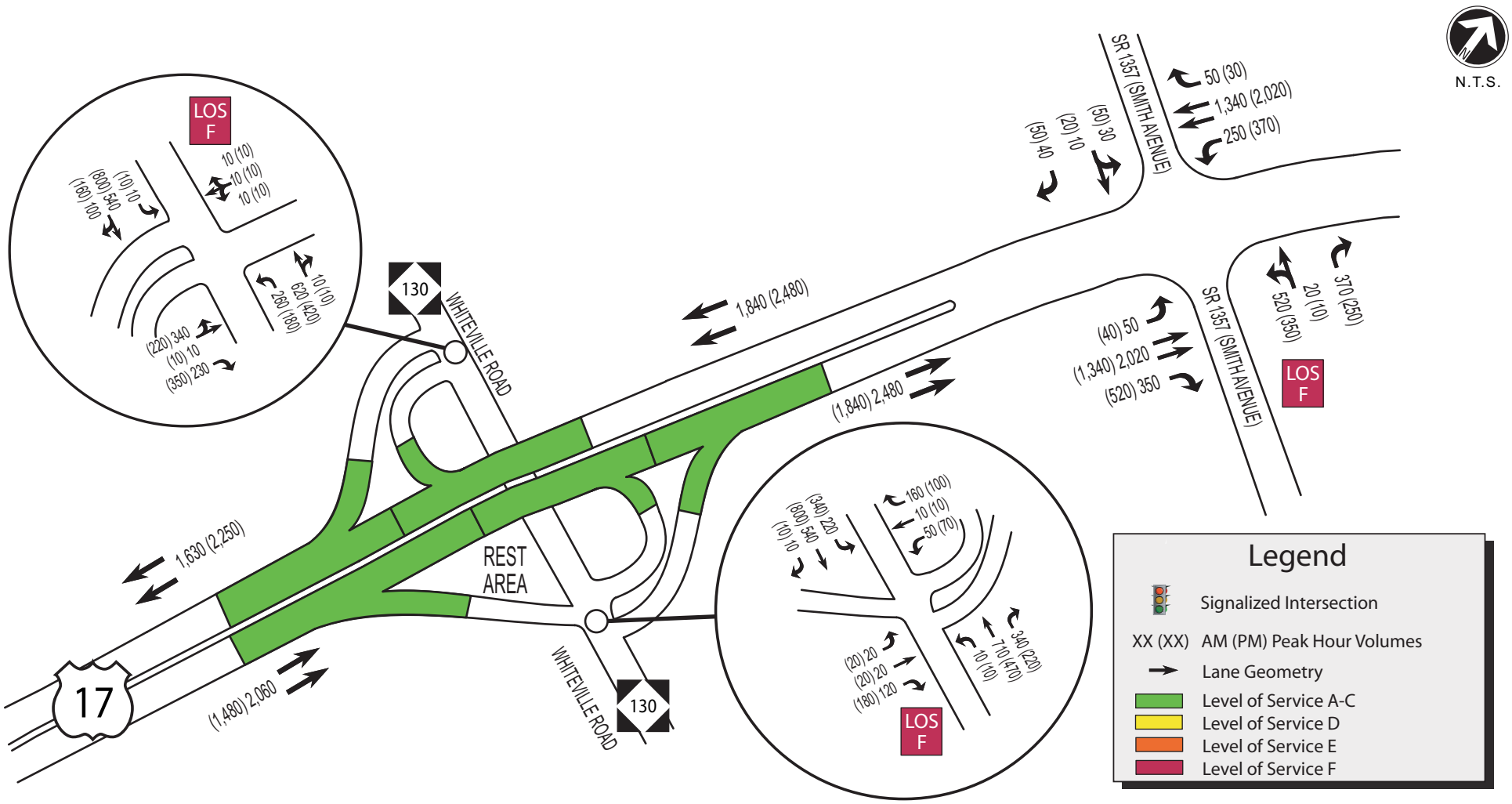
2030 No-Build Peak Hour Turning Movement Volumes, Geometry, and Levels of Service

FIGURE 3- 2





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# US 17 CORRIDOR STUDY

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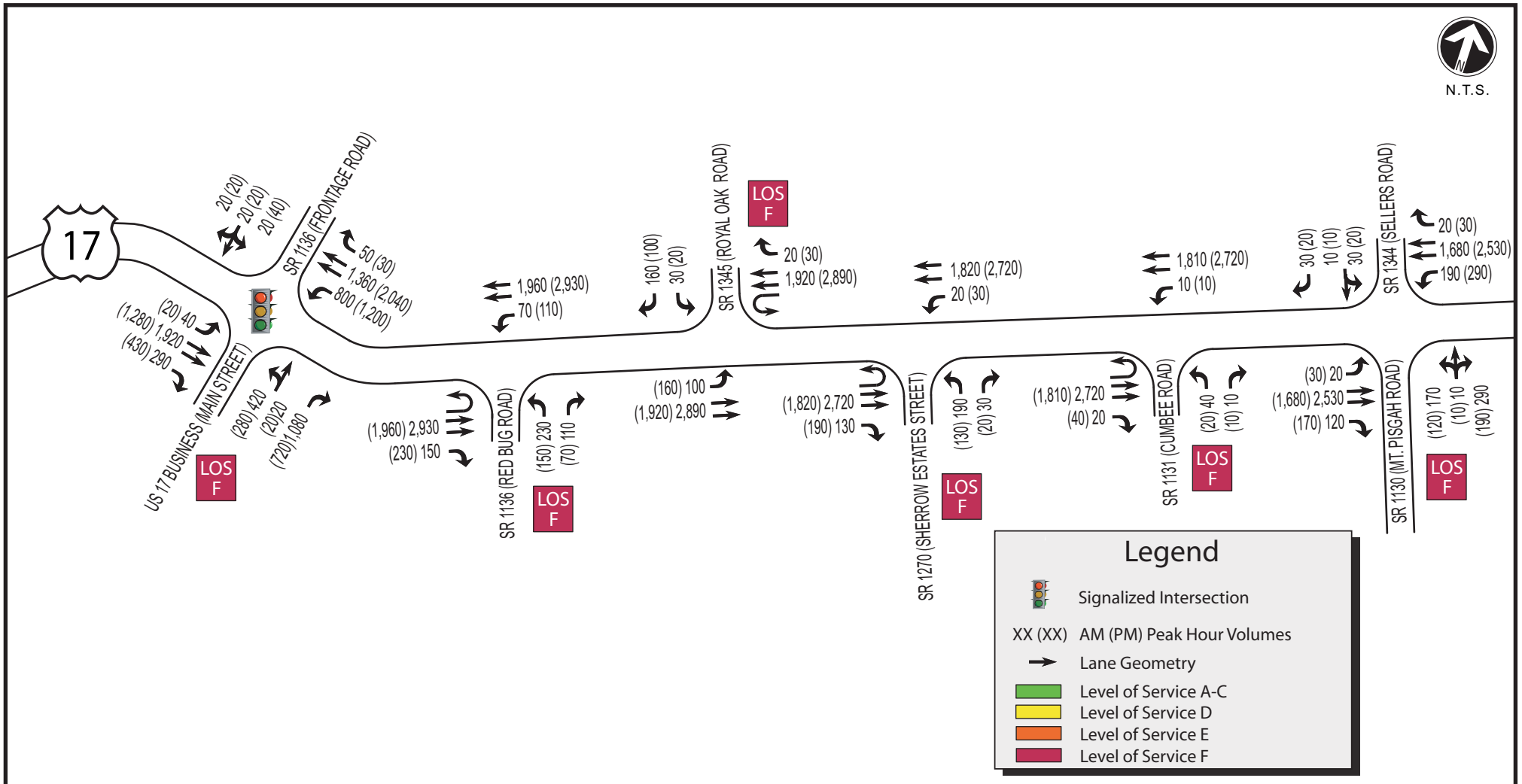
2030 No-Build Peak Hour Turning Movement Volumes, Geometry, and Levels of Service

FIGURE 3- 3

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# US 17 CORRIDOR STUDY

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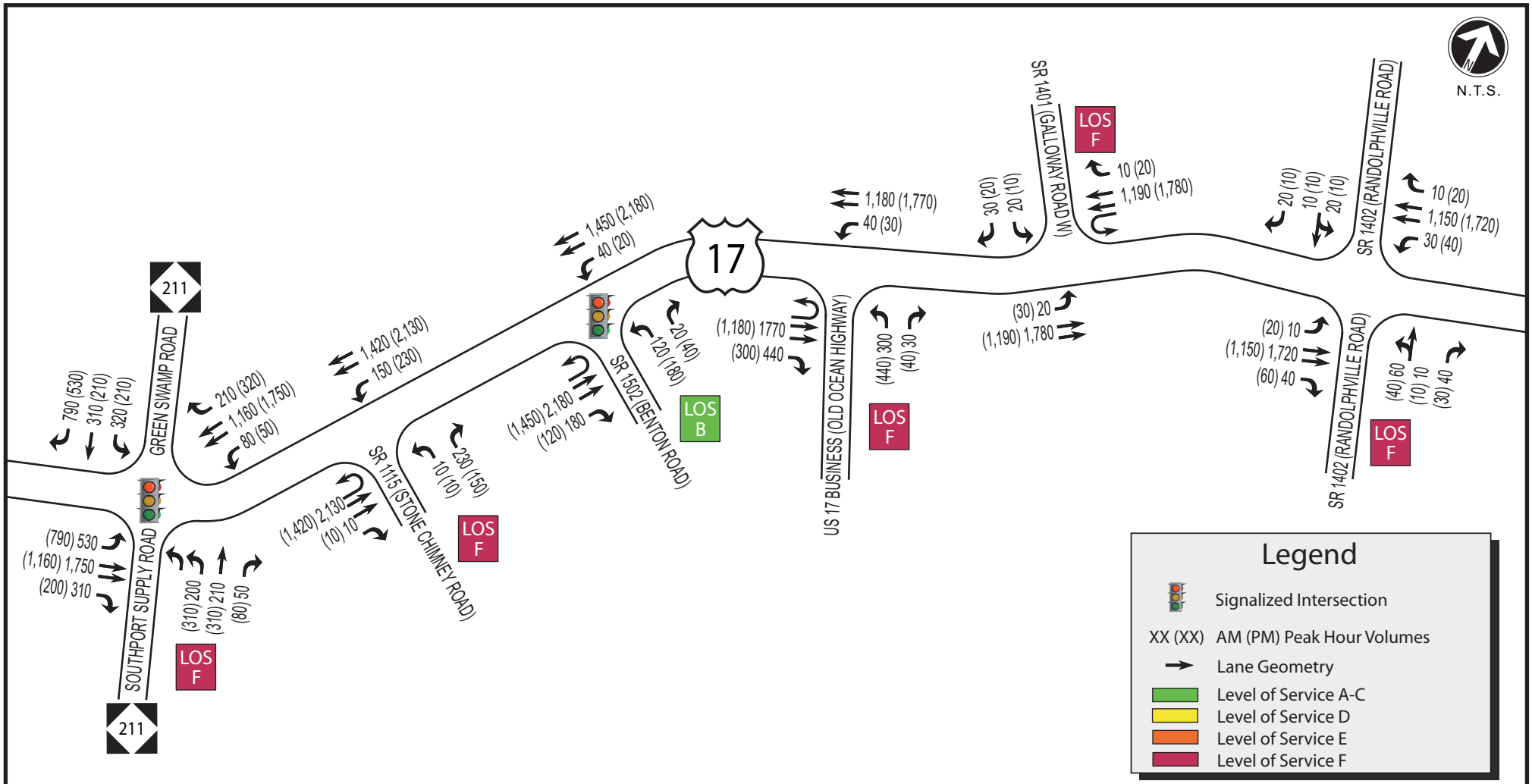
2030 No-Build Peak Hour Turning Movement Volumes, Geometry, and Levels of Service

FIGURE 3- 4

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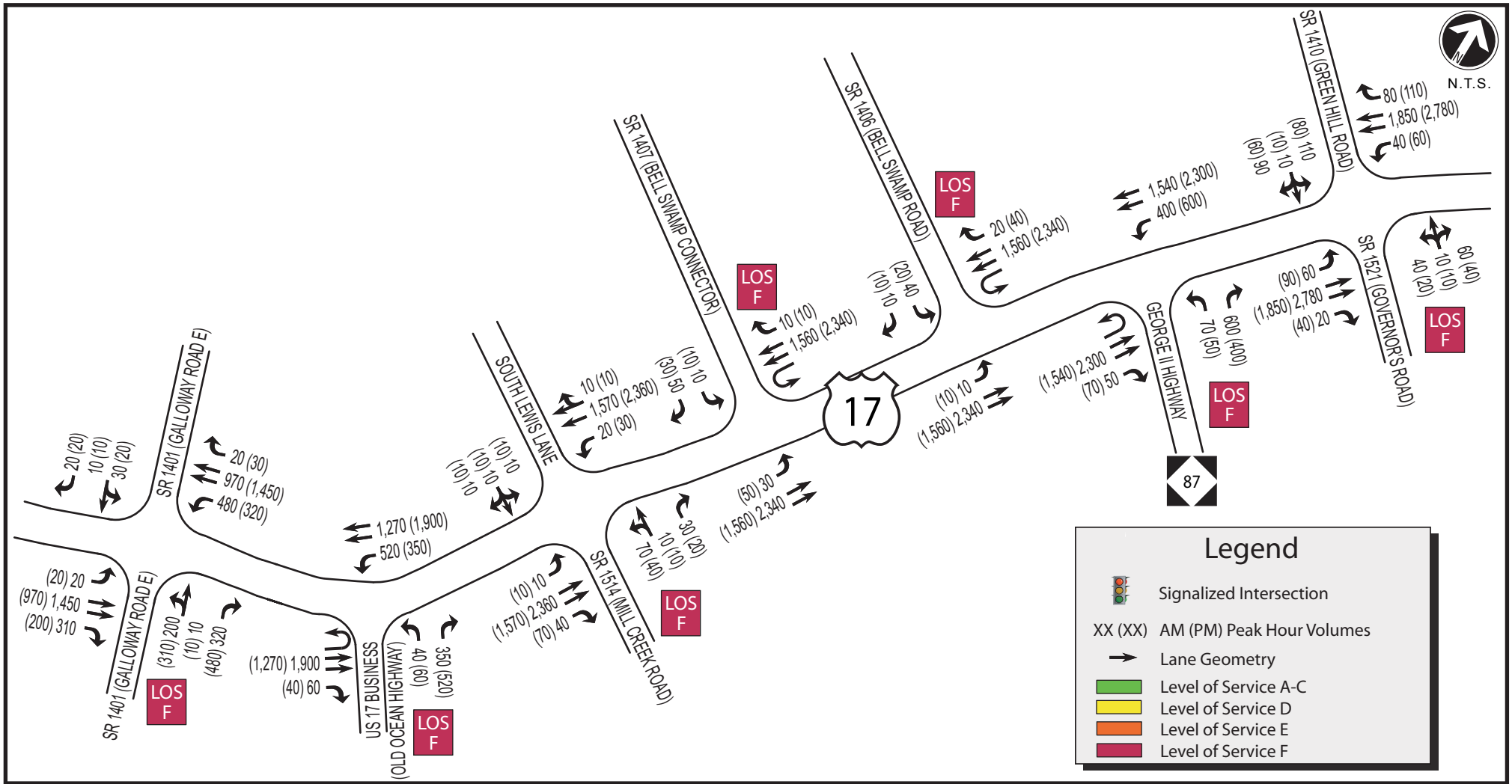
2030 No-Build Peak Hour Turning Movement Volumes, Geometry, and Levels of Service

FIGURE 3- 5

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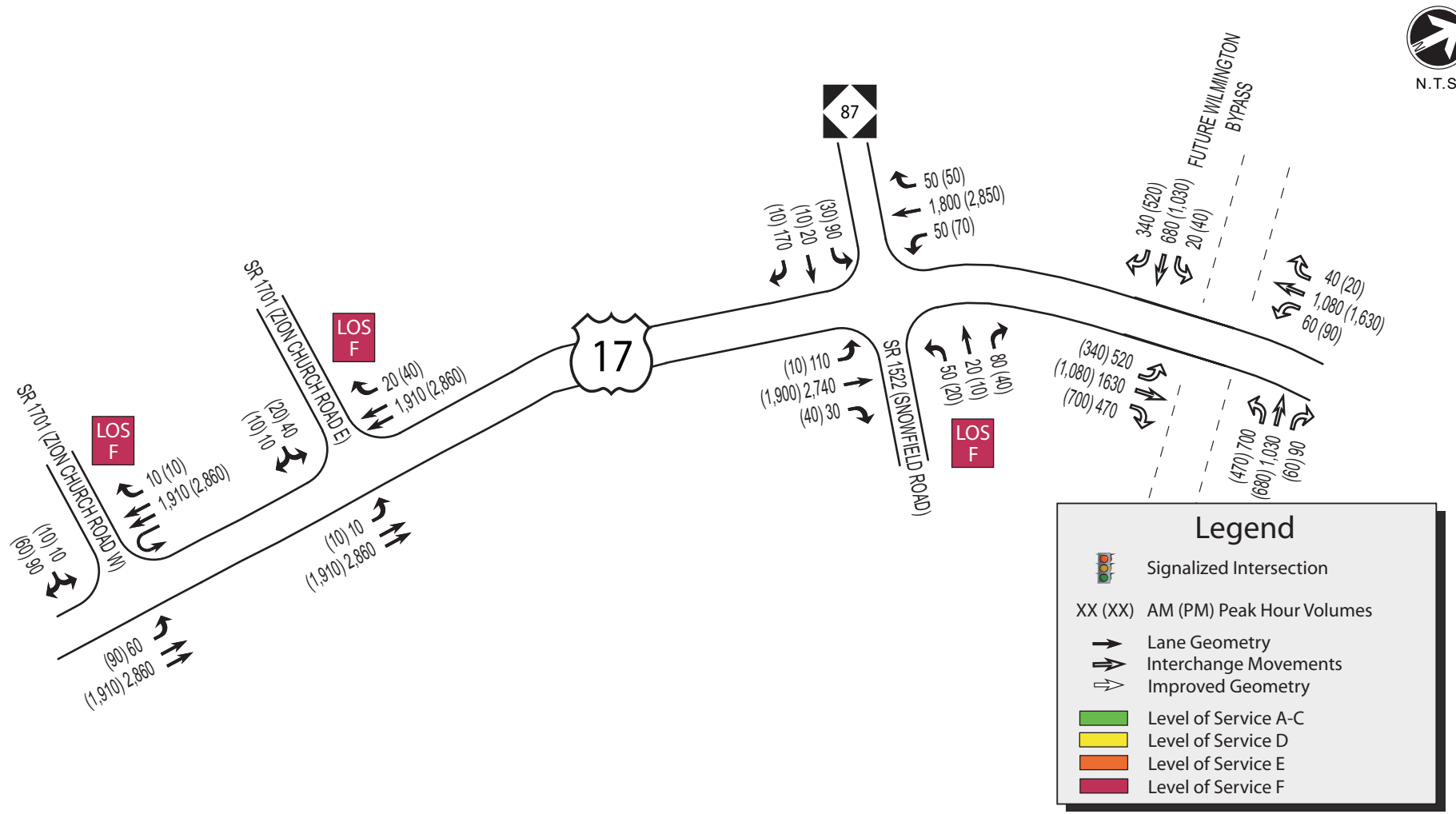
**Brunswick County**

2030 No-Build Peak Hour Turning Movement Volumes, Geometry, and Levels of Service

FIGURE 3- 6

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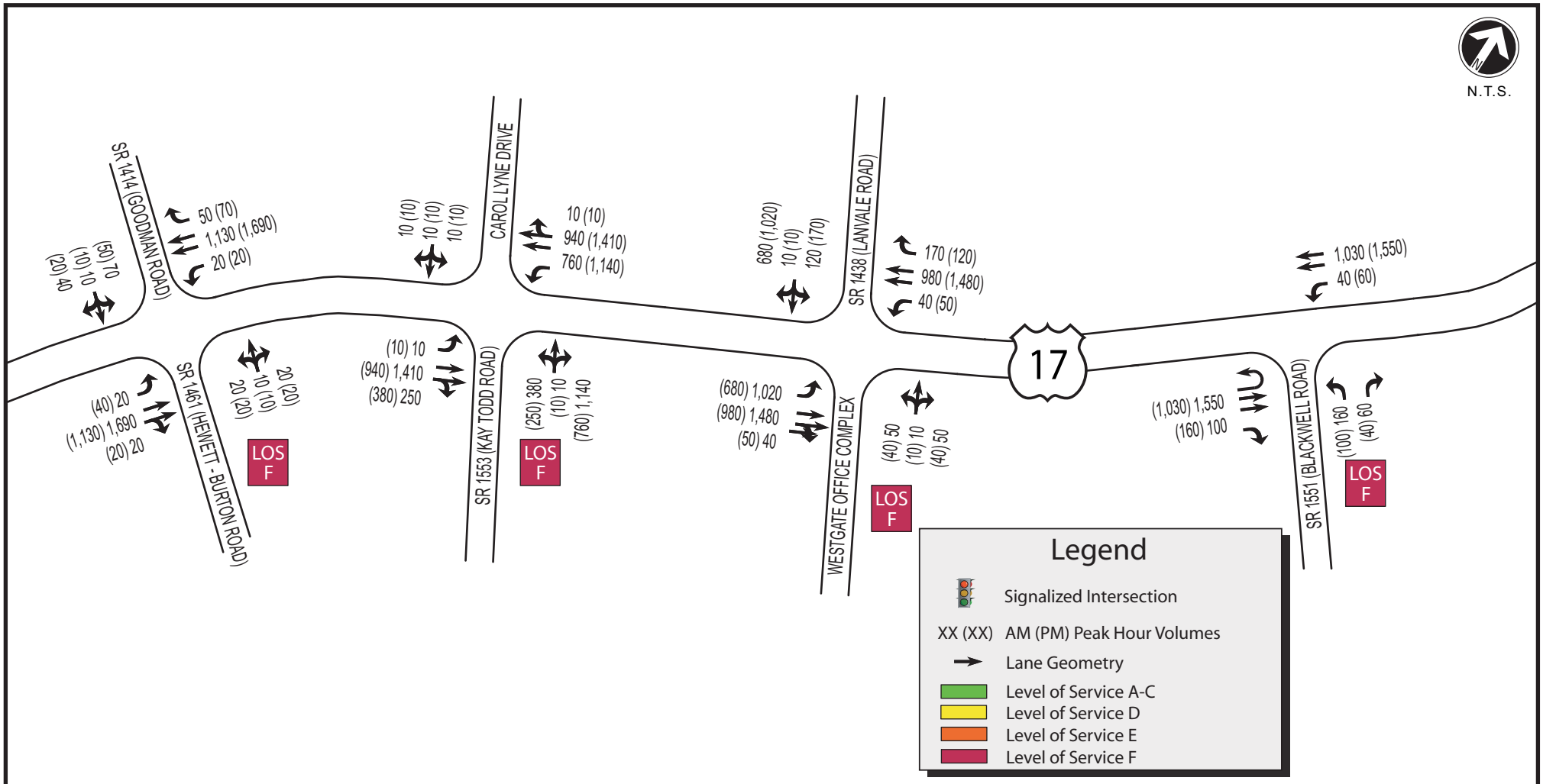
**Brunswick County**

2030 No-Build Peak Hour Turning Movement Volumes, Geometry, and Levels of Service

FIGURE 3- 7





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# US 17 CORRIDOR STUDY

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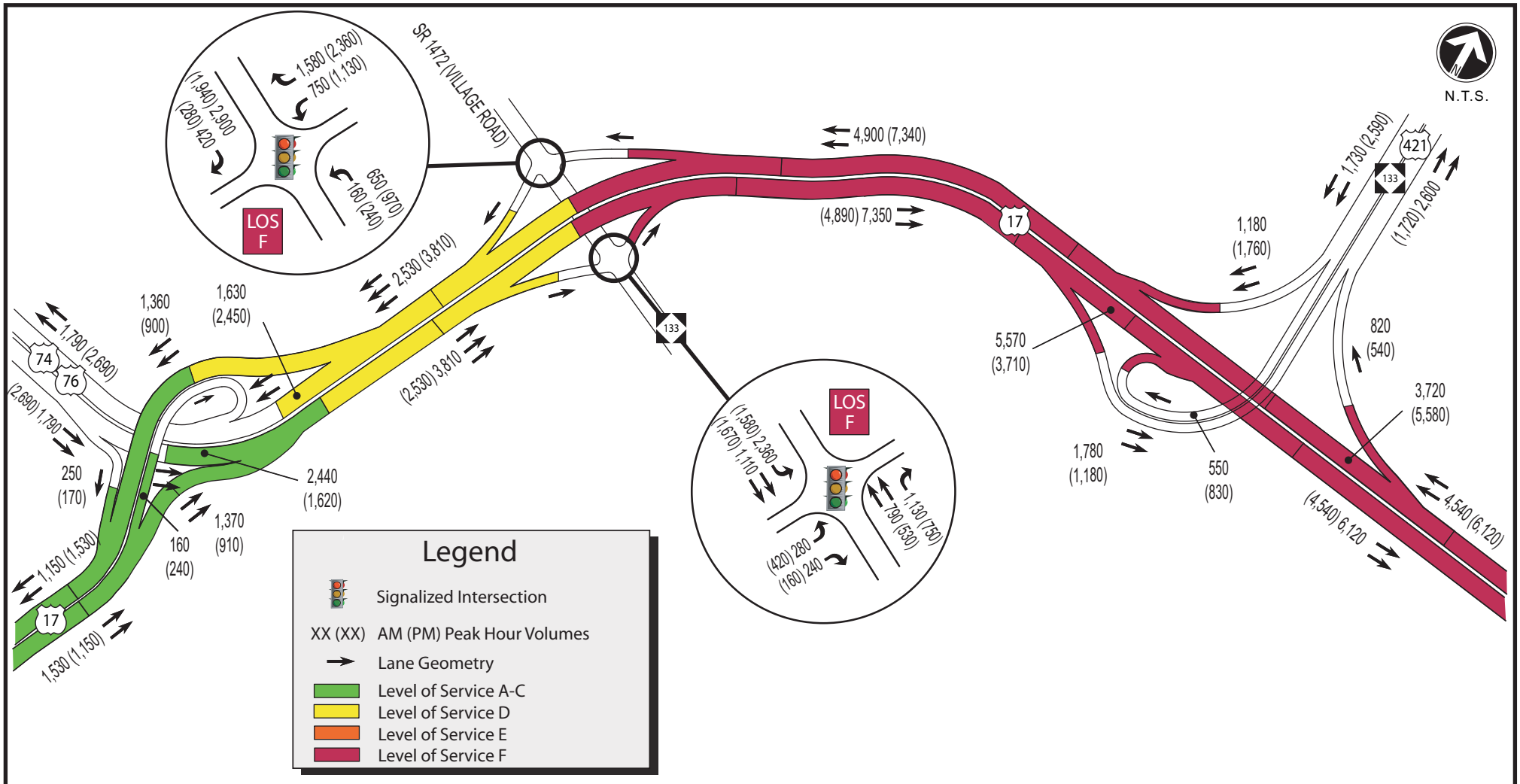
2030 No-Build Peak Hour Turning Movement Volumes, Geometry, and Levels of Service

FIGURE 3- 8

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# US 17 CORRIDOR STUDY

**Brunswick County**

2030 No-Build Peak Hour Turning Movement Volumes, Geometry, and Levels of Service

FIGURE 3- 9

# 4 Definition of Alternatives

Four alternatives were developed to help preserve mobility along the US 17 corridor through the year 2030. All developed alternatives were restricted to existing alignment due to the large potential of environmental impacts on either side of the US 17 Corridor. The four alternatives identified were the Intersection Improvements Alternative, the Superstreet Alternative, the Expressway Alternative, and the Freeway Alternative. Although conceptual geometry was developed for the Expressway Alternative, detailed operations analysis was not performed for this alternative because the Expressway Alternative was determined to be a transitional alternative between the Superstreet and Freeway Alternatives. A discussion of the Expressway Alternative can be found in **Section 7**.

Detailed analysis was performed for the Intersection Improvements Alternative, the Superstreet Alternative, and the Freeway Alternative. It should be noted that the section of US 17 from Blackwell Road to the Cape Fear River Bridge was developed as a freeway for all alternatives, as this section currently exists as a fully controlled access roadway.

For each of the alternatives, a detailed capacity analysis similar to the analysis performed for the Existing and No-Build conditions was performed that would develop lane geometry to accommodate LOS D traffic conditions through the year 2030. Using the capacity analysis results, conceptual designs were developed for all alternatives. The conceptual designs were utilized to develop estimates of probable construction costs for each alternative.

AADT for the Build conditions, year 2030, for mainline segments of US 17 and major cross streets were compiled by NCDOT. Two significant projects on the north end of US 17, the Wilmington Bypass and the Cape Fear Skyway, were included in the Build conditions and did impact traffic modeling results for the Build year 2030 traffic forecast. Interstate 74, a freeway facility currently in the feasibility study phase was assumed to be completed under the Build conditions and was included in the traffic forecast. For traffic modeling purposes, Interstate 74 was assumed to exist jointly with US 17 from the South Carolina State Line to NC 211.

Another project currently in the feasibility study phase, the Carolina Bays Parkway Extension, is studying development of a new freeway facility from the proposed Carolina Bays Parkway in South Carolina to US 17 in Brunswick County. Although some potential corridors of the Parkway have the facility on new alignment, for traffic modeling purposes,

the Parkway was assumed to exist jointly with US 17 from the South Carolina State Line to Hickman Road.

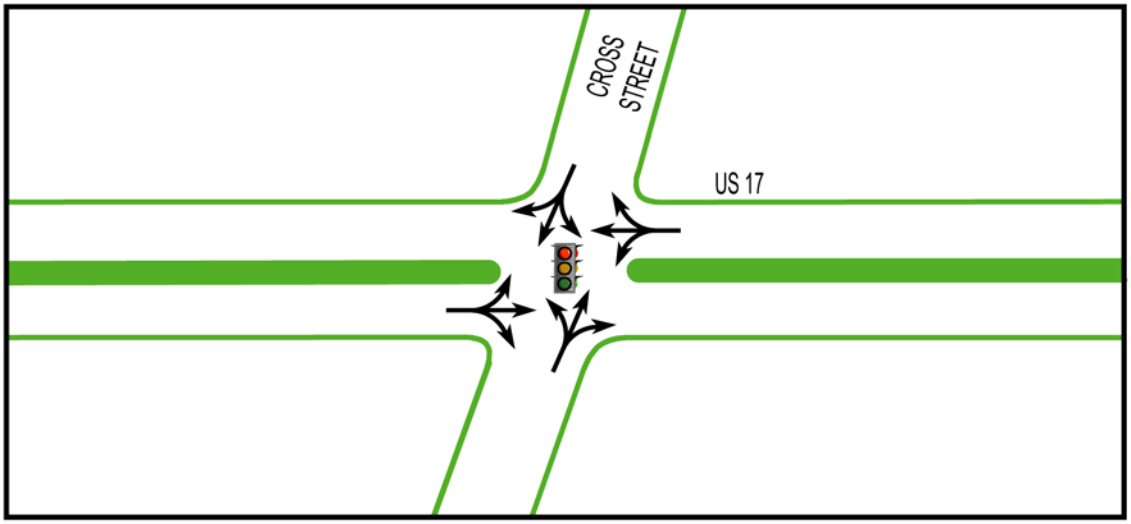
Through Phase II of the US 17 Corridor Study, coordination existed between the US 74 feasibility study and the Carolina Bays feasibility study. Both projects were represented at the US 17 public workshops (see **Section 6**) and interchange locations on US 17 for the Freeway Alternative were coordinated with the I-74 feasibility study.

The AADT volume figures provided by NCDOT are provided in **Appendix A**.

## 4.1 Intersection Improvements Alternative

The Intersection Improvements Alternative was developed to identify capacity improvements that would be required at individual intersections. Capacity improvements included the addition of turn bays or through lanes on US 17 and cross streets, the changing of phase sequences at existing traffic signals, or the addition of new traffic signals at currently unsignalized intersections. If an unsignalized intersection operated at LOS E or worse under the No-Build conditions, and the left turning volume from the cross street onto US 17 was 100 vehicles or more during either peak hour, it was assumed that the intersection would become signalized. **Figure 4-1** shows permitted movements at intersections for the Intersection Improvements Alternative.

***Figure 4-1: Permitted Movements - Intersection Improvements Alternative***




Peak hour turning movement volumes, developed lane geometry, and LOS results for the Intersection Improvements Alternative along the US 17 corridor can be found in **Figures 4-2 to 4-10**.

### 4.1.1 Turning Movement Volumes

Turning movement volumes for the Intersection Improvements Alternative intersections and interchanges along US 17 were developed by following the same methodology used to calculate the Existing conditions volumes (see **Section 2.1**).

### 4.1.2 Capacity Analysis

#### *4.1.2.1 Analysis Methodology and Traffic Characteristics*

Traffic analysis for the Intersection Improvements alternative was performed following the same methodology used to calculate the Existing conditions LOS. Traffic characteristics were the same as the existing conditions (see **Section 2.2**).

#### *4.1.2.2 Freeway Operations*

US 17 would need major improvements for the section of freeway between Blackwell Road and the Cape Fear River Bridge to operate at acceptable levels of service by the year 2030. Between US 74/76 and NC 133, US 17 would operate at a LOS D or better with no improvements. Between NC 133 and US 74/76, US 17 would need to be widened to a ten-

lane section. The ramps at the NC 133 interchange to/from the north would need to be widened to two lanes. Even with these improvements, the ramp merge and diverge areas at the NC 133 ramps to/from the north would operate at a LOS E. The interchange form at this location was held constant with its current configuration and lane geometry was developed to improve capacity using dual left turn lanes on all approaches and two through lanes on NC 133. North of NC 133, US 17 would need to be widened to an eight lane section.

According to traffic projections, a large amount of peak hour traffic travels from the NC 133 interchange north to US 421 and the Wilmington area. It is recognized that due to the constraint of the existing four lane Cape Fear River Bridge, the projected volumes would not be able to reach US 17. However, for the purposes of this project it was assumed that all traffic projected to use US 17 would be able to reach the corridor, and other improvements (such as the replacement of the Cape Fear River Bridge) would be necessary to accommodate the proposed improvements.

#### *4.1.2.3 Intersection Operations*

With the additional capacity of the intersections, the analysis indicates that of the 42 intersections analyzed, 14 would operate at LOS A, B, or C, 10 would operate at LOS D, two would operate at LOS E, and 16 operate at LOS F. All but three of the signalized intersections would operate at LOS D or better. The intersection at Kay Todd Road would operate at LOS E. At this location, over 1,100 vehicles are projected to access Kay Todd Road from the north due to the large amount of development proposed along this cross street. The ramp terminal intersections at the NC 133 interchange would also operate over capacity due to the high volumes at this interchange. The remaining intersections operating over capacity were found to be unsignalized intersections where left turning vehicles from the cross streets do not have adequate gaps in the through US 17 traffic to make the left turn without experiencing high delay times and these left turning vehicle volumes were not high enough to warrant signalization.

Three sections of US 17 would require widening to six lanes to operate at an acceptable level of service: (1) at the NC 904 intersection, (2) Ocean Isle Beach Boulevard to NC 211, and (3) NC 87 to the proposed Wilmington Bypass.

### 4.1.3 Conceptual Designs

Conceptual designs for the Intersection Improvements Alternative were developed using the analysis results described above. The designs represent the lane geometry necessary to allow traffic to operate at LOS D. The conceptual designs are shown in **Appendix B**.

### 4.1.4 Construction Cost Estimates

Construction cost estimates were calculated by applying a unit cost to item quantities developed from the conceptual designs. Quantity items and unit costs were provided by the NCDOT Preliminary Estimate Section. Right of way and utility costs were not calculated in the construction cost estimates. The tabulation of quantities and cost estimates for the Intersection Improvements alternative are shown in **Appendix C**. The total estimated construction cost is $75,402,000. This cost does not include right-of-way, which at the time of completion of this study was not yet provided by NCDOT. Right-of-way quantities and estimated costs are being completed by NCDOT Right-of-Way Branch and will be provide under separate cover when they are completed.

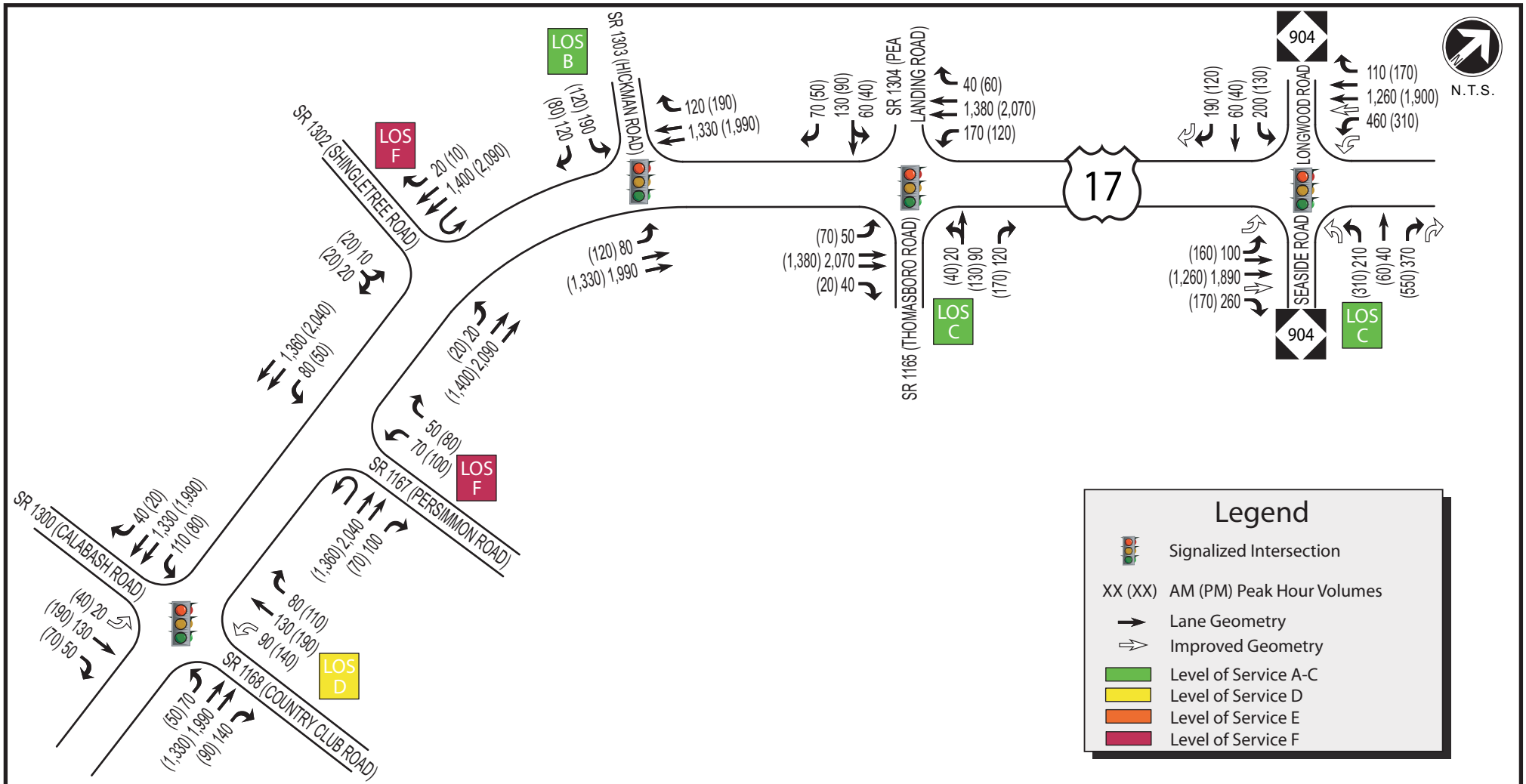




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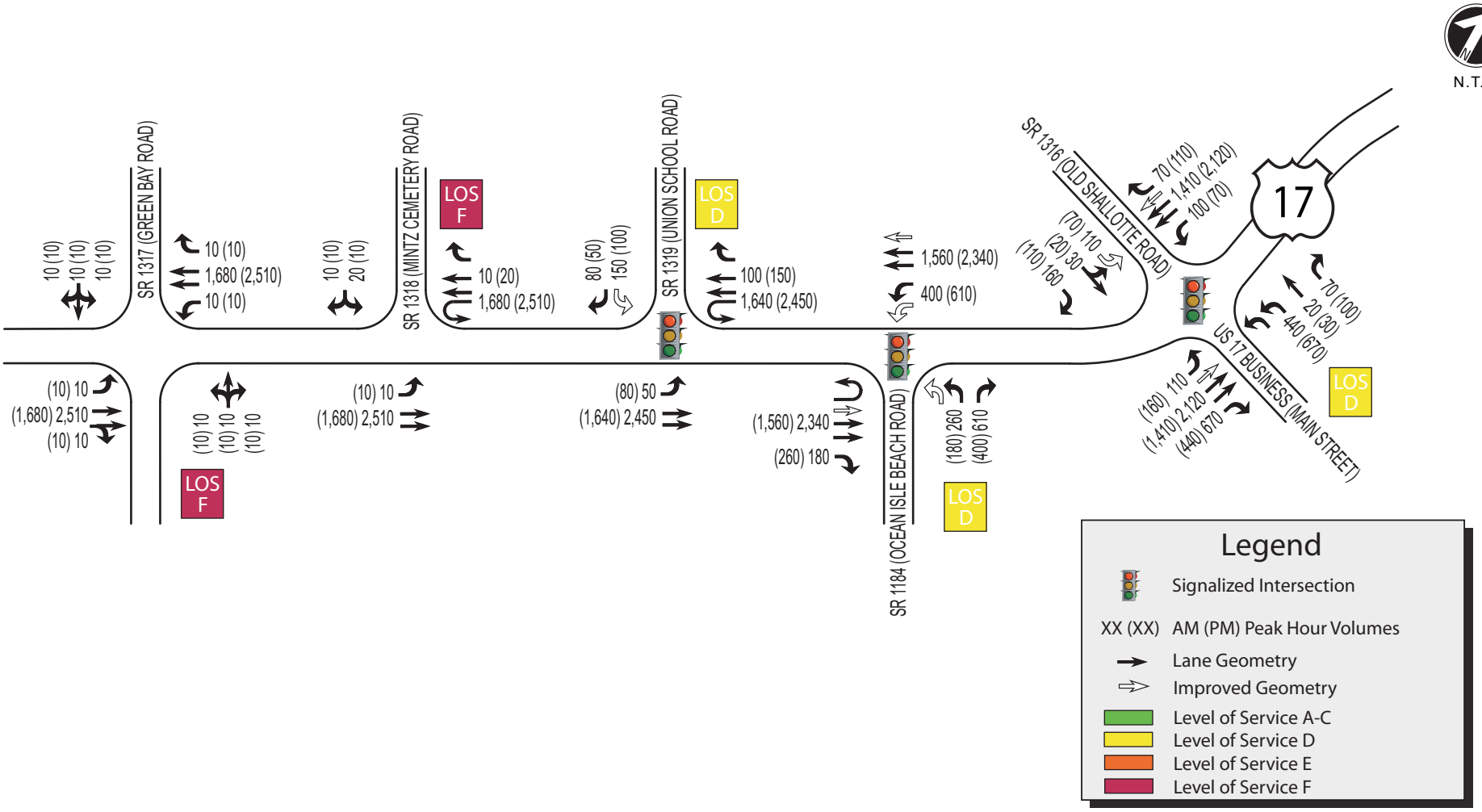
FIGURE 4 - 2





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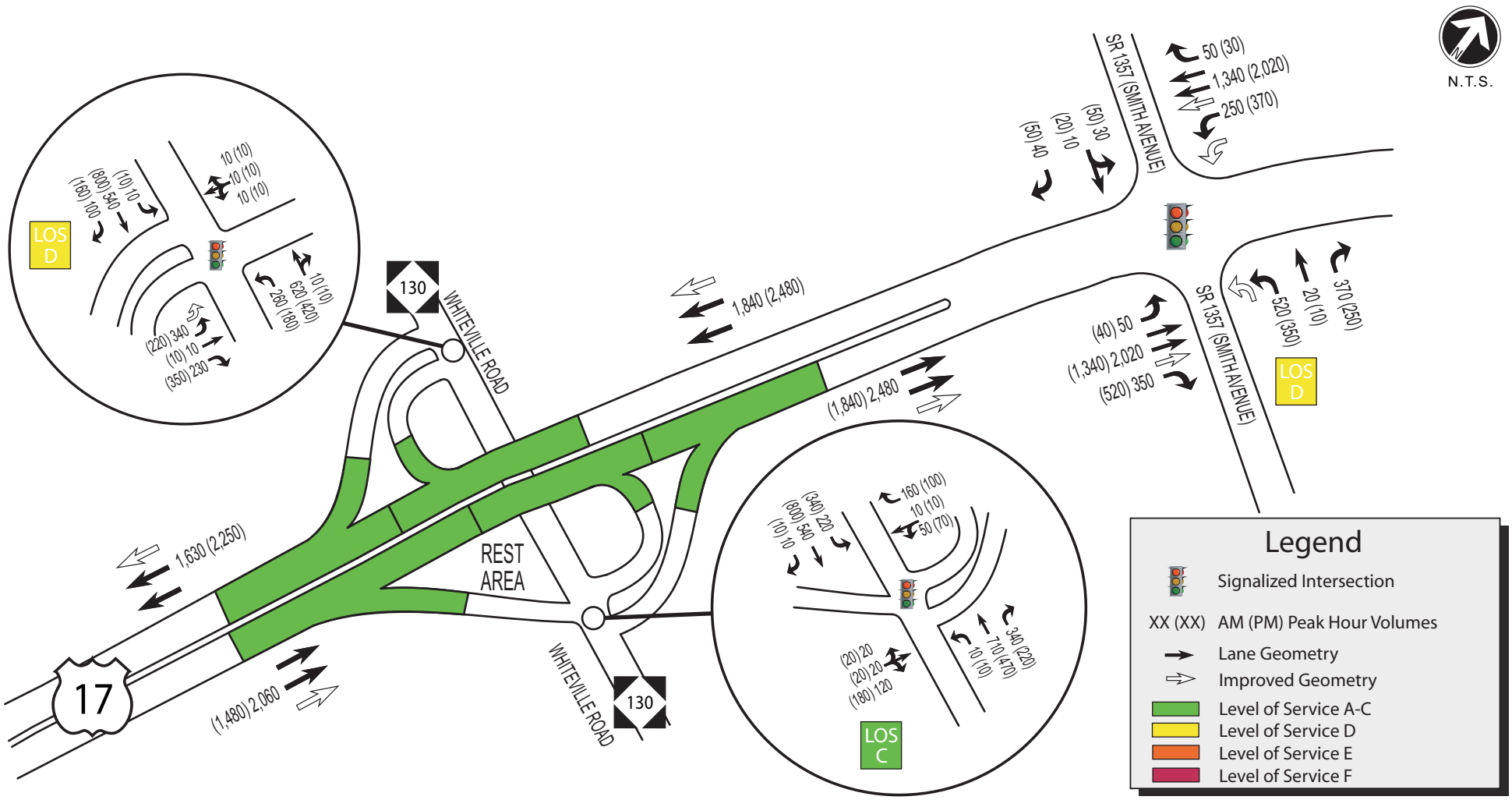
2030 Intersection Improvements Peak Hour Turning Movement Volumes, Geometry, and Levels of Service

FIGURE 4 - 3





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2030 Intersection Improvements Peak Hour Turning Movement Volumes, Geometry, and Levels of Service

FIGURE 4 - 4

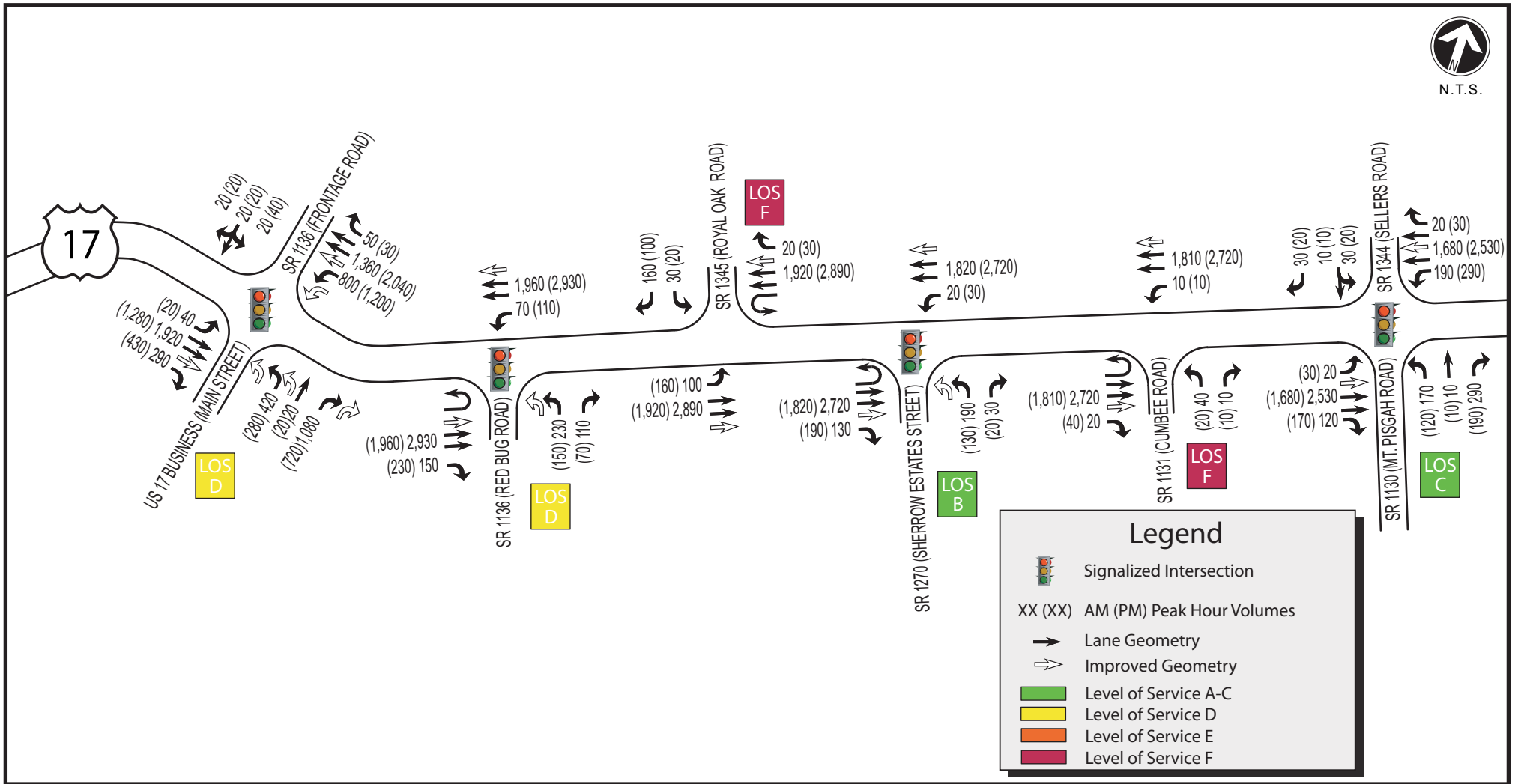



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FIGURE 4 - 5

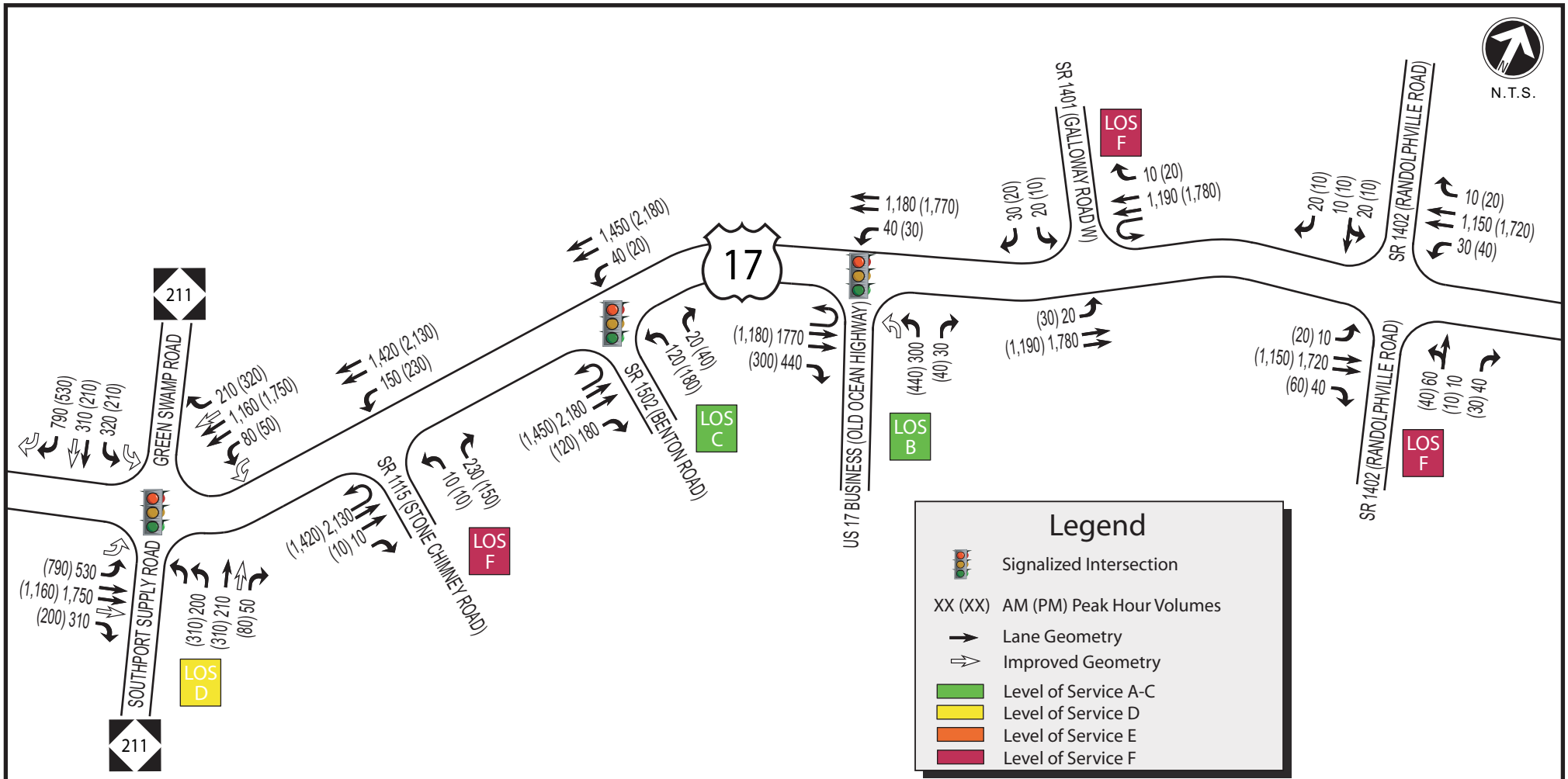


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FIGURE 4 - 6

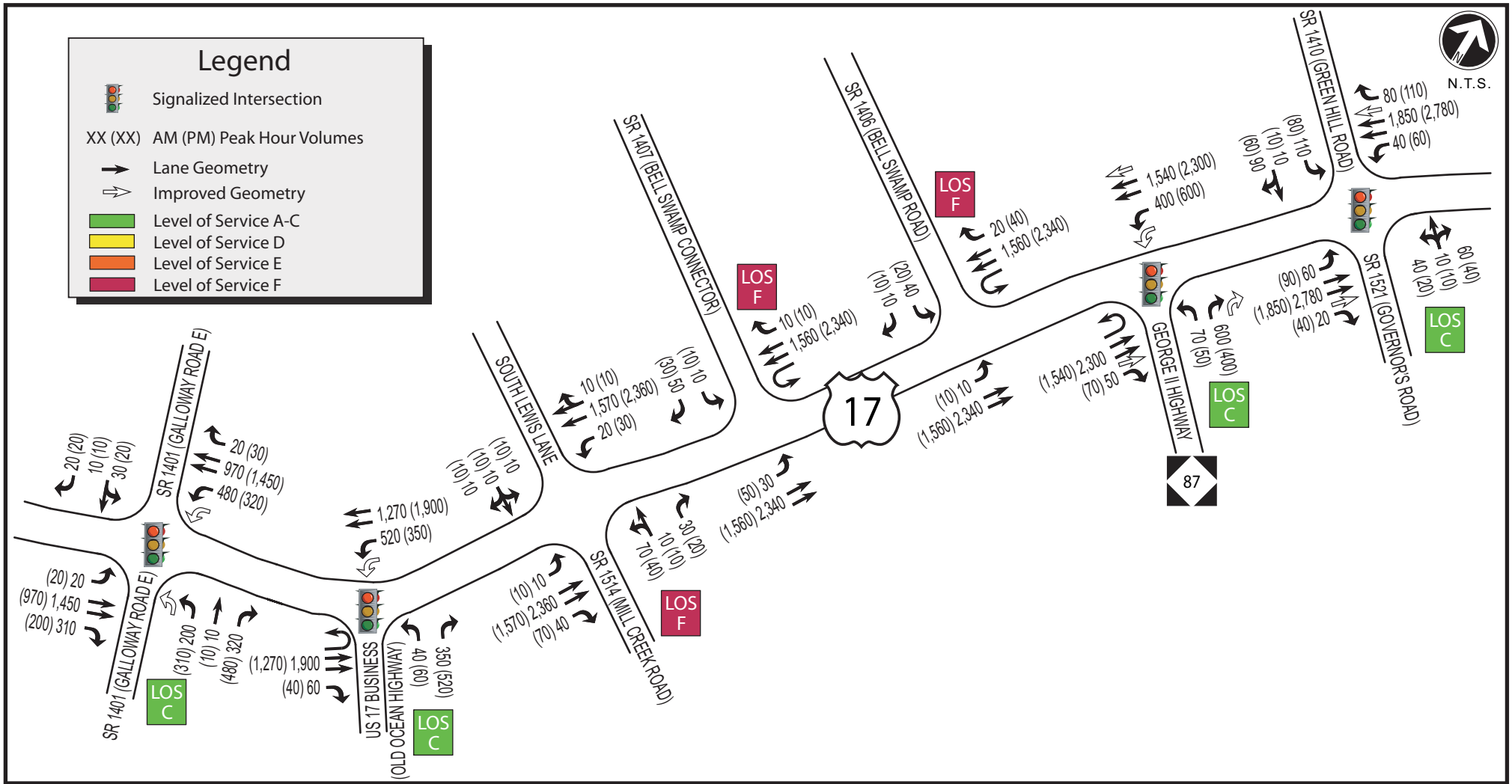


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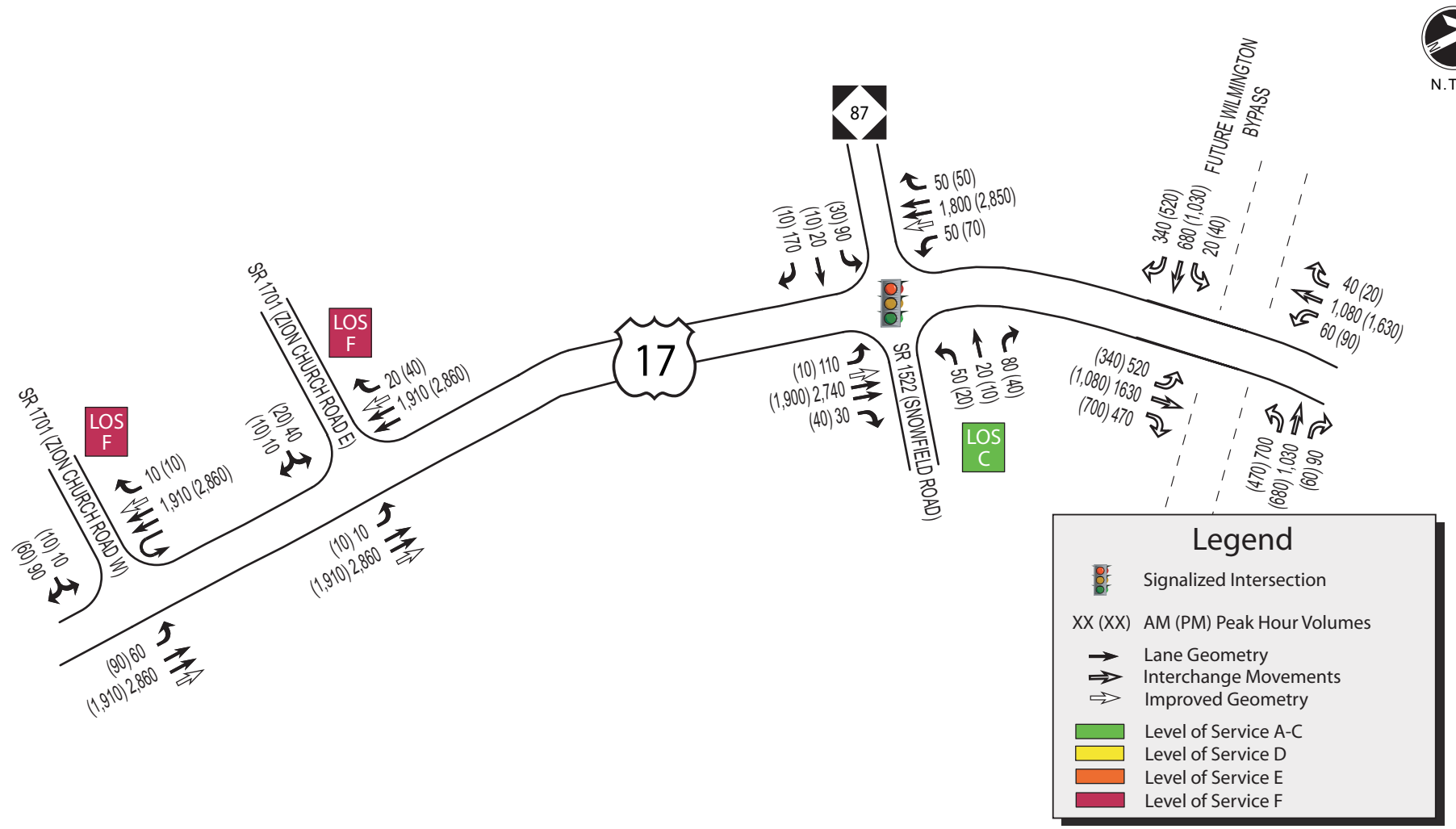
FIGURE 4 - 7

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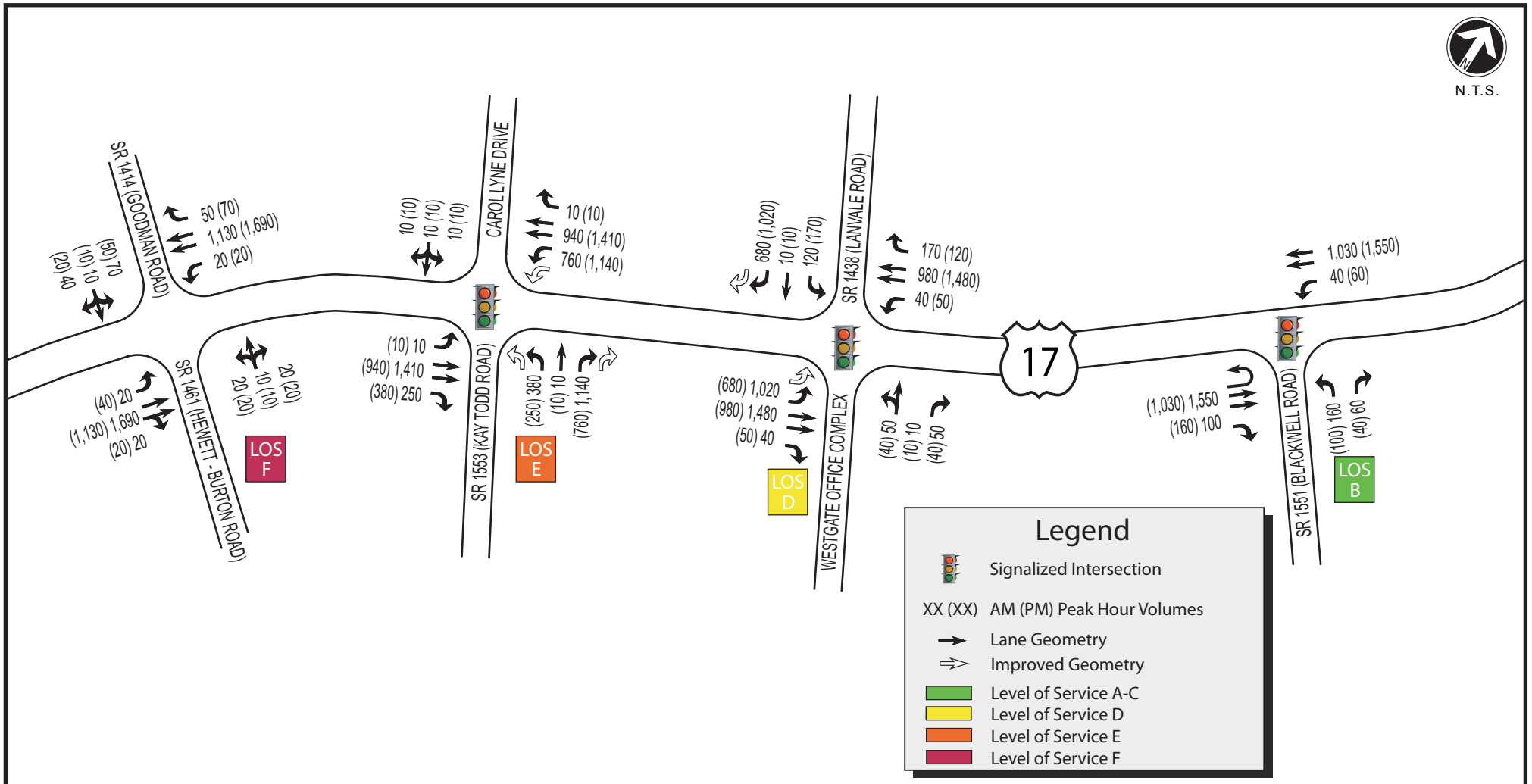
2030 Intersection Improvements Peak Hour Turning Movement Volumes, Geometry, and Levels of Service

FIGURE 4 - 8





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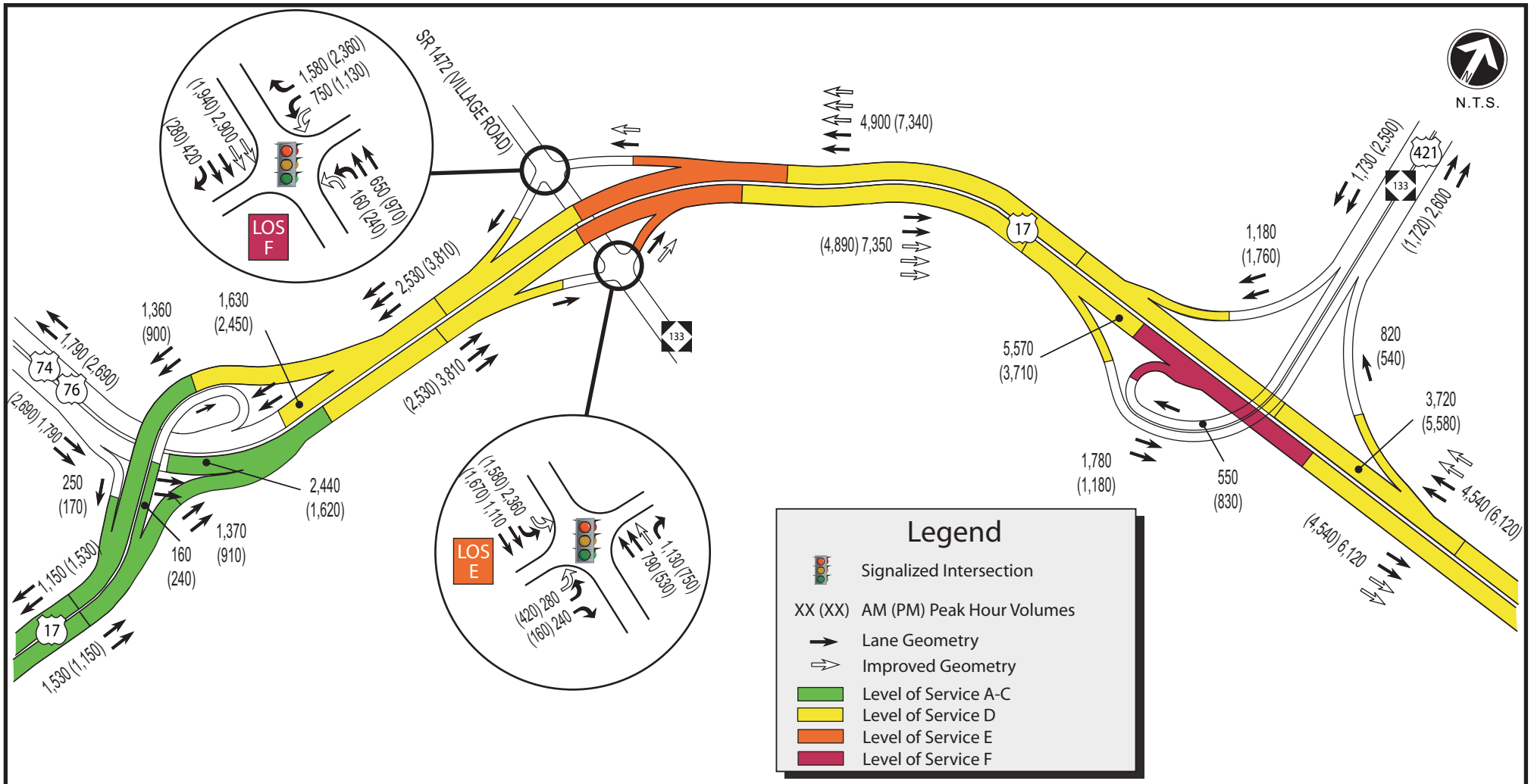
2030 Intersection Improvements Peak Hour Turning Movement Volumes, Geometry, and Levels of Service

FIGURE 4 - 9

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# US 17 CORRIDOR STUDY

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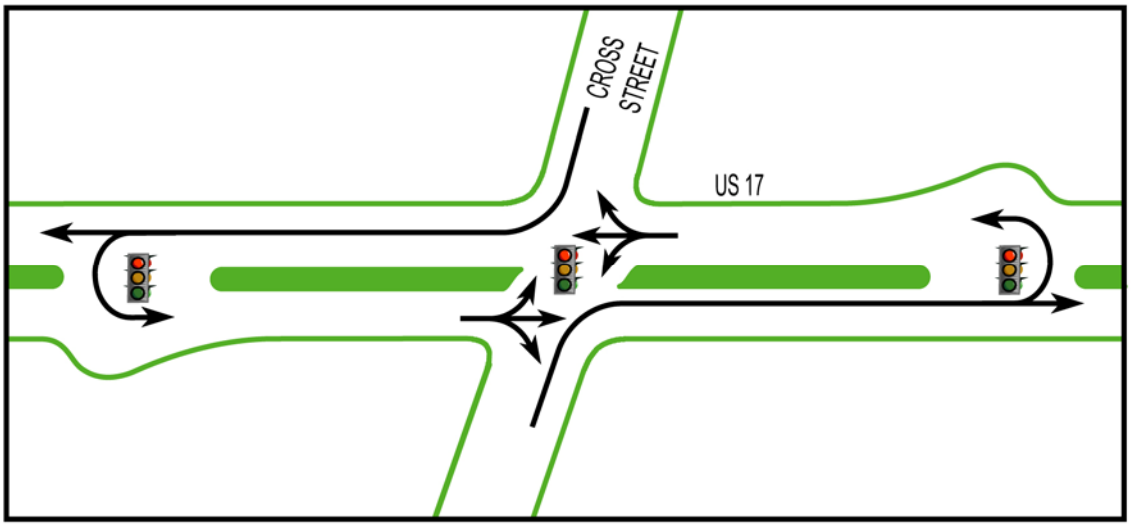
2030 Intersection Improvements Peak Hour Turning Movement Volumes, Geometry, and Levels of Service

FIGURE 4 - 10

## 4.2 Superstreet Alternative

The Superstreet Alternative is a unique improvement alternative that effectively adds capacity at intersections by restricting left turns and through movements from cross streets and allows the US 17 mainline to operate as a pair of one-way streets controlled, when necessary, by two-phase signals. The left turning and through movements from the cross streets would be rerouted to make a right turn onto US 17, travel to a downstream u-turn location (typically located 1,000 feet downstream) and make a u-turn onto US 17 where they can continue on US 17 or make a right turn onto a cross street. The u-turn locations on US 17 could operate as unsignalized or signalized intersections depending on traffic volumes and geometric conditions. However, for the purpose of this report, the u-turn intersections were all analyzed as signalized intersections. U-turn bulbs were designed to accommodate the u-turn movements of large trucks. A major benefit of the Superstreet Alternative is the potential for excellent traffic progression on US 17 due to the simple two-phase traffic signals. **Figure 4-11** shows the roadway configuration of the Superstreet Alternative.

***Figure 4-11: Permitted Movements - Superstreet Alternative***




Peak hour turning movement volumes, developed lane geometry, and LOS results for the Superstreet Alternative along the US 17 corridor are shown in **Figures 4-12 to 4-25**.

### 4.2.1 Turning Movement Volumes

Turning movement volumes for the Superstreet Alternative intersections and interchanges along US 17 were developed by following similar methodology used to calculate the Existing conditions volumes (see **Section 2.1**). Turning movement volumes were developed by rerouting turning movement volumes developed for traditional intersections to the Superstreet geometry. For instance, left turning traffic from cross streets to US 17 is prohibited with the Superstreet Alternative. Under the Superstreet Alternative, these left turning vehicles would typically be rerouted to make a right turn from the cross street and then to make a downstream u-turn on US 17.

### 4.2.2 Capacity Analysis

#### *4.2.2.1 Analysis Methodology and Traffic Characteristics*

Traffic analysis for the Superstreet Alternative was performed following the same methodology used to calculate the Existing conditions LOS. Traffic characteristics were the same as the Existing conditions (see **Section 2.2**).

#### *4.2.2.2 Freeway Operations*

Because the only segment on US 17 operating as a freeway system is on the north end of US 17, freeway operations for the Superstreet are identical to the operations analyzed under the Intersection Improvements Alternative (see **Section 4.1.2.2**).

#### *4.2.2.3 Intersection Operations*

The Superstreet Alternative would require the creation of 84 signalized intersection locations if all u-turn locations were signalized. To ensure proper storage is provided for exclusive turn lanes and to represent the greatest impact to traffic along US 17, it was assumed that all u-turn locations along US 17 would be signalized, regardless of volumes. The analysis indicates that of the 84 intersections analyzed, 79 would operate at LOS A, B, or C and five would operate at LOS D. Even with improved geometry, the ramp terminal intersections at the NC 133 interchange would operate over capacity (accounting for the LOS E and F) due to the high volumes at this interchange. As mentioned in **Section 4.1.2.2**, improvements not currently programmed for NC 133 would be required for projected volumes at this interchange and poor ramp terminal operations to occur.

Three sections of US 17 would require widening to six lanes to achieve an acceptable LOS: (1) from Ocean Isle Beach Boulevard to US 17 Business (south intersection of Shallotte Bypass), (2) from US 17 Business (north intersection of Shallotte Bypass) to NC 211, and (3) from NC 87 to the proposed Wilmington Bypass. There are two sections of US 17 requiring widening to six lanes in the Intersection Improvements Alternative that would not need widening in the Supersteet Alternative. These sections are (1) at the NC 904 intersection and (2) between US 17 Business (south intersection of Shallotte Bypass) to US 17 Business (north intersection of Shallotte Bypass).

### 4.2.3 Conceptual Designs

Conceptual designs for the Superstreet Alternative were developed using the analysis results described above. The designs represent the lane geometry necessary to allow traffic to operate at LOS D. The conceptual designs are shown in **Appendix B**.

### 4.2.4 Construction Cost Estimates

Construction cost estimates were calculated by applying a unit cost to item quantities developed from the conceptual designs. Quantity items and unit costs were provided by the NCDOT Preliminary Estimate Section. Right of way and utility costs were not calculated in the construction cost estimates. The tabulation of quantities and cost estimates for the Intersection Improvements Alternative can be found in **Appendix C**. The total estimated construction cost is $100,212,900. This cost does not include right-of-way, which at the time of completion of this study was not yet provided by NCDOT. Right-of-way quantities and estimated costs are being completed by NCDOT Right-of-Way Branch and will be provide under separate cover when they are completed.

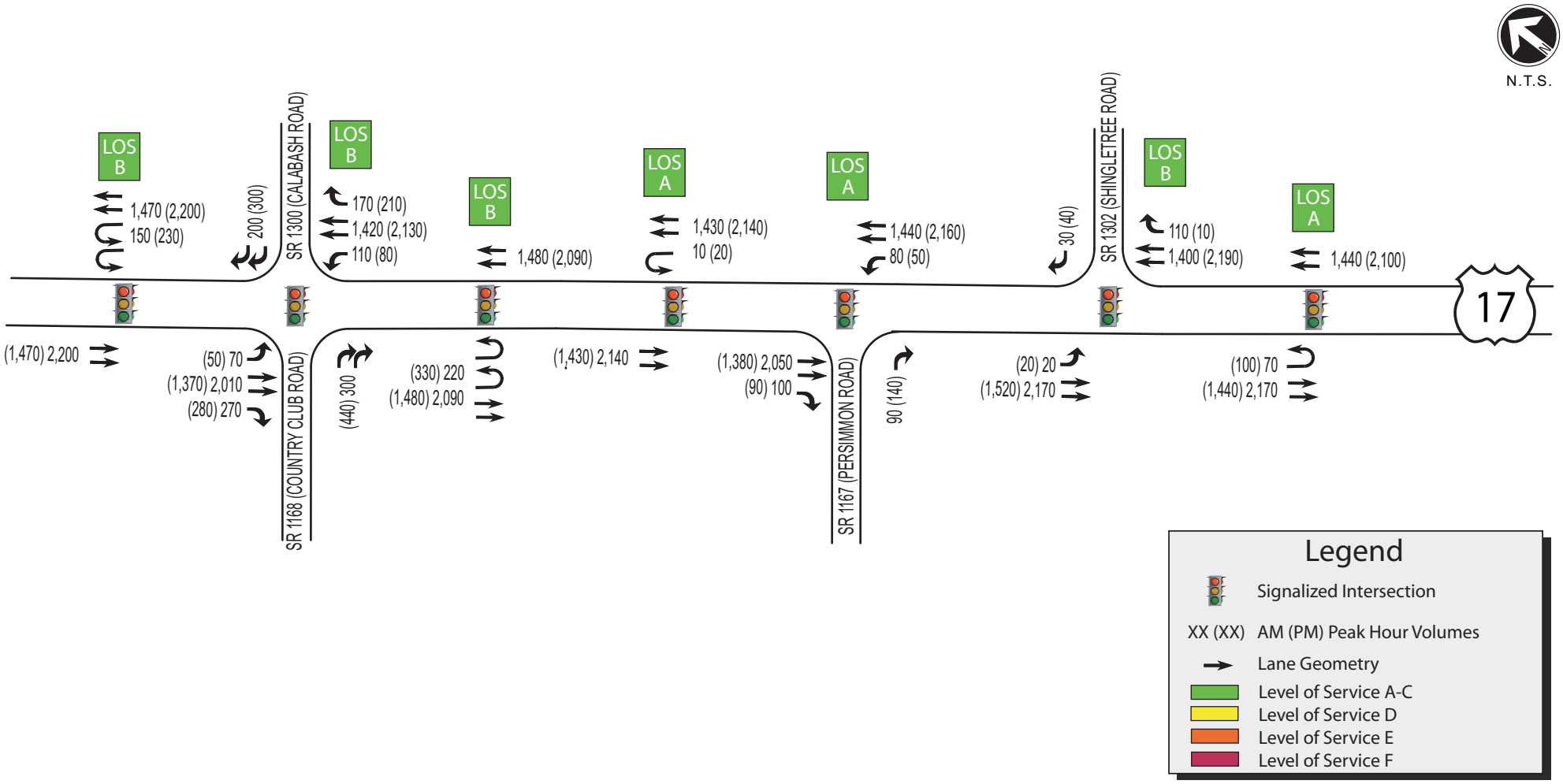



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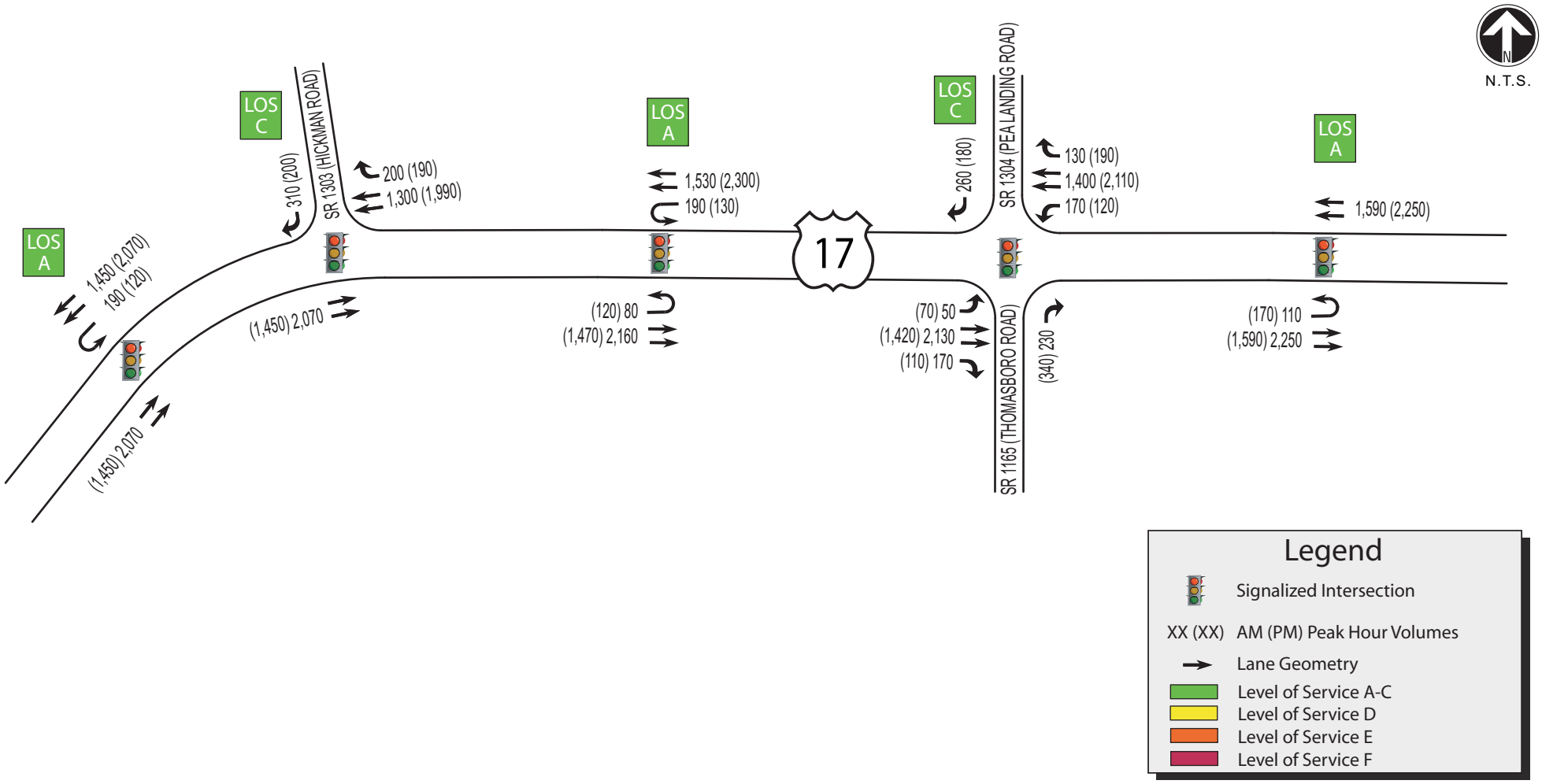
FIGURE 4-12





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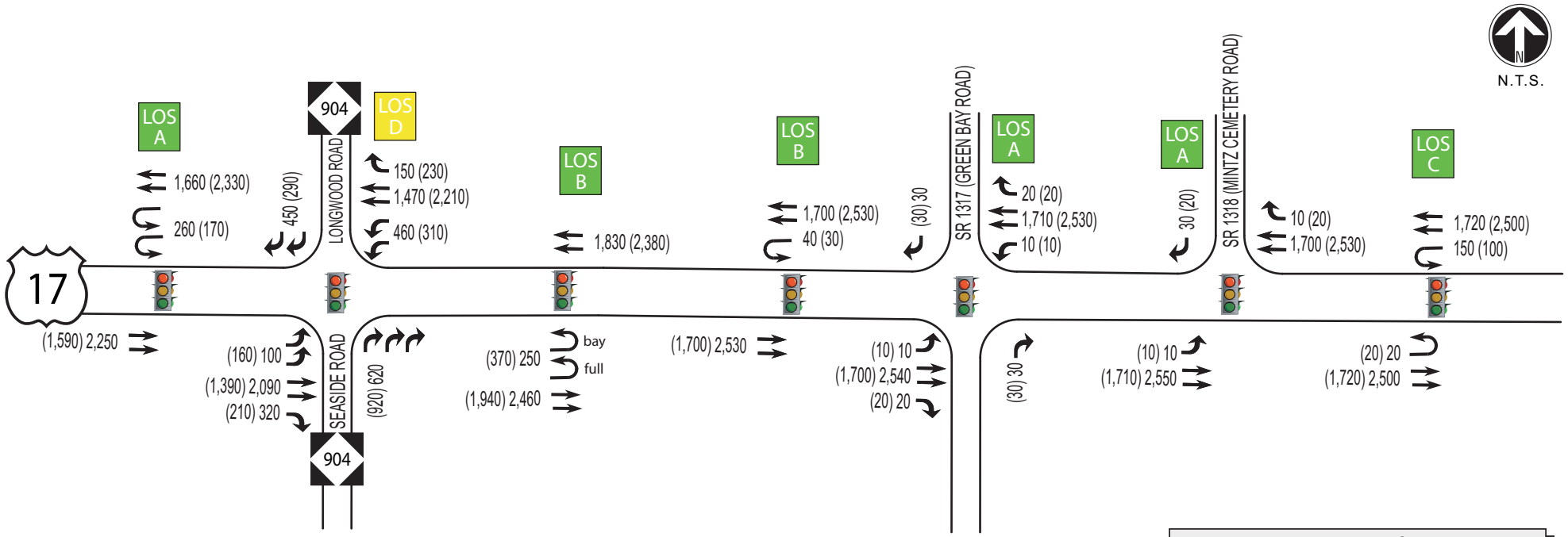
2030 Superstreet Peak Hour Turning Movement Volumes, Geometry, and Levels of Service

FIGURE 4-13

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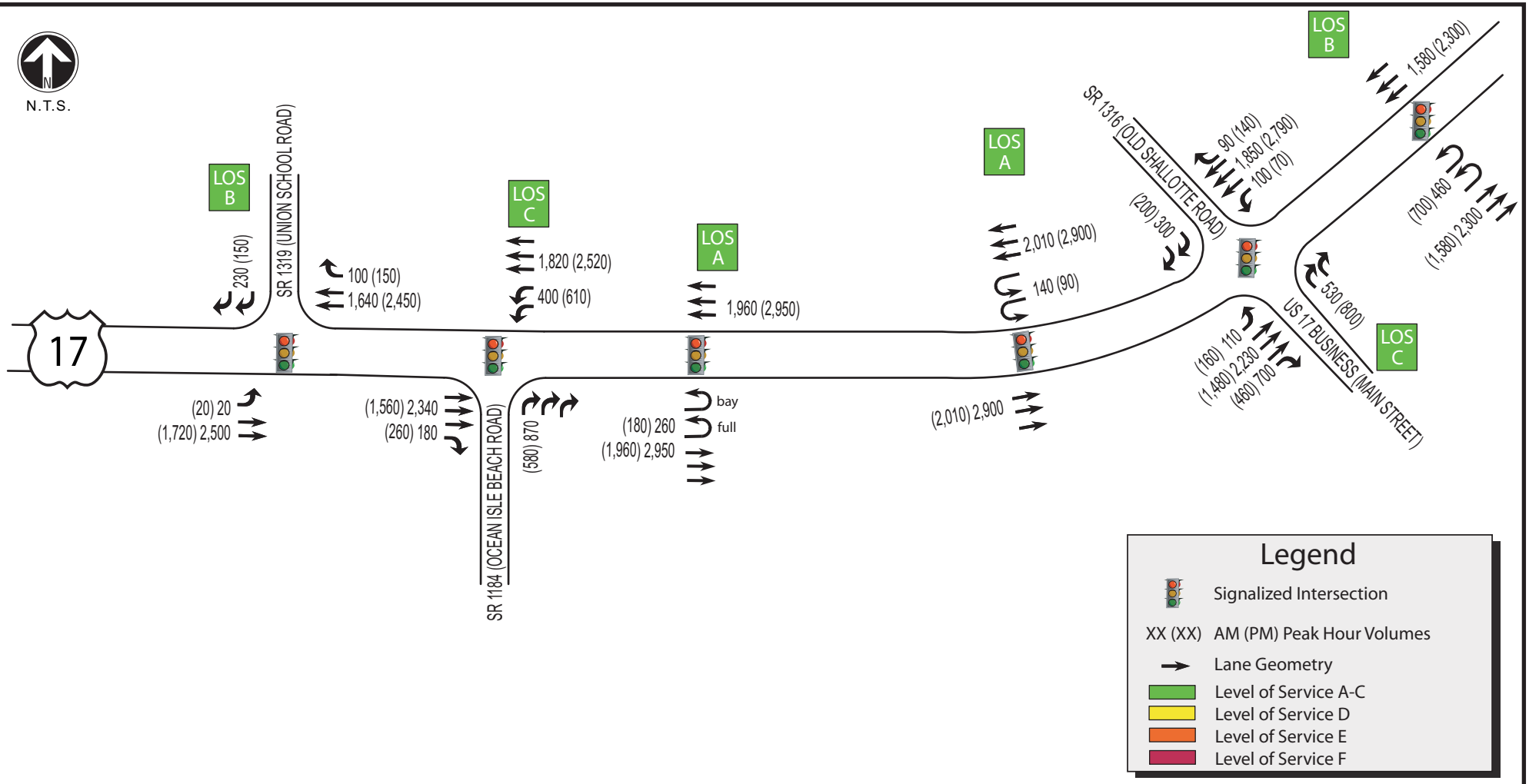
**Brunswick County**

2030 Superstreet Peak Hour Turning Movement Volumes, Geometry, and Levels of Service

FIGURE 4-14

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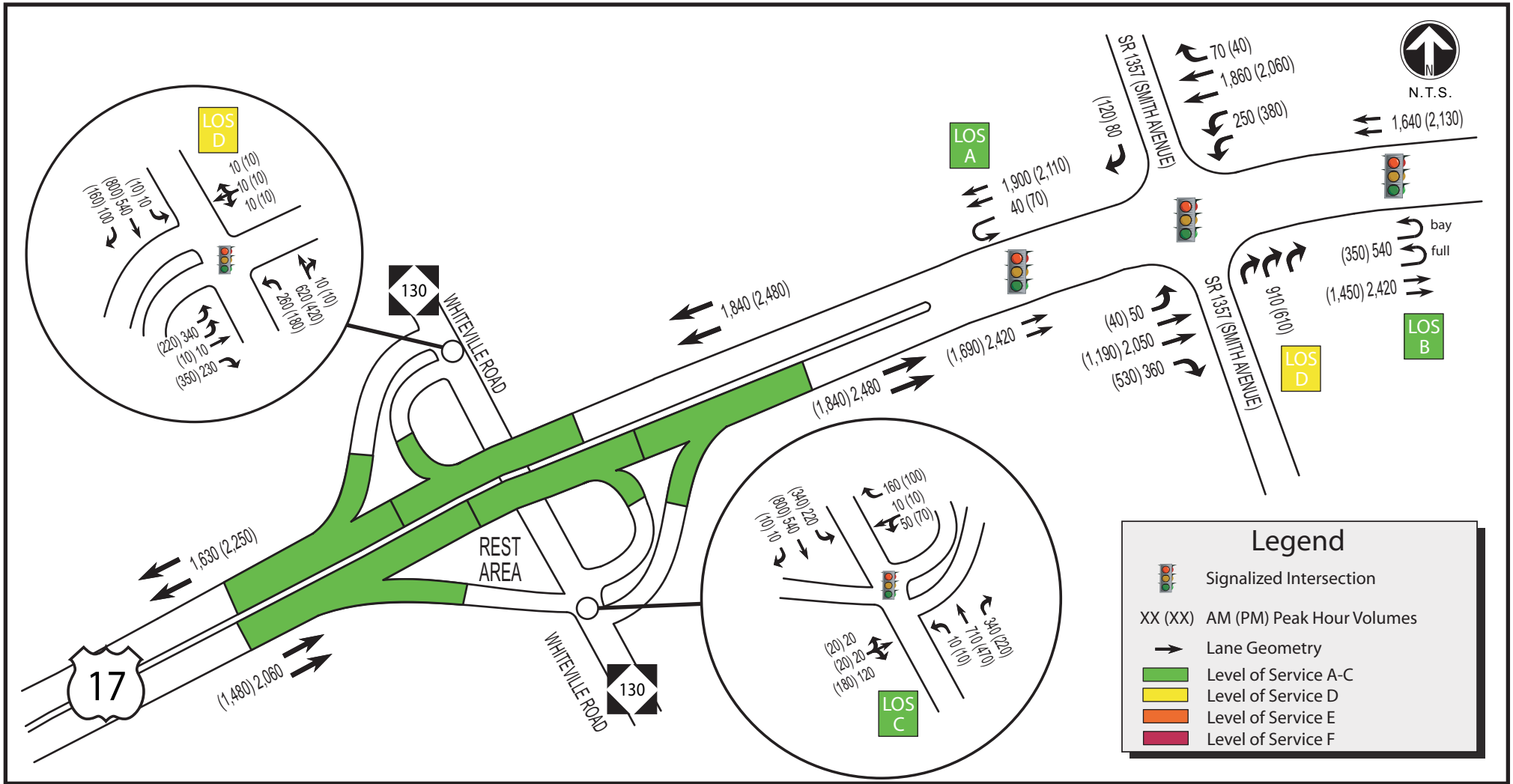
2030 Superstreet Peak Hour Turning Movement Volumes, Geometry, and Levels of Service

FIGURE 4-15

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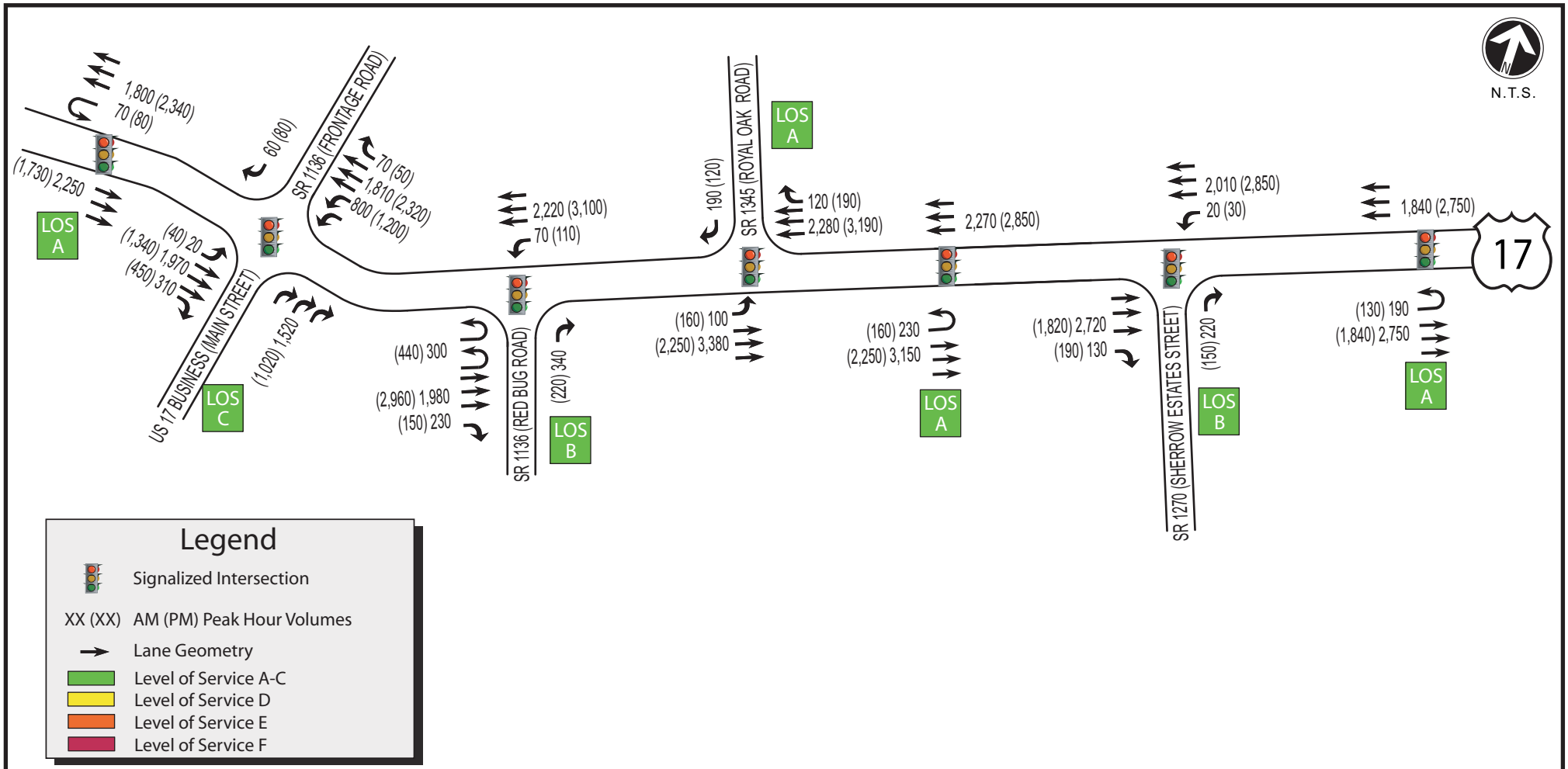
2030 Superstreet Peak Hour Turning Movement Volumes, Geometry, and Levels of Service

FIGURE 4-16





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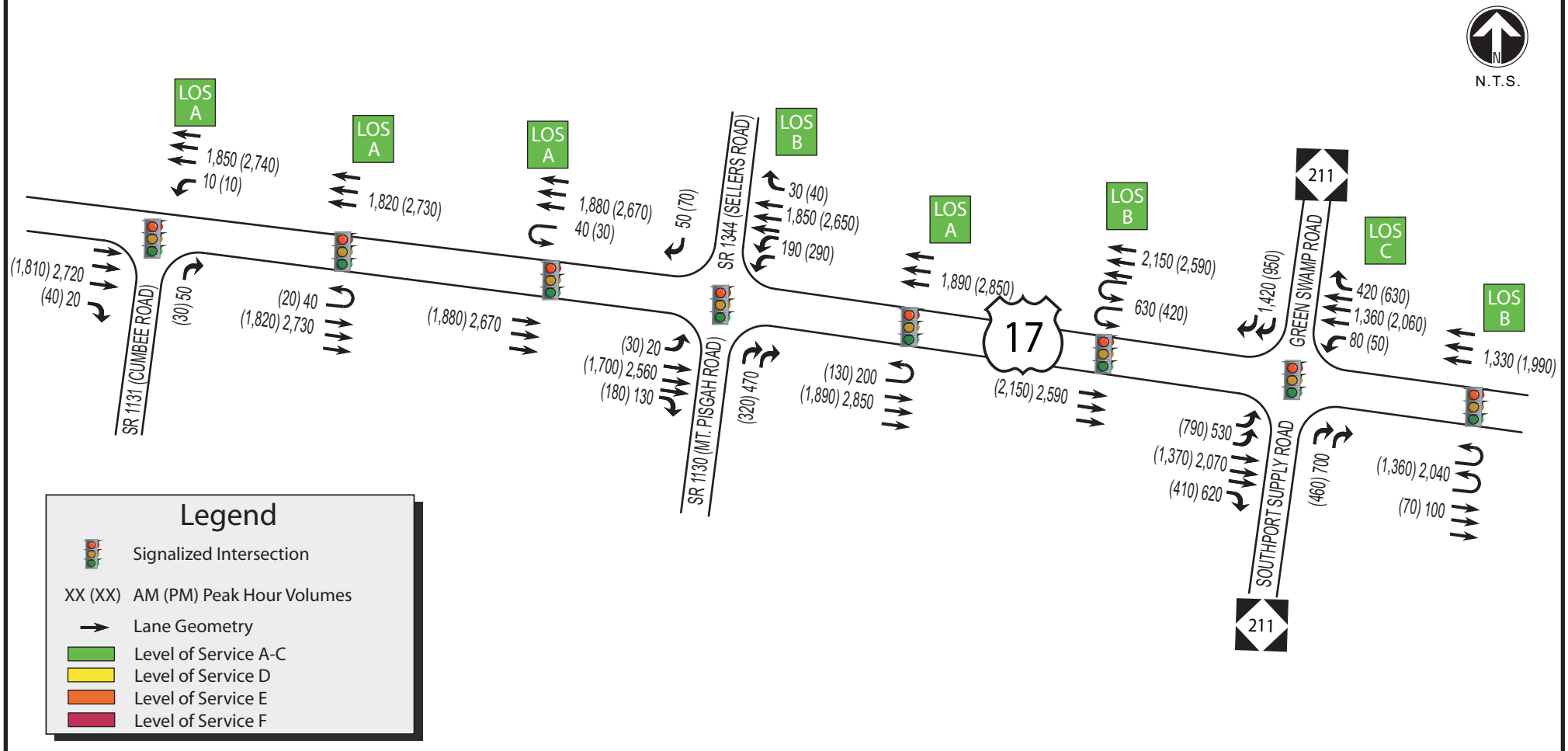
2030 Superstreet Peak Hour Turning Movement Volumes, Geometry, and Levels of Service

FIGURE 4-17

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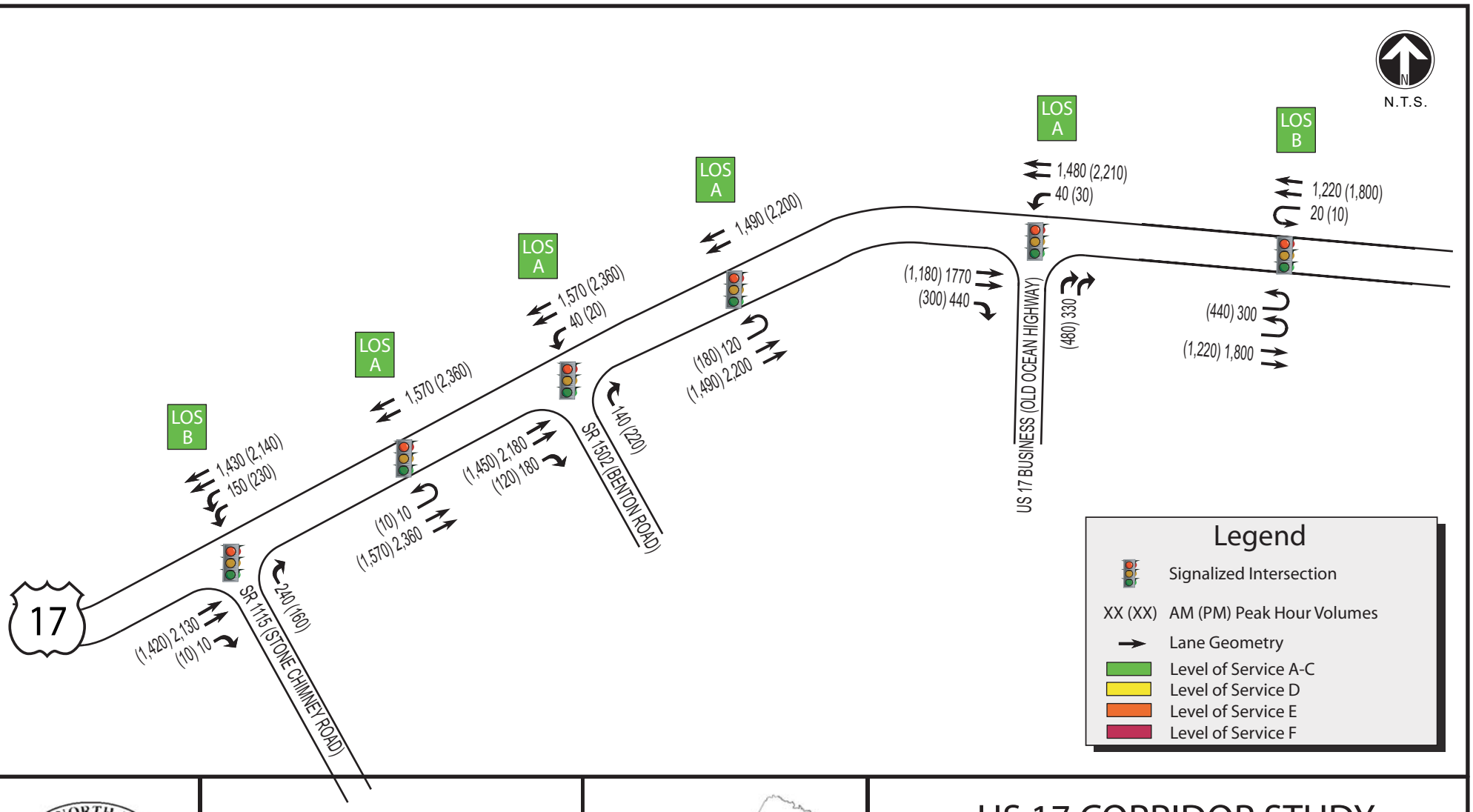
2030 Superstreet Peak Hour Turning Movement Volumes, Geometry, and Levels of Service

FIGURE 4-18

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2030 Superstreet Peak Hour Turning Movement Volumes, Geometry, and Levels of Service

FIGURE 4-19

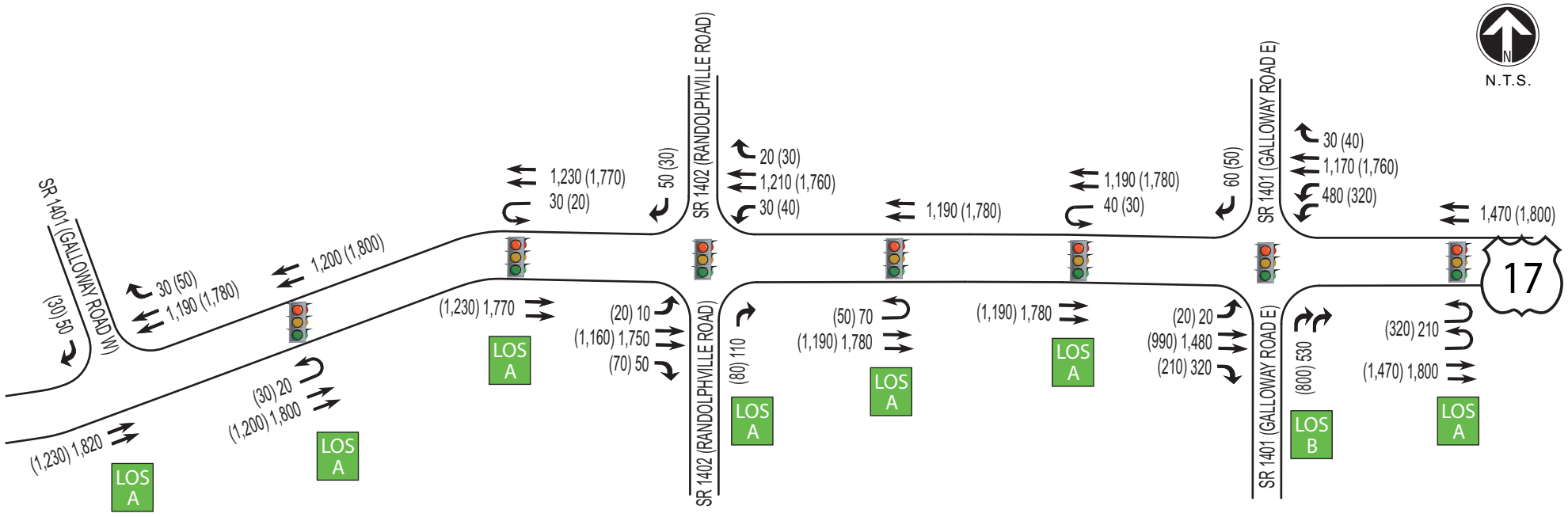



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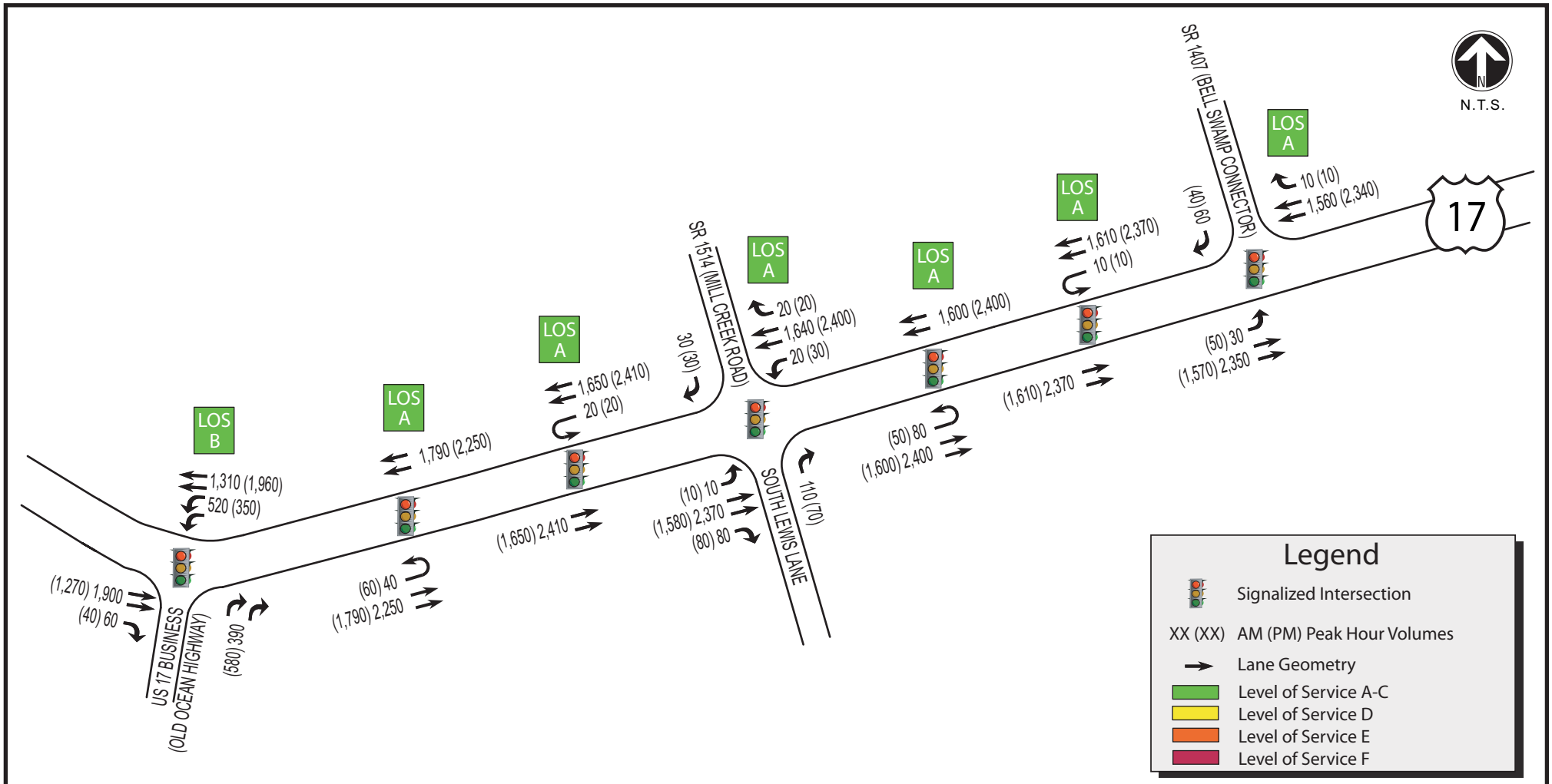
FIGURE 4-20





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# US 17 CORRIDOR STUDY

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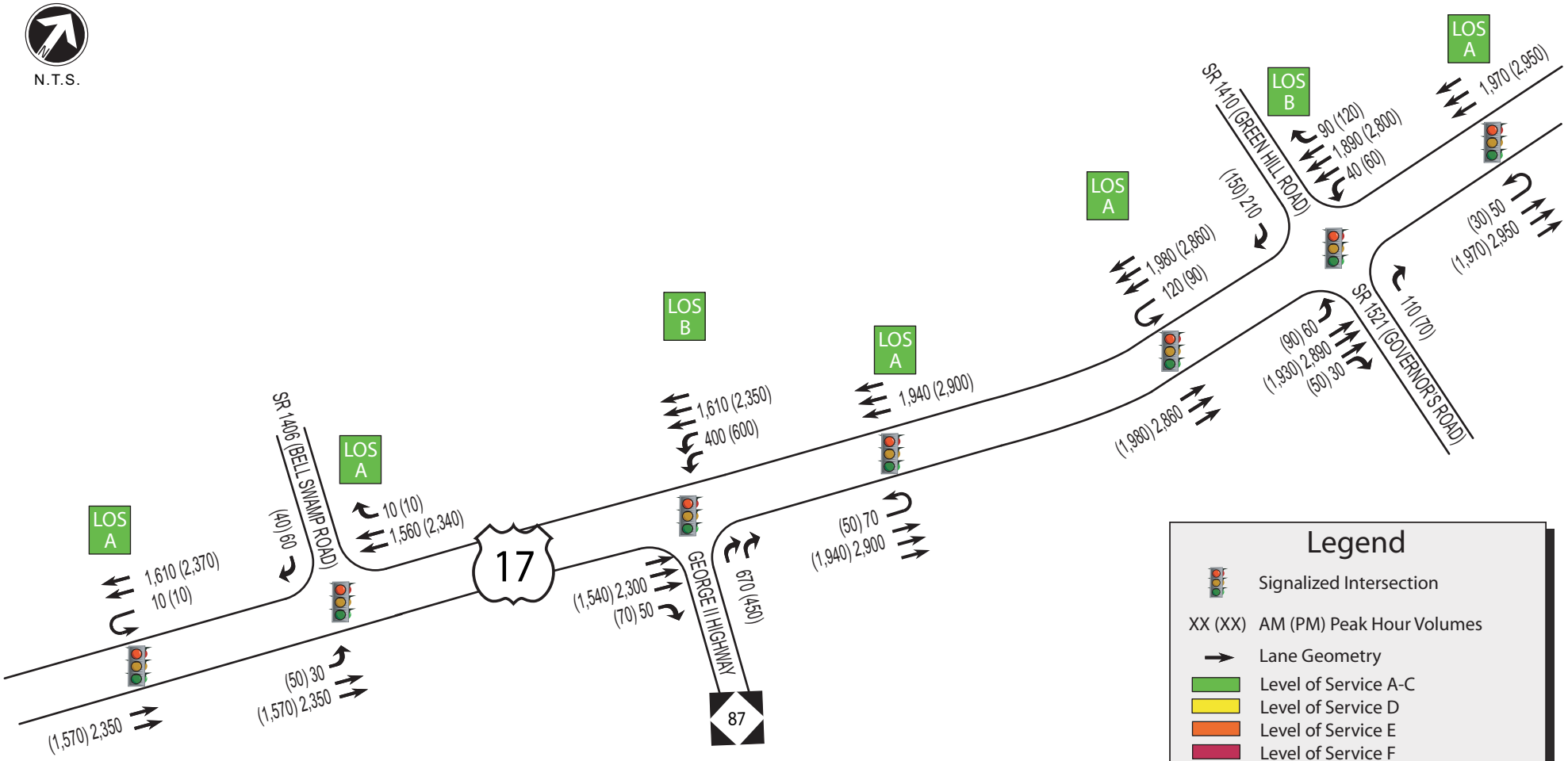
FIGURE 4-21





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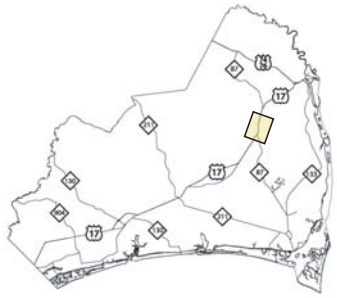

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FIGURE 4-22

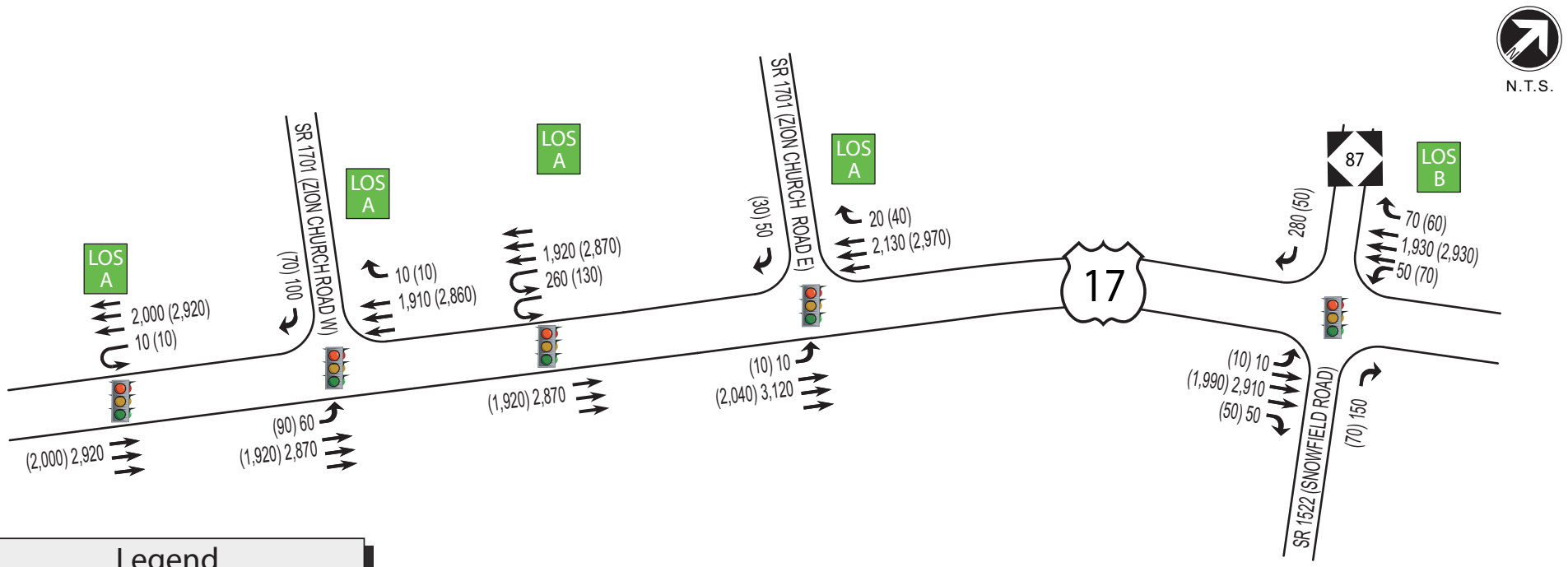


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FIGURE 4-23

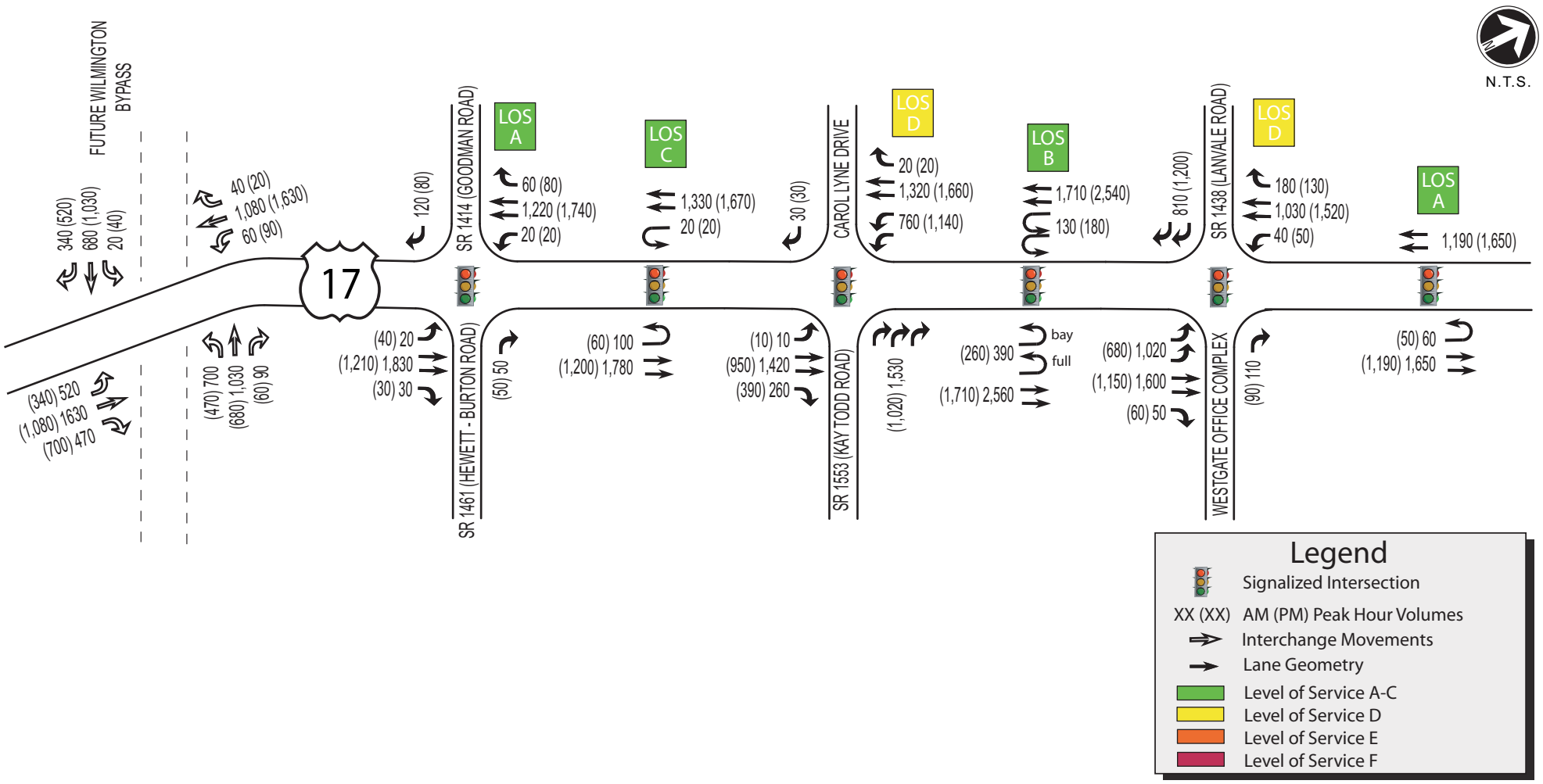


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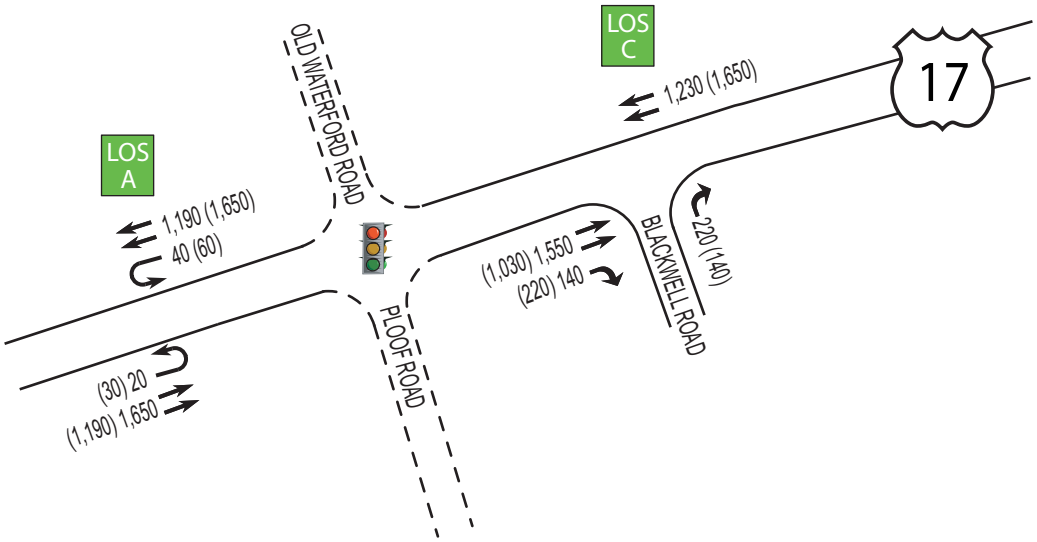
FIGURE 4-24

N.T.S.




## Legend

- Signalized Intersection
- XX (XX) AM (PM) Peak Hour Volumes
- Lane Geometry
- Level of Service A-C
- Level of Service D
- Level of Service E
- Level of Service F

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# US 17 CORRIDOR STUDY

**Brunswick County**

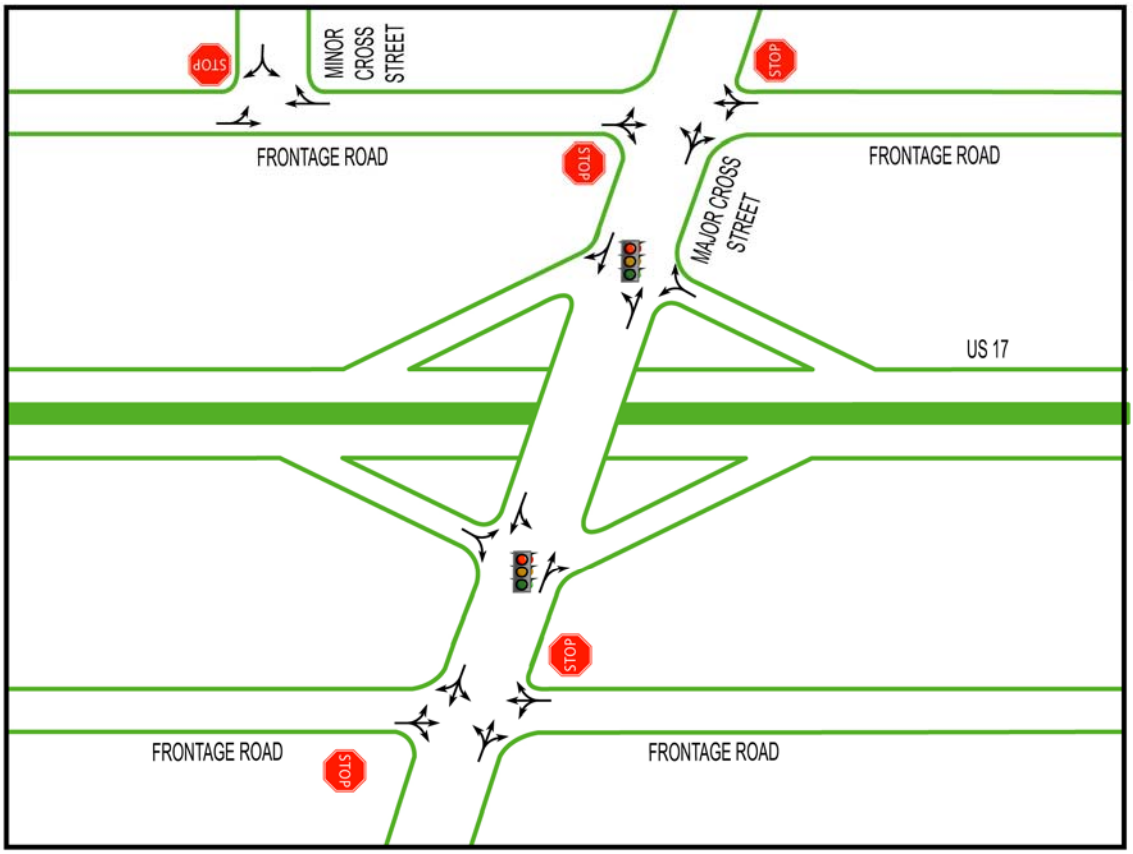
2030 Superstreet Peak Hour Turning Movement Volumes, Geometry, and Levels of Service

FIGURE 4-25

## 4.3 Freeway Alternative

The Freeway Alternative is an improvement alternative that eliminates all at-grade intersections on US 17 and would provide an uninterrupted trip from the South Carolina State Line to the Cape Fear River Bridge. Major intersections would be replaced with a grade-separated interchange. Two-way frontage roads located on the east and west sides of US 17 provide access to property adjacent to US 17 and minor cross streets. **Figure 4-26** shows the roadway configuration of the Intersection Improvements Alternative.

***Figure 4-26: Permitted Movements -Freeway Alternative***




Peak hour turning movement volumes, developed lane geometry, and LOS results for the Freeway Alternative along the US 17 corridor are shown in **Figures 4-27 to 4-42**.

### 4.3.1 Turning Movement Volumes

Turning movement volumes for the Freeway Alternative intersections and interchanges along US 17 were developed by following similar methodology used to calculate the Existing conditions volumes (see **Section 2.1**). Turning movement volumes were developed by rerouting turning movement volumes developed for traditional intersections to the Freeway geometry. For instance, in a situation where a diamond style interchange was proposed, eastbound left turning traffic from cross streets to US 17 was rerouted to an eastbound through movement at the southbound ramp terminal intersection and to an eastbound left turn movement at the northbound ramp terminal intersection. Since the Freeway Alternative did not propose interchanges at all of the cross streets along US 17, the traffic from the cross streets not considered for interchanges needed rerouting to the nearest interchange via a frontage road system.

### 4.3.2 Capacity Analysis

#### *4.3.2.1 Analysis Methodology and Traffic Characteristics*

Traffic analysis for the Freeway Alternative was performed following the same methodology used to calculate the Existing conditions LOS. Traffic characteristics were the same as the Existing conditions (see **Section 2.1**).

#### *4.3.2.2 Freeway Operations*

The freeway system on the north end of US 17 between Blackwell Road and the Cape Fear River is identical to the operations analyzed under the Intersection Improvement Alternative (see **Section 4.1.2.2**).

Between the South Carolina State Line and Blackwell Road, a four-lane freeway would accommodate projected year 2030 volumes. All of the 17 proposed interchanges could be designed as diamond, partial cloverleaf, or trumpet style interchanges with single lane ramps designed to accommodate loop ramps if needed for future capacity. All freeway segments and ramp merge and diverge areas in this section of US 17 would operate at LOS D or better.

#### *4.3.2.3 Intersection Operations*

The Freeway Alternative would require the creation of ramp terminal intersections and intersections between the cross streets and frontage roads at most intersection locations.

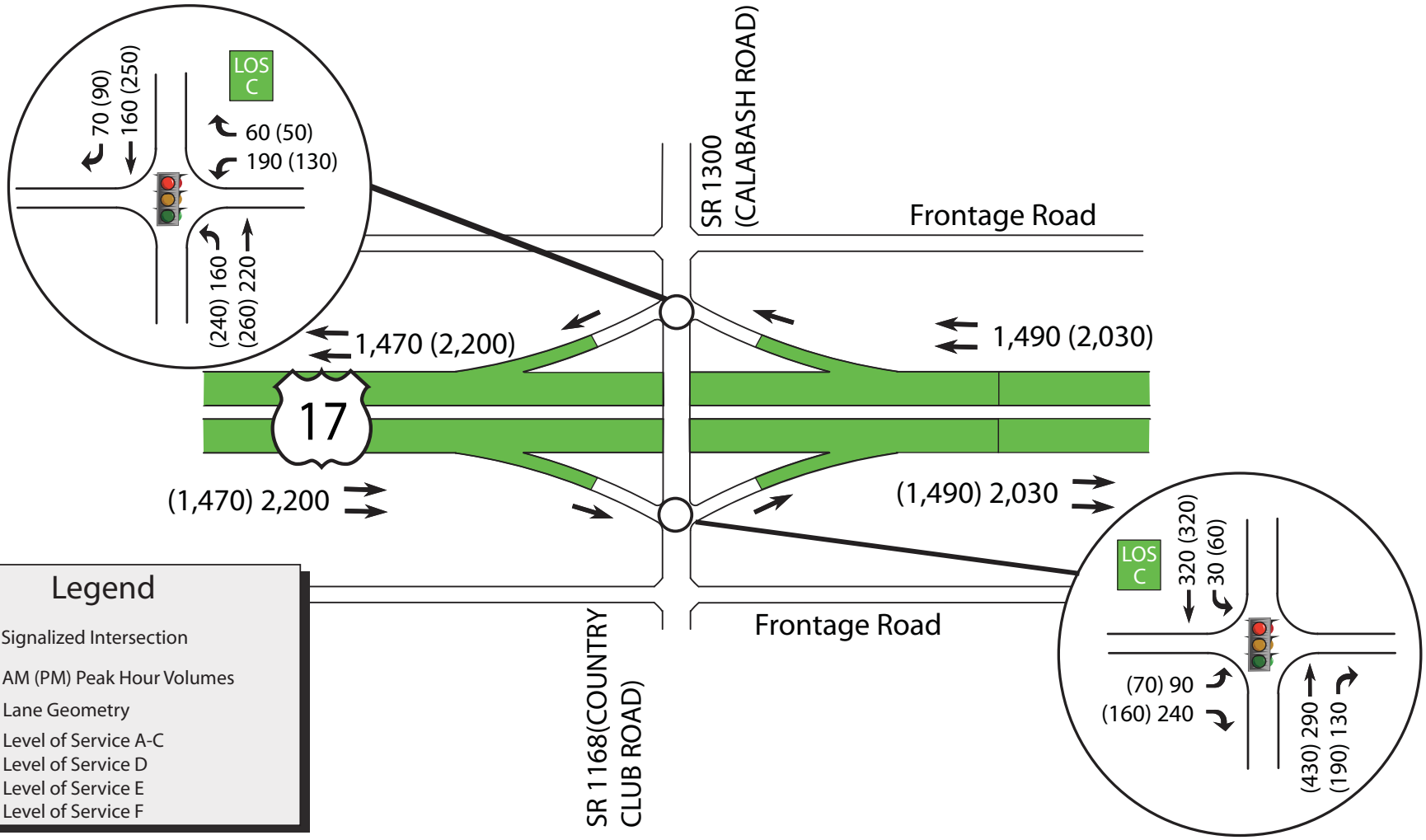
Intersection analysis was performed for all ramp terminal intersections, but not frontage road intersections, due to the low projected volumes. All ramp terminal intersections were assumed to be signalized except for the US 17 Business (Main Street) and US 17 Business (Old Ocean Highway) ramp terminal intersections. The analysis indicates that of the 30 intersections analyzed, 22 would operate at LOS A, B, or C and eight would operate at LOS D. The ramp terminal intersections at the existing NC 133 interchange are not included in the above summary, these intersections are expected to operate at LOS F in the design year.

### 4.3.3 Conceptual Designs

Conceptual designs for the Freeway alternative were developed using the analysis results described above. For new location interchanges, diamond interchanges were typically used. For these interchanges, the on and off-ramps were configured to accommodate loops if traffic growth caused the ramp terminal intersections to operate with poor levels of service. The designs represent the lane geometry necessary to allow traffic to operate at Level of Service D. The conceptual designs can be found in **Appendix B**.

### 4.3.4 Construction Cost Estimates

Construction cost estimates were calculated by applying a unit cost to item quantities developed from the conceptual designs. Quantity items and unit costs were provided by the NCDOT Preliminary Estimate Section. Right of way and utility costs were not calculated in the construction cost estimates. The tabulation of quantities and cost estimates for the Intersection Improvements alternative can be found in **Appendix C**. The total estimated construction cost is $254,000,000. This cost does not include right-of-way, which at the time of completion of this study was not yet provided by NCDOT. Right-of-way quantities and estimated costs are being completed by NCDOT Right-of-Way Branch and will be provide under separate cover when they are completed.





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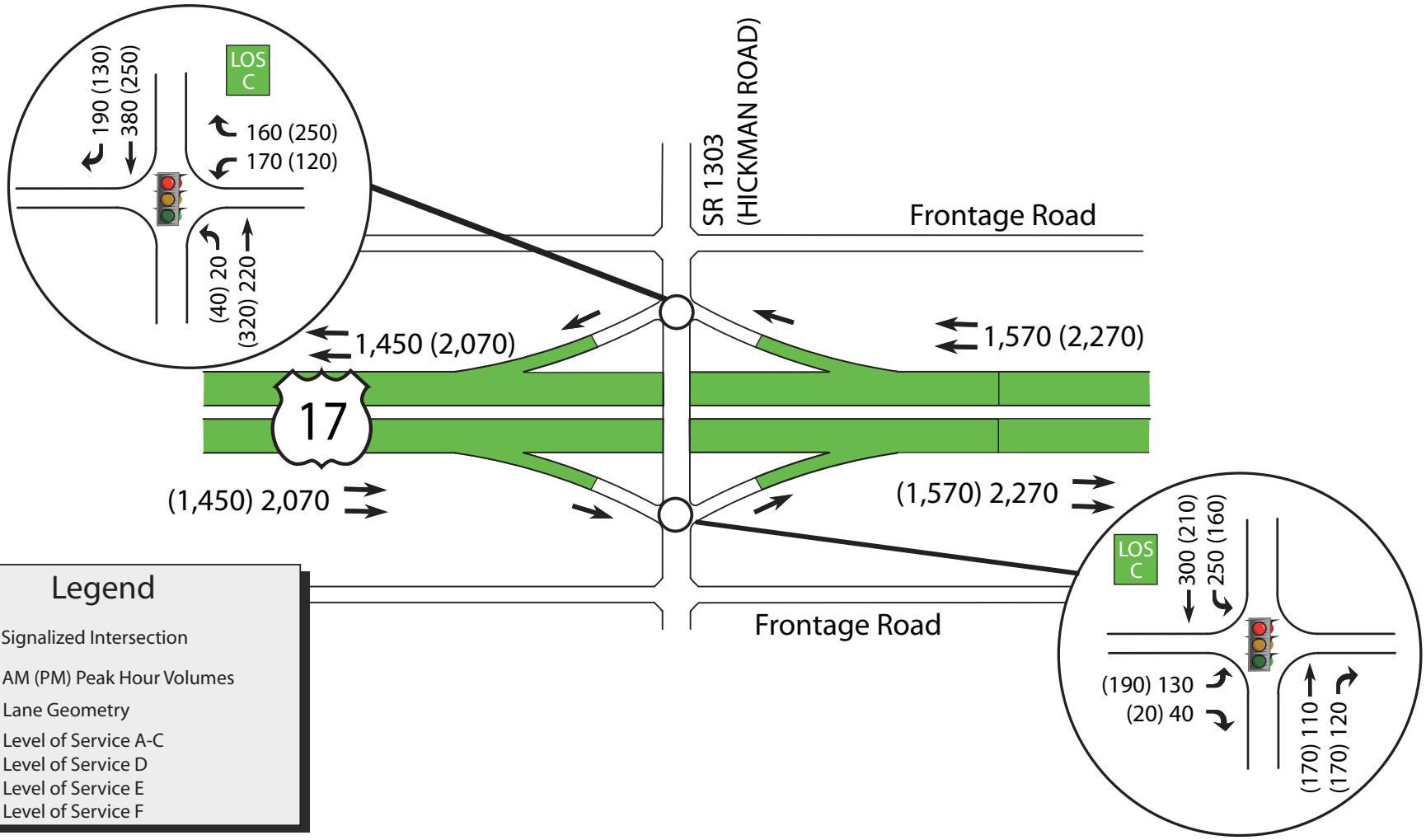
# US 17 CORRIDOR STUDY

**Brunswick County**

2030 Freeway Peak Hour Turning Movement Volumes, Geometry, and Levels of Service

FIGURE 4-27

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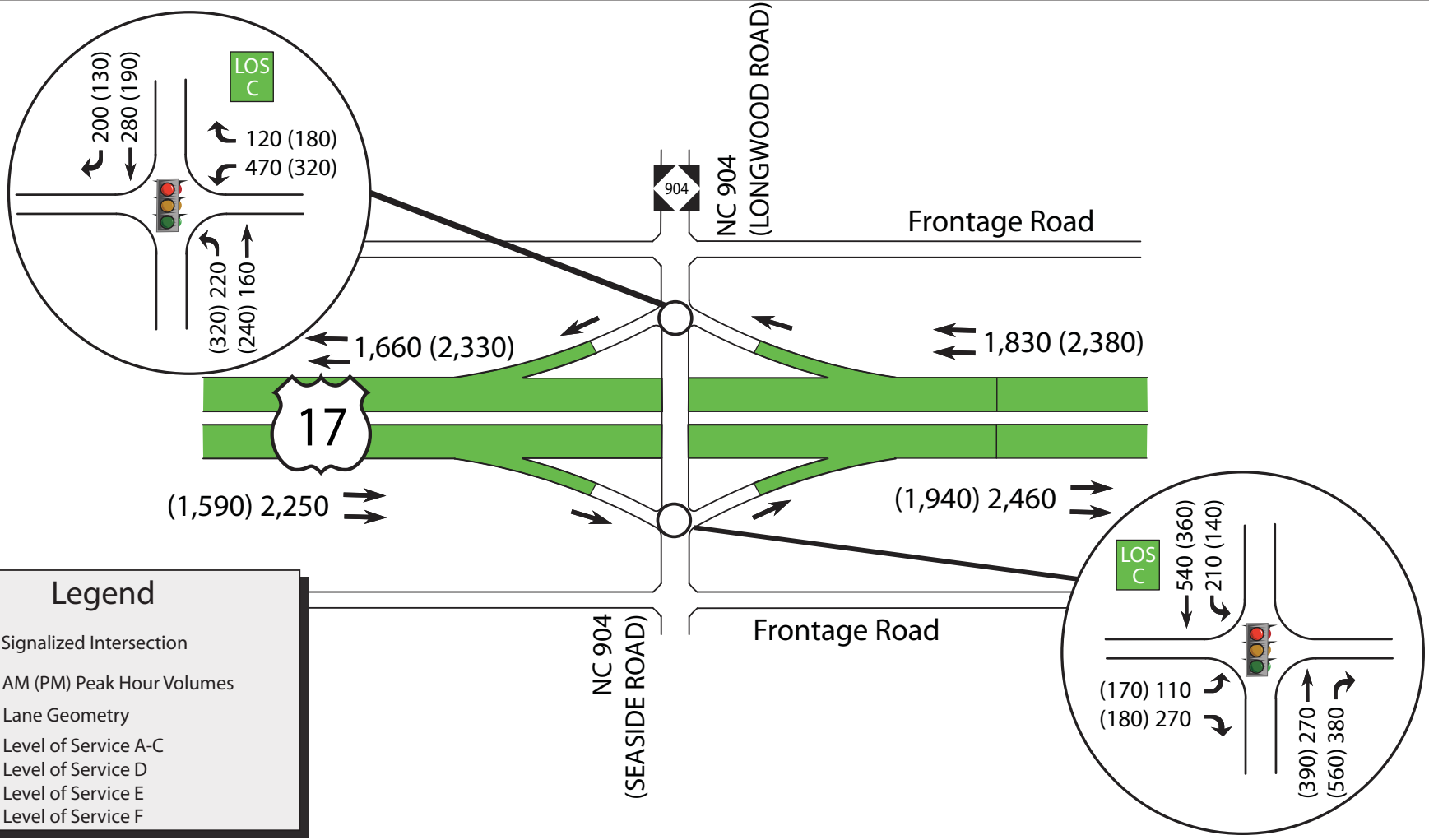
# US 17 CORRIDOR STUDY

**Brunswick County**

2030 Freeway Peak Hour Turning Movement Volumes, Geometry, and Levels of Service

FIGURE 4-28





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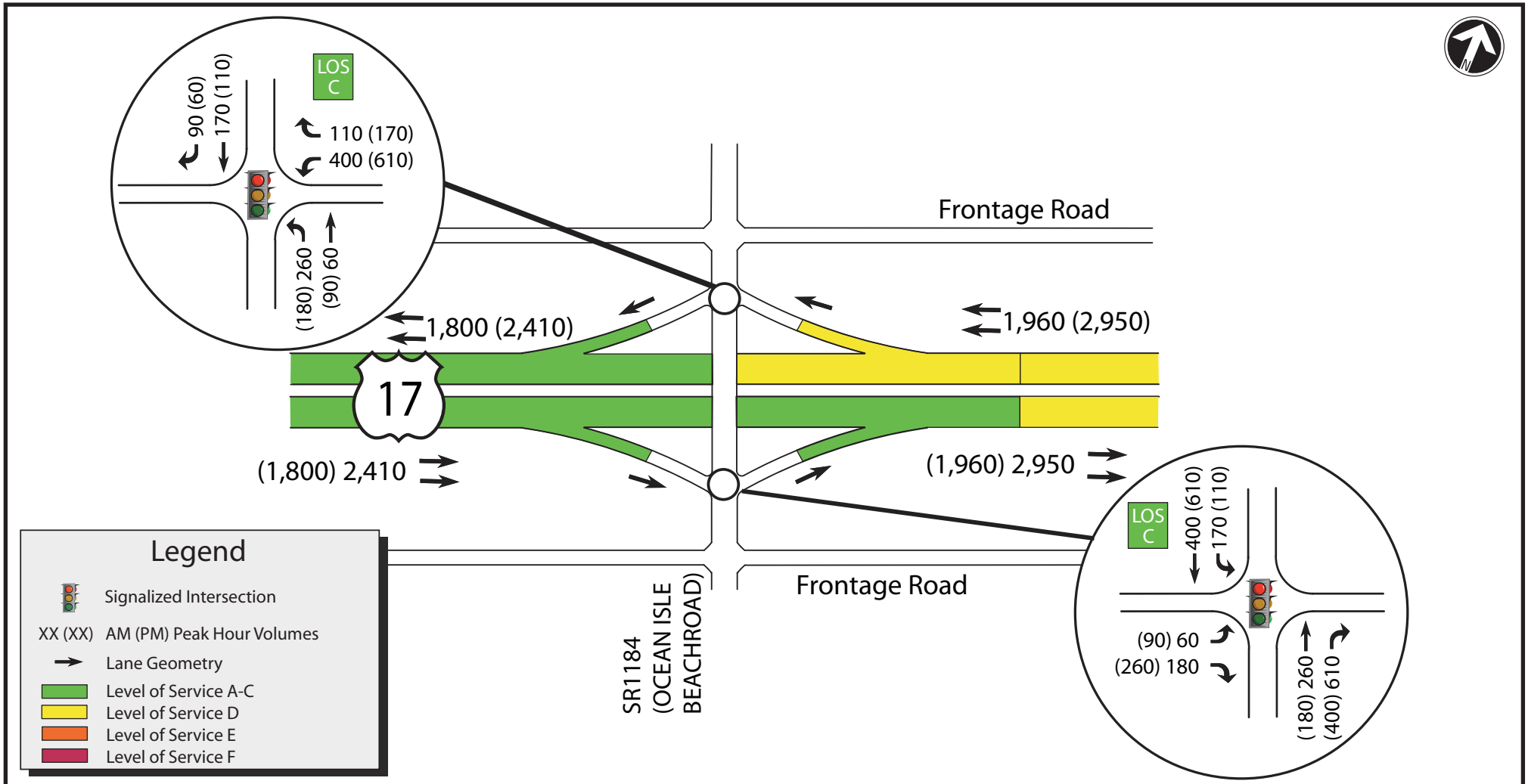
# US 17 CORRIDOR STUDY

**Brunswick County**

2030 Freeway Peak Hour Turning Movement Volumes, Geometry, and Levels of Service

FIGURE 4-29

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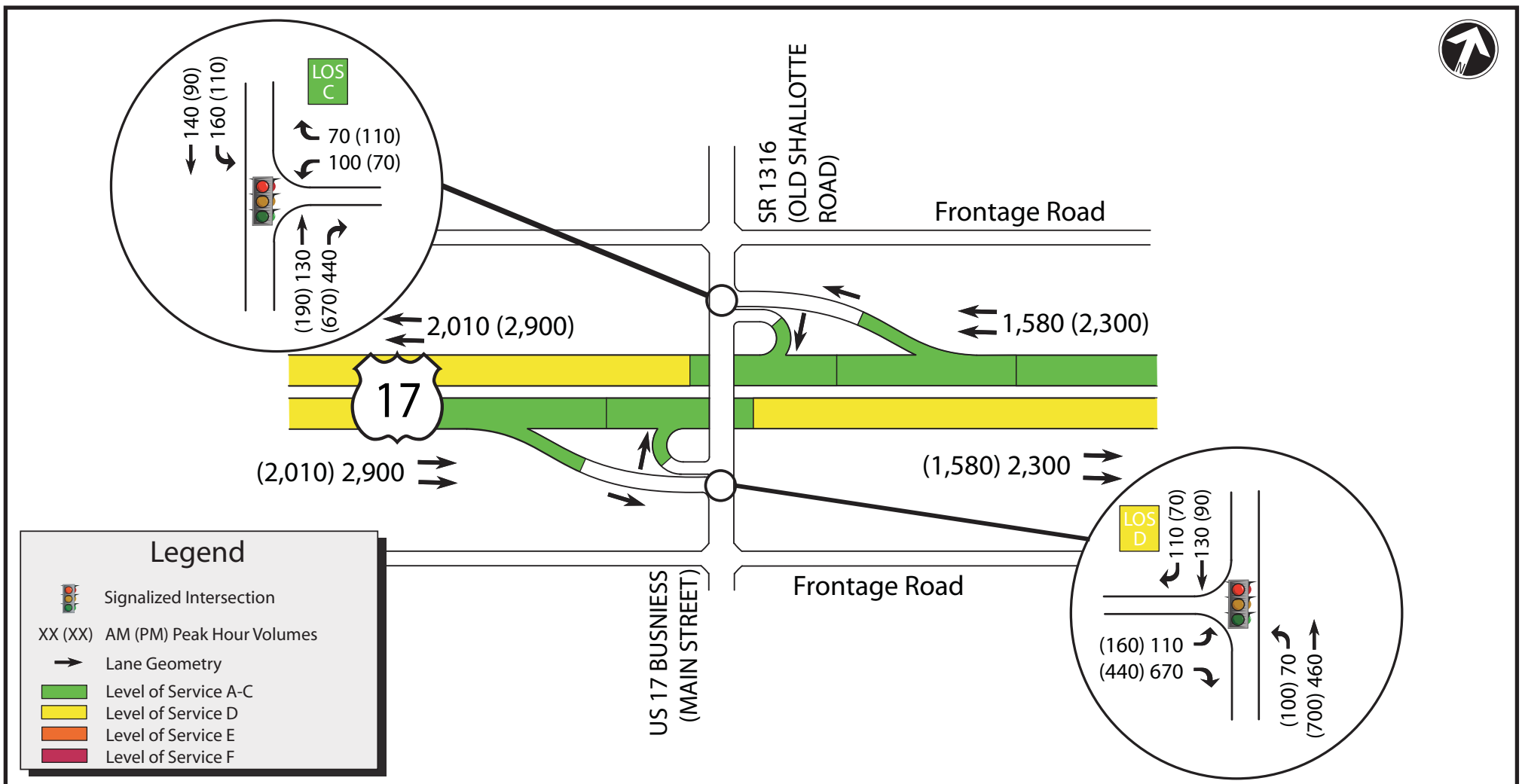
# US 17 CORRIDOR STUDY

**Brunswick County**

2030 Freeway Peak Hour Turning Movement Volumes, Geometry, and Levels of Service

FIGURE 4-30

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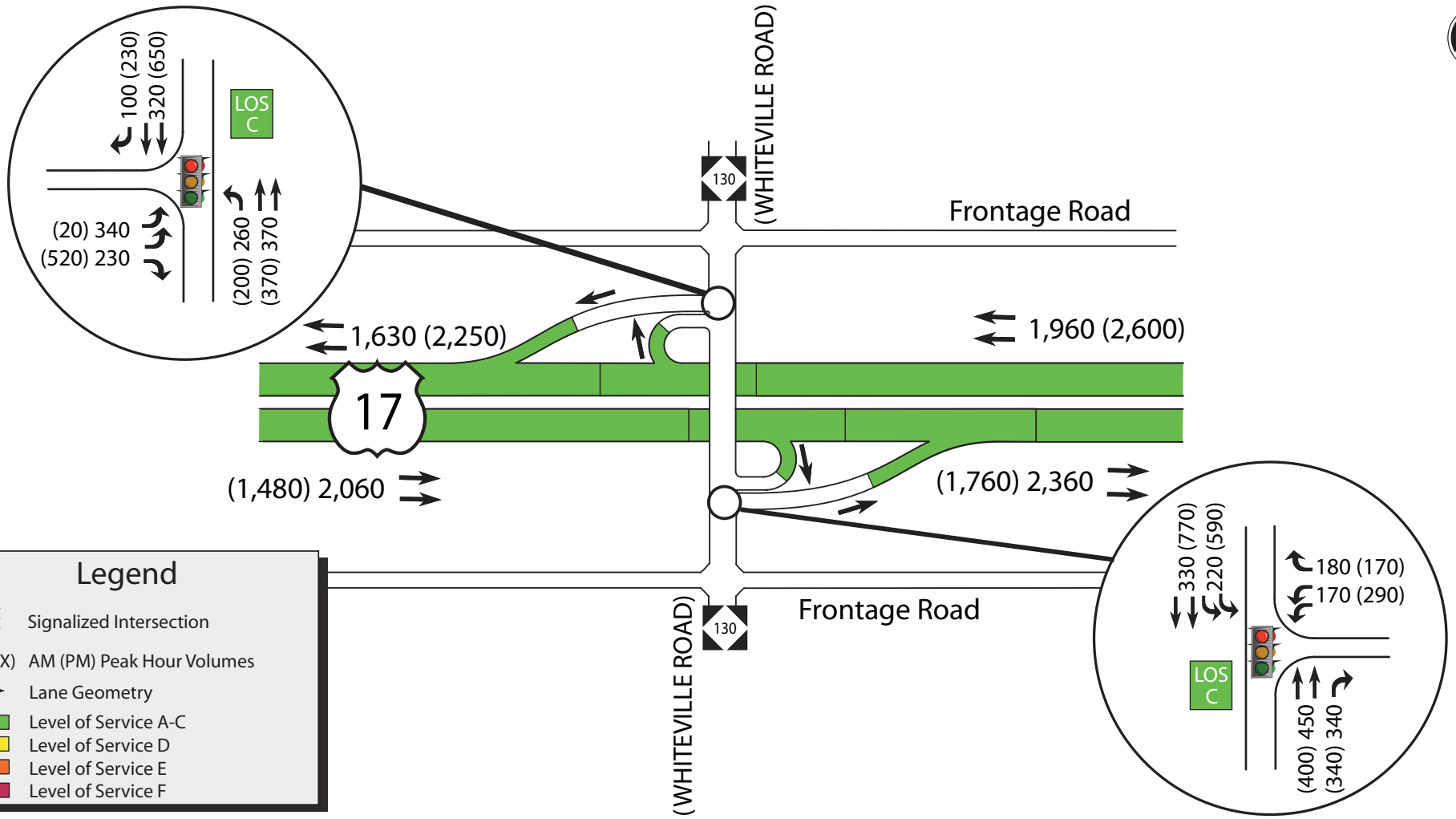
# US 17 CORRIDOR STUDY

**Brunswick County**

2030 Freeway Peak Hour Turning Movement Volumes, Geometry, and Levels of Service

FIGURE 4-31

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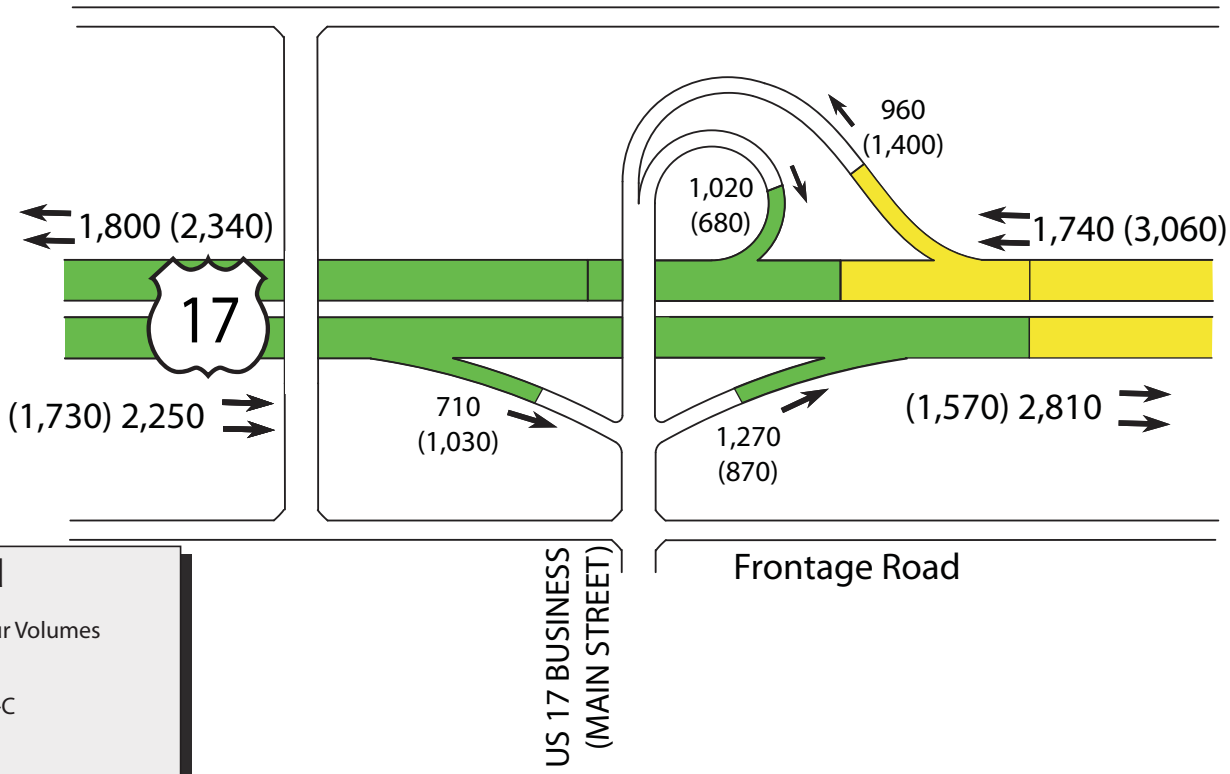
# US 17 CORRIDOR STUDY

**Brunswick County**

2030 Freeway Peak Hour Turning Movement Volumes, Geometry, and Levels of Service

FIGURE 4-32




## Legend

XX (XX) AM (PM) Peak Hour Volumes

Lane Geometry

Level of Service A-C

Level of Service D

Level of Service E

Level of Service F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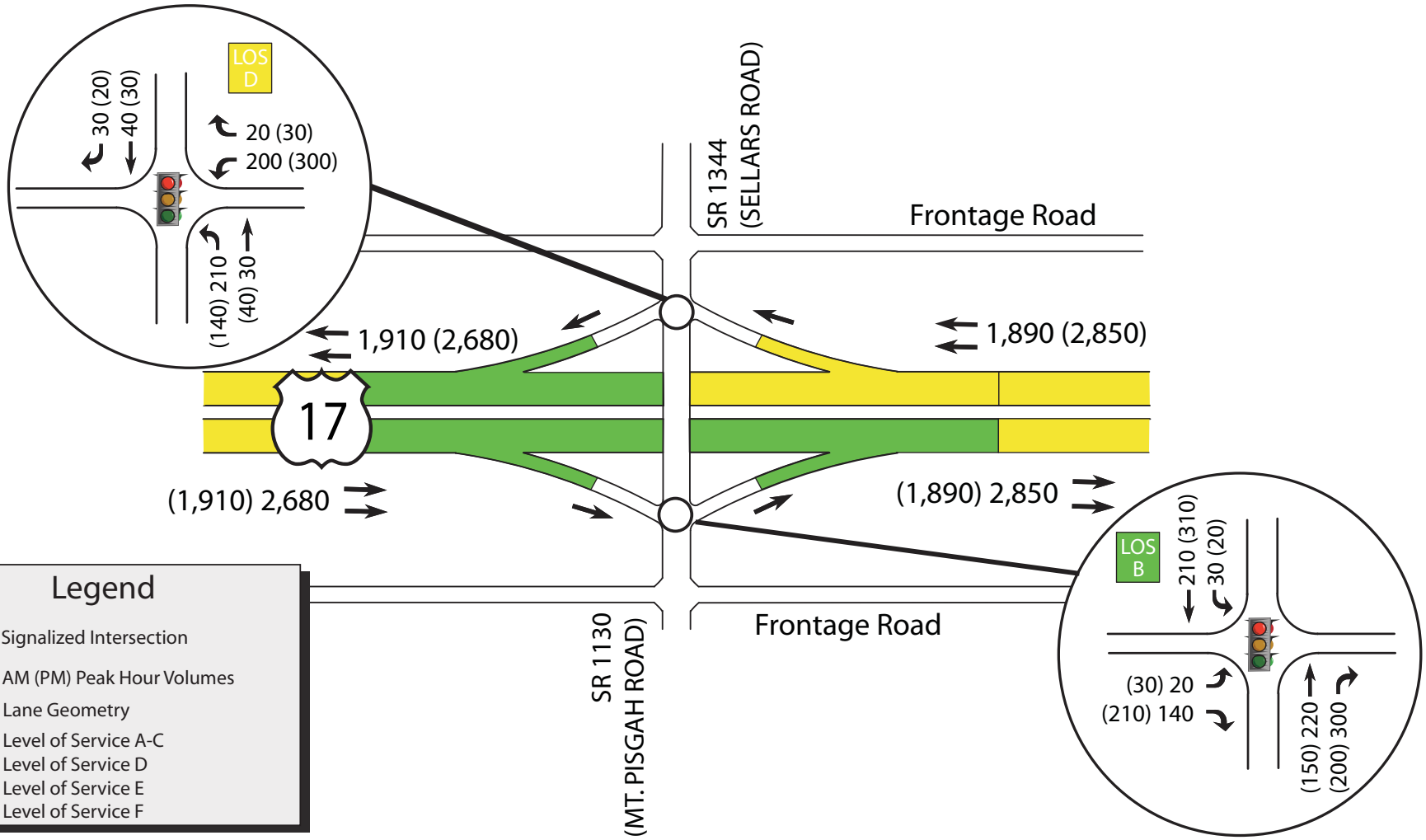
# US 17 CORRIDOR STUDY

**Brunswick County**

2030 Freeway Peak Hour Turning Movement Volumes, Geometry, and Levels of Service

FIGURE 4-33





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# US 17 CORRIDOR STUDY

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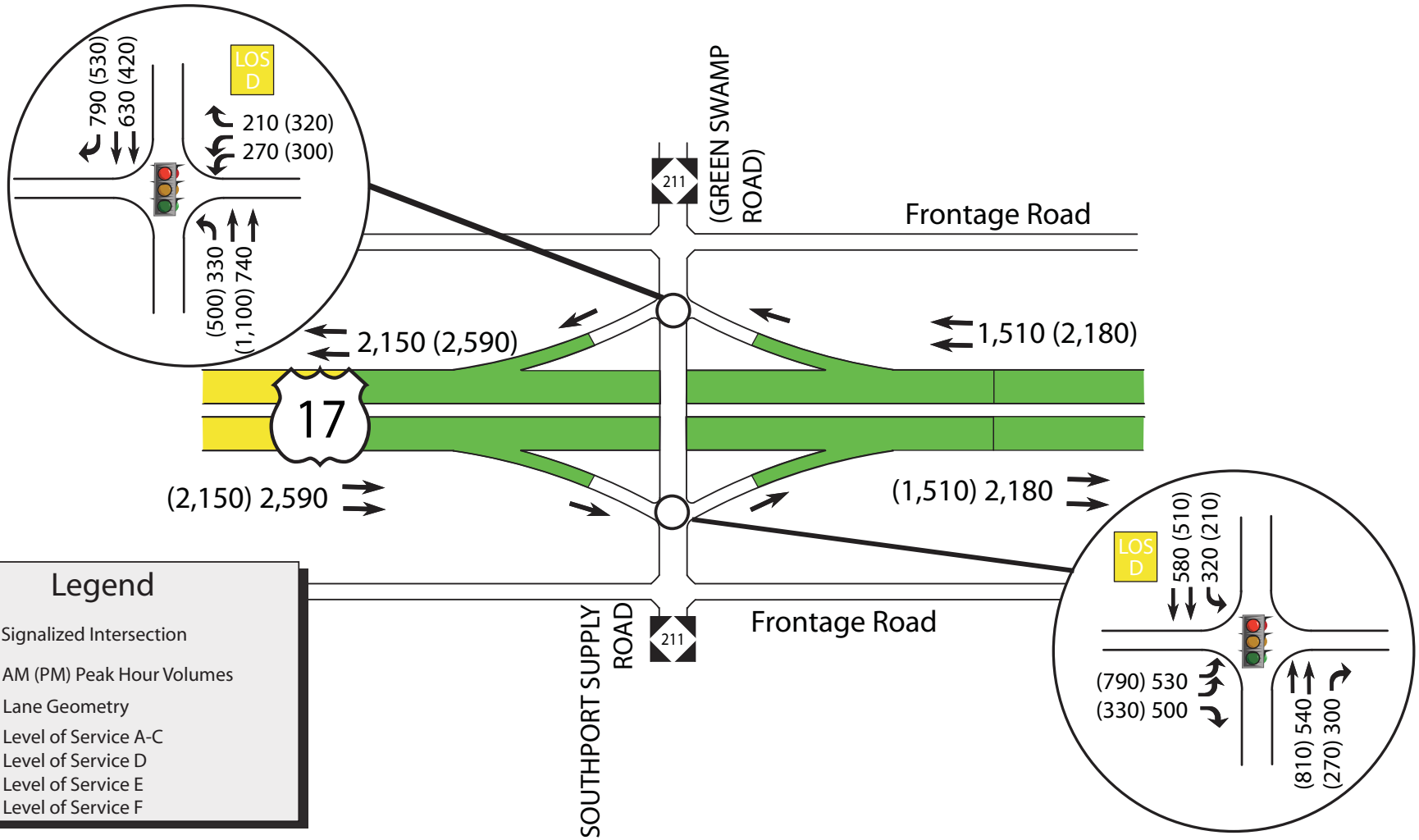
2030 Freeway Peak Hour Turning Movement Volumes, Geometry, and Levels of Service

FIGURE 4-34





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# US 17 CORRIDOR STUDY

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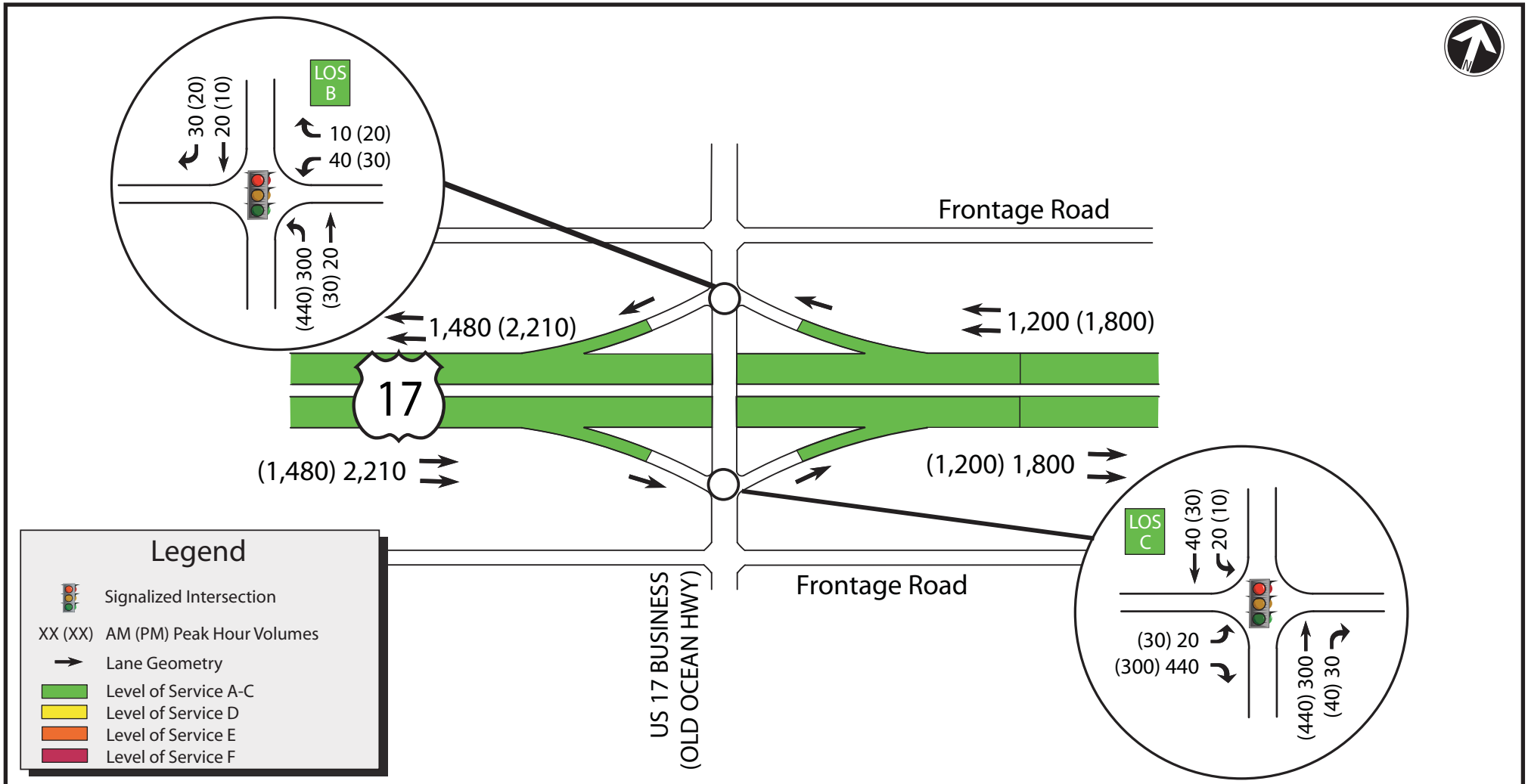
2030 Freeway Peak Hour Turning Movement Volumes, Geometry, and Levels of Service

FIGURE 4-35

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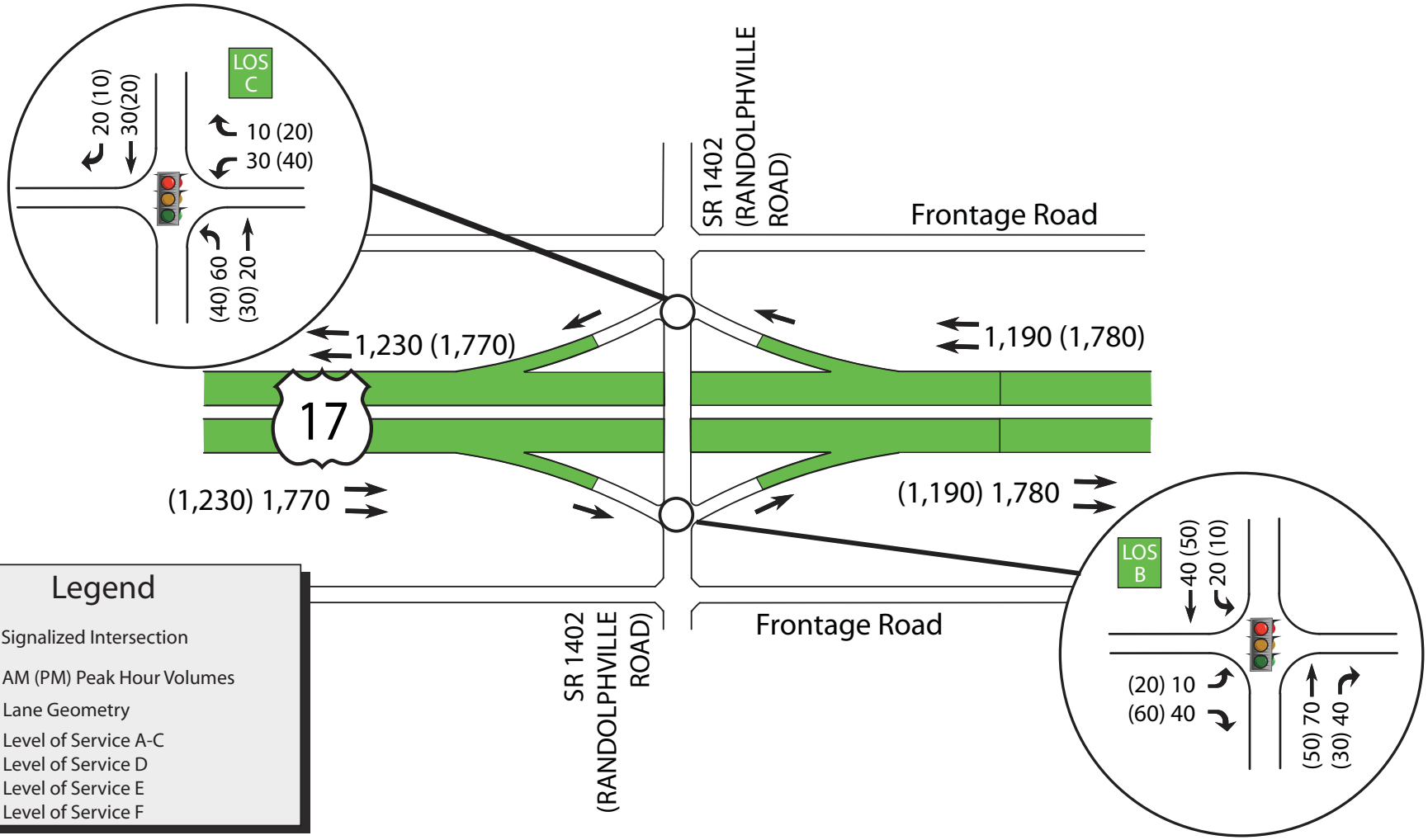
# US 17 CORRIDOR STUDY

**Brunswick County**

2030 Freeway Peak Hour Turning Movement Volumes, Geometry, and Levels of Service

FIGURE 4-36

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# US 17 CORRIDOR STUDY

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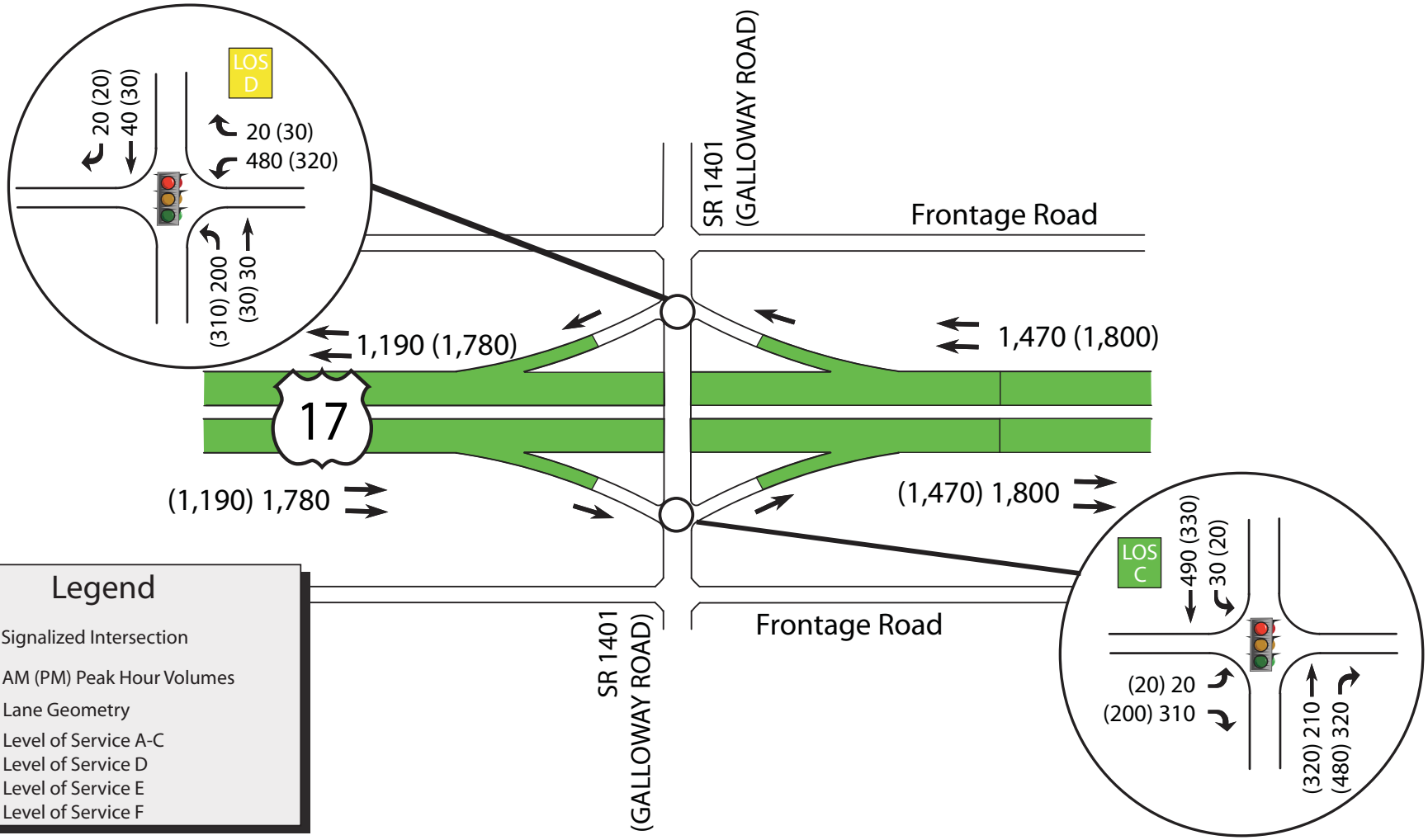
2030 Freeway Peak Hour Turning Movement Volumes, Geometry, and Levels of Service

FIGURE 4-37





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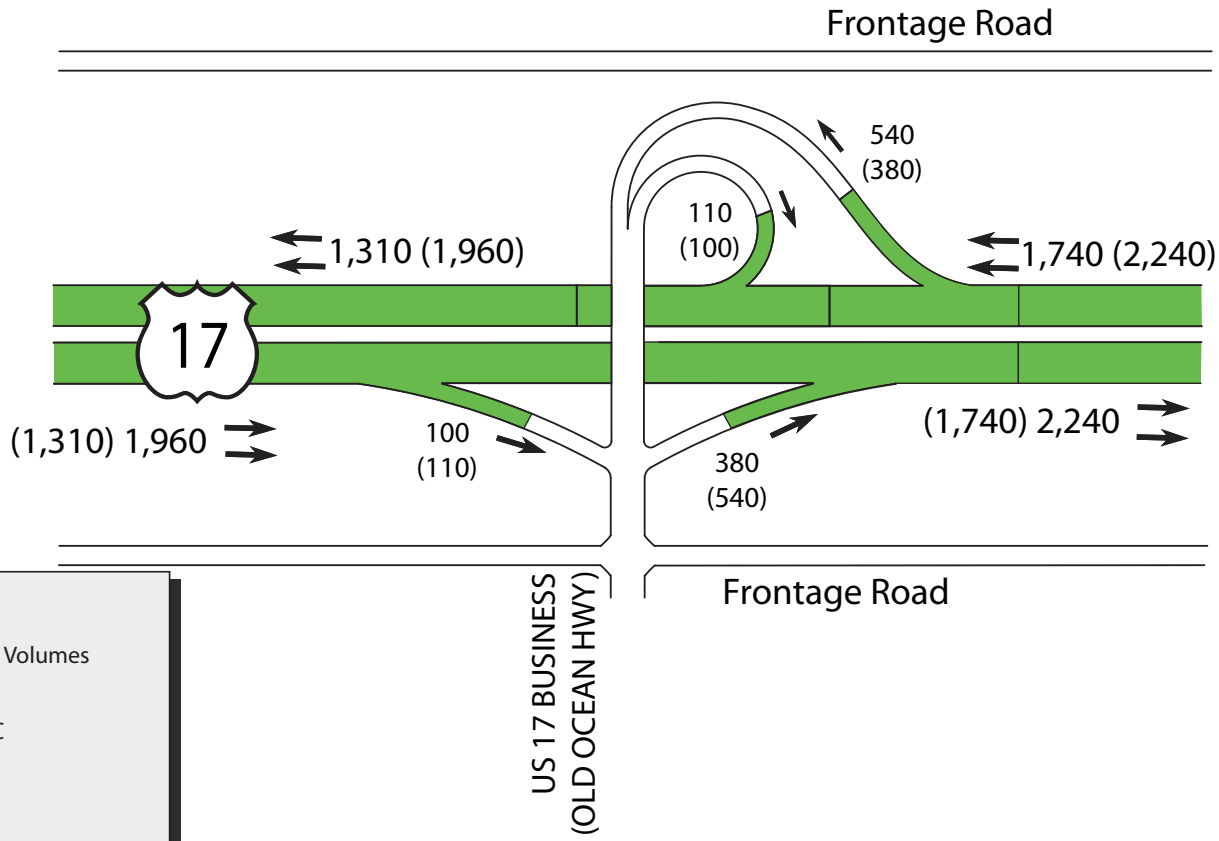
# US 17 CORRIDOR STUDY

**Brunswick County**

2030 Freeway Peak Hour Turning Movement Volumes, Geometry, and Levels of Service

FIGURE 4-38




## Legend

XX (XX) AM (PM) Peak Hour Volumes

Lane Geometry

Level of Service A-C

Level of Service D

Level of Service E

Level of Service F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# US 17 CORRIDOR STUDY

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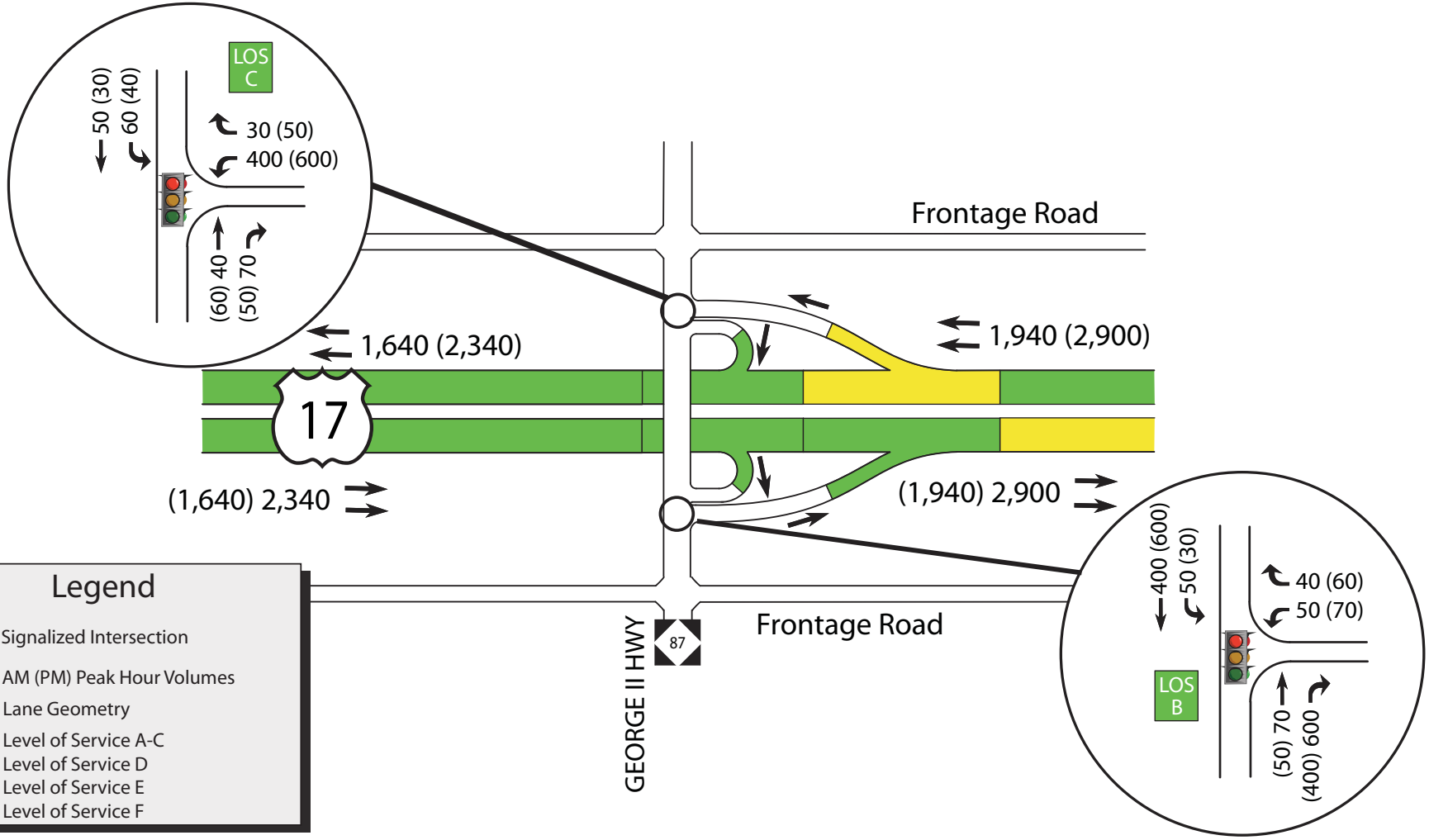
2030 Freeway Peak Hour Turning Movement Volumes, Geometry, and Levels of Service

FIGURE 4-39

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# US 17 CORRIDOR STUDY

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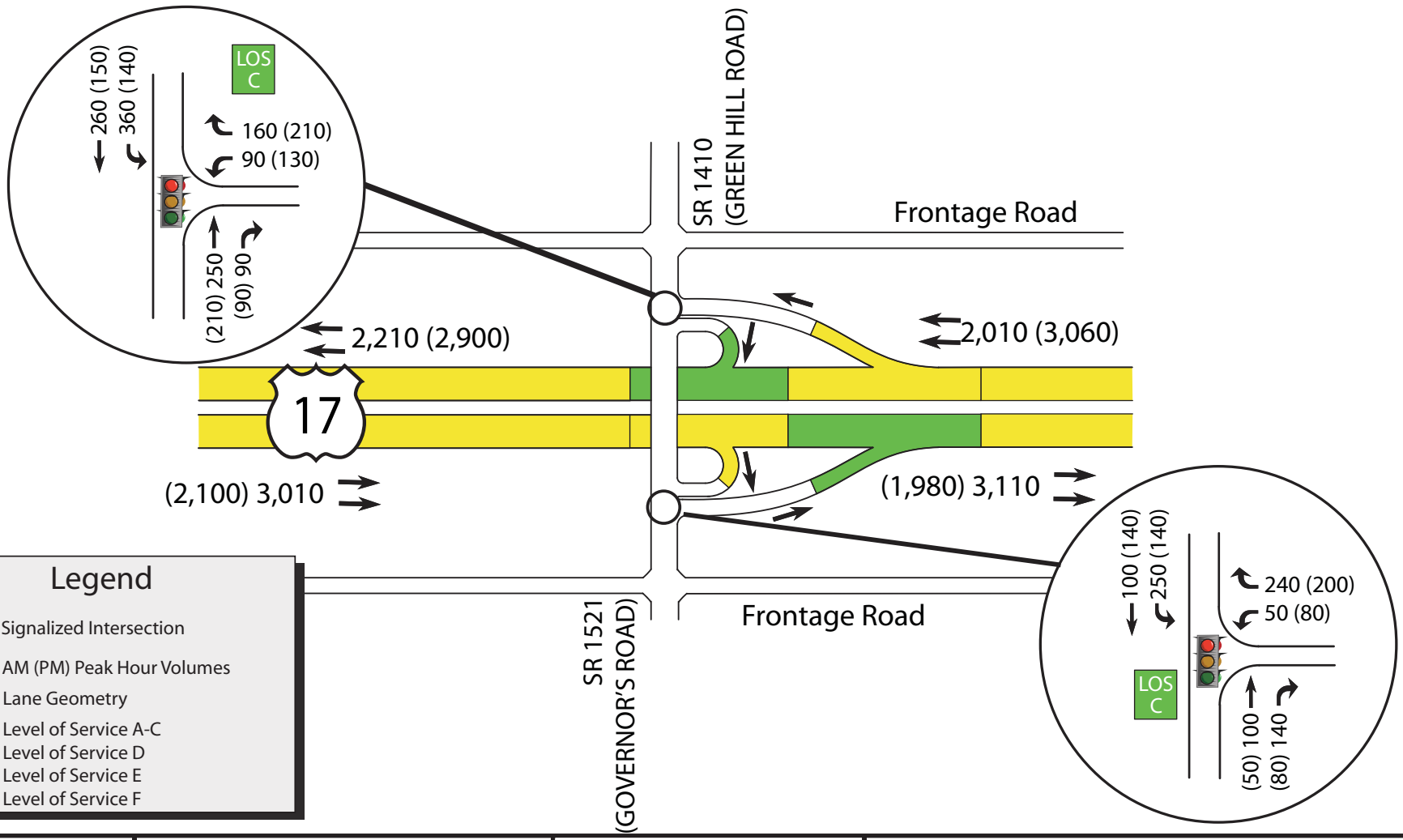
2030 Freeway Peak Hour Turning Movement Volumes, Geometry, and Levels of Service

FIGURE 4-40





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# US 17 CORRIDOR STUDY

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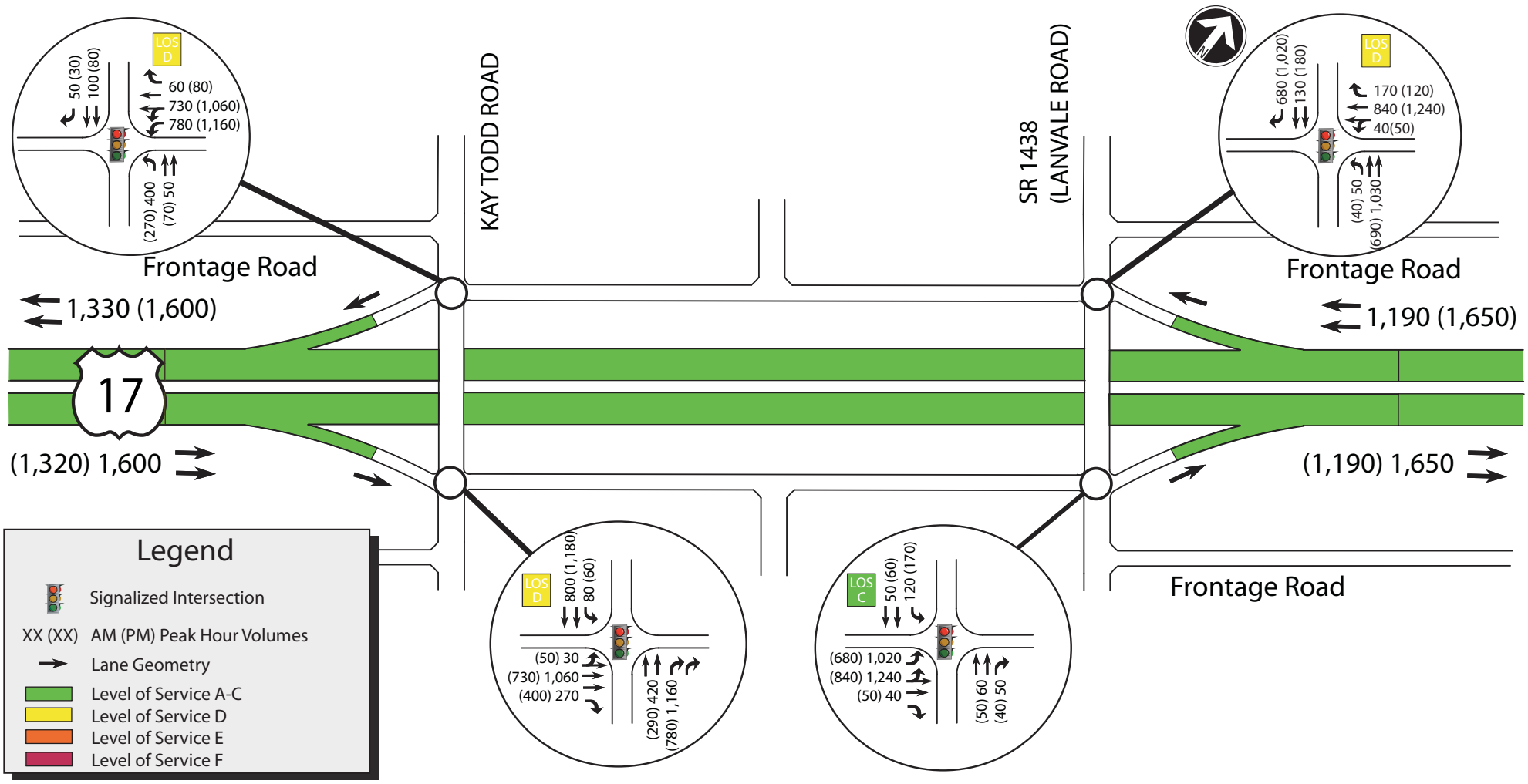
2030 Freeway Peak Hour Turning Movement Volumes, Geometry, and Levels of Service

FIGURE 4-41

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# US 17 CORRIDOR STUDY

**Brunswick County**

2030 Freeway Peak Hour Turning Movement Volumes, Geometry, and Levels of Service

FIGURE 4-42

# 5 Evaluation of Alternatives

To evaluate the improvement alternatives for the US 17 Corridor, a network traffic simulation was performed and compared to the Existing and No-Build conditions. The simulation was performed for two of the three improvement scenarios, the Intersection Improvements Alternative and Superstreet Alternative. Because the simulation software used (Synchro and Simtraffic) does not have the capability to simulate freeway conditions, a simulation analysis was not performed for the Freeway Alternative. The Freeway Alternative individual element analysis results performed using HCS show that Freeway Alternative will operate with acceptable LOS. A brief evaluation of the social and environmental impacts was also performed based on how the alternatives would affect land use, travel patterns, and business access along the US 17 Corridor.

## 5.1 Corridor Traffic Simulation

Using the SimTraffic software program, which simulates the Synchro traffic network, a corridor network evaluation simulated year 2030 conditions between the South Carolina State line and Blackwell Road, located just south of where the existing freeway portion of US 17 begins. Measures of effectiveness for the SimTraffic analysis included delay per vehicle (seconds), stops per vehicle, and average speed. **Table 5-1** shows the SimTraffic analysis results for the entire simulated network and for only vehicles traveling on the US 17 Corridor. Analysis printouts can be found in the Phase II Analysis Results CD attached to this report.

**Table 5-1: SimTraffic Network Evaluation Results**

| Alternative | Entire Network | | | US 17 Corridor Only | | |
|---|---|---|---|---|---|---|
| | Delay per Vehicle (sec) | Stops per Vehicle | Speed (mph) | Delay per Vehicle (sec) | Stops per Vehicle | Speed (mph) |
| 2004 Existing | 152 (150) | 1.7 (1.3) | 39 (39) | 117 (105) | 0.9 (0.8) | 44 (44) |
| 2030 No-Build | 1312 (917) | 3.2 (3.6) | 20 (25) | 475 (300) | 2.1 (3.4) | 26 (31) |
| 2030 Intersection Improvements | 251 (230) | 2.9 (2.6) | 34 (34) | 188 (190) | 1.9 (1.9) | 38 (38) |
| 2030 Superstreet | 247 (217) | 3.1 (2.8) | 34 (34) | 154 (152) | 1.8 (1.8) | 36 (35) |

Note: AM (PM) Peak Hour Conditions

### 5.1.1 Existing Conditions Traffic Simulation Results

As expected, the Existing conditions traffic simulation recorded the lowest amount of delay per vehicle and stops per vehicle and had the highest average speed. This is because the year 2004 peak hour traffic volumes are much lower than the projected year 2030 volumes analyzed for all other alternatives.

### 5.1.2 No-Build Conditions Traffic Simulation Results

Of the three analyzed conditions using year 2030 peak hour volumes, the No-Build conditions traffic simulation recorded the highest amount of delay per vehicle and stops per vehicle and had the lowest average speed. This was common for the entire network analysis and the US 17 Corridor only analysis results.

### 5.1.3 Intersection Improvements Alternative Traffic Simulation Results

Of the three analyzed conditions using year 2030 peak hour volumes, network wide the Intersection Improvements Alternative traffic simulation recorded the second highest amount of delay per vehicle, lowest amount of stops per vehicle, and highest (tied with Superstreet) travel speed. The simulation indicated the US 17 mainline operated with relatively low congestion although some vehicles could not enter the network due to congestion on some of the busy cross street approaches.

### 5.1.4 Superstreet Alternative Traffic Simulation Results

Of the three analyzed conditions using year 2030 peak hour volumes, network wide the Superstreet Alternative traffic simulation recorded the lowest amount of delay per vehicle, second highest amount of stops per vehicle, and highest (tied with Intersection Improvements) travel speed. It should be noted that due to limitations of the Synchro analysis, traffic signals at the cross streets were analyzed as one two-phase signal. If this alternative would be implemented, these signals would operate as a pair of two phase signals. This is important to note because with pairs of two phase signals, the progression on the corridor would operate better than the simulation indicates, and the, delay and stops would be less than was recorded.

## 5.2 Environmental and Community Impacts

### 5.2.1 Intersection Improvements Alternative Environmental and Community Impacts

The Intersection Improvements Alternative would require the least amount of right of way required for the improved geometry. Consequently, this alternative would have the least amount of environmental impacts. Required right of way would be needed for the addition of turn bays and through lanes on the cross streets. In most cases, the addition of through lanes on US 17 could be accommodated within the existing right-of-way, however in locations where existing right-of-way narrows, additional construction easements would be required to accommodate the proposed improvements. Twenty-three multiphase traffic signals would be located on the US 17 mainline, making the trip from South Carolina to Wilmington a stop and go experience. Access to businesses and property along US 17 would remain for the most part, similar to the existing conditions.

### 5.2.2 Superstreet Alternative Environmental and Community Impacts

The Superstreet Alternative would require the second highest amount of right of way required for the improved geometry. Consequently, this alternative would have the second highest amount of environmental impacts, although very similar to the Intersection Improvements Alternative. Required right of way would be needed for the addition of right turn lanes on the cross streets and for areas where u-turn bulbs could not be accommodated within the US 17 right of way. In most cases, the addition of through lanes on US 17 could be accommodated within the existing right-of-way, however in locations where existing right-of-way narrows, additional construction easements would be required to accommodate the proposed improvements. Although 84 traffic signals would be located on the US 17 mainline, making the trip from South Carolina to Wilmington would not be as much a stop and go experience as the Intersection Improvements alternative due to the two phase signals and the potential for excellent traffic progression. It should also be mentioned that the analysis performed for this study assumed that all cross street and u-turn intersections were signalized. If NCDOT decides that any of the signals are not warranted, operations of the corridor would be better than analyzed. Access to businesses and parcels along US 17 would be accommodated through right turns from US 17 and through cross streets. The ability to access business parcels along US 17 could be improved with this alternative compared to the Intersection Improvements Alternative because making left turns into parcels would become very difficult as volumes increase along the corridor. The elimination of many left turning movements and full movement openings on the high speed facility would reduce the amount of conflict points, which may reduce crash potential compared to the Intersection Improvements Alternative.

### 5.2.3 Freeway Alternative Environmental and Community Impacts

The Freeway Alternative would require the highest amount of right of way required for the improved geometry. This alternative would have the highest amount of environmental impacts. Required right of way would be needed for the interchange footprints and for frontage roads that could not be accommodated within the US 17 right of way. The trip from South Carolina to Wilmington would be a free flow experience with high speed travel. Access to businesses and parcels along US 17 would be accommodated through frontage roads and grade separated cross streets. Frontage road locations would allow for the development of property along the on and off-ramps and adjacent to the frontage roads. The elimination of at grade intersections would reduce the amount of conflict points on US 17, however the addition of ramp terminal intersections and frontage road intersections would add conflict points for traffic not traveling through the area on US 17.

# 6 Public Involvement

To help identify and develop the improvement alternatives for the study a Steering Committee and Working Committee were formed and a public involvement plan that involved local officials meetings and two public workshops was created. The project Steering Committee was responsible for coordinating public input and acting as a liaison to the community. The project Working Committee was responsible for providing technical guidance throughout the project. The public involvement plan introduced an Expressway Alternative, which is a scenario that could be created if US 17 is transitioned from a signalized arterial to a freeway facility. The Expressway Alternative would include grade separated interchanges and at-grade unsignalized intersections along the corridor. The Expressway Alternative is discussed further in **Section 7**.

## 6.1 Steering and Working Committee Meetings

Upon completion of the corridor study, four Steering Committee meetings and two Working Committee meetings will be held. Major presentation topics of these meetings can be found below. Presentation materials, if applicable, are shown in **Appendix D**.

Members of the Steering and Working committees are:

### Steering Committee

- Jamal Alavi – NCDOT Systems Planning Unit Head
- Pate Butler – NCDOT Sandhills Regional Traffic Engineer
- James Dunlop – NCDOT Congestion Management Engineer
- Deborah Jokisch – NCDOT Facility Upgrade Engineer
- Kevin Lacy – NCDOT State Traffic Engineer
- May Moore – Brunswick County Commission
- Regina Page – NCDOT Plan Review Senior Project Engineer
- Nathan Phillips – NCDOT Project Manager
- Mark Pleasant – Representative from SCDOT
- Jackson Provost – NCDOT Division 3 Operations Engineer
- Bill Sue – Brunswick County Commission

## Working Committee

- Fred Barkley – NCDOT Right of Way Appraiser
- Teresa Becher – NCDOT Access Management Engineer
- Leslie Bell – Brunswick County Planning Director
- Joe Blair – NCDOT Division 3 Construction Engineer
- Stuart Bourne – NCDOT Traffic Control, Marking, & Delineation Engineer
- Pate Butler – NCDOT Sandhills Regional Traffic Engineer
- Steven Click – NCDOT Signals and Geometrics Systems Engineer
- Charles Cox – Project Development Unit Head
- Dan Cumbo – NCDOT District Engineer
- Don Eggert – Cape Fear RPO (will coordinate with local governments)
- Roger Hawkins – NCDOT Division 3 Traffic Engineer
- Deborah Jokisch – NCDOT Facility Upgrade Engineer
- Doug Lane – NCDOT Preliminary Estimate Squad Engineer
- Derrick Lewis – NCDOT Feasibility Studies Unit Head
- Brian Mayhew – NCDOT Traffic Safety Engineer
- Regina Page – NCDOT Plan Review Senior Project Engineer
- Nathan Phillips – NCDOT Plan Review Engineer
- Jim Speer – NCDOT Roadway Design Engineer
- David Wasserman – NCDOT Systems Planning Engineer

### 6.1.1 Steering Committee Meeting #1

The projects first Steering Committee meeting occurred on August 11, 2003 at the Brunswick Government Center. The meeting served as a kickoff meeting for the corridor study and represented the first gathering of the Steering Committee. Major topics of discussion during the meeting included:

- Purpose of study
- Description of Phase I of study
- Description of Phase II of study
- Steering Committee responsibilities
- Schedule

### 6.1.2 Working Committee Meeting #1

The project's first Working Committee meeting occurred on August 11, 2003 at the NCDOT Division 3 conference room. The meeting served as a kickoff meeting for the corridor study and represented the first gathering of the Working Committee. The Working Committee drove the corridor and performed a field investigation.

### 6.1.3 Steering Committee Meeting #2

The project's second Steering Committee meeting occurred on May 25, 2004 at the Brunswick Electric Membership Corporation Building. The meeting was held prior to the 1st public workshop. Major topics of discussion included:

- Phase II project team introduction
- Review of the findings from Phase I of study
- Description of Phase II and III of study
- Description of the future Steering Committee meetings
- Presentation of 1st public workshop materials

### 6.1.4 Working Committee Meeting #2

The project's second Working Committee meeting occurred on October 18, 2004 at the Brunswick Electric Membership Corporation Building. Major topics of discussion included:

- Review of 1st public workshop
- Presentation of the analysis results of the Existing conditions
- Presentation of the analysis results of the No-Build conditions
- Presentation of the analysis results of the Intersection Improvements Alternative
- Presentation of the Superstreet, Expressway, and Freeway Alternatives

Conceptual plans of the four improvement alternatives were presented and the Working Committee offered comments on the designs.

### 6.1.5 Steering Committee Meeting #3

The projects third Steering Committee meeting occurred on October 22, 2004 at the Brunswick Electric Membership Corporation Building. Major topics of discussion included:

- Review of 1st public workshop
- Presentation of the analysis results of the Existing conditions
- Presentation of the analysis results of the No-Build conditions
- Presentation of the analysis results of the Intersection Improvements Alternative
- Presentation of the Superstreet, Expressway, and Freeway Alternatives
- Review of the Working Committee's comments

### 6.1.6 Steering Committee Meeting #4

The projects third Steering Committee meeting occurred on June 9th, 2005 at the Brunswick Electric Membership Corporation Building. Major topics of discussion included:

- 2nd Public Workshop review
- Summary of Conceptual Alternatives Report
- Description of Phase III of Study – functional designs
- Application of study results

## 6.2 Public Workshops

Two public workshops were held during Phase II of the corridor study. Prior to the public workshops, a local officials meeting was held. A description of both workshops can be found below:

### 6.2.1 Public Workshop #1

The first local officials meeting and public workshop was held on May 25th, 2004 at Supply Elementary School in Supply, North Carolina.

The Local Officials Meeting was held between 3:00 and 4:30 PM. Tables were used to display the maps, newsletters, and handouts that would be shown at the Citizens Informational Workshop. The PowerPoint presentation given provided a summary of Phase I of the Corridor Study and a preview of that evening's public workshop. The PowerPoint presentation can be found in **Appendix E**.

The public workshop was held between 5:00 and 8:00 PM. Seventy-six (76) persons from the public signed in at the sign in table and attended the meeting. The purpose of the meeting was to present the results of Phase I of the study and to give the public a chance to provide input in developing alternatives to improve and preserve mobility along the US 17 corridor.

Aerial maps of the US 17 Corridor were displayed at the meeting. For ease of citizen review, the map was divided into five presentable segments. Separate display areas for each of the five segments of the corridor were set up to facilitate public input on the corridor characteristics and needs. Display boards detailing the purpose of the study, the study process, and the major issues associated with project development were also displayed throughout the meeting area. A handout detailing this project information was also distributed to meeting attendees. Copies of the meeting handout and the items displayed are provided in **Appendix E**.

A total of twenty-two (22) comment sheets were received either at the meeting or via email, fax, and mail.

The comment sheet contained three questions. Responses received to each of these questions are provided below. The comment sheets were numbered in order to track the comments from the individual respondents.

1. If you could identify one feature that you would like for NCDOT to consider while planning the proposed project, what would this be? (For example, endangered species, storm evacuation routes, not disrupting existing neighborhoods, water quality protection, access to local businesses, noise, etc.)

The majority of comments pertained to maintaining access to residences and businesses, not disrupting existing neighborhoods, and keeping US 17 a highway. All of the comments are listed below. The number in parenthesis matches the ID on the actual inventoried comment sheet.

- Safety entering and exiting from residences and businesses along the highway. (1)

- The intersection of US 17 and NC 211 is very dangerous. (2)
- Improving access to the highway from nearby development. (3)
- Ease of traffic exiting and re-entering to help improve local business transactions. (4)
- Access to local businesses. (5)
- Not disrupting existing neighborhoods and access to local businesses. (6)
- Maintaining a free moving highway from Wilmington to South Carolina border with access to local roads (i.e., limit growth of businesses along US 17). (7)
- Access to local businesses and homes, cost of project, proximity of project to existing buildings not acquired for the need of additional right-of-way (8)
- Creation of more service roads in residential communities along US 17. (9)
- Keep the projects a super highway. (10)
- Not disrupting existing neighborhoods. (11)
- A traffic light is badly needed at Country Club Road and Route 179. (12)
- Not disrupting existing neighborhoods, access to local businesses, storm evacuation routes, water quality, and noise. (13)
- Please consider all of the options you have listed in parentheses. (14)
- US 17 is the only route from Little River, SC to Wilmington, NC. Any changes and/or improvements to the roadway should include access roads on both sides of the roadway to provide access to local residences and businesses. These access roads should have very limited access to US 17, as traffic on the roadway will soar in the years to come. (15)
- Bicycle and pedestrian trails. (16)
- Heavy use by trucks that do not observe speed or noise restrictions. (17)
- Do not disrupt existing neighborhoods (underlined on survey). (18)
- Noise. (19)
- Congestion. (20)
- I am opposed to expanding US 17 near Carolina Shores. (21)
- Maintain the natural beauty of North Carolina by curbing development. (22)

2. Why do you think preserving the feature listed in Question 1 is important to the local community?

The majority of comments pertained to keeping traffic away from local streets and safety concerns. All of the comments are listed below. The number in parenthesis matches the ID on the actual inventoried comment sheet.

- When have 400 entered a highway or street and faced 70 mile per hour traffic? (1)

- No. (3)
- Re-routing (US 17) will change the complexion of the local economy – it will make it better, not worse. (4)
- To help local business owners and to improve local, beach, historic and green tourism. (5)
- Because the people living there did so to get away from interstate highways. (6)
- There are many developments, churches, and local roads that people need to enter from US 17. (7)
- US 17 is the major corridor in the county and development along the corridor is substantial. Controlling the access and building service roads will disrupt all of these businesses and homes. (8)
- Decrease accidents along US 17 as well as enhance the flow of traffic so motorists are not constantly decelerating for residents to exit off of US 17. (9)
- Keep traffic moving and off local roads and streets. (10)
- Safety! If traffic in existing neighborhoods is increased, especially high speed traffic, the safety within the neighborhoods would be put at risk. Existing neighborhoods along with the surrounding areas are forever changed. Population increases tend to lower the quality of life and eventually turn suburbs into cities. (11)
- Addressing the first two items [listed in response to Question 1] will solve the other problems listed. (13)
- We are mostly a bedroom community. There must be several side roads off of SC 9 that can handle beach traffic without putting that traffic on us in North Carolina. We already have several routes to our own beaches, which are bad enough. I sometimes sit through two traffic lights in Little River. What will you do when traffic backs up into North Carolina? This will be unfair to the residents who live here and need to get around themselves. You need to think in terms of Venice, Italy with their 400 bridges over the Big Canal. What do you do with traffic backed up over the two-lane bridge? There are now six traffic lights in Little River that back up traffic with limited opportunities for left turns. We do not need I-74 and we do not want it. I see plenty of cars from Michigan here already without another route. There have been accidents at the intersection of US 17 and Country Club Road almost every day since a traffic signal was installed there. That means we hear rescue and fire trucks all of the time. We do not need South Carolina beach traffic coming through our community. (14)
- I believe that mentioned in the first answer will keep traffic moving better and more safely. (15)
- We need more outdoor physical activity. (16)

- This area is a senior citizen community and reducing the noise and speeds of heavy trucks would be greatly appreciated. (17)
- To keep this area a residential place – noise is a big factor. (19)
- The secondary roads are already overcrowded during the summer. They cannot take any more traffic. (20)
- We do not need increased traffic, particularly high-speed traffic. (21)
- Curbing development addresses all the examples listed in Question 1. (22)

3. I also wish to comment on or inquire about the following aspects of this project:

The majority of comments pertained to having an interstate on new location, specific intersection concerns, or keeping traffic off of US 17. All of the comments are listed below. The number in parenthesis matches the ID on the actual inventoried comment sheet.

- This new interstate needs to be on new location that allows for people to enter and exit the roadway exclusively through the use of off ramps. It is ridiculous to turn a county road into an interstate facility. (1)
- Many people avoid the NC 211/US 17 intersection by taking Stone Chimney Road SE, which serves as a cutoff between the two. This creates a bottleneck now for traffic at NC 211. Help with this intersection now would be appreciated. Actually, there is a large volume of traffic from all directions at this intersection. – HELP! (4)
- I would like to see the I-74 and NC 211 intersection left and expanded where it is presently located in Supply and the stop light left where it is at the intersection of US 17 and Main Street in Shallotte (US 17 Business). Please send me a map. (5)
- After the workshop for Carolina Bays Parkway I was able to receive a copy of the aerial photo. Is it possible to receive copies of the five maps from tonight? From the South Carolina State line to at least US 74/76 most if the traffic seems to come from Myrtle Beach. What happens to traffic counts if Myrtle Beach gets interstate access to the Ohio River? (6)
- 1. Please put me on your mailing list. 2. I do not think that US 17 should be made into Interstate 74. That road should parallel US 17 further inland. 3. Closing center island curb cuts is a good idea and should increase safety. 4. Consider more overpasses instead of traffic lights. (7)
- If this corridor is to be built, why build the northern loop from US 421 to US 17 at NC 87? The money for this project would be better spent to route the traffic down US 421, improve the causeway access across the river, and then used for the development of this corridor. This would represent less of an impact to both the human and natural

environments. It poses a question why the US 17 By-Pass to tie in at NC 87 was not shown in some manner such as dashed lines or something to indicate something was planned. (8)

- Will there be deceleration lanes to assist motorists with turning off of US 17 to residential communities rather than having to take the chance of being rear-ended by a vehicle going more than 55 miles per hour that cannot stop for fear of creating a major/multiple car accident. (9)
- We would like to see bridges and overpasses used with no traffic signals and no advertisements. (10)
- I would like very much to know what the proposed project is. (11)
- The biggest problem I see is speed. A posted 55 mph speed limit means traffic at 65 mph or more. If you want to go with a 65 mph design speed then you would have to design the roadway like they did SC 31 in South Carolina. I have traveled that road and even then I have to go 75 mph to keep from getting run off the road. I have lived at this address since 1985, when US 17 was still a two-lane highway, and have seen a lot of changes over the past 20 years. If I can help just ask. Good luck. (13)
- If US 17 is to be a corridor, make roadway crossings grade separated and build access roads parallel to US 17. This would cut down on the number of needed overpasses. (16)
- I would like to mention a condition at #2 Gate Country Club Road. Cars and trucks use this gate to make U-turns to return to NC 179 or US 17 and have caused damage to my driveway and the roadway in front of my driveway. Water now collects there and the standing water could cause a health hazard. I would like very much of you could send a roadway inspector to see this condition. Road signs providing better directions for drivers may also help with the problem. Please get back to me and help in anyway possible. (17)
- The new I-74 route should be separate from US 17 from the SC State line to Whiteville, NC by the shortest distance possible. (18)
- I strongly feel that a wall should be built between US 17 and the Carolina Shores neighborhood. I live on Northwest Drive, which runs parallel to US 17. The noise level could be greatly reduced by adding a wall along US 17 and Northwest Drive. This would also preserve the wildlife and trees from traffic related pollutants. (19)
- What is the study for and how will it help reduce local traffic? (20)
- Stormwater runoff should be a priority no matter where the corridor is built. (21)
- Do not turn the Brunswick County section of US 17 into another Myrtle Beach. As a former resident of New Jersey I have seen the result of poor or no planning. (22)

### 6.2.2 Public Workshop #2

The second local officials meeting and public workshop was held on November 18, 2004 at the Brunswick County Government Center in Bolivia, North Carolina.

The Local Officials meeting was held between 3:00 and 4:00 PM. A PowerPoint presentation was held, followed by a question and answer session. The question and answer session was a chance for local officials to voice comments and have questions answered by the study team. A copy of the PowerPoint presentation was given to the local officials in attendance. The PowerPoint presentation can be found in **Appendix F**. Questions and issues raised at the Local Officials meeting include the following:

Concerned about confusing senior citizens with the Superstreet Alternative. How would that be handled?

*Signing would be a key element to the design. Public involvement would be used to inform citizens about the design.*

Would lots of truck traffic reduce the efficiency of the Superstreet Alternative?

*The Superstreet Alternative is designed to accommodate trucks turning, but lots of truck traffic would slow traffic. Forecasted truck traffic is considered in the design.*

Will the land use change in the area once the selected alternative is built? Will land use around the interchanges or intersections become more commercial?

*Frontage roads used in the long-term alternatives would help protect interchange development along US 17. Ultimately, changes in land use will depend on zoning and coordinating with local officials. Commercial development will be more likely around high traffic areas such as interchanges.*

How will this project be funded in NCDOT's Transportation Improvement Program (TIP)?

*Currently, there is no funding for this project. Both a short-term and a long-term alternative will be chosen for this project. The short-term alternative would provide relatively inexpensive improvements to US 17, and the long-term alternative could be built in parts as needed and as funding becomes available.*

Is there enough existing right of way for service roads?

*No. Additional right of way would be purchased for the construction of service roads.*

Can service roads be built now for a future freeway?

*Because no current funding is available for this project, right of way cannot be purchased now to build service roads for a future project.*

Will the final corridor study report detail intersections and recommendations based on future traffic volumes?

*Yes, and NCDOT wants input from officials and the public on the alternatives.*

The public workshop was held between 4:00 and 7:00 PM. One hundred (100) persons from the public signed in at the sign in table and attended the meeting. The purpose of the meeting was to present the conceptual alternatives chosen for analysis and to ask the public for input on these alternatives.

The maps on display at the workshop showed the US 17 corridor on large-scale aerial photographs. Because of their size, the maps were divided into five sections. A set of maps was displayed for each of the four alternatives that were developed for the US 17 corridor: Intersection Improvements Alternative, Superstreet Alternative, Expressway Alternative, and Freeway Alternative. Maps of the two short-term improvement alternatives (Intersection Improvements Alternative and Superstreet Alternative) were displayed on one side of the cafeteria and maps of the two long-term improvement alternatives (Expressway Alternative and Freeway Alternative) were displayed on the opposite side of the cafeteria.

A computer station was set up at the meeting to provide citizens with a close-up look at the designs. NCDOT representatives were available to assist citizens who wanted to use the computer to look closely at specific locations within the study area.

An animated movie of the Superstreet alternative was projected on a screen. The movie was generated by the VISSIM software program and was set up to continuously play during the meeting. It was explained to citizens that the movie showed a sample intersection along US 17 and provided an example of how the Superstreet Alternative would operate.

Copies of the meeting handout and the items displayed are provided in **Appendix F**.

A total of nineteen (19) comments (including one resolution) were received either at the meeting or via email, fax, and mail. The comment sheet listed the four alternatives that were on display at the meeting:

- Intersection Improvements Alternative (short-term)
- Superstreet Alternative (short-term)
- Expressway Alternative (long-term)
- Freeway Alternative (long-term)

**Table 6-1** provides a summary of those comments that indicated a preference for an alternative.

**Table 6-1: Alternative Preferences**

| Alternatives | Individuals Supporting Alternative |
|---|---|
| Intersection Improvements (short-term) | 4 |
| Superstreet (short-term) | 4 |
| Expressway (long-term) | 0 |
| Freeway (long-term) | 3 |
| Any short-term alternative | 0 |
| Any long-term alternative | 3 |
| *Other suggestions made by commentors* | |
| Relocation of US 17 | 2 |
| Expressway north of US 17 | 1 |

Citizens were asked to comment on any or all of the alternatives. Below is a summary of the comments received.

- Found all but the long-term Freeway Alternative to be dangerous in the end. Feels US 17 is dangerous and is getting worse every day. Says everyone who travels US 17 knows how dangerous the speed is. (1)
- All alternatives were presented extremely well. One concern was outside the elected officials presentation, he did not see any definitions for the alternatives. Prefers the short-term Superstreet Alternative. Says it seems do-able and could be expanded to a freeway with the anticipated I-74 and the Cape Fear Skyway projects. (2)

- For the Expressway and Freeway Alternatives, recommends one large intersection at Supply to accommodate access to US 17, I-74, NC 211 and Stone Chimney Road instead of the major intersection proposed at Mt. Pisgah Church Road. (3)
- Feels that the Expressway and Freeway Alternatives are the only options due to current growth rates and patterns. Says Brunswick County needs a long-term solution to its traffic problems and that a short-term alternative is a waste of time. Intersection improvements are too short-term, will not change anything, and may make problems worse. Feels the Superstreet Alternative is interesting, but is confusing and will be slow-moving. (4)
- Needs a map to show where Maco Road or 87 North will enter US 17. (5)
- Thinks the intersections should be improved right away and that current landowners should be able to use their land for what it is currently zoned for. Wants to be sent any new CDs of maps. (6)

- Thinks the Superstreet Alternative is a way to quickly alleviate traffic problems and accidents. (7)
- Encourages the most permanent solution, even if it is the most expensive. Wants NCDOT to carefully consider the intersection of US 17 and Old Shallotte Road. Says many children are taken to Union Elementary School down Main Street in Shallotte, which becomes Old Shallotte Road. Some of this traffic turns west (or south) on US 17 and some crosses US 17. Impeding either will be dangerous for residents. (8)
- Prefers the Freeway Alternative. It is only going to cost the taxpayers more money to acquire property and access for the alternatives. However, feels that government will select a band-aid approach. He is a member of the Brunswick County Planning Board and says feel free to contact him. (9)
- Prefers the Intersection Improvements and the Superstreet Alternatives. Feels the quickest alternative is the best. (10)
- Prefers the Michigan left turn (Superstreet) Alternative with adding freeway interchanges as needed. Feels none of this is adequate for Leland area if growth continues. (11)
- Feels the two short-term alternatives are a waste of time and money. Thinks NCDOT should build a long-term alternative, improving high traffic areas first. Says to go ahead and build the interchanges and later connect these points as needed. "The road from US 74-76-NC 133-Village Road interchange to Wilmington needs to be improved now. The merging traffic creates a stop situation on the mainline almost every morning and afternoon at peak hours. An additional lane on the outside would

create a merge lane two miles long and would improve traffic flow in both directions." (12)

- Superstreet Alternative appears to be the most feasible. It allows for quicker development and provides ability to phase-in necessary improvements such as traffic signals as needed in the future, which may be more advantageous for potential business developments and/or improvements. Superstreet Alternative has less impact upon property adjacent to the US 17 Corridor, thus fewer right of way issues and relocations (including himself). Would like to be sent a copy of the design for each alternative. His property is on Sheet 3, near the Randolphville Road. N.E. intersection. (13)
- Recommends that a traffic light be installed at the intersection of Ocean Isle Beach Road and US 17. Does not believe the Michigan turn lanes would be effective. The future phases proposed would destroy her farm and business. Feels it would be more practical to build a new thoroughfare running parallel and inland of US 17. (14)

- Prefers the Intersection Improvements Alternative. Feels the other three alternatives are over kill and a waste of money. Thinks the Carolina Bays Highway should be extended from the SC border to Wilmington. Feels there is too much political emphasis being applied to this project. (15)
- The short-term alternatives will not meet the growth needs in Brunswick County. Recommends the following short-term improvements:
  -Need acceleration lanes at every major intersection
  -Need acceleration and deceleration lanes at every major business
  -Need sound strips in pavement at every intersection on primary and secondary roads
  -All stoplights at intersections should have left turn signals on primary and secondary roads.
- Recommends the following long-term improvements
  -Need an acceleration and deceleration lane at every driveway on US 17 in Brunswick County
  -Build an expressway 2 to 4 miles north of US 17 that has a closed access except at major intersections. The expressway should start at NC 211 and intersect with Interstate 31 in South Carolina. (16)
- Is concerned about the high ISO Class Rating of the Grissittown Fire Department in Ocean Ridge. Residents of Ocean Ridge have been working with the Grissittown Fire Department to lower their ISO Class Rating, which would lower property insurance premiums. Feels having an interstate along US 17 roadbed will negatively affect

property owners in the fire district. The interstate needs to be moved further west. (17)

- Suggests the use of interchanges with service roads [Freeway Alternative] as the appropriate measures for US 17 near Magnolia Greens. *Mr. Grimsley's comment was not available. His comment regarding US 17 was taken from a letter responding to Mr. Grimsley from Lanny T. Wilson.* (18)
- This was a resolution opposing the designation of US Highway 17 as a Superstreet, Freeway, or Expressway through Brunswick County from the Business Alliance for a Sound Economy (BASE). (19)

# 7 Conceptual Alternatives Recommendations

Phase III of the US 17 Corridor Study developed two alternatives further by developing functional designs. During Phase II of the study, three alternatives were analyzed: the Intersection Improvements Alternative, the Superstreet Alternative, and the Freeway Alternative.

Throughout the study, the need for a relatively simple to construct and less expensive solution for mitigating current and projected traffic congestion was identified. As development progresses along the corridor and traffic conditions deteriorate, this alternative could be implemented in a series of small projects. The Intersection Improvements and Superstreet Alternatives both are alternatives that fall into this category.

Both of these alternatives show similar traffic analysis results although the true benefit of the traffic progression possible with the Superstreet Alternative could not be simulated to it's full potential due to software limitations. Because both alternatives require very little right of way, these alternatives could easily be constructed in a series of smaller projects as funding becomes available or as development warrants improvements. Opportunities for funding may also become available as developers look for ways to mitigate traffic congestion caused by new development construction. The Superstreet Alternative costs approximately $25 million more than improving the existing intersections along US 17. The main reasons for the difference in costs is the larger area of resurfacing, more detailed signing, and increased amount of traffic signals required for the Superstreet Alternative. At the second public workshop, the Superstreet Alternative was well received by the public and many comments received supported this alternative due to the potential for improved traffic progression along the corridor and the elimination of potential dangerous left turns. In addition, many existing median break location can be eliminated with the Superstreet Alternative due to the provision of the numerous u-turn locations. The proposed median closure list can be found in **Table 7-1**. After performing a detailed traffic analysis and developing conceptual designs it was recommended that the Superstreet Alternative be further developed with functional designs.

It was recommended that the Freeway Alternative be further developed in Phase III because this alternative was identified as the vision for the US 17 corridor by NCDOT's Strategic Corridors Initiative (see **Section 1.1**). Because funding is not currently available for the

**Table 7-1: Existing Median Break Closure Locations (Superstreet Alternative)**

| Station | **Description** |
|---|---|
| 73+00 | North of Calabash Road |
| 198+00 | North of S. Middleton Drive |
| 242+00 | North of Thomasboro Road/Pea Landing Road |
| 267+00 | North of Shamrock Drive |
| 304+00 | North of Leach Trail |
| 358+00 | North of Frink Way |
| 436+00 | North of Ocean Ridge Parkway |
| 535+00 | North of McLamb Court |
| 570+00 | North of Ocean Isle Beach Road |
| 582+00 | North of Ocean Isle Beach Road |
| 605+00 or 615+00 | North of Ocean Isle Beach Road |
| 955+00 | North of Lula Trail |
| 1005+00 | North of Cumbee Road |
| 1032+00 | North of Cumbee Road |
| 1230+00 | North of Benton Road |
| 1655+00 | North of Old Ocean Highway |
| 1706+00 | North of Forest Lawn Lane |
| 1726+00 | North of Prong Branch Trail |
| 1774+00 | North of Bull Swamp Connection |
| 1815+00 | North of Northern Trail |
| 1850+00 | North of Victoria Boulevard |
| 1895+00 | North of George II Highway |
| 1907+00 | North of George II Highway |
| 1981+00 or 2000+00 | North of Zion Church Road |
| 2064+00 | North of Sloan Road/Maco Road |
| 2097+00 | North of Bridle Way |
| 2190+00 | North of Lanvale Road |
| 2216+00 | North of Lanvale Road |

construction of any alternatives and no timetable has been set for the improvements, preservation of right of way along the corridor and at potential interchange locations will be essential. By further developing this alternative, detailed right of way requirements could be identified and used by the NCDOT for use in determining development characteristics such as access locations and setback distances.

If the Freeway Alternative remains as the vision for the corridor, a period would exist as the corridor transitions from an arterial to a freeway facility. Like the Intersection Improvements and Superstreet Alternative, the Freeway Alternative could be built in a series of projects that would construct interchanges, mainline segments, and frontage roads. Developer funding may also become available as larger projects become a part of the Brunswick County development trend. Interchange locations could be constructed as intersections fail and become congested or where safety problems exist. In the second public workshop, the scenario where US 17 included interchanges at major cross streets but still allowed at grade intersections at minor cross streets was presented as the Expressway Alternative. Under the Expressway Alternative, all at-grade intersections would be stop controlled and no traffic signals would exist along the corridor.

**Table 7-2** shows the total volume projected to pass through each intersection during both peak hours and a ranking of the busiest intersections along the corridor by the year 2030. Each intersection was ranked for congestion based on total volumes passing through the intersection. The busiest ten intersections are highlighted, these are the intersections that would warrant grade separation first, based on traffic volumes alone.

**Table 7-2: Year 2030 Intersection Volumes**

| Cross Street | Total Intersection Volume | | Cross Street Volume | | Rank |
|---|---|---|---|---|---|
| | AM Peak Hour | PM Peak Hour | AM Peak Hour | PM Peak Hour | |
| SR 1300 (Calabash Rd.) & SR 1168 (Country Club Rd.) | 4180 | 4300 | 500 | 740 | 21 |
| SR 1167 (Persimmon Rd.) | 3700 | 3700 | 120 | 180 | 33 |
| SR 1302 (Shingletree Rd.) | 3560 | 3560 | 30 | 40 | 34 |
| SR 1303 (Hickman Rd.) | 3830 | 3830 | 310 | 200 | 31 |
| SR 1304 (Pea Landing Rd.) & SR 1165 (Thomasboro Rd.) | 4240 | 4240 | 490 | 520 | 21 |
| NC 904 (Seaside Rd. & Longwood Rd.) | 5150 | 5180 | 1070 | 1210 | 6 |
| SR 1317 (Green Bay Rd.) | 4290 | 4290 | 60 | 60 | 20 |
| SR 1318 (Mintz Cemetery Rd.) | 4240 | 4240 | 30 | 20 | 21 |
| SR 1319 (Union School Rd.) | 4470 | 4470 | 230 | 150 | 19 |
| SR 1184 (Ocean Isle Beach Rd.) | 5350 | 5350 | 870 | 580 | 4 |
| SR 1316 (Old Shallotte Rd.) & US 17 Business (Main St.) | 5310 | 5310 | 830 | 1000 | 5 |
| SR 1357 (Smith Ave.) | 5050 | 5050 | 460 | 730 | 11 |
| SR 1136 (Frontage Rd.) & US 17 Business (Main St.) | 6040 | 6100 | 1580 | 1100 | 1 |
| SR 1136 (Red Bug Rd.) | 5450 | 5450 | 340 | 220 | 3 |
| SR 1345 (Royal Oak Rd.) | 5120 | 5120 | 190 | 120 | 9 |
| SR 1270 (Sherrow Estates St.) | 4910 | 4910 | 220 | 150 | 15 |
| SR 1131 (Cumbee Rd.) | 4610 | 4610 | 50 | 30 | 18 |
| SR 1344 (Sellers Rd.) & SR 1130 (Mt. Pisgah Rd.) | 5100 | 5100 | 540 | 370 | 10 |

| Cross Street | Total Intersection Volume | | Cross Street Volume | | Rank |
|---|---|---|---|---|---|
| | AM Peak Hour | PM Peak Hour | AM Peak Hour | PM Peak Hour | |
| NC 211 (Green Swamp Rd. & Southport Supply Rd.) | 5920 | 5920 | 1880 | 1650 | 2 |
| SR 1115 (Stone Chimney Rd.) | 3950 | 3950 | 240 | 160 | 29 |
| SR 1502 (Benton Rd.) | 3990 | 3990 | 140 | 220 | 27 |
| US 17 Business (Old Ocean Hwy.) | 3760 | 3760 | 330 | 480 | 32 |
| SR 1401 (Galloway Rd. West) | 3050 | 3050 | 50 | 30 | 37 |
| SR 1402 (Randolphville Rd.) | 3120 | 3120 | 160 | 110 | 35 |
| SR 1401 (Galloway Rd. East) | 3840 | 3840 | 590 | 850 | 30 |
| US 17 Business (Old Ocean Hwy.) | 4140 | 4140 | 390 | 580 | 25 |
| South Lewis Ln. & SR 1514 (Mill Creek Rd.) | 4150 | 4150 | 140 | 100 | 24 |
| SR 1407 (Bell Swamp Connector) | 4000 | 4000 | 60 | 40 | 26 |
| SR 1406 (Bell Swamp Rd.) | 3980 | 3980 | 50 | 30 | 28 |
| George II Highway | 4960 | 4960 | 670 | 450 | 12 |
| SR 1410 (Green Hill Rd.) & SR 1521 (Governor's Rd.) | 5150 | 5150 | 320 | 220 | 7 |
| SR 1701 (Zion Church Rd. West) | 4940 | 4940 | 100 | 70 | 13 |
| SR 1701 (Zion Church Rd. East) | 4850 | 4850 | 50 | 30 | 16 |
| NC 87 & SR 1522 (Snowfield Rd.) | 5210 | 5040 | 430 | 120 | 8 |
| SR 1414 (Goodman Rd.) & SR 1461 (Hewett-Burton Rd.) | 3100 | 3100 | 170 | 130 | 36 |
| Carol Lynne Dr. & SR 1533 (Kay Todd Rd.) | 4940 | 4940 | 1560 | 1050 | 13 |
| SR 1438 (Lanvale Rd.) & Westgate Office Complex | 4650 | 4650 | 920 | 1290 | 17 |
| SR 1551 (Blackwell Rd.) | 2940 | 2940 | 220 | 140 | 38 |

**Table 7-3** shows the crash data for existing signalized intersections and unsignalized intersections along the US 17 corridor averaging at least 1 crash per year. The data represents a three year period between 2001 and 2003. For each intersection, the current traffic control, and the expected traffic control for each alternative is listed. The ten intersections with the most crashes are highlighted. Each intersection was ranked based on the number of crashes occurring per location. The ranking is based solely on crashes occurring at each intersection. It is not a representation of how dangerous each intersection is. This is typically calculated by developing an crash rate using the number of crashes and traffic volumes traveling through the intersection.

Figure 7-1 identifies intersection locations that appear on the top 10 crash list and the top 10 volume list. Those intersections are:

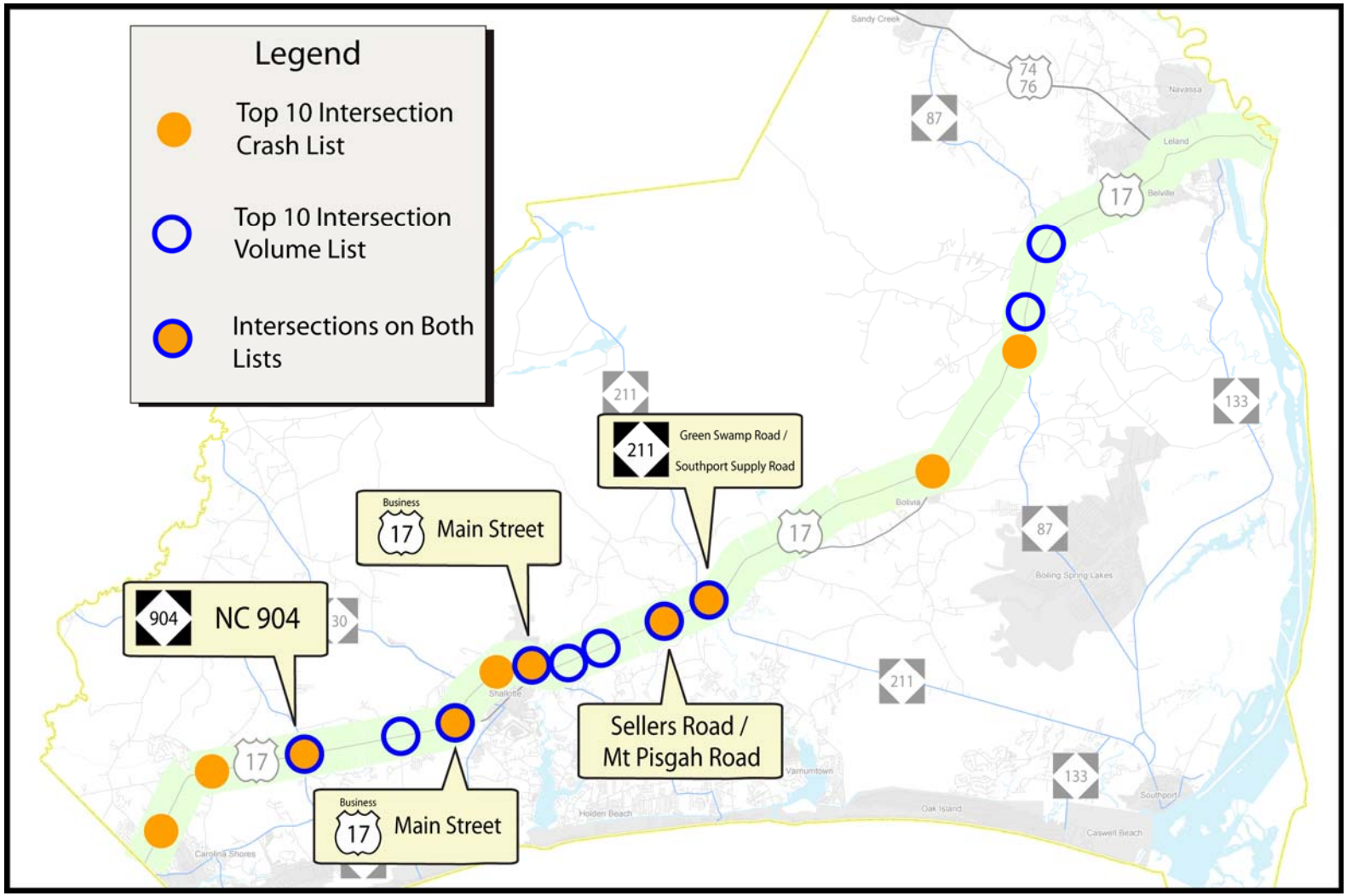
- NC 904
- US 17 Buisiness South (Shallotte)
- US 17 Business North (Shallotte)
- Sellers Road / Mt. Pisgah Road
- NC 211

**Table 7-3: 3-Year Intersection Crash History**

| Cross Street | Total Number of Crashes | Rank | Signalized Under Existing Conditions? | Signalized Under Intersection Improvements Alternative? | Signalized Under Superstreet Alternative? | Interchange Under Freeway Alternative? |
|---|---|---|---|---|---|---|
| SR 1300 (Calabash Rd.) & SR 1168 (Country Club Rd.) | 19 | 7 | Yes | Yes | Yes | Yes |
| SR 1303 (Hickman Rd.) | 5 | 15 | No | Yes | Yes | Yes |
| SR 1304 (Pea Landing Rd.) & SR 1165 (Thomasboro Rd.) | 21 | 5 | Yes | Yes | Yes | No |
| NC 904 (Seaside Rd. & Longwood Rd.) | 26 | 3 | Yes | Yes | Yes | Yes |
| SR 1319 (Union School Rd.) | 5 | 15 | Yes | Yes | Yes | No |
| SR 1316 (Old Shallotte Rd.) & US 17 Business (Main St.) | 21 | 5 | Yes | Yes | Yes | Yes |
| SR 1357 (Smith Ave.) | 11 | 9 | No | Yes | Yes | No |
| SR 1136 (Frontage Rd.) & US 17 Business (Main St.) | 26 | 3 | Yes | Yes | Yes | Yes |
| SR 1136 (Red Bug Rd.) | 8 | 11 | No | Yes | Yes | No |
| SR 1344 (Sellers Rd.) & SR 1130 (Mt. Pisgah Rd.) | 16 | 8 | No | Yes | Yes | Yes |
| NC 211 (Green Swamp Rd. & Southport Supply Rd.) | 30 | 1 | Yes | Yes | Yes | Yes |

| Cross Street | Total Number of Crashes | Rank | Signalized Under Existing Conditions? | Signalized Under Intersection Improvements Alternative? | Signalized Under Superstreet Alternative? | Interchange Under Freeway Alternative? |
|---|---|---|---|---|---|---|
| SR 1502 (Benton Rd.) | 5 | 15 | Yes | Yes | Yes | No |
| US 17 Business (Old Ocean Hwy.) | 8 | 11 | No | Yes | Yes | Yes |
| SR 1402 (Randolphville Rd.) | 3 | 20 | No | No | Yes | Yes |
| US 17 Business (Old Ocean Hwy.) | 9 | 10 | No | Yes | Yes | Yes |
| South Lewis Ln. & SR 1514 (Mill Creek Rd.) | 3 | 20 | No | No | Yes | No |
| NC 87 (George II Highway) | 29 | 2 | No | Yes | Yes | Yes |
| SR 1410 (Green Hill Rd.) & SR 1521 (Governor's Rd.) | 8 | 11 | No | Yes | Yes | Yes |
| SR 1412 (Old Town Creek Rd.) & SR 1522 (Snowfield Rd.) | 7 | 14 | No | Yes | Yes | Yes |
| NC 87 (Maco Rd. Sloan Rd.) | 5 | 15 | No | | | |
| SR 1414 (Goodman Rd.) & SR 1461 (Hewett-Burton Rd.) | 3 | 20 | No | No | Yes | No |
| SR 1438 (Lanvale Rd.) & Westgate Office Complex | 5 | 15 | No | Yes | Yes | Yes |
| SR 1551 (Blackwell Rd.) | 3 | 20 | No | Yes | No | No |

***Figure 7-1: Intersection Crash and Volume Location Summary***



# 8 Functional Designs

## 8.1 Design Results

Upon the completion, review, and approval of the conceptual designs by the project Steering Committee, two preferred alternatives were selected for further development in Phase III of the study, the Superstreet Alternative and Freeway Alternative. During the functional design process, the following items were addressed in greater detail in order to provide a better assessment of the impacts that can be expected with these alternatives:

- Refined the mainline horizontal alignment to utilize the majority of existing pavement along US 17
- Modified ramp and loop horizontal alignments to minimize impacts
- Adjusted ramp horizontal alignments to ensure vertical grades meet minimum standards
- Altered service road locations to minimize impacts and provide access to as many properties as feasible
- And adapted designs to known future developments

The completed functional designs (color 1"=200' scale plots) for the Superstreet and Freeway Alternatives were provided to the NCDOT, along with this report. The functional designs can also be found in **Appendix G** of this report.

## 8.2 Construction Staging Plans

Construction staging concepts for the Superstreet and Freeway Alternatives are very different in nature. However, the following basic criteria apply to each concept:

- Maintenance of intersection traffic during construction of the proposed improvements should be maintained
- Two-lane, two-way traffic should be maintained at all times during peak traffic periods
- Temporary lane closures should be limited to non-peak traffic periods

- And to provide increased safety during the peak seasonal periods by allowing the majority of the construction to be completed during the spring and fall months (if possible) when school is in session.

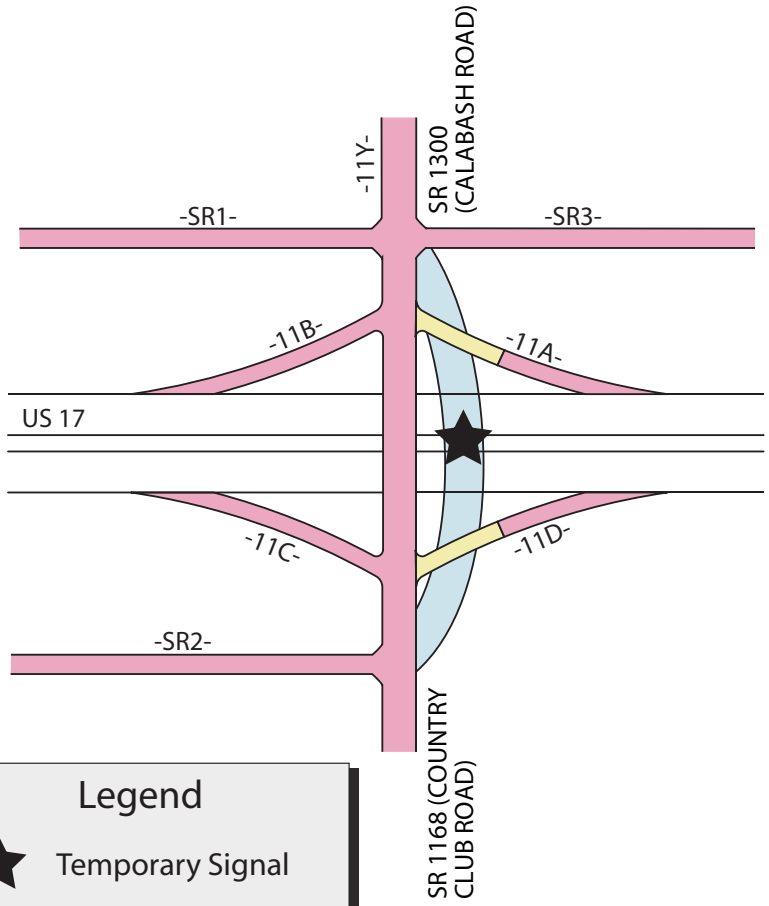
Employing this basic criterion, construction staging concepts were developed to ensure that the proposed improvements are constructible while safely maintaining traffic.

### 8.2.1 Superstreet Alternative Staging Plan

Due to the length of the US 17 corridor and the unique characteristics of each Superstreet Alternative intersection, a general construction staging plan was developed for a typical Superstreet section. This staging plan would apply to the majority of the Superstreet improvements. **Figure 8-1** shows the construction staging plan for a typical Superstreet section.

### 8.2.2 Freeway Alternative Staging Plan

Construction staging plans were generated for each interchange developed for the Freeway Alternative. **Figures 8-1 through 8-16** show the construction staging plans for each interchange.




Construction sequence for Calabash Road interchange

Step 1

- ? Construct temporary detour north of existing Calabash Road.
- ? Construct widening creating temporary left and right turn lanes along US 17.
- ? Install temporary signals.

Step 2

- ? Place temporary pavement marking on detour, activate temporary signals and shift traffic to detour.
- ? Away from traffic, construct as much as possible of ramps and service roads. (Ramps -11A- and -11D- cannot be completed at this time.)
- ? Using lane closures, construct US 17 widening and proposed ramp ties.
- ? Using lane closures and temporary road closures (for hanging steel), construct proposed -11Y- bridge over US 17.
- ? Complete construction of -11Y-, Service Roads and Ramps -11B- and -11C-.

Step 3

- ? Place temporary pavement marking on -11Y-, service roads, and ramps -11A- & -11D-.
- ? Open -11Y- and ramps -11A- & -11D- to traffic. Remove temporary signals and pavement marking.
  - i) Intermediate contract time for -11A- and -11D- road closures, using alternate route for detour.
  - **OR**
  - ii) Construct temporary loops to maintain access.
- ? Complete construction of Ramps -11B- and -11C-.
- ? Open Ramps -11B- and -11C- to traffic.
- ? Remove temporary pavement.

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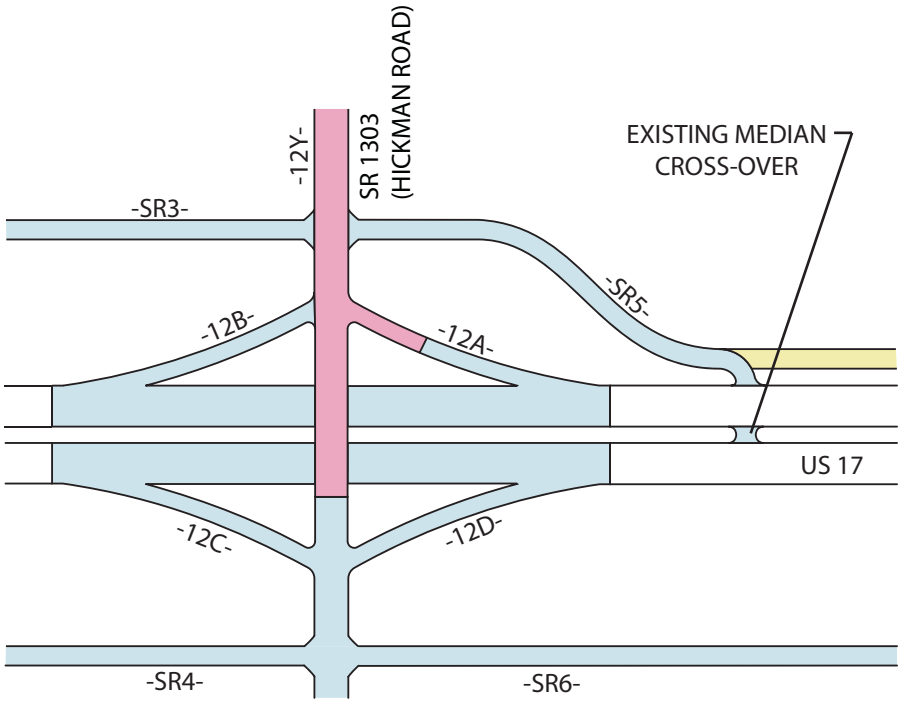
# US 17 CORRIDOR STUDY

**Brunswick County**

Construction Staging Plans
Freeway Alternative

FIGURE 8-2




Construction sequence for Hickmann Road interchange

Step 1

- ? Away from traffic, construct as much as possible of relocated US 17, –Y-line and ramps and service roads. (Ramp A cannot be constructed at this time.)
- ? Construct -SR5- including temporary tie to US 17 at median crossover north of -12A- and temporary right turn lane on US 17.
- ? Using lane closures, construct US 17 SBL widening and US 17 NBL tie-ins, including proposed ramp ties.

Step 2

- ? Place temporary pavement marking on US 17 and shift traffic to relocated section of US 17.
- ? Place temporary pavement marking on -SR5- and shift -12Y- traffic to -SR5-. Close existing Hickman Road to traffic.

Step 3

- ? Using lane closures and temporary road closures (for hanging steel), construct proposed -12Y- bridge over US 17.
- ? Away from traffic, construct -12A-, and remaining section of -12Y-.

Step 4

- ? Place temporary pavement marking on -12Y- and ramps.
- ? Open -12Y- and ramps to traffic.

Step 5

- ? Remove temporary connector from -SR5- to US 17.
- ? Complete construction of -SR5-.
- ? Complete construction of remaining service roads.
- ? Remove existing median cross-overs and turn lanes.

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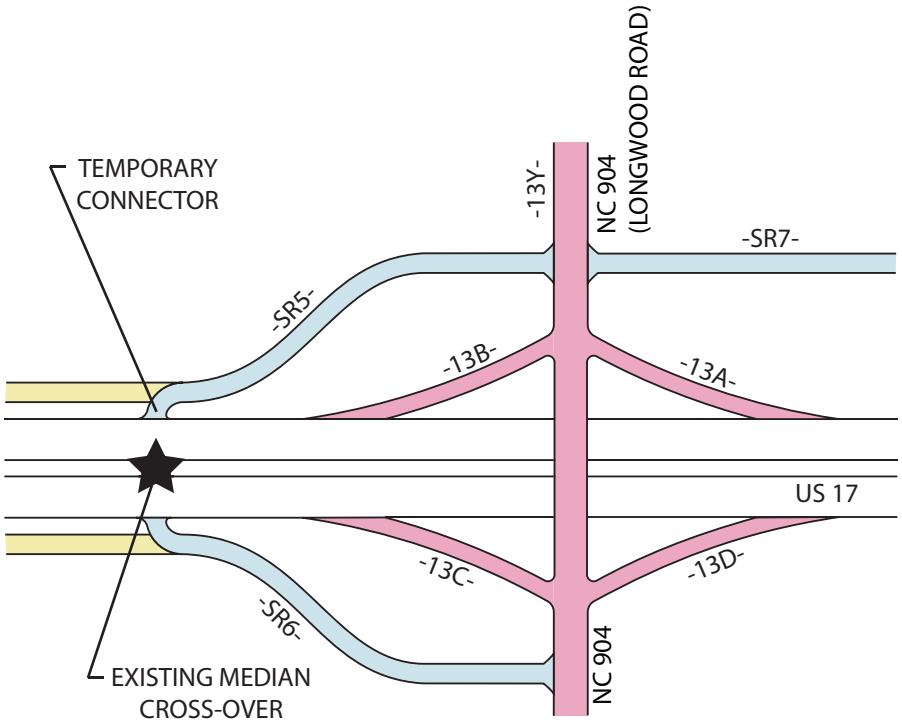
# US 17 CORRIDOR STUDY

**Brunswick County**

Construction Staging Plans
Freeway Alternative

FIGURE 8-3




Legend

★ Temporary Signal

Construction sequence for Longwood Road interchange

Step 1

? Construct –SR5- and –SR6-, temporary tie to US 17 at existing median cross-over south of ramp ties and temporary widening for turn lanes on US 17.
? Install temporary signal.
? Away from traffic, begin ramps and –SR7-.
? Place temporary pavement marking on –SR5- and –SR6-.
? Activate signal and shift traffic to –SR5- and –SR6- as temporary detour.

Step 2

? Using lane closures and temporary road closures (for hanging steel), construct proposed bridge over US 17.
? Away from traffic, construct proposed –13Y- and ramps.
? Using lane closures, construct proposed widening and ramp tie-ins along US 17.

Step 3

? Place pavement marking and open -13Y- to traffic.
? Close service road access to US 17.
? Remove temporary signal.
? Remove temporary tie from service roads to US 17.
? Complete –SR5-, -SR6-, -SR7- and any remaining US 17 construction / pavement removal.

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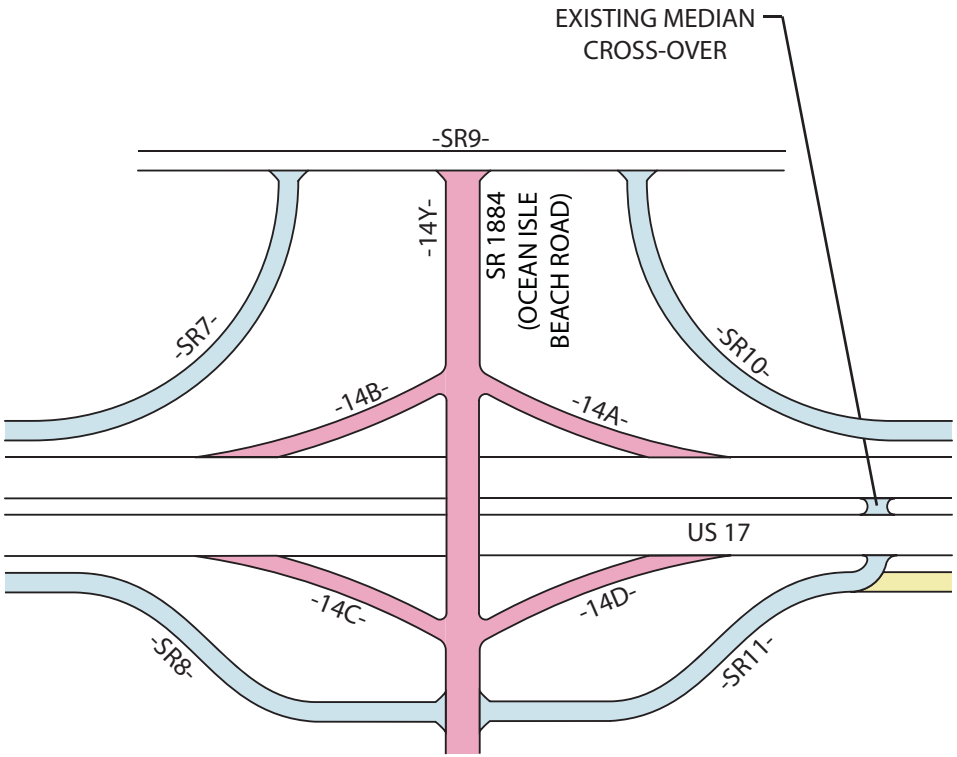
# US 17 CORRIDOR STUDY

**Brunswick County**

Construction Staging Plans
Freeway Alternative

FIGURE 8-4




Construction sequence for Ocean Isle Beach Road interchange

*- Option: Service Road Detour -*

Step 1

- ? Construct -SR11-, temporary tie to US 17 (at existing median cross over north of -14A-), and temporary widening for right turn lane.
- ? Away from traffic, begin ramps, -SR7-, -SR8- and -SR10- Service Roads in quadrants B and C.
- ? Place temporary pavement marking.
- ? Shift -14Y- traffic to –SR11- as temporary detour.

Step 2

- ? Using lane closures and temporary road closures (for hanging steel), construct proposed -14Y- bridge over US 17.
- ? Away from traffic, construct proposed -14Y- and ramps.
- ? Using lane closures, construct proposed widening and ramp ties along US 17. Complete any improvements to –SR9-.

Step 3

- ? Place pavement marking and open -14Y- to traffic.
- ? Close and remove –SR11- temporary access to US 17.
- ? Complete –SR11- and any remaining US 17 construction / pavement removal.

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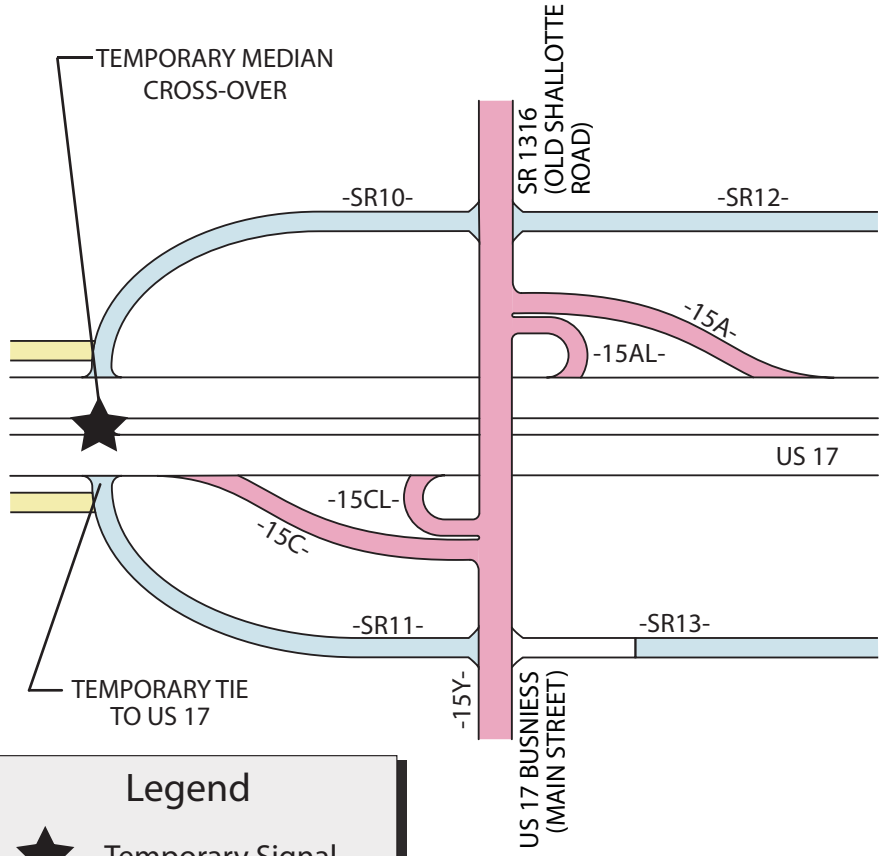
# US 17 CORRIDOR STUDY

**Brunswick County**

Construction Staging Plans
Freeway Alternative

FIGURE 8-5




Legend

★ Temporary Signal

Construction sequence for Old Shallotte Road interchange

Step 1

- Construct –SR10- and –SR11- with temporary tie connecting to US 17, and temporary widening for right turn lanes on US 17.
- Away from traffic construct –SR12- and –SR13-.
- Install temporary signal.
- Activate temporary signal, place temporary pavement marking and detour -15Y- traffic onto –SR10- and –SR11-.

Step 2

- Using lane closures and temporary road closures (for hanging steel), construct proposed -15Y- bridge over US 17.
- Construct -15Y- ramps and loops.

Step 3

- Open -15Y-, loops and ramps to traffic.
- Remove temporary signal.
- Using lane closures, remove temporary tie from service roads to US 17.
- Construct remainder of –SR10- and –SR11-
- Complete any remaining construction / pavement removal on service roads and US 17.

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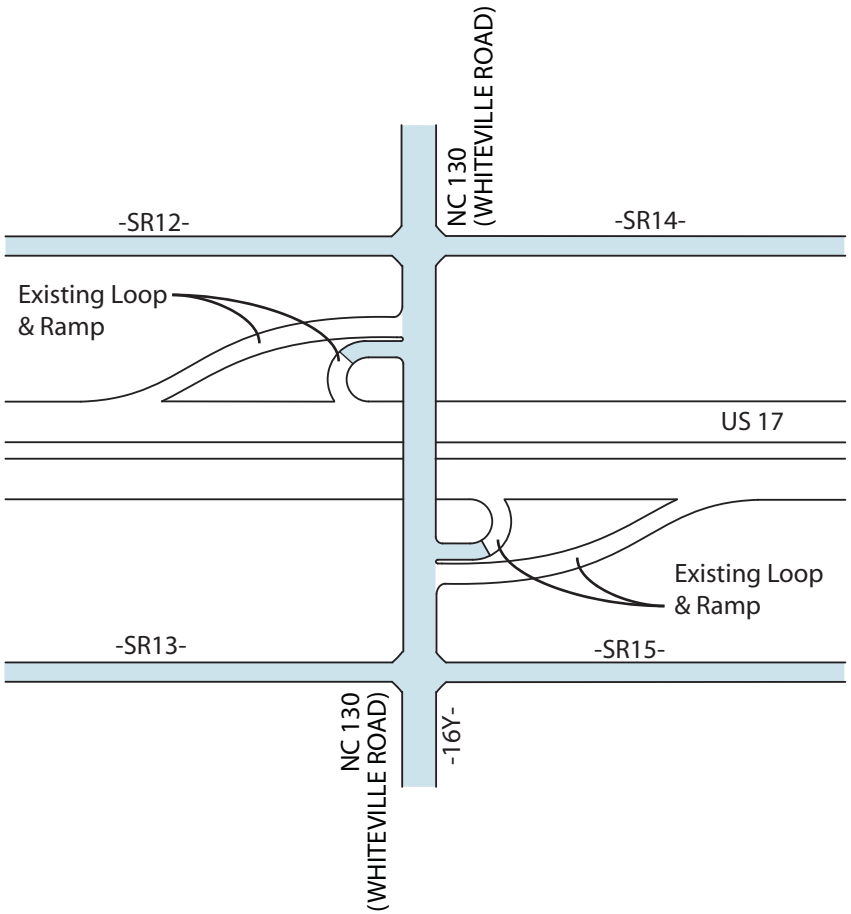
# US 17 CORRIDOR STUDY

**Brunswick County**

Construction Staging Plans
Freeway Alternative

FIGURE 8-6




Construction sequence for Whiteville Road interchange

Step 1

- ? Construct –SR12-, -SR13-, -SR14-, and –SR15-.
- ? Using lane closures, construct improvements to US 17, -16Y- and loops.

Step 2

- ? Place pavement marking and open service roads to traffic.

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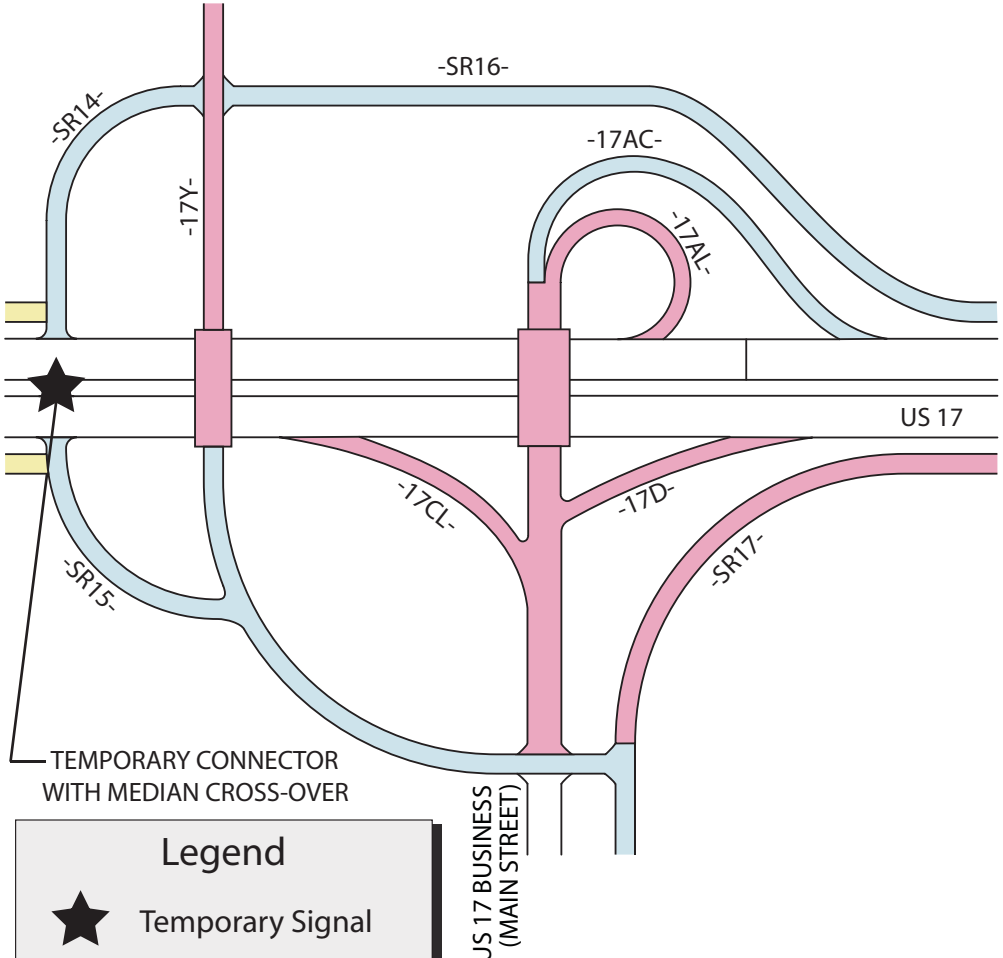
# US 17 CORRIDOR STUDY

**Brunswick County**

Construction Staging Plans
Freeway Alternative

FIGURE 8-7




Construction sequence for US 17 Business (Main St.) interchange

Step 1

- Construct -17Y- (south of US 17), -SR14- and –SR15- with temporary tie to US 17.
- Construct temporary median cross-over and including left & right turn lanes at temporary tie.
- Install temporary signal.
- Away from traffic, begin construction of -SR16- and ramp -17AC-.

Step 2

- Place pavement marking and activate signal. Close -17Y- and US 17 Business (Main Street) to traffic between service road ties. Detour -17Y- and Main Street traffic to service roads constructed in step 1.
- Using lane closures and temporary road closures (for hanging steel), construct proposed bridges over US 17 at -17Y- and -17AC-.
- Using lane closures, construct US 17 widening and ramp and loop ties to US 17.
- Away from traffic construct -17CL-, -17AC-, -17AL-, -17D-, -SR17- and –SR16-.

Step 3

- Place pavement marking and open to traffic.
- Remove temporary pavement.
- Complete pavement removal of turn lanes, median cross-overs and side street ties.
- Complete service road construction.

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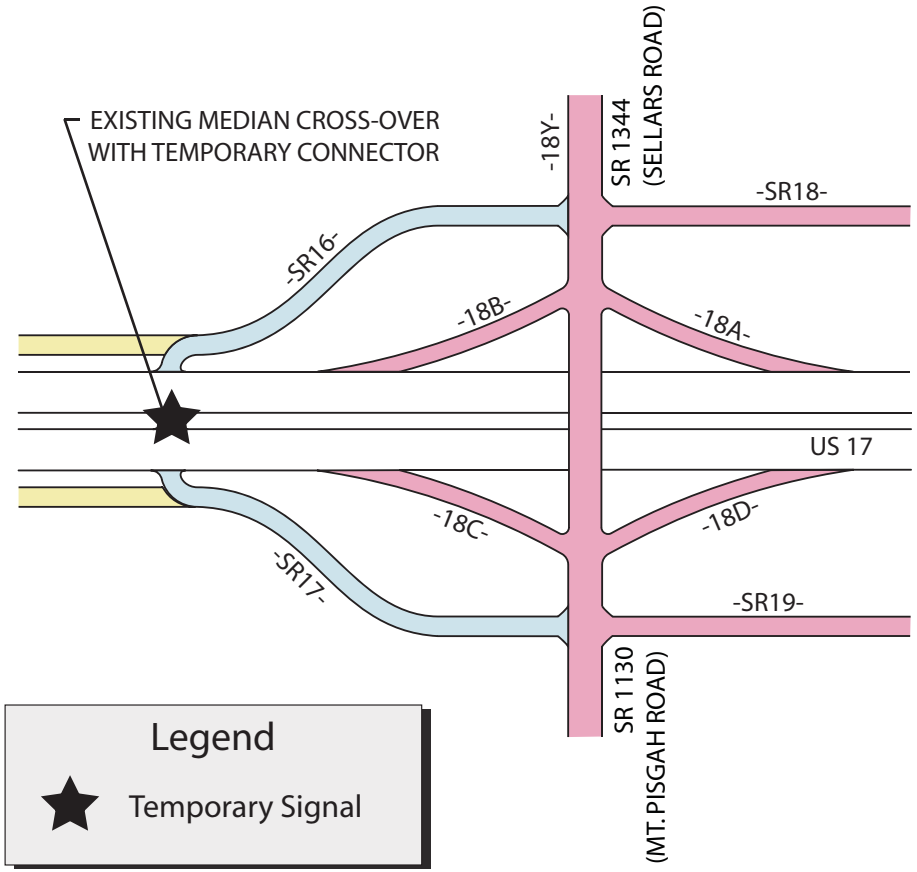
# US 17 CORRIDOR STUDY

**Brunswick County**

Construction Staging Plans
Freeway Alternative

FIGURE 8-8




Construction sequence for Sellars Road interchange

*- Option: Service Road Detour -*

Step 1

- Construct –SR16- and –SR17- with temporary tie at existing median crossover located west of ramp ties, including adding right turn lanes to US 17.
- Install temporary signal.
- Away from traffic, begin ramps and -SR18-.
- Place temporary pavement marking.
- Activate signal and detour -18Y- traffic to –SR16- and –SR17-.

Step 2

- Using lane closures and temporary road closures (for hanging steel), construct -18Y- proposed bridge over US 17.
- Away from traffic, construct proposed roadways and ramps.
- Using lane closures, construct proposed widening along US 17, including proposed ramp tie-ins to US 17.

Step 3

- Place pavement marking and open -18Y- and all ramps to traffic.
- Close and remove –SR16- and –SR17- access to US 17. Remove temporary signal.
- Complete service road construction. & any remaining US 17 construction / pavement removal.

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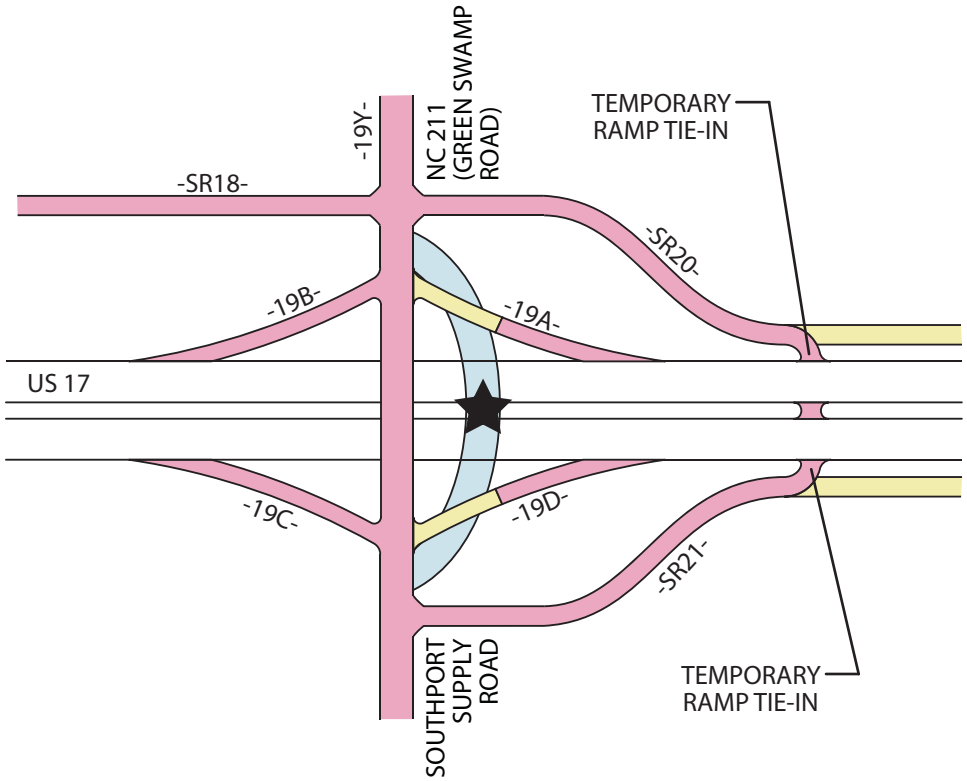
# US 17 CORRIDOR STUDY

**Brunswick County**

Construction Staging Plans
Freeway Alternative

FIGURE 8-9




Legend

★ Temporary Signal

Construction sequence for Green Swamp Road interchange

Step 1

- ? Construct temporary detour northeast of existing NC 211.
- ? Construct widening creating temporary left and right turn lanes along US 17.
- ? Install temporary signal.

Step 2

- ? Place temporary pavement marking on detour, activate temporary signal and shift traffic to detour.
- ? Away from traffic, construct as much as possible of -19Y-, ramps, –SR18-, and -SR22-. (Ramps -19A- and -19D- cannot be completed at this time.)
- ? Away from traffic, construct –SR20- & -SR21- up to temporary ramp ties to US 17.
- ? Using lane closures, construct US 17 widening, proposed ramp ties, temporary ramp ties to –SR20- & -SR21- and temporary right turn lane to ramp tie. Remove existing median cross over at temporary ramp tie.
- ? Using lane closures and temporary road closures (for hanging steel), construct proposed -19Y- bridge over US 17.

Step 3

- ? Place temporary pavement marking on -19Y-, Service Roads, -19B- and -19C-.
- ? Open -19Y-, -19B- and -19C- to traffic. Remove temporary signal and pavement marking. Detour -19A- traffic to –SR20- (suggest Intermediate Contract Time). Detour -19D- traffic to –SR21- (suggest Intermediate Contract Time).
- ? Complete construction of -19A- and -19D-.
- ? Open -19A- and -19D- to traffic.
- ? Complete construction of –SR20- and -SR21-.
- ? Remove temporary pavement. Complete any remaining US 17 construction / pavement removal.

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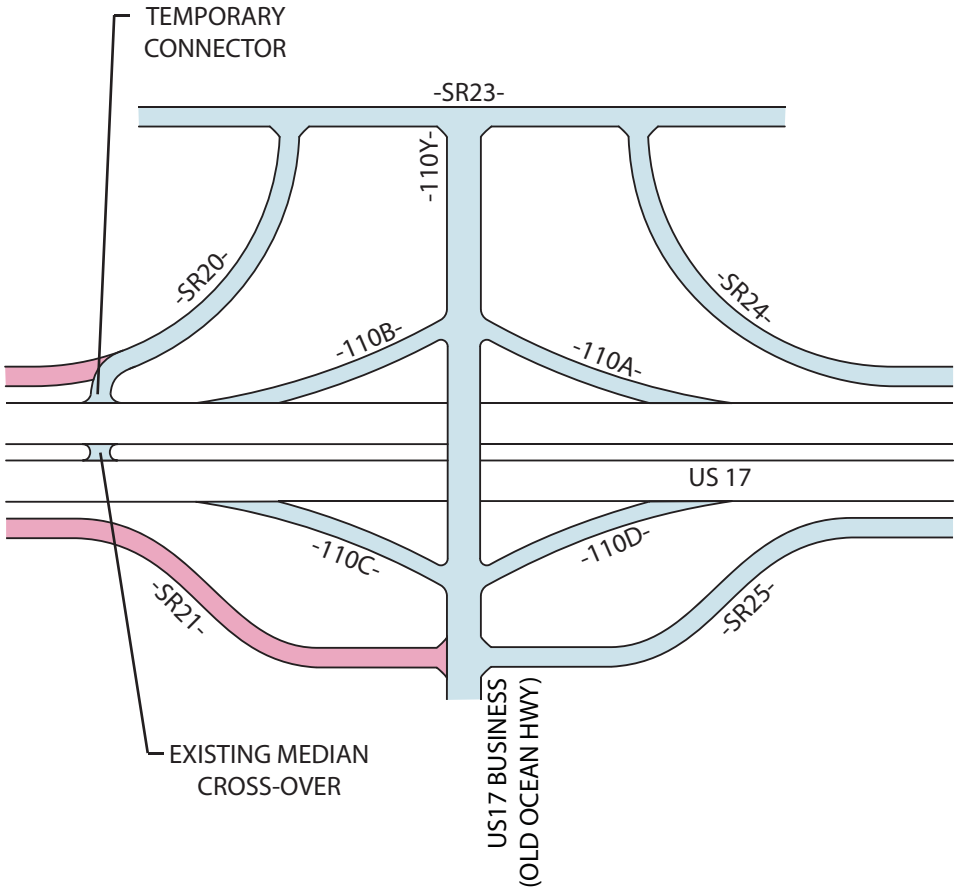
# US 17 CORRIDOR STUDY

**Brunswick County**

Construction Staging Plans
Freeway Alternative

FIGURE 8-10




Construction sequence for US 17 Business (Old Ocean Hwy) interchange

Step 1

- ? Construct –SR23-. Place pavement marking and open to traffic.
- ? Construct –SR20- (from temporary tie to -SR23-), temporary tie to US 17 and temporary widening for turn lanes. Place pavement marking and open to traffic.
- ? Using lane closures, construct temporary right turn lane to –SR20- temporary connector.
- ? Detour -110Y- traffic to –SR20- and –SR23- and close existing -110Y- northwest of US 17.
- ? Construct –SR24. Place pavement marking and open to traffic.
- ? Using lane closures and temporary road closures (for hanging steel), construct proposed -110Y- bridge over US 17.
- ? Using lane closures when needed, construct –SR25-, -110Y-, -SR21- tie to -110Y-, -110A-, -110B-, -110C-, -110D-, US 17 widening and ramp ties.

Step 2

- ? Place pavement marking and shift traffic to -110Y- and open ramps to traffic.
- ? Using lane closures, construct any remaining sections of –SR21- and -SR20-. Remove temporary pavement. Complete proposed pavement removal along US 17.

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# US 17 CORRIDOR STUDY

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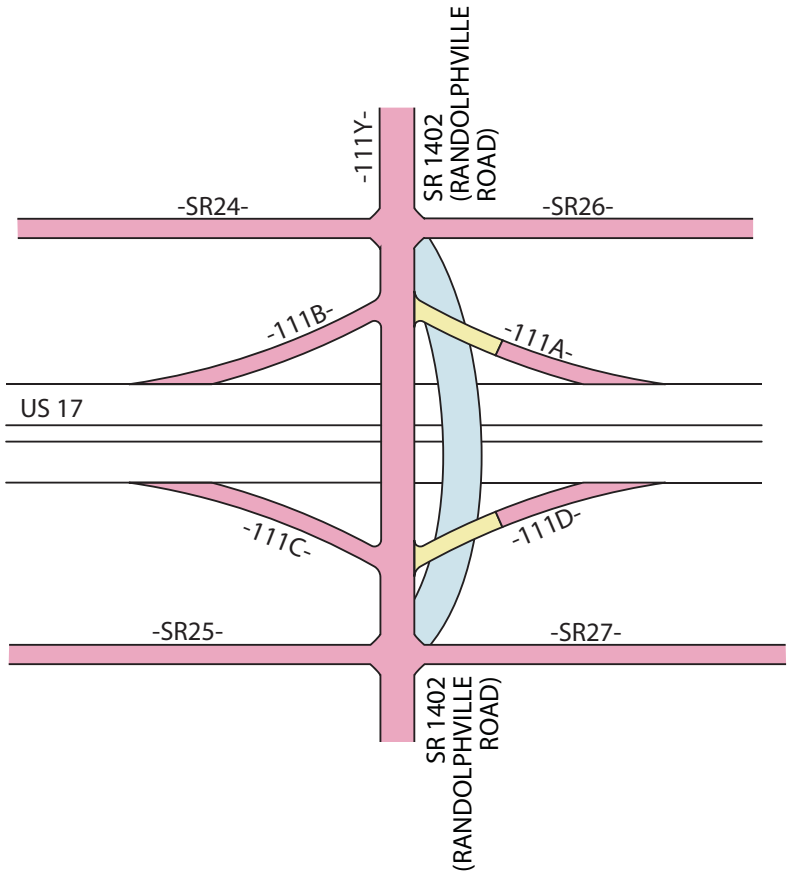
Construction Staging Plans
Freeway Alternative

FIGURE 8-11




Construction sequence for Randolphville Road interchange

*- Option: On Site Detour -*

Step 1

? Construct temporary detour north of existing Y-line.
? Construct widening creating temporary left and right turn lanes along US 17.

Step 2

? Place temporary pavement marking on detour and shift traffic to detour.
? Using lane closures and temporary road closures (for hanging steel), construct proposed bridge over US 17.
? Away from traffic, construct as much as possible of -111Y-, ramps and service roads. (Ramps -111A- and -111D- cannot be completed at this time.)
? Using lane closures, construct US 17 widening, proposed ramp ties and -111Y- ties to existing.

Step 3

? Place temporary pavement marking on -111Y-, service roads, and ramps -111B- and -111C-.
? Open -111Y- and ramps -111B- and -111C- to traffic.
  i) Intermediate Contract Time for Ramp A and Ramp D road closures, using alternate route for detour.
  **OR**
  ii) Construct temporary ties from –SR26- and –SR27- to US 17 and use as detour for ramps -111B- and -111C-.
? Complete construction of ramps -111B- and -111C.
? Open ramps -111B- and -111C to traffic.
? Complete service road construction.
? Remove temporary pavement.

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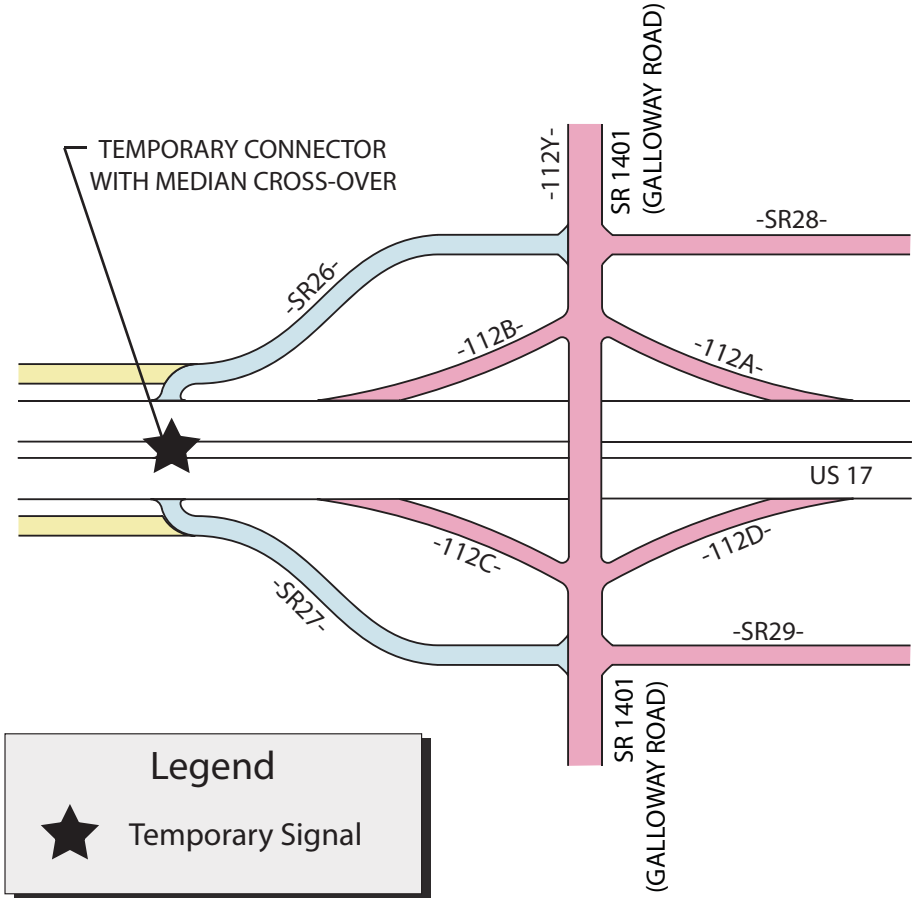
# US 17 CORRIDOR STUDY

**Brunswick County**

Construction Staging Plans
Freeway Alternative

FIGURE 8-12




Construction sequence for Galloway Road interchange

*- Option: Service Road Detour -*

Step 1

? Construct –SR26- and –SR27- with temporary connector to US 17. Construct temporary median cross-over with right and left turn lanes.
? Install temporary signal.
? Away from traffic begin -112A-, -112B-, -112C-, -112D-, –SR28- and –SR29-.
? Place temporary pavement marking.
? Activate signals and detour -112Y- traffic to –SR26-, –SR27- and connector.

Step 2

? Using lane closures and temporary road closures (for hanging steel), construct proposed -112Y- bridge over US 17.
? Away from traffic, construct proposed -112Y- and complete ramps.
? Using lane closures, construct proposed widening along US 17 (including proposed ramp tie-ins to US 17) and -112Y- ties to existing.

Step 3

? Place pavement marking and open Y-line and ramps to traffic.
? Close temporary connector access to US 17. Remove temporary signal and connector.
? Complete –SR26- and –SR27- and any remaining US 17 construction / pavement removal.

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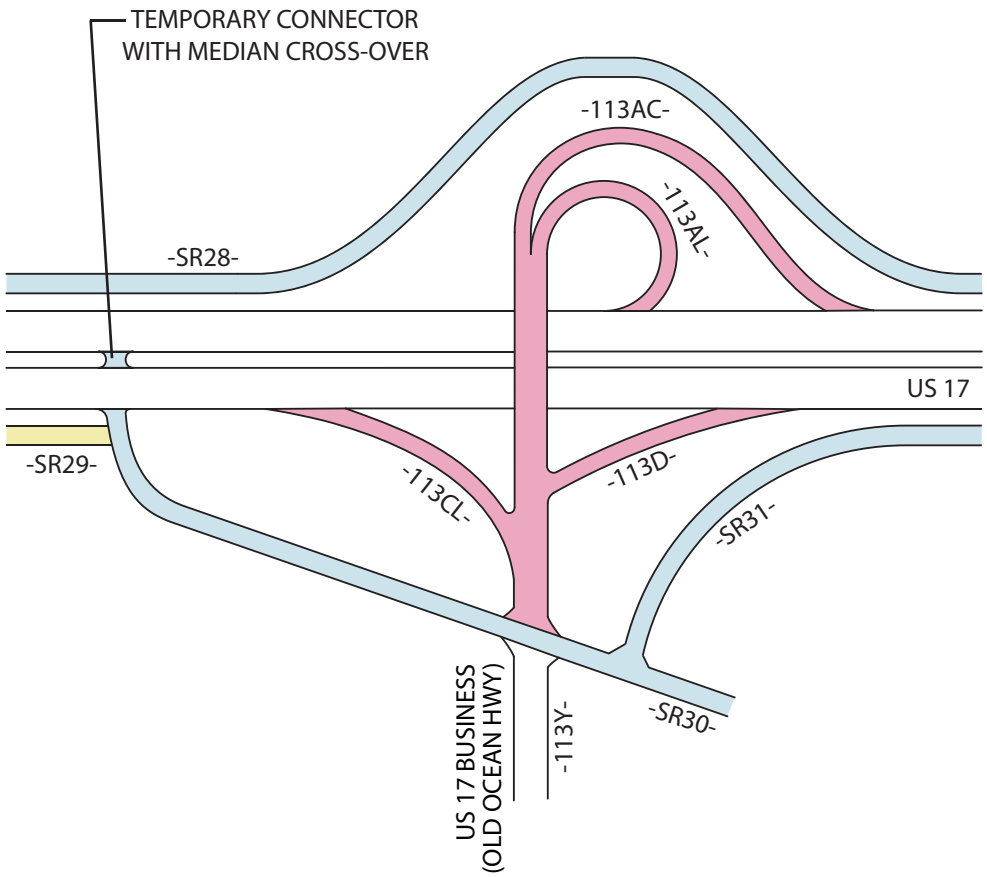
# US 17 CORRIDOR STUDY

**Brunswick County**

Construction Staging Plans
Freeway Alternative

FIGURE 8-13




Construction sequence for US 17 Business (Old Ocean Hwy) interchange

Step 1

- Construct service road –SR29- with temporary connector to US 17.
- Using temporary lane closures, construct temporary median cross-over with left and right turn lanes on US 17 accessing –SR29-.
- Away from traffic begin construction of –SR28-, -SR31- and –SR30-.
- Place pavement marking and detour -113Y- traffic to –SR29-.

Step 2

- Using lane closures and temporary road closures (for hanging steel), construct proposed -113Y- bridge over US 17.
- Away from traffic construct -113Y-, -113AC-, -113AL-, -113C- and -113D-.
- Using lane closures construct widening and ramp ties on US 17.
- Complete construction of –SR28, -SR31- and –SR30-, including pavement marking and open to traffic.

Step 3

- Place pavement marking and open -113Y-, loop and ramps to traffic.
- Complete construction of –SR29-. Remove temporary pavement and complete any remaining US 17 construction / pavement removal.

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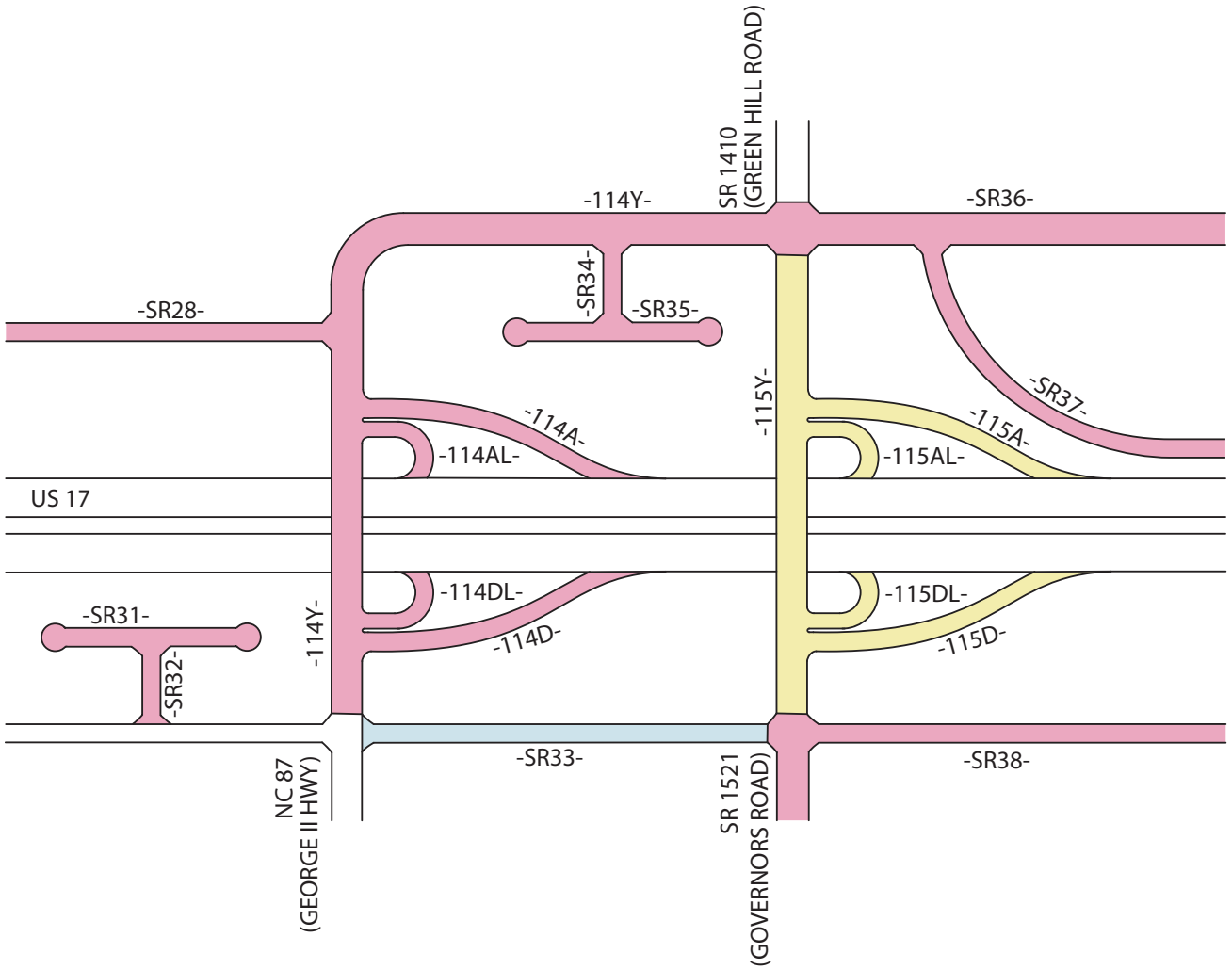
# US 17 CORRIDOR STUDY

**Brunswick County**

Construction Staging Plans
Freeway Alternative

FIGURE 8-14

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# US 17 CORRIDOR STUDY

**Brunswick County**

Construction Staging Plans
Freeway Alternative

FIGURE 8-15A

Construction sequence for NC 87 (George II Hwy.) and Greenville Road/Governors Road interchanges

Step 1

- Construct –SR33-. Place pavement marking and open to traffic.

Step 2

- Using -SR33- as detour route, close -114Y- to traffic.
- Using lane closures and temporary road closures (for hanging steel), construct proposed -114Y- bridge over US 17.
- Using lane closures, construct proposed widening and ramp ties for -114Y- to US 17.
- Away from traffic, construct -114Y- (including ramps and loops at -114Y-), -SR34- and –SR35-. Install signals.
- Construct –SR28-, -SR31-, -SR32-, -SR36-, -SR37-, and -SR38-.

Step 3

- Place pavement marking on -114Y- and open interchange to traffic.
- Using -114Y- and –SR33- as detour routes, close -115Y- to traffic.
- Using lane closures and temporary road closures (for hanging steel), construct proposed -115Y- bridge over US 17.
- Away from traffic, construct -115Y- (including ramps and loops at -115Y-). Install signals.
- Using lane closures, construct proposed widening and ramp ties for -115Y- to US 17.
- Place pavement marking on -115Y- and open interchange to traffic.

Step 4

- Complete any remaining construction / pavement removal operations (previous left/right turn lanes, median crossovers …).

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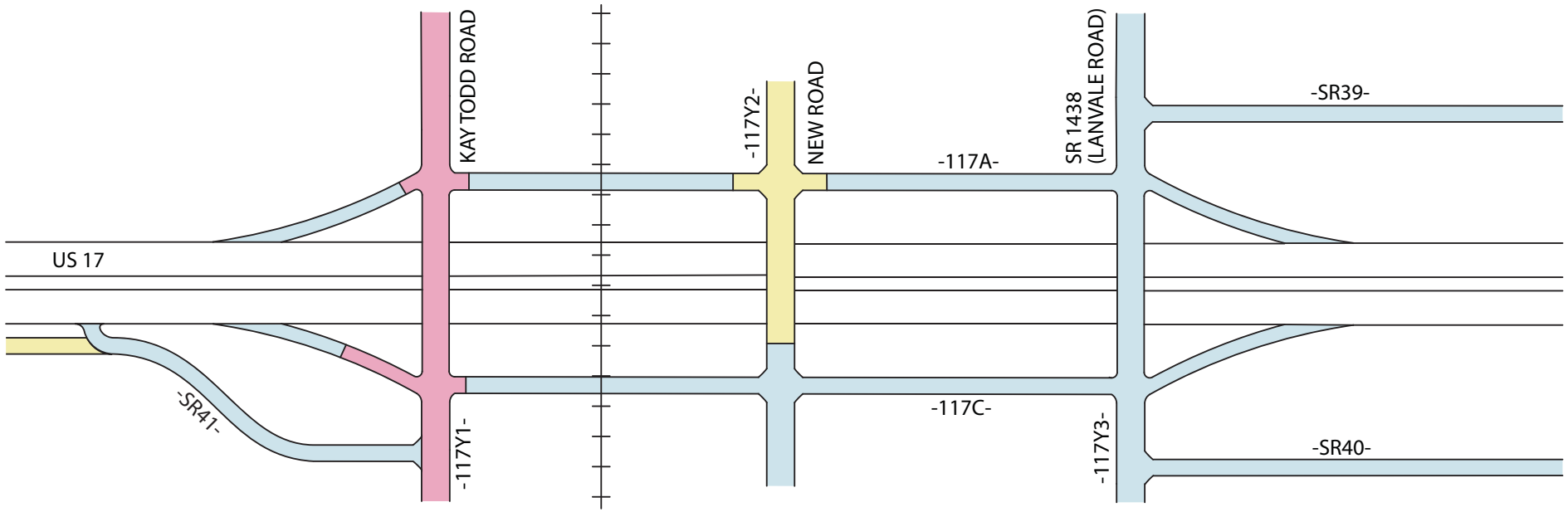
# US 17 CORRIDOR STUDY

**Brunswick County**

Construction Staging Plans
Freeway Alternative

FIGURE 8-15B

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# US 17 CORRIDOR STUDY

**Brunswick County**

Construction Staging Plans
Freeway Alternative

FIGURE 8-16A

Construction sequence for interchange #17

Step 1

- Begin RR bridges on -117A- and -117C-
- Using lane closures and temporary road closures (for hanging steel), construct proposed -117Y3- bridge over US 17.
- Away from traffic, construct the following:
  - -117Y3-
  - -SR39-
  - -SR40-
  - -117A- (from existing US 17 to -117Y1-)
  - -117A- (from -117Y1- to -117Y2-)
  - -117A- (from -117Y2- to tie to existing US 17)
  - -117C- (from -117Y1- to tie to existing US 17)
  - -117Y2- (from US 17 southward)
  - -SR41-
- Using lane closures, construct proposed widening and ramp ties along US 17.

Step 2

- Using existing roads (back roads, crossing RR tracts, hitting existing -117Y2- at far north intersection) as detour route for -117Y1-(northside) and -SR41- for -117Y1- (southside), close -117Y1- to traffic.
- Using lane closures and temporary road closures (for hanging steel), construct proposed -117Y1- bridge over US 17.
- Away from traffic, construct -117Y1- and ties to -117A- & -117C-.
- Remove existing -117Y1- pavement and median crossover.

Step 3

- Place pavement marking and open -117Y1-, -117C- and most of -117A- to traffic. (-Y117A- at -117Y2- has not been constructed at this time.)
- Using the northside detour described in Step 2, close -117Y2- to traffic.
- Using lane closures and temporary road closures (for hanging steel), construct proposed -117Y2- bridge over US 17.
- Construct -117Y2- and ties to -117A-.
- Construct remaining section of -SR41-.
- Complete improvements along US 17.

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

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# US 17 CORRIDOR STUDY

**Brunswick County**

Construction Staging Plans
Freeway Alternative

FIGURE 8-16B

Construction sequence for typical Superstreet section:

Step 1

- Begin proposed signal installation
- Using lane closures, construct proposed widening to outside lanes of US 17, including turnout bulbs.

Step 2

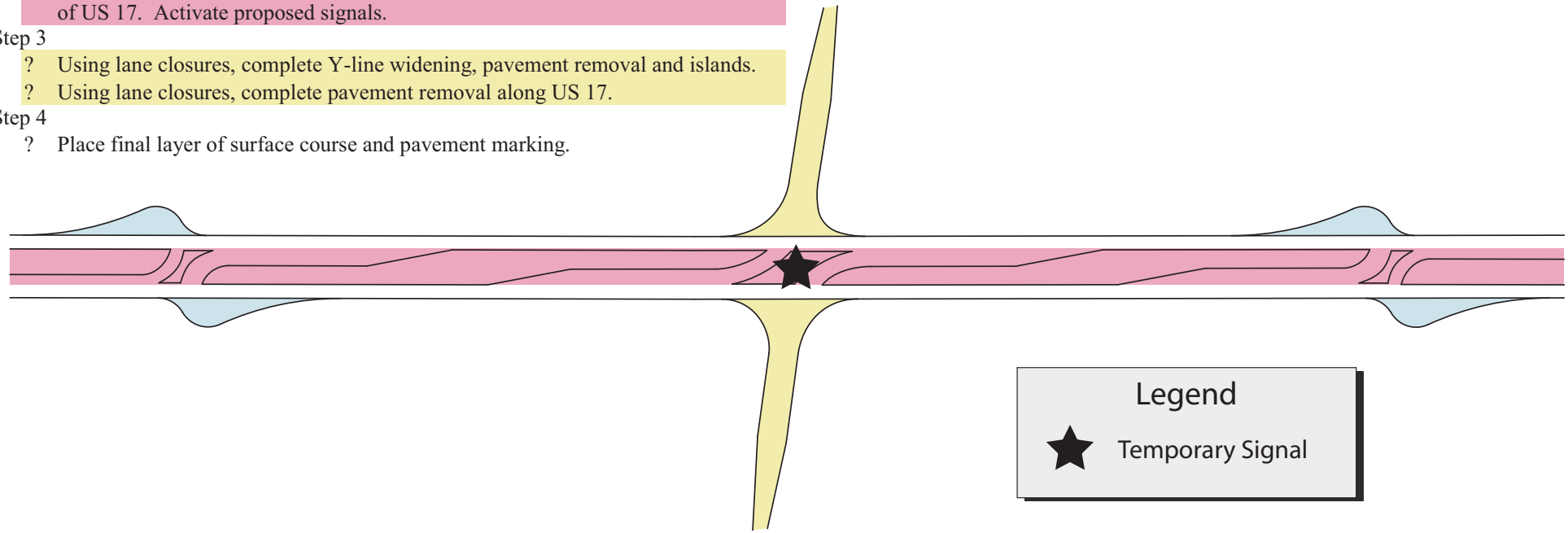
- Close Y-line left turn lanes. If signalized, adjust signal (& phasing).
- Using lane closures, construct proposed islands and widening to the median side of US 17. Activate proposed signals.

Step 3

- Using lane closures, complete Y-line widening, pavement removal and islands.
- Using lane closures, complete pavement removal along US 17.

Step 4

- Place final layer of surface course and pavement marking.

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# US 17 CORRIDOR STUDY

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Construction Staging Plans
Superstreet Alternative

FIGURE 8-1