

# Monterey Shores Development

Corolla, North Carolina

PREPARED FOR

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4/6/2022



4/6/2022

## Executive Summary

This development includes the construction of a residential and commercial development in Corolla, North Carolina (Figure 1). The development is planned to be constructed near the intersection of Ocean Trail (NC 12) and Malia Drive and will tentatively be completed in two phases. Phase I will include 5 single-family homes, 25 multi-family dwellings and 4,502 square feet of restaurant space with an expected build year of 2023 and Phase II will add 8,002 square feet of retail space and an additional 6 multi-family dwellings with an expected full build-out year of 2025.

## Project Background

Based on the conceptual site plan (Figure 2), access to the development is proposed via up to two (2) vehicular access points:

- › Future Access #1, full movement access along Malia Drive, approximately 250 feet northwest of Ocean Trail (NC 12).
- › Future Access #2, full movement access along Sunset Boulevard, via an extension of the access driveway serving the Seaside Market.

There are potential right-of-way complications for the proposed access along Sunset Boulevard. Because of this, the full build-out of the proposed development was analyzed under two scenarios; one with only Future Access #1 via Malia Drive being available for use, and one with both access points available. Additionally, the land uses located along internal streets accessing Malia Drive, north of the lake, will be constructed first.

## Monterey Shores Development TIA

Based on discussions with the North Carolina Department of Transportation (NCDOT), the following intersections were included in the study area and analyzed for existing and future conditions, as applicable:

- › Ocean Trail (NC 12) and Dolphin Street (SR 1458)/Monterey Drive (unsignalized)
- › Ocean Trail (NC 12) and Malia Drive/Commercial Driveway (unsignalized)
- › Ocean Trail (NC 12) and Albacore Street/Sunset Boulevard (signalized)
- › Malia Drive and Future Access #1 (future unsignalized)
- › Sunset Boulevard and Seaside Market Driveway/Future Access #2 (unsignalized)

The following scenarios were analyzed for existing and future conditions to evaluate the impacts that the proposed development may have on the surrounding roadway network:

- › Existing (2021) Conditions
- › Phase I No-Build (2023) Conditions
- › Phase I Build (2023) Conditions
- › Phase II No-Build (2025) Conditions
- › Phase II Build (2025) Alternative #1 Conditions
- › Phase II Build (2025) Alternative #2 Conditions

The Existing (2021) scenario includes typical weekday AM and PM peak hour analysis based on turning movement count data collected in 2021. The Phase I No-Build (2023) scenario includes existing traffic with a two percent (2%) annual growth rate for two years to calculate the expected background growth within the study area. No background developments or roadway improvements were included in this study. The Phase I Build (2023) scenario includes the No-Build (2023) volumes with the addition of Phase I site trips generated by the proposed development utilizing only Future Access #1 via Malia Drive. The Phase II No-Build (2025) scenario includes existing traffic with a two percent (2%) annual growth rate for four years to calculate the expected background growth within the study area. No background developments or roadway improvements were included in this study. The Phase II Build (2025) Alternative #1 scenario includes the No-Build (2025) volumes with the addition of site trips generated by the full build-out of the proposed development utilizing only Future Access #1 via Malia Drive. The Phase II Build (2025) Alternative #2 scenario includes the No-Build (2025) volumes with the addition of site trips generated by the full build-out of the proposed development utilizing both Future Access #1 and Future Access #2.

## Existing (2021) Conditions

Existing analyses were conducted based on current roadway geometrics and intersection turning movement counts collected on September 1<sup>st</sup>, 2021, prior to the Labor Day weekend. After comparisons of the existing volumes collected via counts to the NCDOT AADT figures for the study roadways, no additional adjustment factors were deemed necessary to be applied to the AM and PM peak hour volumes to account for the COVID-19 pandemic or seasonal variations. A minimum of 4 vehicles per movement was applied based on NCDOT Congestion Management guidance.

As reported in the Summary Level of Service (LOS) table on page vi, the signalized intersection within the study area operates at an overall acceptable level of service (LOS D or better) during both peak

hours. The stop-controlled approaches operate at acceptable levels of service except the westbound approach at the intersection of Ocean Trail (NC 12) and Dolphin Street/Monterey Drive, which operates at LOS E during the PM peak hour.

## Phase I No-Build (2023) Conditions

The Existing (2021) peak hour volumes were grown to the Phase I build-out year (2023) using an annual growth rate of two percent (2%) to calculate the expected background growth within the study area. No additional background developments were identified within the study area.

As shown on the Summary LOS table on page vi, the signalized intersection within the study area is expected to continue to operate at an acceptable level of service during both peak hours. The stop-controlled westbound approach at the intersection of Ocean Trail (NC 12) and Dolphin Street/Monterey Drive is projected to degrade to a LOS F during the PM peak hour.

## Phase I Trip Generation and Assignment

Trip generation was conducted based on the most appropriate corresponding trip generation codes included in the *Institute of Transportation Engineers (ITE) Trip Generation Manual, 10<sup>th</sup> Edition* and the suggested method of calculation in the NCDOT's "Rate vs. Equation" Spreadsheet. Phase I of the proposed development is to consist of 5 single-family homes, 25 multi-family dwellings, and 4,502 sf of restaurant space; ITE Land Use Code (LUC) 210 (Single Family Detached Housing), LUC 220 (Multi-Family Housing, Low-Rise), and LUC 931 (Quality Restaurant) were used based on the NCDOT guidance.

As a result, the proposed development is projected to generate 591 daily weekday site trips, with 24 trips (7 entering, 17 exiting) occurring in the AM peak hour and 58 trips (38 entering, 20 exiting) occurring in the PM peak hour. After reductions to account for internal capture the proposed development is expected to generate 552 daily weekday external site trips, with 24 trips (7 entering, 17 exiting) occurring in the AM peak hour, and 53 trips (36 entering, 17 exiting) occurring in the PM peak hour. The generated site trips were distributed in accordance with the existing turning movement counts and land uses.

## Phase I Build (2023) Conditions

The Build (2023) Alternative #1 conditions account for both the Phase I No-Build (2023) traffic and the site traffic generated by Phase I of the proposed development, and the traffic is assigned to the network utilizing only Future Access #1 via Malia Drive.

As shown on the Summary LOS table on page vi, with the addition of site trips, the signalized intersection continues to operate at overall acceptable levels of service during both peak hours. The stop-controlled westbound approach at the intersection of Ocean Trail (NC 12) and Dolphin Street/Monterey Drive is projected to continue to operate at a LOS F during the PM peak hour.



## Phase II No-Build (2025) Conditions

The Existing (2021) peak hour volumes were grown to the Phase II build-out year (2025) using an annual growth rate of two percent (2%) to calculate the expected background growth within the study area. No additional background developments were identified within the study area.

As shown on the Summary LOS table on page vi, the signalized intersection within the study area is expected to continue to operate at an acceptable level of service during both peak hours. The stop-controlled westbound approach at the intersection of Ocean Trail (NC 12) and Dolphin Street/Monterey Drive is projected to degrade to a LOS F during the PM peak hour.

## Phase II Trip Generation and Assignment

Trip generation was conducted based on the most appropriate corresponding trip generation codes included in the *Institute of Transportation Engineers (ITE) Trip Generation Manual, 10<sup>th</sup> Edition* and the suggested method of calculation in the NCDOT's "*Rate vs. Equation*" *Spreadsheet*. The full build-out of the proposed development is to consist of 8,002 sf of retail space, 5 single-family homes, 31 multi-family dwellings, and 4,502 sf of restaurant space; ITE Land Use Code (LUC) 210 (Single Family Detached Housing), LUC 220 (Multi-Family Housing, Low-Rise), LUC 820 (General Retail) and LUC 931 (Quality Restaurant) were used based on the NCDOT guidance.

As a result, the proposed development is projected to generate 1,716 daily weekday site trips, with 70 trips (35 entering, 35 exiting) occurring in the AM peak hour and 127 trips (71 entering, 56 exiting) occurring in the PM peak hour. After reductions to account for internal capture the proposed development is expected to generate 1,285 daily weekday external site trips, with 68 trips (34 entering, 34 exiting) occurring in the AM peak hour, and 80 trips (48 entering, 32 exiting) occurring in the PM peak hour. The generated site trips were distributed in accordance with the existing turning movement counts and land uses.

## Phase II Build (2025) Alternative #1 Conditions

The Phase II Build (2025) Alternative #1 conditions account for both the Phase II No-Build (2025) traffic and the site traffic generated by the full build-out of the proposed development, and the traffic is assigned to the network utilizing only Future Access #1 via Malia Drive.

As shown on the Summary LOS table on page vi, with the addition of site trips, the signalized intersection continues to operate at overall acceptable levels of service during both peak hours. The stop-controlled westbound approach at the intersection of Ocean Trail (NC 12) and Dolphin Street/Monterey Drive is projected to continue to operate at a LOS F during the PM peak hour.

## Phase II Build (2025) Alternative #2 Conditions

The Phase II Build (2025) Alternative #2 conditions account for both the Phase II No-Build (2025) traffic and the site traffic generated by the full build-out of the proposed development, and the traffic is assigned to the network utilizing both Future Access #1 via Malia Drive and Future Access #2 via Sunset Boulevard.

As shown on the Summary LOS table on page vi, with the addition of site trips, the signalized intersection continues to operate at overall acceptable levels of service during both peak hours. The stop-controlled westbound approach at the intersection of Ocean Trail (NC 12) and Dolphin Street/Monterey Drive is projected to continue to operate at a LOS F during the PM peak hour.

## Roadway Improvement Recommendations

As indicated in the traffic operations analyses, the proposed development is projected to have a minimal impact on the traffic operations within the study area.

The following configurations are recommended for the site access driveways:

### Malia Drive and Future Access #1 (unsignalized)

The stop-controlled driveway is expected to operate at LOS A during the AM peak hour and LOS A during the PM peak hour under both Build (2025) conditions. The following lane configurations are recommended for the new driveway connection:

- › Construct driveway with one ingress lane and one egress lane and full movement access.
- › Provide a minimum internal protected stem length of 100 feet.

### Sunset Boulevard and Future Access #2 (unsignalized)

The stop-controlled driveway is expected to operate at LOS A during the AM peak hour and LOS B during the PM peak hour under Build Alternative #2 (2025) conditions. The following lane configurations are recommended for the new driveway connection, should Phase II Alternative #2 be utilized:

- › Modify driveway to clearly delineate one ingress lane and one egress lane and full movement access.
- › Ensure a minimum internal protected stem length of 100 feet.
- › Coordinate with NCDOT for design and pavement standards, and for a potential shifting of the driveway to the west to allow more distance from signal.

All other study area intersections will continue to operate acceptably with the development site trips in place.

The LOS results summary is shown in Table ES, and the future lane configurations and traffic control at the study area intersections, with the development in place, are presented in Figure ES-1 and Figure ES-2.

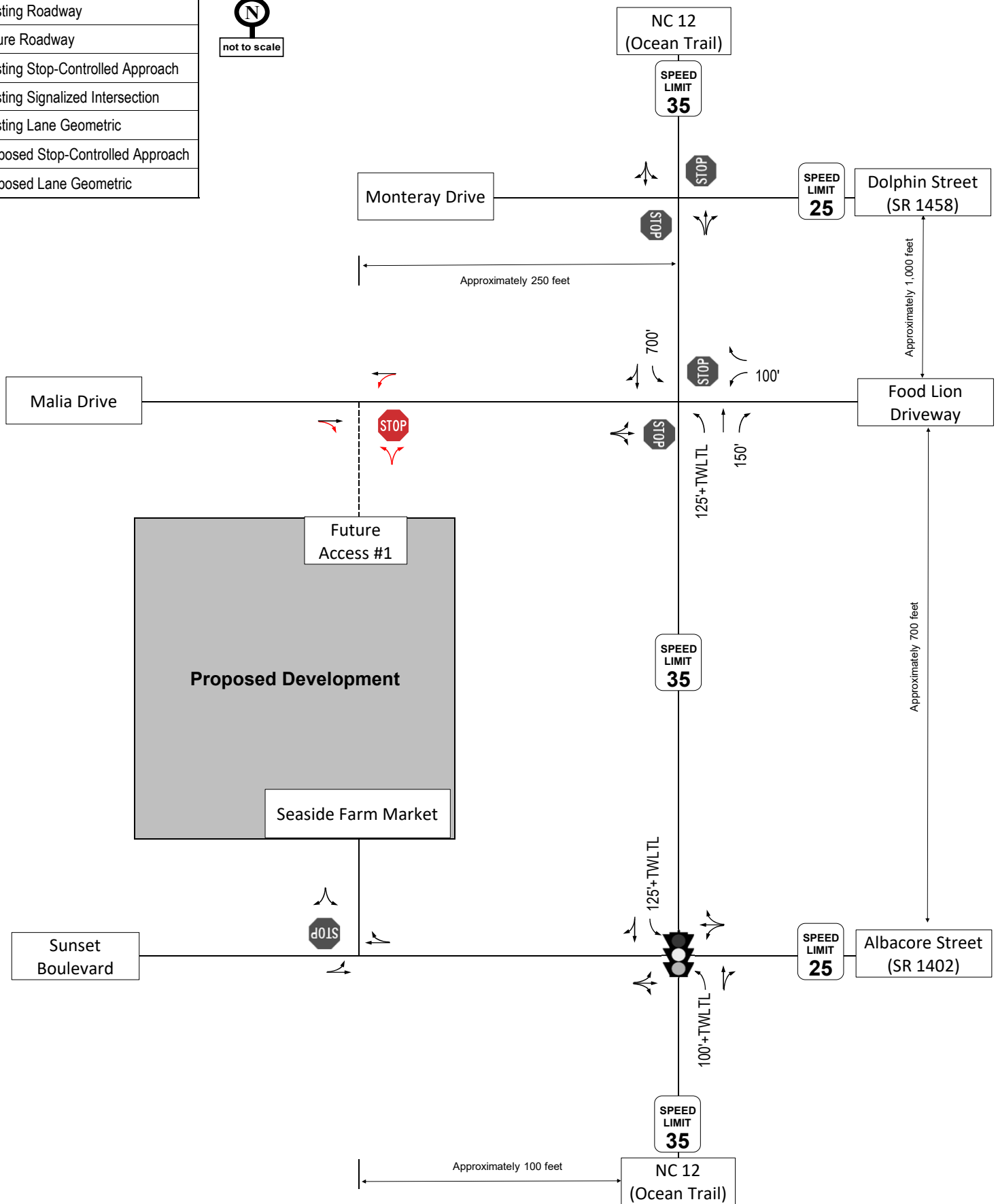
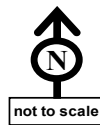
With the addition of the improvements identified as part of this TIA, all of the intersections are projected to operate at improved or acceptable levels of service and there are minimal delay increases (3 seconds or less during either peak period) projected at the study area intersections.

Table ES Summary Level of Service Table

| Intersection and Approach                                                | Traffic Control | Existing (2021) |               | Phase I No-Build (2023) |               | Phase I Build (2023) |               | Phase II No-Build (2025) |               | Phase II Build (2025) Alt #1 |               | Phase II Build (2025) Alt #2 |               |
|--------------------------------------------------------------------------|-----------------|-----------------|---------------|-------------------------|---------------|----------------------|---------------|--------------------------|---------------|------------------------------|---------------|------------------------------|---------------|
|                                                                          |                 | AM              | PM            | AM                      | PM            | AM                   | PM            | AM                       | PM            | AM                           | PM            | AM                           | PM            |
| <b>NC 12 (Ocean Trail) at Albacore Street (SR 1402)/Sunset Boulevard</b> | Signalized      | <b>A</b>        | <b>C</b>      | <b>A</b>                | <b>C</b>      | <b>A</b>             | <b>C</b>      | <b>A</b>                 | <b>C</b>      | <b>B</b>                     | <b>C</b>      | <b>B</b>                     | <b>C</b>      |
|                                                                          |                 | <b>(9.4)</b>    | <b>(21.3)</b> | <b>(9.8)</b>            | <b>(23.6)</b> | <b>(9.8)</b>         | <b>(24.0)</b> | <b>(9.8)</b>             | <b>(24.7)</b> | <b>(10.8)</b>                | <b>(25.3)</b> | <b>(10.3)</b>                | <b>(27.9)</b> |
| Eastbound                                                                |                 | B-16.3          | C-32.9        | B-16.6                  | C-33.6        | B-16.7               | C-34.3        | B-16.9                   | C-34.0        | B-17.5                       | C-34.7        | B-16.9                       | D-38.5        |
| Westbound                                                                |                 | B-17.1          | D-38.5        | B-17.4                  | D-40.9        | B-17.5               | D-42.2        | B-17.8                   | D-42.7        | B-19.3                       | D-44.4        | B-17.6                       | D-50.2        |
| Northbound                                                               |                 | A-8.2           | B-13.0        | A-8.7                   | B-15.9        | A-8.7                | B-16.6        | A-8.7                    | B-16.6        | A-9.8                        | B-17.5        | A-9.2                        | B-17.6        |
| Southbound                                                               |                 | A-8.7           | C-21.7        | A-8.9                   | C-23.8        | A-8.9                | C-23.6        | A-8.8                    | C-25.2        | A-9.7                        | C-25.4        | A-9.0                        | C-28.9        |
| <b>NC 12 (Ocean Trail) at Malia Drive/Food Lion Driveway</b>             | Unsignalized    | -               | -             | -                       | -             | -                    | -             | -                        | -             | -                            | -             | -                            | -             |
| Eastbound                                                                |                 | B-12.5          | C-19.9        | B-12.8                  | C-21.0        | B-12.9               | D-26.5        | B-12.9                   | C-22.6        | B-14.1                       | E-35.9        | B-14.5                       | D-26.7        |
| Westbound                                                                |                 | B-11.6          | C-22.7        | B-11.7                  | D-25.1        | B-11.9               | D-28.4        | B-12.0                   | D-27.7        | B-12.6                       | D-34.1        | B-12.3                       | D-29.7        |
| <b>NC 12 (Ocean Trail) at Dolphin Street (SR 1458)/Monterey Drive</b>    | Unsignalized    | -               | -             | -                       | -             | -                    | -             | -                        | -             | -                            | -             | -                            | -             |
| Eastbound                                                                |                 | B-10.9          | C-19.1        | B-11.0                  | C-20.0        | B-11.0               | C-20.4        | B-11.1                   | C-22.1        | B-11.3                       | C-22.5        | B-11.3                       | C-22.5        |
| Westbound                                                                |                 | C-15.0          | E-48.0        | C-15.4                  | F-57.4        | C-15.5               | F-62.0        | C-16.0                   | F-70.3        | C-16.7                       | F-78.4        | C-16.6                       | F-78.4        |
| <b>Sunset Boulevard at Seaside Farm Market/Future Access #2</b>          | Unsignalized    | -               | -             | -                       | -             | -                    | -             | -                        | -             | -                            | -             | -                            | -             |
| Southbound                                                               |                 | A-8.6           | B-10.6        | A-8.6                   | B-10.7        | A-8.6                | B-10.7        | A-8.6                    | B-10.9        | A-8.6                        | B-10.9        | A-8.9                        | B-11.3        |
| <b>Malia Drive at Future Access #1</b>                                   | Unsignalized    | -               | -             | -                       | -             | -                    | -             | -                        | -             | -                            | -             | -                            | -             |
| Northbound                                                               |                 | -               | -             | -                       | -             | A-8.4                | A-8.6         | ---                      | ---           | A-8.5                        | A-8.7         | A-8.4                        | A-8.6         |

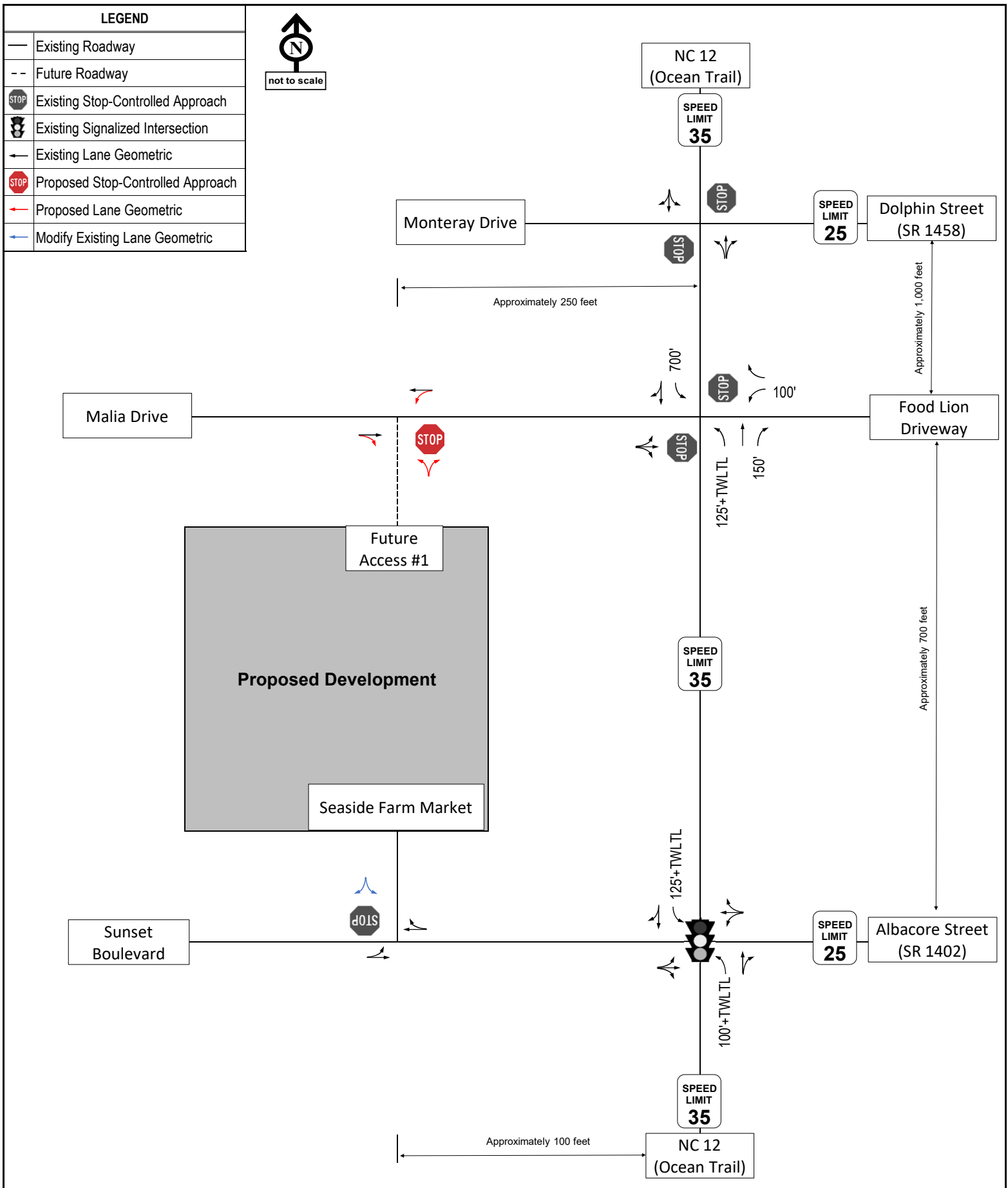
X (XX.X) = Overall intersection LOS (average delay), X-XX = Approach LOS and average delay

| LEGEND                                                                          |                                   |
|---------------------------------------------------------------------------------|-----------------------------------|
| —                                                                               | Existing Roadway                  |
| --                                                                              | Future Roadway                    |
|  | Existing Stop-Controlled Approach |
|  | Existing Signalized Intersection  |
| ←                                                                               | Existing Lane Geometric           |
|  | Proposed Stop-Controlled Approach |
|  | Proposed Lane Geometric           |



**Figure ES-1**  
**Phase II Build (2025) Alternative #1**  
**Lane Geometrics and Traffic Control**

**Monterey Shores TIA**  
**Corolla, NC**



**Figure ES-2**  
**Phase II Build (2025) Alternative #2**  
**Lane Geometrics and Traffic Control**

**Monteray Shores TIA**  
**Corolla, NC**

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# 1

## Introduction

There are plans to construct a multi-use development Corolla, North Carolina (Figure 1). The development is planned to be constructed near the intersection of Ocean Trail (NC 12) and Malia Drive and will tentatively be completed in two phases. Phase I will include 5 single-family homes, 25 multi-family dwellings and 4,502 square feet of restaurant space with an expected build year of 2023 and Phase II will add 8,002 square feet of retail space and an additional 6 multi-family dwellings with an expected full build-out year of 2025.

## Project Background

Based on the conceptual site plan (Figure 2), access to the development is proposed via up to two (2) vehicular access points:

- › Future Access #1, full movement access along Malia Drive, approximately 250 feet northwest of Ocean Trail (NC 12).
- › Future Access #2, full movement access along Sunset Boulevard, via an extension of the access driveway serving the Seaside Market.

There are potential right-of-way complications for the proposed access along Sunset Boulevard. Because of this, the full build-out of the proposed development was analyzed under two scenarios; one with only Future Access #1 via Malia Drive being available for use, and one with both access points available. Additionally, the land uses located along internal streets accessing Malia Drive, north of the lake, will be constructed first.

## Monterey Shores Development TIA

Based on discussions with the North Carolina Department of Transportation (NCDOT), the following intersections were included in the study area and analyzed for existing and future conditions, as applicable:

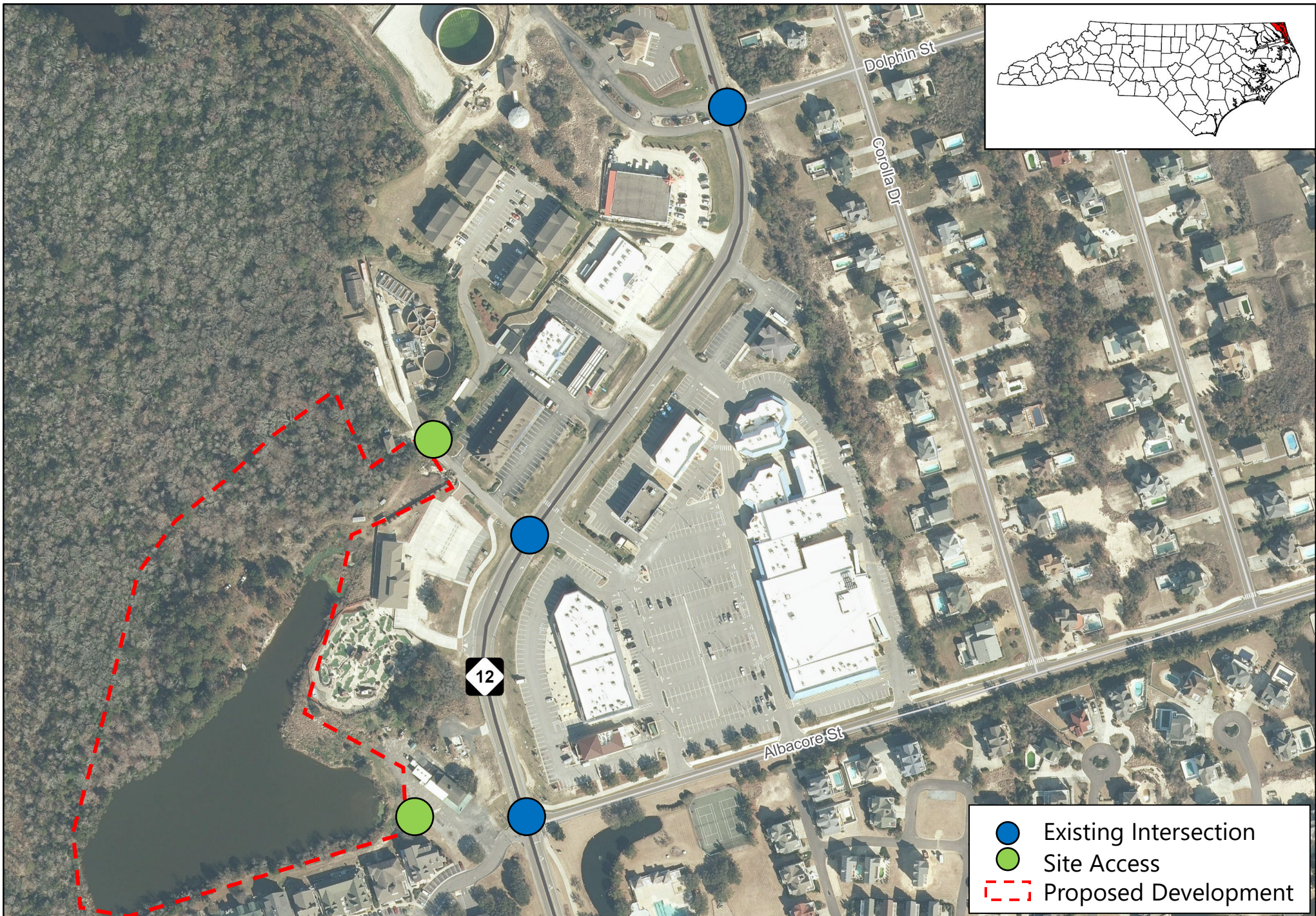
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- › Ocean Trail (NC 12) and Malia Drive/Commercial Driveway (unsignalized)
- › Ocean Trail (NC 12) and Albacore Street/Sunset Boulevard (signalized)
- › Malia Drive and Future Access #1 (future unsignalized)
- › Sunset Boulevard and Seaside Market Driveway/Future Access #2 (unsignalized)

The following scenarios were analyzed for existing and future conditions to evaluate the impacts that the proposed development may have on the surrounding roadway network:

- › Existing (2021) Conditions
- › Phase I No-Build (2023) Conditions
- › Phase I Build (2023) Conditions
- › Phase II No-Build (2025) Conditions
- › Phase II Build (2025) Alternative #1 Conditions
- › Phase II Build (2025) Alternative #2 Conditions

VHB Engineering NC, P.C. (VHB) was retained by Outer Banks Ventures to analyze the potential traffic impacts of the proposed development and to identify any necessary roadway improvements. This Traffic Impact Analysis (TIA) summarizes trip generation, distribution, and traffic capacity analysis for the proposed development. A summary of the key assumptions made within this traffic study was sent to NCDOT staff for review and comment prior to the completion of the TIA. These assumptions are provided within the NCDOT TIA Checklist attached within Appendix A.





Scale  
0 125 250  
Feet



Figure 1:  
Vicinity Map

Monteray Shores Development  
Traffic Impact Analysis  
Corolla, NC

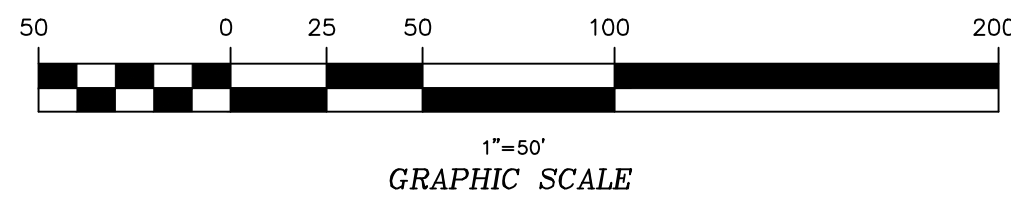




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| SITE DATA                                         |                                     |
|---------------------------------------------------|-------------------------------------|
| TOTAL AREA:                                       | 36.194 AC.                          |
| CAMA WETLANDS:                                    | 9.0 AC.±                            |
| NET AREA:                                         | 27.19 AC.±                          |
| AREA OF R/W & ROADWAY EASEMENTS:                  | 1.03 AC.±                           |
| AREA OF LOTS (SINGLE FAMILY & TOWNHOMES):         | 2.98 AC.±                           |
| AREA OF COMMERCIAL DEVELOPMENT:                   | 1.208 AC.±                          |
| AREA TO BE REMOVED FROM UTILITY OPEN SPACE:       | 4.01 AC.±                           |
| USE OF EXISTING COMMERCIAL AREA:                  | 1.208 AC.±                          |
| DEVELOPMENT SUMMARY                               |                                     |
| COMMERCIAL BUILDINGS:                             | 8,002 S.F.±                         |
| RESTAURANT:                                       | 4,502 S.F.±                         |
| OUTDOOR ENTERTAINMENT VENUE:                      | 7,626 S.F.±                         |
| PARKING REQUIREMENT                               |                                     |
| GENERAL COMMERCIAL:                               | 7,500 S.F. @ 1/300 S.F. = 25 SPACES |
| RESTAURANT:                                       | 4,502 S.F./150 S.F. = 30 SPACES     |
| OUTDOOR ENTERTAINMENT VENUE:                      | 7,626 S.F./250 = 31 SPACES          |
| UPPER STORY DWELLINGS:                            | 0.5/UNIT X 6 = 3 SPACES             |
| PADDLE BOAT RENTALS:                              | 1 SPACE/SLIP OR MOORING = 6 SPACES  |
| 10 BOAT DOCKS:                                    | 1 SPACE/SLIP OR MOORING = 10 SPACES |
| TOTAL SPACES REQUIRED:                            | 105 SPACES                          |
| TOTAL SPACES PROVIDED:                            | 108 SPACES                          |
| FLOOR AREA RATIO                                  |                                     |
| 12,562 S.F./1,184,396 S.F. (NET OF CAMA) = 0.0108 |                                     |



PROJECT: 4596000A3

PROJECT NO: 4596

DATE: 5/27/21

DESIGNED: BPG

BROWN: KFW

SHEET: 5 OF 6

BY: KFW

REVISION: 004 LINE & DOCKS

DATE: 5/27/21

SCALE: 1"=50'

CHECKED: MSB

APPROVED: BPG

PRELIMINARY  
DO NOT USE FOR  
CONSTRUCTION

CAD FILE: 4596000A3

OUTER BANKS VENTURES  
POPLAR BRANCH TOWNSHIP  
CURRITUCK COUNTY  
NORTH CAROLINA

MIXED USE DEVELOPMENT  
LAYOUT & CONCEPTUAL PLAN

LUP AMENDMENT

Bissell Professional Group  
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P.O. Box 1088 South Carolina 29149  
(252) 261-2000  
FAX (252) 261-1790

**BISSELL**  
PROFESSIONAL GROUP

Engineers, Planners, Surveyors  
and Environmental Specialists

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# 2

## Existing (2021) Conditions

This section describes the existing roadways in the vicinity of the proposed development. Annual Average Daily Traffic (AADT) data for the surrounding network of roadway was obtained from the NCDOT, where available.

### **Ocean Trail (NC 12)**

- › Within the study area limits, Ocean Trail (NC 12) is a two-lane undivided roadway with a posted speed limit of 35 miles per hour (mph). There is a two-way left-turn lane present between Albacore Street (SR 1402)/Sunset Boulevard and Malia Drive.
- › The land uses along Ocean Trail are primarily commercial within the study area.
- › The 2019 AADT along Ocean Trail was 4,800 vehicles per day (vpd) through the study area.

### **Albacore Street (SR 1402)**

- › Within the study area limits, Albacore Street is a two-lane undivided roadway with a posted speed limit of 25 mph.
- › The land uses along Albacore Street are primarily commercial and residential within the study area limits.
- › There is no AADT data available along Albacore Street.

### **Sunset Boulevard**

- › Within the study area limits, Sunset Boulevard is a two-lane undivided roadway providing access from Ocean Trail to the TimBuck II shopping plaza.
- › There is no posted speed limit along Sunset Boulevard
- › The land uses along Sunset Boulevard are primarily commercial within the study area limits.

## Monterey Shores Development TIA

- › There is no AADT data available along Sunset Boulevard.

### **Malia Drive**

- › Within the study area limits, Malia Drive is a two-lane undivided roadway with no posted speed limit.
- › The land uses along Malia Drive are primarily commercial within the study area limits.
- › There is no AADT data available along Malia Drive.

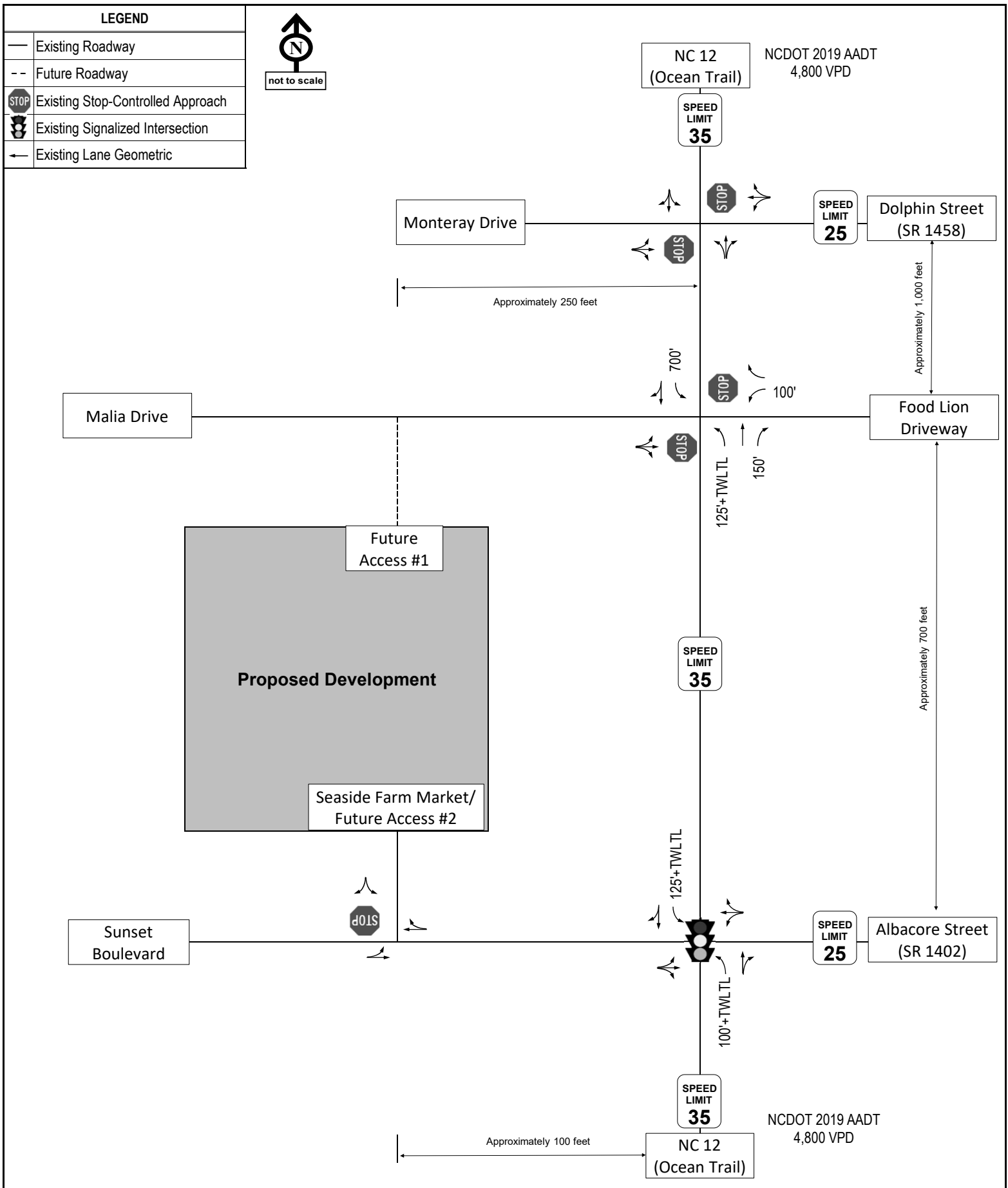
### **Dolphin Street (SR 1458)**

- › Within the study area limits, Dolphin Street is a two-lane undivided roadway with a posted speed limit of 25 mph.
- › The land uses along Dolphin Street are primarily residential within the study area limits.
- › There is no AADT data available along Dolphin Street.

### **Monterey Drive**

- › Within the study area limits, Monterey Drive is a two-lane undivided roadway with a posted speed limit of 20 mph.
- › The land uses along Monterey Drive are primarily commercial and residential within the study area limits.
- › There is no AADT data available along Monterey Drive.

Figure 3 provides a schematic diagram of the existing roadways near the proposed development, including the intersection geometrics.



**Figure 3**  
Existing (2021) Lane Geometrics and Traffic Control

**Monterey Shores TIA**  
Corolla, NC



## Existing Turning Movement Data

VHB Engineering NC, P.C. collected weekday AM and PM peak hour intersection turning movement counts on September 1<sup>st</sup>, 2021. The day was selected to best represent the busier summer conditions of the area, where weekday volumes are expected to be higher than in the other off-peak seasons. Table 1 summarizes the schedule used to obtain the turning movement data. The video collected for the intersection of Ocean Trail and Albacore Street/Sunset Boulevard was also studied manually to find the turning movement volumes at the intersection of Sunset Boulevard and the Seaside Market driveway. No volume balancing adjustments were deemed necessary due to minor volume variations between intersections along the corridor. A minimum of four vehicles per hour was added to several movements based on NCDOT Congestion Management guidance. A detailed summary of the traffic counts can be found in Appendix B. The existing peak hour turning movement volumes are shown in Figure 4.

**Table 1 Turning Movement Count Schedule**

| Intersection                                                      | Time Period                            | Data Collection Date           |
|-------------------------------------------------------------------|----------------------------------------|--------------------------------|
| Ocean Trail (NC 12) at Albacore Street (SR 1402)/Sunset Boulevard | 7:00 AM – 9:00 AM<br>4:00 PM – 6:00 PM | Wednesday<br>September 1, 2021 |
| Ocean Trail (NC 12) at Malia Drive/Food Lion Driveway             | 7:00 AM – 9:00 AM<br>4:00 PM – 6:00 PM | Wednesday<br>September 1, 2021 |
| Ocean Trail (NC 12) at Dolphin Street (SR 1458)/Monterey Drive    | 7:00 AM – 9:00 AM<br>4:00 PM – 6:00 PM | Wednesday<br>September 1, 2021 |

## Level of Service Criteria

Peak hour level of service (LOS) measures the adequacy of the intersection geometrics and traffic controls of a particular intersection or approach for the given turning volumes. Levels of service range from A through F, based on the average control delay experienced by vehicles traveling through the intersection during the peak hour. Control delay represents the portion of total delay attributed to traffic control devices (e.g., signals or stop signs). The engineering professional generally accepts LOS D as an acceptable operating condition for signalized intersections in urban areas and LOS C for rural areas.

At unsignalized intersections, LOS E is generally considered acceptable only if the side street encounters the delay. Nevertheless, side streets sometimes function at LOS F during peak traffic periods; however, the traffic volume often does not warrant a traffic signal to assist side street traffic. Table 2 provides a general description of various levels of service categories and delay ranges.

**Table 2 Level of Service Description for Intersections**

| Level of Service | Description             | Signalized Intersection | Unsignalized Intersection |
|------------------|-------------------------|-------------------------|---------------------------|
| A                | Little or no delay      | <= 10 sec.              | <= 10 sec.                |
| B                | Short traffic delay     | 10-20 sec.              | 10-15 sec.                |
| C                | Average traffic delay   | 20-35 sec.              | 15-25 sec.                |
| D                | Long traffic delay      | 35-55 sec.              | 25-35 sec.                |
| E                | Very long traffic delay | 55-80 sec.              | 35-50 sec.                |
| F                | Unacceptable delay      | > 80 sec.               | > 50 sec.                 |

## Level of Service Analysis

Intersection levels of service analyses were performed for the typical weekday AM and PM peak hour using *Synchro/SimTraffic Professional Version 10*. The turning movement volumes analyzed in the Existing (2021) scenario are displayed in Figure 4. The existing signal plans provided by the NCDOT were utilized in the analysis and are included in Appendix C. A summary of the findings for the Existing (2021) scenario LOS analysis can be found in Table 3, and the full *Synchro* output can be found in Appendix D.

As reported in Table 3, the signalized intersection within the study area operates at an overall acceptable level of service (LOS D or better) during both peak hours. The stop-controlled approaches operate at acceptable levels of service except the westbound approach at the intersection of Ocean Trail (NC 12) and Dolphin Street/Monterey Drive, which operates at LOS E during the PM peak hour.

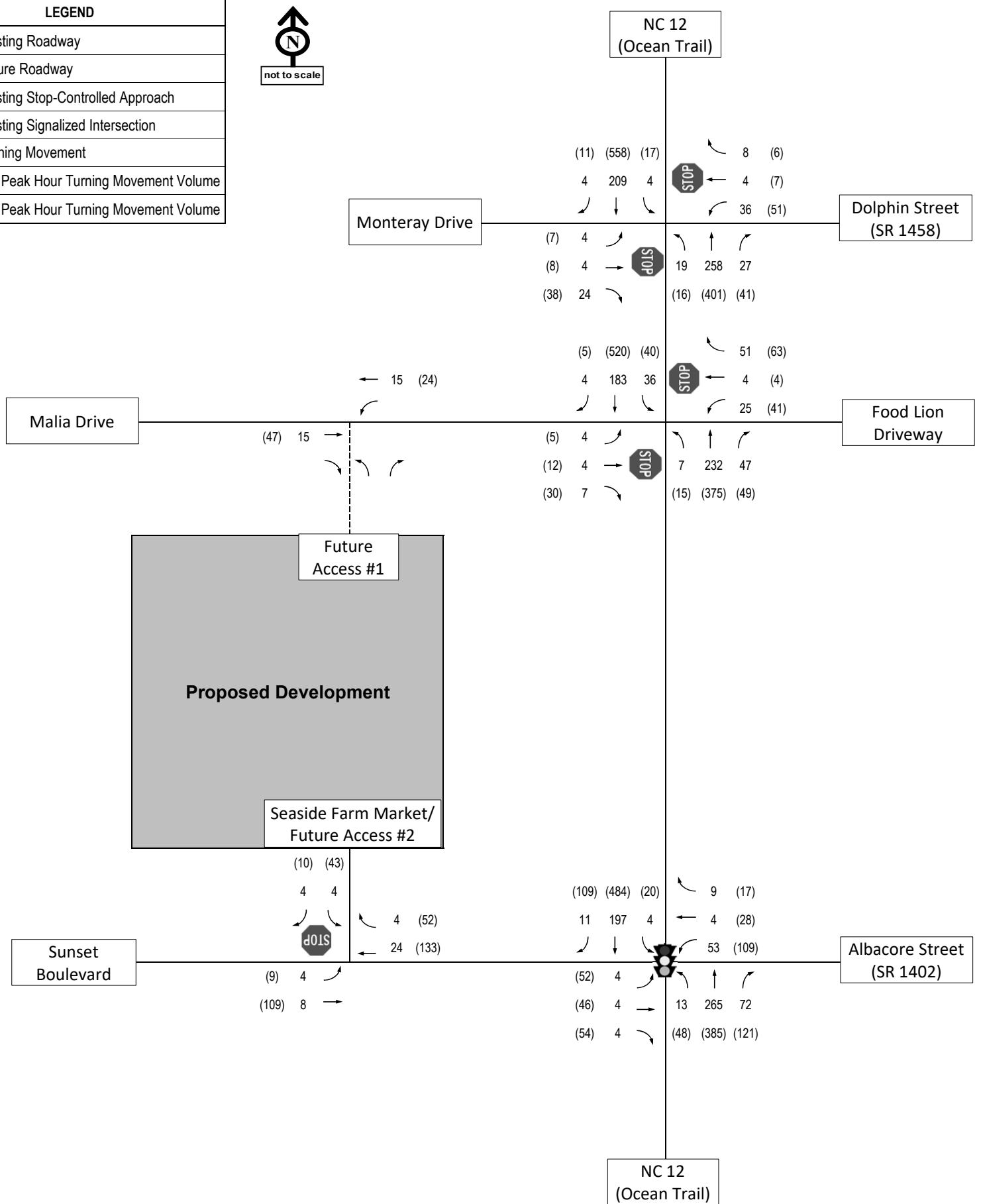
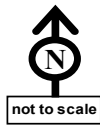
**Table 3 Existing (2021) LOS Results**

| Intersection and Approach                                                | Traffic Control | Existing (2021) |                 |
|--------------------------------------------------------------------------|-----------------|-----------------|-----------------|
|                                                                          |                 | AM              | PM              |
| <b>NC 12 (Ocean Trail) at Albacore Street (SR 1402)/Sunset Boulevard</b> | Signalized      | <b>A (9.4)</b>  | <b>C (21.3)</b> |
| Eastbound                                                                |                 | B-16.3          | C-32.9          |
| Westbound                                                                |                 | B-17.1          | D-38.5          |
| Northbound                                                               |                 | A-8.2           | B-13.0          |
| Southbound                                                               |                 | A-8.7           | C-21.7          |
| <b>NC 12 (Ocean Trail) at Malia Drive/Food Lion Driveway</b>             | Unsignalized    | -               | -               |
| Eastbound                                                                |                 | B-12.5          | C-19.9          |
| Westbound                                                                |                 | B-11.6          | C-22.7          |
| <b>NC 12 (Ocean Trail) at Dolphin Street (SR 1458)/Monterey Drive</b>    | Unsignalized    | -               | -               |
| Eastbound                                                                |                 | B-10.9          | C-19.1          |
| Westbound                                                                |                 | C-15.0          | E-48.0          |
| <b>Sunset Boulevard at Seaside Farm Market/Future Access #2</b>          | Unsignalized    | -               | -               |
| Southbound                                                               |                 | A-8.6           | B-10.6          |

**X (XX.X)** = Overall intersection LOS (average delay), X-XX = Approach LOS and average delay

# LEGEND

|      |                                      |
|------|--------------------------------------|
| —    | Existing Roadway                     |
| --   | Future Roadway                       |
|      | Existing Stop-Controlled Approach    |
|      | Existing Signalized Intersection     |
| ←    | Turning Movement                     |
| XX   | AM Peak Hour Turning Movement Volume |
| (XX) | PM Peak Hour Turning Movement Volume |



**Figure 4**  
Existing (2021) AM and PM Peak Hour Volumes

**Monteray Shores TIA**  
Corolla, NC



# 3

## Phase I No-Build (2023) Conditions

### Background Growth Calculations

The Existing (2021) peak hour volumes were grown to the Phase I year (2023) using an annual growth rate of two percent (2%) to calculate the expected background growth within the study area. There were no background developments or roadway improvements identified for inclusion in the study area. Therefore, no additional background trips were included in the Phase I No-Build (2023) scenario, and the network layout matches the Existing (2021) conditions.

### Level of Service Analysis

Intersection levels of service analyses were performed for the typical weekday AM and PM peak hours using *Synchro/SimTraffic Professional Version 10*. The calculated Phase I No-Build (2023) peak hour turning movements are displayed in Figure 5. A summary of the findings for the Phase I No-Build (2023) LOS analysis can be found in Table 4 and the full Synchro outputs can be found in Appendix D.

As reported in Table 4, the signalized intersection within the study area is expected to continue to operate at an acceptable level of service during both peak hours. The stop-controlled westbound approach at the intersection of Ocean Trail (NC 12) and Dolphin Street/Monterey Drive is projected to degrade to a LOS F during the PM peak hour.



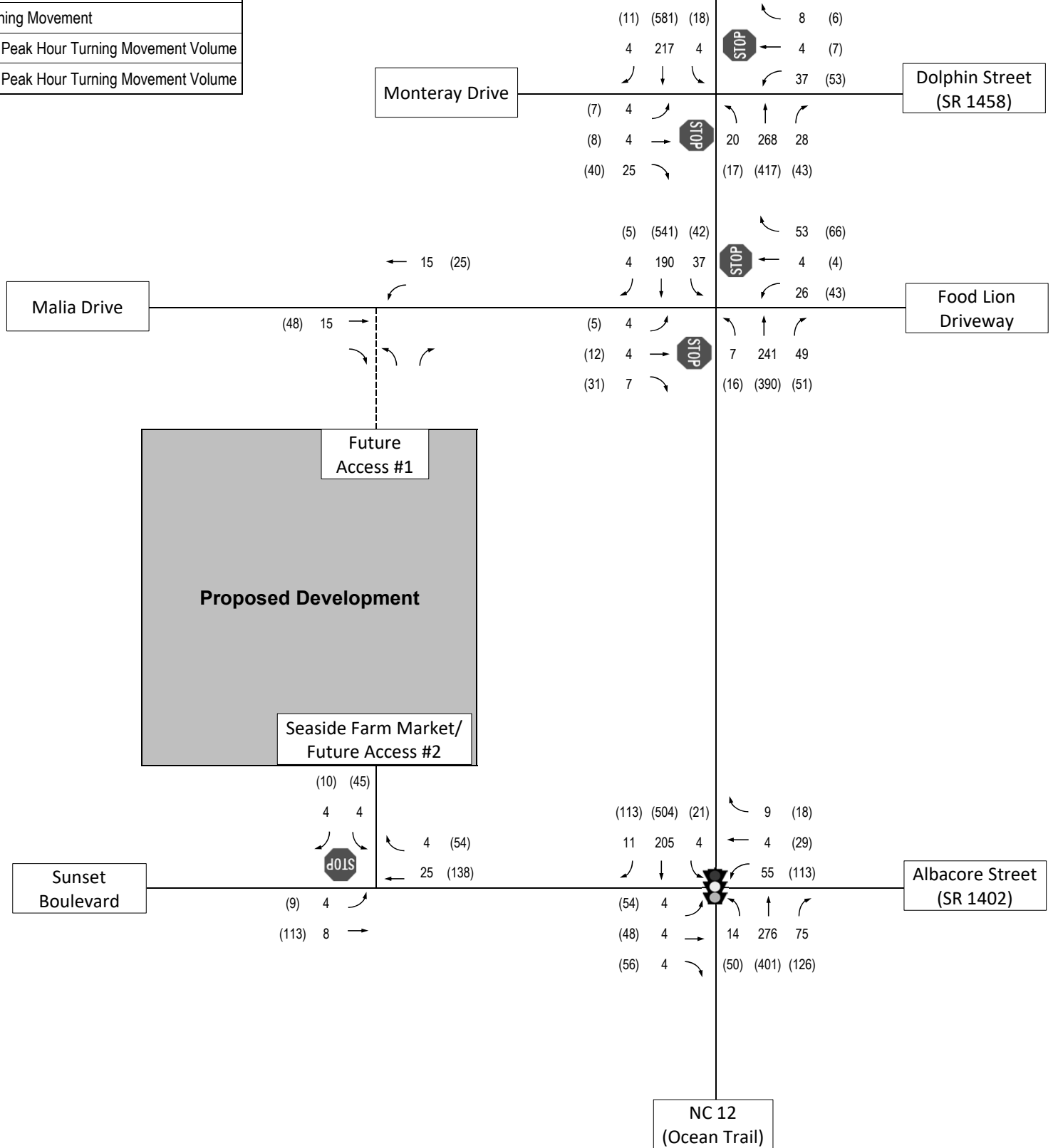
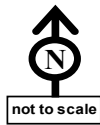
**Table 4 Phase I No-Build (2023) LOS Results**

| Intersection and Approach                                                | Traffic Control | Phase I No-Build (2023) |                 |
|--------------------------------------------------------------------------|-----------------|-------------------------|-----------------|
|                                                                          |                 | AM                      | PM              |
| <b>NC 12 (Ocean Trail) at Albacore Street (SR 1402)/Sunset Boulevard</b> | Signalized      | <b>A (9.8)</b>          | <b>C (23.6)</b> |
| Eastbound                                                                |                 | B-16.6                  | C-33.6          |
| Westbound                                                                |                 | B-17.4                  | D-40.9          |
| Northbound                                                               |                 | A-8.7                   | B-15.9          |
| Southbound                                                               |                 | A-8.9                   | C-23.8          |
| <b>NC 12 (Ocean Trail) at Malia Drive/Food Lion Driveway</b>             | Unsignalized    | -                       | -               |
| Eastbound                                                                |                 | B-12.8                  | C-21.0          |
| Westbound                                                                |                 | B-11.7                  | D-25.1          |
| <b>NC 12 (Ocean Trail) at Dolphin Street (SR 1458)/Monterey Drive</b>    | Unsignalized    | -                       | -               |
| Eastbound                                                                |                 | B-11.0                  | C-20.0          |
| Westbound                                                                |                 | C-15.4                  | F-57.4          |
| <b>Sunset Boulevard at Seaside Farm Market/Future Access #2</b>          | Unsignalized    | -                       | -               |
| Southbound                                                               |                 | A-8.6                   | B-10.7          |

**X (XX.X)** = Overall intersection LOS (average delay), X-XX = Approach LOS and average delay

# LEGEND

|      |                                      |
|------|--------------------------------------|
| —    | Existing Roadway                     |
| --   | Future Roadway                       |
|      | Existing Stop-Controlled Approach    |
|      | Existing Signalized Intersection     |
| ←    | Turning Movement                     |
| XX   | AM Peak Hour Turning Movement Volume |
| (XX) | PM Peak Hour Turning Movement Volume |



**Figure 5**  
Phase I No-Build (2023) AM and PM Peak Hour Volumes

**Monterey Shores TIA**  
Corolla, NC



# 4

## Phase I Build (2023) Conditions

There are plans to construct a multi-use development Corolla, North Carolina (Figure 1). The development is planned to be constructed near the intersection of Ocean Trail (NC 12) and Malia Drive and will tentatively be completed in two phases. Phase I will include 5 single-family homes, 25 multi-family dwellings and 4,502 square feet of restaurant space with an expected build year of 2023 and Phase II will add 8,002 square feet of retail space and an additional 6 multi-family dwellings with an expected full build-out year of 2025.

### Trip Generation

Trip generation was conducted based on the most appropriate corresponding trip generation codes included in the *Institute of Transportation Engineers (ITE) Trip Generation Manual, 10<sup>th</sup> Edition* and the suggested method of calculation in the NCDOT's *"Rate vs. Equation" Spreadsheet*. Phase I of the proposed development is to consist of 5 single-family homes, 25 multi-family dwellings, and 4,502 sf of restaurant space; ITE Land Use Code (LUC) 210 (Single Family Detached Housing), LUC 220 (Multi-Family Housing, Low-Rise), and LUC 931 (Quality Restaurant) were used based on the NCDOT guidance.

Table 5 summarizes the assumed trip generation for Phase I of the proposed development for typical weekday AM and PM peak hours. Phase I of the proposed development is projected to generate 591 daily weekday site trips, with 24 trips (7 entering, 24 exiting) occurring in the AM peak hour and 58 trips (38 entering, 20 exiting) occurring in the PM peak hour. After reductions to account for internal capture the proposed development is expected to generate 552 daily weekday external site trips, with 24 trips (7 entering, 17 exiting) occurring in the AM peak hour, and 53 trips (36 entering, 17 exiting)

## Monterey Shores Development TIA

occurring in the PM peak hour. The generated site trips were distributed in accordance with the existing turning movement counts and land uses.

**Table 5 Phase I Trip Generation Rates (Vehicle Trips)**

| Land Use Code <sup>1</sup>                          | Land Use                       | Unit     | ADT | AM Peak Hour |      |       | PM Peak Hour |      |       |
|-----------------------------------------------------|--------------------------------|----------|-----|--------------|------|-------|--------------|------|-------|
|                                                     |                                |          |     | Enter        | Exit | Total | Enter        | Exit | Total |
| Total Site Trips <sup>2</sup>                       |                                |          |     |              |      |       |              |      |       |
| 210                                                 | Single-Family Detached Housing | 5 du     | 66  | 2            | 6    | 8     | 4            | 2    | 6     |
| 220                                                 | Multifamily Housing (Low-Rise) | 25 du    | 148 | 3            | 10   | 13    | 11           | 6    | 17    |
| 931                                                 | Quality Restaurant             | 4,502 sf | 377 | 2            | 1    | 3     | 23           | 12   | 35    |
| Development Total                                   |                                |          | 591 | 7            | 17   | 24    | 38           | 20   | 58    |
| Trip Reduction Due to Internal Capture <sup>3</sup> |                                |          |     |              |      |       |              |      |       |
| 210                                                 | Single-Family Detached Housing | 5 du     | 2   | 0            | 0    | 0     | 0            | 0    | 1     |
| 220                                                 | Multifamily Housing (Low-Rise) | 25 du    | 7   | 0            | 0    | 0     | 1            | 1    | 1     |
| 931                                                 | Quality Restaurant             | 4,502 sf | 30  | 0            | 0    | 0     | 1            | 2    | 3     |
| Development Total                                   |                                |          | 40  | 0            | 0    | 0     | 2            | 3    | 5     |
| Total External Site Trips                           |                                |          |     |              |      |       |              |      |       |
| 210                                                 | Single-Family Detached Housing | 5 du     | 64  | 2            | 6    | 8     | 4            | 2    | 6     |
| 220                                                 | Multifamily Housing (Low-Rise) | 25 du    | 141 | 3            | 10   | 13    | 10           | 5    | 15    |
| 931                                                 | Quality Restaurant             | 4,502 sf | 347 | 2            | 1    | 3     | 22           | 10   | 32    |
| Development Total                                   |                                |          | 552 | 7            | 17   | 24    | 36           | 17   | 53    |
| Pass-by Site Trips <sup>4</sup>                     |                                |          |     |              |      |       |              |      |       |
| 210                                                 | Single-Family Detached Housing | 5 du     |     | 0            | 0    | 0     | 0            | 0    | 0     |
| 220                                                 | Multifamily Housing (Low-Rise) | 25 du    |     | 0            | 0    | 0     | 0            | 0    | 0     |
| 931                                                 | Quality Restaurant             | 4,502 sf |     | 0            | 0    | 0     | 7            | 7    | 14    |
| Development Total                                   |                                |          |     | 0            | 0    | 0     | 7            | 7    | 14    |
| Non-Pass-by Site Trips                              |                                |          |     |              |      |       |              |      |       |
| 210                                                 | Single-Family Detached Housing | 5 du     |     | 2            | 6    | 8     | 4            | 2    | 6     |
| 220                                                 | Multifamily Housing (Low-Rise) | 25 du    |     | 3            | 10   | 13    | 10           | 5    | 15    |
| 931                                                 | Quality Restaurant             | 4,502 sf |     | 2            | 1    | 3     | 15           | 3    | 18    |
| Development Total                                   |                                |          |     | 7            | 17   | 24    | 29           | 10   | 39    |

Notes:

1. Land Use Code and trip generation rates are determined based on ITE Trip Generation, 10th Edition, rates for 820 based on subset of smaller retail sites (50,000 sf or less)

2. Total site trips are determined based on the suggested method in the NCDOT Rate vs Equation Spreadsheet

3. Internal capture was based on NCHRP 684 method and NCDOT IC calculation spreadsheet, with 1,500 ft spacing between uses

4. Unconstrained pass-by trips are calculated based on ITE Trip Generation Handbook, 3rd Edition. The final projections are not expected to exceed 10% of adjacent street volumes.

## Trip Distribution and Assignment

In Phase I, the proposed development will be accessed via one (1) full-movement driveway along Malia Drive. The generated site trips were distributed in accordance with the existing traffic patterns and land uses in the vicinity of the study area as follows:

- › Ocean Trail (NC 12) from/to the north – 30%
- › Ocean Trail (NC 12) from/to the south – 50%
- › Albacore Street (SR 1402) from/to the east – 5%
- › Sunset Boulevard from/to the west – 2%
- › Food Lion Driveway from/to the east – 5%
- › Dolphin Street from/to the east – 3%
- › Monterey Drive from/to the west – 5%

Pass-by trips for the commercial uses were distributed along Ocean Trail with a 60/40 split between the northbound and southbound directions respectively.

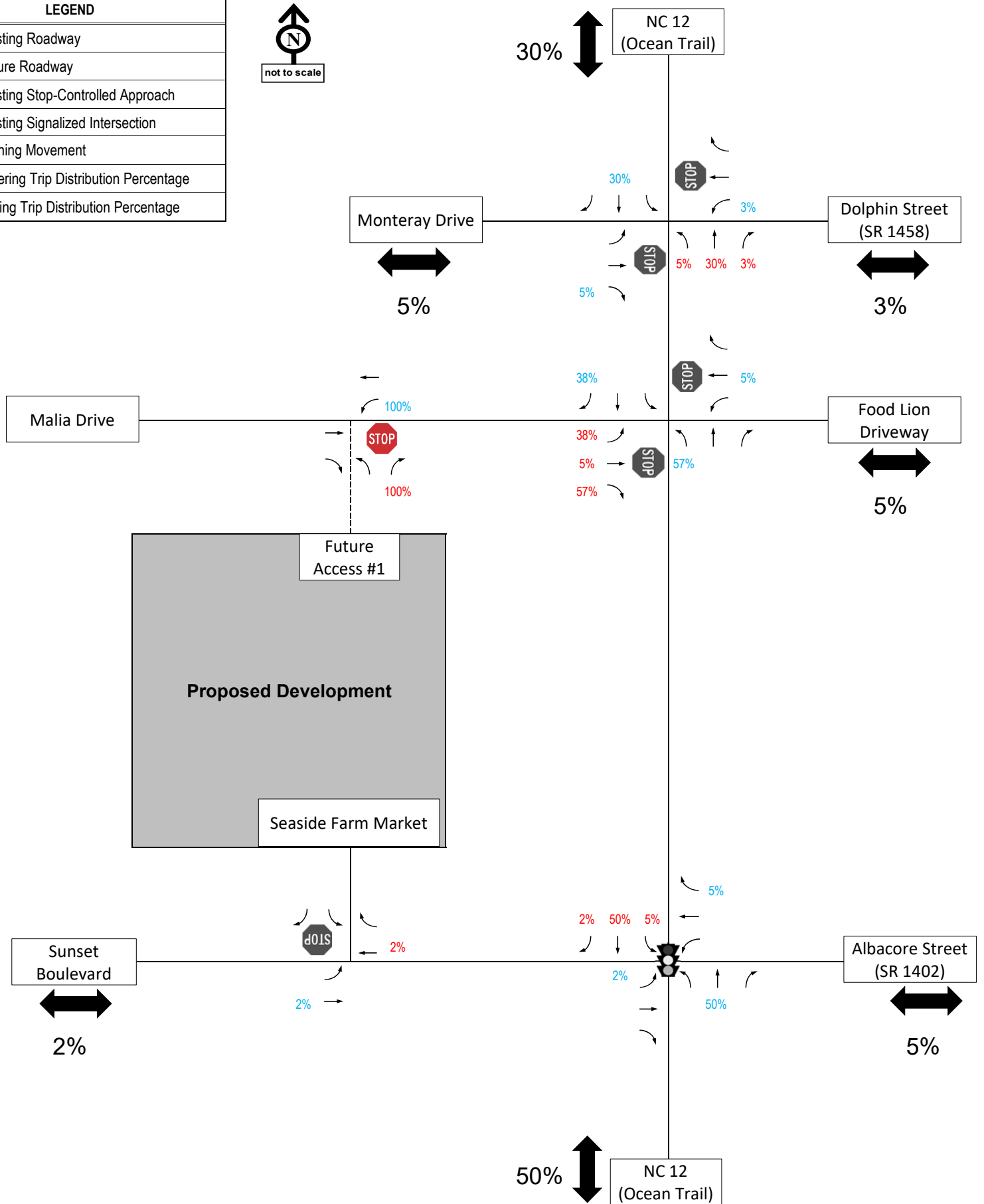
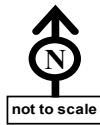


## Monteray Shores Development TIA

The non-pass-by distribution percentages and resulting site trips for Phase I Build (2023) are shown in Figure 6 and Figure 7. The pass-by distribution percentages and resulting site trips for Phase I Build (2023) are shown in Figure 8 and Figure 9. The total combined site trips for Phase I Build (2023) are shown in Figure 10.

# LEGEND

|  |                                           |
|--|-------------------------------------------|
|  | Existing Roadway                          |
|  | Future Roadway                            |
|  | Existing Stop-Controlled Approach         |
|  | Existing Signalized Intersection          |
|  | Turning Movement                          |
|  | XX% Entering Trip Distribution Percentage |
|  | XX% Exiting Trip Distribution Percentage  |

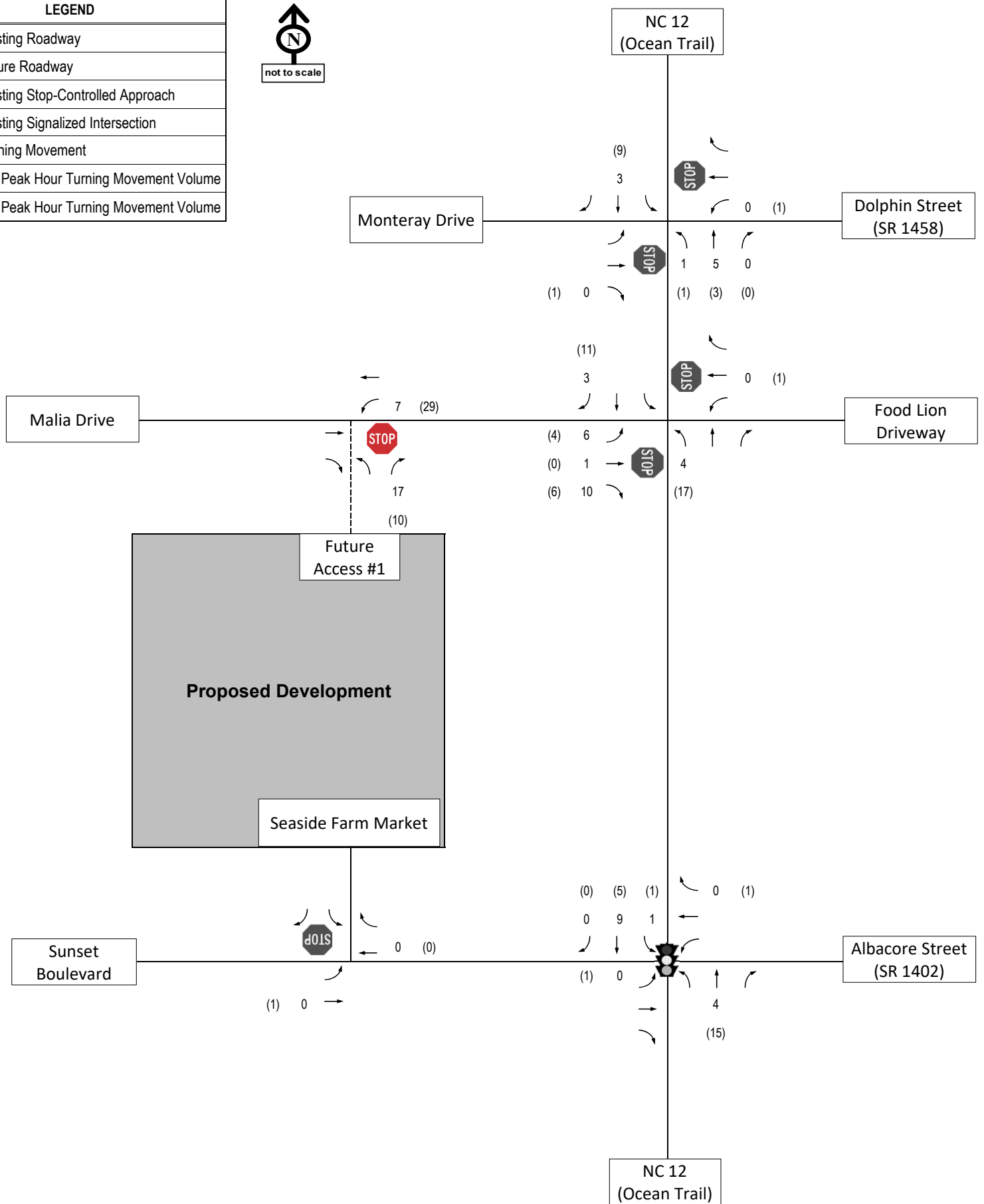
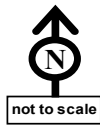


**Figure 6**  
**Phase I Build (2023) Non-Pass-By Site Trip Distribution**

**Monterey Shores TIA**  
**Corolla, NC**

# LEGEND

|      |                                      |
|------|--------------------------------------|
| —    | Existing Roadway                     |
| --   | Future Roadway                       |
|      | Existing Stop-Controlled Approach    |
|      | Existing Signalized Intersection     |
| ←    | Turning Movement                     |
| XX   | AM Peak Hour Turning Movement Volume |
| (XX) | PM Peak Hour Turning Movement Volume |

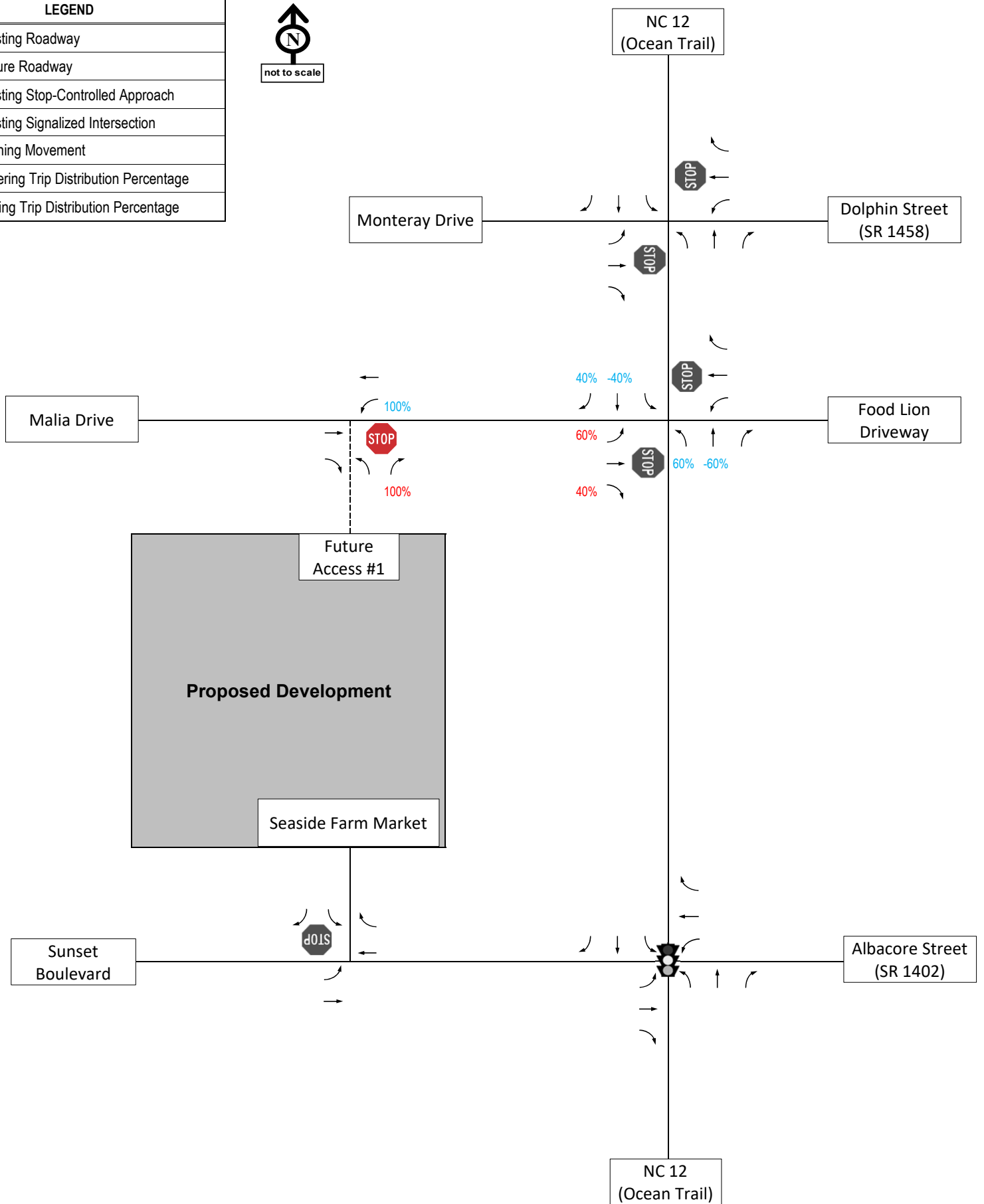
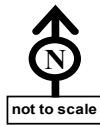


**Figure 7**  
**Phase I Build (2023) Peak Hour Site Generated Non-Pass-By Trips**

**Monteray Shores TIA**  
**Corolla, NC**

# LEGEND

|  |                                           |
|--|-------------------------------------------|
|  | Existing Roadway                          |
|  | Future Roadway                            |
|  | Existing Stop-Controlled Approach         |
|  | Existing Signalized Intersection          |
|  | Turning Movement                          |
|  | XX% Entering Trip Distribution Percentage |
|  | XX% Exiting Trip Distribution Percentage  |

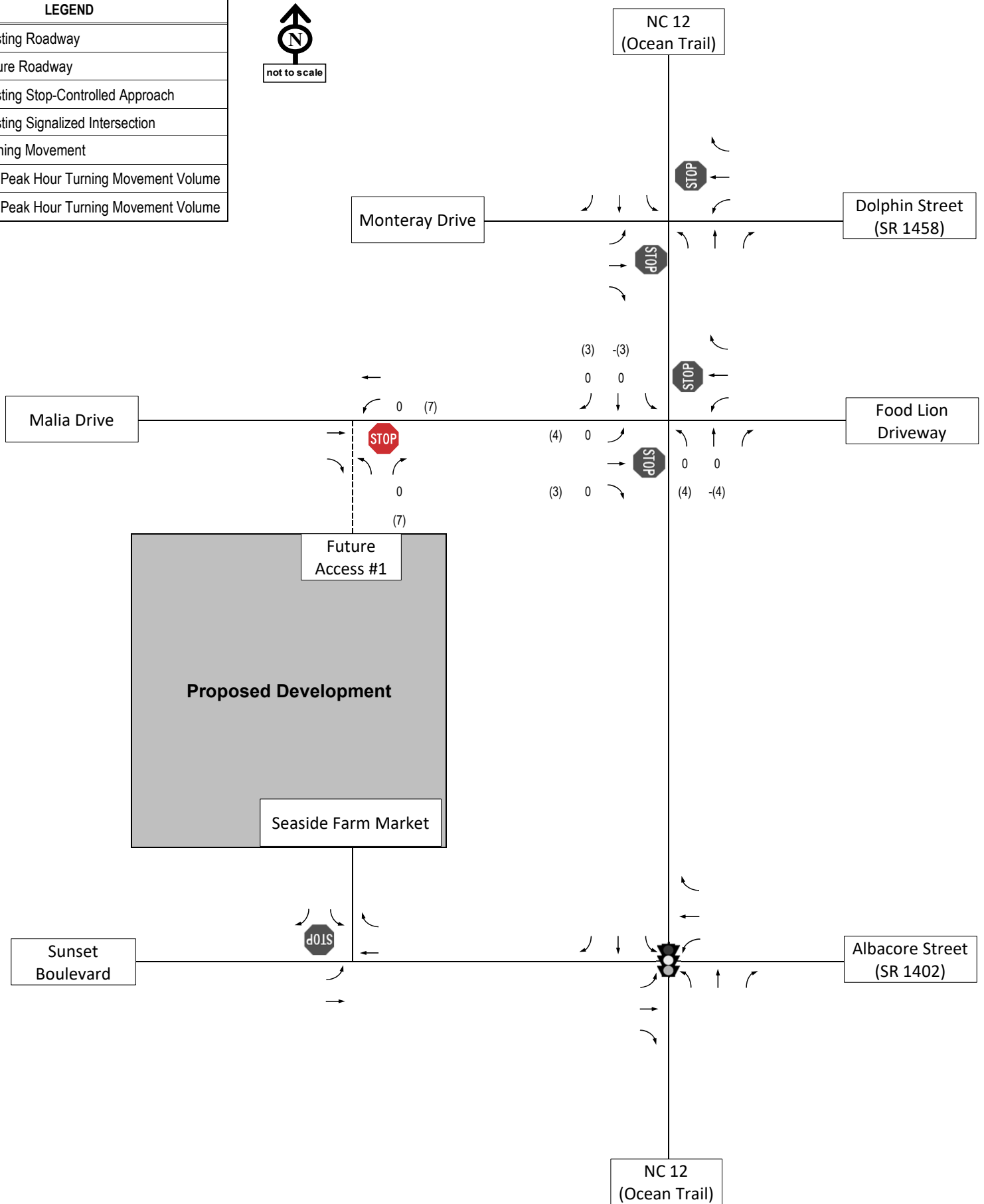


**Figure 8**  
**Phase I Build (2023) Pass-By Site Trip Distribution**

**Monterey Shores TIA**  
**Corolla, NC**

LEGEND

|      |                                      |
|------|--------------------------------------|
| —    | Existing Roadway                     |
| --   | Future Roadway                       |
|      | Existing Stop-Controlled Approach    |
|      | Existing Signalized Intersection     |
| ←    | Turning Movement                     |
| XX   | AM Peak Hour Turning Movement Volume |
| (XX) | PM Peak Hour Turning Movement Volume |



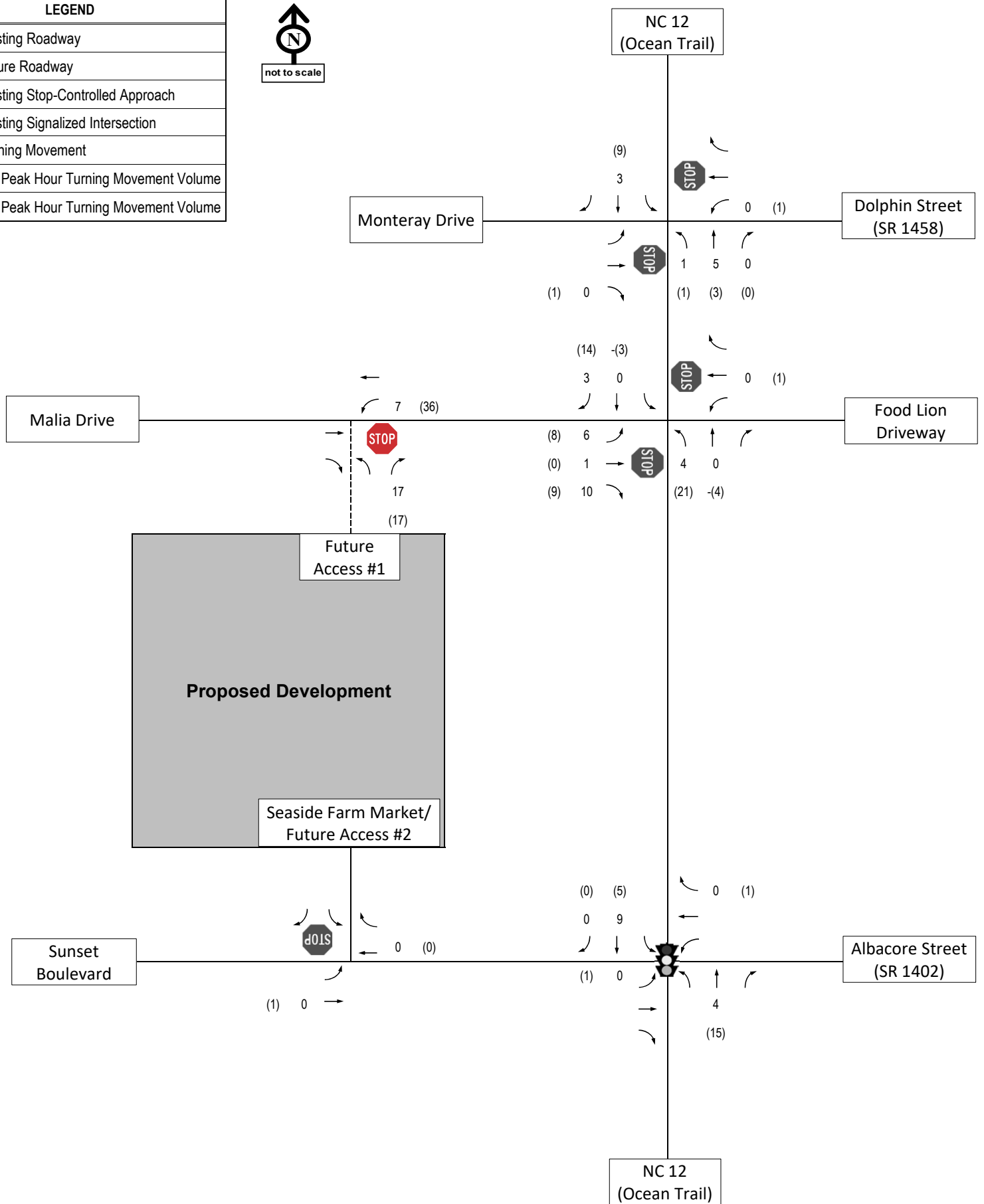
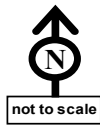
**Figure 9**  
Phase I Build (2023) Peak Hour Site Generated Pass-By Trips

**Monterey Shores TIA**  
Corolla, NC



# LEGEND

|      |                                      |
|------|--------------------------------------|
|      | Existing Roadway                     |
|      | Future Roadway                       |
|      | Existing Stop-Controlled Approach    |
|      | Existing Signalized Intersection     |
|      | Turning Movement                     |
| XX   | AM Peak Hour Turning Movement Volume |
| (XX) | PM Peak Hour Turning Movement Volume |



**Figure 10**  
**Phase I Build (2023) Total Peak Hour Site Generated Trips**

**Monteray Shores TIA**  
**Corolla, NC**

## Level of Service Analysis

The Phase I Build (2023) analysis scenario includes the Phase I No-Build (2023) traffic and site-generated trips from the proposed development as described previously. The network geometry matches the Existing (2021) scenario with the addition of the one driveway along Malia Drive. Figure 11 depicts the turning movement volumes used in the Phase I Build (2023) scenario analysis. Intersection levels of service analyses were performed for the typical weekday AM and PM peak hours using Synchro/SimTraffic Professional Version 10. Table 6 summarizes the findings of the LOS analysis, and Appendix D contains the full Synchro reports.

As reported in Table 6, with the addition of site trips, the signalized intersection continues to operate at overall acceptable levels of service during both peak hours. The stop-controlled westbound approach at the intersection of Ocean Trail (NC 12) and Dolphin Street/Monterey Drive is projected to continue to operate at a LOS F during the PM peak hour.

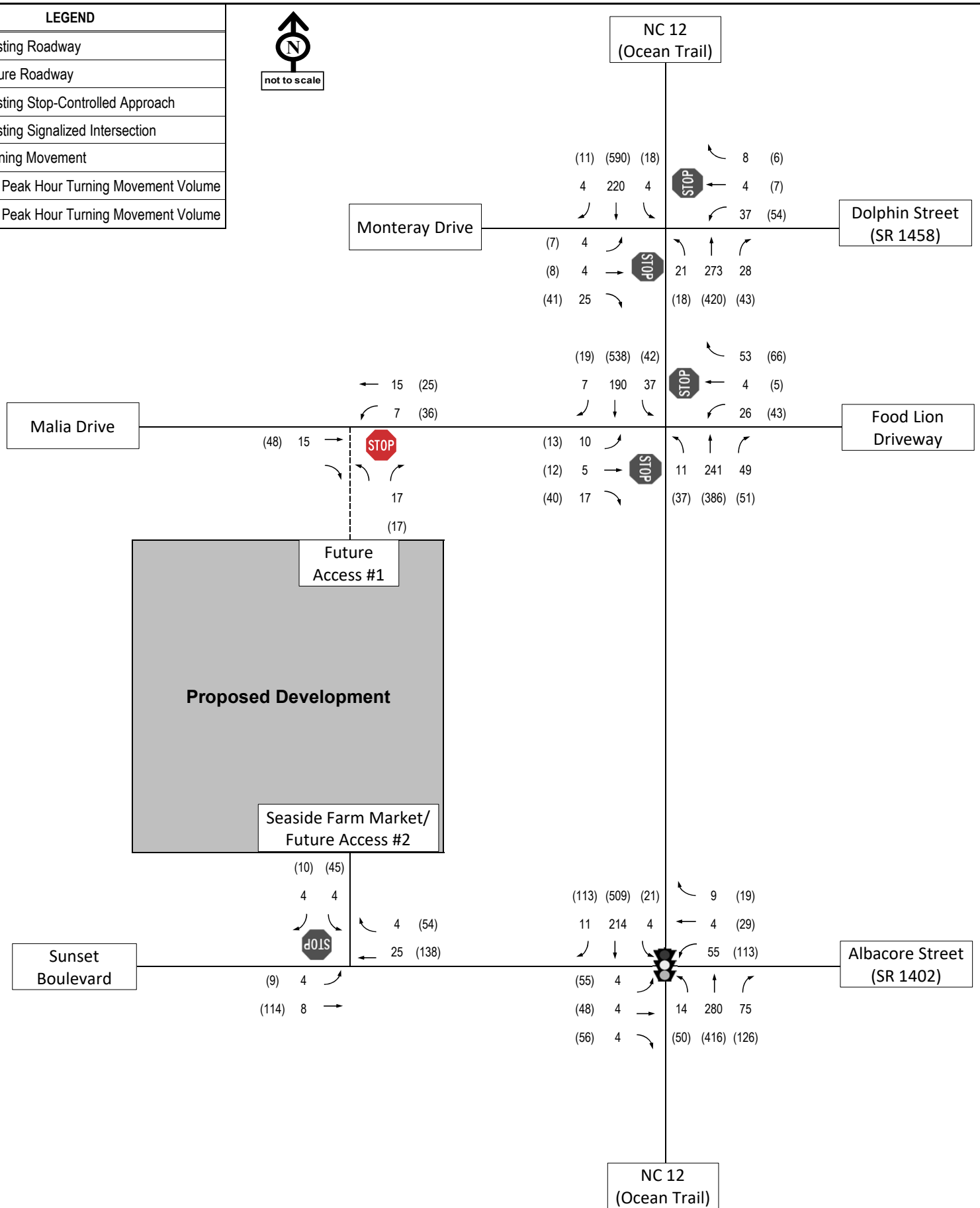
**Table 6 Phase I Build (2023) LOS Results**

| Intersection and Approach                                                | Traffic Control | Phase I Build (2023) |                 |
|--------------------------------------------------------------------------|-----------------|----------------------|-----------------|
|                                                                          |                 | AM                   | PM              |
| <b>NC 12 (Ocean Trail) at Albacore Street (SR 1402)/Sunset Boulevard</b> | Signalized      | <b>A (9.8)</b>       | <b>C (24.0)</b> |
| Eastbound                                                                |                 | B-16.7               | C-34.3          |
| Westbound                                                                |                 | B-17.5               | D-42.2          |
| Northbound                                                               |                 | A-8.7                | B-16.6          |
| Southbound                                                               |                 | A-8.9                | C-23.6          |
| <b>NC 12 (Ocean Trail) at Malia Drive/Food Lion Driveway</b>             | Unsignalized    | -                    | -               |
| Eastbound                                                                |                 | B-12.9               | D-26.5          |
| Westbound                                                                |                 | B-11.9               | D-28.4          |
| <b>NC 12 (Ocean Trail) at Dolphin Street (SR 1458)/Monterey Drive</b>    | Unsignalized    | -                    | -               |
| Eastbound                                                                |                 | B-11.0               | C-20.4          |
| Westbound                                                                |                 | C-15.5               | <b>F-62.0</b>   |
| <b>Sunset Boulevard at Seaside Farm Market/Future Access #2</b>          | Unsignalized    | -                    | -               |
| Southbound                                                               |                 | A-8.6                | B-10.7          |
| <b>Malia Drive at Future Access #1</b>                                   | Unsignalized    | -                    | -               |
| Northbound                                                               |                 | A-8.4                | A-8.6           |

**X (XX.X)** = Overall intersection LOS (average delay), X-XX = Approach LOS and average delay

# LEGEND

|      |                                      |
|------|--------------------------------------|
| —    | Existing Roadway                     |
| --   | Future Roadway                       |
|      | Existing Stop-Controlled Approach    |
|      | Existing Signalized Intersection     |
| ←    | Turning Movement                     |
| XX   | AM Peak Hour Turning Movement Volume |
| (XX) | PM Peak Hour Turning Movement Volume |



**Figure 11**  
Phase I Build (2023) AM and PM Peak Hour Volumes

**Monterey Shores TIA**  
Corolla, NC

## Roadway Improvement Recommendations

As indicated in the traffic operations analyses, the proposed development is projected to have a minimal impact on the traffic operations within the study area.

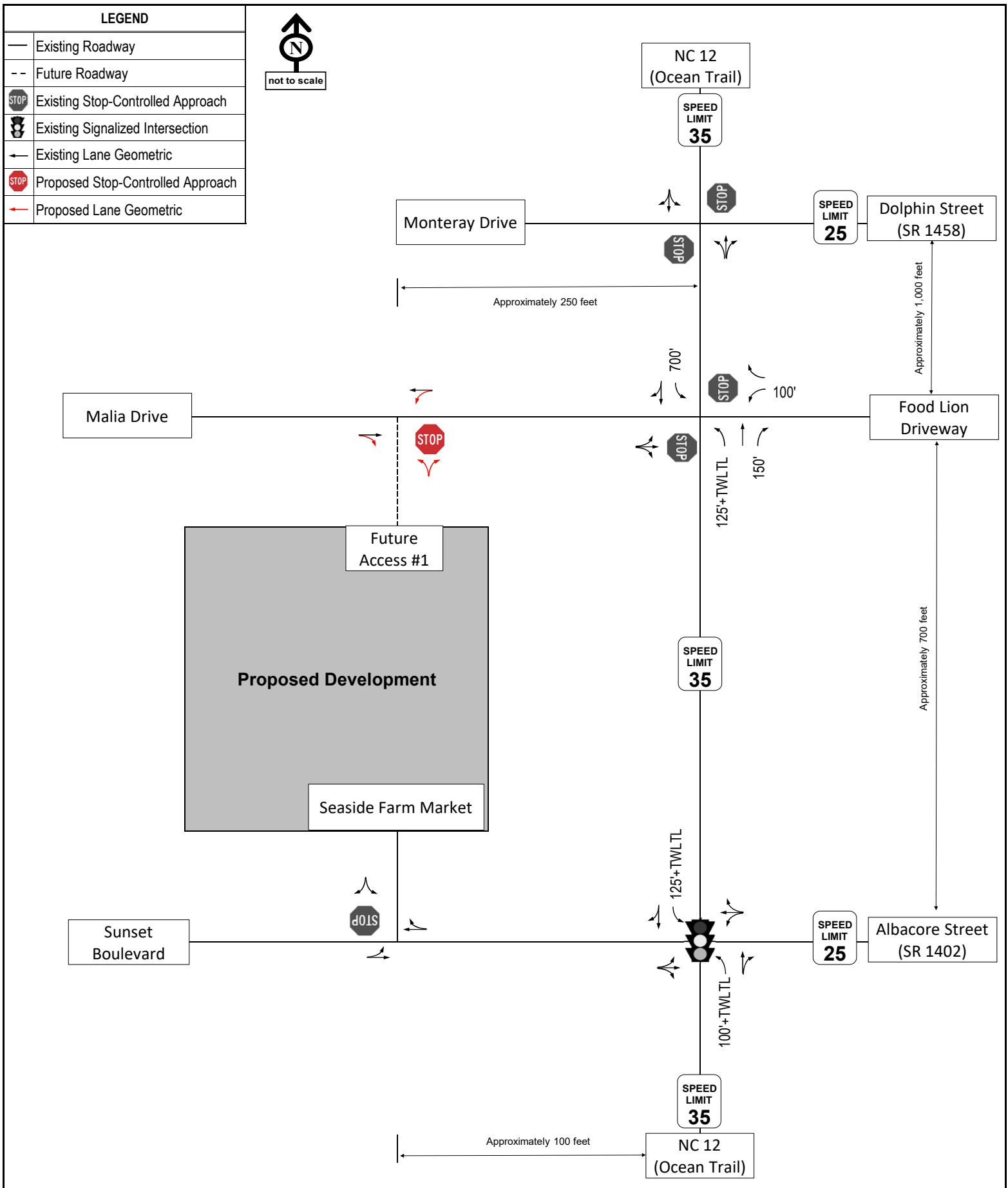
The following configurations are recommended for the site access driveways:

### *Malia Drive and Future Access #1 (unsignalized)*

The stop-controlled driveway is expected to operate at LOS A during the AM peak hour and LOS A during the PM peak hour under both Build (2023) conditions. The following lane configurations are recommended for the new driveway connection:

- › Construct driveway with one ingress lane and one egress lane and full movement access.
- › Provide a minimum internal protected stem length of 100 feet.

Figure 12 provides a schematic diagram of the roadways near the proposed development, including the intersection geometrics with the proposed Phase I Build (2023) improvements applied.



**Figure 12**  
**Phase I Build (2023)**  
**Lane Geometrics and Traffic Control**

**Monterey Shores TIA**  
**Corolla, NC**



# 5

## Phase II No-Build (2025) Conditions

### Background Growth Calculations

The Existing (2021) peak hour volumes were grown to the Phase II year (2025) using an annual growth rate of two percent (2%) to calculate the expected background growth within the study area. There were no background developments or roadway improvements identified for inclusion in the study area. Therefore, no additional background trips were included in the Phase II No-Build (2025) scenario, and the network layout matches the Existing (2021) conditions.

### Level of Service Analysis

Intersection levels of service analyses were performed for the typical weekday AM and PM peak hours using *Synchro/SimTraffic Professional Version 10*. The calculated Phase II No-Build (2025) peak hour turning movements are displayed in Figure 13. A summary of the findings for the Phase II No-Build (2025) LOS analysis can be found in Table 4 and the full Synchro outputs can be found in Appendix D.

As reported in Table 4, the signalized intersection within the study area is expected to continue to operate at an acceptable level of service during both peak hours. The stop-controlled westbound approach at the intersection of Ocean Trail (NC 12) and Dolphin Street/Monterey Drive is projected to degrade to a LOS F during the PM peak hour.

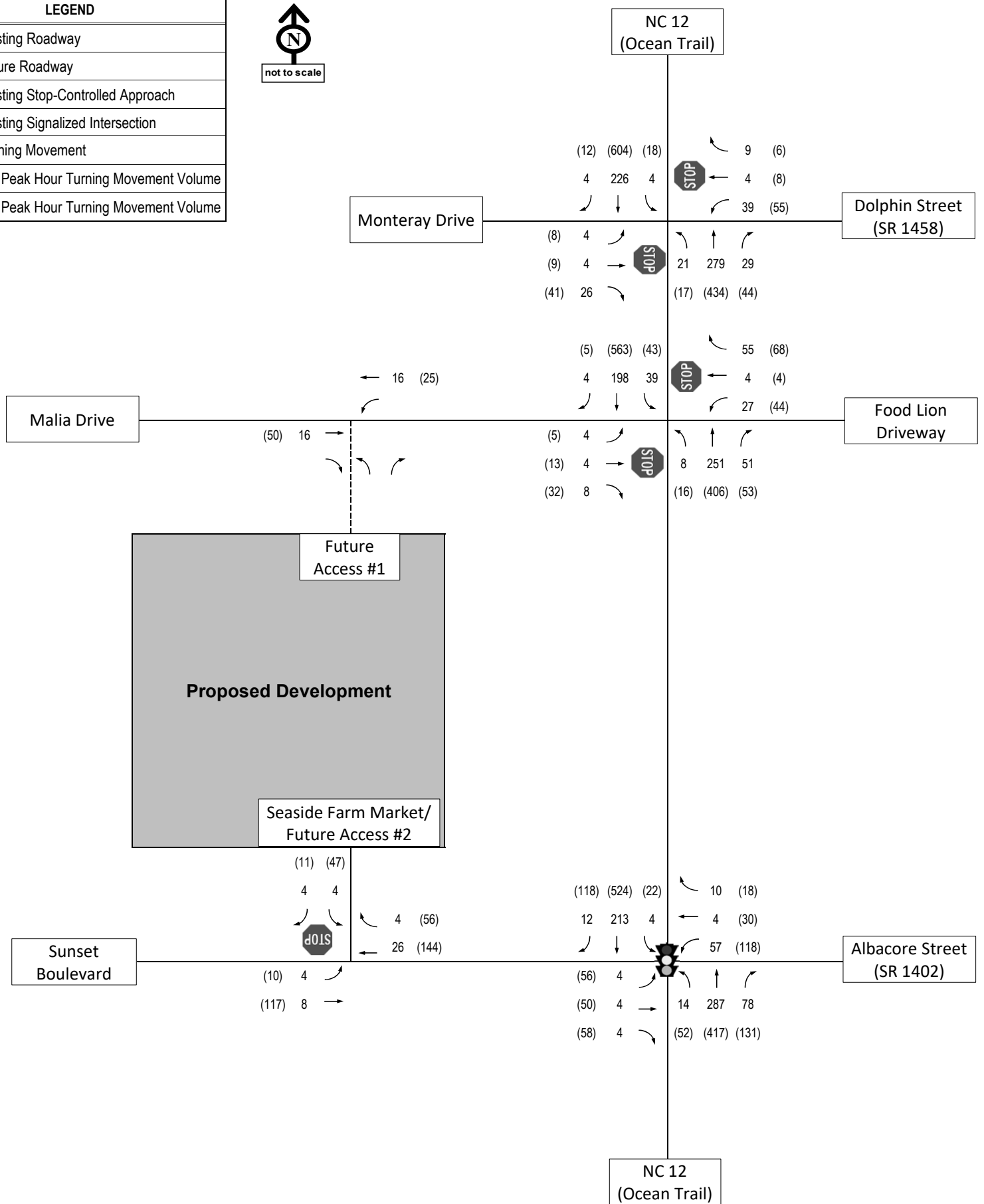
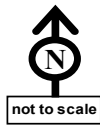
**Table 7 Phase II No-Build (2025) LOS Results**

| Intersection and Approach                                                | Traffic Control | Phase II No-Build (2025) |                 |
|--------------------------------------------------------------------------|-----------------|--------------------------|-----------------|
|                                                                          |                 | AM                       | PM              |
| <b>NC 12 (Ocean Trail) at Albacore Street (SR 1402)/Sunset Boulevard</b> | Signalized      | <b>A (9.8)</b>           | <b>C (24.7)</b> |
| Eastbound                                                                |                 | B-16.9                   | C-34.0          |
| Westbound                                                                |                 | B-17.8                   | D-42.7          |
| Northbound                                                               |                 | A-8.7                    | B-16.6          |
| Southbound                                                               |                 | A-8.8                    | C-25.2          |
| <b>NC 12 (Ocean Trail) at Malia Drive/Food Lion Driveway</b>             | Unsignalized    | -                        | -               |
| Eastbound                                                                |                 | B-12.9                   | C-22.6          |
| Westbound                                                                |                 | B-12.0                   | D-27.7          |
| <b>NC 12 (Ocean Trail) at Dolphin Street (SR 1458)/Monterey Drive</b>    | Unsignalized    | -                        | -               |
| Eastbound                                                                |                 | B-11.1                   | C-22.1          |
| Westbound                                                                |                 | C-16.0                   | F-70.3          |
| <b>Sunset Boulevard at Seaside Farm Market/Future Access #2</b>          | Unsignalized    | -                        | -               |
| Southbound                                                               |                 | A-8.6                    | B-10.9          |

**X (XX.X)** = Overall intersection LOS (average delay), X-XX = Approach LOS and average delay

# LEGEND

|      |                                      |
|------|--------------------------------------|
| —    | Existing Roadway                     |
| --   | Future Roadway                       |
|      | Existing Stop-Controlled Approach    |
|      | Existing Signalized Intersection     |
| ←    | Turning Movement                     |
| XX   | AM Peak Hour Turning Movement Volume |
| (XX) | PM Peak Hour Turning Movement Volume |



**Figure 13**  
Phase II No-Build (2025) AM and PM Peak Hour Volumes

**Monteray Shores TIA**  
Corolla, NC



# 6

## Phase II Build (2025) Alternative #1 Conditions

There are plans to construct a multi-use development Corolla, North Carolina (Figure 1). The development is planned to be constructed near the intersection of Ocean Trail (NC 12) and Malia Drive and will tentatively be completed in two phases. Phase I will include 5 single-family homes, 25 multi-family dwellings and 4,502 square feet of restaurant space with an expected build year of 2023 and Phase II will add 8,002 square feet of retail space and an additional 6 multi-family dwellings with an expected full build-out year of 2025.

### Trip Generation

Trip generation was conducted based on the most appropriate corresponding trip generation codes included in the *Institute of Transportation Engineers (ITE) Trip Generation Manual, 10<sup>th</sup> Edition* and the suggested method of calculation in the NCDOT's "Rate vs. Equation" Spreadsheet. The full build-out of the proposed development is to consist of 8,002 sf of retail space, 5 single-family homes, 31 multi-family dwellings, and 4,502 sf of restaurant space; ITE Land Use Code (LUC) 210 (Single Family Detached Housing), LUC 220 (Multi-Family Housing, Low-Rise), LUC 820 (General Retail) and LUC 931 (Quality Restaurant) were used based on the NCDOT guidance.

Table 5 summarizes the assumed trip generation for the full build-out of the proposed development for typical weekday AM and PM peak hours. Phase II of the proposed development is projected to generate 1,716 daily weekday site trips, with 70 trips (35 entering, 35 exiting) occurring in the AM peak hour and 127 trips (71 entering, 56 exiting) occurring in the PM peak hour. After reductions to account

for internal capture the proposed development is expected to generate 1,285 daily weekday external site trips, with 68 trips (34 entering, 34 exiting) occurring in the AM peak hour, and 80 trips (48 entering, 32 exiting) occurring in the PM peak hour. The generated site trips were distributed in accordance with the existing turning movement counts and land uses.

**Table 8 Phase II Trip Generation Rates (Vehicle Trips)**

| Land Use<br>Code <sup>1</sup>                       | Land Use                       | Unit     | ADT   | AM Peak Hour |      |       | PM Peak Hour |      |       |
|-----------------------------------------------------|--------------------------------|----------|-------|--------------|------|-------|--------------|------|-------|
|                                                     |                                |          |       | Enter        | Exit | Total | Enter        | Exit | Total |
| Total Site Trips <sup>2</sup>                       |                                |          |       |              |      |       |              |      |       |
| 210                                                 | Single-Family Detached Housing | 5 du     | 66    | 2            | 6    | 8     | 4            | 2    | 6     |
| 220                                                 | Multifamily Housing (Low-Rise) | 31 du    | 194   | 4            | 12   | 16    | 13           | 8    | 21    |
| 820                                                 | General Retail                 | 8,002 sf | 1,079 | 27           | 16   | 43    | 31           | 34   | 65    |
| 931                                                 | Quality Restaurant             | 4,502 sf | 377   | 2            | 1    | 3     | 23           | 12   | 35    |
| Development Total                                   |                                |          | 1,716 | 35           | 35   | 70    | 71           | 56   | 127   |
| Trip Reduction Due to Internal Capture <sup>3</sup> |                                |          |       |              |      |       |              |      |       |
| 210                                                 | Single-Family Detached Housing | 5 du     | 13    | 0            | 0    | 0     | 2            | 1    | 3     |
| 220                                                 | Multifamily Housing (Low-Rise) | 31 du    | 49    | 0            | 0    | 0     | 7            | 2    | 9     |
| 820                                                 | General Retail                 | 8,002 sf | 210   | 0            | 1    | 1     | 6            | 14   | 20    |
| 931                                                 | Quality Restaurant             | 4,502 sf | 159   | 1            | 0    | 1     | 8            | 7    | 15    |
| Development Total                                   |                                |          | 430   | 1            | 1    | 2     | 23           | 24   | 47    |
| Total External Site Trips                           |                                |          |       |              |      |       |              |      |       |
| 210                                                 | Single-Family Detached Housing | 5 du     | 53    | 2            | 6    | 8     | 2            | 1    | 3     |
| 220                                                 | Multifamily Housing (Low-Rise) | 31 du    | 145   | 4            | 12   | 16    | 6            | 6    | 12    |
| 820                                                 | General Retail                 | 8,002 sf | 869   | 27           | 15   | 42    | 25           | 20   | 45    |
| 931                                                 | Quality Restaurant             | 4,502 sf | 218   | 1            | 1    | 2     | 15           | 5    | 20    |
| Development Total                                   |                                |          | 1,285 | 34           | 34   | 68    | 48           | 32   | 80    |
| Pass-by Site Trips <sup>4</sup>                     |                                |          |       |              |      |       |              |      |       |
| 210                                                 | Single-Family Detached Housing | 5 du     |       | 0            | 0    | 0     | 0            | 0    | 0     |
| 220                                                 | Multifamily Housing (Low-Rise) | 31 du    |       | 0            | 0    | 0     | 0            | 0    | 0     |
| 820                                                 | General Retail                 | 8,002 sf |       | 0            | 0    | 0     | 8            | 7    | 15    |
| 931                                                 | Quality Restaurant             | 4,502 sf |       | 0            | 0    | 0     | 4            | 5    | 9     |
| Development Total                                   |                                |          |       | 0            | 0    | 0     | 12           | 12   | 24    |
| Non-Pass-by Site Trips                              |                                |          |       |              |      |       |              |      |       |
| 210                                                 | Single-Family Detached Housing | 5 du     |       | 2            | 6    | 8     | 2            | 1    | 3     |
| 220                                                 | Multifamily Housing (Low-Rise) | 31 du    |       | 4            | 12   | 16    | 6            | 6    | 12    |
| 820                                                 | General Retail                 | 8,002 sf |       | 27           | 15   | 42    | 17           | 13   | 30    |
| 931                                                 | Quality Restaurant             | 4,502 sf |       | 1            | 1    | 2     | 11           | 0    | 11    |
| Development Total                                   |                                |          |       | 34           | 34   | 68    | 36           | 20   | 56    |

Notes:  
1. Land Use Code and trip generation rates are determined based on ITE Trip Generation, 10th Edition, rates for 820 based on subset of smaller retail sites (50,000 sf or less)  
2. Total site trips are determined based on the suggested method in the NCDOT Rate vs Equation Spreadsheet  
3. Internal capture was based on NCHRP 684 method and NCDOT IC calculation spreadsheet, with 1,500 ft spacing between uses  
4. Unconstrained pass-by trips are calculated based on ITE Trip Generation Handbook, 3rd Edition. The final projections are not expected to exceed 10% of adjacent street volumes.

## Trip Distribution and Assignment

In Phase II Alternative #1, the proposed development will be accessed via one (1) full-movement driveway along Malia Drive. The generated site trips were distributed in accordance with the existing traffic patterns and land uses in the vicinity of the study area as follows:

- › Ocean Trail (NC 12) from/to the north – 30%
- › Ocean Trail (NC 12) from/to the south – 50%
- › Albacore Street (SR 1402) from/to the east – 5%
- › Sunset Boulevard from/to the west – 2%
- › Food Lion Driveway from/to the east – 5%

## Monterey Shores Development TIA

- › Dolphin Street from/to the east – 3%
- › Monterey Drive from/to the west – 5%

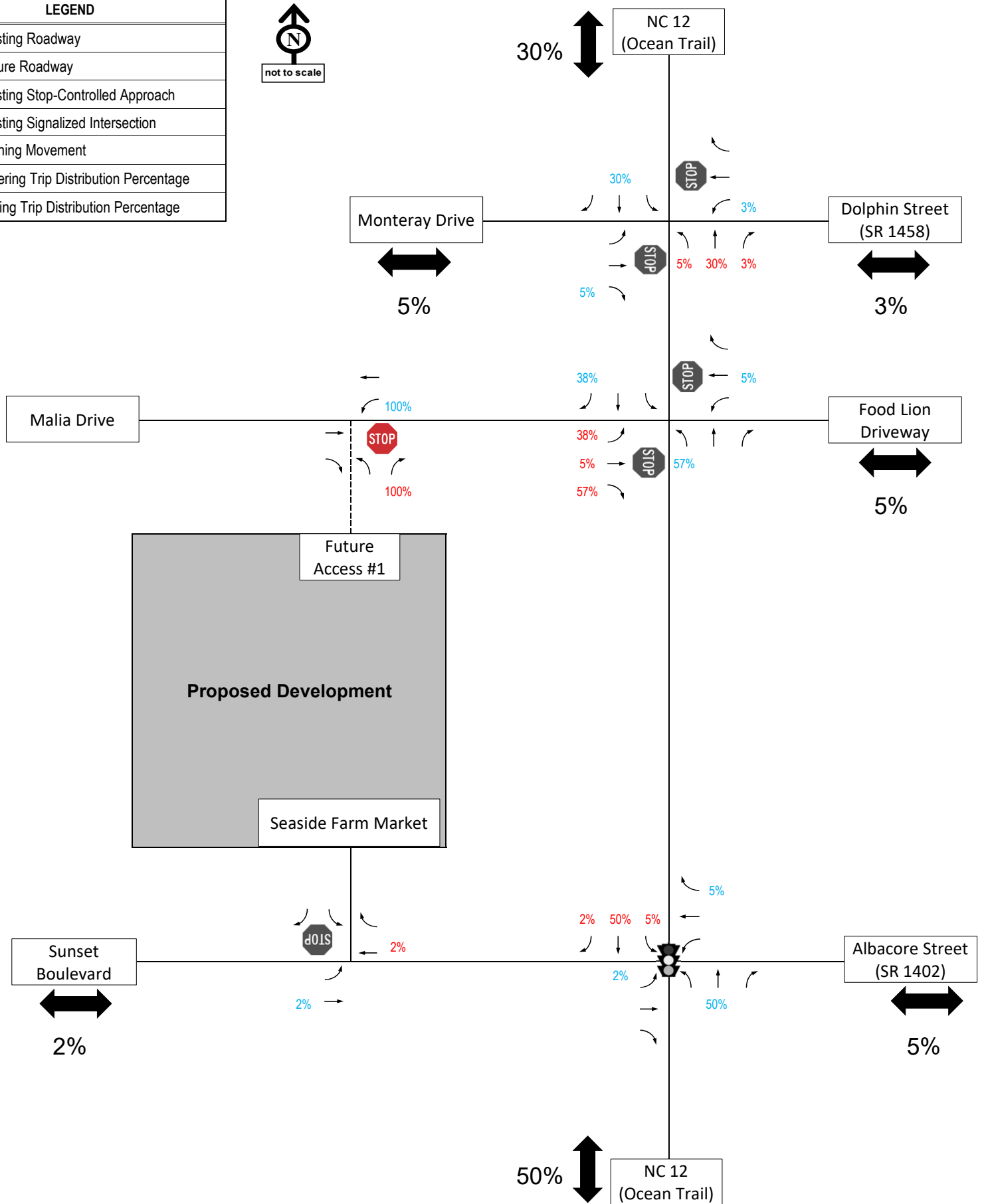
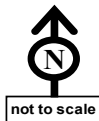
Pass-by trips for the commercial uses were distributed along Ocean Trail with a 60/40 split between the northbound and southbound directions respectively.

The non-pass-by distribution percentages and resulting site trips for Phase II Build (2025) Alternative #1 are shown in Figure 14 and Figure 15. The pass-by distribution percentages and resulting site trips for Phase I Build (2025) Alternative #1 are shown in Figure 16 and Figure 17. The total combined site trips for Phase II Build (2025) Alternative #1 are shown in Figure 18.



LEGEND

|     |                                       |
|-----|---------------------------------------|
| —   | Existing Roadway                      |
| --  | Future Roadway                        |
|     | Existing Stop-Controlled Approach     |
|     | Existing Signalized Intersection      |
| ←   | Turning Movement                      |
| XX% | Entering Trip Distribution Percentage |
| XX% | Exiting Trip Distribution Percentage  |

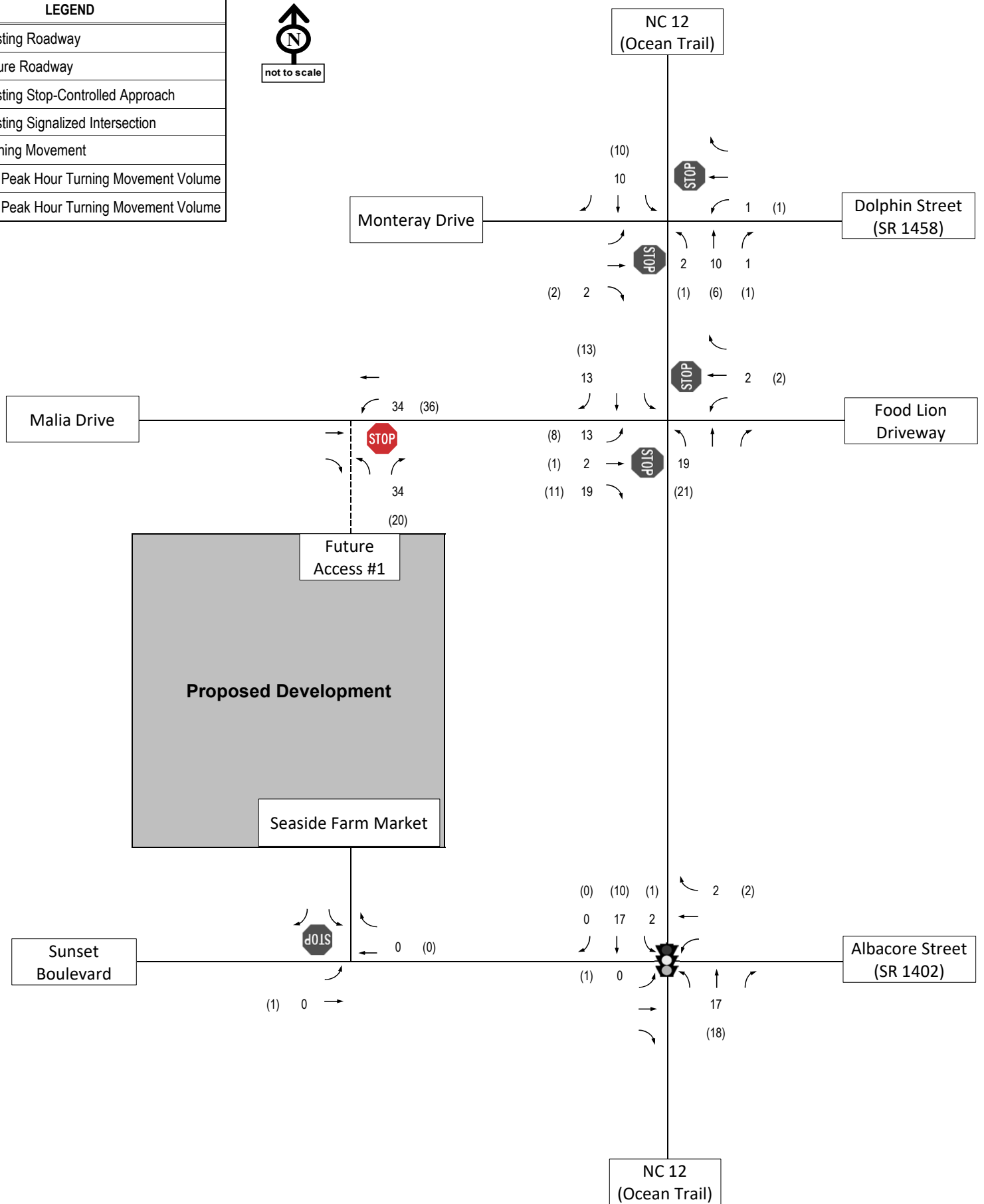
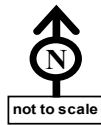


**Figure 14**  
Phase II Build (2025) Alternative #1 Non-Pass-By Site Trip  
Distribution

**Monterey Shores TIA**  
Corolla, NC

# LEGEND

|      |                                      |
|------|--------------------------------------|
| —    | Existing Roadway                     |
| --   | Future Roadway                       |
|      | Existing Stop-Controlled Approach    |
|      | Existing Signalized Intersection     |
| ←    | Turning Movement                     |
| XX   | AM Peak Hour Turning Movement Volume |
| (XX) | PM Peak Hour Turning Movement Volume |

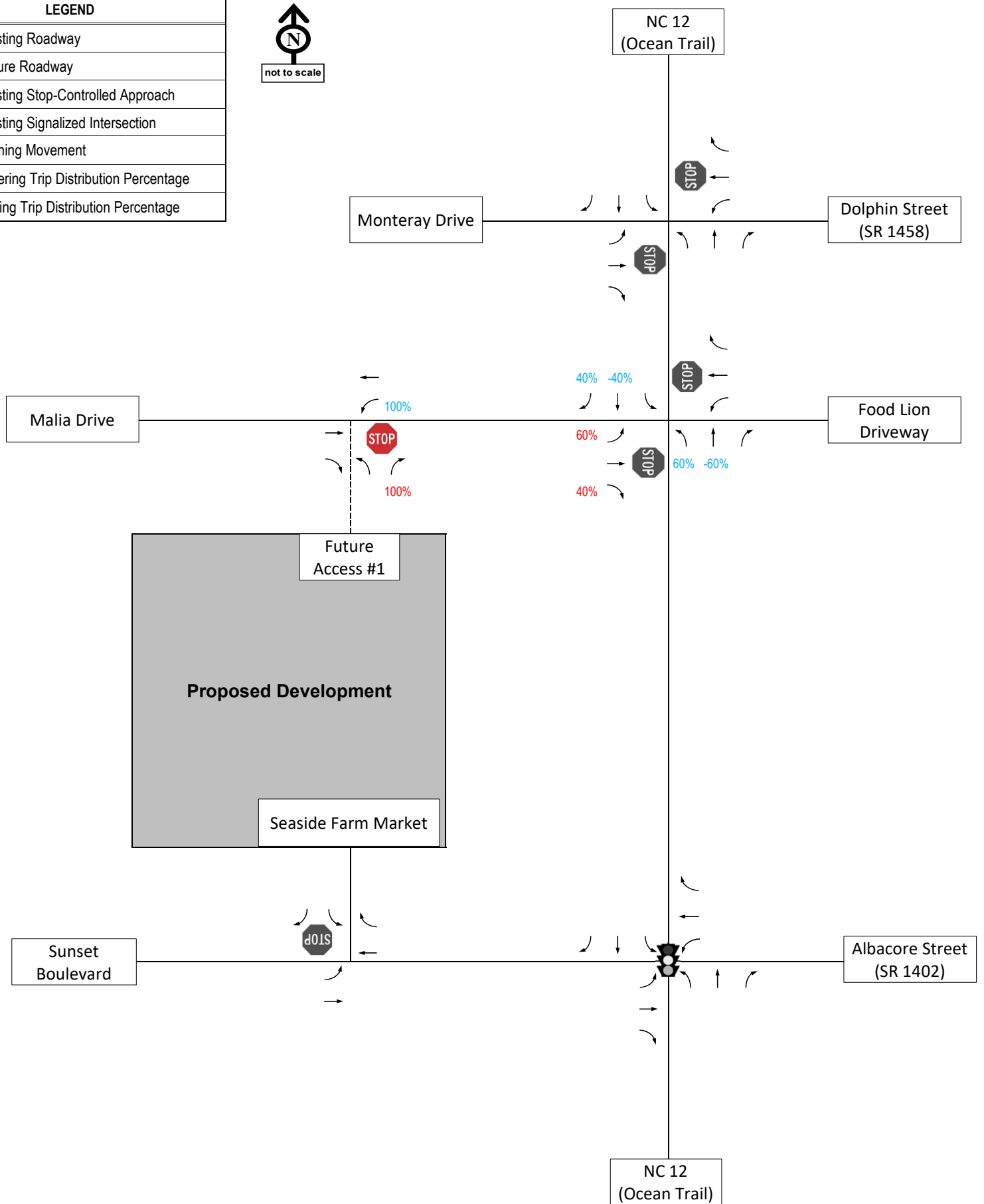
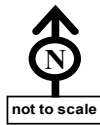


**Figure 15**  
**Phase II Build (2025) Alternative #1 Peak Hour Site**  
**Generated Non-Pass-By Trips**

**Monteray Shores TIA**  
**Corolla, NC**

# LEGEND

|  |                                       |
|--|---------------------------------------|
|  | Existing Roadway                      |
|  | Future Roadway                        |
|  | Existing Stop-Controlled Approach     |
|  | Existing Signalized Intersection      |
|  | Turning Movement                      |
|  | Entering Trip Distribution Percentage |
|  | Exiting Trip Distribution Percentage  |

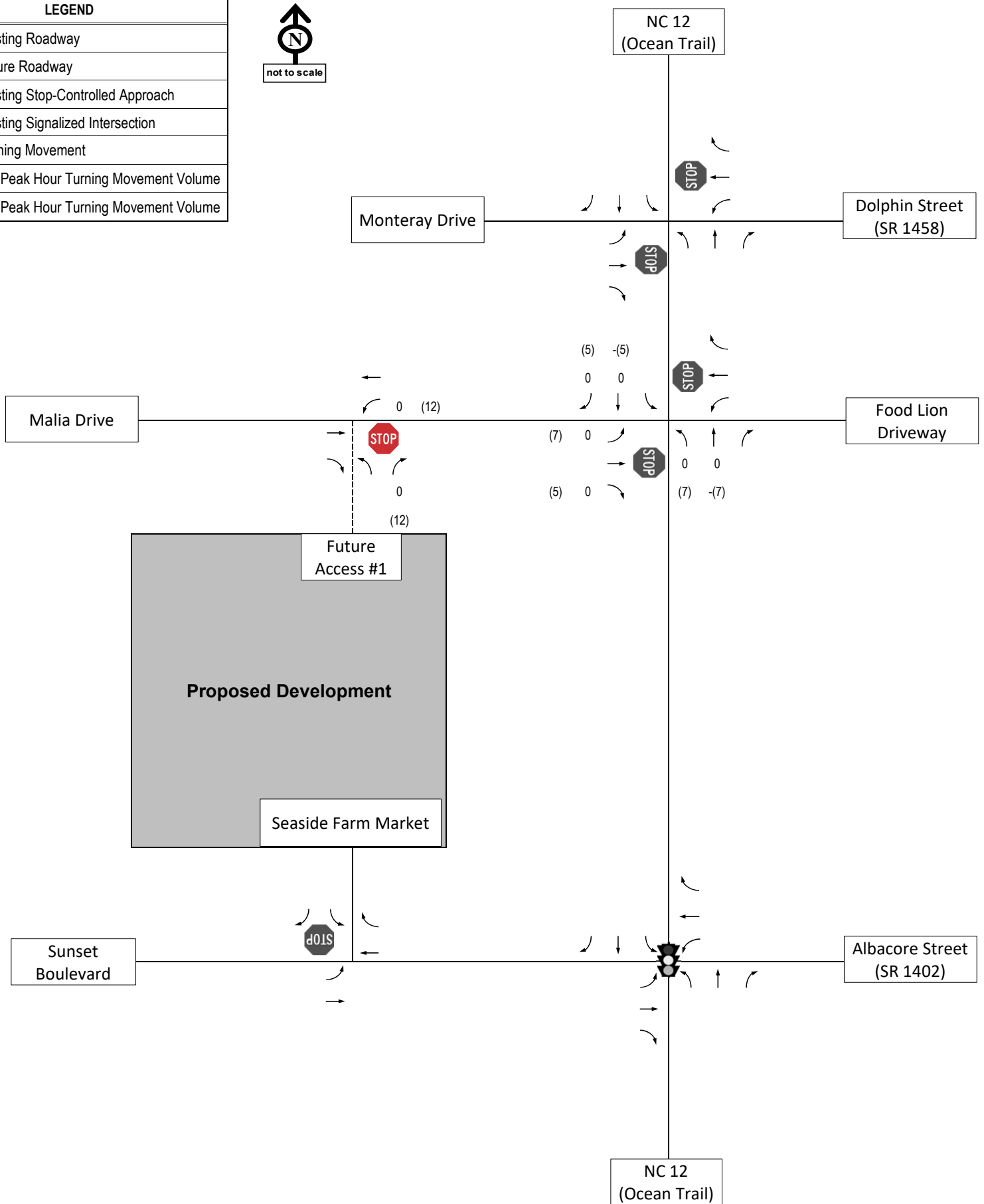


**Figure 16**  
**Phase II Build (2025) Alternative #1 Pass-By Site Trip Distribution**

**Monterey Shores TIA**  
**Corolla, NC**

**LEGEND**

|      |                                      |
|------|--------------------------------------|
| —    | Existing Roadway                     |
| --   | Future Roadway                       |
| STOP | Existing Stop-Controlled Approach    |
|      | Existing Signalized Intersection     |
| ←    | Turning Movement                     |
| XX   | AM Peak Hour Turning Movement Volume |
| (XX) | PM Peak Hour Turning Movement Volume |

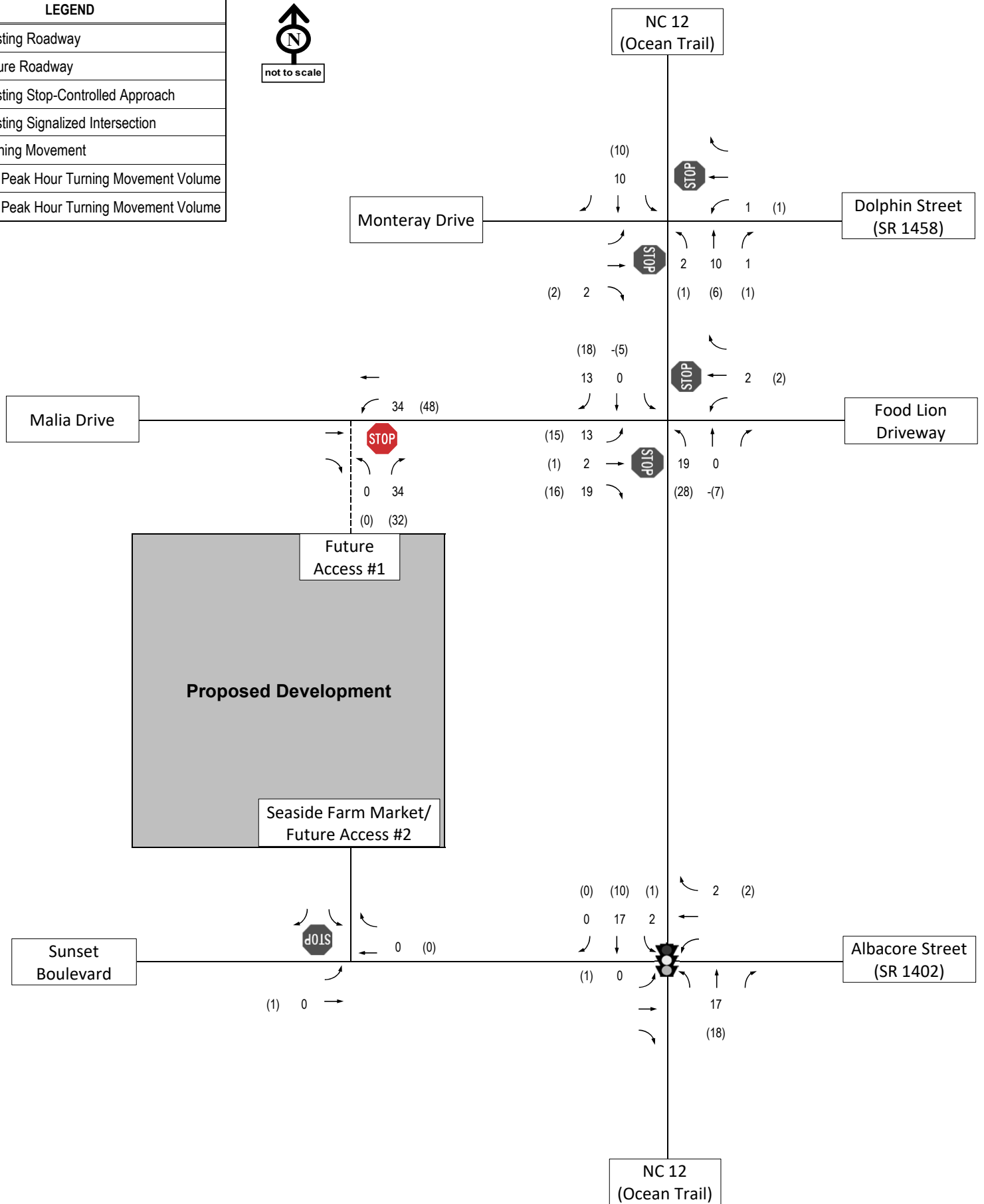
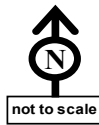


**Figure 17**  
**Phase II Build (2025) Alternative #1 Peak Hour Site Generated**  
**Pass-By Trips**

**Monterey Shores TIA**  
**Corolla, NC**

# LEGEND

|      |                                      |
|------|--------------------------------------|
| —    | Existing Roadway                     |
| --   | Future Roadway                       |
| STOP | Existing Stop-Controlled Approach    |
|      | Existing Signalized Intersection     |
| ←    | Turning Movement                     |
| XX   | AM Peak Hour Turning Movement Volume |
| (XX) | PM Peak Hour Turning Movement Volume |



**Figure 18**  
**Phase II Build (2025) Alternative #1 Total Peak Hour Site**  
**Generated Trips**

**Monteray Shores TIA**  
**Corolla, NC**

## Level of Service Analysis

The Phase II Build (2025) Alternative #1 analysis scenario includes the Phase II No-Build (2025) traffic and site-generated trips from the proposed development as described previously. The network geometry matches the Existing (2021) scenario with the addition of the one driveway along Malia Drive. Figure 19 depicts the turning movement volumes used in the Phase II Build (2025) Alternative #1 scenario analysis. Intersection levels of service analyses were performed for the typical weekday AM and PM peak hours using Synchro/SimTraffic Professional Version 10. Table 6 summarizes the findings of the LOS analysis, and Appendix D contains the full Synchro reports.

As reported in Table 9, with the addition of site trips, the signalized intersection continues to operate at overall acceptable levels of service during both peak hours. The stop-controlled westbound approach at the intersection of Ocean Trail (NC 12) and Dolphin Street/Monterey Drive is projected to continue to operate at a LOS F during the PM peak hour.

**Table 9 Phase II Build (2025) Alternative #1 LOS Results**

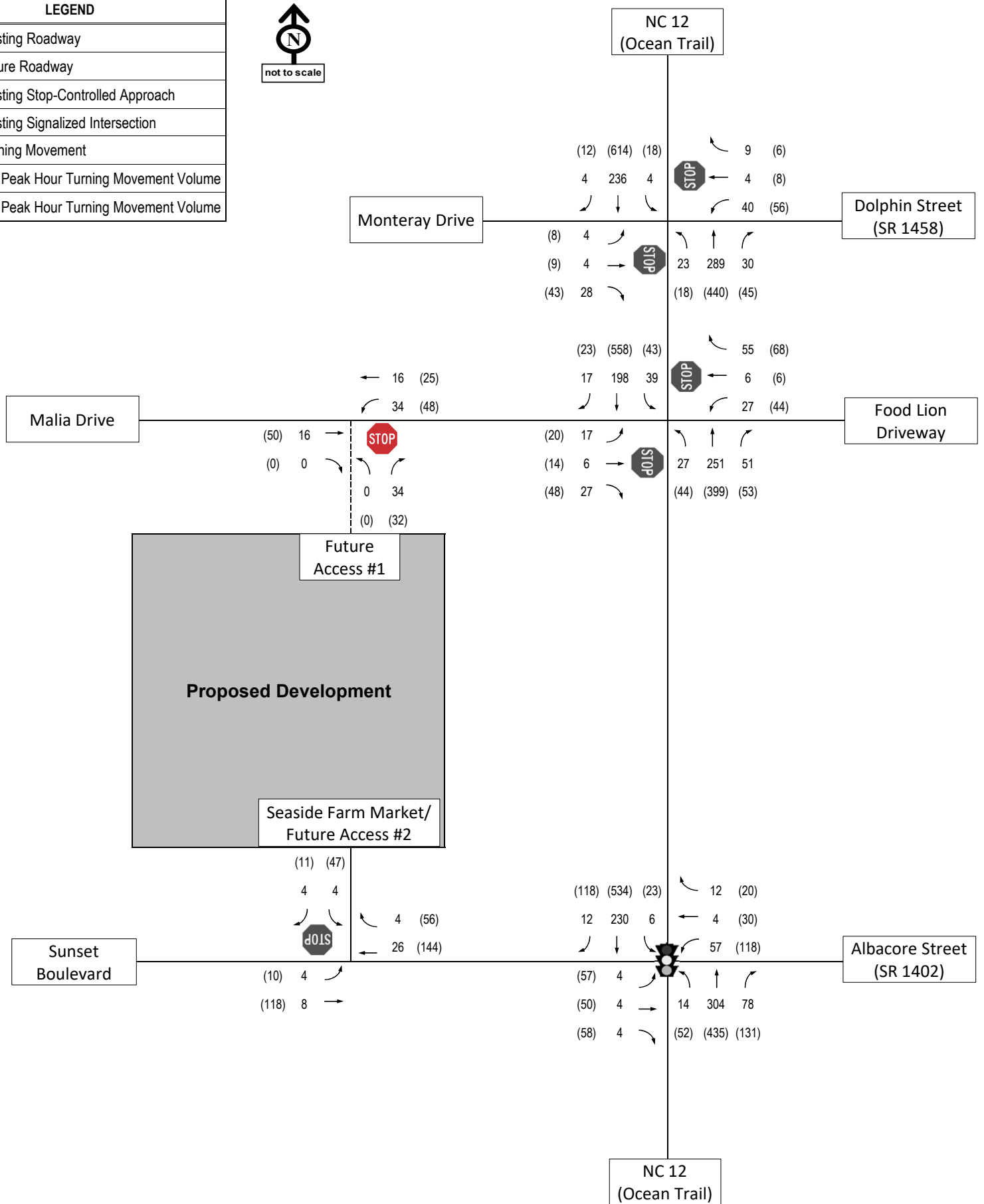
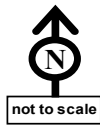
| Intersection and Approach                                                | Traffic Control | Phase II Build (2025) Alt #1 |                 |
|--------------------------------------------------------------------------|-----------------|------------------------------|-----------------|
|                                                                          |                 | AM                           | PM              |
| <b>NC 12 (Ocean Trail) at Albacore Street (SR 1402)/Sunset Boulevard</b> | Signalized      | <b>B (10.8)</b>              | <b>C (25.3)</b> |
| Eastbound                                                                |                 | B-17.5                       | C-34.7          |
| Westbound                                                                |                 | B-19.3                       | D-44.4          |
| Northbound                                                               |                 | A-9.8                        | B-17.5          |
| Southbound                                                               |                 | A-9.7                        | C-25.4          |
| <b>NC 12 (Ocean Trail) at Malia Drive/Food Lion Driveway</b>             | Unsignalized    | -                            | -               |
| Eastbound                                                                |                 | B-14.1                       | <b>E-35.9</b>   |
| Westbound                                                                |                 | B-12.6                       | D-34.1          |
| <b>NC 12 (Ocean Trail) at Dolphin Street (SR 1458)/Monterey Drive</b>    | Unsignalized    | -                            | -               |
| Eastbound                                                                |                 | B-11.3                       | C-22.5          |
| Westbound                                                                |                 | C-16.7                       | <b>F-78.4</b>   |
| <b>Sunset Boulevard at Seaside Farm Market/Future Access #2</b>          | Unsignalized    | -                            | -               |
| Southbound                                                               |                 | A-8.6                        | B-10.9          |
| <b>Malia Drive at Future Access #1</b>                                   | Unsignalized    | -                            | -               |
| Northbound                                                               |                 | A-8.5                        | A-8.7           |

**X (XX.X)** = Overall intersection LOS (average delay), X-XX = Approach LOS and average delay



# LEGEND

|      |                                      |
|------|--------------------------------------|
| —    | Existing Roadway                     |
| --   | Future Roadway                       |
|      | Existing Stop-Controlled Approach    |
|      | Existing Signalized Intersection     |
| ←    | Turning Movement                     |
| XX   | AM Peak Hour Turning Movement Volume |
| (XX) | PM Peak Hour Turning Movement Volume |



**Figure 19**  
**Phase II Build (2025) Alternative #1**  
**AM and PM Peak Hour Volumes**

**Monterey Shores TIA**  
**Corolla, NC**

## Roadway Improvement Recommendations

As indicated in the traffic operations analyses, the proposed development is projected to have a minimal impact on the traffic operations within the study area.

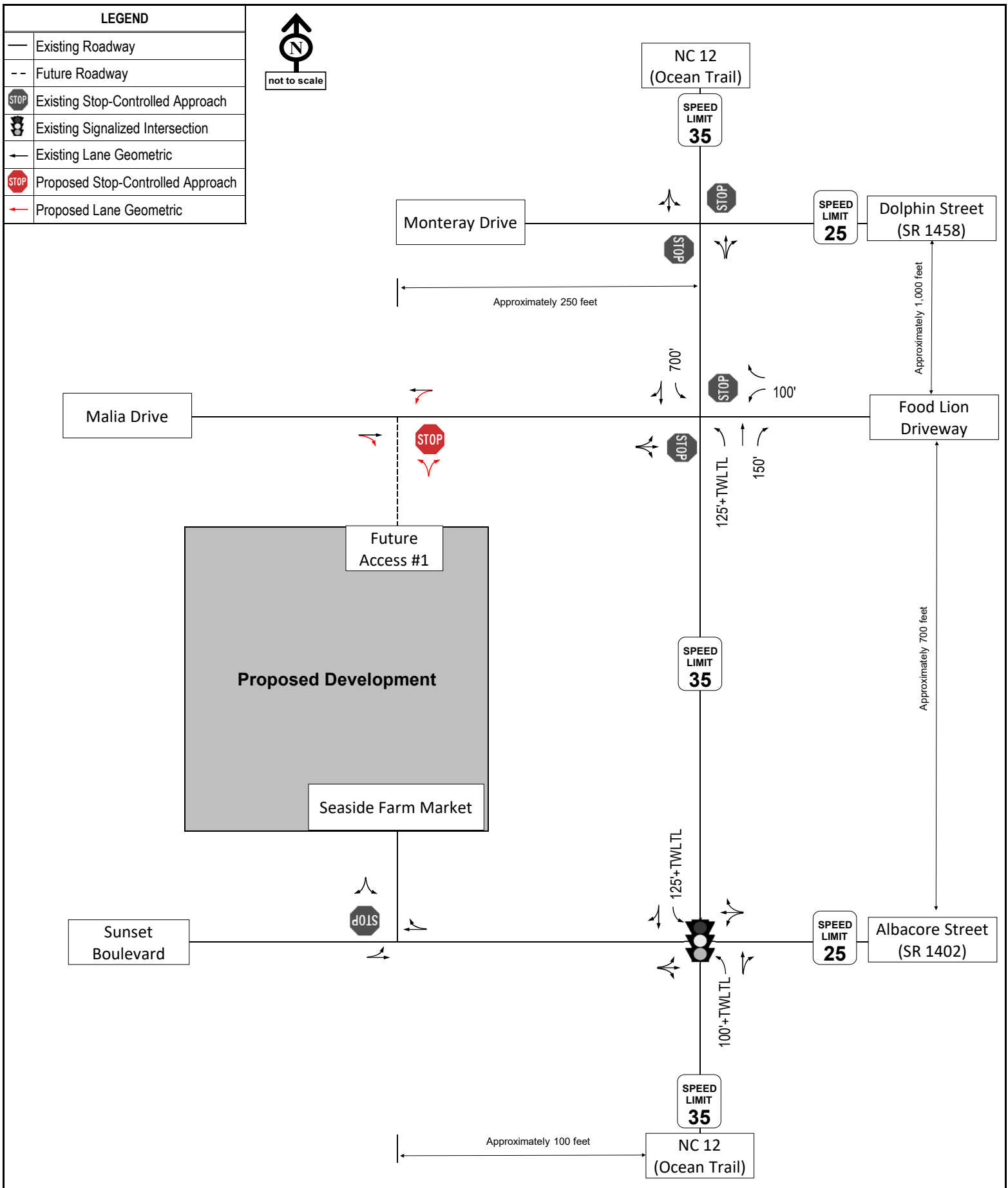
The following configurations are recommended for the site access driveways:

### *Malia Drive and Future Access #1 (unsignalized)*

The stop-controlled driveway is expected to operate at LOS A during the AM peak hour and LOS A during the PM peak hour under both Phase II Build (2025) conditions. The following lane configurations are recommended for the new driveway connection:

- › Construct driveway with one ingress lane and one egress lane and full movement access.
- › Provide a minimum internal protected stem length of 100 feet.

Figure 20 provides a schematic diagram of the roadways near the proposed development, including the intersection geometrics with the proposed Phase II Build (2025) Alternative #1 improvements applied.



**Figure 20**  
**Phase II Build (2025) Alternative #1**  
**Lane Geometrics and Traffic Control**

**Monterey Shores TIA**  
**Corolla, NC**



# 7

## Phase II Build (2025) Alternative #2 Conditions

There are plans to construct a multi-use development Corolla, North Carolina (Figure 1). The development is planned to be constructed near the intersection of Ocean Trail (NC 12) and Malia Drive and will tentatively be completed in two phases. Phase I will include 5 single-family homes, 25 multi-family dwellings and 4,502 square feet of restaurant space with an expected build year of 2023 and Phase II will add 8,002 square feet of retail space and an additional 6 multi-family dwellings with an expected full build-out year of 2025.

### Trip Generation

Trip generation was conducted based on the most appropriate corresponding trip generation codes included in the *Institute of Transportation Engineers (ITE) Trip Generation Manual, 10<sup>th</sup> Edition* and the suggested method of calculation in the NCDOT's *"Rate vs. Equation" Spreadsheet*. The full build-out of the proposed development is to consist of 8,002 sf of retail space, 5 single-family homes, 31 multi-family dwellings, and 4,502 sf of restaurant space; ITE Land Use Code (LUC) 210 (Single Family Detached Housing), LUC 220 (Multi-Family Housing, Low-Rise), LUC 820 (General Retail) and LUC 931 (Quality Restaurant) were used based on the NCDOT guidance.

Table 5 summarizes the assumed trip generation for the full build-out of the proposed development for typical weekday AM and PM peak hours. Phase II of the proposed development is projected to generate 1,716 daily weekday site trips, with 70 trips (35 entering, 35 exiting) occurring in the AM peak hour and 127 trips (71 entering, 56 exiting) occurring in the PM peak hour. After reductions to

## Monterey Shores Development TIA

account for internal capture the proposed development is expected to generate 1,285 daily weekday external site trips, with 68 trips (34 entering, 34 exiting) occurring in the AM peak hour, and 80 trips (48 entering, 32 exiting) occurring in the PM peak hour. The generated site trips were distributed in accordance with the existing turning movement counts and land uses.

**Table 10 Phase II Trip Generation Rates (Vehicle Trips)**

| Land Use<br>Code <sup>1</sup>                       | Land Use                       | Unit     | ADT   | AM Peak Hour |      |       | PM Peak Hour |      |       |
|-----------------------------------------------------|--------------------------------|----------|-------|--------------|------|-------|--------------|------|-------|
|                                                     |                                |          |       | Enter        | Exit | Total | Enter        | Exit | Total |
| Total Site Trips <sup>2</sup>                       |                                |          |       |              |      |       |              |      |       |
| 210                                                 | Single-Family Detached Housing | 5 du     | 66    | 2            | 6    | 8     | 4            | 2    | 6     |
| 220                                                 | Multifamily Housing (Low-Rise) | 31 du    | 194   | 4            | 12   | 16    | 13           | 8    | 21    |
| 820                                                 | General Retail                 | 8,002 sf | 1,079 | 27           | 16   | 43    | 31           | 34   | 65    |
| 931                                                 | Quality Restaurant             | 4,502 sf | 377   | 2            | 1    | 3     | 23           | 12   | 35    |
| Development Total                                   |                                |          | 1,716 | 35           | 35   | 70    | 71           | 56   | 127   |
| Trip Reduction Due to Internal Capture <sup>3</sup> |                                |          |       |              |      |       |              |      |       |
| 210                                                 | Single-Family Detached Housing | 5 du     | 13    | 0            | 0    | 0     | 2            | 1    | 3     |
| 220                                                 | Multifamily Housing (Low-Rise) | 31 du    | 49    | 0            | 0    | 0     | 7            | 2    | 9     |
| 820                                                 | General Retail                 | 8,002 sf | 210   | 0            | 1    | 1     | 6            | 14   | 20    |
| 931                                                 | Quality Restaurant             | 4,502 sf | 159   | 1            | 0    | 1     | 8            | 7    | 15    |
| Development Total                                   |                                |          | 430   | 1            | 1    | 2     | 23           | 24   | 47    |
| Total External Site Trips                           |                                |          |       |              |      |       |              |      |       |
| 210                                                 | Single-Family Detached Housing | 5 du     | 53    | 2            | 6    | 8     | 2            | 1    | 3     |
| 220                                                 | Multifamily Housing (Low-Rise) | 31 du    | 145   | 4            | 12   | 16    | 6            | 6    | 12    |
| 820                                                 | General Retail                 | 8,002 sf | 869   | 27           | 15   | 42    | 25           | 20   | 45    |
| 931                                                 | Quality Restaurant             | 4,502 sf | 218   | 1            | 1    | 2     | 15           | 5    | 20    |
| Development Total                                   |                                |          | 1,285 | 34           | 34   | 68    | 48           | 32   | 80    |
| Pass-by Site Trips <sup>4</sup>                     |                                |          |       |              |      |       |              |      |       |
| 210                                                 | Single-Family Detached Housing | 5 du     |       | 0            | 0    | 0     | 0            | 0    | 0     |
| 220                                                 | Multifamily Housing (Low-Rise) | 31 du    |       | 0            | 0    | 0     | 0            | 0    | 0     |
| 820                                                 | General Retail                 | 8,002 sf |       | 0            | 0    | 0     | 8            | 7    | 15    |
| 931                                                 | Quality Restaurant             | 4,502 sf |       | 0            | 0    | 0     | 4            | 5    | 9     |
| Development Total                                   |                                |          |       | 0            | 0    | 0     | 12           | 12   | 24    |
| Non-Pass-by Site Trips                              |                                |          |       |              |      |       |              |      |       |
| 210                                                 | Single-Family Detached Housing | 5 du     |       | 2            | 6    | 8     | 2            | 1    | 3     |
| 220                                                 | Multifamily Housing (Low-Rise) | 31 du    |       | 4            | 12   | 16    | 6            | 6    | 12    |
| 820                                                 | General Retail                 | 8,002 sf |       | 27           | 15   | 42    | 17           | 13   | 30    |
| 931                                                 | Quality Restaurant             | 4,502 sf |       | 1            | 1    | 2     | 11           | 0    | 11    |
| Development Total                                   |                                |          |       | 34           | 34   | 68    | 36           | 20   | 56    |

Notes:  
1. Land Use Code and trip generation rates are determined based on ITE Trip Generation, 10th Edition , rates for 820 based on subset of smaller retail sites (50,000 sf or less)  
2. Total site trips are determined based on the suggested method in the NCDOT Rate vs Equation Spreadsheet  
3. Internal capture was based on NCHRP 684 method and NCDOT IC calculation spreadsheet, with 1,500 ft spacing between uses  
4. Unconstrained pass-by trips are calculated based on ITE Trip Generation Handbook, 3rd Edition. The final projections are not expected to exceed 10% of adjacent street volumes.

## Trip Distribution and Assignment

In Phase II Build (2025) Alternative #2, the proposed development will be accessed via two (2) full-movement driveways along Malia Drive and Sunset Boulevard. The generated site trips were distributed in accordance with the existing traffic patterns and land uses in the vicinity of the study area as follows:

- › Ocean Trail (NC 12) from/to the north – 30%
- › Ocean Trail (NC 12) from/to the south – 50%
- › Albacore Street (SR 1402) from/to the east – 5%

## Monterey Shores Development TIA

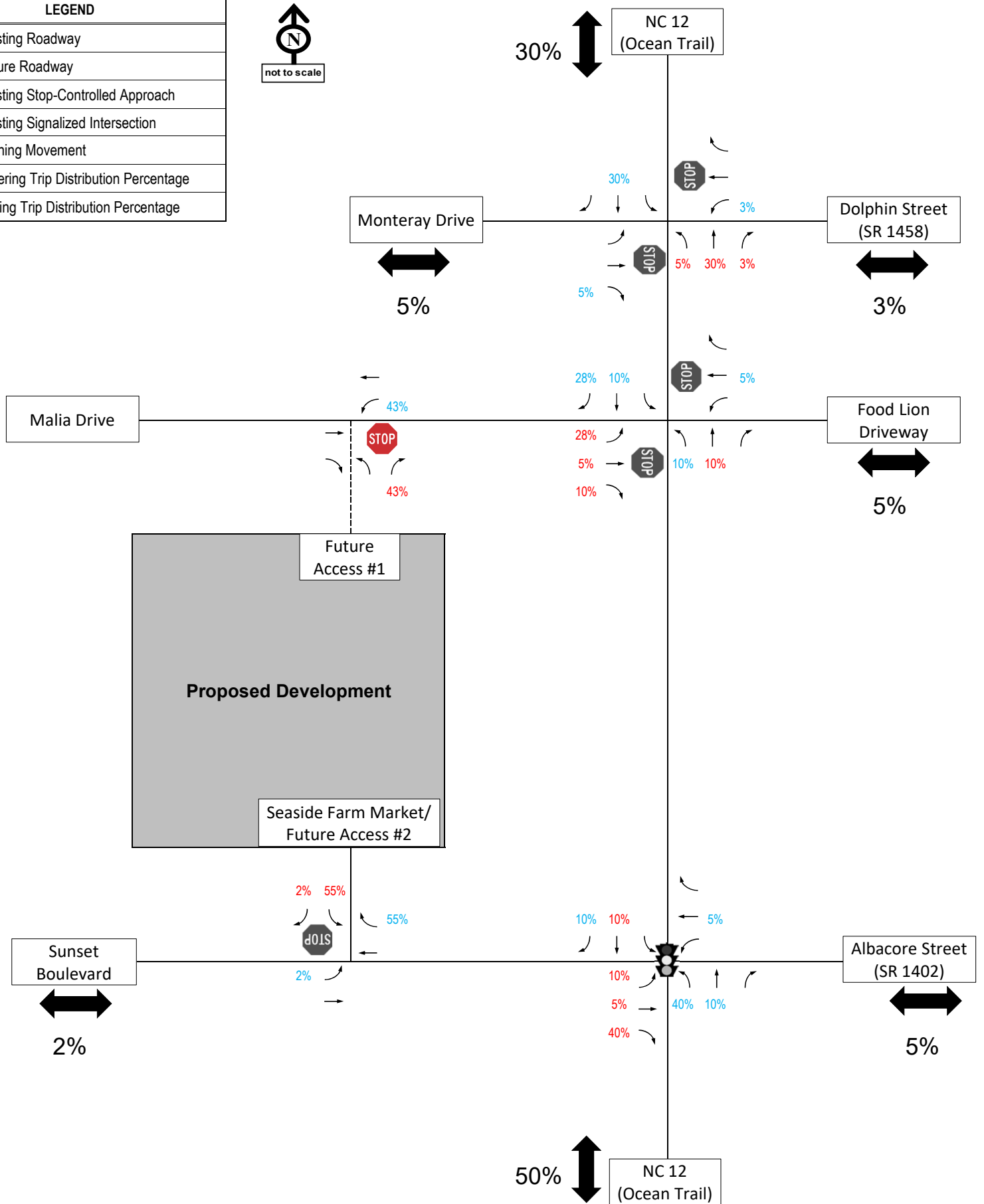
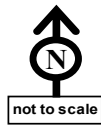
- › Sunset Boulevard from/to the west – 2%
- › Food Lion Driveway from/to the east – 5%
- › Dolphin Street from/to the east – 3%
- › Monterey Drive from/to the west – 5%

Pass-by trips for the commercial uses were distributed along Ocean Trail with a 60/40 split between the northbound and southbound directions respectively.

The non-pass-by distribution percentages and resulting site trips for Phase II Build (2025) Alternative #2 are shown in Figure 21 and Figure 22 respectively. The pass-by distribution percentages and resulting site trips for Phase II Build (2025) Alternative #1 are shown in Figure 23 and Figure 24, respectively. The total combined site trips for Phase II Build (2025) Alternative #1 are shown in Figure 25.

# LEGEND

|  |                                           |
|--|-------------------------------------------|
|  | Existing Roadway                          |
|  | Future Roadway                            |
|  | Existing Stop-Controlled Approach         |
|  | Existing Signalized Intersection          |
|  | Turning Movement                          |
|  | XX% Entering Trip Distribution Percentage |
|  | XX% Exiting Trip Distribution Percentage  |



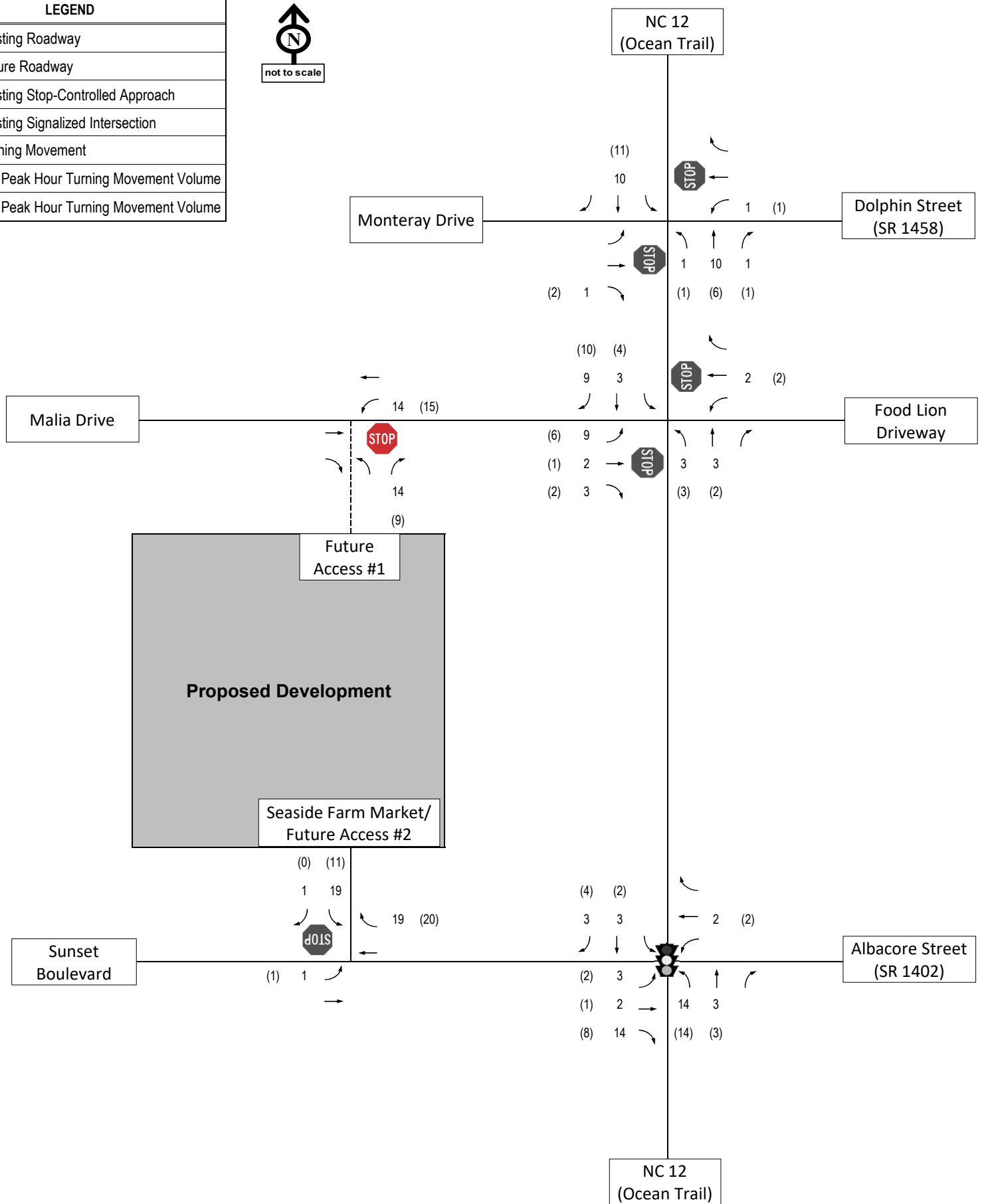
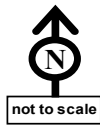
**Figure 21**  
Phase II Build (2025) Alternative #2 Non-Pass-By Site Trip  
Distribution

**Monterey Shores TIA**  
Corolla, NC



# LEGEND

|      |                                      |
|------|--------------------------------------|
|      | Existing Roadway                     |
|      | Future Roadway                       |
|      | Existing Stop-Controlled Approach    |
|      | Existing Signalized Intersection     |
|      | Turning Movement                     |
| XX   | AM Peak Hour Turning Movement Volume |
| (XX) | PM Peak Hour Turning Movement Volume |

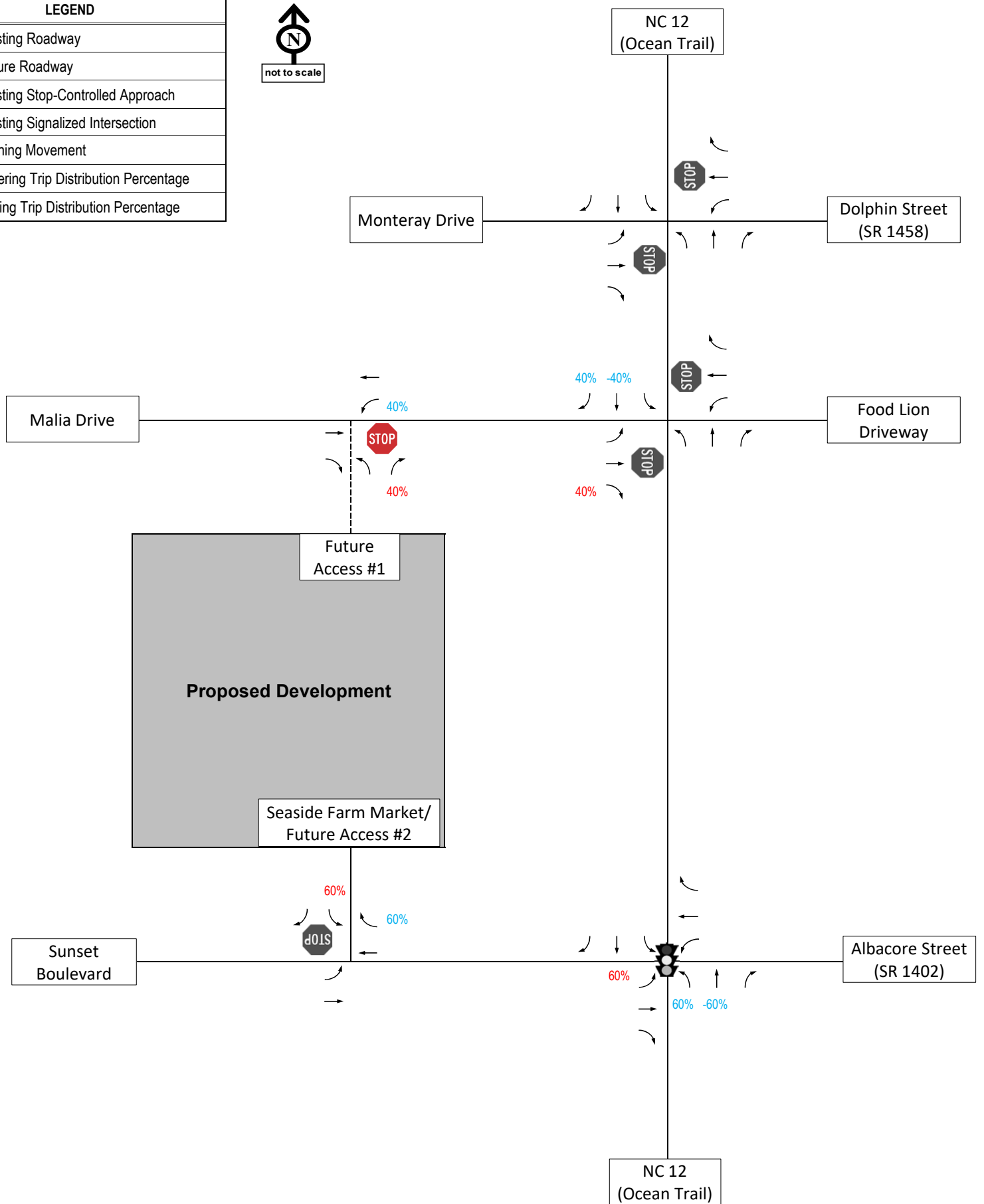
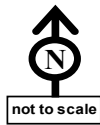


**Figure 22**  
**Phase II Build (2025) Alternative #2 Peak Hour Site**  
**Generated Non-Pass-By Trips**

**Monteray Shores TIA**  
**Corolla, NC**

# LEGEND

|     |                                       |
|-----|---------------------------------------|
| —   | Existing Roadway                      |
| --  | Future Roadway                        |
|     | Existing Stop-Controlled Approach     |
|     | Existing Signalized Intersection      |
| ←   | Turning Movement                      |
| XX% | Entering Trip Distribution Percentage |
| XX% | Exiting Trip Distribution Percentage  |

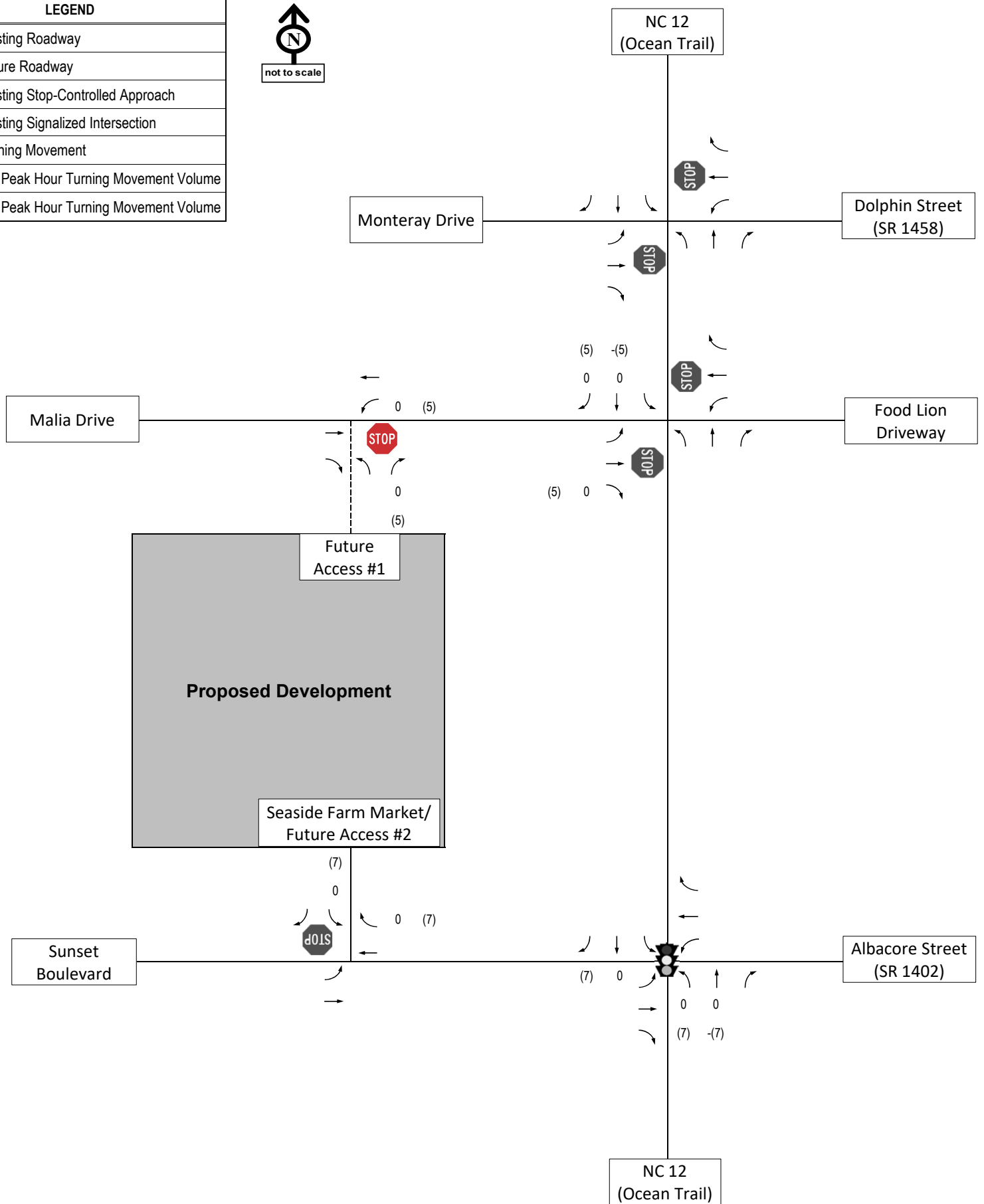
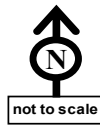


**Figure 23**  
**Phase II Build (2025) Alternative #2 Pass-By Site Trip**  
**Distribution**

**Monterey Shores TIA**  
**Corolla, NC**

# LEGEND

|      |                                      |
|------|--------------------------------------|
| —    | Existing Roadway                     |
| --   | Future Roadway                       |
|      | Existing Stop-Controlled Approach    |
|      | Existing Signalized Intersection     |
| ←    | Turning Movement                     |
| XX   | AM Peak Hour Turning Movement Volume |
| (XX) | PM Peak Hour Turning Movement Volume |

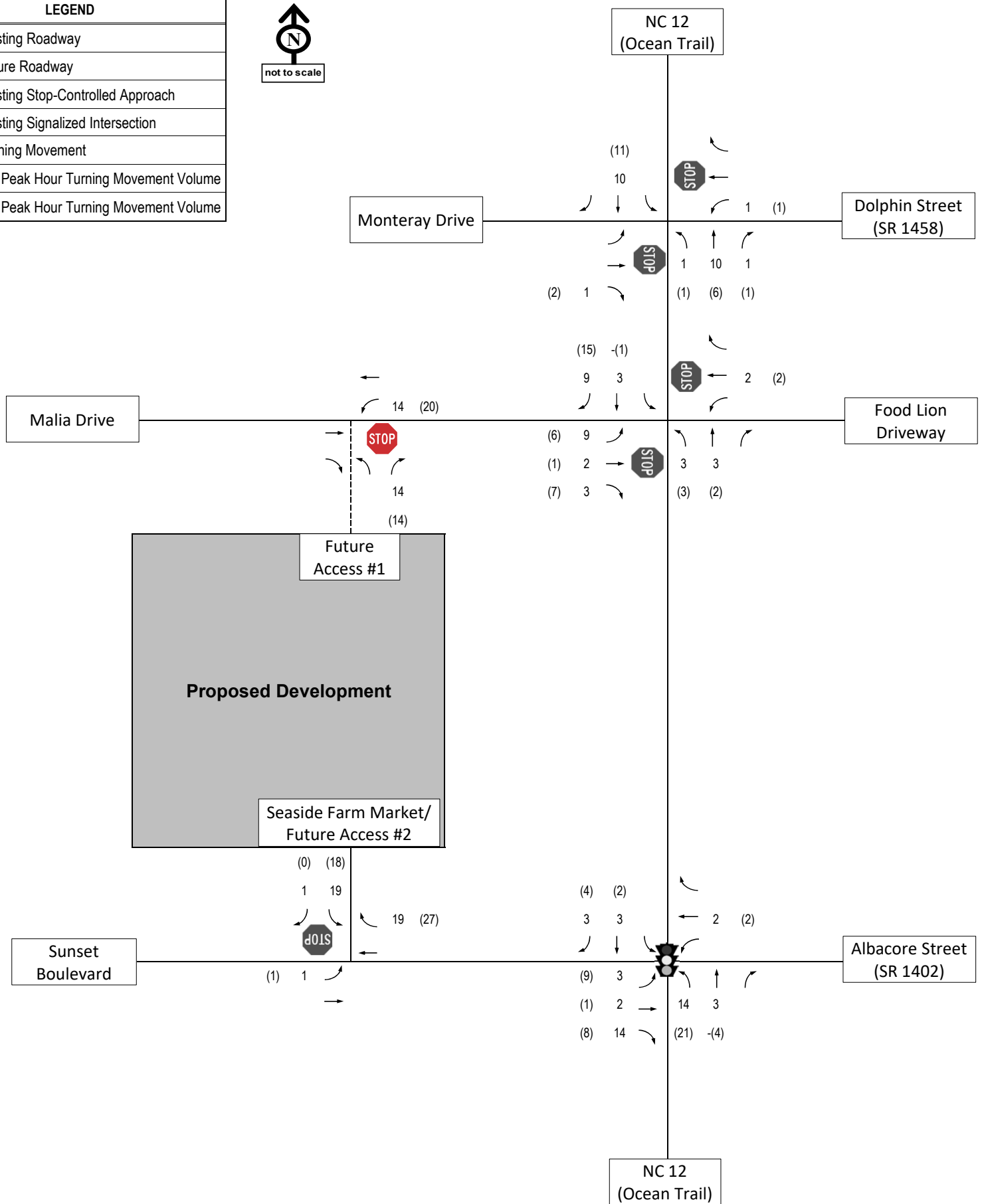
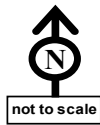


**Figure 24**  
**Phase II Build (2025) Alternative #2 Peak Hour Site**  
**Generated Pass-By Trips**

**Monteray Shores TIA**  
**Corolla, NC**

# LEGEND

|      |                                      |
|------|--------------------------------------|
| —    | Existing Roadway                     |
| --   | Future Roadway                       |
|      | Existing Stop-Controlled Approach    |
|      | Existing Signalized Intersection     |
| ←    | Turning Movement                     |
| XX   | AM Peak Hour Turning Movement Volume |
| (XX) | PM Peak Hour Turning Movement Volume |



**Figure 25**  
Phase II Build (2025) Alternative #2 Total Peak Hour Site  
Generated Trips

**Monteray Shores TIA**  
Corolla, NC

## Level of Service Analysis

The Phase II Build (2025) Alternative #2 analysis scenario includes the Phase II No-Build (2025) traffic and site-generated trips from the proposed development as described previously. The network geometry matches the Existing (2021) scenario with the addition of the one driveway along Malia Drive and access provided via a connection to the existing Seaside Market driveway along Sunset Boulevard. Figure 26 depicts the turning movement volumes used in the Phase II Build (2025) Alternative #2 scenario analysis. Intersection levels of service analyses were performed for the typical weekday AM and PM peak hours using Synchro/SimTraffic Professional Version 10. Table 6 summarizes the findings of the LOS analysis, and Appendix D contains the full Synchro reports.

As reported in Table 11, with the addition of site trips, the signalized intersection continues to operate at overall acceptable levels of service during both peak hours. The stop-controlled westbound approach at the intersection of Ocean Trail (NC 12) and Dolphin Street/Monterey Drive is projected to continue to operate at a LOS F during the PM peak hour.

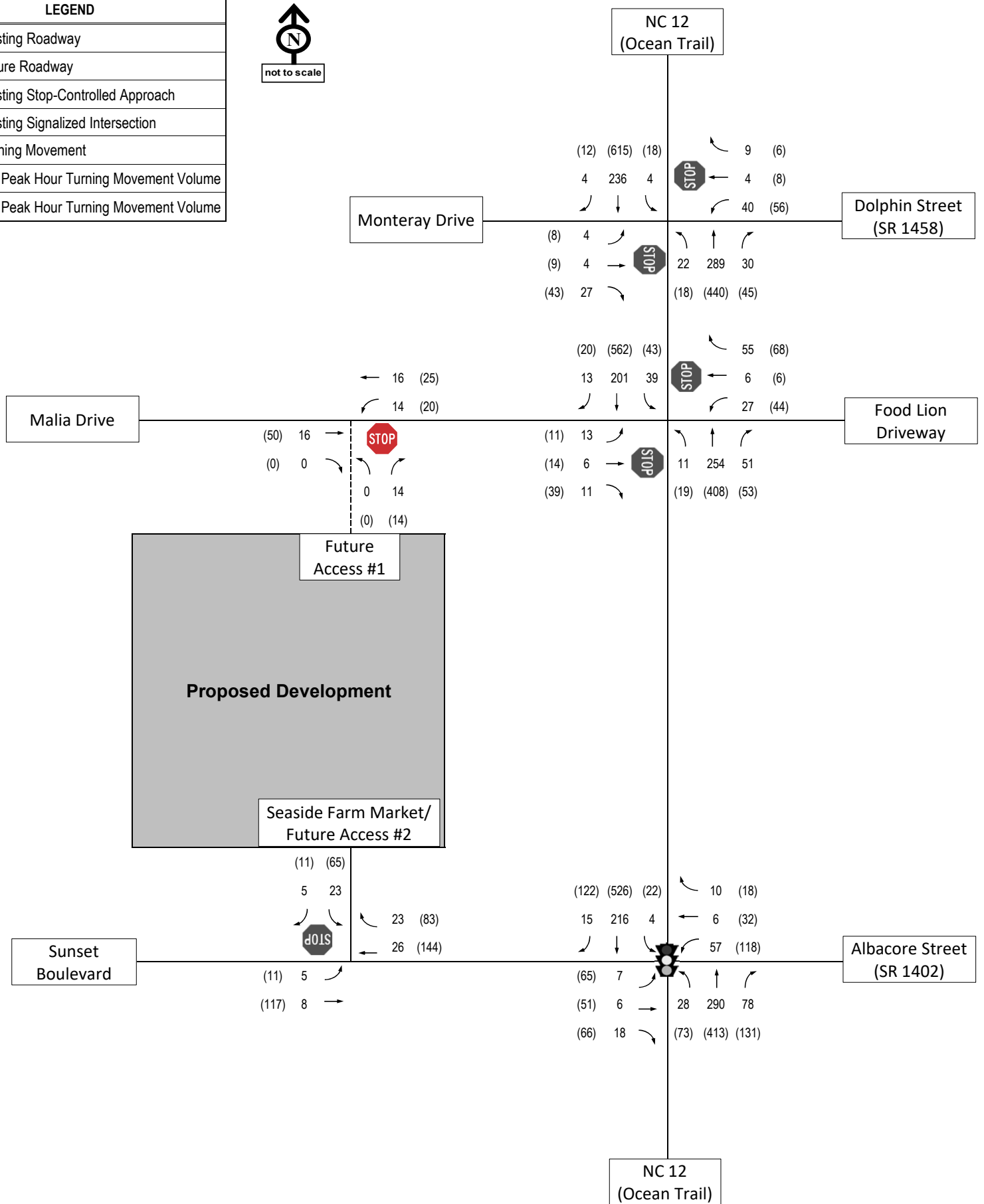
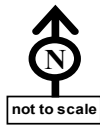
**Table 11 Phase II Build (2025) Alternative #2 LOS Results**

| Intersection and Approach                                                | Traffic Control | Phase II Build (2025) Alt #2 |                 |
|--------------------------------------------------------------------------|-----------------|------------------------------|-----------------|
|                                                                          |                 | AM                           | PM              |
| <b>NC 12 (Ocean Trail) at Albacore Street (SR 1402)/Sunset Boulevard</b> | Signalized      | <b>B (10.3)</b>              | <b>C (27.9)</b> |
| Eastbound                                                                |                 | B-16.9                       | D-38.5          |
| Westbound                                                                |                 | B-17.6                       | D-50.2          |
| Northbound                                                               |                 | A-9.2                        | B-17.6          |
| Southbound                                                               |                 | A-9.0                        | C-28.9          |
| <b>NC 12 (Ocean Trail) at Malia Drive/Food Lion Driveway</b>             | Unsignalized    | -                            | -               |
| Eastbound                                                                |                 | B-14.5                       | D-26.7          |
| Westbound                                                                |                 | B-12.3                       | D-29.7          |
| <b>NC 12 (Ocean Trail) at Dolphin Street (SR 1458)/Monterey Drive</b>    | Unsignalized    | -                            | -               |
| Eastbound                                                                |                 | B-11.3                       | C-22.5          |
| Westbound                                                                |                 | C-16.6                       | <b>F-78.4</b>   |
| <b>Sunset Boulevard at Seaside Farm Market/Future Access #2</b>          | Unsignalized    | -                            | -               |
| Southbound                                                               |                 | A-8.9                        | B-11.3          |
| <b>Malia Drive at Future Access #1</b>                                   | Unsignalized    | -                            | -               |
| Northbound                                                               |                 | A-8.4                        | A-8.6           |

**X (XX.X)** = Overall intersection LOS (average delay), X-XX = Approach LOS and average delay

# LEGEND

|      |                                      |
|------|--------------------------------------|
| —    | Existing Roadway                     |
| --   | Future Roadway                       |
|      | Existing Stop-Controlled Approach    |
|      | Existing Signalized Intersection     |
| ←    | Turning Movement                     |
| XX   | AM Peak Hour Turning Movement Volume |
| (XX) | PM Peak Hour Turning Movement Volume |



**Figure 26**  
Phase II Build (2025) Build Alternative #2 AM and PM Peak  
Hour Volumes

**Monteray Shores TIA**  
**Corolla, NC**

## Roadway Improvement Recommendations

As indicated in the traffic operations analyses, the proposed development is projected to have a minimal impact on the traffic operations within the study area.

The following configurations are recommended for the site access driveways:

### *Malia Drive and Future Access #1 (unsignalized)*

The stop-controlled driveway is expected to operate at LOS A during the AM peak hour and LOS A during the PM peak hour under both Phase II Build (2025) conditions. The following lane configurations are recommended for the new driveway connection:

- › Construct driveway with one ingress lane and one egress lane and full movement access.
- › Provide a minimum internal protected stem length of 100 feet.

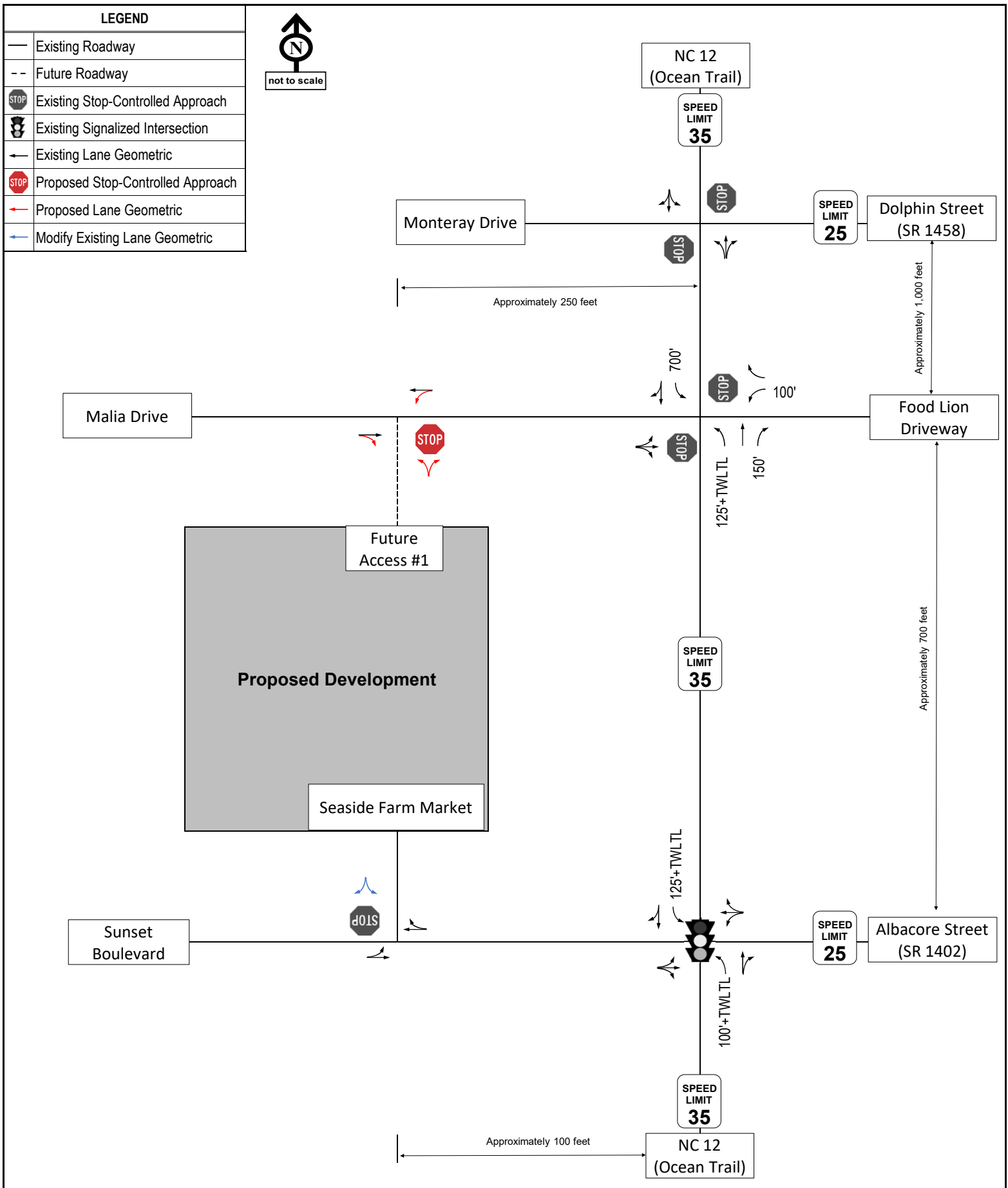
### *Sunset Boulevard and Future Access #2 (unsignalized)*

The stop-controlled driveway is expected to operate at LOS A during the AM peak hour and LOS B during the PM peak hour under Phase II Build (2025) Alternative #2 conditions. The following lane configurations are recommended for the new driveway connection, should Alternative #2 be utilized:

- › Modify driveway to clearly delineate one ingress lane and one egress lane and full movement access.
- › Ensure a minimum internal protected stem length of 100 feet.
- › Coordinate with NCDOT for design and pavement standards, and for a potential shifting of the driveway to the west to allow more distance from signal.

Figure 27 provides a schematic diagram of the roadways near the proposed development, including the intersection geometrics with the proposed Phase II Build (2025) Alternative #2 improvements applied.





**Figure 27**  
**Phase II Build (2025) Alternative #2**  
**Lane Geometrics and Traffic Control**

**Monteray Shores TIA**  
**Corolla, NC**



# 8

## Findings and Conclusions

As indicated in the traffic operations analyses, the proposed development is projected to have a minimal impact on the traffic operations for multiple intersections within the study area. Therefore, the following offsite roadway improvements are recommended as a result of the additional site traffic that this development will generate.

### Roadway Improvement Recommendations

As indicated in the traffic operations analyses, the proposed development is projected to have a minimal impact on the traffic operations within the study area.

The following configurations are recommended for the site access driveways:

#### Malia Drive and Future Access #1 (unsignalized)

The stop-controlled driveway is expected to operate at LOS A during the AM peak hour and LOS A during the PM peak hour under both Phase II Build (2025) conditions. The following lane configurations are recommended for the new driveway connection:

- › Construct driveway with one ingress lane and one egress lane and full movement access.
- › Provide a minimum internal protected stem length of 100 feet.

#### Sunset Boulevard and Future Access #2 (unsignalized)

The stop-controlled driveway is expected to operate at LOS A during the AM peak hour and LOS B during the PM peak hour under Phase II Build (2025) Alternative #2 conditions. The following lane configurations are recommended for the new driveway connection, should Alternative #2 be utilized:

- › Modify driveway to clearly delineate one ingress lane and one egress lane and full movement access.
- › Ensure a minimum internal protected stem length of 100 feet.

## Monterey Shores Development TIA

- › Coordinate with NCDOT for design and pavement standards, and for a potential shifting of the driveway to the west to allow more distance from signal.

The summary LOS results are shown in Table 12 and the future lane configurations and traffic control at the study area intersections, with the development in place, are presented in Figure 20 or Figure 27. With the addition of the improvements identified as part of this TIA, all of the intersections are projected to operate at improved or acceptable levels of service or there are minimal delay increases (3 seconds or less during either peak period) projected at the study area intersections.

**Table 12 Summary of LOS Results**

| Intersection and Approach                                                | Traffic Control | Existing (2021) |                 | Phase I No-Build (2023) |                 | Phase I Build (2023) |                 | Phase II No-Build (2025) |                 | Phase II Build (2025) Alt #1 |                 | Phase II Build (2025) Alt #2 |                 |
|--------------------------------------------------------------------------|-----------------|-----------------|-----------------|-------------------------|-----------------|----------------------|-----------------|--------------------------|-----------------|------------------------------|-----------------|------------------------------|-----------------|
|                                                                          |                 | AM              | PM              | AM                      | PM              | AM                   | PM              | AM                       | PM              | AM                           | PM              | AM                           | PM              |
| <b>NC 12 (Ocean Trail) at Albacore Street (SR 1402)/Sunset Boulevard</b> | Signalized      | <b>A (9.4)</b>  | <b>C (21.3)</b> | <b>A (9.8)</b>          | <b>C (23.6)</b> | <b>A (9.8)</b>       | <b>C (24.0)</b> | <b>A (9.8)</b>           | <b>C (24.7)</b> | <b>B (10.8)</b>              | <b>C (25.3)</b> | <b>B (10.3)</b>              | <b>C (27.9)</b> |
| Eastbound                                                                |                 | B-16.3          | C-32.9          | B-16.6                  | C-33.6          | B-16.7               | C-34.3          | B-16.9                   | C-34.0          | B-17.5                       | C-34.7          | B-16.9                       | D-38.5          |
| Westbound                                                                |                 | B-17.1          | D-38.5          | B-17.4                  | D-40.9          | B-17.5               | D-42.2          | B-17.8                   | D-42.7          | B-19.3                       | D-44.4          | B-17.6                       | D-50.2          |
| Northbound                                                               |                 | A-8.2           | B-13.0          | A-8.7                   | B-15.9          | A-8.7                | B-16.6          | A-8.7                    | B-16.6          | A-9.8                        | B-17.5          | A-9.2                        | B-17.6          |
| Southbound                                                               |                 | A-8.7           | C-21.7          | A-8.9                   | C-23.8          | A-8.9                | C-23.6          | A-8.8                    | C-25.2          | A-9.7                        | C-25.4          | A-9.0                        | C-28.9          |
| <b>NC 12 (Ocean Trail) at Malia Drive/Food Lion Driveway</b>             | Unsignalized    | -               | -               | -                       | -               | -                    | -               | -                        | -               | -                            | -               | -                            | -               |
| Eastbound                                                                |                 | B-12.5          | C-19.9          | B-12.8                  | C-21.0          | B-12.9               | D-26.5          | B-12.9                   | C-22.6          | B-14.1                       | E-35.9          | B-14.5                       | D-26.7          |
| Westbound                                                                |                 | B-11.6          | C-22.7          | B-11.7                  | D-25.1          | B-11.9               | D-28.4          | B-12.0                   | D-27.7          | B-12.6                       | D-34.1          | B-12.3                       | D-29.7          |
| <b>NC 12 (Ocean Trail) at Dolphin Street (SR 1458)/Monterey Drive</b>    | Unsignalized    | -               | -               | -                       | -               | -                    | -               | -                        | -               | -                            | -               | -                            | -               |
| Eastbound                                                                |                 | B-10.9          | C-19.1          | B-11.0                  | C-20.0          | B-11.0               | C-20.4          | B-11.1                   | C-22.1          | B-11.3                       | C-22.5          | B-11.3                       | C-22.5          |
| Westbound                                                                |                 | C-15.0          | E-48.0          | C-15.4                  | F-57.4          | C-15.5               | F-62.0          | C-16.0                   | F-70.3          | C-16.7                       | F-78.4          | C-16.6                       | F-78.4          |
| <b>Sunset Boulevard at Seaside Farm Market/Future Access #2</b>          | Unsignalized    | -               | -               | -                       | -               | -                    | -               | -                        | -               | -                            | -               | -                            | -               |
| Southbound                                                               |                 | A-8.6           | B-10.6          | A-8.6                   | B-10.7          | A-8.6                | B-10.7          | A-8.6                    | B-10.9          | A-8.6                        | B-10.9          | A-8.9                        | B-11.3          |
| <b>Malia Drive at Future Access #1</b>                                   | Unsignalized    | -               | -               | -                       | -               | -                    | -               | -                        | -               | -                            | -               | -                            | -               |
| Northbound                                                               |                 | -               | -               | -                       | -               | A-8.4                | A-8.6           | ---                      | ---             | A-8.5                        | A-8.7           | A-8.4                        | A-8.6           |

**X (XX.X)** = Overall intersection LOS (average delay), X-XX = Approach LOS and average delay

---

# Appendices



A

## Memorandum of Understanding



# NCDOT Traffic Impact Analysis Need Screening / Scoping Request



TIA Need  
Screening



TIA  
Scoping



TIA  
Submittal

A Traffic Impact Analysis (TIA) may be required for developments based on the site trip generation estimates, site context, or at the discretion of the NCDOT District Engineer. The Applicant or the TIA Consultant shall submit this form along with the site plan to the District Engineer to determine the TIA need and, if a TIA is required, initiate the TIA scoping process. Without an approved scope, the TIA is incomplete and will be rejected until the study is revised to conform to NCDOT's TIA requirements.

**Project** Monterary Shores Development **Previous Name:** If Applicable \_\_\_\_\_  
**Location:** Corolla, NC **County:** Currituck **Municipality:** Corolla  
**Project Description:** Construction of 8,002 sq ft of retail, 4,502 sq ft of restaurant, 5 single family homes and 31 multifamily dwelling units

**Project Contact:** Applicant  
 Company Name Outer Banks Ventures  
 Contact Person Richard Willis  
 Phone Number (757) 286-2859  
 Email rcwillis@outerbanksventures.com  
 Mailing Address 215 Brooks Ave #1001  
Norfolk, Virginia 23510

**TIA Consultant**  
VHB Engineering NC, P.C.  
Andrew Topp, PE, PTOE  
(919) 334-5620  
atopp@vhb.com  
940 Main Campus Drive, Ste. 500  
Raleigh, NC 27606

**Site Plan Prepared** Bissell Professional Group  
 See site plan/vicinity map requirements on page 2.  
**Parcel Size:** 36.1 Acre(s)

**Site Plan Date:** 5/27/2021  
**Anticipated Build-Out Year:** Early 2023

**Weekday Site Trip Generation - Do NOT adjust for mode split, pass-by, internal capture, or diverted trips.**

| ITE LUC | Proposed Land Use  | Size | Unit | Daily Trips | Peak Hour Type | AM Peak Hour Trips |      |       | PM Peak Hour Trips |      |       | Data Source  |
|---------|--------------------|------|------|-------------|----------------|--------------------|------|-------|--------------------|------|-------|--------------|
|         |                    |      |      |             |                | Enter              | Exit | Total | Enter              | Exit | Total |              |
| 210     | Single Family      | 5    | du   | 66          | Adj. Street    | 2                  | 6    | 8     | 4                  | 2    | 6     | ITE Equation |
| 220     | Multi-Family       | 31   | du   | 194         | Adj. Street    | 4                  | 12   | 16    | 13                 | 8    | 21    | ITE Equation |
| 820     | General Retail     | 8002 | sf   | 1079        | Adj. Street    | 27                 | 16   | 43    | 31                 | 34   | 65    | ITE Equation |
| 932     | Quality Restaurant | 4502 | sf   | 377         | Generator      | 2                  | 1    | 3     | 23                 | 12   | 35    | ITE Rate     |
|         |                    |      |      |             |                |                    |      |       |                    |      |       |              |
|         |                    |      |      |             |                |                    |      |       |                    |      |       |              |
|         |                    |      |      |             |                |                    |      |       |                    |      |       |              |
|         |                    |      |      |             |                |                    |      |       |                    |      |       |              |
|         |                    |      |      |             |                |                    |      |       |                    |      |       |              |
|         |                    |      |      |             |                |                    |      |       |                    |      |       |              |
|         |                    |      |      |             |                |                    |      |       |                    |      |       |              |
| Total   |                    |      |      | 1716        |                | 35                 | 35   | 70    | 71                 | 56   | 127   |              |

Refer to the current [NCDOT Congestion Management Capacity Analysis Guidelines](#) for acceptable trip calculation methods and data sources.

\*\*Explain local or other data sources, if used: \_\_\_\_\_

- ☐ The estimated site trips meet NCDOT's TIA trip threshold of 3,000 daily trips.
- ☐ The estimated site trips meet the municipal TIA trip threshold of \_\_\_\_\_
- ☐ This project is located in a known [STIP](#) and/ or local CIP project # \_\_\_\_\_
- ☐ This project includes a rezoning request.





# NCDOT Traffic Impact Analysis Need Screening / Scoping Request

TIA Need  
Screening



TIA  
Scoping



TIA  
Submittal



- ☐ The proposed site access is located within 1,000 feet of an interchange.
- ☐ The Applicant requests for a new or modified control-of-access break.
- ☐ The Applicant requests for a new or modified median break.

Applicant's Signature

Print Name

Date

**Site Plan/Vicinity Map Requirement for TIA Need Screening:** While the site plan may not be finalized during the TIA scoping stage, the graphic representation of the proposed development shall provide adequate details on the development scope and context. More specifically, the site plan/map shall clearly show the location and type of each access point, spacing to adjacent and opposing driveways or intersections, internal street network, proposed buildings/parcels with their anticipated uses and sizes at full build-out and, if applicable, any nearby interstate, US, NC or Secondary Roads (SR).

**Project**

Monterary Shores Development

**Project Reference Number:**

- ☐ **A TIA is Required by the Local Government.** In addition, the study area is expected to include NCDOT maintained transportation facilities.
- ☐ **A TIA is Required by NCDOT,** per the [Policy on Street and Driveway Access to North Carolina Highways](#).

If either or both of the boxes above are checked, the Applicant/TIA Consultant is hereby requested to fill out as much as possible of the following TIA scoping checklist, and return it along with the supporting documents to NCDOT prior to the scoping meeting.

- ☐ **A TIA is NOT required.** This decision is based on the development information presented above. Changes in the development plan will require re-evaluation of the TIA need, and may necessitate a TIA. The Applicant should inform the District Engineer of any significant changes in a timely fashion to avoid delays or rejections of the driveway permit / encroachment agreement applications.



# NCDOT Traffic Impact Analysis Need Screening / Scoping Request

TIA Need  
Screening



TIA  
Scoping



TIA  
Submittal



## Additional Comments:

The TIA need decision is made by the NCDOT Division \_\_\_\_\_ District \_\_\_\_\_ on \_\_\_\_\_.

\_\_\_\_\_  
NCDOT District Representative's Signature

Email concurrence may be used in lieu of the signature.

\_\_\_\_\_  
Print Name



# NCDOT TIA Scoping Checklist



## Project

Name: Montera Monterary Shores Development

TIA Scoping Date: 9/24/2021

☒ TIA Need Screening Forms are Attached. Project Reference #: \_\_\_\_\_ Decision Date: \_\_\_\_\_

## ☒ Site Plan and Access

☒ Provide a site plan illustrating site access, internal and external roadways, buildings and land uses.

Refer to NCDOT's [Policy on Street and Driveway Access to North Carolina Highways](#) pages 14 and 15 for site plan requirements.

☒ Identify site access.

| New Access      | On Road                  | Access Type            |                 | Driveway Spacing                           |                |                               |
|-----------------|--------------------------|------------------------|-----------------|--------------------------------------------|----------------|-------------------------------|
|                 | Road Name                | Permitted Movements    | Traffic Control | Distance (ft)                              | Direction      | Nearest Intersection / Access |
| Access A        | Sunset Boulevard         | Conventional Full-Mvmt | 2-Way Stop      | 100                                        | West           | NC 12                         |
| Access B        | Malia Drive              | Conventional Full-Mvmt | 2-Way Stop      | 250                                        | West           | NC 12                         |
| Access C        |                          |                        |                 |                                            |                |                               |
| Access D        |                          |                        |                 |                                            |                |                               |
| Access E        |                          |                        |                 |                                            |                |                               |
| Access F        |                          |                        |                 |                                            |                |                               |
| Access G        |                          |                        |                 |                                            |                |                               |
| Access H        |                          |                        |                 |                                            |                |                               |
| Existing Access | Existing Intersection of |                        | Access          | Proposed Interconnectivity (If Applicable) |                |                               |
|                 | Road A                   | Road B                 | Modification    | Connector #                                | Road Connected | Adjacent Development          |
| Access 1        |                          |                        | Please Select   | Connector 1                                |                |                               |
| Access 2        |                          |                        |                 | Connector 2                                |                |                               |
| Access 3        |                          |                        |                 | Connector 3                                |                |                               |
| Access 4        |                          |                        |                 | Connector 4                                |                |                               |

☐ Additional access clarifications and provisions (e.g., proposed control-of-access or median breaks, modifications of existing access, loading/unloading area access, bike/pedestrian accommodation).

☐ There will be two access scenarios evaluated in the TIA. One will include both the Malia Drive access and the Sunset Blvd access. The second scenario will included only the Malia Drive access.

## Proposed K-12 School Site

☐ NCDOT [MSTA School Traffic Calculator](#) for Select School Type shall be used.

☐ Peak Hour Factors (PHFs) shall be adjusted/weighted for new school trips (0.5 PHF by default).

☐ Internal school circulation analysis is required, and should be submitted in advance or concurrent with the TIA submittal.

☐ Clarify traffic operation plans (e.g. traffic circulation pattern, pedestrian access, drop-off/pick-up zone location and configuration, queue storage area and, if applicable, staggered start times).



# NCDOT TIA Scoping Checklist

TIA Need  
Screening



TIA  
Scoping



TIA  
Submittal



## ☒ Trip Generation

The TIA Consultant shall prepare trip generation estimates following the current [NCDOT Congestion Management Capacity Analysis Guidelines](#), and submit the calculation sheets and supporting information to the District Engineer for approval prior to capacity analysis.

| ITE<br>LUC                                         | Proposed Land Use  | Size                        | Unit | Daily Trips                 | Peak Hour<br>Type | AM Peak Hour Trips |      |       | PM Peak Hour Trips |      |       | Data Source   |
|----------------------------------------------------|--------------------|-----------------------------|------|-----------------------------|-------------------|--------------------|------|-------|--------------------|------|-------|---------------|
|                                                    |                    |                             |      |                             |                   | Enter              | Exit | Total | Enter              | Exit | Total |               |
| 210                                                | Single Family      | 5                           | du   | 66                          | Adj. Street       | 2                  | 6    | 8     | 4                  | 2    | 6     | ITE Equation  |
| 220                                                | Multi Family       | 31                          | du   | 194                         | Adj. Street       | 4                  | 12   | 16    | 13                 | 8    | 21    | ITE Equation  |
| 820                                                | General Retail     | 8002                        | sf   | 1079                        | Adj. Street       | 27                 | 16   | 43    | 31                 | 34   | 65    | ITE Equation  |
| 931                                                | Quality Restaurant | 4502                        | sf   | 377                         | Generator         | 2                  | 1    | 3     | 23                 | 12   | 35    | ITE Rate      |
|                                                    |                    |                             |      |                             |                   |                    |      |       |                    |      |       |               |
|                                                    |                    |                             |      |                             |                   |                    |      |       |                    |      |       |               |
|                                                    |                    |                             |      |                             |                   |                    |      |       |                    |      |       |               |
|                                                    |                    |                             |      |                             |                   |                    |      |       |                    |      |       |               |
|                                                    |                    |                             |      |                             |                   |                    |      |       |                    |      |       |               |
|                                                    |                    |                             |      |                             |                   |                    |      |       |                    |      |       |               |
|                                                    |                    |                             |      |                             |                   |                    |      |       |                    |      |       |               |
| Unadjusted Site Trips                              |                    |                             |      | 1716                        |                   | 35                 | 35   | 70    | 71                 | 56   | 127   |               |
| Internal Capture Trips (Attach Calculation Sheets) |                    |                             |      | 430                         |                   | 1                  | 1    | 2     | 23                 | 24   | 47    | NCHRP 684     |
| Internal Capture % of Unadjusted Site Trips        |                    |                             |      | %                           |                   | %                  |      |       | %                  |      |       |               |
| LUC                                                | Proposed Land Use  | Any Internal Trips?         |      | Pass-By % of External Trips |                   |                    |      |       |                    |      |       |               |
| 820                                                | General Retail     | Yes - Adjust External Trips |      | %                           |                   | 0 %                |      |       | 34 %               |      |       | ITE Rate      |
| 932                                                | Restaurant         | Yes - Adjust External Trips |      | %                           |                   | 0 %                |      |       | 44 %               |      |       | ITE Rate      |
|                                                    |                    |                             |      | %                           |                   | %                  |      |       | %                  |      |       |               |
|                                                    |                    |                             |      | %                           |                   | %                  |      |       | %                  |      |       |               |
|                                                    |                    |                             |      | %                           |                   | %                  |      |       | %                  |      |       |               |
| Pass-By Trips (Attach Calculation Sheets)          |                    |                             |      |                             |                   | 0                  | 0    | 0     | 12                 | 12   | 24    |               |
| Adjacent Street Volumes                            |                    |                             |      |                             |                   |                    |      |       |                    |      |       | Please Select |
| Non-Pass-By Primary Trips                          |                    |                             |      |                             |                   | 34                 | 34   | 68    | 36                 | 20   | 56    |               |
| Diverted Trips, if Applicable and Justifiable      |                    |                             |      |                             |                   |                    |      |       |                    |      |       | Please Select |

\*\*Explain local or other data sources, if used:

Once counts are process, pass-by trips may be adjusted downward if they exceed 10% of the adjacent street volume.

## ☐ Existing Site Trip Information for Redevelopment Projects (Attach separate sheets as needed)

| ITE<br>LUC                | Existing Land Use | Size | Unit | Daily Trips | Peak Hour<br>Type | AM Peak Hour Trips |      |       | PM Peak Hour Trips |      |       | Data Source   |
|---------------------------|-------------------|------|------|-------------|-------------------|--------------------|------|-------|--------------------|------|-------|---------------|
|                           |                   |      |      |             |                   | Enter              | Exit | Total | Enter              | Exit | Total |               |
|                           |                   |      |      |             | Please Select     |                    |      |       |                    |      |       | Please Select |
|                           |                   |      |      |             |                   |                    |      |       |                    |      |       |               |
| Total Existing Site Trips |                   |      |      |             |                   |                    |      |       |                    |      |       |               |



## NCDOT TIA Scoping Checklist



### ☒ Trip Distribution

- ☐ Trip distribution diagrams are submitted concurrently with this document (attach separate sheets).
- ☒ Trip distribution diagrams will be submitted separately, along with supporting information, to the District Engineer for review and approval prior to capacity analysis. The trip distribution shall be based on the current and anticipated traffic patterns, as well as instructions noted below.

Trip distribution will be determined once counts are obtained

If required by the District Engineer, the following additional diagrams shall also be submitted:

- ☐ Mixed-Use Developments (separate diagrams for residential, commercial, and office trips)
- ☐ Inter-Development Trips (if 'internal' trips cross public streets)
- ☐ Pass-By Trips
- ☐ Diverted Trips
- ☐ Each Analysis Period

### ☐ Mode Split

- ☐ Provide Data Source and Justification

| Mode<br>Period | Auto |   |   |
|----------------|------|---|---|
| AM Peak        | %    | % | % |
| PM Peak        | %    | % | % |
| Daily          | %    | % | % |
|                | %    | % | % |

- ☐ Identify proper infrastructure and accommodation for other modes of travel.

### ☒ Analysis Peak Periods:

- ☒ Weekday AM Peak \_\_\_\_\_
- ☒ Weekday PM Peak \_\_\_\_\_
- ☐ Weekday Midday Peak \_\_\_\_\_
- ☐ Weekday PM School Peak \_\_\_\_\_
- ☐ Weekend \_\_\_\_\_ Peak \_\_\_\_\_
- ☐ Other \_\_\_\_\_



# NCDOT TIA Scoping Checklist



## ☒ Study Area Intersections and Data Collection

The study area shall include the site access intersections (both new and existing) identified under “Site Plan and Access” on page 1, as well as the following external and, if applicable, internal intersections.

| External Intersection | Intersection of |                 | Traffic Control | Intersection Turning Movement Counts |                |                   | Notes |
|-----------------------|-----------------|-----------------|-----------------|--------------------------------------|----------------|-------------------|-------|
|                       | Road A          | Road B          |                 | New / Existing                       | Date of Counts | Growth Adjustment |       |
| #1                    | NC 12           | Albacore Street | Signal          | Require New Counts                   | 9/1/2021       |                   |       |
| #2                    | NC 12           | Malia Drive     | 2-Way Stop      | Require New Counts                   | 9/1/2021       |                   |       |
| #3                    | NC 12           | Dolphin Street  | 2-Way Stop      | Require New Counts                   | 9/1/2021       |                   |       |
| #4                    |                 |                 |                 |                                      |                |                   |       |
| #5                    |                 |                 |                 |                                      |                |                   |       |
| #6                    |                 |                 |                 |                                      |                |                   |       |
| #7                    |                 |                 |                 |                                      |                |                   |       |
| #8                    |                 |                 |                 |                                      |                |                   |       |
| #9                    |                 |                 |                 |                                      |                |                   |       |
| #10                   |                 |                 |                 |                                      |                |                   |       |
| #11                   |                 |                 |                 |                                      |                |                   |       |
| #12                   |                 |                 |                 |                                      |                |                   |       |

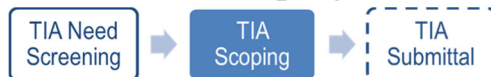
| Internal Intersection | Intersection of |        | Access Type     |                     | Intersection Spacing |               |                      |
|-----------------------|-----------------|--------|-----------------|---------------------|----------------------|---------------|----------------------|
|                       | Road A          | Road B | Traffic Control | Permitted Movements | Distance (ft)        | Direction     | Nearest Intersection |
| #101                  |                 |        | Please Select   | Please Select       |                      | Please Select |                      |
| #102                  |                 |        |                 |                     |                      |               |                      |
| #103                  |                 |        |                 |                     |                      |               |                      |
| #104                  |                 |        |                 |                     |                      |               |                      |
| #105                  |                 |        |                 |                     |                      |               |                      |

The following data will be collected:

- ☒ New traffic turning movement counts in ☒ 15-min intervals ☐ 5-min intervals (near schools)  
 Unless otherwise noted above, new traffic counts shall be collected at the existing study intersections during the analysis periods. Weekday counts shall avoid Mondays, Fridays, holidays, school breaks, road closures, and major weather events.
- ☐ To account for the impact of existing and/or proposed school traffic, PHFs will be adjusted for:  
     intersections numbered: \_\_\_\_\_  
     and access points numbered: \_\_\_\_\_
- ☐ Traffic Forecast Data for TIP: \_\_\_\_\_
- ☒ Roadway/Intersection Configuration & Traffic Control
- ☒ Traffic Signal Phasing & Timing Data
- ☐ Crash Data: \_\_\_\_\_ Period: \_\_\_\_\_
- ☐ Other: \_\_\_\_\_



## NCDOT TIA Scoping Checklist



### ☒ Future Year Conditions

☒ Project Build-Out Year: Early 2023

☒ Future Analysis Year(s): 2023

- ☐ Identify below any funded/committed future transportation improvements, as well as any approved but incomplete developments near the site.

| Funded STIP / Local CIP Project | Project Description |                                                | Year Complete          |
|---------------------------------|---------------------|------------------------------------------------|------------------------|
|                                 |                     |                                                |                        |
|                                 |                     |                                                |                        |
|                                 |                     |                                                |                        |
|                                 |                     |                                                |                        |
| Nearby Approved Development     | Location            | Future Land Use (exclude any completed phases) | Committed Improvements |
|                                 |                     |                                                |                        |
|                                 |                     |                                                |                        |
|                                 |                     |                                                |                        |
|                                 |                     |                                                |                        |

☒ Annual Growth Factor: 2 %

Justification/Data Source: NCDOT 2020-2030 growth rate = 1.4%

### ☐ Local Comprehensive Transportation Plan Compliance

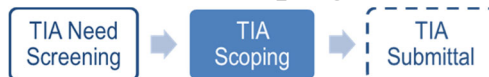
- ☐ Identify Applicable Local Transportation Planning Documents

- ☐ Identify Applicable Roadways inside the Study Area

| Road Name | Classification | Speed Limit | Proposed Cross-Section | Proposed Right-of-Way | Compliance Requirements | Affect Study Intersection # |
|-----------|----------------|-------------|------------------------|-----------------------|-------------------------|-----------------------------|
|           |                |             |                        |                       |                         |                             |
|           |                |             |                        |                       |                         |                             |
|           |                |             |                        |                       |                         |                             |
|           |                |             |                        |                       |                         |                             |
|           |                |             |                        |                       |                         |                             |



## NCDOT TIA Scoping Checklist



### ☒ Study Method

The traffic analysis shall follow the current [NCDOT Congestion Management Capacity Analysis Guidelines](#), [Policy on Street and Driveway Access to North Carolina Highways](#), and use the current approved version of analysis software (e.g. Synchro/SimTraffic, HCS, Sidra Intersection, TransModeler).

The study shall include the following analysis scenarios for each analysis period.

1. Existing Conditions
2. Future No-Build Conditions (existing + background growth + approved developments + committed or funded improvements)
3. Future Build Conditions (future no-build + site trips)
4. Future Build with Improvements Conditions (future build traffic with improvements to mitigate the proposed development's impacts) and, if applicable:
- ☐ 5. TIP Design Year Analysis \_\_\_\_\_
- ☐ 6. Alternative Access Scenario (without proposed control-of-access or median break / modification)

The following additional analysis/outputs should be provided as warranted:

- ☐ Signal Warrant Analysis for accesses/intersections \_\_\_\_\_
- ☐ Multi-Modal Level of Service Analysis
- ☐ School Loading Zone Traffic Simulation
- ☐ Phasing Analysis (scope separately as needed)
- ☐ Safety/Crash Analysis
- ☐ Control-of-Access Modification Justification
- ☐ Median Break / Modification Justification
- ☐ Other \_\_\_\_\_

### ☒ Submittals

In addition to the hardcopies required below, the TIA Consultant shall provide the District Engineer and, if required, the local government an electronic copy of the study documents, including the latest site plan, figures and appendices, in searchable PDF files and the original traffic analysis files (e.g., Synchro, HCS).

To expedite review, the NCDOT electronic submittals shall also be delivered concurrently to:

- ☐ Div. Traffic Engr ☐ Regional Traffic Engr ☐ Congestion Management ☐ Other \_\_\_\_\_

| Submittals                     | NCDOT      |          | Local Government |          |
|--------------------------------|------------|----------|------------------|----------|
|                                | Electronic | Hardcopy | Electronic       | Hardcopy |
| Trip Generation & Distribution | Required   |          | Please Select    |          |
| Draft TIA Report               | Required   |          |                  |          |
| Final Sealed TIA Report        | Required   |          |                  |          |

- ☐ **Additional Comments** (municipal TIA requirements, approved variations from NCDOT guidelines)







## NCDOT TIA Submittal Checklist

TIA Need  
Screening



TIA  
Scoping



TIA  
Submittal



Submittal: Please Select Document Date: \_\_\_\_\_  
Project \_\_\_\_\_ Previous Name: If Applicable \_\_\_\_\_  
NCDOT Division: \_\_\_\_\_ District: \_\_\_\_\_ County: \_\_\_\_\_ Municipality: \_\_\_\_\_  
TIA Consultant: \_\_\_\_\_ Submitted By: \_\_\_\_\_  
Phone Number: \_\_\_\_\_ Email: \_\_\_\_\_  
TIA Scoping Checklist Approval Date: \_\_\_\_\_ Unadjusted Daily Site Trips: \_\_\_\_\_

- ☒ The approved TIA Scoping Checklist is included in this submittal.
- ☒ LOS D or better is expected at all study intersections after proposed mitigations.
- ☒ The study report is sealed by a NC Professional Engineer with expertise in traffic engineering.
- ☒ This study has identified all known deficiencies with and without the proposed development.
- ☒ This study has identified mitigation measures to adequately accommodate the site trips.

Explain here if any of the boxes above are unchecked:

The undersigned affirms that, except for the deviations noted below, the TIA submittal conforms to the current [NCDOT Congestion Management Capacity Analysis Guidelines](#), [Policy on Street and Driveway Access to North Carolina Highways](#), and the TIA Scoping Checklist approved by the NCDOT District Office. The undersigned also acknowledges that the TIA will be rejected if the deviations and justifications are not properly documented and approved by NCDOT.

**Deviations and Justifications** (e.g., changes in site plan, development schedule, site trip and off-site trip estimates, study area, data collection, analysis period and method. Attached separate sheets if needed.)



## NCDOT TIA Submittal Checklist



---

TIA Consultant's Signature  
(Professional Engineer of TIA Record)

---

Print Name

---

Date



# B

## Turning Movement Counts

# VHB Engineering NC, P.C.

Venture I  
940 Main Campus Drive, Suite 500  
Raleigh, NC 27606  
p: 919.829.0328 f: 919.833.0034

File Name : NC12@AlbacoreStreet  
Site Code :  
Start Date : 9/1/2021  
Page No : 1

Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

|                         | NC 12<br>Southbound |      |       |      | Albacore Street<br>Westbound |      |       |      | NC 12<br>Northbound |      |       |      | Sunset Boulevard<br>Eastbound |      |       |      | Exclu. Total | Inclu. Total | Int. Total |
|-------------------------|---------------------|------|-------|------|------------------------------|------|-------|------|---------------------|------|-------|------|-------------------------------|------|-------|------|--------------|--------------|------------|
| Start Time              | Left                | Thru | Right | Peds | Left                         | Thru | Right | Peds | Left                | Thru | Right | Peds | Left                          | Thru | Right | Peds |              |              |            |
| 07:00 AM                | 1                   | 26   | 2     | 0    | 9                            | 0    | 1     | 5    | 1                   | 23   | 8     | 0    | 1                             | 0    | 0     | 0    | 5            | 72           | 77         |
| 07:15 AM                | 0                   | 48   | 2     | 1    | 9                            | 0    | 0     | 1    | 1                   | 46   | 11    | 0    | 0                             | 0    | 0     | 0    | 2            | 117          | 119        |
| 07:30 AM                | 0                   | 30   | 4     | 1    | 8                            | 1    | 1     | 8    | 1                   | 63   | 12    | 0    | 0                             | 0    | 0     | 0    | 9            | 120          | 129        |
| 07:45 AM                | 0                   | 44   | 1     | 0    | 9                            | 1    | 2     | 8    | 3                   | 73   | 12    | 0    | 0                             | 0    | 0     | 0    | 8            | 145          | 153        |
| Total                   | 1                   | 148  | 9     | 2    | 35                           | 2    | 4     | 22   | 6                   | 205  | 43    | 0    | 1                             | 0    | 0     | 0    | 24           | 454          | 478        |
| 08:00 AM                | 2                   | 41   | 1     | 0    | 9                            | 1    | 1     | 11   | 4                   | 45   | 14    | 0    | 2                             | 0    | 0     | 0    | 11           | 120          | 131        |
| 08:15 AM                | 2                   | 42   | 6     | 3    | 9                            | 0    | 3     | 7    | 4                   | 75   | 12    | 0    | 0                             | 3    | 0     | 1    | 11           | 156          | 167        |
| 08:30 AM                | 1                   | 49   | 0     | 0    | 20                           | 2    | 2     | 15   | 0                   | 72   | 19    | 0    | 1                             | 1    | 0     | 0    | 15           | 167          | 182        |
| 08:45 AM                | 1                   | 65   | 4     | 0    | 15                           | 1    | 3     | 3    | 5                   | 73   | 27    | 0    | 1                             | 0    | 0     | 0    | 3            | 195          | 198        |
| Total                   | 6                   | 197  | 11    | 3    | 53                           | 4    | 9     | 36   | 13                  | 265  | 72    | 0    | 4                             | 4    | 0     | 1    | 40           | 638          | 678        |
| *** BREAK ***           |                     |      |       |      |                              |      |       |      |                     |      |       |      |                               |      |       |      |              |              |            |
| 04:00 PM                | 3                   | 101  | 29    | 3    | 20                           | 9    | 5     | 5    | 10                  | 100  | 26    | 0    | 15                            | 14   | 15    | 0    | 8            | 347          | 355        |
| 04:15 PM                | 6                   | 139  | 25    | 2    | 23                           | 8    | 4     | 1    | 5                   | 86   | 29    | 0    | 9                             | 9    | 19    | 0    | 3            | 362          | 365        |
| 04:30 PM                | 7                   | 130  | 30    | 4    | 36                           | 4    | 2     | 10   | 20                  | 106  | 34    | 0    | 11                            | 7    | 7     | 0    | 14           | 394          | 408        |
| 04:45 PM                | 4                   | 114  | 25    | 1    | 30                           | 7    | 6     | 1    | 13                  | 93   | 32    | 0    | 17                            | 16   | 13    | 0    | 2            | 370          | 372        |
| Total                   | 20                  | 484  | 109   | 10   | 109                          | 28   | 17    | 17   | 48                  | 385  | 121   | 0    | 52                            | 46   | 54    | 0    | 27           | 1473         | 1500       |
| 05:00 PM                | 3                   | 97   | 17    | 5    | 35                           | 11   | 1     | 0    | 18                  | 86   | 22    | 0    | 8                             | 7    | 12    | 0    | 5            | 317          | 322        |
| 05:15 PM                | 2                   | 83   | 37    | 4    | 26                           | 11   | 1     | 6    | 13                  | 89   | 33    | 0    | 14                            | 12   | 12    | 0    | 10           | 333          | 343        |
| 05:30 PM                | 2                   | 78   | 30    | 4    | 21                           | 14   | 9     | 4    | 8                   | 80   | 24    | 2    | 13                            | 7    | 12    | 1    | 11           | 298          | 309        |
| 05:45 PM                | 5                   | 72   | 17    | 6    | 21                           | 7    | 7     | 2    | 13                  | 72   | 27    | 0    | 9                             | 9    | 9     | 0    | 8            | 268          | 276        |
| Total                   | 12                  | 330  | 101   | 19   | 103                          | 43   | 18    | 12   | 52                  | 327  | 106   | 2    | 44                            | 35   | 45    | 1    | 34           | 1216         | 1250       |
| Grand Total             | 39                  | 1159 | 230   | 34   | 300                          | 77   | 48    | 87   | 119                 | 1182 | 342   | 2    | 101                           | 85   | 99    | 2    | 125          | 3781         | 3906       |
| Apprch %                | 2.7                 | 81.2 | 16.1  |      | 70.6                         | 18.1 | 11.3  |      | 7.2                 | 71.9 | 20.8  |      | 35.4                          | 29.8 | 34.7  |      |              |              |            |
| Total %                 | 1                   | 30.7 | 6.1   |      | 7.9                          | 2    | 1.3   |      | 3.1                 | 31.3 | 9     |      | 2.7                           | 2.2  | 2.6   |      | 3.2          | 96.8         |            |
| Motorcycles             | 0                   | 0    | 0     |      | 3                            | 1    | 0     |      | 0                   | 1    | 0     |      | 0                             | 0    | 0     |      | 0            | 0            | 5          |
| % Motorcycles           | 0                   | 0    | 0     | 0    | 1                            | 1.3  | 0     | 0    | 0                   | 0.1  | 0     | 0    | 0                             | 0    | 0     | 0    | 0            | 0            | 0.1        |
| Cars & Light Goods      | 39                  | 1129 | 227   |      | 289                          | 75   | 46    |      | 119                 | 1150 | 328   |      | 100                           | 85   | 98    |      | 0            | 0            | 3685       |
| % Cars & Light Goods    | 100                 | 97.4 | 98.7  | 0    | 96.3                         | 97.4 | 95.8  | 0    | 100                 | 97.3 | 95.9  | 0    | 99                            | 100  | 99    | 0    | 0            | 0            | 94.3       |
| Buses                   | 0                   | 3    | 0     |      | 2                            | 0    | 0     |      | 0                   | 2    | 0     |      | 0                             | 0    | 0     |      | 0            | 0            | 7          |
| % Buses                 | 0                   | 0.3  | 0     | 0    | 0.7                          | 0    | 0     | 0    | 0                   | 0.2  | 0     | 0    | 0                             | 0    | 0     | 0    | 0            | 0            | 0.2        |
| Single-Unit Trucks      | 0                   | 22   | 0     |      | 2                            | 0    | 0     |      | 0                   | 22   | 5     |      | 0                             | 0    | 1     |      | 0            | 0            | 52         |
| % Single-Unit Trucks    | 0                   | 1.9  | 0     | 0    | 0.7                          | 0    | 0     | 0    | 0                   | 1.9  | 1.5   | 0    | 0                             | 0    | 1     | 0    | 0            | 0            | 1.3        |
| Articulated Trucks      | 0                   | 3    | 0     |      | 2                            | 0    | 0     |      | 0                   | 1    | 3     |      | 1                             | 0    | 0     |      | 0            | 0            | 10         |
| % Articulated Trucks    | 0                   | 0.3  | 0     | 0    | 0.7                          | 0    | 0     | 0    | 0                   | 0.1  | 0.9   | 0    | 1                             | 0    | 0     | 0    | 0            | 0            | 0.3        |
| Bicycles on Road        | 0                   | 2    | 3     |      | 2                            | 1    | 2     |      | 0                   | 6    | 6     |      | 0                             | 0    | 0     |      | 0            | 0            | 22         |
| % Bicycles on Road      | 0                   | 0.2  | 1.3   | 0    | 0.7                          | 1.3  | 4.2   | 0    | 0                   | 0.5  | 1.8   | 0    | 0                             | 0    | 0     | 0    | 0            | 0            | 0.6        |
| Bicycles on Crosswalk   |                     |      |       |      |                              |      |       |      |                     |      |       |      |                               |      |       |      |              |              |            |
| % Bicycles on Crosswalk | 0                   | 0    | 0     | 14.7 | 0                            | 0    | 0     | 49.4 | 0                   | 0    | 0     | 100  | 0                             | 0    | 0     | 50   | 0            | 0            | 1.3        |
| Pedestrians             | 0                   | 0    | 0     |      | 0                            | 0    | 0     |      | 0                   | 0    | 0     |      | 0                             | 0    | 0     |      | 0            | 0            | 74         |
| % Pedestrians           | 0                   | 0    | 0     | 85.3 | 0                            | 0    | 0     | 50.6 | 0                   | 0    | 0     | 0    | 0                             | 0    | 0     | 50   | 0            | 0            | 1.9        |

File Name : NC12@AlbacoreStreet  
Site Code :  
Start Date : 9/1/2021  
Page No : 2

# VHB Engineering NC, P.C.

## Venture I

940 Main Campus Drive, Suite 500

Raleigh, NC 27606

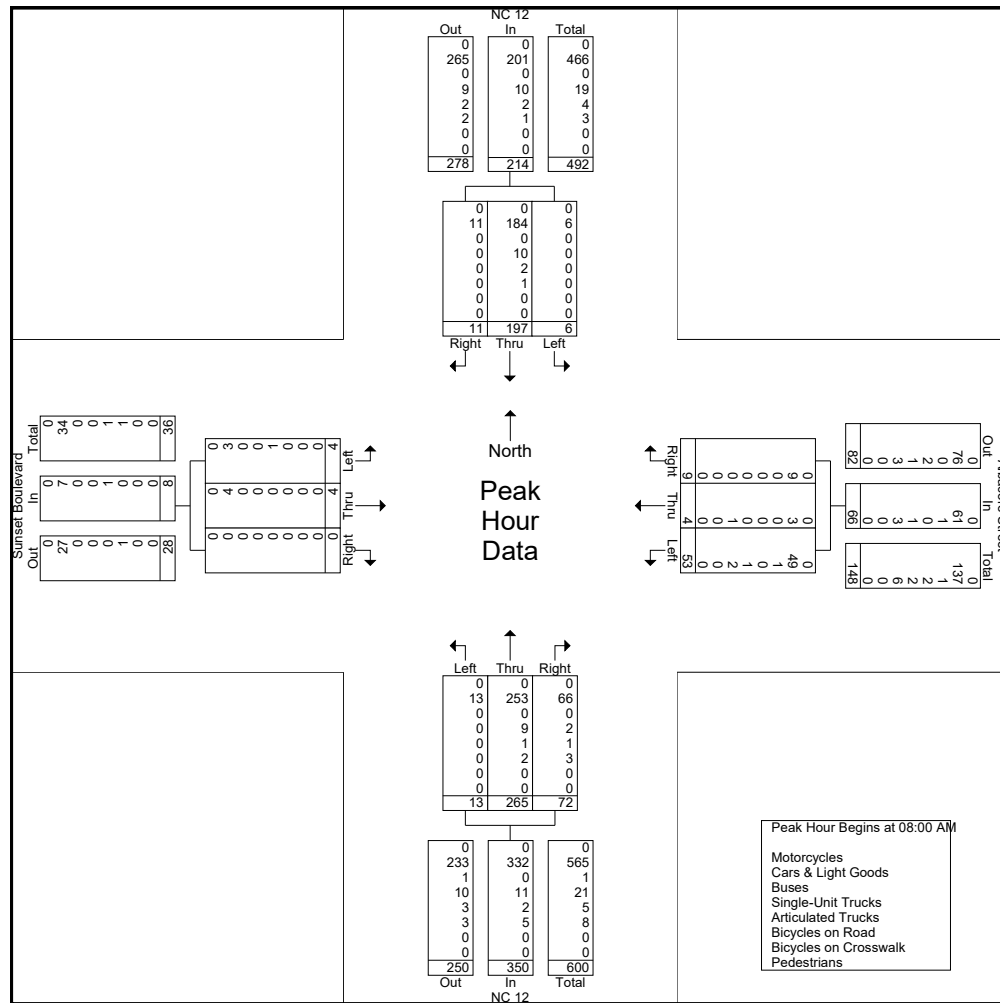
*p: 919.829.0328 f: 919.833.0034*

File Name : NC12@AlbacoreStreet

Site Code :

Start Date : 9/1/2021

Page No : 3



# VHB Engineering NC, P.C.

Venture I

940 Main Campus Drive, Suite 500

Raleigh, NC 27606

p: 919.829.0328 f: 919.833.0034

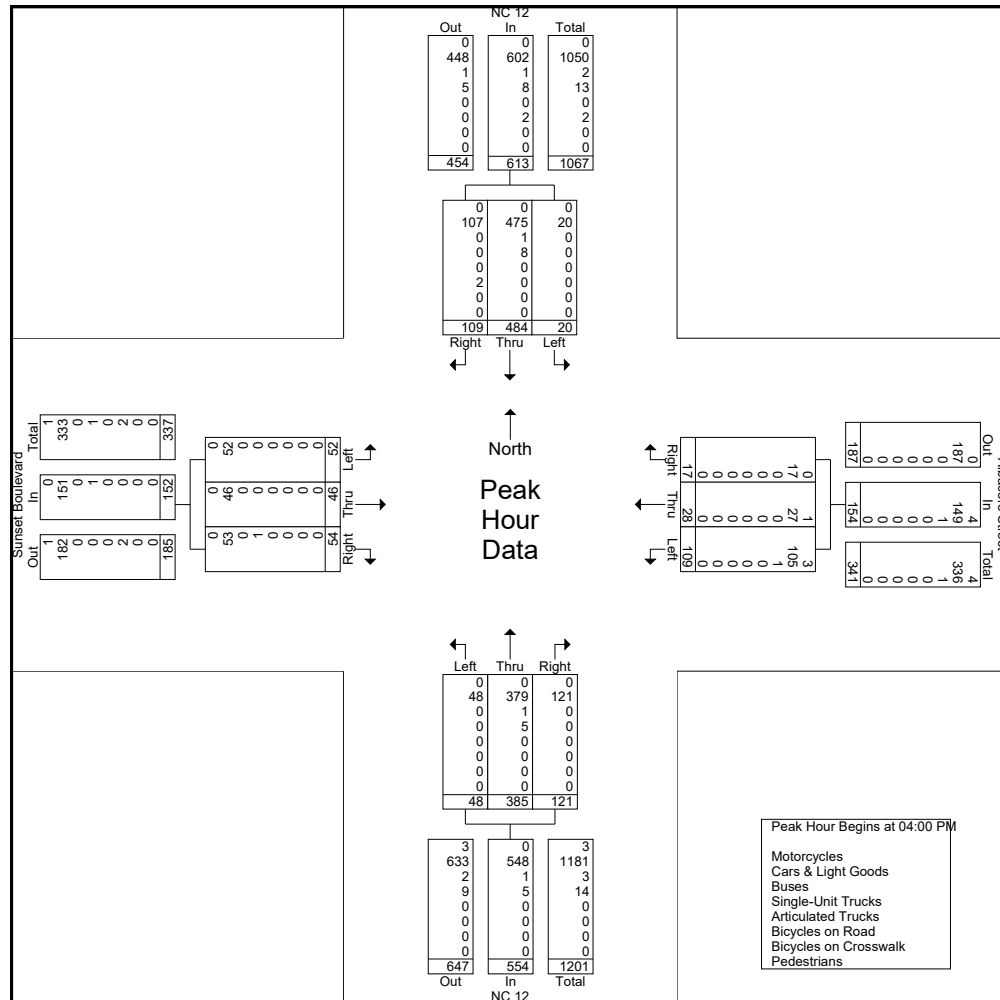
File Name : NC12@AlbacoreStreet

Site Code :

Start Date : 9/1/2021

Page No : 4

|                                                            | NC 12 Southbound |      |       |            | Albacore Street Westbound |      |       |            | NC 12 Northbound |      |       |            | Sunset Boulevard Eastbound |      |       |            |            |
|------------------------------------------------------------|------------------|------|-------|------------|---------------------------|------|-------|------------|------------------|------|-------|------------|----------------------------|------|-------|------------|------------|
| Start Time                                                 | Left             | Thru | Right | App. Total | Left                      | Thru | Right | App. Total | Left             | Thru | Right | App. Total | Left                       | Thru | Right | App. Total | Int. Total |
| Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1 |                  |      |       |            |                           |      |       |            |                  |      |       |            |                            |      |       |            |            |
| Peak Hour for Entire Intersection Begins at 04:00 PM       |                  |      |       |            |                           |      |       |            |                  |      |       |            |                            |      |       |            |            |
| 04:00 PM                                                   | 3                | 101  | 29    | 133        | 20                        | 9    | 5     | 34         | 10               | 100  | 26    | 136        | 15                         | 14   | 15    | 44         | 347        |
| 04:15 PM                                                   | 6                | 139  | 25    | 170        | 23                        | 8    | 4     | 35         | 5                | 86   | 29    | 120        | 9                          | 9    | 19    | 37         | 362        |
| 04:30 PM                                                   | 7                | 130  | 30    | 167        | 36                        | 4    | 2     | 42         | 20               | 106  | 34    | 160        | 11                         | 7    | 7     | 25         | 394        |
| 04:45 PM                                                   | 4                | 114  | 25    | 143        | 30                        | 7    | 6     | 43         | 13               | 93   | 32    | 138        | 17                         | 16   | 13    | 46         | 370        |
| Total Volume                                               | 20               | 484  | 109   | 613        | 109                       | 28   | 17    | 154        | 48               | 385  | 121   | 554        | 52                         | 46   | 54    | 152        | 1473       |
| % App. Total                                               | 3.3              | 79   | 17.8  |            | 70.8                      | 18.2 | 11    |            | 8.7              | 69.5 | 21.8  |            | 34.2                       | 30.3 | 35.5  |            |            |
| PHF                                                        | .714             | .871 | .908  | .901       | .757                      | .778 | .708  | .895       | .600             | .908 | .890  | .866       | .765                       | .719 | .711  | .826       | .935       |
| Motorcycles                                                | 0                | 0    | 0     | 0          | 3                         | 1    | 0     | 4          | 0                | 0    | 0     | 0          | 0                          | 0    | 0     | 0          | 4          |
| % Motorcycles                                              | 0                | 0    | 0     | 0          | 2.8                       | 3.6  | 0     | 2.6        | 0                | 0    | 0     | 0          | 0                          | 0    | 0     | 0          | 0.3        |
| Cars & Light Goods                                         | 20               | 475  | 107   | 602        | 105                       | 27   | 17    | 149        | 48               | 379  | 121   | 548        | 52                         | 46   | 53    | 151        | 1450       |
| % Cars & Light Goods                                       | 100              | 98.1 | 98.2  | 98.2       | 96.3                      | 96.4 | 100   | 96.8       | 100              | 98.4 | 100   | 98.9       | 100                        | 100  | 98.1  | 99.3       | 98.4       |
| Buses                                                      | 0                | 1    | 0     | 1          | 1                         | 0    | 0     | 1          | 0                | 1    | 0     | 1          | 0                          | 0    | 0     | 0          | 3          |
| % Buses                                                    | 0                | 0.2  | 0     | 0.2        | 0.9                       | 0    | 0     | 0.6        | 0                | 0.3  | 0     | 0.2        | 0                          | 0    | 0     | 0          | 0.2        |
| Single-Unit Trucks                                         | 0                | 8    | 0     | 8          | 0                         | 0    | 0     | 0          | 0                | 5    | 0     | 5          | 0                          | 0    | 1     | 1          | 14         |
| % Single-Unit Trucks                                       | 0                | 1.7  | 0     | 1.3        | 0                         | 0    | 0     | 0          | 0                | 1.3  | 0     | 0.9        | 0                          | 0    | 1.9   | 0.7        | 1.0        |
| Articulated Trucks                                         | 0                | 0    | 0     | 0          | 0                         | 0    | 0     | 0          | 0                | 0    | 0     | 0          | 0                          | 0    | 0     | 0          | 0          |
| % Articulated Trucks                                       | 0                | 0    | 0     | 0          | 0                         | 0    | 0     | 0          | 0                | 0    | 0     | 0          | 0                          | 0    | 0     | 0          | 0          |
| Bicycles on Road                                           | 0                | 0    | 2     | 2          | 0                         | 0    | 0     | 0          | 0                | 0    | 0     | 0          | 0                          | 0    | 0     | 0          | 2          |
| % Bicycles on Road                                         | 0                | 0    | 1.8   | 0.3        | 0                         | 0    | 0     | 0          | 0                | 0    | 0     | 0          | 0                          | 0    | 0     | 0          | 0.1        |
| Bicycles on Crosswalk                                      | 0                | 0    | 0     | 0          | 0                         | 0    | 0     | 0          | 0                | 0    | 0     | 0          | 0                          | 0    | 0     | 0          | 0          |
| % Bicycles on Crosswalk                                    | 0                | 0    | 0     | 0          | 0                         | 0    | 0     | 0          | 0                | 0    | 0     | 0          | 0                          | 0    | 0     | 0          | 0          |
| Pedestrians                                                | 0                | 0    | 0     | 0          | 0                         | 0    | 0     | 0          | 0                | 0    | 0     | 0          | 0                          | 0    | 0     | 0          | 0          |
| % Pedestrians                                              | 0                | 0    | 0     | 0          | 0                         | 0    | 0     | 0          | 0                | 0    | 0     | 0          | 0                          | 0    | 0     | 0          | 0          |





# VHB Engineering NC, P.C.

Venture I

940 Main Campus Drive, Suite 500

Raleigh, NC 27606

p: 919.829.0328 f: 919.833.0034

File Name : NC12@DolphinStreet\_MonterayDrive

Site Code :

Start Date : 9/1/2021

Page No : 1

Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

|                         | NC 12<br>Southbound |      |       |      | Dolphin Street<br>Westbound |      |       |      | NC 12<br>Northbound |      |       |      | Monteray Drive<br>Eastbound |      |       |      | Exclu. Total | Inclu. Total | Int. Total |
|-------------------------|---------------------|------|-------|------|-----------------------------|------|-------|------|---------------------|------|-------|------|-----------------------------|------|-------|------|--------------|--------------|------------|
| Start Time              | Left                | Thru | Right | Peds | Left                        | Thru | Right | Peds | Left                | Thru | Right | Peds | Left                        | Thru | Right | Peds |              |              |            |
| 07:00 AM                | 0                   | 26   | 0     | 3    | 5                           | 0    | 0     | 0    | 1                   | 33   | 2     | 0    | 0                           | 0    | 4     | 0    | 3            | 71           | 74         |
| 07:15 AM                | 1                   | 38   | 0     | 0    | 7                           | 0    | 3     | 0    | 3                   | 38   | 5     | 0    | 0                           | 1    | 5     | 0    | 0            | 101          | 101        |
| 07:30 AM                | 0                   | 47   | 1     | 0    | 5                           | 0    | 1     | 0    | 0                   | 58   | 4     | 0    | 1                           | 1    | 1     | 0    | 0            | 119          | 119        |
| 07:45 AM                | 1                   | 45   | 0     | 0    | 3                           | 0    | 1     | 0    | 2                   | 65   | 1     | 0    | 0                           | 0    | 2     | 1    | 1            | 120          | 121        |
| Total                   | 2                   | 156  | 1     | 3    | 20                          | 0    | 5     | 0    | 6                   | 194  | 12    | 0    | 1                           | 2    | 12    | 1    | 4            | 411          | 415        |
| 08:00 AM                | 0                   | 33   | 0     | 4    | 12                          | 0    | 2     | 1    | 4                   | 50   | 3     | 1    | 0                           | 0    | 3     | 1    | 7            | 107          | 114        |
| 08:15 AM                | 0                   | 53   | 1     | 2    | 11                          | 0    | 2     | 2    | 4                   | 67   | 9     | 1    | 1                           | 0    | 3     | 2    | 7            | 151          | 158        |
| 08:30 AM                | 0                   | 53   | 1     | 4    | 2                           | 0    | 3     | 1    | 6                   | 73   | 6     | 0    | 1                           | 1    | 10    | 3    | 8            | 156          | 164        |
| 08:45 AM                | 3                   | 70   | 1     | 0    | 11                          | 0    | 1     | 0    | 5                   | 68   | 9     | 1    | 2                           | 0    | 8     | 0    | 1            | 178          | 179        |
| Total                   | 3                   | 209  | 3     | 10   | 36                          | 0    | 8     | 4    | 19                  | 258  | 27    | 3    | 4                           | 1    | 24    | 6    | 23           | 592          | 615        |
| *** BREAK ***           |                     |      |       |      |                             |      |       |      |                     |      |       |      |                             |      |       |      |              |              |            |
| 04:00 PM                | 0                   | 136  | 3     | 0    | 7                           | 5    | 0     | 0    | 5                   | 105  | 12    | 0    | 4                           | 2    | 11    | 0    | 0            | 290          | 290        |
| 04:15 PM                | 6                   | 181  | 2     | 0    | 12                          | 0    | 2     | 0    | 2                   | 94   | 6     | 0    | 1                           | 5    | 8     | 1    | 1            | 319          | 320        |
| 04:30 PM                | 7                   | 126  | 1     | 1    | 14                          | 0    | 2     | 0    | 4                   | 114  | 11    | 0    | 1                           | 0    | 11    | 1    | 2            | 291          | 293        |
| 04:45 PM                | 4                   | 115  | 5     | 4    | 18                          | 2    | 2     | 0    | 5                   | 88   | 12    | 0    | 1                           | 1    | 8     | 0    | 4            | 261          | 265        |
| Total                   | 17                  | 558  | 11    | 5    | 51                          | 7    | 6     | 0    | 16                  | 401  | 41    | 0    | 7                           | 8    | 38    | 2    | 7            | 1161         | 1168       |
| 05:00 PM                | 0                   | 120  | 7     | 0    | 9                           | 0    | 1     | 0    | 11                  | 98   | 12    | 0    | 2                           | 2    | 10    | 0    | 0            | 272          | 272        |
| 05:15 PM                | 0                   | 108  | 0     | 0    | 8                           | 1    | 0     | 0    | 9                   | 89   | 8     | 0    | 0                           | 1    | 8     | 0    | 0            | 232          | 232        |
| 05:30 PM                | 1                   | 97   | 1     | 0    | 20                          | 1    | 1     | 0    | 7                   | 105  | 14    | 0    | 1                           | 0    | 8     | 0    | 0            | 256          | 256        |
| 05:45 PM                | 0                   | 75   | 2     | 5    | 7                           | 5    | 2     | 0    | 7                   | 81   | 13    | 0    | 4                           | 3    | 8     | 1    | 6            | 207          | 213        |
| Total                   | 1                   | 400  | 10    | 5    | 44                          | 7    | 4     | 0    | 34                  | 373  | 47    | 0    | 7                           | 6    | 34    | 1    | 6            | 967          | 973        |
| Grand Total             | 23                  | 1323 | 25    | 23   | 151                         | 14   | 23    | 4    | 75                  | 1226 | 127   | 3    | 19                          | 17   | 108   | 10   | 40           | 3131         | 3171       |
| Apprch %                | 1.7                 | 96.5 | 1.8   |      | 80.3                        | 7.4  | 12.2  |      | 5.3                 | 85.9 | 8.9   |      | 13.2                        | 11.8 | 75    |      |              |              |            |
| Total %                 | 0.7                 | 42.3 | 0.8   |      | 4.8                         | 0.4  | 0.7   |      | 2.4                 | 39.2 | 4.1   |      | 0.6                         | 0.5  | 3.4   |      | 1.3          | 98.7         |            |
| Motorcycles             | 0                   | 1    | 0     |      | 0                           | 0    | 0     |      | 0                   | 1    | 2     |      | 0                           | 0    | 0     |      | 0            | 0            | 4          |
| % Motorcycles           | 0                   | 0.1  | 0     | 0    | 0                           | 0    | 0     | 0    | 0                   | 0.1  | 1.6   | 0    | 0                           | 0    | 0     | 0    | 0            | 0            | 0.1        |
| Cars & Light Goods      | 22                  | 1297 | 25    |      | 145                         | 13   | 20    |      | 73                  | 1192 | 122   |      | 19                          | 16   | 106   |      | 0            | 0            | 3050       |
| % Cars & Light Goods    | 95.7                | 98   | 100   | 0    | 96                          | 92.9 | 87    | 0    | 97.3                | 97.2 | 96.1  | 0    | 100                         | 94.1 | 98.1  | 0    | 0            | 0            | 96.2       |
| Buses                   | 0                   | 2    | 0     |      | 0                           | 0    | 0     |      | 0                   | 1    | 0     |      | 0                           | 0    | 0     |      | 0            | 0            | 3          |
| % Buses                 | 0                   | 0.2  | 0     | 0    | 0                           | 0    | 0     | 0    | 0                   | 0.1  | 0     | 0    | 0                           | 0    | 0     | 0    | 0            | 0            | 0.1        |
| Single-Unit Trucks      | 1                   | 16   | 0     |      | 5                           | 0    | 3     |      | 1                   | 22   | 2     |      | 0                           | 0    | 2     |      | 0            | 0            | 52         |
| % Single-Unit Trucks    | 4.3                 | 1.2  | 0     | 0    | 3.3                         | 0    | 13    | 0    | 1.3                 | 1.8  | 1.6   | 0    | 0                           | 0    | 1.9   | 0    | 0            | 0            | 1.6        |
| Articulated Trucks      | 0                   | 1    | 0     |      | 0                           | 0    | 0     |      | 1                   | 2    | 0     |      | 0                           | 0    | 0     |      | 0            | 0            | 4          |
| % Articulated Trucks    | 0                   | 0.1  | 0     | 0    | 0                           | 0    | 0     | 0    | 1.3                 | 0.2  | 0     | 0    | 0                           | 0    | 0     | 0    | 0            | 0            | 0.1        |
| Bicycles on Road        | 0                   | 6    | 0     |      | 1                           | 1    | 0     |      | 0                   | 8    | 1     |      | 0                           | 1    | 0     |      | 0            | 0            | 18         |
| % Bicycles on Road      | 0                   | 0.5  | 0     | 0    | 0.7                         | 7.1  | 0     | 0    | 0                   | 0.7  | 0.8   | 0    | 0                           | 5.9  | 0     | 0    | 0            | 0            | 0.6        |
| Bicycles on Crosswalk   |                     |      |       |      |                             |      |       |      |                     |      |       |      |                             |      |       |      |              |              |            |
| % Bicycles on Crosswalk | 0                   | 0    | 0     | 39.1 | 0                           | 0    | 0     | 0    | 0                   | 0    | 0     | 0    | 0                           | 0    | 0     | 10   | 0            | 0            | 0.3        |
| Pedestrians             | 0                   | 0    | 0     |      | 0                           | 0    | 0     |      | 0                   | 0    | 0     |      | 0                           | 0    | 0     |      | 0            | 0            | 30         |
| % Pedestrians           | 0                   | 0    | 0     | 60.9 | 0                           | 0    | 0     | 100  | 0                   | 0    | 0     | 100  | 0                           | 0    | 0     | 90   | 0            | 0            | 0.9        |

# VHB Engineering NC, P.C.

## Venture I

940 Main Campus Drive, Suite 500

Raleigh, NC 27606

*p: 919.829.0328 f: 919.833.0034*

File Name : NC12@DolphinStreet\_MonterayDrive

Site Code :

Start Date : 9/1/2021

Page No : 2

[illegible]

# VHB Engineering NC, P.C.

## Venture I

940 Main Campus Drive, Suite 500

Raleigh, NC 27606

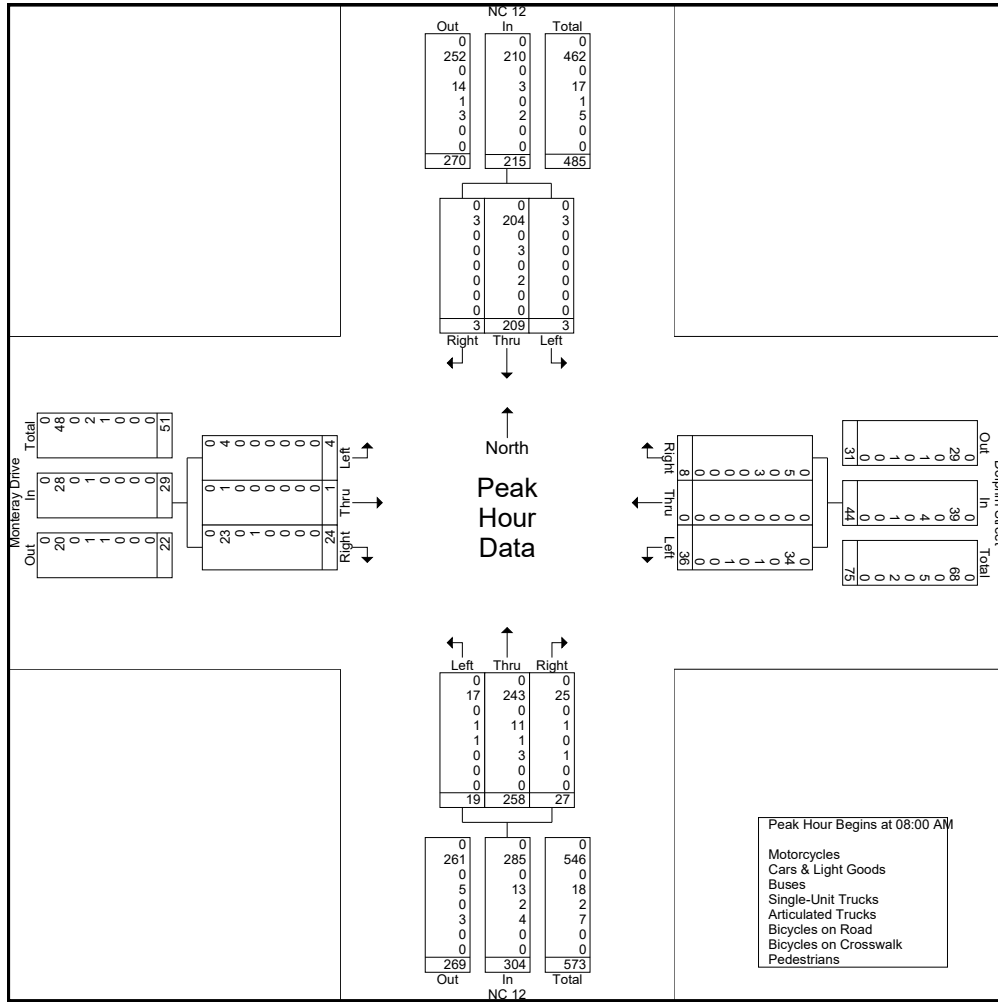
*p*: 919.829.0328 *f*: 919.833.0034

File Name : NC12@DolphinStreet\_MonterayDrive

Site Code :

Start Date : 9/1/2021

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File Name : NC12@DolphinStreet\_MonterayDrive  
Site Code :  
Start Date : 9/1/2021  
Page No : 4

Monterey Drive

NC 12

North

Peak Hour Data

Peak Hour Begins at 04:00 PM

- Motorcycles
- Cars & Light Goods
- Buses
- Single-Unit Trucks
- Articulated Trucks
- Bicycles on Road
- Bicycles on Crosswalk
- Pedestrians

**Top-Left Quadrant Data:**

| Out | In  | Total |
|-----|-----|-------|
| 0   | 0   | 0     |
| 412 | 581 | 993   |
| 0   | 0   | 0     |
| 2   | 5   | 7     |
| 0   | 0   | 0     |
| 0   | 0   | 0     |
| 0   | 0   | 0     |
| 0   | 0   | 0     |
| 414 | 586 | 1000  |

**Top-Right Quadrant Data:**

| Out | In | Total |
|-----|----|-------|
| 0   | 0  | 0     |
| 6   | 6  | 12    |
| 0   | 0  | 0     |
| 0   | 0  | 0     |
| 0   | 0  | 0     |
| 0   | 0  | 0     |
| 0   | 0  | 0     |
| 0   | 0  | 0     |
| 6   | 6  | 12    |

**Bottom-Left Quadrant Data:**

| Out | In | Total |
|-----|----|-------|
| 0   | 0  | 0     |
| 34  | 52 | 86    |
| 0   | 0  | 0     |
| 0   | 1  | 1     |
| 0   | 0  | 0     |
| 0   | 0  | 0     |
| 0   | 0  | 0     |
| 0   | 0  | 0     |
| 0   | 0  | 0     |
| 34  | 53 | 87    |

**Bottom-Right Quadrant Data:**

| Out | In | Total |
|-----|----|-------|
| 0   | 0  | 0     |
| 62  | 62 | 126   |
| 0   | 0  | 0     |
| 2   | 2  | 4     |
| 0   | 0  | 0     |
| 0   | 0  | 0     |
| 0   | 0  | 0     |
| 0   | 0  | 0     |
| 0   | 0  | 0     |
| 64  | 64 | 130   |

# VHB Engineering NC, P.C.

Venture I

940 Main Campus Drive, Suite 500

Raleigh, NC 27606

p: 919.829.0328 f: 919.833.0034

File Name : NC12@MaliaDrive

Site Code :

Start Date : 9/1/2021

Page No : 1

Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

|                         | NC 12<br>Southbound |      |       |      | Monterey Plaza<br>Westbound |      |       |      | NC 12<br>Northbound |      |       |      | Malia Drive<br>Eastbound |      |       |      | Exclu. Total | Inclu. Total | Int. Total |
|-------------------------|---------------------|------|-------|------|-----------------------------|------|-------|------|---------------------|------|-------|------|--------------------------|------|-------|------|--------------|--------------|------------|
| Start Time              | Left                | Thru | Right | Peds | Left                        | Thru | Right | Peds | Left                | Thru | Right | Peds | Left                     | Thru | Right | Peds |              |              |            |
| 07:00 AM                | 2                   | 27   | 0     | 0    | 6                           | 1    | 8     | 0    | 0                   | 26   | 2     | 0    | 0                        | 0    | 0     | 0    | 0            | 72           | 72         |
| 07:15 AM                | 1                   | 45   | 0     | 0    | 5                           | 0    | 4     | 0    | 0                   | 40   | 8     | 0    | 0                        | 0    | 0     | 0    | 0            | 103          | 103        |
| 07:30 AM                | 4                   | 34   | 0     | 1    | 3                           | 0    | 5     | 0    | 1                   | 57   | 7     | 0    | 1                        | 0    | 1     | 0    | 1            | 113          | 114        |
| 07:45 AM                | 9                   | 35   | 0     | 0    | 8                           | 0    | 11    | 0    | 3                   | 57   | 11    | 0    | 0                        | 0    | 1     | 0    | 0            | 135          | 135        |
| Total                   | 16                  | 141  | 0     | 1    | 22                          | 1    | 28    | 0    | 4                   | 180  | 28    | 0    | 1                        | 0    | 2     | 0    | 1            | 423          | 424        |
| 08:00 AM                | 9                   | 32   | 0     | 4    | 7                           | 0    | 10    | 0    | 0                   | 44   | 14    | 0    | 1                        | 1    | 3     | 1    | 5            | 121          | 126        |
| 08:15 AM                | 10                  | 40   | 0     | 0    | 6                           | 0    | 13    | 1    | 1                   | 63   | 11    | 0    | 0                        | 0    | 0     | 3    | 4            | 144          | 148        |
| 08:30 AM                | 8                   | 48   | 0     | 0    | 4                           | 0    | 19    | 0    | 1                   | 60   | 13    | 1    | 0                        | 0    | 1     | 0    | 1            | 154          | 155        |
| 08:45 AM                | 9                   | 63   | 1     | 0    | 8                           | 0    | 9     | 0    | 5                   | 65   | 9     | 0    | 0                        | 0    | 3     | 0    | 0            | 172          | 172        |
| Total                   | 36                  | 183  | 1     | 4    | 25                          | 0    | 51    | 1    | 7                   | 232  | 47    | 1    | 1                        | 1    | 7     | 4    | 10           | 591          | 601        |
| *** BREAK ***           |                     |      |       |      |                             |      |       |      |                     |      |       |      |                          |      |       |      |              |              |            |
| 04:00 PM                | 10                  | 117  | 1     | 3    | 7                           | 0    | 19    | 0    | 3                   | 97   | 18    | 0    | 2                        | 2    | 6     | 0    | 3            | 282          | 285        |
| 04:15 PM                | 14                  | 152  | 2     | 2    | 8                           | 0    | 14    | 0    | 2                   | 82   | 9     | 0    | 2                        | 8    | 14    | 0    | 2            | 307          | 309        |
| 04:30 PM                | 10                  | 128  | 1     | 0    | 14                          | 2    | 18    | 0    | 6                   | 108  | 11    | 0    | 0                        | 1    | 7     | 0    | 0            | 306          | 306        |
| 04:45 PM                | 6                   | 123  | 1     | 0    | 12                          | 0    | 12    | 0    | 4                   | 88   | 11    | 0    | 1                        | 1    | 3     | 0    | 0            | 262          | 262        |
| Total                   | 40                  | 520  | 5     | 5    | 41                          | 2    | 63    | 0    | 15                  | 375  | 49    | 0    | 5                        | 12   | 30    | 0    | 5            | 1157         | 1162       |
| 05:00 PM                | 6                   | 99   | 2     | 1    | 11                          | 1    | 25    | 0    | 3                   | 80   | 17    | 0    | 2                        | 2    | 5     | 0    | 1            | 253          | 254        |
| 05:15 PM                | 6                   | 106  | 0     | 0    | 5                           | 1    | 12    | 0    | 3                   | 88   | 17    | 0    | 3                        | 5    | 5     | 0    | 0            | 251          | 251        |
| 05:30 PM                | 10                  | 85   | 0     | 0    | 11                          | 0    | 23    | 0    | 4                   | 86   | 5     | 1    | 0                        | 0    | 10    | 0    | 1            | 234          | 235        |
| 05:45 PM                | 8                   | 81   | 0     | 1    | 9                           | 1    | 14    | 0    | 1                   | 76   | 8     | 0    | 1                        | 2    | 2     | 0    | 1            | 203          | 204        |
| Total                   | 30                  | 371  | 2     | 2    | 36                          | 3    | 74    | 0    | 11                  | 330  | 47    | 1    | 6                        | 9    | 22    | 0    | 3            | 941          | 944        |
| Grand Total             | 122                 | 1215 | 8     | 12   | 124                         | 6    | 216   | 1    | 37                  | 1117 | 171   | 2    | 13                       | 22   | 61    | 4    | 19           | 3112         | 3131       |
| Apprch %                | 9.1                 | 90.3 | 0.6   |      | 35.8                        | 1.7  | 62.4  |      | 2.8                 | 84.3 | 12.9  |      | 13.5                     | 22.9 | 63.5  |      |              |              |            |
| Total %                 | 3.9                 | 39   | 0.3   |      | 4                           | 0.2  | 6.9   |      | 1.2                 | 35.9 | 5.5   |      | 0.4                      | 0.7  | 2     |      | 0.6          | 99.4         |            |
| Motorcycles             | 1                   | 0    | 0     |      | 0                           | 0    | 1     |      | 0                   | 1    | 0     |      | 0                        | 0    | 0     |      | 0            | 0            | 3          |
| % Motorcycles           | 0.8                 | 0    | 0     | 0    | 0                           | 0    | 0.5   | 0    | 0                   | 0.1  | 0     | 0    | 0                        | 0    | 0     | 0    | 0            | 0            | 0.1        |
| Cars & Light Goods      | 120                 | 1192 | 8     |      | 123                         | 4    | 209   |      | 35                  | 1077 | 167   |      | 12                       | 20   | 58    |      | 0            | 0            | 3025       |
| % Cars & Light Goods    | 98.4                | 98.1 | 100   | 0    | 99.2                        | 66.7 | 96.8  | 0    | 94.6                | 96.4 | 97.7  | 0    | 92.3                     | 90.9 | 95.1  | 0    | 0            | 0            | 96.6       |
| Buses                   | 0                   | 2    | 0     |      | 0                           | 0    | 0     |      | 0                   | 2    | 0     |      | 0                        | 0    | 0     |      | 0            | 0            | 4          |
| % Buses                 | 0                   | 0.2  | 0     | 0    | 0                           | 0    | 0     | 0    | 0                   | 0.2  | 0     | 0    | 0                        | 0    | 0     | 0    | 0            | 0            | 0.1        |
| Single-Unit Trucks      | 0                   | 14   | 0     |      | 1                           | 0    | 5     |      | 0                   | 26   | 2     |      | 1                        | 0    | 2     |      | 0            | 0            | 51         |
| % Single-Unit Trucks    | 0                   | 1.2  | 0     | 0    | 0.8                         | 0    | 2.3   | 0    | 0                   | 2.3  | 1.2   | 0    | 7.7                      | 0    | 3.3   | 0    | 0            | 0            | 1.6        |
| Articulated Trucks      | 0                   | 2    | 0     |      | 0                           | 0    | 0     |      | 0                   | 3    | 1     |      | 0                        | 0    | 0     |      | 0            | 0            | 6          |
| % Articulated Trucks    | 0                   | 0.2  | 0     | 0    | 0                           | 0    | 0     | 0    | 0                   | 0.3  | 0.6   | 0    | 0                        | 0    | 0     | 0    | 0            | 0            | 0.2        |
| Bicycles on Road        | 1                   | 5    | 0     |      | 0                           | 2    | 1     |      | 2                   | 8    | 1     |      | 0                        | 2    | 1     |      | 0            | 0            | 23         |
| % Bicycles on Road      | 0.8                 | 0.4  | 0     | 0    | 0                           | 33.3 | 0.5   | 0    | 5.4                 | 0.7  | 0.6   | 0    | 0                        | 9.1  | 1.6   | 0    | 0            | 0            | 0.7        |
| Bicycles on Crosswalk   |                     |      |       |      |                             |      |       |      |                     |      |       |      |                          |      |       |      |              |              |            |
| % Bicycles on Crosswalk | 0                   | 0    | 0     | 0    | 0                           | 0    | 0     | 0    | 0                   | 0    | 0     | 0    | 0                        | 0    | 0     | 0    | 0            | 0            | 0          |
| Pedestrians             | 0                   | 0    | 0     |      | 0                           | 0    | 0     |      | 0                   | 0    | 0     |      | 0                        | 0    | 0     |      | 0            | 0            | 19         |
| % Pedestrians           | 0                   | 0    | 0     | 100  | 0                           | 0    | 0     | 100  | 0                   | 0    | 0     | 100  | 0                        | 0    | 0     | 100  | 0            | 0            | 0.6        |

File Name : NC12@MaliaDrive  
Site Code :  
Start Date : 9/1/2021  
Page No : 2

[illegible]

# VHB Engineering NC, P.C.

## Venture I

940 Main Campus Drive, Suite 500

Raleigh, NC 27606

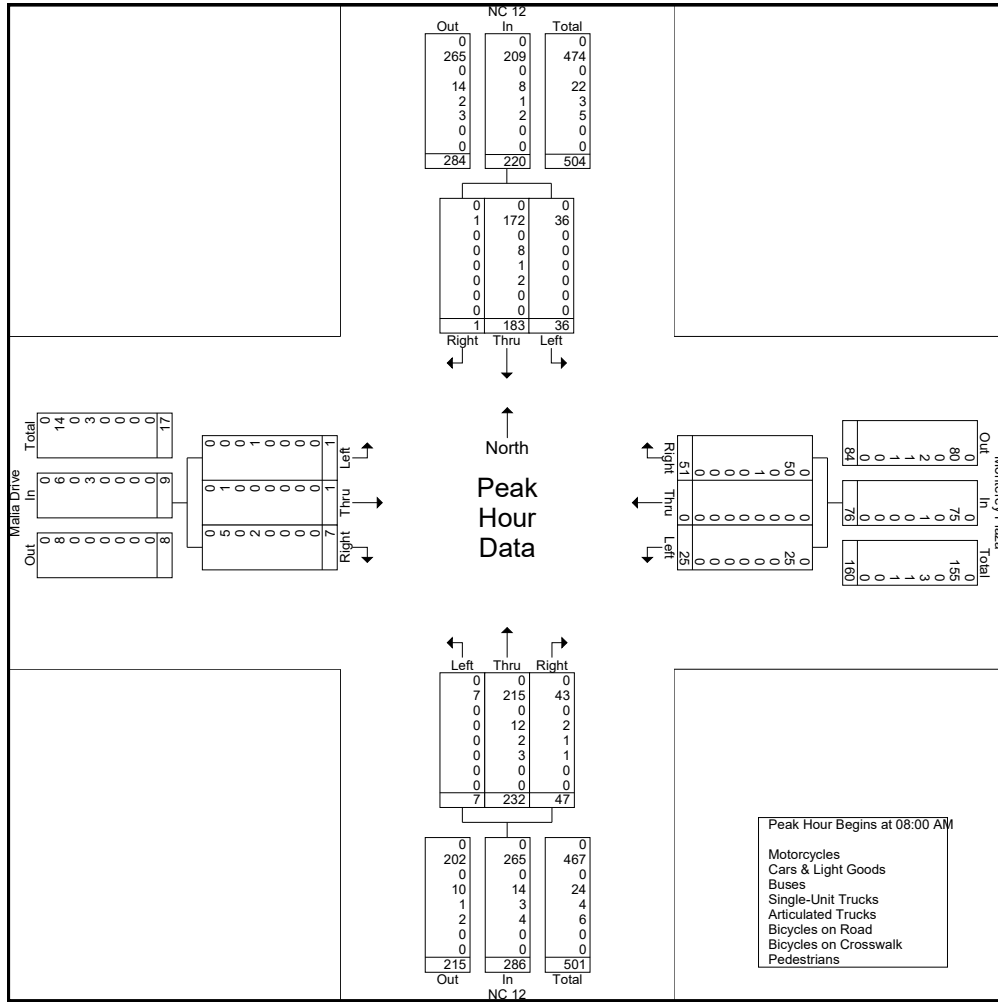
*p*: 919.829.0328 *f*: 919.833.0034

File Name : NC12@MaliaDrive

Site Code :

Start Date : 9/1/2021

Page No : 3



File Name : NC12@MaliaDrive  
Site Code :  
Start Date : 9/1/2021  
Page No : 4

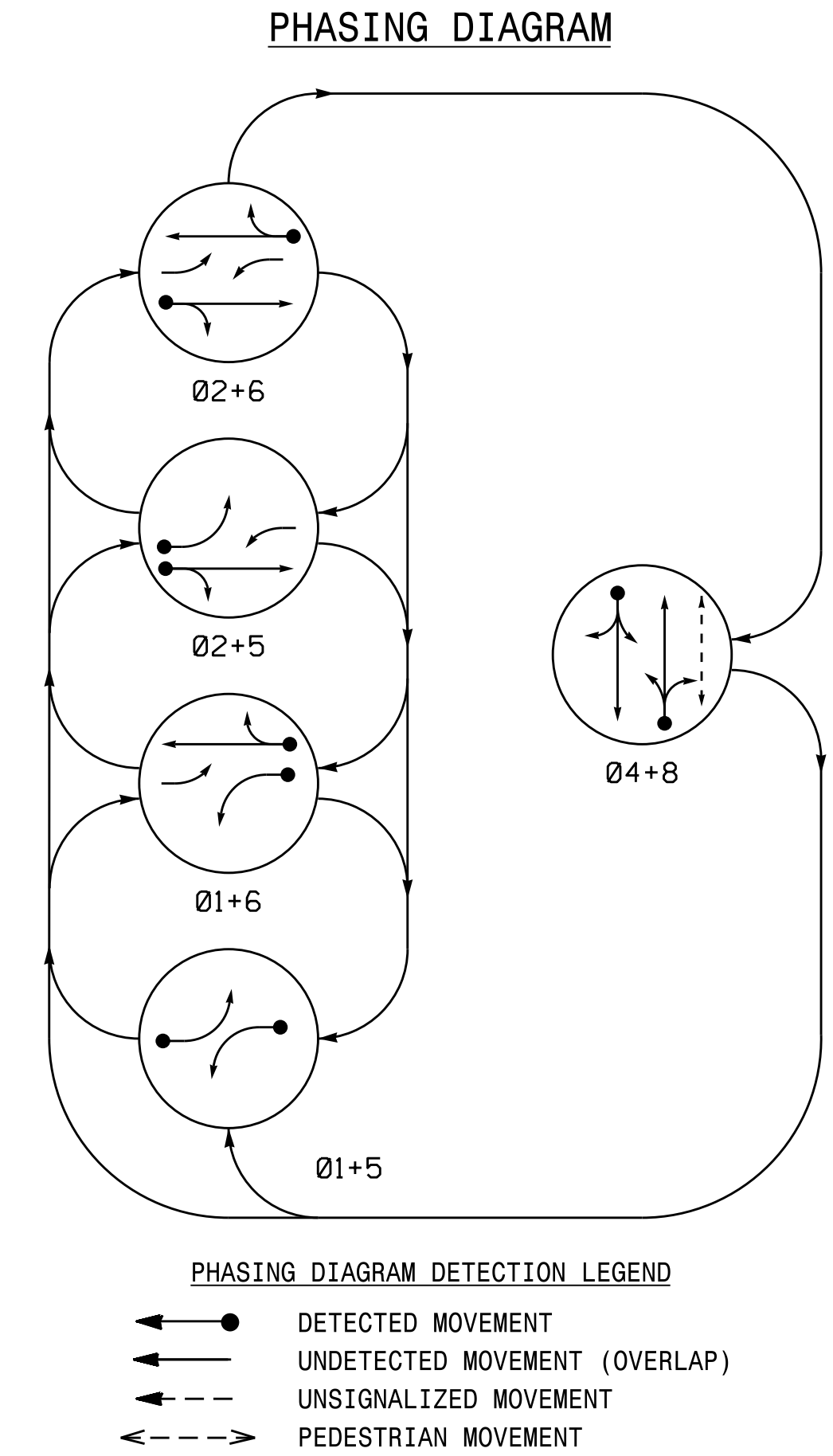
[illegible]





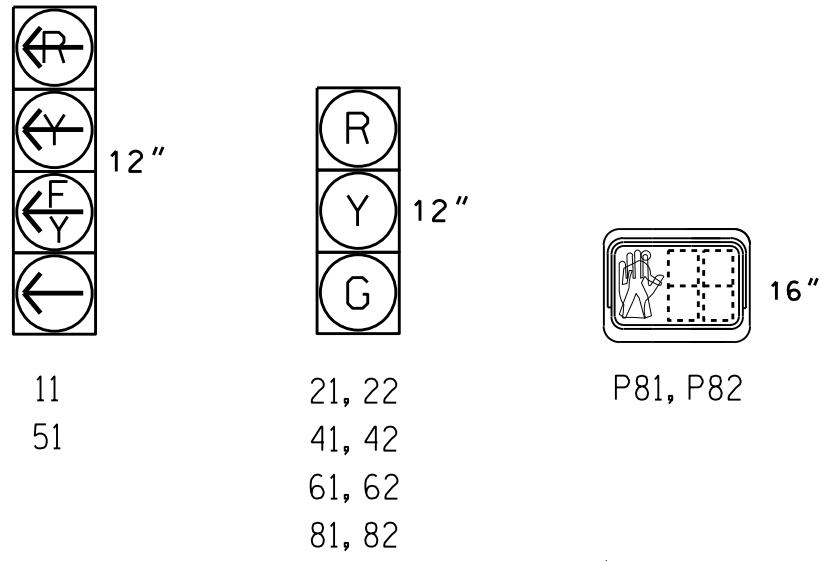
# C

## Traffic Signal Plans



| SIGNAL<br>FACE | PHASE    |          |          |          |          |                  |
|----------------|----------|----------|----------|----------|----------|------------------|
|                | 01<br>+5 | 01<br>+6 | 02<br>+5 | 02<br>+6 | 04<br>+8 | F<br>L<br>T<br>R |
| 11             | ←        | ←        | ←        | ←        | ←        | ←                |
| 21,22          | R        | R        | G        | G        | R        | Y                |
| 41,42          | R        | R        | R        | R        | G        | R                |
| 51             | ←        | ←        | ←        | ←        | ←        | ←                |
| 61,62          | R        | G        | R        | G        | R        | Y                |
| 81,82          | R        | R        | R        | R        | G        | R                |
| P81,P82        | DW       | DW       | DW       | DW       | W        | DRK              |

SIGNAL FACE I.D.  
All Heads L.E.D.

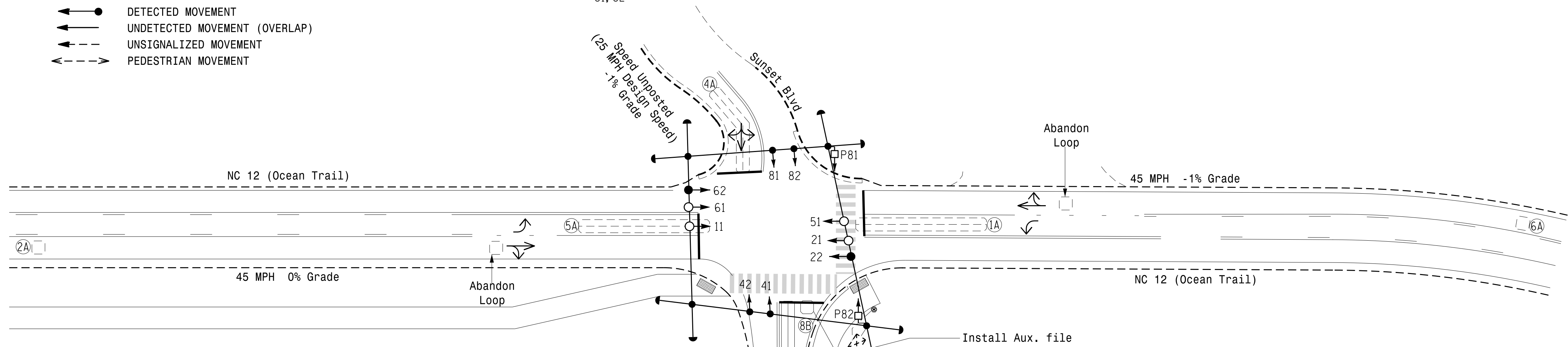


| OASIS 2070 LOOP & DETECTOR INSTALLATION CHART |              |                                     |       |          |       |                      |           |                 |                 |               |                         |
|-----------------------------------------------|--------------|-------------------------------------|-------|----------|-------|----------------------|-----------|-----------------|-----------------|---------------|-------------------------|
| INDUCTIVE LOOPS                               |              |                                     |       |          |       | DETECTOR PROGRAMMING |           |                 |                 |               |                         |
| LOOP                                          | SIZE<br>(FT) | DISTANCE<br>FROM<br>STOPBAR<br>(FT) | TURNS | NEW LOOP | PHASE | CALLING              | EXTENSION | FULL TIME DELAY | STRETCH<br>TIME | DELAY<br>TIME | SYSTEM LOOP<br>NEW CARD |
| 1A                                            | 6X60         | +5                                  | 2-4-2 | -        | 1     | Y                    | Y         | -               | -               | 15            | -                       |
| 2A                                            | 6X6          | 300                                 | 4     | -        | 6     | Y                    | Y         | Y               | -               | 3             | -                       |
| 4A                                            | 6X40         | 0                                   | 2-4-2 | -        | 4     | Y                    | Y         | -               | -               | -             | -                       |
| 5A                                            | 6X60         | +5                                  | 2-4-2 | -        | 5     | Y                    | Y         | -               | -               | 15            | -                       |
| 6A                                            | 6X6          | 300                                 | 4     | -        | 2     | Y                    | Y         | Y               | -               | 3             | -                       |
| 8A                                            | 6X40         | 0                                   | 2-4-2 | Y        | 8     | Y                    | Y         | -               | -               | 10            | -                       |
| 8B                                            | 6X6          | 0                                   | 3     | Y        | 8     | Y                    | Y         | -               | -               | 15            | -                       |

5 Phase  
Fully Actuated  
Isolated

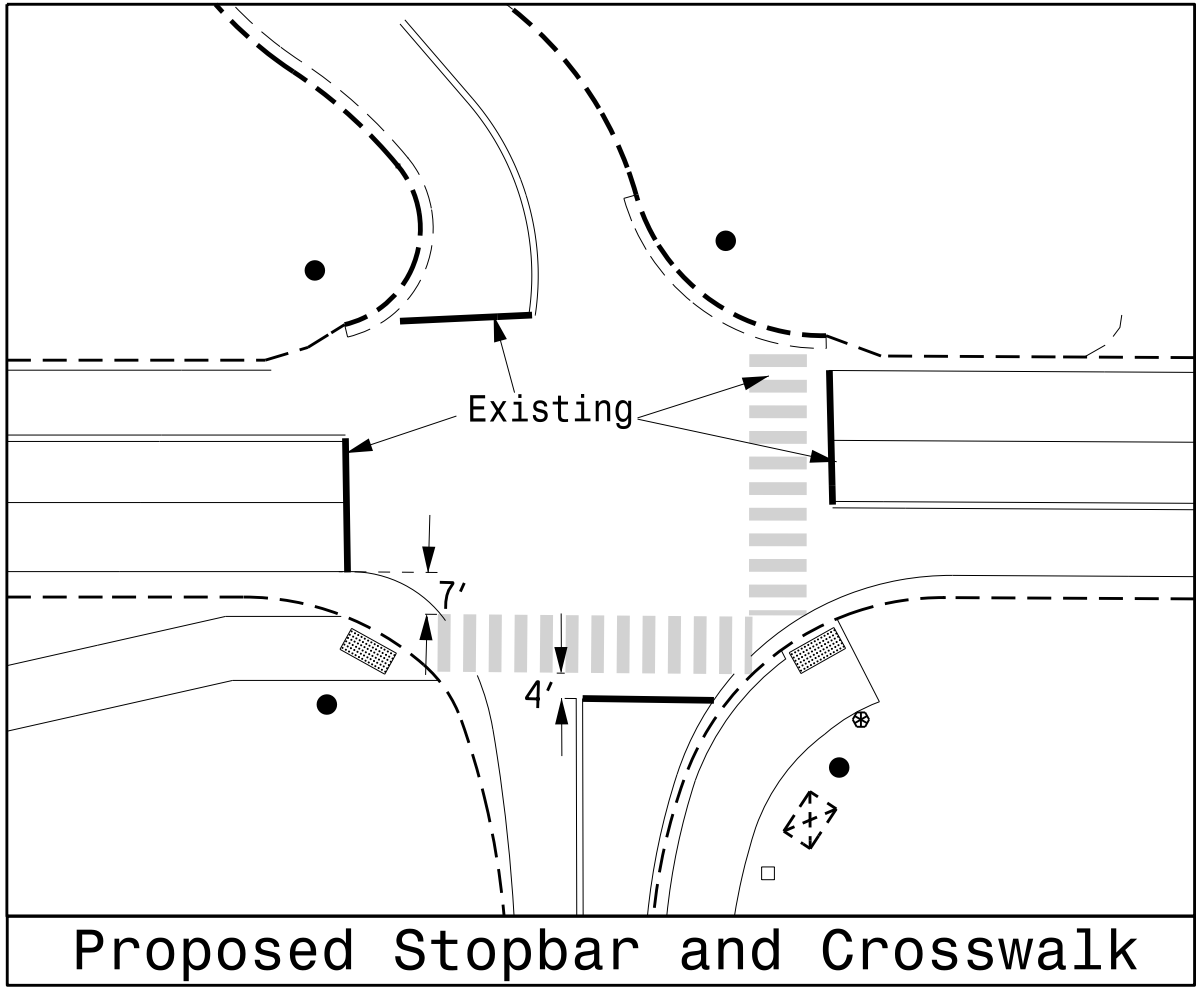
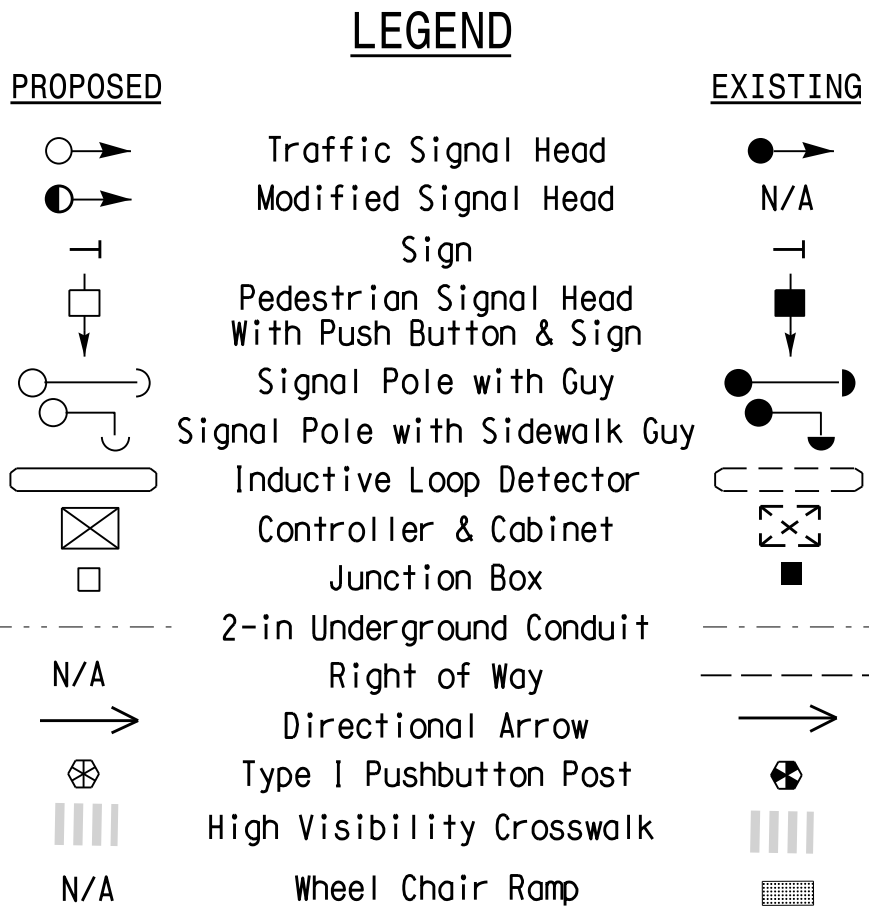
NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Phase 1 and/or phase 5 may be lagged.
- Reposition existing signal heads numbered 22 and 62.
- Set all detector units to presence mode.
- Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
- Program pedestrian heads to countdown the flashing "Don't Walk" time only.
- Phase 4 ped is dummy ped to enable phase 8 leading ped interval.



| OASIS 2070 TIMING CHART |       |            |     |     |            |     |  |
|-------------------------|-------|------------|-----|-----|------------|-----|--|
| FEATURE                 | PHASE |            |     |     |            |     |  |
|                         | 1     | 2          | 4   | 5   | 6          | 8   |  |
| Min Green 1 *           | 7     | 12         | 7   | 12  | 7          | 12  |  |
| Extension 1 *           | 1.0   | 6.0        | 2.0 | 1.0 | 6.0        | 2.0 |  |
| Max Green 1 *           | 15    | 90         | 15  | 15  | 90         | 15  |  |
| Yellow Clearance        | 3.0   | 4.6        | 3.2 | 3.0 | 4.6        | 3.2 |  |
| Red Clearance           | 1.6   | 1.0        | 1.9 | 1.4 | 1.0        | 1.9 |  |
| Walk 1 *                | -     | -          | 7   | -   | -          | 7   |  |
| Don't Walk 1            | -     | -          | 12  | -   | -          | 12  |  |
| Advance Walk            | -     | -          | 7   | -   | -          | 7   |  |
| Seconds Per Actuation * | -     | 2.5        | -   | -   | 2.5        | -   |  |
| Max Variable Initial *  | -     | 34         | -   | -   | 34         | -   |  |
| Time Before Reduction * | -     | 15         | -   | -   | 15         | -   |  |
| Time To Reduce *        | -     | 30         | -   | -   | 30         | -   |  |
| Minimum Gap             | -     | 3.0        | -   | -   | 3.0        | -   |  |
| Recall Mode             | -     | MIN RECALL | -   | -   | MIN RECALL | -   |  |
| Vehicle Call Memory     | -     | YELLOW     | -   | -   | YELLOW     | -   |  |
| Dual Entry              | -     | -          | ON  | -   | -          | ON  |  |
| Simultaneous Gap        | ON    | ON         | ON  | ON  | ON         | ON  |  |

\* These values may be field adjusted. Do not adjust Min Green and Extension times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.



Signal Upgrade

|                                                                  |                                                                     |                                                                |       |      |
|------------------------------------------------------------------|---------------------------------------------------------------------|----------------------------------------------------------------|-------|------|
|                                                                  | NC 12 (Ocean Trail)<br>at<br>SR 1402 (Albacore St)/<br>Sunset Blvd. |                                                                |       |      |
|                                                                  | Division 1 Currituck County                                         |                                                                |       |      |
|                                                                  | PLAN DATE: May 2016                                                 | REVIEWED BY: JPG, PE                                           |       |      |
|                                                                  | PREPARED BY: EM Minshew                                             | REVIEWED BY:                                                   |       |      |
| 750 N. Greenfield Pkwy, Garner, NC 27529                         |                                                                     | REVISIONS                                                      | INIT. | DATE |
| SCALE: 0 30<br>1"=30'                                            |                                                                     |                                                                |       |      |
| DOCUMENT NOT CONSIDERED FINAL<br>UNLESS ALL SIGNATURES COMPLETED |                                                                     | SIGNED: JASON P. GALLAWAY<br>DATE: 6/15/2016<br>SHEET: 01-0634 |       |      |



# D

## Intersection Capacity Analysis



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