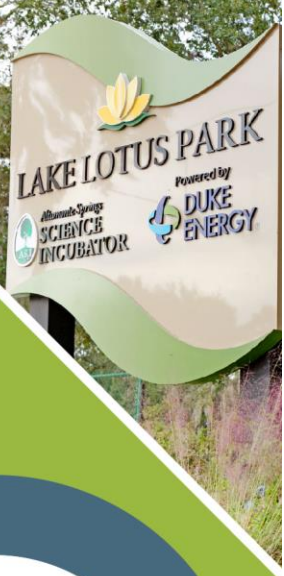

Project Traffic Analysis Report

Draft

State Road 414 Expressway Extension
Project Development and Environment Study
From US 441 to SR 434
Orange County and Seminole County, Florida

Prepared for:
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CFX Project Number: 414-227

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FEBRUARY 2022

CENTRAL FLORIDA EXPRESSWAY AUTHORITY

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Acronyms and Abbreviations

CFX	Central Florida Expressway Authority
EB	Eastbound
FDOT	Florida Department of Transportation
I-4	Interstate 4
LOS	Level of Service
LRTP	Long Range Transportation Plan
LYNX	Central Florida Regional Transportation Authority (dba LYNX)
mph	mile(s) per hour
OBT	Orange Blossom Trail
pcpmpl	Passenger cars per mile per lane
PD&E	Project Development and Environment
ROW	Right-of-way
SR 414	State Road 414
SR 429	State Road 429
SR 434	State Road 434
SR 436	State Road 436
SR 50	State Road 50
TIP	Transportation Improvement Plan
vph	vehicles per hour
US 441	US Highway 441
WB	Westbound

1. Project Overview

1.1 Project Background and Description

The Central Florida Expressway Authority (CFX) is conducting a Project Development and Environment (PD&E) study to evaluate the potential extension of the SR 414 Expressway from its current eastern terminus near US 441, Orange Blossom Trail (OBT), to a new location west of the interchange with SR 434. The project location is shown in **Figure 1-1**. The idea is to provide an expressway connection between the SR 414 Expressway and the recently improved portions of SR 414 that tie into the I-4 Ultimate. This proposed 2.1-mile, limited-access facility will be known as the SR 414 Expressway Extension and will include two toll lanes in each direction and be elevated over the existing SR 414 Maitland Boulevard, a four-lane divided arterial with three signalized intersections.

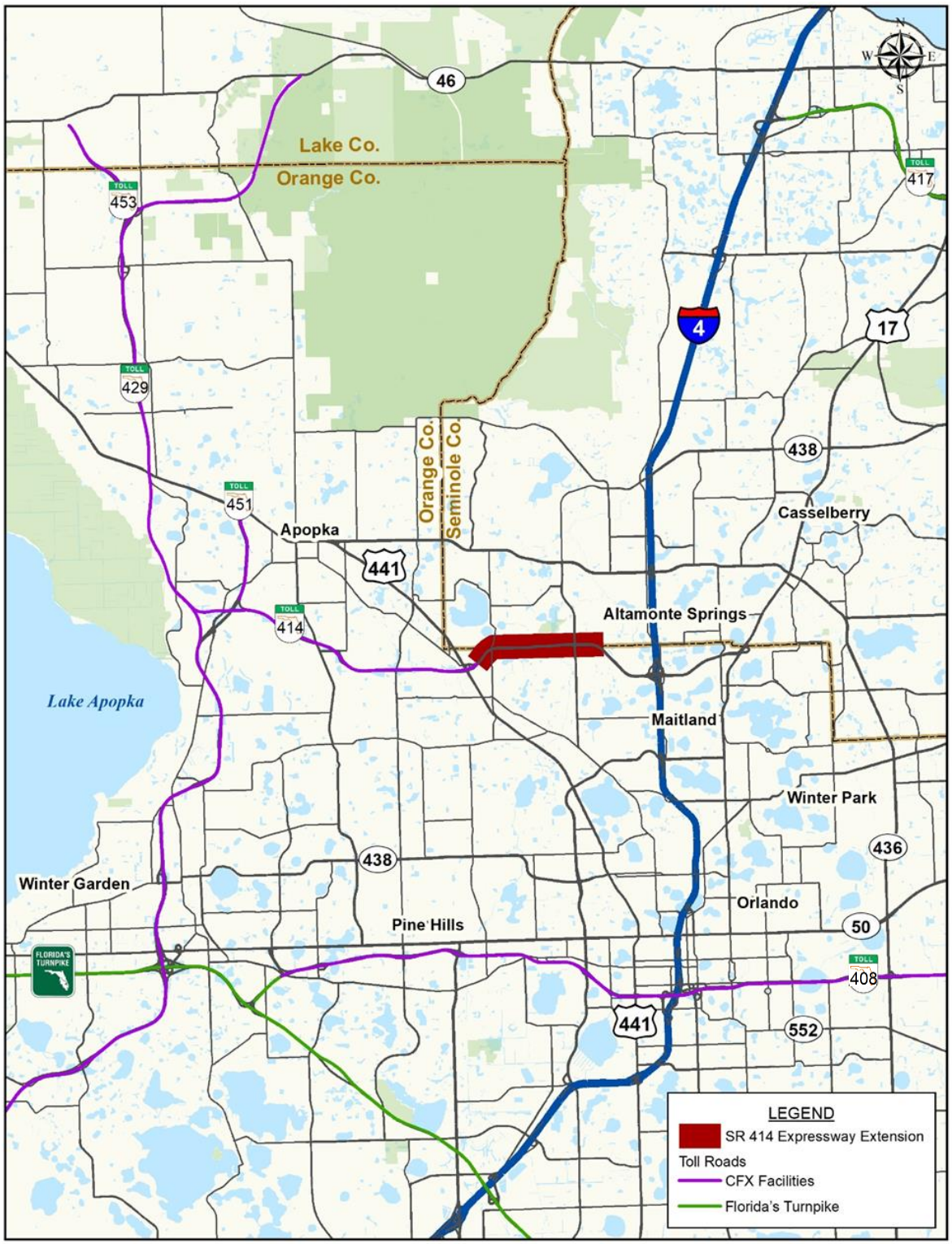
This Project Traffic Analysis Report (PTAR) supports the PD&E study and contains a summary of assumptions and analysis methodology, a summary of existing conditions, specifically a report on the operational analyses of existing conditions (2019), a description of the travel demand model used in the forecast, a summary of alternatives analysis, and future traffic forecasts and operational analyses.

Traffic counts taken since 2015 must be considered in light of construction activities associated with the I-4 Ultimate Project. The Florida Department of Transportation (FDOT) selected I-4 Mobility Partners to design, construct, finance, maintain and operate the I-4 Ultimate Project. This public-private partnership provided a $2.3 billion reconstruction of I-4 through Orlando, the largest construction project in FDOT history. Construction activities began with the groundbreaking ceremony, held in Maitland on February 18, 2015. Construction includes improvements to the I-4 and SR 414/Maitland Boulevard interchange and improvements along SR 414 Maitland Boulevard, ending east of the SR 434 Interchange. As the normal and necessary part of highway construction, the Contractor made use of detours, maintaining traffic operations through the work site, and allowing construction of the roadway improvements in stages. In this instance, except for special time periods, the Contractor maintained two travel lanes in each direction for SR 414 traffic. The type of operation on those lanes varied from a roadway with signalized intersections (at Maitland Summit Boulevard and Keller Road) to a roadway with uninterrupted flow like an expressway. Also, operations changed when the collector-distributor roadways between Maitland Summit Boulevard and Keller Road opened to traffic. Construction along SR 414 and at the I-4 interchange ramps was generally completed in late 2019 to early 2020.

The PD&E project limits and the traffic study area are shown in **Figure 1-2**. Along SR 414, the PD&E project limits begin at the US 441 interchange and end at the SR 434 interchange. The project limits extend north and south along the cross streets, i.e., US 441, Bear Lake Road/Rose Avenue, Eden Park Road, Magnolia Homes Road/Lake Lotus Park Road and Gateway Drive. To perform a thorough analysis of traffic on this corridor, the existing traffic study area extends further along SR 414 to include the Hiawassee Road interchange in the west and the I-4 interchange/Hope Road intersection in the east.

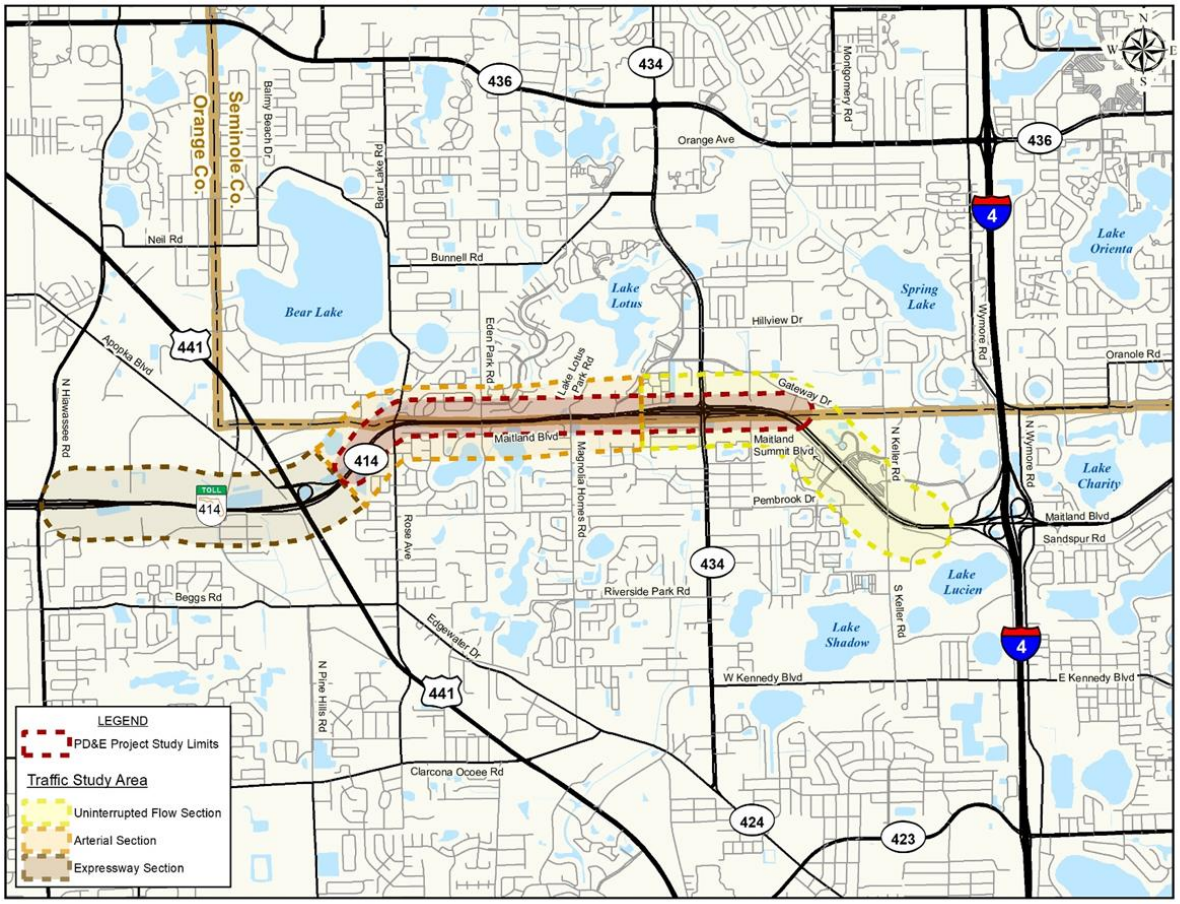
At present, SR 414 operates in three different forms within the study area, highlighted in **Figure 1-2.** In the western portion of the study area, SR 414 operates as the John Land Apopka Expressway, a four-lane, limited-access expressway. The SR 414 Expressway is a tolled facility, part of the CFX System.

Figure 1-1. Project Location



East of the Coral Hills Main Plaza, there are two grade-separated interchanges, one with Hiawassee Road and the other with US 441. The ramps to/from the east in the Hiawassee Road interchange are tolled. The SR 414 Expressway terminates east of the interchange with US 441.

Figure 1-2. Traffic Study Limits/Area of Influence



In the central portion of the study area, SR 414 operates as Maitland Boulevard, a four-lane divided arterial with at-grade intersections. The three signalized intersections on SR 414 Maitland Boulevard include Bear Lake Road/Rose Avenue, Eden Park Road and Magnolia Homes Road/Lake Lotus Park Road. There is also a partial at-grade T-intersection with Gateway Drive, which includes all movements except the left-turn movement from Gateway Drive to eastbound Maitland Boulevard. Traffic movements at this location are controlled with stop signs. At present, there is significant recurring delay around the arterial portion of Maitland Boulevard. The traffic signals impede traffic flow through and into/from the corridor and cause congestion in the eastbound and westbound directions during the morning and evening peak periods, respectively. The congestion is severe and long lasting.

In the eastern portion of the study area, SR 414 operates as a four-lane divided controlled access highway, with closely spaced grade-separated interchanges and short weaving distances between ramp gores. There are full interchanges at SR 434, Maitland Summit Boulevard and Keller Road. In addition, there are parallel frontage roads on both sides of SR 414 between Maitland Summit Boulevard and Keller Road. While the interchange with SR 434 has been in operation since 2002, the other segments were recently

improved as part of the I-4 Ultimate Project. The I-4 interchange with Maitland Boulevard, was also improved to include directionally separated ramps and new ramps to/from the east at Lake Destiny Drive. Even though I-4 was still under construction during the preparation of this report, the ramps are in the final configuration.

The SR 414 Expressway Extension is proposed as an expressway connection "elevated over" the arterial portion of Maitland Boulevard. Subject to the alternative development and testing, the western terminus would be in the midst of the US 441 interchange, and the eastern terminus would be in the midst of the SR 434 interchange. Given the relatively close spacing of interchanges, the location of the eastern end will have a direct effect on the operational characteristics of those segments. Changing the location of the eastern end will also determine the movements served by the new roadway.

CFX is the operator and developer of toll roads in Central Florida. The SR 414 Expressway Extension will be a toll facility with tolls collected electronically as customers pass through a single mainline gantry. Customers will pay with a transponder (E-PASS or one of several interoperable transponders) or through the video billing process, known as Pay By Plate. Since there is only one way to enter and one way to exit the SR414 Expressway Extension, there will be only one new toll location. Recent CFX expansion projects, including the Wekiva Parkway, were planned to open with the standard toll rate of $0.18 per mile in 2016 dollars, with rates escalated at the rate of inflation with a minimum 1.5 percent per year, in accordance with established CFX toll policies. For design traffic purposes, the assumed toll rate will be static and start at $0.18 per mile with 1.5 percent escalation per year. Depending on conclusions from the analysis of typical section alternatives, CFX may decide to operate the SR 414 Expressway Extension as a price-managed facility. Under this type of toll regime, toll rates will be adjusted by time of day to manage traffic volumes so that the facility operates free of congestion. Higher tolls mean lower traffic volumes. Variable toll rates will also influence financial feasibility. It is not anticipated that the existing SR 414 Expressway would be converted to dynamic tolling, but this analysis will be undertaken during the Traffic and Revenue (T&R) study portion of the project.

Once open, the SR 414 Expressway Extension will take traffic away from the arterial segments of Maitland Boulevard, thereby improving traffic operations on the arterial over the No-Build option. In general, the arterial portions of Maitland Boulevard will remain as they exist today. Improvements to the arterial will be considered as part of this study, funded by the state and local government participants in the study. The details will depend on the alternative and be worked out during the study.

1.2 Purpose and Need

The purpose of the SR 414 Expressway Extension is to improve traffic flow through the study corridor eastward connecting to I-4. At present, the existing arterial portion of Maitland Boulevard is severely congested during peak travel times. Located every half-mile, traffic signals impede traffic flow and cause delay, as much as 15 minutes during typical peak time and in the peak directions. Traffic counts from October 2019 indicate that the Average Annual Daily Traffic (AADT) on Maitland Boulevard is approximately 59,000 vehicles per day, west of the intersection with SR 434, exceeding an adopted Level of Service D to E threshold. Future traffic forecasts indicate that the AADT at this location is expected to increase significantly by 2045. The proposed improvements are needed to accommodate existing and future travel demand. The idea behind the proposed project is to "open" this important bottleneck,

providing a much-needed expressway connection between northwestern portions of the Orlando metropolitan area and I-4. The project would improve system connectivity between SR 429 and I-4, meeting existing and future travel needs.

There are good reasons to expect continued growth in traffic volumes passing through this corridor. Using recent forecasts from the Florida Bureau of Economic and Business Research (BEBR), population in Orange County is expected to grow at a annual growth rate of 1.5 percent per year; Seminole County population is expected to grow at 1.4 percent per year and Lake County population at 1.7 percent per year. The growth rates for employment are similar, with Orange County at 1.8 percent, Seminole County at 1.6 percent and Lake County at 1.7 percent. While no large land development projects are anticipated within the study area, there are several, mixed-use land development projects along SR 429, Wekiva Parkway. Traffic from eastern Lake County heading to the employment centers in the Orlando Metropolitan Area is steadily increasing. The Maitland Center, located along SR 414 just west of I-4, is a large office complex of regional significance whose employment base contributes to the existing traffic congestion on SR 414 in the morning peak period (eastbound direction) and afternoon peak period (westbound direction).

Future year traffic with origins/destinations along the corridor will continue to use Maitland Boulevard between US 441 and SR 434. By paying the toll, traffic passing through the corridor will have the option of using either the proposed SR 414 Expressway Extension or the existing Maitland Boulevard. CFX customers who pay the toll receive the benefit of travel time savings. The volume of future year traffic on Maitland Boulevard will be reduced because of the traffic diverted to the SR 414 Expressway Extension. By separating traffic passing through the corridor from traffic with local destinations, the proposed SR 414 Expressway Extension will reduce congestion on both facilities and provide greater mobility. The proposed improvements are to accommodate anticipated transportation demand, improve safety, improve system connectivity/linkage, and support multimodal opportunities.

1.3 Alternatives Considered

Viable alternatives were developed and presented for public input at the Public Information Meeting held on February 10, 2021. These viable alternatives included roadway concepts for the SR 414 Expressway Extension project, including the SR 414 toll lanes and the Maitland Boulevard local access lanes. The viable alternatives were updated after the Public Information Meeting to reflect ongoing alternatives refinements that avoid and minimize environmental impacts.

1.3.1 Viable Alternatives

The evaluation of typical section alternatives is documented in the SR 414 Expressway Extension *Final Typical Section Technical Memorandum* (CFX 2021). Referred to as an assessment of the typical section, the following typical sections for the SR 414 Expressway Extension were considered:

- Typical Section 1 – 2019 Existing – 2 lanes/direction on arterial;
- Typical Section 2 – No-Build - 3 lanes/direction on arterial;
- Typical Section 3 – 1 lane/direction on the elevated Expressway Extension;
- Typical Section 4 – 2 lanes/direction on the elevated Expressway Extension;
- Typical Section 5 – 2-lane reversible on the elevated Expressway Extension, i.e., two lanes in the peak direction and no lanes in the off-peak direction reversed by time of day; and

- Typical Section 6 – Convertible 3-lane section on elevated Expressway Extension, one lane in each direction with the center lane being physically reversed twice a day; and,
- Typical Section 7 – 1 lane/direction on Expressway Extension & 3 lanes/direction on arterial.

The number of lanes provided in the SR 414 Expressway Extension were also the subject of alternative testing. All typical section options require widening within the Right-of-Way (ROW) and, therefore, a variety of elevated expressway alternatives were developed. Initially, two typical section options for the at-grade Maitland Boulevard and four typical section options for the elevated SR 414 Expressway Extension were qualitatively evaluated. The alignment analysis was evaluated based on the maximum viable typical section footprint of 118 feet wide. The alignment is constrained by the ROW and median width needed for pier placement of the proposed elevated structure. To maximize the use of the existing typical section of 118 feet, the proposed alignment for both the at-grade and elevated facilities is along the centerline of the existing ROW. The piers for the elevated SR 414 bridge are proposed within the median of the at-grade Maitland Boulevard facility. Based on the design criteria, the design and posted speed was reduced from 55 miles per hour to 45 mph along the at-grade Maitland Boulevard facility.

Based on the initial analyses, the viable typical section for the at-grade Maitland Boulevard maintains the pavement footprint of the four-lane facility but shifts and restripes the lanes to provide a 7-foot-wide buffered bike lane and proposed Type F curb and gutter in the median. The viable typical section options for the elevated SR 414 Expressway Extension include Typical Section 4 and 6 as detailed in the following text:

- Typical Section 4: Provides four 12-foot-wide express lanes (two per direction) separated by a median barrier wall.
- Typical Section 6: Provides three 12-foot-wide express lanes separated by a movable barrier wall. In morning peak traffic, there are two lanes eastbound and one lane westbound. In afternoon peak traffic, there is one lane eastbound and two lanes westbound. The movable barrier would be shifted approximately 12 feet via specialty vehicle twice daily. This option is both reversible and convertible and requires advance signing, access equipment, specialty barrier and specialty vehicle with onsite or nearby storage.

Typical Section 4 construction costs are higher but are offset by the significant capital and operating costs for Typical Section 6. Additionally, higher capacity is provided by Typical Section 4 and provides safer incident management. Therefore, the recommended option for the elevated SR 414 Expressway Extension is Typical Section 4. The proposed posted and design speed is 50 mph.

2. Assumptions and Methodology

The purpose of this chapter is to provide a summary of the data and methods used to analyze existing and future traffic conditions associated with the project. The modeling tools include a project-specific travel demand model, created to produce reliable forecasts of future traffic volumes under No-Build, Build No-Toll and Build Toll conditions. With forecasts of future traffic volumes in the Corridor, the analysis makes use of Level of Service (LOS) and Volume-to-Capacity (V/C) Ratio Analysis to evaluate existing and future peak-hour conditions on roadway segments, including No-Build and Build conditions. Synchro v10 Analysis is used to assess existing and future peak-hour conditions at intersections. After this brief introduction, more details on the different modeling tools and results are provided in subsequent chapters.

2.1 Area of Influence

The traffic analysis Area of Influence (AOI) included the traffic study limits shown on **Figure 1-2**, as well as the I-4 interchange ramps and Hope Road intersection to the east. The AOI included the following:

- SR 414 from east of Hiawassee Road to east of Hope Road
- Orange Blossom Trail (OBT), U.S. 441 interchange
- Bear Lake Road/Rose Avenue intersection
- Eden Park Road intersection
- Magnolia Homes Road/Lake Lotus Park Road intersection
- Gateway Drive access
- Forest City Road (SR 434) interchange
- Maitland Summit Boulevard interchange
- Keller Road interchange
- Lake Destiny Road intersection
- I-4 interchange ramps
- Hope Road intersection

The traffic analysis will be based on the year 2019 for existing conditions, the year 2025 as the opening year and the year 2045 as the design year. The analysis presented beyond the limits of the CFX's PD&E study east of SR 434 is for informational purposes only and any operational issues identified may not be addressed as a part of this project.

2.2 Data Sources

This analysis of existing and future conditions made use of several types of data, including traffic counts, travel time and delay, travel patterns and roadway characteristics described in the following sections.

2.2.1 Traffic Counts

Traffic volume data for the SR 414 Expressway Extension was obtained in several ways. A project-specific traffic count program was conducted in October 2019. The counts included 72-hour directional counts at 21 locations (expressway and ramp segments), one 72-hour classification count (central location on SR 414), 72-hour bi-directional counts at 20 locations (arterials both SR 414 and cross streets) and 4-hour turning movement counts at nine locations (at-grade intersections). The count locations are shown in **Figure 2-1** and listed in **Table 2-1**, including counts along SR 414 from just west of the Hiawassee Road interchange to the I-4 interchange. The directional counts were taken on all the expressway and ramp segments in the study area. The bi-directional traffic counts were typically taken at the undivided roadway segments, i.e., the arterial portion of SR 414 and roadways connecting to SR 414. The turning movement counts were taken at the intersections and interchanges along SR 414. CFX collects and maintains detailed information on transactions at all toll locations. Transaction data from the Coral Hills Mainline and Hiawassee Road ramp toll plazas was used to generate traffic counts at those locations. These were supplemented with data from the FDOT Florida Traffic Online (FTO) website application and from Orange and Seminole County traffic count programs. The volumes for the I-4 interchange ramps were provided by FDOT District 5 for April 2019. The turning movement volumes for the Hope Road intersection were obtained from the *I-4 Ultimate Hope Road Signal Retiming Report*, provided by FDOT District 5. The traffic count data is provided in **Appendix A**.

Figure 2-1. Traffic Count Locations

Table 2-1. Count Locations

SR 414 Ramp	Location	Count Type	Date Taken
EB On-Ramp	From US 441	72 Hour Directional	10/22 – 10/24/2019
WB Off-Ramp	To US 441	72 Hour Directional	10/22 – 10/24/2019
EB Off-Ramp	To SR 434	72 Hour Directional	10/22 – 10/24/2019
WB On-Ramp	From SR 434	72 Hour Directional	10/22 – 10/24/2019
EB On-Ramp	From SR 434	72 Hour Directional	10/22 – 10/24/2019
WB Off-Ramp	To SR 434	72 Hour Directional	10/22 – 10/24/2019
WB Off-Ramp	To Gateway Drive	72 Hour Directional	10/22 – 10/24/2019
EB On-Ramp	From Maitland Summit Blvd	72 Hour Directional	10/22 – 10/24/2019
WB Off-Ramp	To Maitland Summit Blvd	72 Hour Directional	10/22 – 10/24/2019
EB Off-Ramp	To Maitland Summit Blvd	72 Hour Directional	10/22 – 10/24/2019
WB On-Ramp	From Maitland Summit Blvd	72 Hour Directional	10/22 – 10/24/2019
EB On-Ramp	From Keller Road	72 Hour Directional	10/22 – 10/24/2019
WB Off-Ramp	To Keller Road	72 Hour Directional	10/22 – 10/24/2019
EB Off-Ramp	To Keller Road	72 Hour Directional	10/22 – 10/24/2019
WB On-Ramp	From Keller Road	72 Hour Directional	10/22 – 10/24/2019
I-4 WB On-Ramp	From Lake Destiny Drive	72 Hour Directional	10/22 – 10/24/2019
I-4 WB On-Ramp	From EB SR 414	72 Hour Directional	10/22 – 10/24/2019
I-4 WB Off Ramp	To WB SR 414	72 Hour Directional	10/22 – 10/24/2019
I-4 WB Off-Ramp	To Lake Destiny Drive	72 Hour Directional	10/22 – 10/24/2019
I-4 EB Off-Ramp	To WB SR 414	72 Hour Directional	10/22 – 10/24/2019
I-4 EB On-Ramp	From EB SR 414	72 Hour Directional	10/22 – 10/24/2019

Table 2-1. Count Locations (continued)

Roadway	Location	Count Type	Date Taken
Hiawassee Road	South of SR 414	72 Hour Bi-Directional	10/22 – 10/24/2019
Hiawassee Road	North of SR 414	72 Hour Bi-Directional	10/22 – 10/24/2019
US 441/Orange Blossom Trail	South of SR 414	72 Hour Bi-Directional	10/22 – 10/24/2019
US 441/Orange Blossom Trail	North of SR 414	72 Hour Bi-Directional	10/22 – 10/24/2019
Rose Avenue	South of SR 414	72 Hour Bi-Directional	10/22 – 10/24/2019
Bear Lake Road	North of SR 414	72 Hour Bi-Directional	10/22 – 10/24/2019
Eden Park Road	South of SR 414	72 Hour Bi-Directional	10/22 – 10/24/2019
Eden Park Road	North of SR 414	72 Hour Bi-Directional	10/22 – 10/24/2019
Magnolia Homes Rd	South of SR 414	72 Hour Bi-Directional	10/22 – 10/24/2019
Lake Lotus Park Rd	North of SR 414	72 Hour Bi-Directional	10/22 – 10/24/2019
Gateway Drive	North of SR 414	72 Hour Bi-Directional	10/22 – 10/24/2019
SR 434	South of SR 414	72 Hour Bi-Directional	10/22 – 10/24/2019
SR 434	North of SR 414	72 Hour Bi-Directional	10/22 – 10/24/2019
Maitland Summit Blvd	South of SR 414	72 Hour Bi-Directional	10/22 – 10/24/2019
Maitland Summit Blvd	North of SR 414	72 Hour Bi-Directional	10/22 – 10/24/2019
Keller Road	South of SR 414	72 Hour Bi-Directional	10/22 – 10/24/2019
Keller Road	North of SR 414	72 Hour Bi-Directional	10/22 – 10/24/2019
SR 414	East of SR 434	7-day Classification Count	10/21- 10/25/2019

Table 2-1. Count Locations (continued)

Intersection	Location	Count Type	Date Taken
Hiawassee Road	SR 414	4 Hour Turning Movement	10/22 – 10/24/2019
US 441/Orange Blossom Trail	SR 414 EB Ramps	4 Hour Turning Movement	10/22 – 10/24/2019
US 441/Orange Blossom Trail	SR 414 WB Ramps	4 Hour Turning Movement	10/22 – 10/24/2019
Bear Lake Rd/Rose Ave	SR 414	4 Hour Turning Movement	10/22 – 10/24/2019
Eden Park	SR 414	4 Hour Turning Movement	10/22 – 10/24/2019
Magnolia Homes Rd/Lk Lotus Park	SR 414	4 Hour Turning Movement	10/22 – 10/24/2019
SR 434/Forest City Road	SR 414 Ramps	4 Hour Turning Movement	10/22 – 10/24/2019
Maitland Summit Blvd	SR 414 Ramps	4 Hour Turning Movement	10/22 – 10/24/2019
Keller Road	SR 414 Ramps	4 Hour Turning Movement	10/22 – 10/24/2019

2.2.2 Travel Patterns

Data on travel patterns was derived from INRIX data. This data provided an assessment of the distribution of trip lengths in the corridor, e.g., the proportion of trips traveling between the SR 414 Expressway (western end) and the Maitland Office Park, or the I-4. This information was used to validate the travel demand model.

2.2.3 Roadway Characteristics

Information about the existing roadway geometry was obtained from recent aerial photography. This included the number of lanes on roadway segments and intersection approaches. Traffic signal timing data was obtained from the maintaining agencies. Posted speed limits were obtained from state and local sources. This information was used in the analysis contained in this report.

2.3 Traffic Analysis

The analysis of existing (2019) and future (2025 and 2045) conditions followed the latest edition of the FDOT Traffic Analysis Handbook (May 2021). The following is a summary of the analysis methods, factors and analytic tools that were used.

2.3.1 Traffic Data Development

The data collected in **Section 2.2.1** was used to define existing traffic conditions for the travel model validation and traffic operational analysis. Seasonal adjustment factors were applied accordingly. Traffic volumes for the ramps between Keller Road and I-4 were adjusted using Origin-Destination data from StreetLight. The data was finally balanced/adjusted to ensure continuity of flow.

Development of future design traffic started with an examination of existing data in the project study area to establish historical growth rates. Traffic forecasts for the year 2025 and 2045 under No-build conditions were then developed from the CFX project-specific travel demand model. The future No-build projections were then compared with the 2017 base year validated travel demand model output to establish growth rates for 2025 and 2045. The historical and model growth rates were compared and applied appropriately to the existing conditions traffic profile to develop 2025 and 2045 No-Build AADT and Directional Design Hour Volumes (DDHV).

The CFX project-specific travel demand model was also used as the basis for developing 2025 and 2045 traffic for the Build alternatives. Final AADT and DDHVs for the Build scenarios were estimated by comparing the travel demand model output for the Build to the No-Build. Additional adjustments were made to the No-Build and Build alternatives projections based on traffic factors (K and D) to ensure reasonableness and accuracy. The profiles were finally balanced/adjusted to ensure continuity of flow.

2.3.2 Traffic Factors

This study was based on a standard set of traffic factors developed for the project. The K Factor is defined as the proportion of the AADT that occurs during the design hour. The D Factor is the percentage of traffic moving in the peak travel direction during the peak-hour. It is calculated by dividing the higher directional volume by the total roadway volume for that hour. The T Factor is the percentage of the AADT volume generated by trucks or commercial vehicles. The K, D and T Factors are needed to advance design of highway projects and in the calculation of congestion or performance measurements. The analysis of future conditions made use of K, D and T Factors. The peak-hour factor (PHF) is the hourly volume during the peak-hour of the day divided by four times the peak 15-minute flow rate within that hour. This is a measure of fluctuation in demand within the peak-hour. PHF is used in capacity and level of service analysis to account for the variation in traffic volumes during the peak-hour. A PHF of 0.95 was assumed for future conditions. Existing conditions traffic factor analysis and future year recommendations for the study are presented in **Section 3.3.3**.

2.3.3 Analysis Tools

The study area is comprised of facilities with varying levels of roadway functional classification, including major collectors, major arterials, and principal arterials. LOS is considered as the primary Measure of Effectiveness (MOE) for this study to determine the traffic operational conditions of the roadways analyzed. The portion of SR 414 west of Bear Lake Road is analyzed as an expressway. The arterial portion of SR 414 is classified as a Class I Arterial. The portion of SR 414 east of SR 434 is classified as Uninterrupted Highway. In this study, roadway segments Volume to Capacity (V/C) analysis was based on the FDOT 2020 Quality and LOS Generalized Service Volume targets.

The Highway Capacity Software (HCS) Version 7.6 identifies Level of Service (LOS) along freeway segments, based on methods from the Highway Capacity Manual (HCM). LOS is based on density, a function of flow rate (volumes) and travel speed. These relations apply to uninterrupted flow facilities, such as basic freeway segments, merge and diverge segments, and freeway weaving segments. Density is the number of passenger cars per mile per lane (pcpmpl). The LOS for freeway segments, with their density thresholds are presented in **Table 2-2**.

Table 2-2. Level of Service Criteria, Freeway Segments

LOS	Basic (HCM Exhibit 12-15)	Freeway Weaving (HCM Exhibit 13-6)	Freeway Merge and Diverge (HCM Exhibit 14-3)
A	≤ 11	0 - 10	≤ 10
B	> 11 – 18	> 10 – 20	> 10 – 20
C	> 18 – 26	> 20 – 28	> 20 – 28
D	> 26 – 35	> 28 – 35	> 28 – 35
E	> 35 – 45	> 35 – 43	> 35
F	Density > 45 or demand exceeds capacity	Density >43 or demand exceeds capacity	Demand exceeds capacity

Source: Highway Capacity Manual (HCM), V 6.0
Note: Density measured in passenger cars/mile/lane (pcpmpl)

The HCS analysis assumed the following:

- SR 414 Free-Flow Speed (FFS) = 65 mph
- SR 414 peak-hour truck percentage = 3%
- Lane width = 12 feet
- Right shoulder clearance = 6 feet
- Driver Population = All Familiar
- Weather Type = Non-Severe Weather
- Incident Type = No Incident
- Demand Adjustment Factor = 1.000

For freeway merge and diverge areas, the HCM defines capacity for the influence area and the upstream or downstream ramp roadways. Capacity depends on the FFS and the number of lanes.

Signalized intersections were evaluated using Synchro Version 10. The results are based on the HCM LOS and delay targets shown in **Table 2-3**. Unlike the HCM, Synchro has additional procedures for estimating control delay, including estimation of right turn on red and queue delay associated with starvation and spillback. Thus, Synchro yields more reliable results than HCM because of these refinements.

Table 2-3. Level of Service Criteria, Signalized Intersections

Control Delay (s/veh)	LOS by Volume-to-Capacity Ratio	
	≤ 1.0	> 1.0
≤ 10	A	F
> 10 – 20	B	F
> 20 – 35	C	F
> 35 – 55	D	F
> 55 – 80	E	F
> 80	F	F

Source: Highway Capacity Manual (HCM), V 6.0, Exhibit 19-8.
Notes: For approach-based and intersection wide assessments, LOS is defined solely by control delay. Control delay and volume-to-capacity ratio are used to characterize LOS for a lane group.

2.4 Level of Service Targets and Performance Measures

Per Policy 000-525-006 Level of Service (LOS) target for the State Highway System, the adopted FDOT level of service for state roads, is LOS "D." The LOS "D" volume (or capacity) depends on the type of facility and the number of lanes. SR 414 was evaluated at LOS D for directional travel in peak-hour. Intersection LOS was based on the amount of delay in the peak-hour.

Orange County has adopted LOS standards in their land development code, Section 30-520(6). State and county facilities shall operate at LOS E in the peak-hours in urban areas, and LOS D in rural areas. The SR 414 study area is identified as an urban area. The Transportation Element of Seminole County's Comprehensive Plan includes LOS standards for facilities in Development Corridors and Neighborhoods. Per policies TRA 4.2 and 7.2, LOS is set at LOS E in peak-hours for arterial and collector facilities. Policy TRA 4.4 identifies Bear Lake Road north of the Orange County line as a Constrained Facility and shall be limited to a 2-lane facility.

3. Existing Conditions

This chapter contains a summary of existing conditions. This begins with land use conditions within the study area, followed by an account of transportation features and services, current traffic volumes and vehicle speeds, and analysis of existing traffic operations. The chapter concludes with a summary of crash data analysis.

3.1 Socioeconomic and Land Use Data

The study area is located in both Orange and Seminole Counties. SR 414 Maitland Boulevard actually runs along the county line between Bear Lake Road/Rose Avenue and SR 434. The proposed improvement project will also influence traffic to/from Lake County.

Orange County is the fifth-most populous county in Florida. According to the US Census, between 2010 and 2019, the county population grew by 18.1 percent, outpacing the state's growth of 14.2 percent for the same period. Lake County experienced significant growth, almost 24 percent, increasing by over 70,000 residents or 2.38 percent per year. Seminole County also experienced population increases; however, it features lower population growth rates than the state. These growth rates are expected to continue in the future and provide growth on the project.

Employment trends in the region from 2000 to 2018 were developed from the United States Bureau of Economic Analysis (BEA) data. Orange County is the primary employment center in Central Florida, with over 1.13 million employees in 2018. Seminole and Lake Counties have significantly lower employment with 282,370 and 147,900 respectively; however, Lake County's employment has grown by 71.4 percent over last 20 years and Seminole County's employment has grown by almost 52 percent.

In the study area, the SR 414 corridor is mostly developed. The Maitland Center Office Park is located on the eastern end of the corridor, east of SR 434 and west of I-4. This is a mix of mid-rise office buildings and mid-rise apartment complexes. The land uses surrounding the SR 434 interchange with SR 414 include commercial, mid-level apartments and mid-level office uses including the Seminole State College – Altamonte Springs Campus. West of SR 434, the land uses transition to low density residential subdivisions of approximately three dwelling units per acre. In addition to the low-density residential neighborhoods, there is one regional park, Lake Lotus Park, a 150-acre passive park surrounding Lake Lotus owned by Seminole County. The stretch of SR 414 between SR 434 and US 441 is controlled access, wherein the residential neighborhoods backup to SR 414 and are typically separated from the facility by a wall. Closer to the US 441 interchange the land uses are industrial in nature, mostly heavy industrial with outside storage and manufacturing uses.

The SR 414 corridor from US 441 to SR 434 is mostly built out with only limited opportunity of infill development or redevelopment. With the location of the proposed facility, surrounding land uses will not contribute to the growth in the corridor, this growth will occur along connecting facilities to the west and north. SR 414 west of US 441 is still mostly industrial development, large-scale greenhouse operations, public uses, and low density residential. Further west, near the Marden Road Interchange on SR 414 Expressway, there are newer developments. Several single family and multi-family residential developments have started, as well as new light industrial/distribution centers and the new Advent Health Hospital. The City of Apopka has annexed much of the vacant lands in the areas around the SR 429 and SR 414 interchange and has adopted an Ocoee Apopka Road Small Area Study which has zoning districts that encourages mixed-use development at higher densities and intensities. The area dubbed the "Eastshore,"

envisions three types of mixed-use development. Developments that will also contribute long-term growth to the corridor is the Kelly Park Crossing DRI in northwest Orange County and the Wolf Branch Innovation District in Lake County. Additional information regarding these developments can be found in **Appendix B.**

3.2 Transportation Network

The transportation network includes the system or roadways, transit routes, pedestrian paths, and bicycle routes.

3.2.1 Roadway

The roadways and their functional classification and jurisdiction are listed in **Table 3-1**.

Table 3-1. Roadway Segments

Roadway	Location	Facility Type	Jurisdiction
SR 414	West of US 441	Expressway	CFX
SR 414	East of US 441 to SR 434	Class I Arterial	FDOT
SR 414	East of SR 434 to I-4	Uninterrupted Highway	FDOT
Hiawassee Road	South of SR 414	Class I Arterial	Orange County
Hiawassee Road	North of SR 414	Class I Arterial	Orange County
US 441/Orange Blsm Trl	South of SR 414	Class I Arterial	FDOT
US 441/Orange Blsm Trl	North of SR 414	Class I Arterial	FDOT
Rose Avenue	South of SR 414	Collector	Orange County
Bear Lake Road	North of SR 414	Collector	Seminole
Eden Park Road	South of SR 414	Collector	Orange County
Eden Park Road	North of SR 414	Collector	Seminole
Magnolia Homes Rd	South of SR 414	Collector	Orange County
Lake Lotus Park Rd	North of SR 414	Driveway	Seminole
Gateway Drive	North of SR 414	Collector	Seminole
SR 434	South of SR 414	Class I Arterial	FDOT
SR 434	North of SR 414	Class I Arterial	FDOT
Maitland Summit Blvd	South of SR 414	Collector	Orange County
Maitland Summit Blvd	North of SR 414	Collector	Orange County
Keller Road	South of SR 414	Collector	Orange County
Keller Road	North of SR 414	Collector	Orange County

For the LOS analysis, SR 414 has four lanes, two lanes in each direction, over the entire length. The number of lanes on roadways intersecting with SR 414, or cross streets, are shown in **Table 3-2.**

Table 3-2. Number of Lanes on Cross Streets - 2020

Roadway	Location	Existing Lanes
		2020
US 441/OBT	North of SR 414	4L
US 441/OBT	South of SR 414	4L
Bear Lake Rd	North of SR 414	2L
Rose Avenue	South of SR 414	2L
Eden Park Road	North of SR 414	2L
Eden Park Road	South of SR 414	2L
Magnolia Homes Road	North of SR 414	2L
SR 434/Forest City Road	North of SR 414	6L
SR 434/Forest City Road	South of SR 414	4L
Maitland Summit Blvd	North of SR 414	4L
Maitland Summit Blvd	South of SR 414	4L
Keller Road	North of SR 414	4L
Keller Road	South of SR 414	2L

Figure 3-1 contains a map of the at-grade intersections in the study area with graphics indicating the number of lanes turning left, passing straight through, and turning right. It's important to note that the SR 414 section between Maitland Summit Boulevard and I-4 was under construction in 2019 and the lane configuration changed frequently due to maintenance of traffic. To ensure consistency and reasonableness, the existing conditions analysis was based on the lane geometry after the construction of this section in 2020. This roadway geometry is used in the analysis of traffic operations under existing conditions.

Figure 3-1. Existing Roadway Geometry

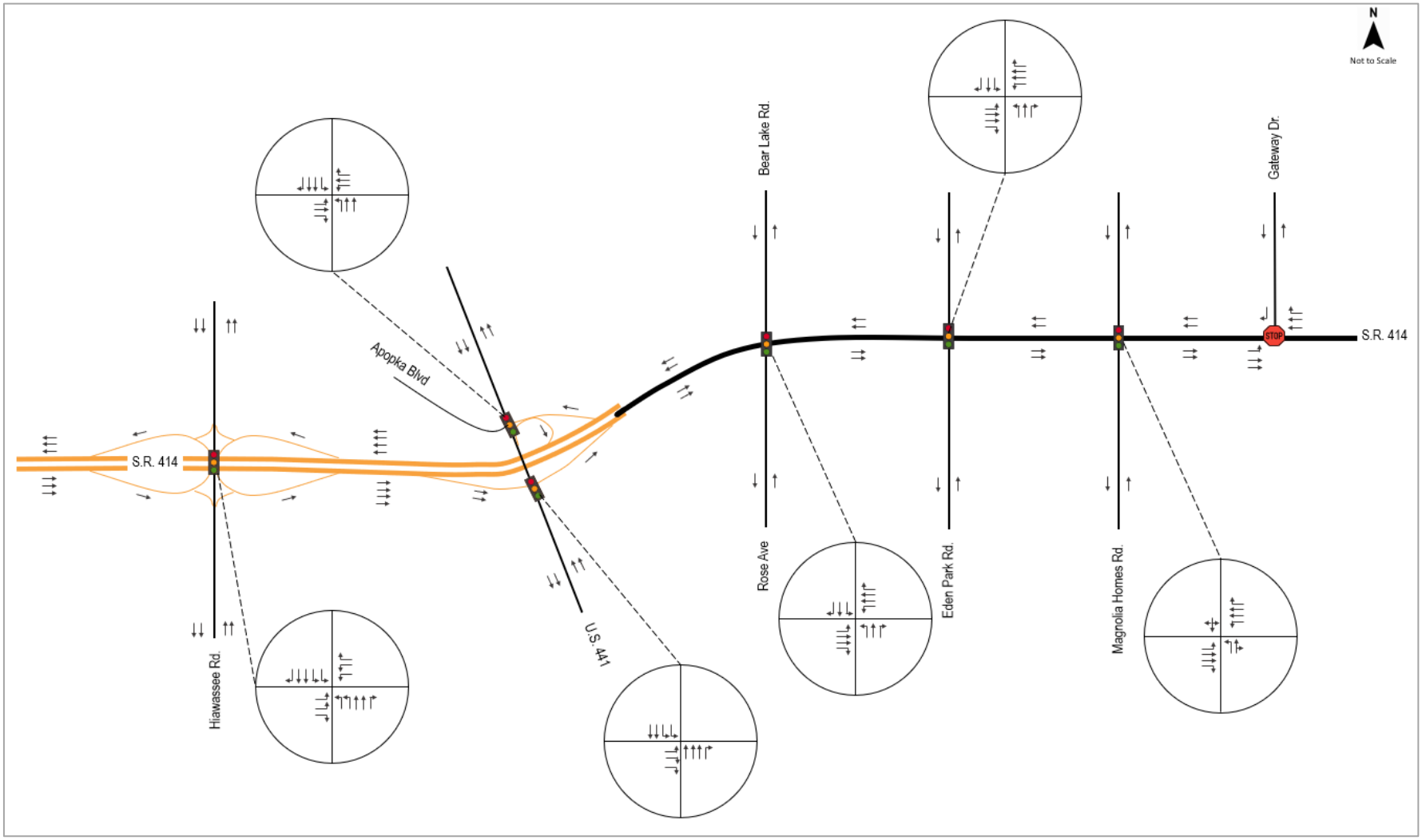
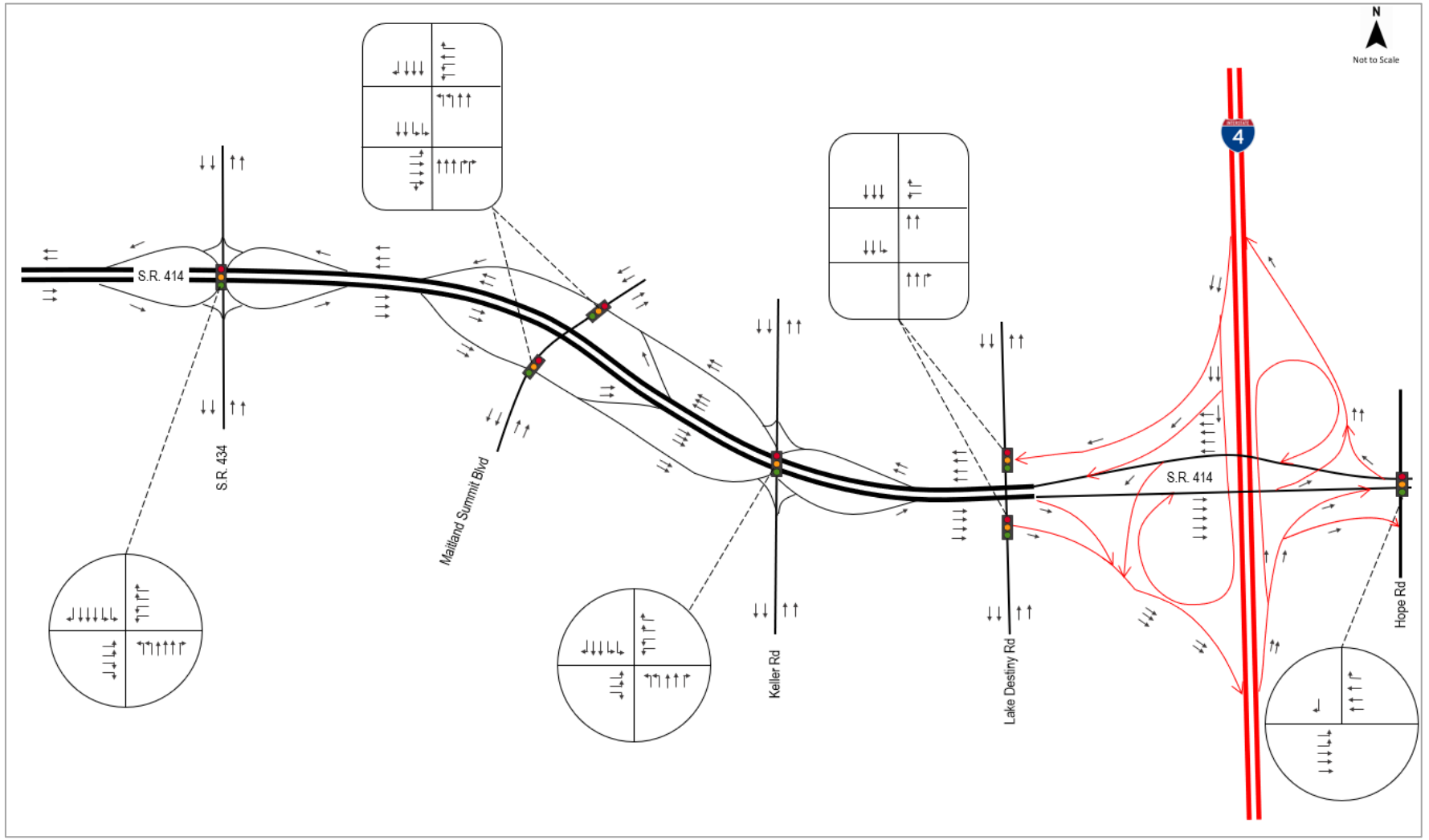


Figure 3-1. Existing Roadway Geometry (Cont.)



3.2.2 Transit

The Central Florida Regional Transportation Authority (dba LYNX) operates fixed route and flexible transit services within the study area. While there is not a fixed route service that runs on SR 414/Maitland Blvd, there are several routes that cross the study corridor, including Link 106 on US 441, Links 23 and 434 which run on SR 434, Link 1 on Keller Road, and NeighborLink 652/Maitland, which services and connects the Maitland Center Office Park to the Maitland Sunrail Station.

3.2.3 Bicycle and Pedestrian

Bicycles and pedestrians are prohibited on the SR 414 Expressway or the expressway-like portion of SR 414 on the eastern end of the corridor, starting at the interchange with SR 434 leading to the I-4 Ultimate. There is a bike trail of the north side of SR 414 starting at US 441 that extends to Bear Lake Road and connects to the Seminole Wekiva Trail via sidewalks on Bear Lake Road. There is a sidewalk on the south side of the road that begins at US 441 and runs within the Expressway right-of -way. From Bear Lake Road/Rose Avenue to SR 434 there are sidewalks on both sides of SR 414. There is also a 4-foot bicycle lane provided on both sides of street from Bear Lake Road/Rose Avenue to just west of the SR 434 ramps to/from the west.

3.3 Traffic Volumes

After a summary of historic traffic volumes, this part of the chapter contains a description of current traffic volumes, over the course of an average day and during the AM and PM peak-hours.

3.3.1 Historical Data

Table 3.3 contains a recent history of AADT along the corridor and annual growth rates (linear). The count locations, labeled A through E, begin in the west at the Coral Hills Mainline Toll Plaza and end at a location just West of Lake Destiny Drive.

Table 3-3. Historic Two-Way AADT on SR 414

Label	Location	ID	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Annual Growth Rate
A	Coral Hills Main Plaza					20,900	24,100	29,100	33,900	36,600	43,200	47,500	21.2%
B	1.5 Mi W of SR 434	750290	35,500	33,000	36,500	37,500	38,000	49,500	40,500	46,000	48,500	50,000	4.5%
C	0.4 Mi W of SR 434	750291	42,000	45,500	46,500	44,000	46,000	50,000	52,500	48,500	51,500	49,500	2.0%
D	0.2 Mi W of Maitland Summit Blvd	750643	48,000	49,500	49,500	48,500	50,500	50,000	51,000	52,000	53,000	53,500	1.3%
E	0.2 Mi W of Lake Destiny Dr	750592	70,000	68,000	70,500	62,000	71,000	72,500	73,500	75,500	77,000	74,000	0.6%

The historical traffic volumes are plotted in **Figure 3-2**. As expected, traffic volumes generally increase from year to year and moving from west toward the east. During this period, the highest growth rate is at the Coral Hills Mainline Toll Plaza (21.2 percent per year over six years). The annual growth rates decline moving east and are lowest just west of Maitland Summit Boulevard (1.3 percent per year over nine years).

Traffic volumes on the arterial portion have had lower increases in traffic because the volumes on the arterial are constrained. A large portion of the growth that did occur appeared through peak period spreading.

Figure 3-2. Historic Two-Way AADT on SR 414

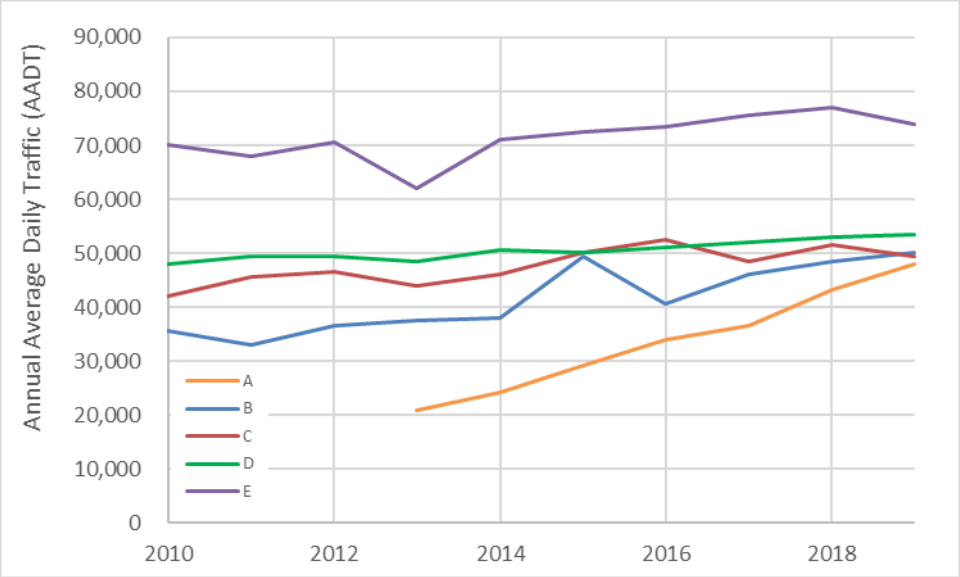


Table 3-4 contains ten years of traffic count data along most of the cross streets within the study area. The growth rates are the average growth over the longest available period. Many of these roadways have had substantial growth over this period. Generally, growth has slowed down during the last two or three years. This is especially true of the roadways intersecting with SR 414 in the arterial portion of Maitland Boulevard.

Table 3-4. Historical Two-Way AADT on Cross Streets

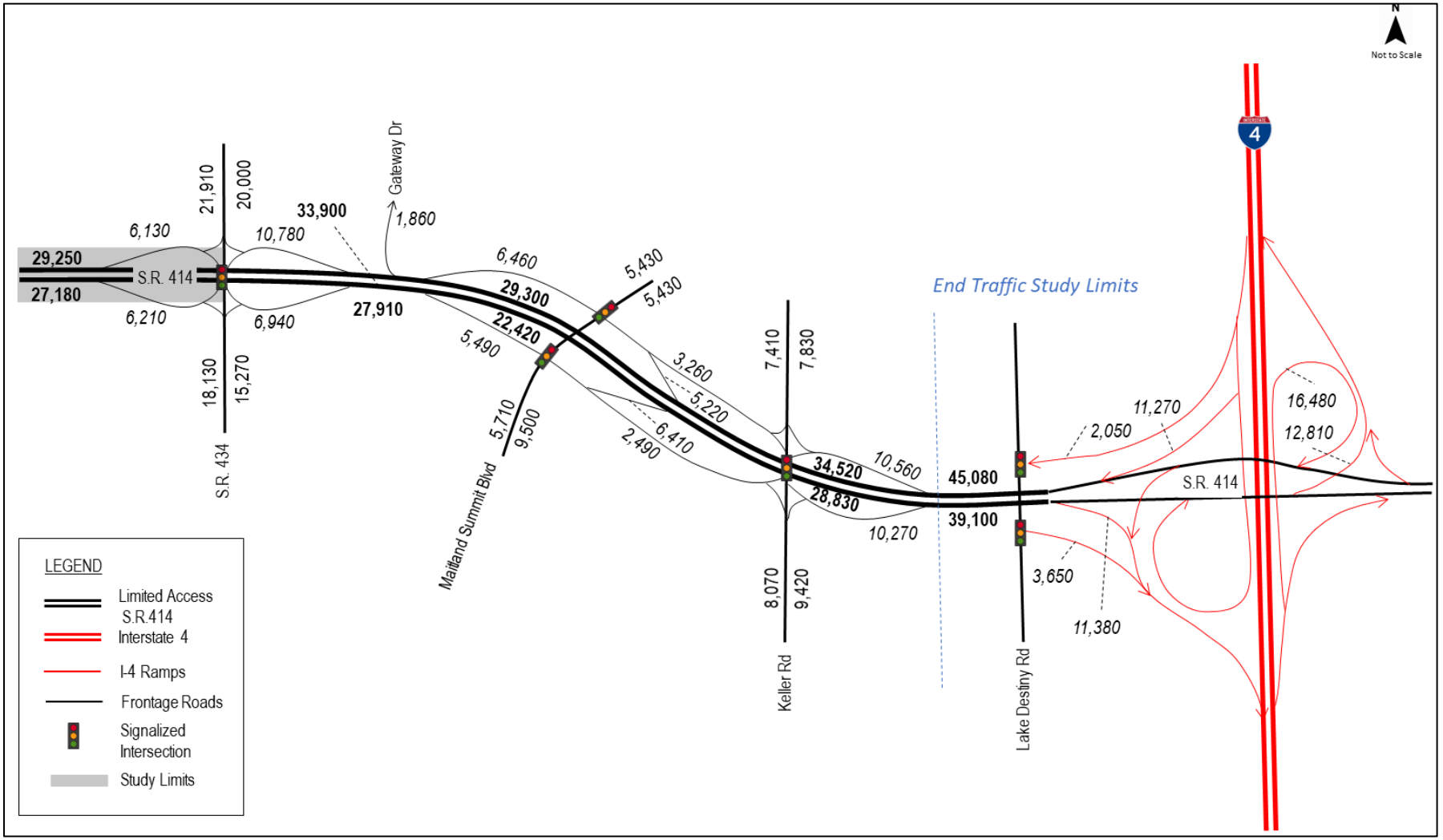
Roadway	Location	Facility Type	Juris	Cosite	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Annual Growth Rate
Hiawassee Road	South	Class I Arterial	Orange County	757017	14,000	12,100	12,100	17,700	17,900	17,100	17,500	17,900	19,000	19,100	4.0%
US 441/Orange Blossom Trail	South	Class I Arterial	FDOT	750480	26,000	24,500	25,000	24,000	27,000	28,000	28,000	28,000	28,000	27,000	0.4%
US 441/Orange Blossom Trail	North	Class I Arterial	FDOT	750021	32,000	33,000	30,000	30,500	31,000	28,500	30,500	29,500	30,000	30,000	-0.7%
Rose Avenue	South	Collector	Orange County	758063	-	4,500	4,500	4,500	4,600	4,700	4,800	3,800	3,800	3,800	-1.9%
Bear Lake Road	North	Collector	Seminole County	778088	-	8,500	8,500	8,600	8,700	8,900	11,500	11,200	11,400	11,400	4.3%
Eden Park Road	North	Collector	Seminole County	778012	-	5,500	5,500	5,800	5,800	6,000	3,900	6,900	6,400	7,100	3.6%
Magnolia Homes Rd	South	Collector	Orange County	757009	8,300	6,600	6,600	7,900	8,000	8,200	7,600	7,800	8,600	8,800	0.7%
SR 434	South	Class I Arterial	FDOT	750594	22,000	21,000	21,500	23,500	26,000	25,500	29,500	27,500	28,500	31,500	4.8%
SR 434	North	Class I Arterial	FDOT	770289	40,500	41,500	44,000	42,500	44,000	51,500	52,500	51,000	51,000	50,500	2.7%
Maitland Summit Blvd	North	Collector	Orange County	758183	-	6,600	6,600	6,600	6,600	6,700	6,900	8,600	8,800	9,000	4.5%
Keller Road	South	Collector	Orange County	758328	-	-	6,400	-	-	-	-	-	-	12,600	13.8%

3.3.2 2019 AADT Profile

The daily traffic volumes from the various count locations were used to develop the existing (2019) average AADT for roadways in the traffic study area shown in **Figure 3-3**. The double-line coding in graphic identifies the expressway portions of SR 414; the signalized intersections are identified with the graphic showing a traffic signal; and ramps and frontage roads appear in lighter line weight. Generally, traffic volumes on SR 414 increase from west to east. The traffic volume on SR 414 (John Land Expressway) at the Coral Hill Toll Plaza was 50,360 vehicles per day and the traffic volume on SR 414 to the west of the I-4 Interchange was 84,180 vehicles per day. In between these traffic count locations, the largest daily traffic volume was 59,910 vehicles per day, just east of the SR 434 interchange.

Figure 3-3. 2019 Average Annual Daily Traffic (AADT)

Figure 3-3. 2019 Average Annual Daily Traffic (AADT) (cont.)



3.3.3 Traffic Peaking and Directionality Characteristics

Table 3-5 contains peaking (K) and directional (D) factors for the AM and PM peak-hours, developed for roadway segments from the traffic data collected for the study.

Table 3-5. 2019 K and D Factors

Location	Direction	Peak Hour		Daily	AADT	K Factor		D Factor	
		AM	PM			AM Peak	PM Peak	AM Peak	PM Peak
Hiawassee Rd, south of SR 414	NB	996	985	12,021	23,400	8.6%	8.0%	48%	51%
	SB	1,067	930	12,031				52%	49%
Hiawassee Rd, north of SR 414	NB	740	845	10,034	20,500	8.1%	8.3%	44%	48%
	SB	961	908	11,058				56%	52%
US 441, north of SR 414	NB	991	1,377	16,545	29,900	7.3%	7.5%	44%	59%
	SB	1,249	940	14,271				56%	41%
Rose Ave, south of SR 414	NB	563	579	7,213	13,500	7.1%	7.6%	57%	55%
	SB	424	470	6,632				43%	45%
Bear Lake Rd, north of SR 414	NB	239	472	4,407	9,100	7.2%	9.6%	35%	52%
	SB	440	435	5,045				65%	48%
SR 414, between Bear Lake Rd and Eden Park Rd	EB	2,372	1,588	25,481	50,100	7.5%	7.2%	60%	42%
	WB	1,561	2,177	27,176				40%	58%
Eden Park Rd, south of SR 414	NB	188	232	1,861	3,400	9.0%	10.4%	59%	63%
	SB	131	137	1,673				41%	37%
Eden Park Rd, north of SR 414	NB	180	389	3,943	7,700	7.4%	9.5%	31%	52%
	SB	406	362	3,980				69%	48%
SR 414, between Eden Park Rd and Magnolia Homes Rd	EB	2,606	1,580	26,532	52,300	7.7%	6.9%	61%	41%
	WB	1,643	2,230	28,469				39%	59%
Magnolia Homes Rd, south of SR 414	NB	235	241	3,591	6,500	6.2%	6.7%	57%	54%
	SB	174	204	3,032				43%	46%
Lake Lotus Park Rd, north of SR 414	NB	3	6	23	100	12.8%	17.0%	50%	75%
	SB	3	2	24				50%	25%
SR 414, between Magnolia Homes Rd and Gateway Dr	EB	2,707	1,688	28,393	54,900	7.4%	6.9%	63%	42%
	WB	1,570	2,298	29,342				37%	58%
Gateway Dr, north of SR 414	NB	274	182	2,424	3,800	9.1%	9.4%	77%	50%
	SB	80	185	1,487				23%	50%
SR 434, south of SR 414	NB	815	1,309	15,269	32,400	7.3%	8.7%	33%	45%
	SB	1,623	1,612	18,123				67%	55%
SR 434, north of SR 414	NB	1,120	1,544	20,000	39,500	7.5%	6.9%	36%	54%
	SB	2,016	1,331	21,909				64%	46%
SR 414, between SR 434 and Maitland Summit Blvd	EB	1,729	1,133	19,484	39,600	6.8%	7.4%	63%	37%
	WB	1,037	1,890	21,327				37%	63%
Maitland Summit Dr, south of SR 414	NB	873	794	9,501	14,800	8.3%	9.0%	69%	58%
	SB	394	569	5,713				31%	42%
Maitland Summit Dr, north of SR 414	NB	900	323	5,426	10,600	10.0%	9.5%	83%	31%
	SB	184	709	5,434				17%	69%
Keller Rd, south of SR 414	NB	457	1,247	9,424	17,000	9.4%	9.4%	28%	76%
	SB	1,186	400	8,073				72%	24%
Keller Rd, north of SR 414	NB	1,049	572	7,834	14,800	9.9%	8.7%	69%	43%
	SB	463	751	7,411				31%	57%

The roadway segments on SR 414 Maitland Boulevard are highlighted in yellow. The peak directions, identified by the greater D-Factor, are highlighted in red. The K-Factors on SR 414 range from 6.9 percent to 7.4 percent. These lower values reflect the severe congestion in the corridor and peak spreading. The D-factors along SR 414 range from a high of 63 percent in the eastbound direction during the AM Peak to a low of 58 percent in the westbound direction during the PM Peak. These factors are also influenced by the severe, recurring congestion. Along SR 414, the peak direction is eastbound in the AM Peak and westbound in the PM Peak. The peak direction on SR 414 switches east of Keller Road, reflecting the importance of the Maitland Office Park.

A classification count taken at the SR 434 overpass in October 2019, provides data for truck factors. **Table 3-6** shows vehicle classification data on SR 414 in the study area. The total daily truck percentage is 5.96.

Table 3-6. Vehicle Classification

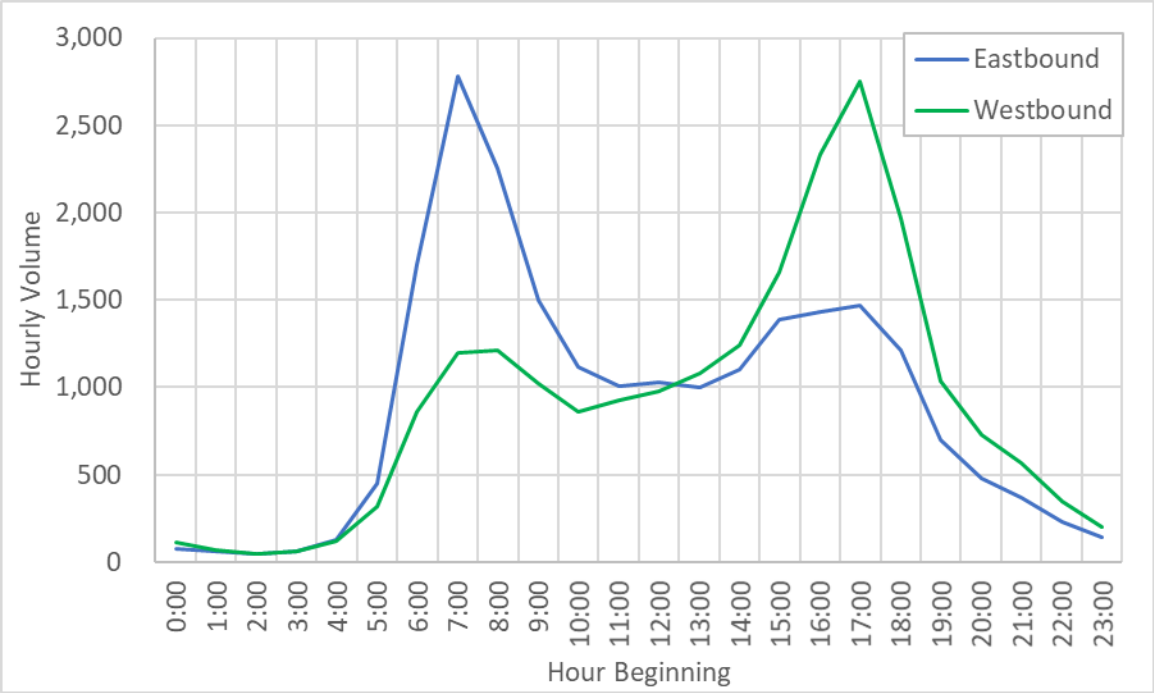
Location	Passenger Vehicles	Total Daily Trucks	Single Unit Trucks	Combination Trailer Trucks	Multi-trailer Trucks
SR 414 at SR 434	94.04%	5.96%	3.47%	2.46%	0.03%

The following traffic factors were applied in future year analysis:

- SR 414 Expressway and Expressway Extension - K factor of 9.0% (FDOT Standard K-Factor)
- SR 414 arterial and cross Streets - K factor of 9.0%
- D-factors reflected 2019 observed conditions supplemented with FDOT Standards
- T-Factor SR 414 - (6% daily and 3% peak hour)
- T-Factor Cross Streets - 4% daily and 2% peak hour

The SR 414 Expressway near the Coral Hills mainline toll plaza remains uncongested, even with the extraordinary growth in recent years. Traffic volumes are peaked and directional. Using the average of traffic counts collected on three weekdays during the second week of March 2019, traffic at Coral Hills peaks in the morning between 7:00 AM to 8:00 AM and the evening between 5:00 PM to 6:00 PM. The overall peak-hour occurs in the afternoon. The hourly distribution of traffic at the Coral Hills Toll Plaza is shown in **Figure 3-4**. The proportion of traffic in the peak-hour (K) was 9.7 percent, and the directional split (D) was 69.8 percent in the AM peak-hour, and 65.4 percent in the PM peak-hour. Based on this data, there is twice as much traffic in the peak direction as in the off-peak direction during both peak hours.

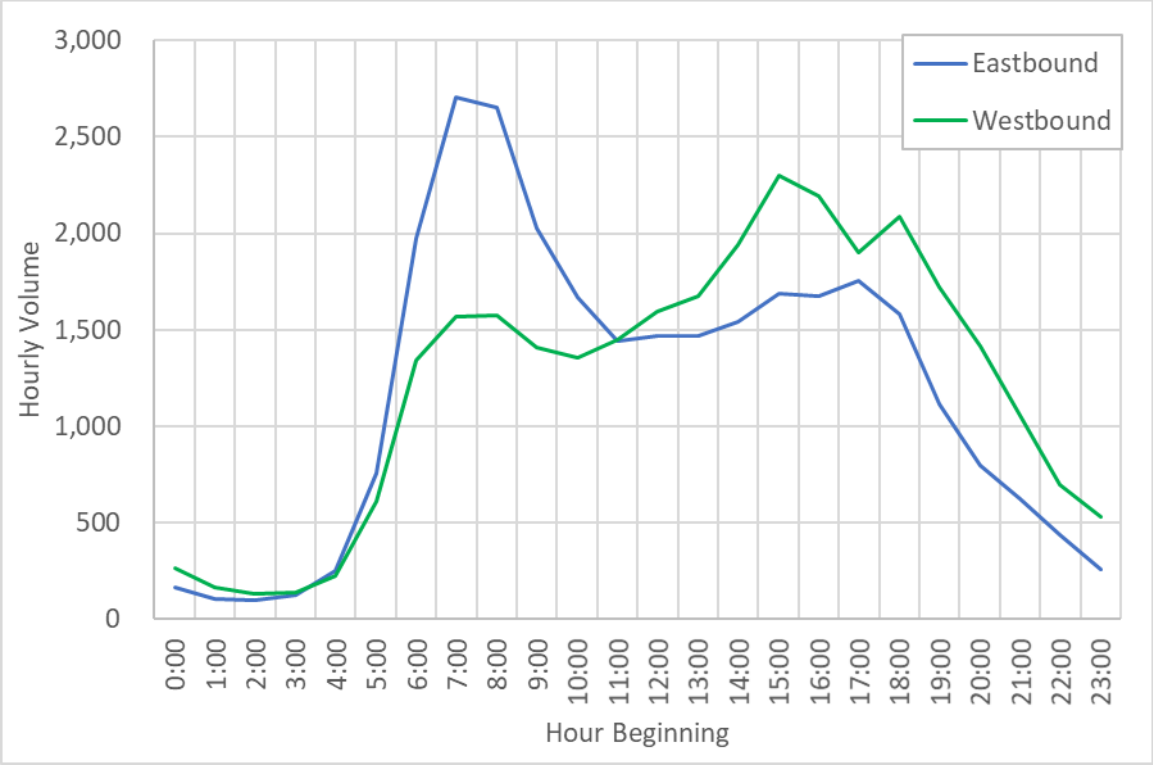
Figure 3-4. Hourly Distribution of Traffic at Coral Hills Toll Plaza



Source: Average of hourly traffic from March 12 to 14, 2019 (Tuesday to Thursday), CFX Counts.

Further east along the corridor, the peaking and directional characteristics of traffic are impacted by the severe and recurring congestion. **Figure 3-5** contains the hourly distribution of traffic on SR 414 west of Gateway Drive. Using the average of traffic counts collected on three weekdays in October 2019, the peak direction near the intersection is eastbound in the morning and westbound in the evening, but the peak-hours are disturbed by congestion. The AM peak-hour is spread over two hours, beginning at 7:00 AM, while the PM peak occurs at 3:00 PM, but spreads over an approximately five-hour period. There appears to be significant operational problems in the westbound direction as the volume of traffic and 3:00 and 4:00 PM declines at 5:00 PM (which occurred in all three days) but then increases again at 6:00 pm. Traffic volumes during the middle of the day are just over 1,500 vehicles per hour in both directions. The proportion of traffic in the peak-hour (K) was 7.4 percent. The directional split (D) was 63.3 percent in the morning peak-hour and 57.7 percent in the evening peak-hour. The lower values of K and D reflect the level of congestion during peak periods.

Figure 3-5. Hourly Distribution of Traffic on SR 414, West of Gateway Drive



Source: Average of hourly traffic from October 22 to 24, 2019 (Tuesday to Thursday), Traffic Counts

3.3.4 2019 Peak-Hour Traffic Profile

The final 2019 AM and PM peak hour volumes for the entire project are presented in **Figure 3-6**. The peak-hour direction of flow is eastbound in the morning and westbound in the evening west of Keller Road. East of Keller Road, the peak-hour directions switch so that westbound is the peak direction in the morning and eastbound in the evening, though the evening directionality is close to a 50/50 split. This switch in peak direction indicates the importance of the Maitland Center office parks (between Maitland Summit Boulevard and Lake Destiny Road) as a major destination.

Figure 3-6. 2019 AM (PM) Peak Hour Volumes

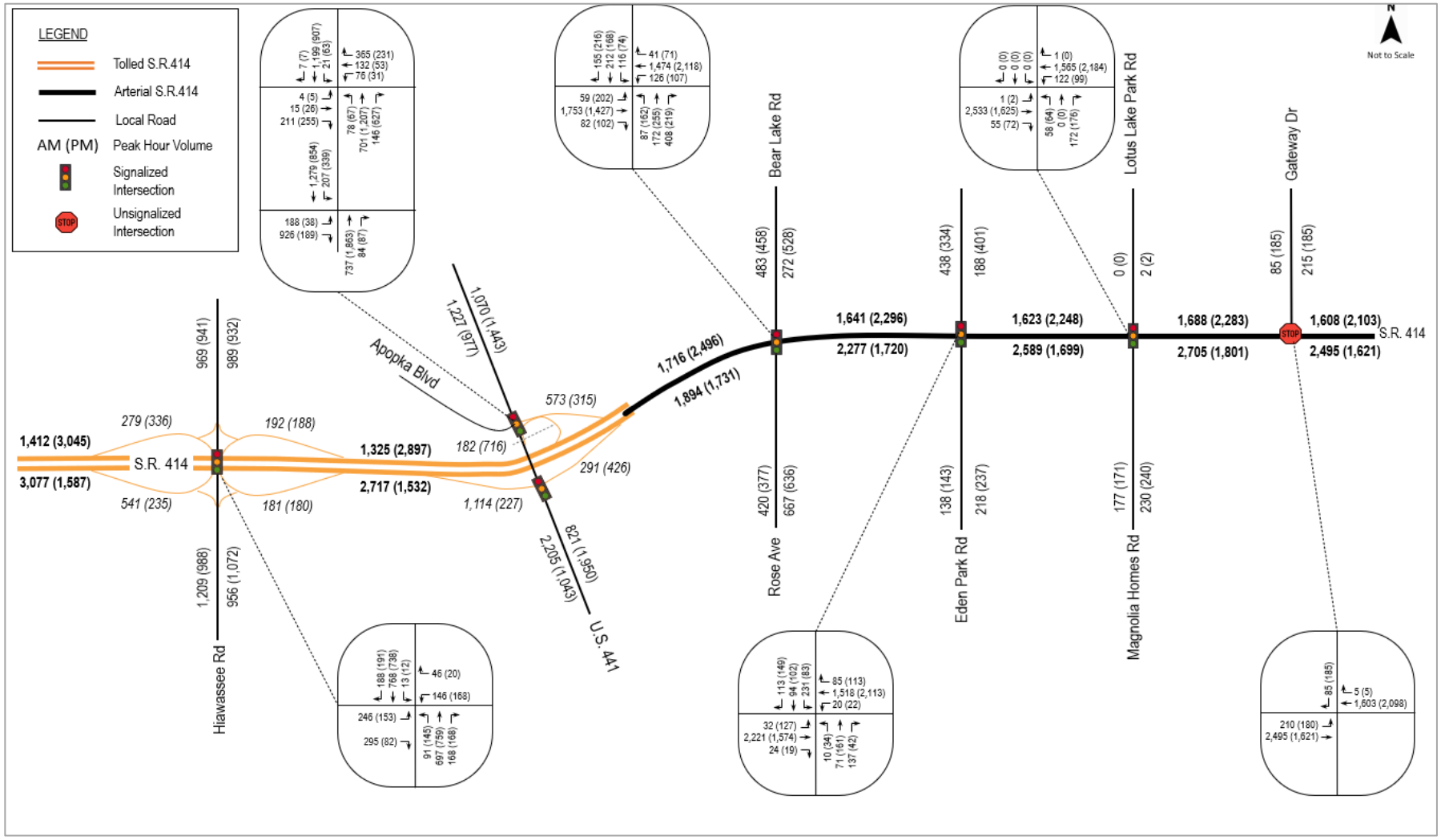
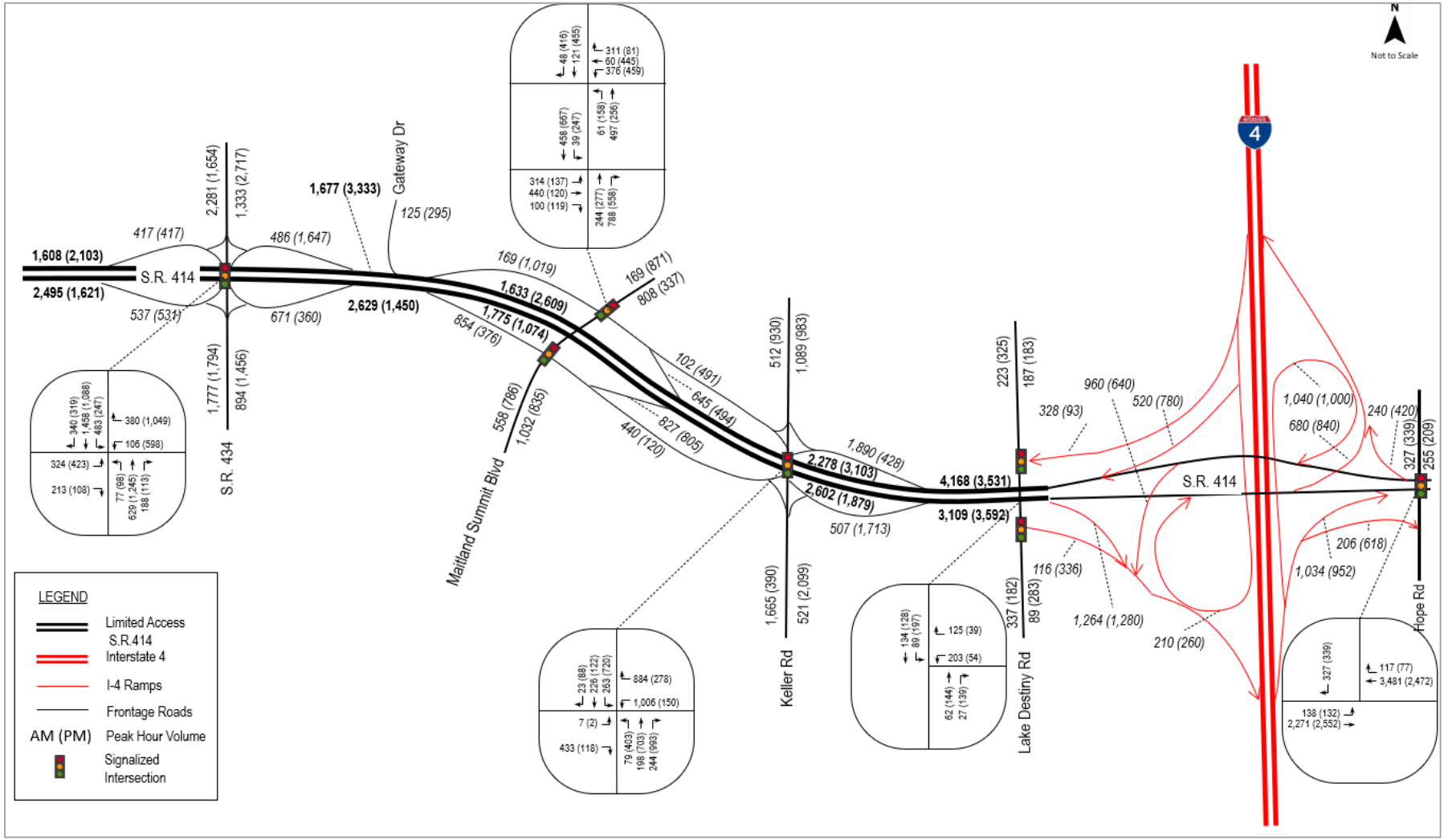


Figure 3-6. 2019 AM (PM) Peak Hour Volumes (Cont'd)



3.4 Travel Patterns

To establish travel patterns, origin/destination (OD) analysis was completed using INRIX and Streetlight data for the travel demand model validation. The OD patterns were developed using a select-link analysis along SR 414 east of the Coral Hills mainline toll plaza, shown in **Figure 3-7**. This is a band-width plot, with the widest line representing 100 percent of the traffic through the selected link location. As traffic enters/leaves SR 414, the line gets thinner moving away from the select link location. From the select link point to the east, a small portion of traffic exits/enters at Hiawassee Road interchange, a larger portion exits/enters at US 441 mostly from the south, and a small portion exits/enters in the arterial portion of SR 434. The select link traffic remaining passes by SR 434 and heads to the Maitland Center office park, I-4, and east of I-4.

Figure 3-7. SR 414 INRIX Data Travel Patterns

Using a filter point west of US 441, Streetlight Data indicated the following distribution to destinations:

- 20% to US 441
- 20% to the arterial cross streets and SR 434
- 30% to Maitland Center Office Park
- 30% to I-4 and Maitland east of I-4

3.5 Traffic Operational Analysis

Starting with the description of existing facilities and traffic volumes, the purpose of this part of the chapter is to establish current operational conditions within the traffic analysis AOI. This analysis employs LOS and V/C ratio evaluation of existing daily and peak-hour conditions on roadway segments and Synchro analysis to assess existing peak-hour conditions at intersections.

3.6.1 Roadway Segments

The 2019 daily and peak hour V/C ratios for roadway segments in the study area are shown in **Table 3-7**.

Table 3-7. 2019 Performance of Roadway Segments

Location	Facility Type	Lanes	LOS D Service Volume*		Volume			V/C		
			Daily 2-Way	Peak Hour Peak Dir	Daily	AM Peak	PM Peak	Daily	AM Peak	PM Peak
SR 414, west of Hiawassee Rd	Expressway	6L	123,600	5,620	50,360	3,077	3,045	0.41	0.56	0.54
SR 414, between Hiawassee Rd and US 441	Expressway	6L+ 2Aux	143,600	6,620	48,860	2,717	2,897	0.34	0.41	0.44
SR 414, between US 441 and Bear Lake Rd	Class I Arterial	4L	39,800	2,000	52,310	1,894	2,496	1.31	0.95	1.25
SR 414, between Bear Lake Rd and Eden Park Rd	Class I Arterial	4L	39,800	2,000	52,650	2,277	2,296	1.32	1.14	1.15
SR 414, between Eden Park Rd and Magnolia Homes Rd	Class I Arterial	4L	39,800	2,000	55,000	2,589	2,248	1.38	1.29	1.12
SR 414, between Magnolia Homes Rd and Gateway Dr	Class I Arterial	4L	39,800	2,000	59,910	2,705	2,283	1.51	1.35	1.14
SR 414, between Gateway Dr and SR 434 Ramps	Class I Arterial	4L	39,800	2,000	56,430	2,495	2,103	1.42	1.25	1.05
SR 414, between the SR 434 Ramps	Uninterrupted Highway	4L	66,200	3,280	44,090	1,830	1,170	0.67	0.56	0.36
SR 414, between SR 434 Ramps and Maitland Summit Blvd Ramps	Uninterrupted Highway	4L + 2Aux	82,750	4,100	61,810	2,629	3,333	0.75	0.64	0.81
SR 414, between Maitland Summit Blvd Ramps	Uninterrupted Highway	4L	66,200	3,280	51,720	1,775	2,609	0.78	0.54	0.80
SR 414, between Maitland Summit Blvd Ramps and Keller Rd Ramps	Uninterrupted Highway	4L + 2 Aux	82,750	4,100	63,350	2,602	3,103	0.77	0.63	0.76
SR 414, between Keller Rd Ramps and I-4 Ramps	Uninterrupted Highway	4L + 4Aux	115,950	5,740	84,180	4,168	3,592	0.73	0.73	0.63
Hiawassee Rd, south of SR 414	Class I Arterial	4L	39,800	2,000	24,050	1,209	1,072	0.60	0.60	0.54
Hiawassee Rd, north of SR 414	Class I Arterial	4L	39,800	2,000	21,090	989	941	0.53	0.49	0.47
US 441, south of SR 414	Class I Arterial	4L	39,800	2,000	26,340	2,205	1,950	0.66	1.10	0.98
US 441, north of SR 414	Class I Arterial	4L	39,800	2,000	30,820	1,227	1,443	0.77	0.61	0.72
Rose Ave, south of SR 414	Collector	2L	15,930	790	13,850	667	636	0.87	0.84	0.81
Bear Lake Rd, north of SR 414	Collector	2L	13,320	680	9,470	483	528	0.71	0.71	0.78
Eden Park Rd, south of SR 414	Collector	2L	13,320	680	7,920	438	401	0.59	0.64	0.59
Eden Park Rd, north of SR 414	Collector	2L	13,320	680	3,530	218	237	0.27	0.32	0.35
Magnolia Homes Rd, south of SR 414	Collector	2L	13,320	680	6,620	230	240	0.50	0.34	0.35
Lake Lotus Park Rd, north of SR 414	Driveway	2L			40	2	2			
Gateway Dr, north of SR 414	Collector	2L	13,320	680	3,920	215	185	0.29	0.32	0.27
SR 434, south of SR 414	Class I Arterial	4L	39,800	2,000	33,400	1,777	1,794	0.84	0.89	0.90
SR 434, north of SR 414	Class I Arterial	6L	59,900	3,020	41,910	2,281	2,717	0.70	0.76	0.90
Maitland Summit Dr, south of SR 414	Collector	4L	29,160	1,470	15,210	1,032	835	0.52	0.70	0.57
Maitland Summit Dr, north of SR 414	Collector	4L	29,160	1,470	10,860	808	871	0.37	0.55	0.59
Keller Rd, south of SR 414	Collector	4L	29,160	1,470	17,490	1,665	2,099	0.60	1.13	1.43
Keller Rd, north of SR 414	Collector	4L	29,160	1,470	15,240	1,089	983	0.52	0.74	0.67

*Source: FDOT 2020 Quality and LOS Generalized Service Volume Tables

The LOS "D" service volumes come from the FDOT 2020 Quality and LOS Generalized Service Volume tables. The bottom portion of the table, highlighted in gray, contains the LOS "D" volume results from roadways classified as arterials and collectors that intersect with SR 414 within the traffic study area. The segments where the volume exceeds the capacity (highlighted in red) and the V/C ratio is greater than one are the arterial portions of SR 414, US 441, and Keller Road south of SR 414.

The only segment in the study area that qualified for freeway analysis was the SR 414 Expressway between Hiawassee Road and US 441. This section was analyzed using the HCS software. **Table 3-8** contains results from weaving, diverge and merge analysis . The HCS7 reports are provided in **Appendix C**. In 2019, the freeway segments operated at acceptable levels of service.

Table 3-8. 2019 Weave, Diverge and Merge Freeway Segments Analysis Results

Segment	Segment Type	Lanes	Volume (vph)		Density/LOS (pcpmpl)	
			AM	PM	AM	PM
SR 414 Eastbound						
EB Off Ramp to Hiawassee Rd	Diverge	3	541	235	23.8/C	14.4/B
EB On Ramp from Hiawassee Rd	Weave	4	181	180	14.9/B	7.1/A
EB Off Ramp to US 441			1,114	227		
SR 414 Westbound						
WB On Ramp from US 441	Weave	4	182	716	5.2/A	12.6/B
WB Off Ramp to Hiawassee Rd			192	188		
WB On Ramp from Hiawassee Rd	Merge	3	279	336	5.1/A	10.9/A

3.5.1 Intersections

A traffic analysis using Synchro v.10 software was completed to evaluate the LOS operations at the signalized intersections in the traffic study area. Using the existing signal timings, roadway configuration and turning movement counts, the traffic delay and LOS was determined for each movement and the overall intersection in both the 2019 AM and PM peak hours, as shown in **Table 3-9** and **Table 3-9** respectively. Unacceptable LOS is highlighted in red font. The Synchro reports and signal timing sheets are provided in **Appendix D**.

In both 2019 AM and PM peak hours, the intersections of Bear Lake Road/Rose Avenue, Eden Park Road, and Magnolia Homes Road operate at unacceptable LOS F for most northbound and southbound movements, and eastbound and westbound the left turn movements. However, the total intersection delay for these intersections is acceptable, except for Bear Lake Road/Rose Avenue operating at LOS E and SR 434 operating at LOS E (in the PM only). All other intersections operate at acceptable LOS D or better. Several left-turn movements operate at LOS F at the US 441 and SR 434 intersections.

Table 3-9. 2019 AM Peak Hour Intersection Operations Results

Intersection	Delay/ LOS	Eastbound			Westbound			Northbound			Southbound			Overall
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Hiawassee Rd @ SR 414 Ramps	Delay	60.3		43.1	54.0		0.9	44.6	15.1	2.4	54.2	24.5	4.0	**26.6**
	LOS	E		D	D		A	D	B	A	D	C	A	**C**
US 441@ SR 414 Eastbound Ramps	Delay	33.0		49.9					36.4	7.0	89.7	15.1		**34.4**
	LOS	C		D					D	A	F	B		**C**
US 441@ SR 414 Westbound Ramps	Delay	42.0	57.8	32.0	51.1	57.1	18.9	82.1	12.9	0.0	75.4	27.0	0.0	**26.2**
	LOS	D	E	C	D	E	B	F	B		E	C		**C**
SR 414 @ Bear Lake Rd/Rose Ave	Delay	184.1	64.8	2.5	218.3	19.1	0.1	108.2	124.9	112.1	115.0	137.0	19.8	**64.5**
	LOS	F	E	A	F	B	A	F	F	F	F	F	B	**E**
SR 414 @ Eden Park Rd	Delay	173.0	22.2	0.0	213.6	25.9	1.7	145.5	175.6	124.5	158.7	110.6	42.1	**39.8**
	LOS	F	C		F	C	A	F	F	F	F	F	D	**D**
SR 414 @ Magnolia Homes Rd	Delay	188.0	17.6	0.0	202.5	6.1	0.0	168.9	133.7			118.0		**24.9**
	LOS	F	B		F	A		F	F			F		**C**
SR 434 @ SR 414 Ramps	Delay	93.1		7.8	75.2		33.2	97.0	39.9	5.5	86.9	30.5	3.0	**41.3**
	LOS	F		A	E		C	F	D	A	F	C	A	**D**
Maitland Summit Blvd @ SR 414 EB Ramps	Delay	57.9	36.8						27.0	8.4	22.9	5.5		**23.0**
	LOS	E	D						C	A	C	A		**C**
Maitland Summit Blvd @ SR 414 WB Ramps	Delay				52.7	42.5	26.9	27.8	3.9			13.2	1.0	**24.4**
	LOS				D	D	C	C	A			B	A	**C**
Keller Rd @ SR 414 Ramps	Delay	54.7		0.5	38.8		3.9	57.0	40.9	0.2	51.1	31.5	0.0	**22.7**
	LOS	D		A	D		A	E	D	A	D	C		**C**
Lake Destiny Rd @ I-4 Ramps	Delay				44.7		0.1		17.2	7.7	44.8	6.5		**23.8**
	LOS				D		A		B	A	D	A		**C**
SR 414 @ Hope Rd	Delay	55.3	0.3			17.2	1.1						0.3	**10.8**
	LOS	E	A			B	A						A	**B**

Table 3-10. 2019 PM Peak Hour Intersection Operation Results

Intersection	Delay/ LOS	Eastbound			Westbound			Northbound			Southbound			Overall
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Hiawassee Rd @ SR 414 Ramps	Delay	74.8		7.4	76.2		0.8	76.0	10.5	1.7	69.3	13.7	1.9	**22.8**
	LOS	E		A	E		A	E	B	A	E	B	A	**C**
US 441@ SR 4141 Eastbound Ramps	Delay	83.3		15.3					16.3	2.8	87.1	1.8		**20.1**
	LOS	F		B					B	A	F	A		**C**
US 441@ SR 414 Westbound Ramps	Delay	54.6	71.2	28.1	58.5	65.2	19.5	111.1	18.7		93.3	16.6		**23.5**
	LOS	D	E	C	E	E	B	F	B		F	B		**C**
SR 414 @ Bear Lake Rd/Rose Ave	Delay	197.6	37.0	2.8	210.5	52.2	0.3	196.9	188.7	86.2	203.2	194.8	61.7	**75.4**
	LOS	F	D	A	F	D	A	F	F	F	F	F	E	**E**
SR 414 @ Eden Park Rd	Delay	180.5	14.2	0.0	175.8	44.2	3.3	138.2	183.3	1.6	179.4	124.0	41.6	**46.4**
	LOS	F	B		F	D	A	F	F	A	F	F	D	**D**
SR 414 @ Magnolia Homes Rd	Delay	181.0	4.5	0.1	177.7	10.6	0.0	182.1	56.1			115.7		**16.6**
	LOS	F	A	A	F	B		F	E			F		**B**
SR 434 @1 SR 414 Ramps	Delay	77.0		5.5	100.6		76.9	102.6	78.3	0.8	53.4	29.6	3.1	**62.0**
	LOS	E		A	F		E	F	E	A	D	C	A	**E**
Maitland Summit Blvd @ SR 414 EB Ramps	Delay	63.2	24.2						25.8	3.1	7.5	6.0		**13.7**
	LOS	E	C						C	A	A	A		**B**
Maitland Summit Blvd @ SR 414 WB Ramps	Delay				33.5	49.0	5.3	30.4	16.5			24.6	13.9	**28.1**
	LOS				C	D	A	C	B			C	B	**C**
Keller Rd @ SR 414 Ramps	Delay	54.5		0.1	54.0		2.5	57.7	31.1	2.3	48.9	17.2	0.1	**26.2**
	LOS	D		A	D		A	E	C	A	D	B	A	**C**
Lake Destiny Rd @ I-4 Ramps	Delay				40.5				15.4	3.9	44.8	3.5		**20.3**
	LOS				D				B	A	D	A		**C**
SR 414 @1 Hope Rd	Delay	52.5	0.4			7.3	0.9						0.3	**4.7**
	LOS	D	A			A	A						A	**A**

The analysis of the roadway segments and intersections as stand-alone items can be misleading since it may not reflect the traffic operational issues routinely experienced. The reason is that the turning and through movement counts only reflect the traffic volumes that cleared the intersection, not the unmet demand. There is significant queuing of traffic at the intersections on the arterial portion of SR 414 in the AM and PM peaks. Cross street delays and left turning movements on the arterial section of SR 414 are generally over the LOS standards, due to long cycle lengths to accommodate the SR 414 through movements.

The SR 414 and Bear Lake Road/Rose Avenue intersection acts as a bottleneck both in the AM and PM peaks. In the AM peak, the SR 414 east direction experiences a shock wave, with traffic moving at 65 mph or more coming to a stop condition at Bear Lake Rd/Rose Ave intersection. The shockwave extends upstream to the US 441 eastbound off-ramp. The commuters have a choice at this location to either continue SR 414 or take the US 441 eastbound off-ramp exit and use local streets to get to their destinations. This pattern is evident with 1,100+ vph exiting at US 441 while the AADT of the ramp is 5,270, computes to a 20 percent share which is typically very high.

In the PM peak-hours, westbound SR 414 is congested from Bear Lake Road/Rose Avenue intersection to SR 434 westbound off-ramp exit. The commuters have a choice at this location to either continue on SR 414 or take the SR 434 westbound off-ramp exit and use local streets to get to their destinations. This pattern is evident with 1,650 vph exiting at SR 434 while the AADT of the ramp is 10,780, which translates to a 15 percent PM peak share, which is on the higher side. One of the reasons for this congestion is that traffic gets funneled into this intersection, i.e., the eastbound/westbound green times at two intersections, Eden Park Road and Magnolia Homes Road, are higher than the green time at Bear Lake Road/Rose Avenue intersection. This creates a funneling effect and results in a stop and go conditions. There is minimal progression even with over 150 seconds of green time in the westbound through direction. The long cycle lengths also occasionally result in westbound left-turn lane at Bear Lake intersection to spill back into the through lanes, even with a left turn volume of only 107 vph.

The existing turn bay storage and Synchro 50th and 95th percentile queue lengths for each turn movement at the study intersections are presented in **Table 3-11**. It's important to note that Synhro has limitations in estimating queue lengths for saturated conditions, as indicated in the tables' footnotes. The queue lengths in the table are provided for information only. Queue lengths and storage length recommendations for saturated conditions should be based on a properly calibrated microsimulation model.

Table 3-11. 2019 Synchro Peak Hour 50th and 95th Percentile Queue Lengths

Intersection	Movement	Storage Length (ft)	50th Percentile		95th Percentile	
			AM Peak	PM Peak	AM Peak	PM Peak
Hiawassee Rd @ SR 414 Ramps	EBL	500	108	84	148	122
	EBR	500	139	0	227	22
	WBL	600	62	93	93	132
	WBR	600	0	0	0	0
	NBL	350	36	80	56	118
	NBT		170	183	230	237
	NBR	400	0	0	34	29
	SBL	300	5	6	16	19
	SBT		227	181	354	250
	SBR	300	0	0	4	33
US 441 @ SR 414 Eastbound Ramps	EBL	390	133	41	187	82
	EBR		462	0	536	45
	NBT		208	387	266	504
	NBR	250	0	3	41	27
	SBL	490	92	201	155	257
	SBT		560	72	173	34
US 441 @ SR 414 Westbound Ramps	EBL	450	3	5	13	17
	EBT		15	27	35	60
	EBR	450	56	28	134	128
	WBL	425	67	30	104	62
	WBT		121	52	190	104
	WBR	425	60	26	184	126
	NBL	500	84	79	145	m135
	NBT		130	846	148	436
	NBR		0	0	0	0
	SBL	450	21	68	53	#147
	SBT		423	257	637	355
	SBR	450	0	0	0	0
SR 414 @ Bear Lake Rd/ Rose Ave	EBL	630	133	~477	205	#705
	EBT		1,811	1,031	1,897	1,141
	EBR	630	0	0	24	33
	WBL	550	296	251	#397	m269
	WBT		329	~2690	351	#2700
	WBR	375	0	2	m0	m3
	NBL	330	159	~342	232	#553
	NBT		356	~603	466	#840
	NBR	420	797	348	964	455
	SBL	575	214	142	298	#274
	SBT		456	384	581	#585
	SBR	350	25	157	119	288

Notes: ~ indicates volume exceeds capacity, queue is theoretically infinite,
 # indicates 95th percentile volume exceeds capacity, queue may be longer, and
m indicates volume for 95th percentile queue is metered by upstream signal.

Table 3-11. 2019 Synchro Peak Hour 50th and 95th Percentile Queue Lengths (Cont.)

Intersection	Movement	Storage Length (ft)	50th Percentile		95th Percentile	
			AM Peak	PM Peak	AM Peak	PM Peak
SR 414 @ Magnolia Homes Road	EBL	425	2	5	m2	m6
	EBT		426	110	791	487
	EBR	425	0	1	m0	m1
	WBL	580	277	222	#449	307
	WBT		374	765	554	1,346
	WBR	725	0	0	0	0
	NBL	325	129	143	204	215
	NBT		229	90	#432	204
	SBT		4	4	23	22
SR 434 @ SR 414 Ramps	EBL	600	216	269	268	335
	EBR	750	0	0	43	21
	WBL	900	65	406	97	#529
	WBR	900	144	739	194	#917
	NBL	500	52	65	84	103
	NBT		210	589	269	#653
	NBR	825	0	0	61	0
	SBL	1000	320	130	371	174
	SBT		469	327	543	367
	SBR	800	0	0	56	54
Maitland Summit Blvd @ SR 414 EB Ramps	EBL	450	243	108	321	169
	EBT		127	32	150	57
	NBT		49	55	71	77
	NBR	300	54	0	121	40
	SBL		11	9	26	13
	SBT		26	52	53	110
Maitland Summit Blvd @ SR 414 WB Ramps	WBL	510	151	154	188	176
	WBT		43	334	78	405
	WBR		85	0	179	30
	NBL		7	16	14	24
	NBT		19	76	30	106
	SBT		15	86	30	131
	SBR		0	91	7	224
Keller Rd @ SR 414 Ramps	EBL	400	2	1	10	5
	EBR		0	0	0	0
	WBL	525	375	61	410	87
	WBR	285	45	0	86	27
	NBL	250	31	162	57	215
	NBT		68	226	119	340
	NBR		0	0	0	0
	SBL	275	104	281	141	344
	SBT		71	25	117	52
	SBR	475	0	0	0	0
Lake Destiny Rd @ I-4 Ramps	WBL	365	115	30	173	66
	WBR		0	0	0	0
	NBT		10	25	27	50
	NBR		0	0	18	37
	SBL	300	51	111	95	170
	SBT		13	9	29	17
SR 414 @ Hope Rd	EBL	485	49	48	81	79
	EBT		0	0	0	0
	WBT		620	267	734	330
	WBR	200	4	0	15	10
	SBR		0	0	0	0

Notes: ~ indicates volume exceeds capacity, queue is theoretically infinite,
 # indicates 95th percentile volume exceeds capacity, queue may be longer, and
m indicates volume for 95th percentile queue is metered by upstream signal.

3.6 Crash Analysis

Crash analysis was performed for the SR 414 study corridor. The crash data was collected from west of US 441 to east of SR 434 (PD&E study limits) using the state's Crash Analysis Reporting (CAR) system and Signal Four Analytics. The crash analysis methodology at the intersections included a 500-foot buffer influence area to accurately capture all crashes and used the most recent and complete five-year data set available, 2014 through 2018 data. The study area is characterized by residential neighborhoods and consists of three signalized intersections: Bear Lake Road/Rose Avenue, Eden Park Road and Magnolia Home Road; and two interchanges, US 441, and SR 434. The details from the crash reports were reviewed based on the long forms provided to accurately understand the crash results.

Table 3-12 contains the results for total yearly crashes in the five-year study period. A total of 694 crashes were reported during the five-year analysis period. There was a reduction in the yearly crashes from 2016 to 2018.

Table 3-12. Number of Crashes Per Year

Year	Crashes
2014	149
2015	141
2016	155
2017	140
2018	109
Total	**694**

The crash locations by severity for the five-year period are shown in **Figure 3-8**. Approximately 60 percent of the crashes occurred between west of US 441 to just east of Eden Park Road. There was no linear trend between the year and the number of crashes at each intersection.

Out of the 694 crashes, 507 (approximately 73 percent) occurred at the intersections and 187 (approximately 27 percent) occurred at mid-block locations. The results included two fatalities reported within the five-year analysis period and 164 crashes resulting in injury, whereas 528 (approximately 76 percent) resulted in no injury or property damage only. One of the fatalities occurred at the Bear Lake Road /Rose Avenue intersection on a Saturday at 1:27 AM when the roadway conditions were dry and the lighting was dark. The driver entered the insection going the wrong way causing a head-on collision. The other fatality occurred at a mid-block location at 11:51 PM on a Saturday when the roadway conditions were dry and the lighting was dark. The driver was under the influence of alcohol and driving distracted.

Figure 3-8. Crash Injury Severity

Intersection crash rates were calculated for all five intersections located within the study area. Crash rates were estimated as crashes per Million Entering Vehicles (MEV) for the intersections using a methodology provided by FHWA. Average crash rates were estimated using the total crashes that occurred in the five-year data period at the intersections and dividing it by the number of years collected (five). Since daily traffic counts were not collected for some of the intersection approaches, data from the FDOT's Florida Traffic Online website was used to supplement. The intersection crash rates are shown in **Table 3-13**. To further expand on the analysis, these results should be compared to a facility and intersections similar to the ones in the study area. The crash rates at each of the study area intersections is above the 5-year statewide average crash rate for similar intersection type.

Table 3-13. Intersection Crash Rates

SR 414 Intersection	Total Crashes	Average Crashes[1]	AADT (Approach Volumes)[2]	Intersection Crash Rate[3]	5-year Statewide Avg. Crash Rate[4]
US 441	133	26.6	39,725	1.83	0.667
Bear Lake Rd/Rose Ave	118	23.6	57,600	1.12	0.667
Eden Park Rd	86	17.2	53,850	0.88	0.667
Magnolia Homes Rd	79	15.8	29,150	1.49	0.667
SR 434	91	18.2	54,200	0.92	0.667

[1]Crashes/Years of Data Collected
[2]https://tdaappsprod.dot.state.fl.us/fto/
[3]https://safety.fhwa.dot.gov/local_rural/training/fhwasa1210/s3.cfm
[4]Source: Florida Average Crash Rates for Suburban Spots 2013-2017, 2-3 lanes ww Div'd Raised Median 4 legs.

The mid-block crash locations are the crashes that occurred outside of the intersection influence area of 500 feet. The mid-block locations accounted for 187 crashes (approximately 27 percent) of the total crashes between 2014 and 2018 for the study corridor. The crashes were evenly distributed along the study area and not concentrated in one area. In addition, there was no apparent pattern to the day of the week or time of day when these crashes occurred. Most of the crashes were rear-end, resulting in property damage only, occurring during the day and in dry roadway conditions. Detailed crash data summaries for intersections and mid-block locations are provided in **Appendix E**.

4. Development of Future Year Traffic Forecast

This section contains brief descriptions of the travel demand model and the 2045 design traffic forecasts for the corridors evaluated.

4.1 Model Development

The latest version of the CFX travel demand model was used with a validation year of 2017 and forecast years of 2025 and 2045. This is a regional daily model with a disaggregated zone structure and supporting network in the study area.

4.1.1 Base Year Model (2017)

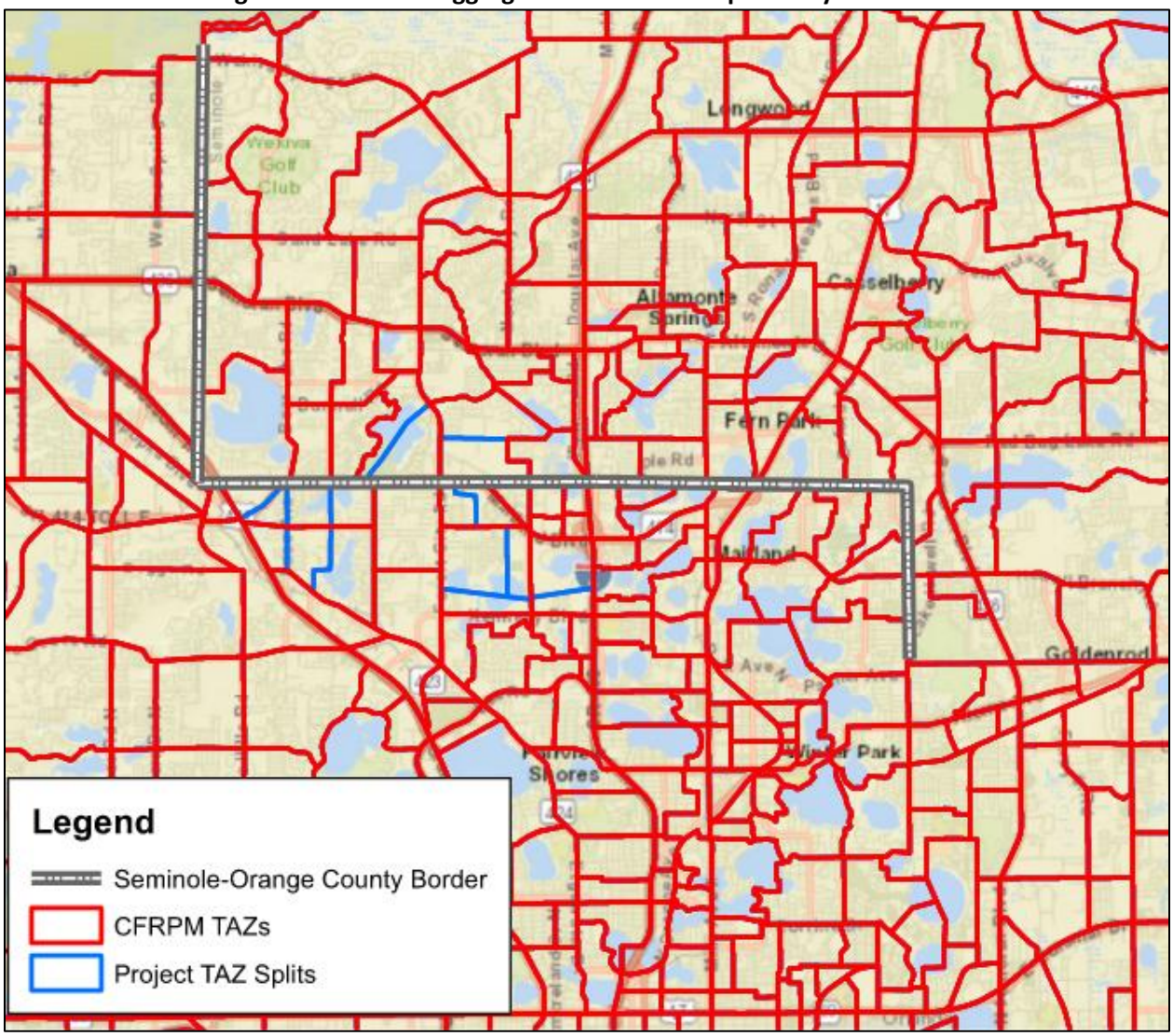
Design traffic for the SR 414 Expressway Extension PD&E study was forecasted using version CFX Model 414 developed specifically for this study. This model was based on the CFX Model Lake Orange Connector (LOC) created specifically for the purpose of evaluating the Lake/Orange County Connector, which incorporated updates/revisions to the CFX Model from previous studies and based on the Central Florida Regional Planning Model (CFRPM) v6.1 model. CFX Model 414 was validated for a 2017 base year with a concentration on the sub-area of Orange, Seminole and Lake Counties. The full model covers all of Orange, Seminole, Osceola, Lake, Sumter, Marion, Volusia, Flagler, Brevard Counties, as well as connected portions of Polk and Indian River County. The 2017 base year was utilized for this analysis due to the on-going construction activities of the I-4 Ultimate project. The I-4 Ultimate project improvements at the I-4 and Maitland Boulevard interchange and supporting roadway network were completely redesigned which altered travel patterns in the study area. The I-4 Ultimate construction activities are expected to be completed in 2022.

The CFX Model 414 comprises a total of 5406 traffic analysis zones (TAZs) including the 56 external zones. The 2017 base year model includes updated 2017 local networks. For the SR 414 Expressway Extension, the zonal structure was updated in the study area to better reflect existing development patterns. For the purpose of evaluating this expressway extension traffic analysis zone disaggregation was needed, as some of the zones were large and cut across links in the transportation network. The zone disaggregation occurred along both sides of SR 414 between US 441 and SR 434. A total of eleven (11) new zones were created. The old zonal structure is depicted with red lines and the new disaggregated zones depicted with blue lines in **Figure 4-1**.

4.1.2 Base Year Model Network

The base year network was developed from the CFX Model LOC network and updated to 2017 conditions. As part of the disaggregation of TAZs, additional local roads were added in the Maitland Center office park and Rose Avenue neighborhoods to allow for better trip distribution in these developed areas and ensure better loading of traffic to the network and SR 414. Using GIS and 2017 aerial imagery, the network facility types, speeds and capacities were checked, concentrating on expressway and arterial facilities, to ensure that the network was properly coded to match existing conditions. Adjustments were made to the link attributes in the study area, including operating speed and capacity.

Figure 4-1. Zone Disaggregation for SR 414 Expressway Extension



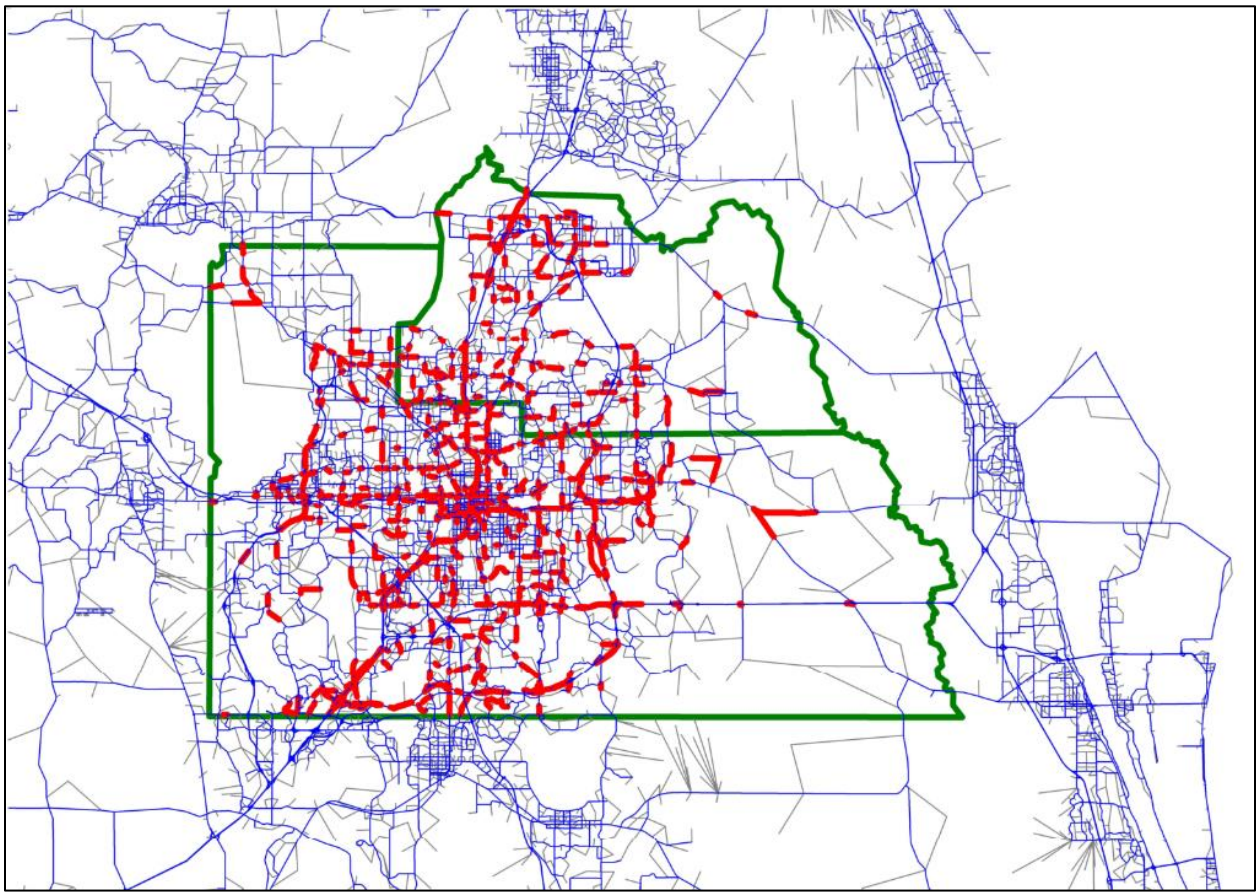
4.1.3 Socioeconomic Data

The CFX Model 414 used the base-year Socio-Economic (SE) data set for 2017 from the CFX Model LOC. Fishkind and Associates (FKA) was employed to develop socioeconomic data for the entirety of Lake and Orange Counties, specifically population, dwelling units/households, school enrollment and employment control totals for the 2017 base year SE data sets, as well as provide 2025, 2035 and 2045 forecasts, for the LOC Model. The base year reevaluation for these two counties was completed using historical population and employment growth rates, property appraiser parcel data, Florida Department of Business and Professional Regulation licensure data, Department of Education data, Woods & Poole data, and DataStory, a third party GIS data service that provides historical socioeconomic data estimates to develop estimates of population, housing units, employment, school enrollment and hotel/units at a county control total level.

4.1.4 Base Year Model Validation

The validation of the CFX Model 414 concentrated on a study area including the Orange and Seminole Counties. The facilities highlighted in red in **Figure 4-2** were the focus locations for the validation effort.

Figure 4-2. CFX Model 414 Project Specific Validation Limits



Two ways to evaluate the goodness of fit for a regional model are the ratio of model predicted volumes to counts and root-mean squared error (RMSE). The Florida Department of Transportation (FDOT) validation standards suggest that the acceptable range of areawide v/c ratio for a daily model is +/- 5 percent.

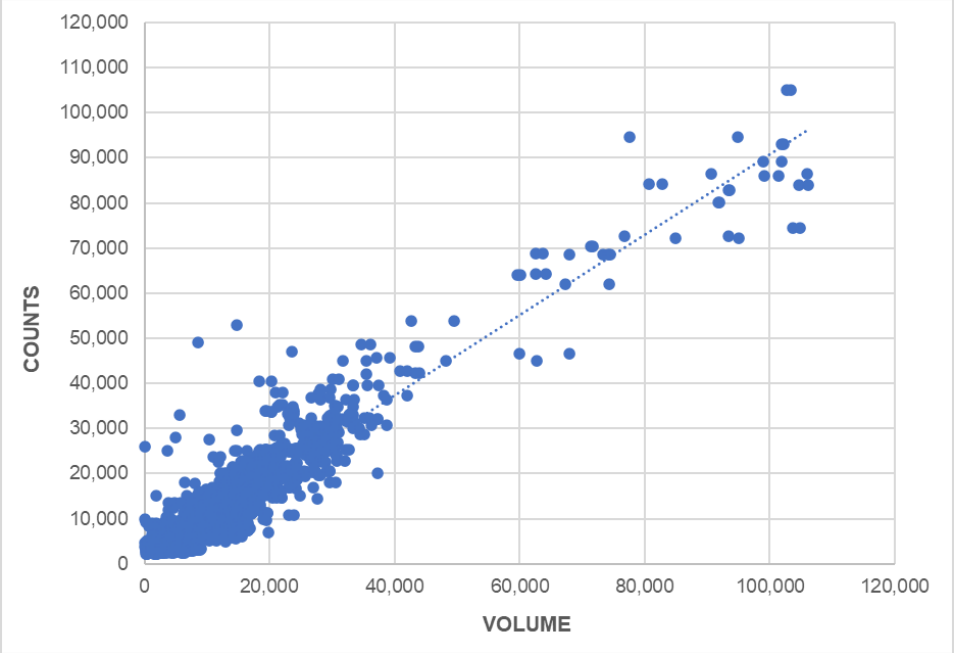
Table 4-1 contains a summary of the daily volume/count ratios and RMSE for the study area link volume groups in the base year model. A total of 1,393 links with counts were included in the analysis. The study area results show that the study area volume/count ratio is 1.04 and RMSE is 33 percent, both are within the overall acceptable range. The volumes on the individual link volume groups are 3-14 percent higher than the counts. When the historical high growth is considered in Orange and Seminole Counties, the validation results are deemed reasonable.

Table 4-1. CFX Model 414 Validation by Volume Groups – 2017 Base Year

Group	Low Range	High Range	RMSE Daily	Volume/Count
<= 5,000 vpd	45%	100%	78.1%	0.70
5,001 – 10,000 vpd	35%	45%	49.8%	1.13
10,001 - 15,000 vpd	27%	35%	38.5%	1.12
15,001 – 20,000 vpd	25%	35%	27.7%	1.14
20,001 – 30,000 vpd	15%	27%	24.5%	1.07
30,001 – 50,000 vpd	15%	25%	24.5%	1.12
50,001 – 60,000 vpd	10%	20%	18.1%	1.11
60,000+ vpd	10%	19%	16.9%	1.11
Study Area	**35%**	**45%**	**33.0%**	**1.04**

Figure 4-3 contains a graph showing the model predicted traffic volumes against traffic counts in the study area. The correlation between the two is very close (R^2 = 0.89).

Figure 4-3. CFX Model 414 Validation Results – 2017 Base Year



4.2 Future Year Models

By starting with the CFX Model 414, the future year models retained all the updates and enhancements created for previous models and with additional base year model improvements in the study area. The design traffic forecast year was set to 2045, consistent with the requirements for CFX projects. Loaded network plots of the 2045 No-Build and Build conditions are provided in **Appendix H**.

4.2.1 Socioeconomic Forecasts

New independent socioeconomic forecasts of population, school enrollment and employment were developed by FKA for the entirety of Orange and Lake Counties for the Lake/Orange County Connector project which were also incorporated into this project model. FKA considered the historical growth rates, as well as published forecasts from the Bureau of Economic and Business Research and Woods & Poole to develop forecasts of population at a county control total level. Employment control total forecasts were estimated in a similar fashion, using Woods & Poole, ESRI and Data Story sources. School enrollment forecasts were completed by geocoding the existing 2017 enrollments for K-12 students for public and private schools in the study area, analyzing the county-specific detailed age profile forecasts, estimating future control totals for each county, and allocating forecasted student enrollment based on each TAZs' share of the current student allocations. FKA used a land use allocation model to allocate the population and employment control total forecasts in the study area. FKA considered market characteristics including acres of developable vacant land, holding capacity of vacant land, developments of regional impact and other approved developments, utility, and transportation access proximity, surrounding land use compatibility and other variables to determine the attractiveness of development. There were no changes in the SE data forecasts in this study.

4.2.2 Future Year Networks

The future year networks from the CFX Model LOC were updated to incorporate network changes to the link attribute revisions completed to the base year network and checked for additional updates needed in the study area to reflect planned improvements in the study area. One network improvement to note is the recoding of the new I-4 Ultimate Improvements at the Maitland Boulevard/SR 414 interchange. The existing interchange and supporting roadway network changed significantly as part of the I-4 Ultimate project and were not reflected in the previous model network.

The future year networks in the model contained the transportation improvements identified in the CFX, FDOT and county work programs, as well as the improvements included in the cost feasible plan from Metroplan Orlando's Long-Range Transportation Plan (LRTP) for year 2040. The 2045 network improvements of note included:

- 6-lane SR 429 from Seidel Road to SR 414
- 10-lane I-4 Ultimate Improvement from SR 408 to SR 434
- 4-lane Wekiva Parkway/SR 429 from Mt. Plymouth Road to I-4

The Metroplan Orlando 2040 LRTP includes a 6-lane arterial improvement to SR 414, so a 6-lane arterial improvement was assumed as the No-Build alternative in the future year networks, west of SR 434.

4.2.3 Model Growth Rates

To develop estimates of design traffic, model volumes for the year 2045 under No-build conditions were pulled from the project-specific travel demand model. The No-build scenarios was then compared against the year 2017 validated project-specific model run to establish 2017-2045 growth rates. These growth rates were evaluated against historical growth rates and adjusted for reasonableness, as presented in **Table 4-2**. The adjusted growth rates were used in developing the initial future year traffic profiles. Future estimates were further adjusted for K&D and balanced.

Table 4-2. Model Growth Rates – 2017-2045

Location	Facility Type	2045 No-Build		2045 Build	
		Model	Adjusted	Model	Adjusted
SR 414, West of US 441	Expressway	2.6%	2.6%	4.5%	3.7%
SR 414, between US 441 and Bear Lake Rd	Class I Arterial	2.3%	2.3%	5.5%	3.7%
SR 414, between Bear Lake Rd and Eden Park Rd	Class I Arterial	2.4%	2.4%	6.2%	3.7%
SR 414, between Eden Park Rd and Magnolia Homes Rd	Class I Arterial	2.4%	2.4%	6.3%	3.7%
SR 414, between Magnolia Homes Rd and Gateway Dr	Class I Arterial	1.5%	1.5%	4.0%	3.7%
SR 414, between Gateway Dr and SR 434 Ramps	Class I Arterial	1.3%	1.3%	4.0%	3.7%
SR 414, between the SR 434 Ramps	Uninterrupted Highway	1.1%	1.1%	2.4%	3.7%
US 441, south of SR 414	Class I Arterial	0.9%	0.5%	0.8%	2.0%
US 441, north of SR 414	Class I Arterial	0.2%	0.5%	0.5%	2.0%
Rose Ave, south of SR 414	Collector	0.5%	0.5%	1.2%	0.5%
Bear Lake Rd, north of SR 414	Collector	0.8%	0.5%	0.6%	0.5%
Eden Park Rd, south of SR 414	Collector	0.3%	0.5%	0.2%	0.5%
Eden Park Rd, north of SR 414	Collector	0.5%	0.5%	0.6%	0.5%
Magnolia Homes Rd, south of SR 414	Collector	-0.2%	0.5%	-0.6%	0.5%
Gateway Dr, north of SR 414	Collector	2.6%	0.5%	3.1%	1.0%
Maitland Summit Dr, south of SR 414	Collector	0.0%	0.5%	0.6%	1.0%
Maitland Summit Dr, north of SR 414	Collector	2.7%	1.0%	1.8%	2.0%

4.2.4 Tolls

To assess the impact of the proposed SR 414 Expressway Extension project as a future toll facility, the forecasts were based on the use of a coefficient of toll (CTOLL). CTOLL is applied to all toll facilities in the model and is the conversion of cost (toll) to time based upon average incomes in the study area incorporated as a time penalty. The model global model has a CTOLL Value of 0.06 or a value of $16.67 per hour.

The Build alternatives for the SR 414 Expressway Extension were evaluated with and without tolls. The alternatives assumed one toll location on the Extension with all-electronic toll collection. For the analysis, the toll rate was set to $0.18 per mile in 2017 dollars for design traffic, consistent with average toll on all new CFX facilities. Toll rates were escalated at 1.5 percent per year according to the CFX Customer First Toll Policy, adopted by the CFX Board in January 2017.

5. Alternatives Analysis

This section provides a description of the traffic analysis completed in the typical section selection and alternatives analysis phases of the study. This section also provides the AADT and DDHV for the preferred alternative in the 2025 opening and 2045 design years.

5.1 Typical Section Analysis

With the project being in the existing SR 414 corridor, the traffic analysis commenced with a study of several proposed typical sections. In addition to the existing (Typical Section 1) and the No-Build (Typical Section 2), five Build typical sections were developed for the study. In the Metroplan Orlando 2040 LRTP, a SR 414/Maitland Boulevard improvement to a 6-lane arterial from US 441 to SR 434 is listed in the Cost Feasible Plan. Since this is a planned improvement in the LRTP, it was considered the No-Build condition. The Build typical sections included an elevated expressway with varying numbers of lanes above a 4-lane arterial, unless otherwise noted, and include:

- Typical Section 3 – 1 lane/direction on the elevated Expressway Extension;
- Typical Section 4 – 2 lanes/direction on the elevated Expressway Extension;
- Typical Section 5 – 2-lane reversible on the elevated Expressway Extension, i.e., two lanes in the peak direction and no lanes in the off-peak direction reversed by time of day; and
- Typical Section 6 – Convertible 3-lane section on elevated Expressway Extension, one lane in each direction with the center lane being physically reversed twice a day; and,
- Typical Section 7 – 1 lane/direction on Expressway Extension & 3 lanes/direction on arterial.

The travel demand model was run for the typical sections under a tolled and non-tolled condition. Using a simple LOS analysis, the typical sections were compared based on LOS using V/C ratios in the daily, AM peak and PM peak-hours based on the FDOT 2020 Quality and LOS Generalized Service Volume tables. The results of the typical section analysis are shown in **Table 5-1**. The red highlighted cells represent a V/C ratio higher than 1.1 or a generalized LOS E condition. This simple LOS analysis provided a high-level capacity analysis to compare the typical sections and help the project team eliminate typical sections from further analysis.

The typical section analysis demonstrated that the Existing (Typical Section 1), No-Build (Typical Section 2) and Typical Section 3 would be below the LOS standards in both the daily and peak-hour/peak-direction conditions, i.e., operate with LOS worse than the standard. Typical Section 5 would also be below the LOS standard in daily and peak-hour/off-peak direction, Typical Section 6 would be below the LOS standard for daily volumes, and Typical Section 7 was below the LOS standard in the peak-hour/peak-direction. The only typical section that was within LOS standards for all three time periods was Typical Section 4. Typical Sections 4 and 6 were selected as viable and given further consideration.

Typical Section 4 construction costs are higher but are offset by the significant capital and operating costs for Typical Section 6. Additionally, higher capacity is provided by Typical Section 4 and provides safer incident management. Therefore, the recommended option for the elevated SR 414 Expressway Extension is Typical Section 4.

Table 5-1. Typical Section LOS Analysis

Typical Section	Description	Lanes per Direction			Volume						Growth Rate
		Expressway		Arterial	Volume			V/C			
		Peak Dir	Off-Peak Dir		AADT	Peak Hour Peak Dir	Peak Hour Off-Peak Dir	Daily	Peak-Hour Peak Dir	Peak-Hour Off-Peak Dir	
1	2019 Existing – 2 lanes/direction on arterial	0	0	2	59,910	2,500	1,688	1.50	1.25	0.84	n/a
2	No-Build – 3 lanes/direction on arterial	0	0	3	75,300	4,070	2,715	1.25	1.34	0.90	1.0%
3	1 lane/direction on Elevated Expressway Extension	1	1	2	94,200	5,090	3,395	1.20	1.32	0.89	2.3%
4	2 lanes/direction on Elevated Expressway Extension	2	2	2	112,100	6,055	4,040	0.95	1.07	0.71	3.5%
5	2-lane reversible on Elevated Expressway Extension	2	0	2	112,100	6,055	4,040	1.13	0.91	1.34	3.5%
6	Convertible 3-lane section on Elevated Expressway Extension	2	1	2	112,100	6,055	4,040	1.14	1.07	1.05	3.5%
7	1 lane/direction on Elevated Expwy Extension & 3 lanes/direction on arterial	1	1	3	105,000	5,670	3,780	1.06	1.17	0.78	3.0%

Service Volume Source: FDOT 2020 Quality and LOS Generalized Service Volume Tables
Travel Demand Model: SR 414 EE (CFX Model 414) - Validated to SR 414 Corridor
AADT/DDHV: Cross-section on SR 414 just east of Magnolia Homes Rd
Toll Rate: $0.18/mile ~ $0.50 for corridor in 2019

Additional screening analysis was conducted for the east and west end transitions for Typical Section 4. Two options were evaluated:

- Option 1 - two-lane expressway ramp with a one-lane arterial ramp connection. Graphically depicted in in **Figure 5-1** and **Figure 5-2**.
- Option 2 - one-lane expressway ramp with a two-lane arterial ramp connection.

Figure 5-1. West End Concept for Expressway Extension Connection – Option 1

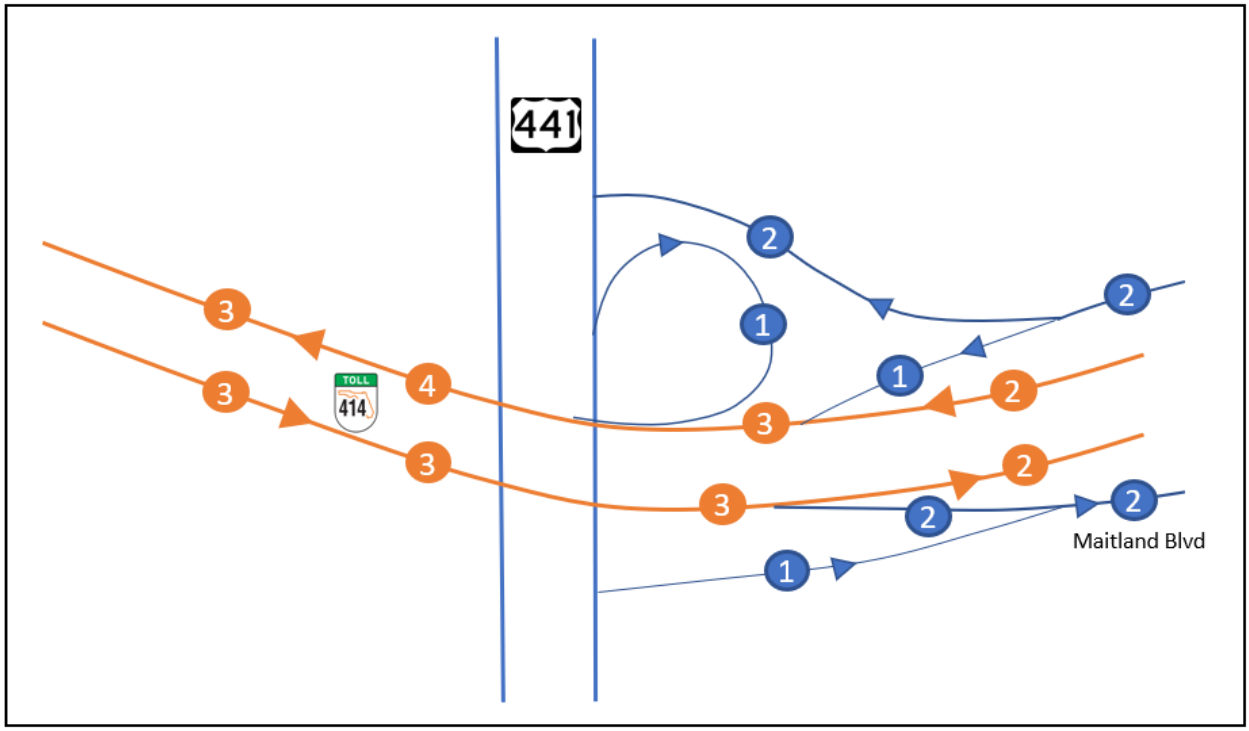
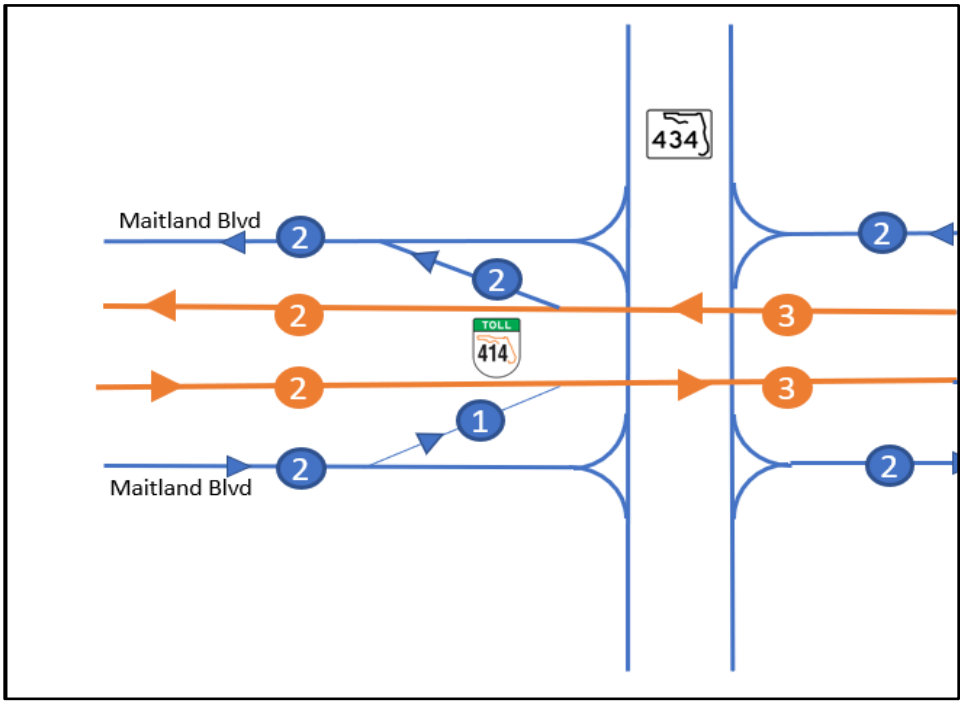


Figure 5-2. East End Concept for Expressway Extension Connection – Option 1



The two options were evaluated using the project section with the maximum volume, which is located west of SR 434, for operational capacity in peak-hour/peak-direction. The results of this analysis are shown in **Table 5-2**. The analysis concluded that Option 1: 2 lane expressway extension ramps with 1 lane arterial ramp performs better than Option 2: 1 lane expressway extension ramp with 2 lane arterial ramps. Under Option 2 the expressway extension is limited to 2,000 vehicles per hour in peak-hour/peak-direction which forces the remainder of demand to the arterial section. Option 2 would have twice as much volume than the capacity can provide.

Table 5-2. 2045 Build End Treatment Concept LOS Analysis

		Option 1 (2L Exp, + 1L Art. End Treatments)				Option 2 (1L Exp, + 2L Art. End Treatments)			
Location	**Facility**	**Lanes per Direction**	**Daily Volume**	**Peak Hr Peak Direction Volume**	**Peak Hr V/C Ratio**	**Lanes per Direction**	**Daily Volume**	**Peak Hr Peak Direction Volume**	**Peak Hr V/C Ratio**
Section 1: West End	Expressway	3	84,000	4,540	0.83	3	84,000	4,540	0.83
Section 2: Maximum Volume Section	Expressway	2	112,000	3,565	0.97	1	112,000	2,000	1.00
	Arterial	2		2,485	1.24	2		4,050	2.03
Section 3: East End	Uninterrupted	2	85,200	4,605	1.42	2	85,200	4,605	1.42

The ramp operational analysis using HCS v 7.6 for both Option 1 and Option 2 is shown in **Table 5-3** and **Table 5-4**. This analysis shows that Option 1 performs at a LOS C or better in both the AM and PM peak-hours, while Option 2 performs at LOS F for both the AM and PM peak-hours.

Table 5-3. 2045 Peak Hour Analysis (Option 1 – 2L Expressway 1L Arterial)

Ramp Junction	Facility	Lanes	Peak Hour Volume	LOS
SR 414 Expressway Extension EB On-Ramp for SR 414 Arterial (AM Peak)	Mainline	2	3,565	C
	Ramp	1	1,040	
SR 414 Expressway Extension EB On-Ramp for SR 414 Arterial (AM Peak)	Mainline	2	3,565	B
	Ramps	1	975	

Table 5-4. 2045 Peak Hour Analysis (Option 2 – 1L Expressway 2L Arterial)

Ramp Junction	Facility	Lanes	Peak Hour Volume	LOS
SR 414 Expressway Extension EB On-Ramp for SR 414 Arterial (AM Peak)	Mainline	1	2,000	F
	Ramp	2	2,605	
SR 414 Expressway Extension EB On-	Mainline	1	2,000	F
	Ramp	2	2,540	

5.1.1 Preferred Build Alternative

As a result of the alternatives analyses conducted for the project, a Preferred Build alternative (Typical Section 4) was identified for further analysis and public input. The proposed posted and design speed for the toll lanes is 50 mph. The proposed SR 414 Expressway Extension typical section for the Build alternative includes maintaining the pavement footprint (118 feet) of the four-lane at-grade Maitland Boulevard but shifts and restripes the lanes to provide a 7-foot-wide buffered bike lane implemented with the elevated SR 414 facility in the median, as four 12-foot-wide express lanes (two lanes per direction) separated by a median barrier wall. Using these recommendations and ongoing traffic analysis, the Build alternative was developed for the corridor to consider connections between existing facilities and include operational improvements at intersections.

5.2 Daily Traffic Forecasts and LOS

A project-specific travel demand model was developed to forecast traffic. The validation of the travel demand model was performed for the base year 2017 as described in detail in **Section 4.1**. Using the validated model, traffic forecasts were developed for the 2045 design year of the project for both No-Build and Build conditions within the project limits. The model volumes were converted from Peak-Season Average Weekday Traffic (PSAWDT) to AADT using a model output conversion factor of 0.98. The future AADTs from the model were compared with 2019 AADTs and adjusted where applicable to ensure reasonableness in growth rates. The adjustments were made to ensure reasonable K/D factors, growth rates, directionality and comparison between No-Build and Build conditions. **Figure 5-3** and **Figure 5-4** below provide AADT for the 2025 and 2045 No-Build conditions, respectively. **Figure 5-5** and **Figure 5-6** provide the AADT for the 2025 and 2045 Build conditions for the preferred Build alternative, respectively.

Figure 5-3. 2025 No-Build AADT

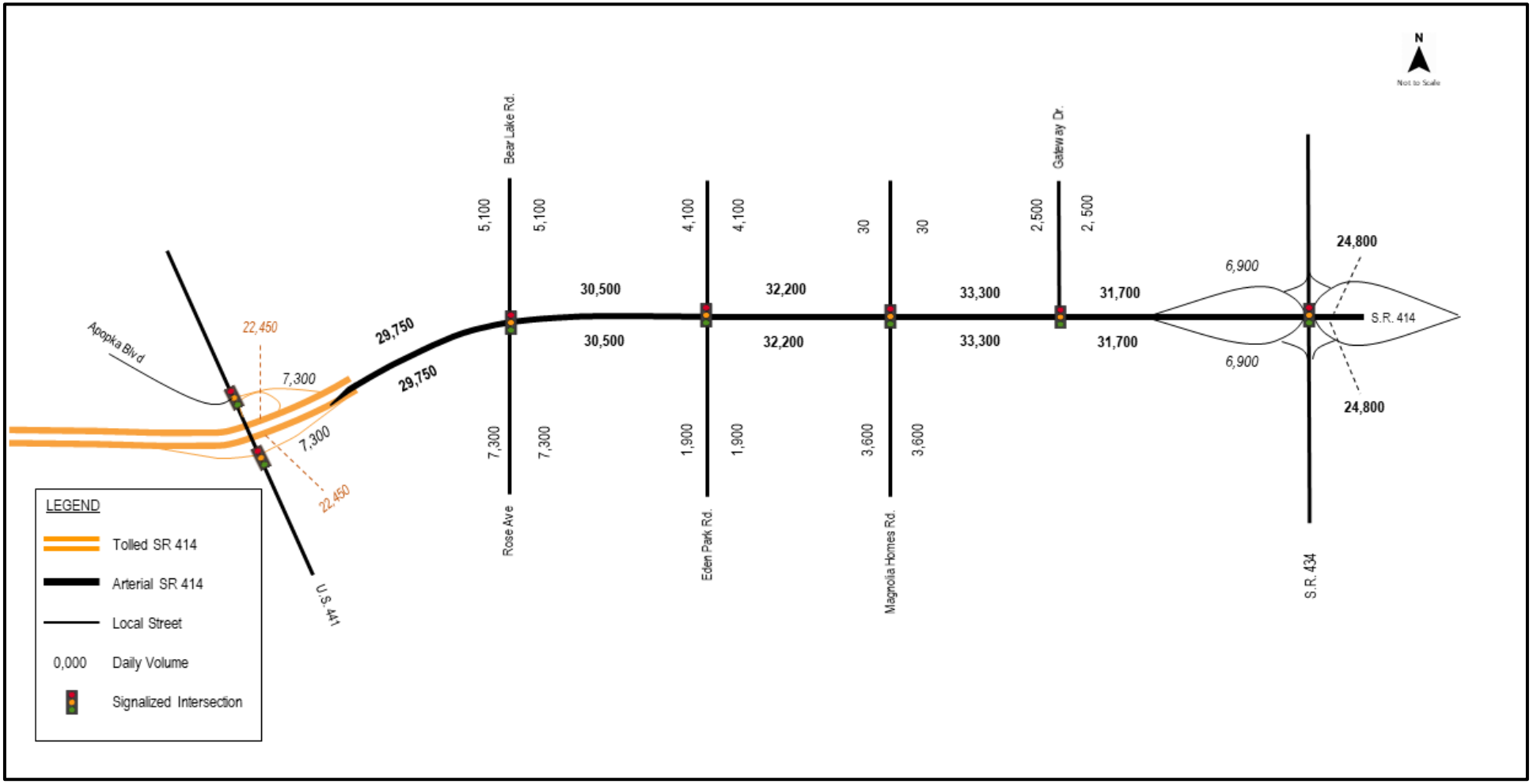


Figure 5-4. 2045 No-Build AADT

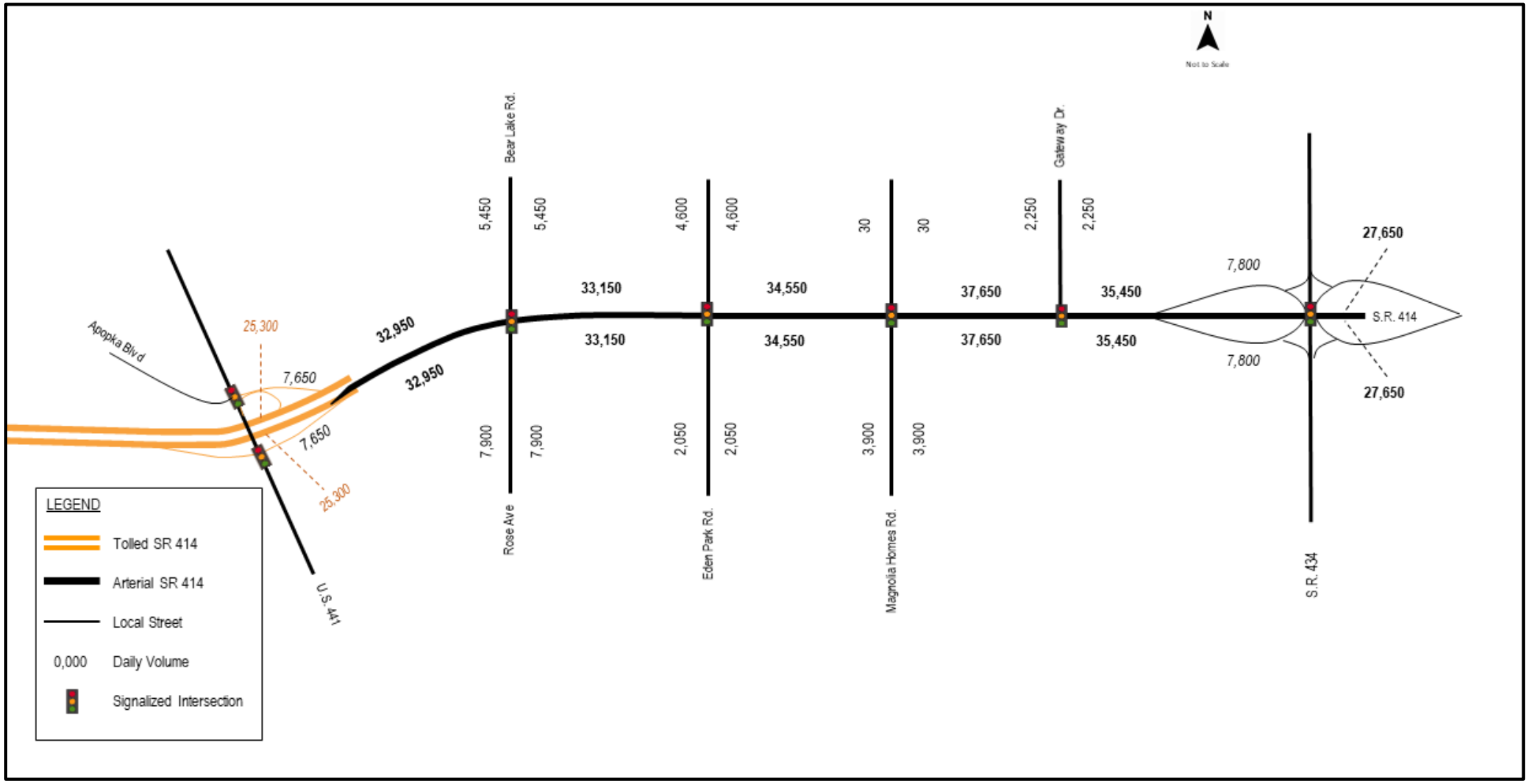


Figure 5-5. 2025 Build AADTs

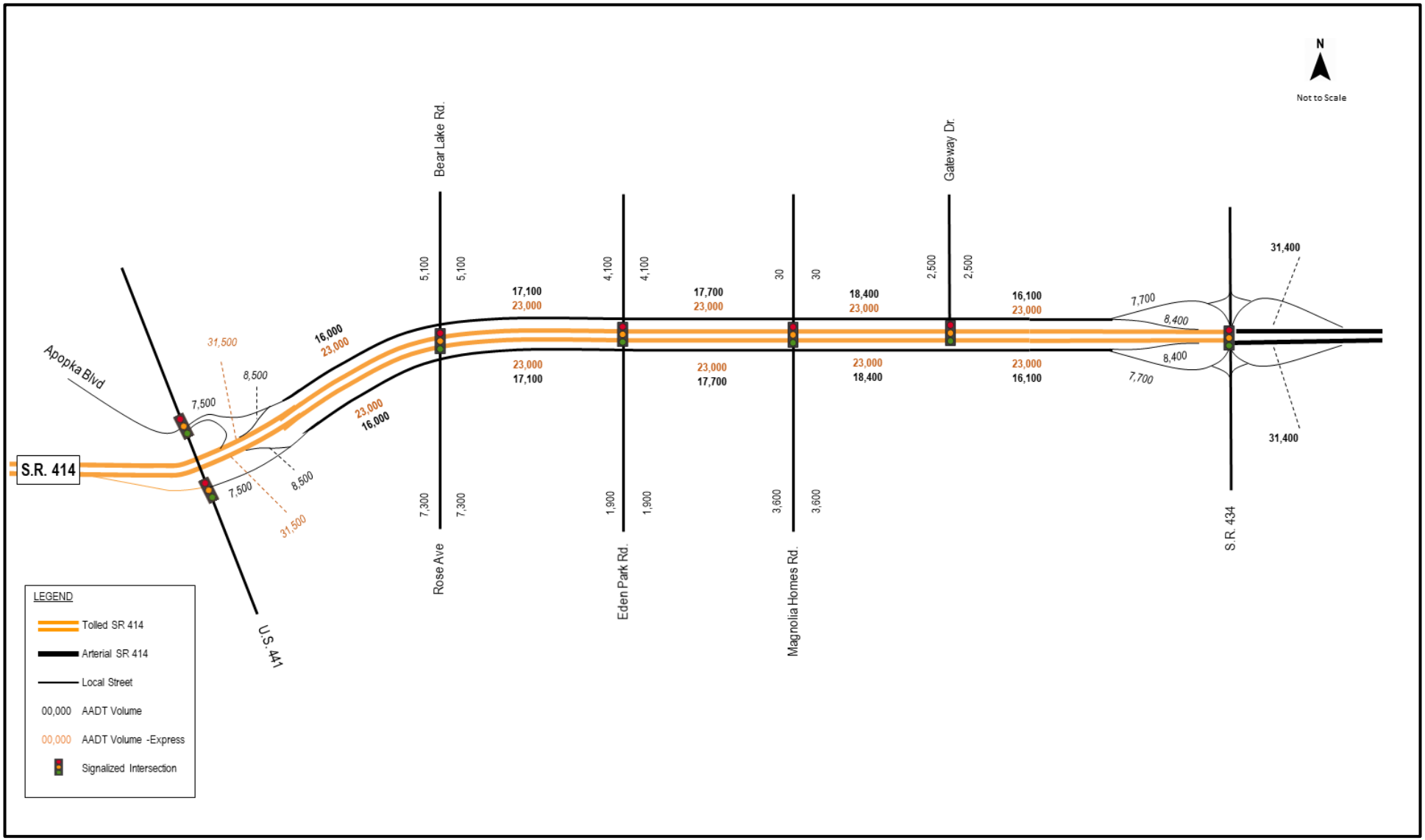
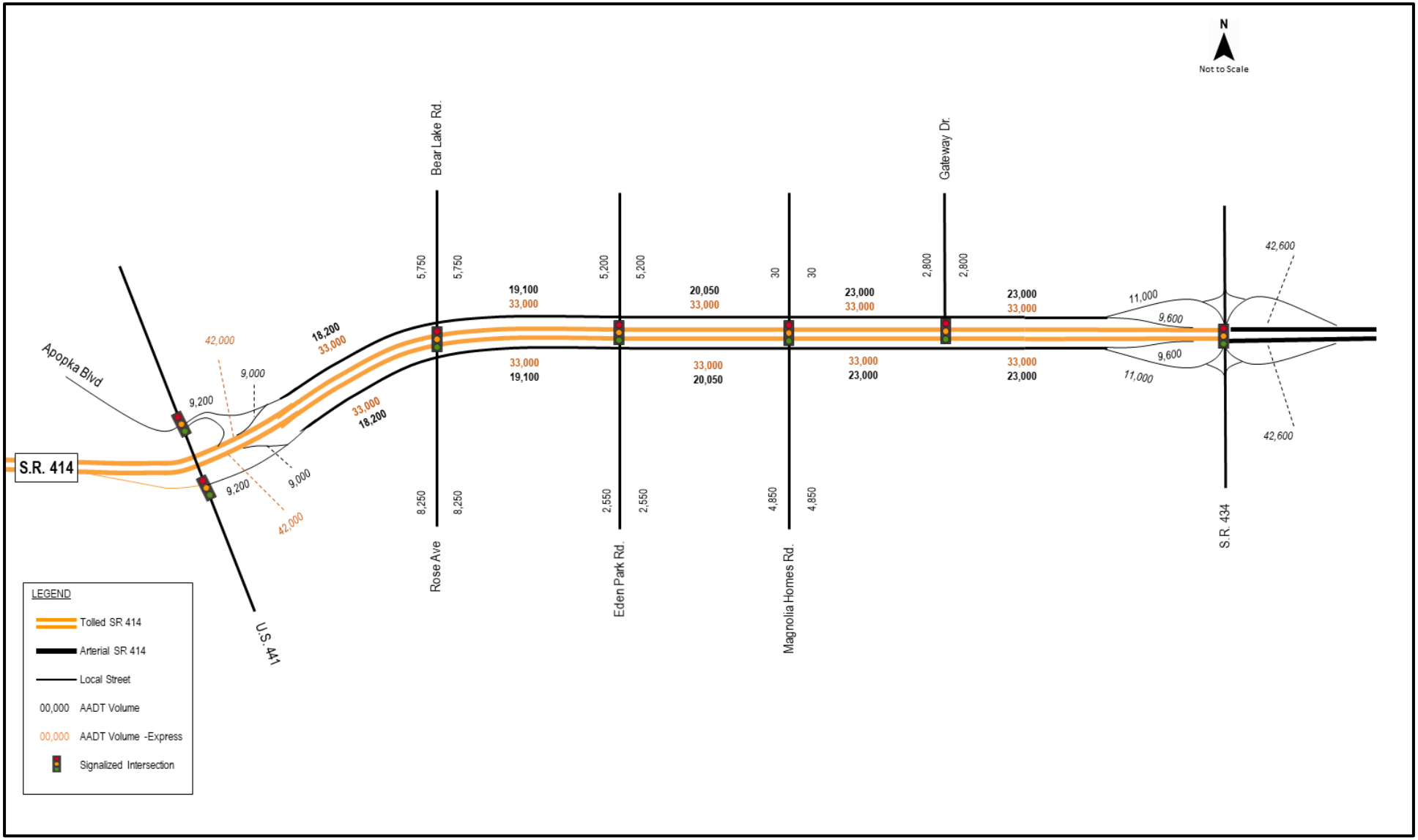


Figure 5-6. 2045 Build AADTs



The daily roadway segment LOS analysis was conducted for the No-Build and Build conditions using the FDOT 2020 Quality and LOS Generalized Service Volume tables. A summary of 2025 and 2045 No-Build daily volumes and LOS are provided in **Table 5-5** and 2025 and 2045 Build daily volumes and LOS are provided in **Table 5-6**. As shown in the tables, all the arterial roadway segments between Bear Lake Road/Rose Avenue and SR 434 are projected to operate at LOS F in 2025 under No-Build conditions, which is assumed as a 6-lane arterial. In 2045 all of the segments between US 441 and SR 434, as well as Rose Avenue south of SR 414 are projected to operate at LOS F. However, under the Build condition, the arterial segments of SR 414 between US 441 and SR 434 are projected to operate at LOS D or better in 2025. In 2045, the arterial section between US 441 and Eden Park Road operates at LOS D or better, and all segments are projected to operate better than existing conditions.

Table 5-5. 2025 and 2045 No-Build AADT and LOS

			2025 No-Build			2045 No-Build		
Location	**Number of Lanes**	**LOS D Service Volume**	**Daily Total**	**V/C**	**Daily LOS**	**Daily Total**	**V/C**	**Daily LOS**
Expressway								
SR 414, btw US 441 Ramps	6	123,600	44,900	0.36	B	50,600	0.41	B
SR 414 Expressway Extension	-	-	-	-	-	-	-	-
SR 414, btw SR 434 Ramps	6	123,600	49,600	0.40	B	55,300	0.45	B
SR 414 Arterial								
SR 414, btw US 441 and Bear Lake Rd	6	59,900	59,500	0.99	D	65,900	1.10	F
SR 414, btw Bear Lake Rd and Eden Park Rd	6	59,900	61,000	1.02	F	66,300	1.11	F
SR 414, btw Eden Park Rd and Magnolia Homes Rd	6	59,900	64,400	1.08	F	69,100	1.15	F
SR 414, btw Magnolia Homes Rd to Gateway Dr	6	59,900	66,600	1.11	F	75,300	1.26	F
SR 414, btw Gateway Dr to SR 434 Ramps	6	59,900	63,400	1.06	F	70,900	1.18	F
Cross Street								
Bear Lake Rd	2	14,800	10,200	0.69	D	10,900	0.74	D
Rose Ave	2	14,800	14,600	0.99	D	15,800	1.07	F
Eden Park Rd N. of SR 414	2	14,800	8,200	0.55	D	9,200	0.62	D
Eden Park Rd S. of SR 414	2	14,800	3,800	0.26	C	4,100	0.28	C
Lake Lotus Park Road	2	14,800	60	0.00	C	60	0.00	C
Magnolia Homes S. of SR 414	2	14,800	7,200	0.49	C	7,800	0.53	D
Gateway Dr N. of SR 414	2	14,800	5,000	0.34	C	4,500	0.30	C

Table 5-6. 2025 and 2045 Build AADT and LOS

			2025 Build			2045 Build		
Location	**Number of Lanes**	**LOS D Service Volume**	**Daily Total**	**V/C**	**Daily LOS**	**Daily Total**	**V/C**	**Daily LOS**
Expressway								
SR 414, btw US 441 Ramps	6	123,600	63,000	0.51	B	84,000	0.68	C
SR 414 Expressway Extension	4	83,200	46,000	0.55	B	66,000	0.79	C
SR 414, btw SR 434 Ramps	6	123,600	62,800	0.51	B	85,200	0.69	C
SR 414 Arterial								
SR 414, btw US 441 and Bear Lake Rd	4	39,800	32,000	0.80	C	36,400	0.91	C
SR 414, btw Bear Lake Rd and Eden Park Rd	4	39,800	34,200	0.86	C	38,200	0.96	D
SR 414, btw Eden Park Rd and Magnolia Homes Rd	4	39,800	35,400	0.89	C	40,100	1.01	F
SR 414, btw Magnolia Homes Rd to Gateway Dr	4	39,800	36,800	0.92	C	46,000	1.16	F
SR 414, btw Gateway Dr to SR 434 Ramps	4	39,800	32,200	0.81	C	41,200	1.04	F
Cross Street								
Bear Lake Rd	2	14,800	10,200	0.69	D	11,500	0.78	D
Rose Ave	2	14,800	14,600	0.99	D	16,500	1.11	F
Eden Park Rd N. of SR 414	2	14,800	8,200	0.55	D	10,400	0.70	D
Eden Park Rd S. of SR 414	2	14,800	3,800	0.26	C	5,100	0.34	C
Lake Lotus Park Road	2	14,800	60	0.00	C	60	0.00	C
Magnolia Homes S. SR 414	2	14,800	7,200	0.49	C	9,700	0.66	D
Gateway Dr N. of SR 414	2	14,800	5,000	0.34	C	5,600	0.38	C

5.3 Roadway Geometry

The future lane geometry for the No-build and Build conditions is presented in **Figures 5-7** and **5-8**. In addition to the proposed toll lanes, the Build alternative includes the extension of a third eastbound lane from the project terminus at SR 434 to Maitland Summit Boulevard, to enhance operations. The additional lane is marked in blue in Figure 5-8. These improvements are considered part of the Build scenario.

Figure 5-7. 2025 and 2045 No-Build Intersection Geometry

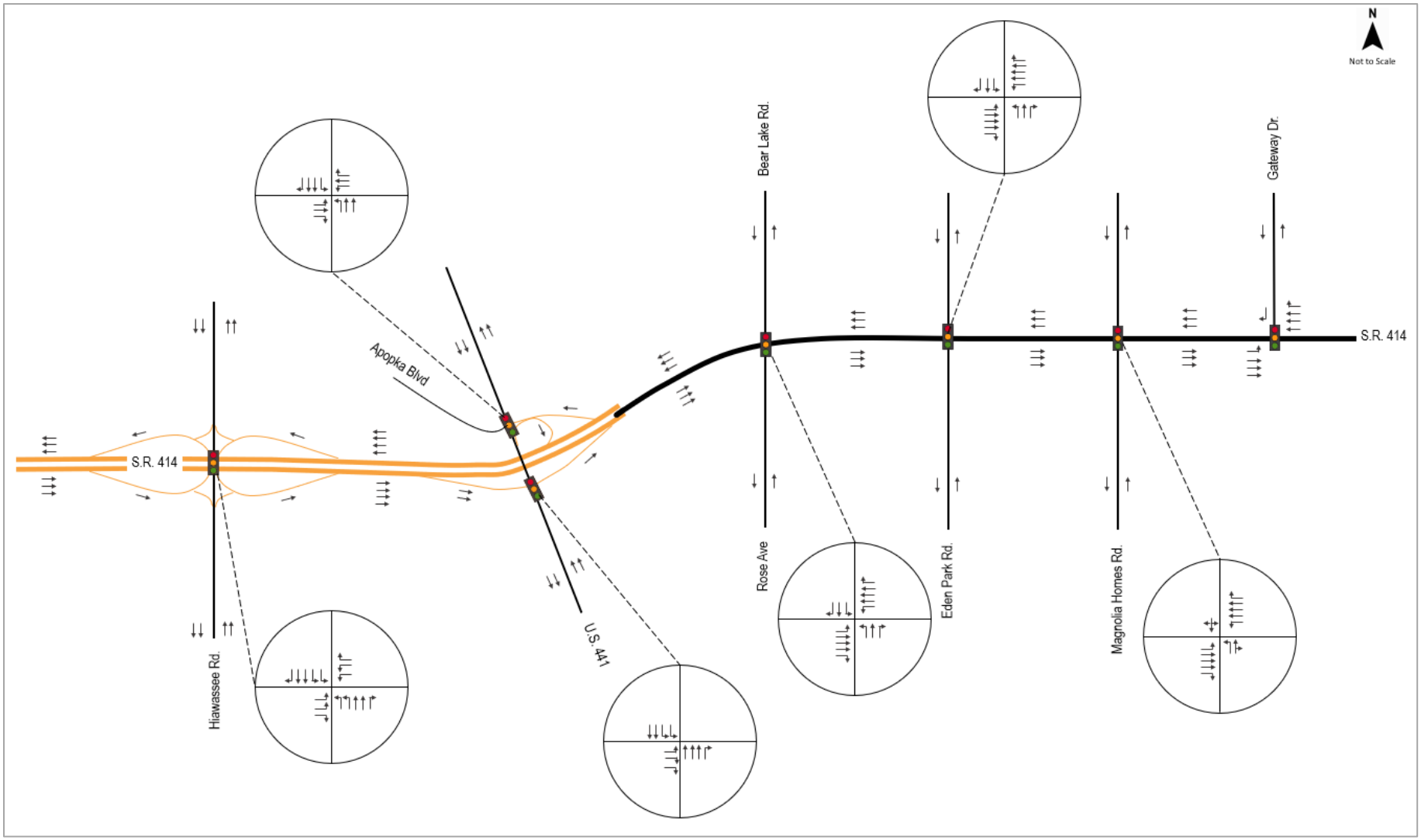


Figure 5-7. 2025 and 2045 No-Build Intersection Geometry (Cont.)

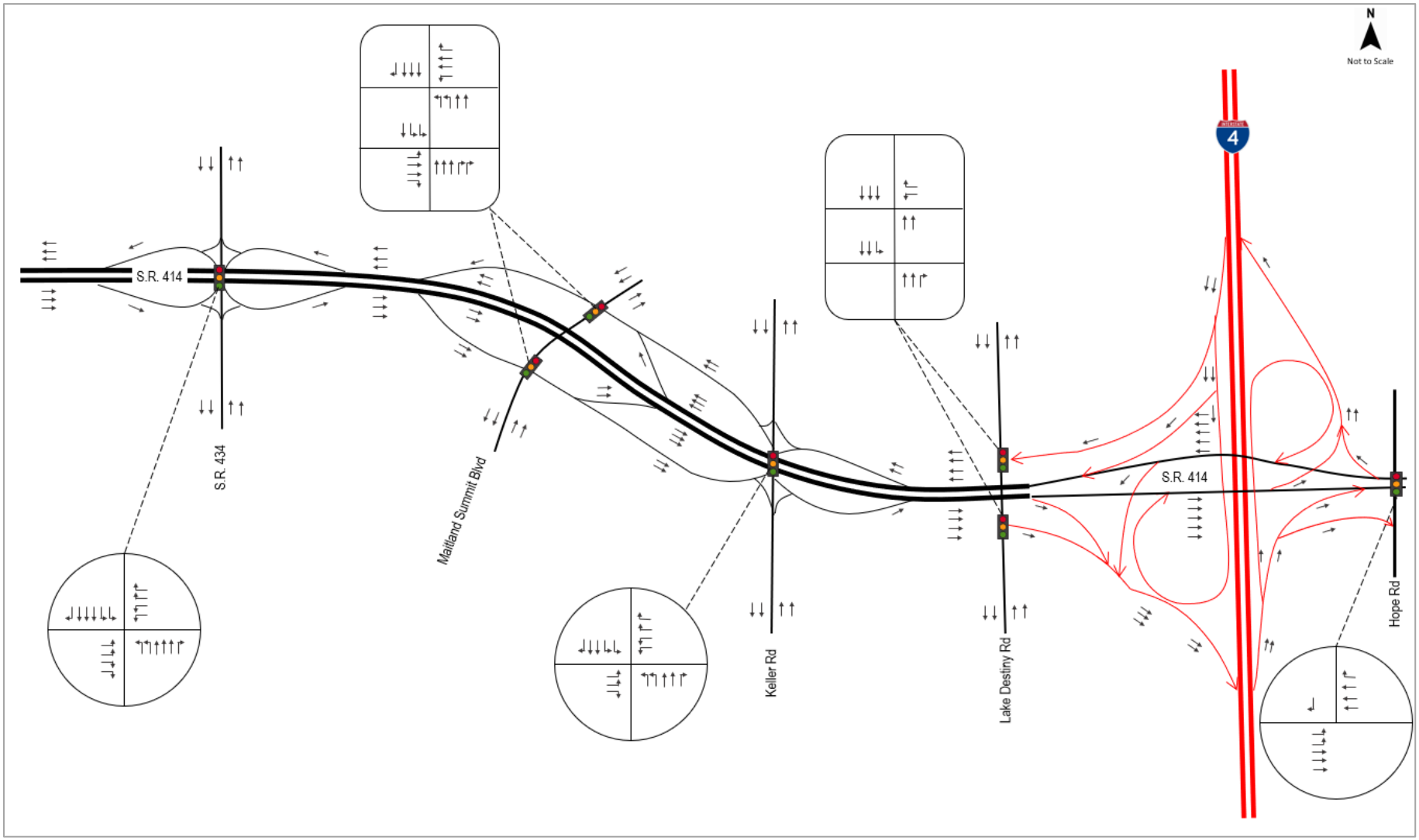


Figure 5-8. 2025 and 2045 Build Intersection Geometry

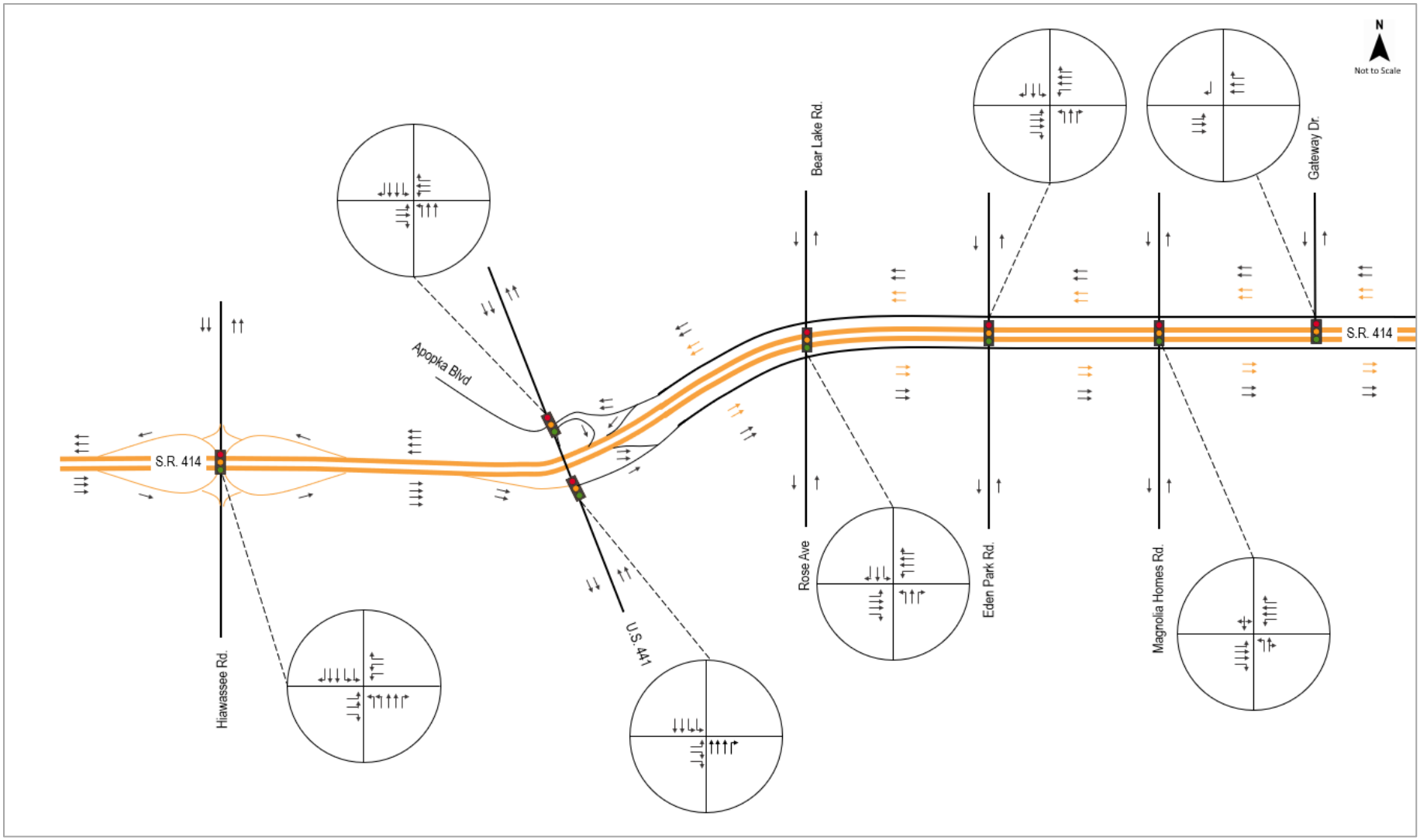
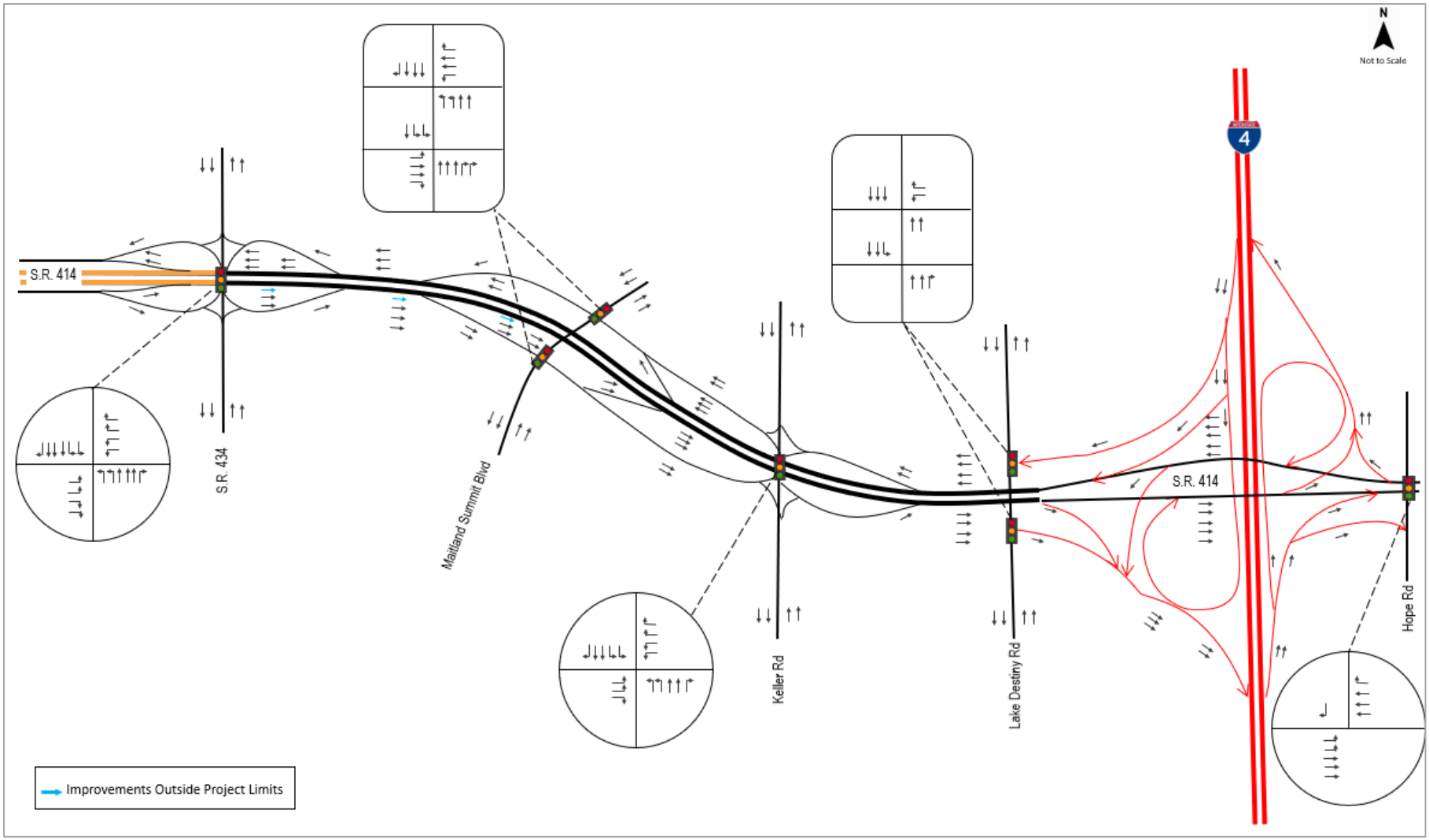


Figure 5-8. 2025 and 2045 Build Intersection Geometry (Cont.)



5.4 Design-Hour Traffic Forecasts and LOS

The DDHVs for the traffic forecast year 2045 were developed for both No-Build and Build conditions, using a combination of growth rates and the K and D factors (described in Section 3.3.3) along with the forecasted AADTs (described and shown in Section 5.2) and existing volumes (described and shown in Section 3.3.4). The 2025 DDHVs were developed by scaling back the 2045 DDHVs using the projected AADTs. DDHVs east of the project limits (SR 434 to Hope Road) were primarily developed using growth rates and balancing from the project terminus at SR 434. The DDHVs for the 2025 opening year and 2045 design year conditions are presented in **Figure 5-9** though **Figure 5-12**. Figures 5-9 and 5-10 are summaries of the 2025 and 2045 No-Build condition DDHVs, respectively. Figures 5-11 and 5-12 present the 2025 and 2045 DDHVs under the Build condition, respectively.

Figure 5-9. 2025 No-Build DDHVs

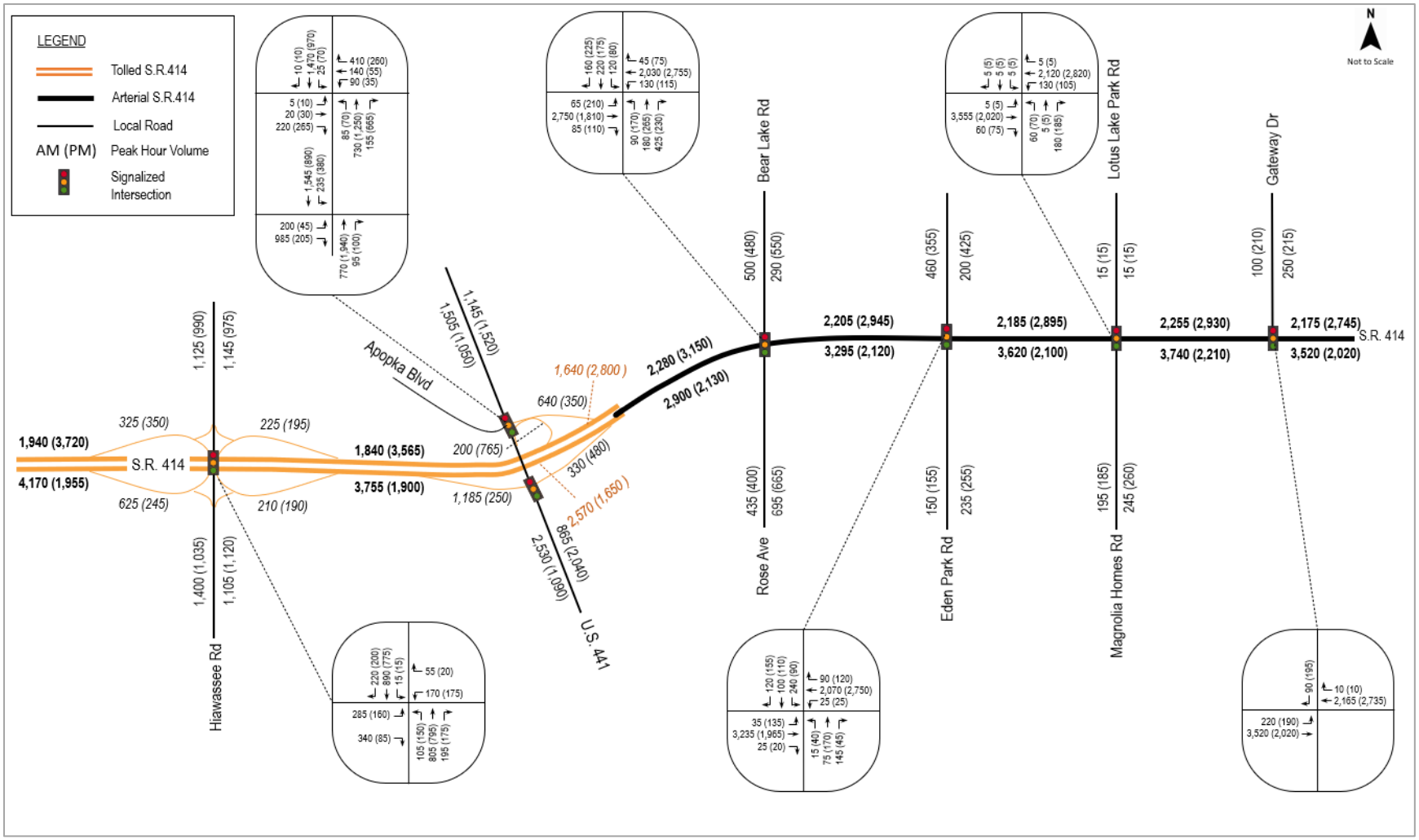


Figure 5-9. 2025 No-Build DDHVs (Cont'd)

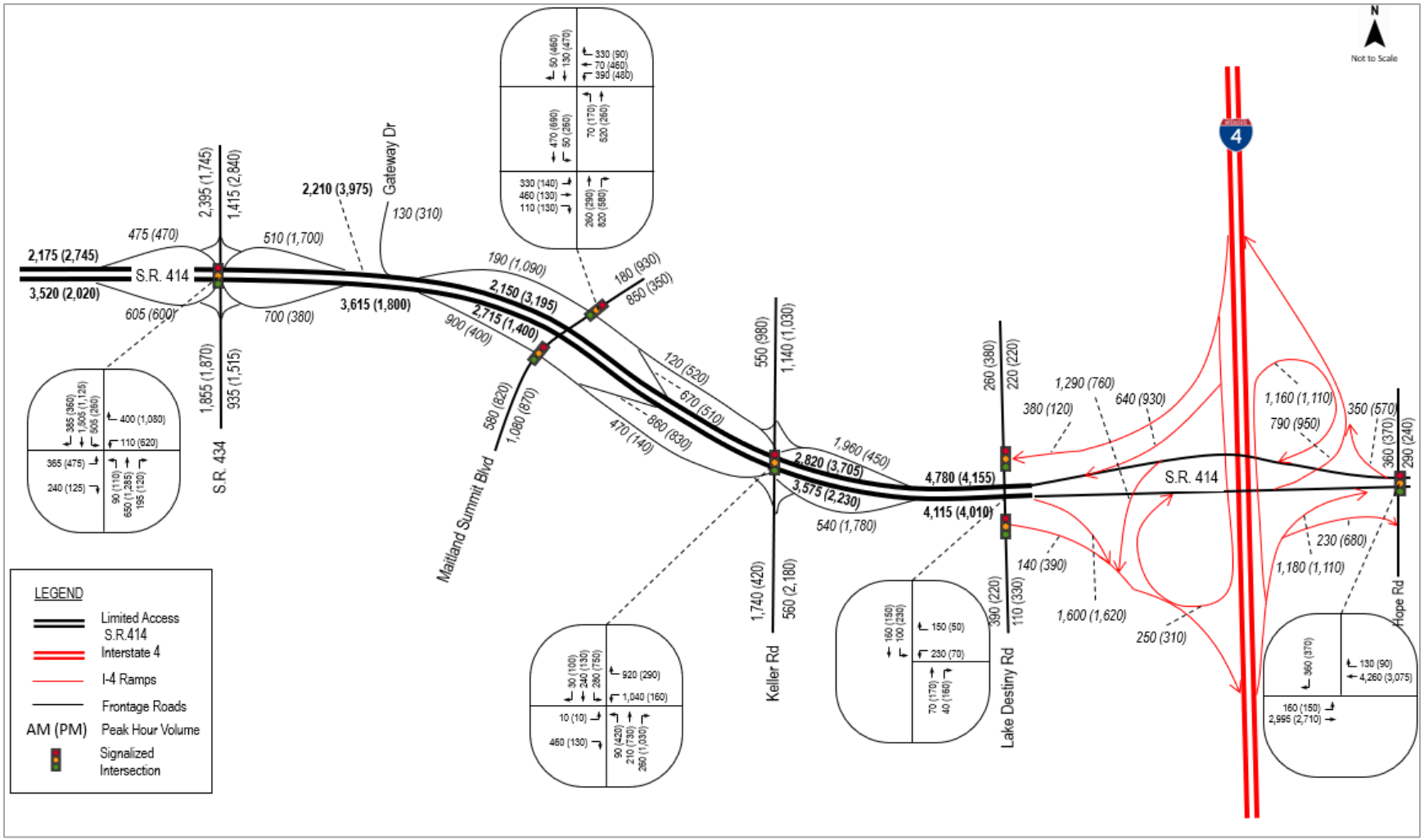


Figure 5-10. 2045 No-Build DDHVs

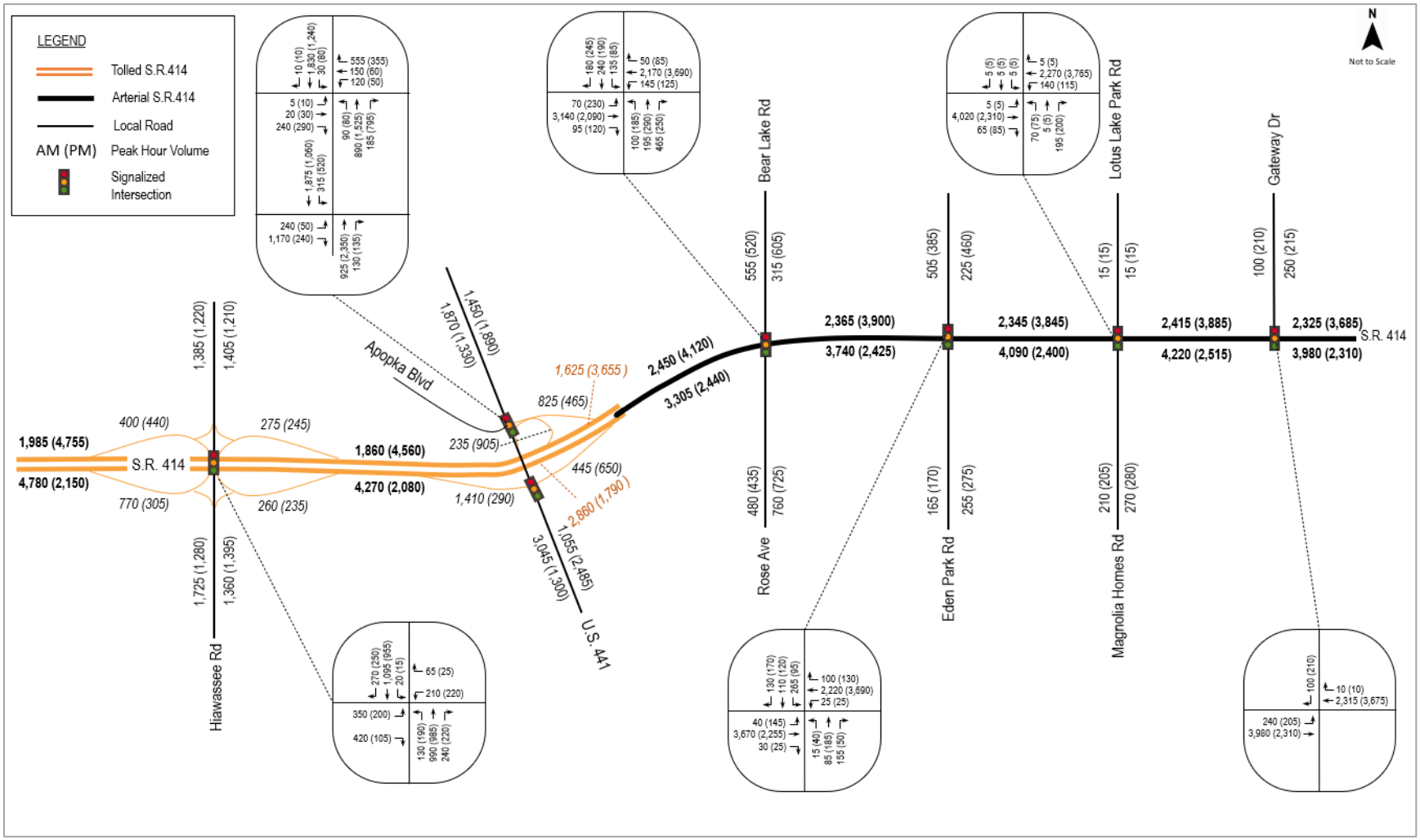


Figure 5-10. 2045 No-Build DDHVs (Cont'd)

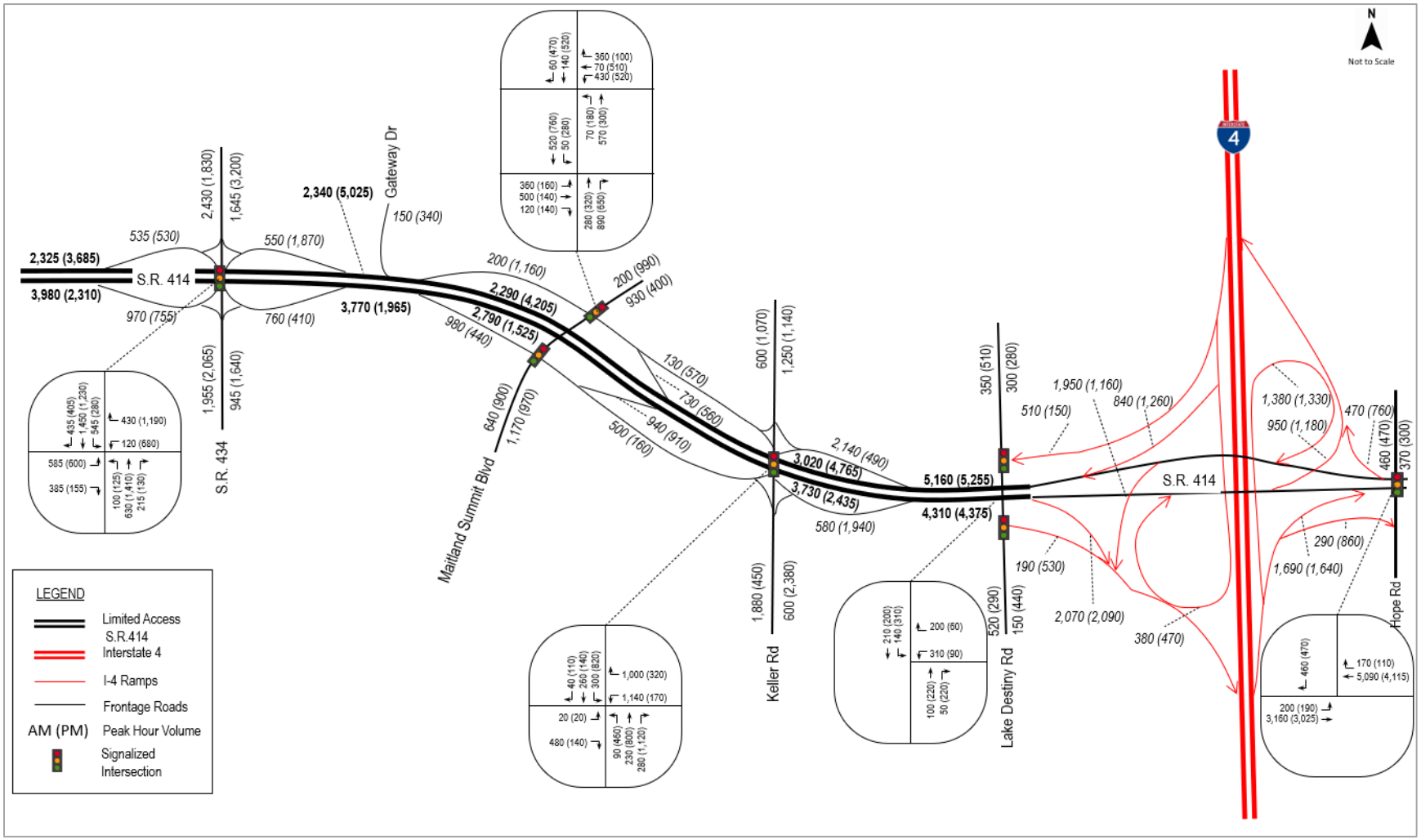


Figure 5-11. 2025 Build DDHVs

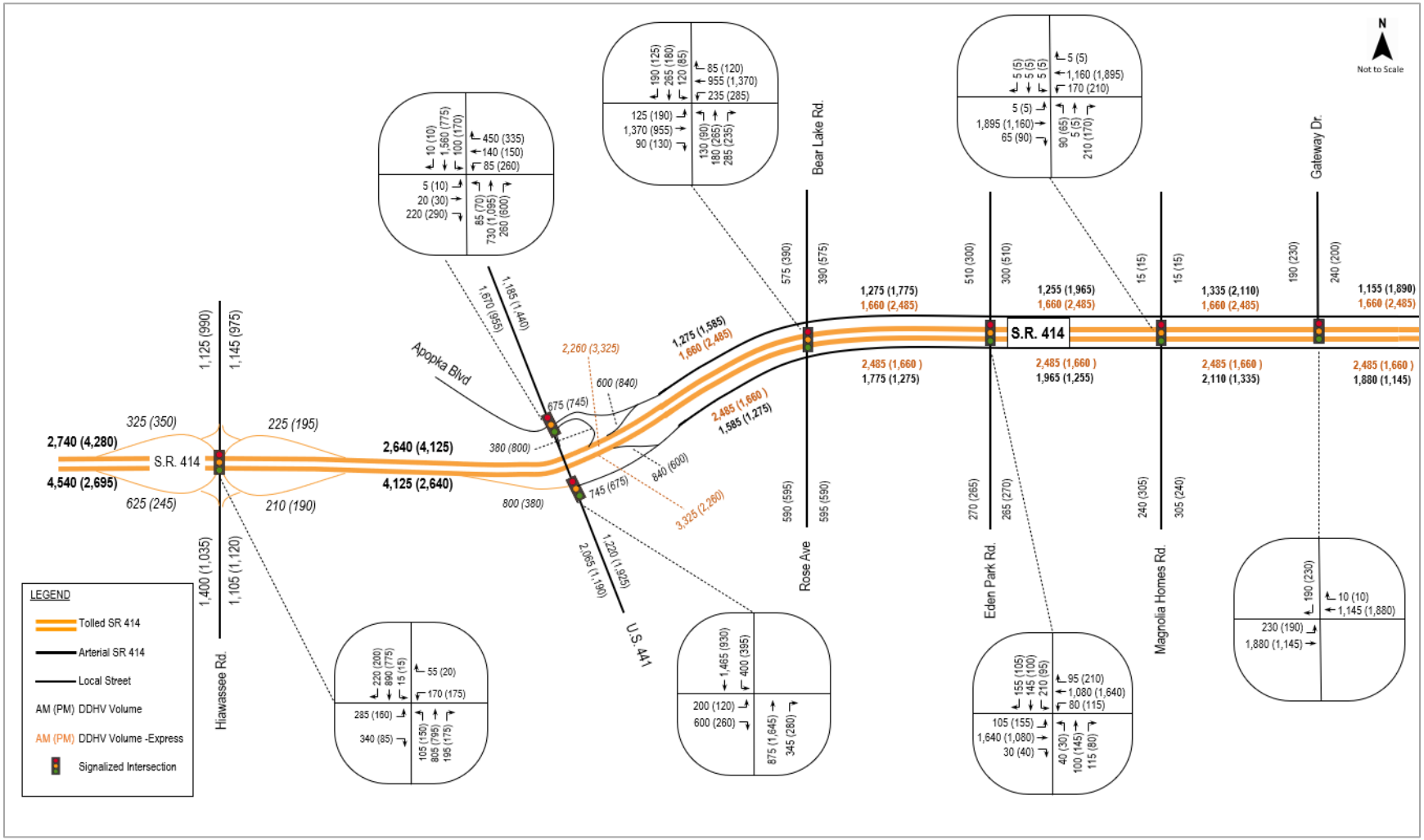


Figure 5-11. 2025 Build DDHVs (Cont'd)

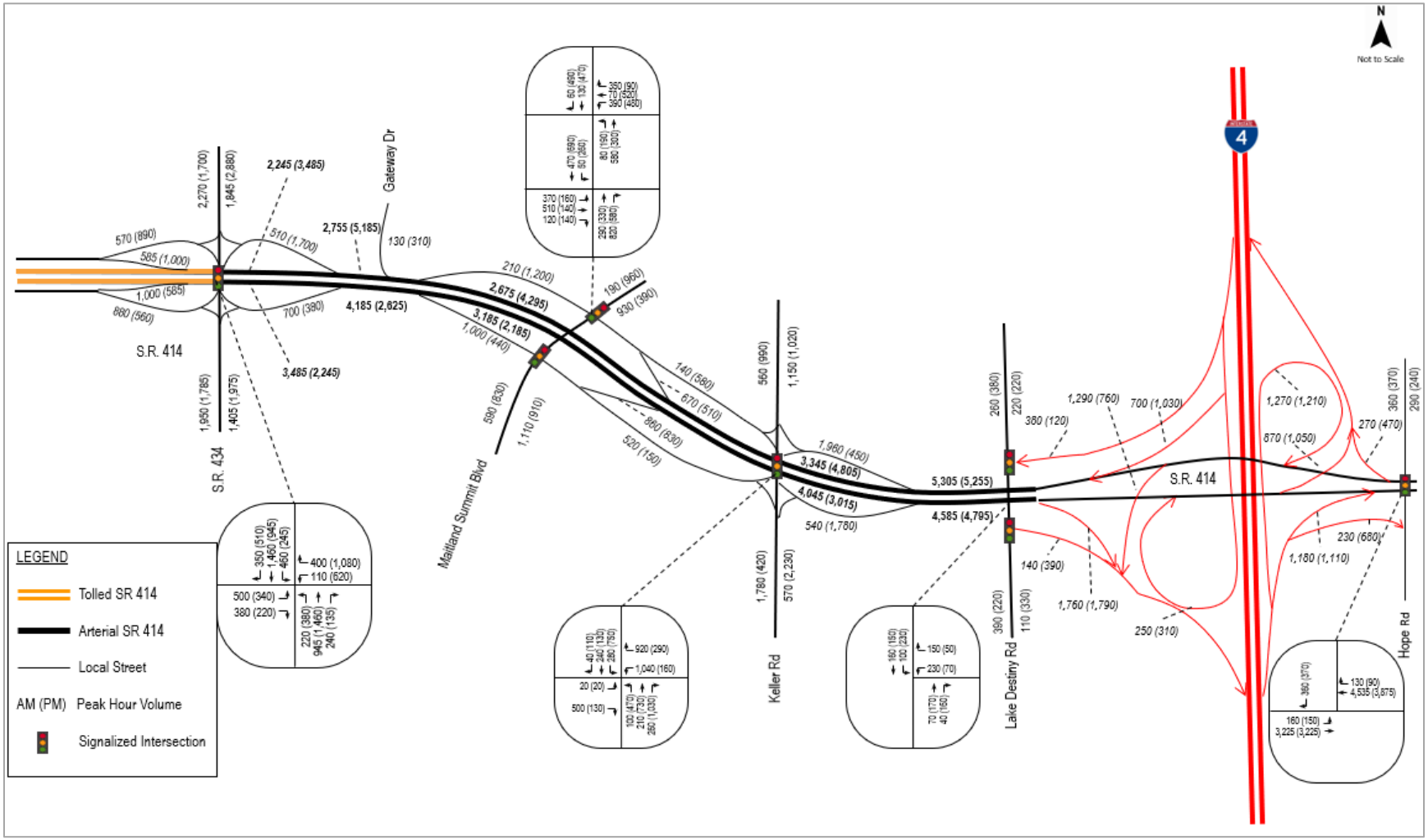


Figure 5-12. 2045 Build DDHVs

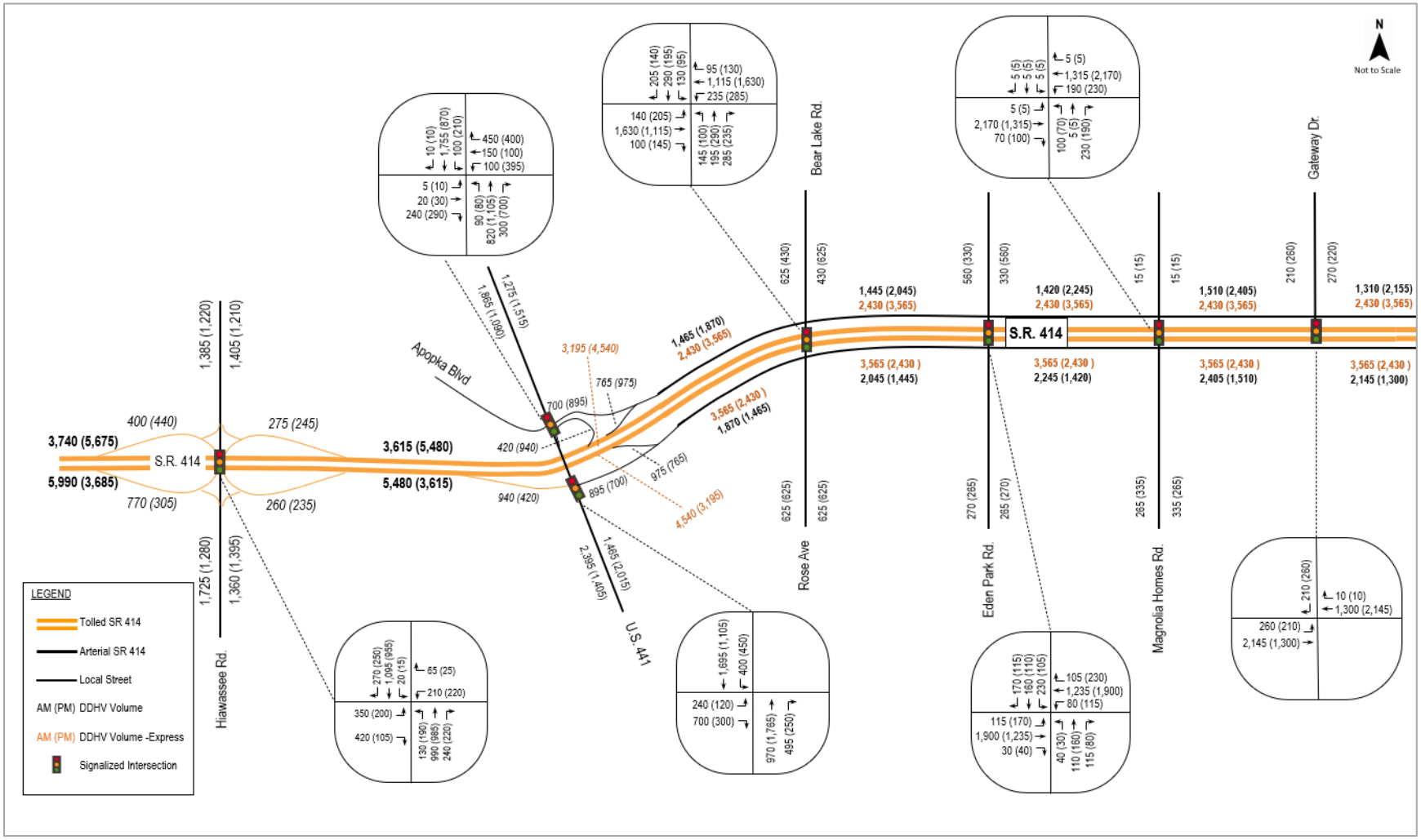
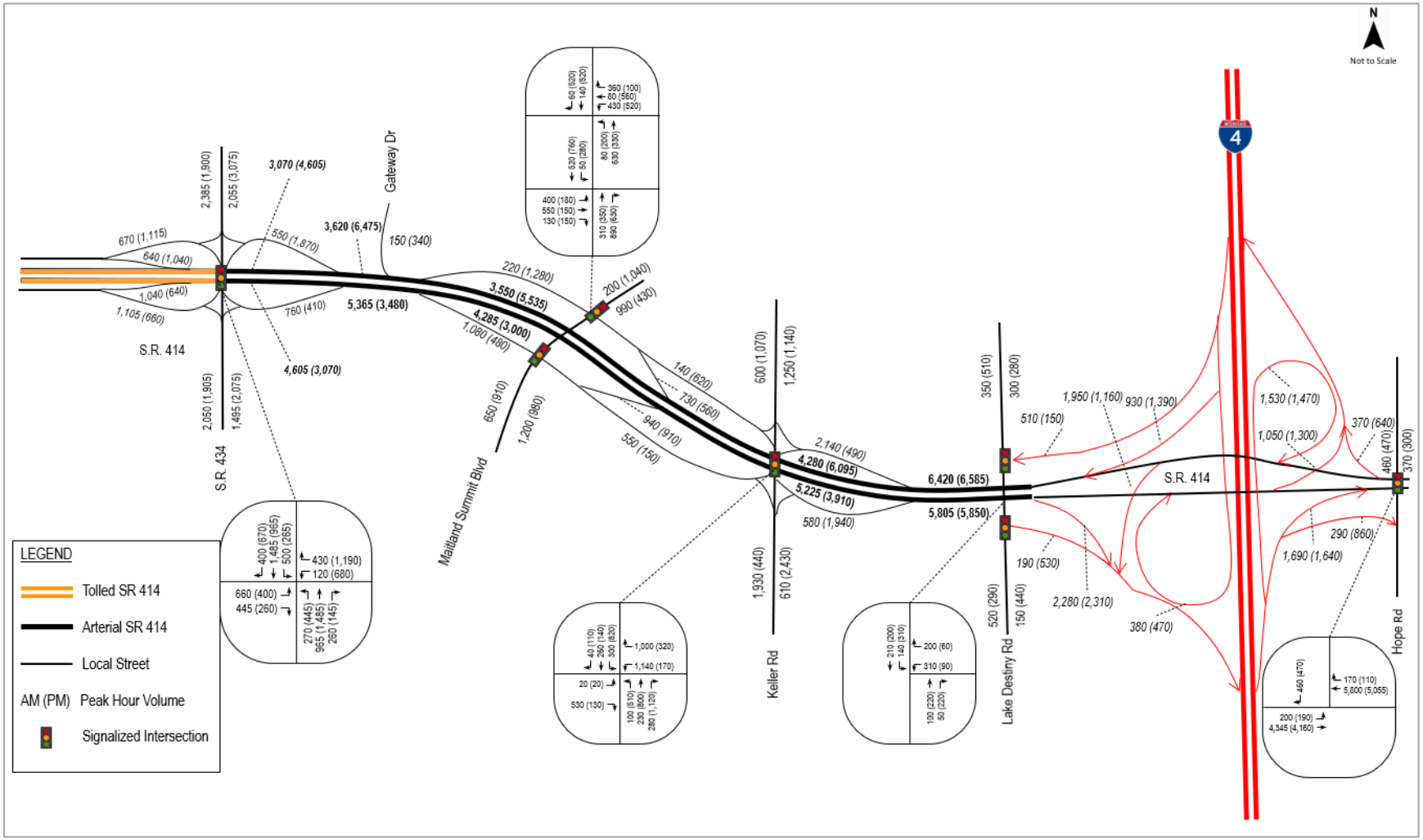


Figure 5-12. 2045 Build DDHVs (Cont'd)



The roadway segment LOS analysis was conducted for the 2025 and 2045 AM and PM peak hours for the No-Build and Build conditions using the projected DDHVs and the FDOT 2020 Quality and LOS Generalized Service Volume tables. A summary of the results is provided in **Tables 5-7** and **Table 5-8** for the No-Build and Build, respectively.

As shown in the tables, most of the arterial roadway segments between US 441 and SR 434 are projected to operate at LOS F in the eastbound 2025 AM peak pour peak direction, for the No-Build condition, which is assumed to be three lanes in each direction. In 2045 AM peak hour, all the arterial roadway segments between US 441 and SR 434 are projected to operate at LOS F under No-Build conditions. All the cross streets are projected to operate at a LOS D or better in the 2025 and 2045 AM and PM peak hours under No-Build conditions.

In 2025 under the Build condition, the arterial segments of SR 414 between US 441 and SR 434 are expected to operate at LOS D or better, with the exception of the segment between Magnolia Homes Road and Gateway Drive in the peak direction. In 2045, the arterial segments of SR 414 between Bear Lake Road/Rose Avenue and SR 434 west ramps are expected to operate at LOS F. In the AM Peak Hour, however, all segments are projected to operate better than existing conditions. All the cross streets are projected to operate at a LOS D or better in the AM and PM peak hours, except Rose Avenue south of SR 414, which is projected to operate at LOS E in the AM peak hour.

Table 5-7. 2025 and 2045 No-Build Roadway Segments DDHV and LOS

				2025						2045					
Location	**Direction**	**Number of Lanes**	**LOS D Service Volume**	**AM Peak Hour**	**V/C**	**AM Peak Hour LOS**	**PM Peak Hour**	**V/C**	**PM Peak Hour LOS**	**AM Peak Hour**	**V/C**	**AM Peak Hour LOS**	**PM Peak Hour**	**V/C**	**PM Peak Hour LOS**
Expressway															
SR 414, btw US 441 Ramps	Eastbound	3	5,620	2,570	0.46	B	1,650	0.29	B	2,717	0.48	B	1,532	0.27	B
	Westbound		5,620	1,640	0.29	B	2,800	0.50	B	1,325	0.24	B	2,897	0.52	B
SR 414 Expressway Extension	Eastbound	-	-	-			-	-		-			-	-	
	Westbound	-	-	-			-	-		-			-	-	
SR 414, btw SR 434 Ramps	Eastbound	3	5,620	2,915	0.52	B	1,420	0.25	B	3,010	0.54	B	1,555	0.28	B
	Westbound		5,620	1,505	0.27	B	2,075	0.37	B	1,790	0.32	B	3,155	0.56	B
SR 414 Arterial															
SR 414, btw US 441 and Bear Lake Rd	Eastbound	3	3,020	2,900	0.96	C	2,130	0.71	C	3,305	1.09	F	2,440	0.81	C
	Westbound		3,020	2,280	0.75	C	3,150	1.04	F	2,450	0.81	C	4,010	1.33	F
SR 414, btw Bear Lake Rd and Eden Park Rd	Eastbound	3	3,020	3,295	1.09	F	2,120	0.70	C	3,740	1.24	F	2,425	0.80	C
	Westbound		3,020	2,205	0.73	C	2,945	0.98	D	2,365	0.78	C	3,790	1.25	F
SR 414, btw Eden Park Rd and Magnolia Homes Rd	Eastbound	3	3,020	3,620	1.20	F	2,100	0.70	C	4,090	1.35	F	2,400	0.79	C
	Westbound		3,020	2,185	0.72	C	2,895	0.96	C	2,345	0.78	C	3,735	1.24	F
SR 414, btw Magnolia Homes Rd to Gateway Dr	Eastbound	3	3,020	3,740	1.24	F	2,210	0.73	C	4,220	1.40	F	2,515	0.83	C
	Westbound		3,020	2,255	0.75	C	2,930	0.97	C	2,415	0.80	C	3,775	1.25	F
SR 414, btw Gateway Dr to SR 434 Ramps	Eastbound	3	3,020	3,520	1.17	F	2,020	0.67	C	3,980	1.32	F	2,310	0.76	C
	Westbound		3,020	2,175	0.72	C	2,745	0.91	C	2,325	0.77	C	3,575	1.18	F
Cross Street															
Bear Lake Rd	Northbound	1	750	290	0.39	C	550	0.73	D	315	0.42	C	605	0.81	D
Bear Lake Rd	Southbound		750	500	0.67	D	480	0.64	D	555	0.74	D	520	0.69	D
Rose Ave	Northbound	1	750	695	0.93	D	665	0.89	D	760	1.01	E	725	0.97	D
Rose Ave	Southbound		750	435	0.58	D	400	0.53	D	480	0.64	D	435	0.58	D
Eden Park Rd N. of SR 414	Northbound	1	750	200	0.27	C	425	0.57	D	225	0.30	C	460	0.61	D
Eden Park Rd N. of SR 414	Southbound		750	460	0.61	D	355	0.47	C	505	0.67	D	385	0.51	D
Eden Park Rd S. of SR 414	Northbound	1	750	235	0.31	C	255	0.34	C	255	0.34	C	275	0.37	C
Eden Park Rd S. of SR 414	Southbound		750	150	0.20	C	155	0.21	C	165	0.22	C	170	0.23	C
Lake Lotus Park Road	Northbound	1	750	15	0.02	C	15	0.02	C	15	0.02	C	15	0.02	C
Lake Lotus Park Road	Southbound		750	15	0.02	C	15	0.02	C	15	0.02	C	15	0.02	C
Magnolia Homes S. SR 414	Northbound	1	750	245	0.33	C	260	0.35	C	270	0.36	C	280	0.37	C
Magnolia Homes S. SR 414	Southbound		750	195	0.26	C	185	0.25	C	210	0.28	C	205	0.27	C
Gateway Dr N. of SR 414	Northbound	1	750	230	0.31	C	200	0.27	C	250	0.33	C	215	0.29	C
Gateway Dr N. of SR 414	Southbound		750	90	0.12	C	195	0.26	C	100	0.13	C	210	0.28	C

Table 5-8. 2025 and 2045 Build Roadway Segments DDHV and LOS

				2025						2045					
Location	**Direction**	**Number of Lanes**	**LOS D Service Volume**	**AM Peak Hour**	**V/C**	**AM Peak Hour LOS**	**PM Peak Hour**	**V/C**	**PM Peak Hour LOS**	**AM Peak Hour**	**V/C**	**AM Peak Hour LOS**	**PM Peak Hour**	**V/C**	**PM Peak Hour LOS**
Expressway															
SR 414, btw US 441 Ramps	Eastbound	3	5,620	3,325	0.59	C	2,260	0.40	B	4,540	0.81	C	3,195	0.57	B
	Westbound		5,620	2,260	0.40	B	3,325	0.59	C	3,195	0.57	B	4,540	0.81	C
SR 414 Expressway Extension	Eastbound	2	3,740	2,485	0.66	C	1,660	0.44	B	3,565	0.95	D	2,430	0.43	C
	Westbound		3,740	1,660	0.44	B	2,485	0.66	C	2,430	0.65	C	3,565	0.63	D
SR 414, btw SR 434 Ramps	Eastbound	3	5,620	3,530	0.63	C	2,245	0.40	B	4,605	0.82	D	3,070	0.55	B
	Westbound		5,620	2,255	0.40	B	3,540	0.63	C	3,070	0.55	B	4,605	0.82	D
SR 414 Arterial															
SR 414, btw US 441 and Bear Lake Rd	Eastbound	2	2,000	1,585	0.79	C	1,275	0.64	C	1,870	0.94	C	1,465	0.73	C
	Westbound		2,000	1,275	0.64	C	1,585	0.79	C	1,465	0.73	C	1,870	0.94	C
SR 414, btw Bear Lake Rd and Eden Park Rd	Eastbound	2	2,000	1,775	0.89	C	1,275	0.64	C	2,045	1.02	F	1,445	0.72	C
	Westbound		2,000	1,275	0.64	C	1,775	0.89	C	1,445	0.72	C	2,045	1.02	F
SR 414, btw Eden Park Rd and Magnolia Homes Rd	Eastbound	2	2,000	1,965	0.98	D	1,255	0.63	C	2,245	1.12	F	1,420	0.71	C
	Westbound		2,000	1,255	0.63	C	1,965	0.98	D	1,420	0.71	C	2,245	1.12	F
SR 414, btw Magnolia Homes Rd to Gateway Dr	Eastbound	2	2,000	2,110	1.06	F	1,335	0.67	C	2,405	1.20	F	1,510	0.76	C
	Westbound		2,000	1,335	0.67	C	2,110	1.06	F	1,510	0.76	C	2,405	1.20	F
SR 414, btw Gateway Dr to SR 434 Ramps	Eastbound	2	2,000	1,880	0.94	C	1,145	0.57	C	2,145	1.07	F	1,310	0.66	C
	Westbound		2,000	1,155	0.58	C	1,890	0.95	C	1,300	0.65	C	2,155	1.08	F
Cross Street															
Bear Lake Rd	Northbound	1	750	390	0.52	D	575	0.77	D	430	0.57	D	625	0.83	D
Bear Lake Rd	Southbound		750	575	0.77	D	390	0.52	D	625	0.83	D	430	0.57	D
Rose Ave	Northbound	1	750	595	0.79	D	590	0.79	D	625	0.83	D	625	0.83	D
Rose Ave	Southbound		750	590	0.79	D	595	0.79	D	625	0.83	D	625	0.83	D
Eden Park Rd N. of SR 414	Northbound	1	750	300	0.40	C	510	0.68	D	330	0.44	C	560	0.75	D
Eden Park Rd N. of SR 414	Southbound		750	510	0.68	D	300	0.40	C	560	0.75	D	330	0.44	C
Eden Park Rd S. of SR 414	Northbound	1	750	255	0.34	C	255	0.34	C	265	0.35	C	270	0.36	C
Eden Park Rd S. of SR 414	Southbound		750	255	0.34	C	255	0.34	C	270	0.36	C	265	0.35	C
Lake Lotus Park Road	Northbound	1	750	15	0.02	C	15	0.02	C	15	0.02	C	15	0.02	C
Lake Lotus Park Road	Southbound		750	15	0.02	C	15	0.02	C	15	0.02	C	15	0.02	C
Magnolia Homes S. SR 414	Northbound	1	750	305	0.41	C	240	0.32	C	335	0.45	C	265	0.35	C
Magnolia Homes S. SR 414	Southbound		750	240	0.32	C	305	0.41	C	265	0.35	C	335	0.45	C
Gateway Dr N. of SR 414	Northbound	1	750	240	0.32	C	200	0.27	C	270	0.36	C	220	0.29	C
Gateway Dr N. of SR 414	Southbound		750	190	0.25	C	230	0.31	C	210	0.28	C	260	0.35	C

5.4.1 Intersection Control Evaluation (ICE)

The FDOT Intersection Control Evaluation (ICE) process quantitatively evaluates several intersection control alternatives and ranks these alternatives based on their operational and safety performance. Implementing a "performance-based" procedure such as ICE creates a transparent and consistent approach to consider intersection alternatives based on metrics such as safety, operations, cost, and social, environmental, and economic impacts. The arterial intersections were evaluated using the ICE Process including Bear Lake Road/Rose Avenue, Eden Park Road, and Magnolia Homes Road.

Stage 1 of the ICE analysis is a screening stage using FHWA's Capacity Analysis for Planning of Junctions (CAP-X). The Stage 1 CAP-X screening was performed using FDOT's ICE forms, using 2045 volumes. The results are summarized in **Table 5-9** and the forms are included in **Appendix F.** The ICE CAP-X Screening recommends a Displaced Left Turn (DLT) as the appropriate type of control for the arterial intersections. With the Expressway Extension pulling most of the east/west through traffic from the arterial, the left turn volumes on the cross streets do not justify a full DLT configuration but may justify a partial DTL.

Traffic operational benefits might be likely if the intersection is converted to a partial DTL intersection, but those configurations also have major ROW impacts to adjacent areas along SR 414 that outweigh the benefit. The Expressway Extension is elevated through the corridor and requires frequent piers which might not allow for displaced left turn storage and may cause sight distance issues. For this study, the recommendation was to retain the existing traffic signal control for all the arterial intersections.

Table 5-9. ICE CAP-X at Arterial Intersections

Intersection	Existing Control	Anticipated Control	Intersection ICE Recommendation	Consideration	Final Recommendation
Bear Lake Road/Rose Avenue	Traffic Signal	Traffic Signal	Displaced Left Turn	No ROW & Safety Issue w/ Elevated Expressway in Median	Traffic Signal
Eden Park Road	Traffic Signal	Traffic Signal	Displaced Left Turn	No ROW & Safety Issue w/ Elevated Expressway in Median	Traffic Signal
Magnolia Homes Road	Traffic Signal	Traffic Signal	Displaced Left Turn	No ROW & Safety Issue w/ Elevated Expressway in Median	Traffic Signal

5.4.2 Intersection Operations

The intersection LOS analysis using Synchro was conducted for the 2025 and 2045 AM and PM peak hours. A summary of 2025 and 2045 No-Build and Build AM and PM peak hour intersection LOS is provided in **Tables 5-10** through **Table 5-17**. In the No-Build models, an additional through lane in each direction on the arterial was added to the intersections from west of Rose Avenue to east of Gateway Drive, terminating at the SR 434 ramps. The Build analysis assumed existing intersection lane geometry with an exception of the following changes which were made in both No-Build and Build analysis:

- The westbound approach at the Maitland Summit Boulevard intersection was updated to match recent changes in lane assignment.
- The Gateway Drive intersection was assumed to be signalized in all future models.

The yellow change and red clearance intervals were checked against the standards in the FDOT Traffic Engineering Manual, published in January 2022. Insufficient existing yellow and all-red intervals were updated to meet the standards. Existing cycle lengths were maintained, and splits and offsets were optimized using Synchro for each intersection coordination zone for all future models.

The Synchro reports for 2025 and 2045 No-Build and Build conditions are provided in **Appendix G.**
The Synchro analysis shows that the intersections operations are expected to similar between the No-Build and Build conditions, except at a few locations. In 2025 PM, the delays increase noticeably for the westbound-left movement at the US 441/SR 414 westbound ramps intersection and the westbound-through movement at the Hope Road intersection in Build compared to No-Build, due to much higher volumes for these movements. However, these intersections operate acceptably at LOS D and C, respectively in Build. In 2045 AM, the delays reduce noticeably for eastbound-right and westbound-right movements at the US 441 intersections in Build compared to No-Build, due to reduced volumes for the right-turn movements from SR 414 to US 441.

In both 2045 AM and PM, the delays for the eastbound-through movement (in the AM) and westbound-through movement (in the PM) at the intersections from Bear Lake Road/Rose Avenue to Gateway Drive reduce significantly in Build compared to No-Build due to much lower through traffic on the arterial facility. The delay for the westbound-through movement at the Hope Road intersection increases significantly in Build compared to No-Build due to higher volume generating from east of Hope Road in Build. In 2045 AM, the Hope Road intersection operates at LOS F in both No-Build and Build; while in 2045 PM, it operates at LOS in D in No-Build and LOS F in Build.

This isolated intersection analysis does not take into account the additional benefit associated with reduced delay and travel time for the traffic diverted to the proposed toll lanes in the Build alternative. The No-Build condition is an improvement on the arterial to a six-lane section, albeit there is less overall corridor volume with 70,900 AADT in 2045 in the highest volume section. The Build is a four-lane expressway with a four-lane arterial with more overall corridor traffic – with 112,000 AADT in 2045 in the highest volume section. As a result, a few intersection delays are worse due to the four-lane cross section in the Build. In addition, the user benefit resulting from reduced travel and delay for the traffic shifted to the proposed expressway is a major improvement to traffic operations along the corridor. Also, the project includes extension of a third eastbound lane from the project terminus at SR 434 to Maitland Summit Blvd and an acceleration lane for the SR 434 on-ramp. Overall, the Build is expected to process more demand than the No-Build and improve operations and safety in the region.

Table 5-10. 2025 No-Build AM Peak Hour Intersection LOS

Intersection	Delay/ LOS	Eastbound			Westbound			Northbound			Southbound			Overall
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Hiawassee Rd @ SR 414 Ramps	Delay	62.1		46.2	54.5		1.0	42.0	17.0	2.4	54.3	31.0	4.3	**29.4**
	LOS	E		D	D		A	D	B	A	D	C	A	**C**
US 441@ SR 414 Eastbound Ramps	Delay	34.1		57.8					37.0	6.4	89.8	19.4		**37.6**
	LOS	C		E					D	A	F	B		**D**
US 441@ SR 414 Westbound Ramps	Delay	42.6	58.0	42.3	52.3	56.9	27.7	83.1	13.1		78.0	34.4	0.0	**31.5**
	LOS	D	E	D	D	E	C	F	B		E	C		**C**
SR 414 @ Bear Lake Rd/Rose Ave	Delay	184.5	67.0	6.5	203.2	20.1	0.1	127.5	132.4	127.6	132.5	142.1	36.8	**64.6**
	LOS	F	E	A	F	C	A	F	F	F	F	F	D	**E**
SR 414 @ Eden Park Rd	Delay	178.2	15.7	0.0	227.7	16.9	3.0	147.7	175.2	128.3	162.9	110.5	70.8	**30.9**
	LOS	F	B		F	B	A	F	F	F	F	F	E	**C**
SR 414 @ Magnolia Homes Rd	Delay	166.0	10.9	0.0	184.3	9.5	0.0	161.8	134.1			121.4		**19.5**
	LOS	F	B		F	A		F	F			F		**B**
SR 414 @ Gateway Drive	Delay	81.4	0.3			11.3	4.5						54.3	**8.1**
	LOS	F	A			B	A						D	**A**
SR 434 @ SR 414 Ramps	Delay	91.4		7.6	72.6		37.3	97.4	44.9	6.0	85.8	35.2	3.4	**43.8**
	LOS	F		A	E		D	F	D	A	F	D	A	**D**
Maitland Summit Blvd @ SR 414 EB Ramps	Delay	57.2	41.7	6.8					21.2	17.5	35.8	6.2		**25.3**
	LOS	E	D	A					C	B	D	A		**C**
Maitland Summit Blvd @ SR 414 WB Ramps	Delay				49.1	28.3	23.8	36.1	7.9			20.7	0.2	**24.6**
	LOS				D	C	C	D	A			C	A	**C**
Keller Rd @ SR 414 Ramps	Delay	54.9		0.5	38.7		5.1	57.1	42.5	0.2	50.9	34.0	0.0	**23.3**
	LOS	D		A	D		A	E	D	A	D	C		**C**
Lake Destiny Rd @ I-4 Ramps	Delay				44.2	0.1			19.3	7.6	45.0	7.5		**23.4**
	LOS				D	A			B	A	D	A		**C**
SR 414 @ Hope Rd	Delay	60.0	0.6			130.3	1.9						0.4	**74.1**
	LOS	E	A			F	A						A	**E**

Table 5-11. 2025 No-Build PM Peak Hour Intersection LOS

Intersection	Delay/ LOS	Eastbound			Westbound			Northbound			Southbound			Overall
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Hiawassee Rd @ SR 414 Ramps	Delay	74.7		7.3	76.3		0.8	76.1	11.5	1.8	69.5	15.3	2.0	**23.5**
	LOS	E		A	E		A	E	B	A	E	B	A	**C**
US 441@ SR 414 Eastbound Ramps	Delay	84.2		14.6					18.6	3.9	84.1	2.0		**21.6**
	LOS	F		B					B	A	F	A		**C**
US 441@ SR 414 Westbound Ramps	Delay	54.0	70.6	38.9	57.3	67.7	32.5	109.8	25.1		103.0	18.3	0.0	**29.2**
	LOS	D	E	D	E	E	C	F	C		F	B		**C**
SR 414 @ Bear Lake Rd/Rose Ave	Delay	186.6	37.3	3.0	214.8	33.2	0.2	180.4	184.3	86.2	189.4	169.3	54.4	**61.0**
	LOS	F	D	A	F	C	A	F	F	F	F	F	D	**E**
SR 414 @ Eden Park Rd	Delay	181.2	14.8	0.0	197.2	26.4	0.6	135.0	175.3	1.5	150.9	118.0	29.9	**35.1**
	LOS	F	B		F	C	A	F	F	A	F	F	C	**D**
SR 414 @ Magnolia Homes Rd	Delay	181.4	3.1	0.1	156.0	17.9	0.0	181.5	61.2			129.4		**18.9**
	LOS	F	A	A	F	B		F	E			F		**B**
SR 414 @ Gateway Drive	Delay	62.5	0.2			14.2	4.4						85.0	**13.2**
	LOS	E	A			B	A						F	**B**
SR 434 @ SR 414 Ramps	Delay	81.4		6.2	110.0		91.4	102.0	81.7	0.8	55.7	31.9	3.3	**67.3**
	LOS	F		A	F		F	F	F	A	E	C	A	**E**
Maitland Summit Blvd @ SR 414 EB Ramps	Delay	63.2	48.3	11.6					19.5	3.5	14.3	6.7		**14.7**
	LOS	E	D	B					B	A	B	A		**B**
Maitland Summit Blvd @ SR 414 WB Ramps	Delay				55.5	32.8	4.9	57.6	14.8			24.8	23.7	**32.8**
	LOS				E	C	A	E	B			C	C	**C**
Keller Rd @ SR 414 Ramps	Delay	55.2		0.1	54.2		4.1	57.3	32.7	2.5	49.3	17.9	0.1	**26.7**
	LOS	E		A	D		A	E	C	A	D	B	A	**C**
Lake Destiny Rd @ I-4 Ramps	Delay				41.6	0.0			17.8	4.3	44.2	3.9		**20.9**
	LOS				D				B	A	D	A		**C**
SR 414 @ Hope Rd	Delay	59.3	0.5			12.1	1.0						0.4	**7.6**
	LOS	E	A			B	A						A	**A**

Table 5-12. 2025 Build AM Peak Hour Intersection LOS

Intersection	Delay/ LOS	Eastbound			Westbound			Northbound			Southbound			Overall
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Hiawassee Rd @ SR 414 Ramps	Delay	62.1		46.2	54.5		1.0	42.0	17.0	2.4	54.3	31.0	4.3	**29.4**
	LOS	E		D	D		A	D	B	A	D	C	A	**C**
US 441@ SR 414 Eastbound Ramps	Delay	51.2		56.9					30.5	4.4	88.5	9.9		**31.5**
	LOS	D		E					C	A	F	A		**C**
US 441@ SR 414 Westbound Ramps	Delay	42.8	57.7	29.7	52.4	57.8	38.0	92.6	17.5		85.0	35.3	0.0	**34.5**
	LOS	D	E	C	D	E	D	F	B		F	D		**C**
SR 414 @ Bear Lake Rd/Rose Ave	Delay	178.0	70.9	4.5	189.0	26.3	5.1	141.4	127.6	68.2	107.9	164.4	35.2	**77.9**
	LOS	F	E	A	F	C	A	F	F	E	F	F	D	**E**
SR 414 @ Eden Park Rd	Delay	196.4	19.8	0.0	207.3	32.8	1.9	157.1	177.2	23.4	129.4	106.6	10.8	**46.5**
	LOS	F	B		F	C	A	F	F	C	F	F	B	**D**
SR 414 @ Magnolia Homes Rd	Delay	156.8	10.2	0.1	159.9	4.9	0.0	182.0	39.8			111.4		**21.9**
	LOS	F	B	A	F	A		F	D			F		**C**
SR 414 @ Gateway Drive	Delay	68.7	0.4			10.1	4.5						42.4	**10.5**
	LOS	E	A			B	A						D	**B**
SR 434 @ SR 414 Ramps	Delay	86.9		7.7	64.8		42.1	97.5	51.0	5.9	88.4	45.8	4.3	**49.5**
	LOS	F		A	E		D	F	D	A	F	D	A	**D**
Maitland Summit Blvd @ SR 414 EB Ramps	Delay	55.6	39.6	6.1					22.2	20.0	39.0	7.5		**26.6**
	LOS	E	D	A					C	B	D	A		**C**
Maitland Summit Blvd @ SR 414 WB Ramps	Delay				49.7	28.5	28.8	35.4	7.9			20.7	0.2	**25.1**
	LOS				D	C	C	D	A			C	A	**C**
Keller Rd @ SR 414 Ramps	Delay	55.2		0.6	38.7		7.3	57.3	42.5	0.2	50.9	34.3	0.0	**23.7**
	LOS	E		A	D		A	E	D	A	D	C		**C**
Lake Destiny Rd @ I-4 Ramps	Delay				44.2	0.1			19.3	7.6	45.0	7.5		**23.4**
	LOS				D	A			B	A	D	A		**C**
SR 414 @ Hope Rd	Delay	60.0	0.8			145.7	1.9						0.4	**81.4**
	LOS	E	A			F	A						A	**F**

Table 5-13. 2025 Build PM Peak Hour Intersection LOS

Intersection	Delay/ LOS	Eastbound			Westbound			Northbound			Southbound			Overall
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Hiawassee Rd @ SR 414 Ramps	Delay	74.7		7.3	76.3		0.8	76.1	11.5	1.8	69.5	15.3	2.0	**23.5**
	LOS	E		A	E		A	E	B	A	E	B	A	**C**
US 441@ SR 414 Eastbound Ramps	Delay	87.2		9.9					21.6	5.0	77.8	3.9		**23.2**
	LOS	F		A					C	A	E	A		**C**
US 441@ SR 414 Westbound Ramps	Delay	50.5	72.9	31.8	122.7	68.1	29.4	110.1	47.7		101.8	20.6	0.0	**48.9**
	LOS	D	E	C	F	E	C	F	D		F	C		**D**
SR 414 @ Bear Lake Rd/Rose Ave	Delay	169.3	61.8	7.3	195.0	22.8	1.6	107.5	160.1	52.5	124.4	125.7	13.1	**69.1**
	LOS	F	E	A	F	C	A	F	F	D	F	F	B	**E**
SR 414 @ Eden Park Rd	Delay	157.6	22.4	0.8	196.4	32.3	3.0	135.3	171.9	11.1	135.4	116.2	14.2	**47.6**
	LOS	F	C	A	F	C	A	F	F	B	F	F	B	**D**
SR 414 @ Magnolia Homes Rd	Delay	149.4	7.7	0.7	145.3	11.9	0.0	182.4	26.8			140.3		**22.5**
	LOS	F	A	A	F	B		F	C			F		**C**
SR 414 @ Gateway Drive	Delay	55.7	0.2			16.4	4.9						79.8	**17.4**
	LOS	E	A			B	A						E	**B**
SR 434 @ SR 414 Ramps	Delay	75.2		20.4	122.5		100.7	95.4	90.6	1.7	57.0	40.5	4.8	**73.8**
	LOS	E		C	F		F	F	F	A	E	D	A	**E**
Maitland Summit Blvd @ SR 414 EB Ramps	Delay	63.0	46.9	10.8					20.4	3.4	15.3	7.1		**15.5**
	LOS	E	D	B					C	A	B	A		**B**
Maitland Summit Blvd @ SR 414 WB Ramps	Delay				57.1	34.3	5.1	83.5	15.2			24.5	29.7	**36.3**
	LOS				E	C	A	F	B			C	C	**D**
Keller Rd @ SR 414 Ramps	Delay	56.0		0.1	50.7		6.8	56.5	34.3	2.5	50.4	20.4	0.1	**27.7**
	LOS	E		A	D		A	E	C	A	D	C	A	**C**
Lake Destiny Rd @ I-4 Ramps	Delay				41.6	0.0			17.8	4.3	44.2	3.9		**20.9**
	LOS				D				B	A	D	A		**C**
SR 414 @ Hope Rd	Delay	61.0	0.8			62.3	1.2						0.4	**33.6**
	LOS	E	A			E	A						A	**C**

Table 5-14. 2045 No-Build AM Peak Hour Intersection LOS

Intersection	Delay/ LOS	Eastbound			Westbound			Northbound			Southbound			Overall
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Hiawassee Rd @1	Delay	69.2		56.7	56.0		1.2	39.3	18.7	2.3	54.5	41.2	5.2	**34.7**
SR 414 Ramps	LOS	E		E	E		A	D	B	A	D	D	A	**C**
US 441@ SR 414	Delay	35.9		106.2					42.0	6.2	81.3	58.3		**66.0**
Eastbound Ramps1	LOS	D		F					D	A	F	E		**E**
US 441@ SR 414	Delay	38.8	51.4	31.2	45.7	48.4	63.6	170.6	30.0		83.9	90.7	0.0	**66.1**
Westbound Ramps	LOS	D	D	C	D	D	E	F	C		F	F		**E**
SR 414 @	Delay	183.9	109.1	7.3	205.6	25.7	2.7	189.4	149.8	168.5	187.5	171.4	53.1	**92.2**
Bear Lake Rd/Rose Ave	LOS	F	F	A	F	C	A	F	F	F	F	F	D	**F**
SR 414 @	Delay	172.6	59.3	0.0	254.6	14.6	1.2	159.6	240.2	124.7	197.9	114.4	52.1	**55.1**
Eden Park Rd	LOS	F	E		F	B	A	F	F	F	F	F	D	**E**
SR 414 @ Magnolia	Delay	168.4	51.2	0.0	205.5	12.7	0.0	173.7	173.9			124.5		**46.1**
Homes Rd	LOS	F	D		F	B		F	F			F		**D**
SR 414 @	Delay	73.2	6.5			12.9	4.7						55.5	**11.9**
Gateway Drive	LOS	E	A			B	A						E	**B**
SR 434 @	Delay	83.5		16.5	60.4		39.8	97.6	56.0	7.3	84.9	44.6	4.3	**48.8**
SR 414 Ramps1	LOS	F		B	E		D	F	E	A	F	D	A	**D**
Maitland Summit	Delay	56.4	40.3	6.3					20.7	21.3	38.9	8.5		**26.6**
Blvd @ SR 414 EB Ramps	LOS	E	D	A					C	C	D	A		**C**
Maitland Summit	Delay				47.0	26.0	27.4	36.7	9.1			22.7	0.2	**25.2**
Blvd @ SR 414 WB Ramps	LOS				D	C	C	D	A			C	A	**C**
Keller Rd @	Delay	55.9		0.5	37.4		8.7	59.4	45.7	0.3	52.4	36.0	0.0	**24.4**
SR 414 Ramps	LOS	E		A	D		A	E	D	A	D	D		**C**
Lake Destiny Rd @	Delay				42.9	0.2			24.1	8.8	45.5	9.6		**24.3**
I-4 Ramps	LOS				D	A			C	A	D	A		**C**
SR 414 @1	Delay	73.6	0.7			191.8	2.8						0.5	**109.5**
Hope Rd	LOS	E	A			F	A						A	**F**

Table 5-15. 2045 No-Build PM Peak Hour Intersection LOS

Intersection	Delay/ LOS	Eastbound			Westbound			Northbound			Southbound			Overall
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Hiawassee Rd @1 SR 414 Ramps	Delay	74.2		12.4	76.3		1.0	76.5	15.2	1.9	69.5	18.9	2.3	**26.1**
	LOS	E		B	E		A	E	B	A	E	B	A	**C**
US 441@ SR 414 Eastbound Ramps1	Delay	87.3		14.6					27.5	6.2	71.4	2.5		**26.0**
	LOS	F		B					C	A	E	A		**C**
US 441@ SR 414 Westbound Ramps	Delay	51.6	65.6	57.6	54.8	62.6	62.8	109.2	111.6		174.0	26.4	0.0	**80.0**
	LOS	D	E	E	D	E	E	F	F		F	C		**E**
SR 414 @ Bear Lake Rd/Rose Ave	Delay	240.8	38.7	3.5	186.9	132.7	0.4	236.7	217.9	90.8	289.0	248.3	84.8	**115.0**
	LOS	F	D	A	F	F	A	F	F	F	F	F	F	**F**
SR 414 @ Eden Park Rd	Delay	206.3	13.4	0.0	178.3	88.3	3.1	144.9	221.6	2.2	249.6	129.7	78.1	**70.7**
	LOS	F	B		F	F	A	F	F	A	F	F	E	**E**
SR 414 @ Magnolia Homes Rd	Delay	150.0	9.0	1.4	161.5	31.4	0.0	179.7	106.3			122.9		**29.7**
	LOS	F	A	A	F	C		F	F			F		**C**
SR 414 @ Gateway Drive	Delay	80.5	0.3			55.8	2.9						129.4	**38.9**
	LOS	F	A			E	A						F	**D**
SR 434 @ SR 414 Ramps1	Delay	102.9		12.3	132.4		127.1	101.8	101.2	1.4	56.1	33.6	3.4	**83.7**
	LOS	F		B	F		F	F	F	A	E	C	A	**F**
Maitland Summit Blvd @ SR 414 EB Ramps	Delay	63.2	46.9	10.8					19.1	6.3	15.3	7.6		**15.7**
	LOS	E	D	B					B	A	B	A		**B**
Maitland Summit Blvd @ SR 414 WB Ramps	Delay				55.1	31.4	5.2	77.3	16.3			26.7	28.5	**35.1**
	LOS				E	C	A	E	B			C	C	**D**
Keller Rd @ SR 414 Ramps	Delay	56.2		0.1	51.4		8.6	56.7	37.1	3.4	52.1	20.1	0.1	**28.7**
	LOS	E		A	D		A	E	D	A	D	C	A	**C**
Lake Destiny Rd @ I-4 Ramps	Delay				43.8		0.1		21.2	4.9	42.8	4.0		**21.6**
	LOS				D		A		C	A	D	A		**C**
SR 414 @1 Hope Rd	Delay	76.4	0.6			65.7	2.3						0.5	**36.3**
	LOS	E	A			E	A						A	**D**

Table 5-16. 2045 Build AM Peak Hour Intersection LOS

Intersection	Delay/ LOS	Eastbound			Westbound			Northbound			Southbound			Overall
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Hiawassee Rd @1 SR 414 Ramps	Delay	69.2		56.7	56.0		1.2	39.3	18.7	2.3	54.5	41.2	5.2	**34.7**
	LOS	E		E	E		A	D	B	A	D	D	A	**C**
US 441@ SR 414 Eastbound Ramps1	Delay	49.0		58.6					34.1	4.9	80.5	12.0		**31.3**
	LOS	D		E					C	A	F	B		**C**
US 441@ SR 414 Westbound Ramps	Delay	42.6	55.9	36.9	51.3	55.5	40.1	105.2	25.6		85.0	51.8	0.0	**44.4**
	LOS	D	E	D	D	E	D	F	C		F	D		**D**
SR 414 @ Bear Lake Rd/Rose Ave	Delay	176.4	87.7	13.9	197.1	26.9	4.2	161.6	134.0	74.4	105.6	171.2	44.3	**85.2**
	LOS	F	F	B	F	C	A	F	F	E	F	F	D	**F**
SR 414 @ Eden Park Rd	Delay	183.8	18.1	0.0	209.2	39.8	5.2	157.8	185.3	23.5	140.5	108.0	10.9	**47.3**
	LOS	F	B		F	D	A	F	F	C	F	F	B	**D**
SR 414 @ Magnolia Homes Rd	Delay	157.8	13.2	0.1	170.4	4.5	0.0	191.3	76.5			111.9		**25.9**
	LOS	F	B	A	F	A		F	E			F		**C**
SR 414 @ Gateway Drive	Delay	64.8	0.4			12.6	5.6						51.2	**11.4**
	LOS	E	A			B	A						D	**B**
SR 434 @ SR 414 Ramps1	Delay	84.3		18.4	57.8		44.1	99.7	59.1	6.7	88.6	55.1	5.0	**54.9**
	LOS	F		B	E		D	F	E	A	F	E	A	**D**
Maitland Summit Blvd @ SR 414 EB Ramps	Delay	55.2	38.4	5.6					21.5	23.5	32.8	8.1		**27.2**
	LOS	E	D	A					C	C	C	A		**C**
Maitland Summit Blvd @ SR 414 WB Ramps	Delay				47.4	26.4	30.3	37.1	11.4			22.8	0.2	**26.3**
	LOS				D	C	C	D	B			C	A	**C**
Keller Rd @ SR 414 Ramps	Delay	55.9		0.6	37.4		8.7	59.2	45.7	0.3	52.4	36.4	0.0	**24.2**
	LOS	E		A	D		A	E	D	A	D	D		**C**
Lake Destiny Rd @ I-4 Ramps	Delay				42.9	0.2			24.1	8.8	45.5	9.6		**24.3**
	LOS				D	A			C	A	D	A		**C**
SR 414 @1 Hope Rd	Delay	73.6	3.9			278.7	2.8						0.5	**150.2**
	LOS	E	A			F	A						A	**F**

Table 5-17. 2045 Build PM Peak Hour Intersection LOS

Intersection	Delay/ LOS	Eastbound			Westbound			Northbound			Southbound			Overall
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Hiawassee Rd @1 SR 414 Ramps	Delay	74.2		12.4	76.3		1.0	76.5	15.2	1.9	69.5	18.9	2.3	**26.1**
	LOS	E		B	E		A	E	B	A	E	B	A	**C**
US 441@ SR 414 Eastbound Ramps1	Delay	87.6		18.2					24.7	6.1	73.3	4.2		**24.7**
	LOS	F		B					C	A	E	A		**C**
US 441@ SR 414 Westbound Ramps	Delay	47.1	75.4	55.0	161.2	56.7	32.2	107.2	92.3		168.0	26.9	0.0	**79.7**
	LOS	D	E	D	F	E	C	F	F		F	C		**E**
SR 414 @ Bear Lake Rd/Rose Ave	Delay	175.4	67.8	10.3	181.8	27.1	1.5	107.0	164.9	56.3	151.2	133.1	13.7	**70.8**
	LOS	F	E	B	F	C	A	F	F	E	F	F	B	**E**
SR 414 @ Eden Park Rd	Delay	157.0	28.1	3.6	190.5	36.8	3.6	135.4	178.4	33.5	158.9	118.7	14.2	**51.5**
	LOS	F	C	A	F	D	A	F	F	C	F	F	B	**D**
SR 414 @ Magnolia Homes Rd	Delay	157.0	10.3	0.8	138.0	17.8	0.0	182.0	25.5			129.4		**25.4**
	LOS	F	B	A	F	B		F	C			F		**C**
SR 414 @ Gateway Drive	Delay	70.5	0.3			23.9	4.7						106.3	**24.0**
	LOS	E	A			C	A						F	**C**
SR 434 @ SR 414 Ramps1	Delay	77.5		25.7	142.5		133.1	97.3	104.4	2.7	56.6	43.4	8.1	**85.2**
	LOS	E		C	F		F	F	F	A	E	D	A	**F**
Maitland Summit Blvd @ SR 414 EB Ramps	Delay	62.8	45.6	10.0					19.3	6.1	17.6	8.2		**16.6**
	LOS	E	D	A					B	A	B	A		**B**
Maitland Summit Blvd @ SR 414 WB Ramps	Delay				58.8	33.2	5.5	79.2	15.9			26.1	35.8	**37.4**
	LOS				E	C	A	E	B			C	D	**D**
Keller Rd @ SR 414 Ramps	Delay	56.2		0.1	51.4		8.6	55.8	37.1	3.4	52.1	21.2	0.1	**29.0**
	LOS	E		A	D		A	E	D	A	D	C	A	**C**
Lake Destiny Rd @ I-4 Ramps	Delay				43.8		0.1		21.2	4.9	42.8	4.0		**21.6**
	LOS				D		A		C	A	D	A		**C**
SR 414 @1 Hope Rd	Delay	76.4	2.5			179.6	2.3						0.5	**93.5**
	LOS	E	A			F	A						A	**F**

The existing turn bay storage and Synchro 50th and 95th percentile queue lengths for the study intersections turn movements in 2025 and 2045 No-Build and Build conditions are presented in **Tables 5-18** through **5-21.** It's important to note that Synhro has limitations in estimating queue lengths for saturated conditions, as indicated in the tables' footnotes. The queue lengths in the tables are provided for information only. Queue lengths and storage length recommendations for saturated conditions should be based on a properly calibrated microsimulation model.

Table 5-18. 2025 No-Build 50th and 95th Percentile Queue Lengths

Intersection	Movement	Storage Length (ft)	50th Percentile		95th Percentile	
			AM Peak	PM Peak	AM Peak	PM Peak
Hiawassee Rd @ SR 414 Ramps	EBL	500	125	88	174	126
	EBR	500	176	0	272	23
	WBL	600	72	96	109	137
	WBR	600	0	0	0	0
	NBL	350	40	83	61	120
	NBT		216	202	270	261
	NBR	400	0	0	36	31
	SBL	300	6	8	18	21
	SBT		311	204	442	278
	SBR	300	0	0	55	36
US 441 @ SR 414 Eastbound Ramps	EBL	390	143	48	211	93
	EBR		510	0	#664	47
	NBT		223	438	269	568
	NBR	250	0	7	42	36
	SBL	490	110	222	m154	283
	SBT		677	75	258	39
US 441 @ SR 414 Westbound Ramps	EBL	450	4	10	15	29
	EBT		19	32	44	67
	EBR	450	85	59	172	#188
	WBL	425	77	33	123	68
	WBT		123	53	205	106
	WBR	425	118	66	#297	#212
	NBL	500	91	82	#175	m132
	NBT		152	1,013	163	#583
	NBR					
	SBL	450	25	76	59	#173
	SBT		664	303	832	390
	SBR	450	0	0	0	0
SR 414 @ Bear Lake Rd/ Rose Ave	EBL	630	145	479	220	#702
	EBT		2,094	889	2,057	957
	EBR	630	14	0	48	36
	WBL	550	304	268	#455	m308
	WBT		372	2,252	391	1,472
	WBR	375	0	2	m1	m0
	NBL	330	168	~354	243	#498
	NBT		380	~617	496	#859
	NBR	420	869	371	#1106	477
	SBL	575	227	151	313	#291
	SBT		479	393	606	#550
	SBR	350	85	157	189	289

Note: ~ indicates volume exceeds capacity, queue is theoretically infinite,
 # indicates 95th percentile volume exceeds capacity, queue may be longer, and
m indicates volume for 95th percentile queue is metered by upstream signal.

Table 5-18. 2025 No-Build 50th and 95th Percentile Queue Lengths (Cont.)

Intersection	Movement	Storage Length (ft)	50th Percentile		95th Percentile	
			AM Peak	PM Peak	AM Peak	PM Peak
SR 414 @ Magnolia Homes Road	EBL	425	11	11	m10	m17
	EBT		289	83	290	86
	EBR	425	0	0	m0	m0
	WBL	580	298	237	#474	m301
	WBT		402	1,114	665	1,188
	WBR	725	0	0	m0	m0
	NBL	325	132	158	206	232
	NBT		254	115	#460	232
	SBT		20	21	57	56
SR 414 @ Gateway Drive	EBL	310	320	274	m303	321
	EBT		0	0	0	0
	WBT		376	590	504	756
	WBR	170	1	1	8	8
	SBR		79	205	131	289
SR 434 @ SR 414 Ramps	EBL	600	243	309	294	379
	EBR	750	0	0	46	25
	WBL	900	67	426	98	#566
	WBR	900	171	~825	227	#977
	NBL	500	60	74	95	113
	NBT		231	614	290	#705
	NBR	825	0	0	65	0
	SBL	1000	335	141	386	187
	SBT		526	353	594	395
	SBR	800	0	0	61	58
Maitland Summit Blvd @ SR 414 EB Ramps	EBL	450	254	110	333	171
	EBT		173	51	206	78
	EBR		0	0	42	55
	NBT		46	49	65	69
	NBR	300	173	14	248	51
	SBL		20	88	43	136
	SBT		23	146	90	192
Maitland Summit Blvd @ SR 414 WB Ramps	WBL	510	292	363	359	472
	WBT		22	153	35	187
	WBR		130	0	201	31
	NBL		27	68	50	107
	NBT		66	48	98	72
	SBT		21	93	41	129
	SBR		0	197	0	343
Keller Rd @ SR 414 Ramps	EBL	400	4	4	14	14
	EBR		0	0	0	0
	WBL	525	388	64	424	92
	WBR	285	61	10	123	40
	NBL	250	36	169	63	221
	NBT		76	245	125	354
	NBR		0	0	0	0
	SBL	275	109	290	152	363
	SBT		77	28	126	55
	SBR	475	0	0	0	0
Lake Destiny Rd @ I-4 Ramps	WBL	365	129	40	191	80
	WBR		0	0	0	0
	NBT		13	32	32	63
	NBR		0	0	23	43
	SBL	300	57	129	103	191
	SBT		17	11	36	22
SR 414 @ Hope Rd	EBL	485	57	56	#98	91
	EBT		0	0	0	0
	WBT		~1487	510	#1549	591
	WBR	200	10	2	23	12
	SBR		0	0	0	0

Notes: ~ indicates volume exceeds capacity, queue is theoretically infinite, # indicates 95th percentile volume exceeds capacity, queue may be longer, and m indicates volume for 95th percentile queue is metered by upstream signal.

Table 5-19. 2025 Build 50th and 95th Percentile Queue Lengths

Intersection	Movement	Storage Length (ft)	50th Percentile		95th Percentile	
			AM Peak	PM Peak	AM Peak	PM Peak
Hiawassee Rd @ SR 414 Ramps	EBL	500	125	88	174	126
	EBR	500	176	0	272	23
	WBL	600	72	96	109	137
	WBR	600	0	0	0	0
	NBL	350	40	83	61	120
	NBT		216	202	270	261
	NBR	400	0	0	36	31
	SBL	300	6	8	18	21
	SBT		311	204	442	278
	SBR	300	0	0	55	36
US 441 @ SR 414 Eastbound Ramps	EBL	390	178	129	240	198
	EBR		296	0	349	47
	NBT		220	388	309	518
	NBR	250	0	27	71	88
	SBL	490	224	213	m240	m280
	SBT		200	71	190	m196
US 441 @ SR 414 Westbound Ramps	EBL	450	4	9	15	28
	EBT		19	32	44	68
	EBR	450	54	38	141	#171
	WBL	425	75	~294	117	#343
	WBT		128	147	206	242
	WBR	425	175	100	#390	#274
	NBL	500	93	82	#193	141
	NBT		104	~954	204	#278
	NBR					
	SBL	450	101	184	166	#349
	SBT		695	243	#909	314
	SBR	450	0	0	0	0
SR 414 @ Bear Lake Rd/ Rose Ave	EBL	630	282	426	377	530
	EBT		1,365	808	1,556	1,004
	EBR	630	0	7	36	66
	WBL	550	529	597	665	698
	WBT		356	905	374	1,114
	WBR	375	18	5	25	m13
	NBL	330	238	165	#325	227
	NBT		375	593	476	705
	NBR	420	424	292	508	344
	SBL	575	218	154	292	214
	SBT		593	374	718	467
	SBR	350	98	0	204	78

Notes: ~ indicates volume exceeds capacity, queue is theoretically infinite,
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m indicates volume for 95th percentile queue is metered by upstream signal.

Table 5-19. 2025 Build 50th and 95th Percentile Queue Lengths (Cont.)

Intersection	Movement	Storage Length (ft)	50th Percentile		95th Percentile	
			AM Peak	PM Peak	AM Peak	PM Peak
SR 414 @ Magnolia Homes Road	EBL	425	10	10	m15	m25
	EBT		300	136	335	160
	EBR	425	0	4	m0	5
	WBL	580	354	472	449	559
	WBT		132	815	353	1,117
	WBR	725	0	0	m0	m0
	NBL	325	202	145	286	217
	NBT		77	10	199	116
	SBT		20	21	55	57
SR 414 @ Gateway Drive	EBL	310	311	253	388	279
	EBT		0	0	0	0
	WBT		246	607	360	837
	WBR	170	1	1	8	8
	SBR		119	226	194	315
SR 434 @ SR 414 Ramps	EBL	600	330	213	385	273
	EBR	750	8	44	60	88
	WBL	900	63	~456	93	#588
	WBR	900	185	~844	246	#997
	NBL	500	148	254	195	312
	NBT		369	~735	445	#829
	NBR	825	0	0	71	7
	SBL	1000	305	134	359	178
	SBT		575	327	656	384
	SBR	800	0	0	69	83
Maitland Summit Blvd @ SR 414 EB Ramps	EBL	450	283	125	363	191
	EBT		188	54	220	82
	EBR		0	0	42	56
	NBT		53	57	74	79
	NBR	300	194	12	272	49
	SBL		20	89	44	138
	SBT		25	146	90	194
Maitland Summit Blvd @ SR 414 WB Ramps	WBL	510	293	363	362	486
	WBT		22	176	35	220
	WBR		162	0	237	32
	NBL		31	77	55	#126
	NBT		74	57	113	81
	SBT		21	95	41	126
	SBR		0	266	2	419
Keller Rd @ SR 414 Ramps	EBL	400	8	8	21	22
	EBR		0	0	0	0
	WBL	525	388	64	424	92
	WBR	285	82	21	153	53
	NBL	250	40	189	68	243
	NBT		76	245	125	354
	NBR		0	0	0	0
	SBL	275	109	290	152	363
	SBT		77	28	127	57
	SBR	475	0	0	0	0
Lake Destiny Rd @ I-4 Ramps	WBL	365	129	40	191	80
	WBR		0	0	0	0
	NBT		13	32	32	63
	NBR		0	0	23	43
	SBL	300	57	129	103	191
	SBT		17	11	36	22
SR 414 @ Hope Rd	EBL	485	57	56	#98	91
	EBT		0	0	0	0
	WBT		~1554	~1258	#1614	#1326
	WBR	200	10	4	23	13
	SBR		0	0	0	0

Notes: ~ indicates volume exceeds capacity, queue is theoretically infinite,
 # indicates 95th percentile volume exceeds capacity, queue may be longer, and
m indicates volume for 95th percentile queue is metered by upstream signal.

Table 5-20. 2045 No-Build 50th and 95th Percentile Queue Lengths

Intersection	Movement	Storage Length (ft)	50th Percentile		95th Percentile	
			AM Peak	PM Peak	AM Peak	PM Peak
Hiawassee Rd @ SR 414 Ramps	EBL	500	157	110	#226	151
	EBR	500	245	0	#430	49
	WBL	600	90	122	132	165
	WBR	600	0	0	0	0
	NBL	350	46	105	73	146
	NBT		287	283	349	360
	NBR	400	0	0	39	35
	SBL	300	8	8	22	21
	SBT		472	292	569	394
	SBR	300	7	0	66	42
US 441 @ SR 414 Eastbound Ramps	EBL	390	179	55	258	103
	EBR		~755	0	#909	50
	NBT		285	710	341	842
	NBR	250	0	21	49	58
	SBL	490	151	292	m142	m346
	SBT		~1108	84	m#490	86
US 441 @ SR 414 Westbound Ramps	EBL	450	4	9	15	28
	EBT		17	31	43	67
	EBR	450	97	159	197	#354
	WBL	425	95	46	153	88
	WBT		122	55	215	114
	WBR	425	360	213	#712	#498
	NBL	500	~106	93	#234	m117
	NBT		280	~846	377	#592
	NBR					
	SBL	450	31	~91	69	#213
	SBT		~1115	486	#1250	583
	SBR	450	0	0	0	0
SR 414 @ Bear Lake Rd/ Rose Ave	EBL	630	158	~628	235	#861
	EBT		~2772	1,089	#2700	1,169
	EBR	630	22	5	56	41
	WBL	550	~351	283	#552	m254
	WBT		490	~3734	604	m#3119
	WBR	375	0	4	m14	m2
	NBL	330	191	~458	#316	#680
	NBT		428	~769	551	#1015
	NBR	420	~1115	419	#1384	529
	SBL	575	~269	~186	#473	#352
	SBT		544	~519	#753	#738
	SBR	350	142	222	257	#417

Notes: ~ indicates volume exceeds capacity, queue is theoretically infinite,
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m indicates volume for 95th percentile queue is metered by upstream signal.

Table 5-20. 2045 No-Build 50th and 95th Percentile Queue Lengths (Cont.)

Intersection	Movement	Storage Length (ft)	50th Percentile		95th Percentile	
			AM Peak	PM Peak	AM Peak	PM Peak
SR 414 @ Magnolia Homes Road	EBL	425	10	10	m8	m18
	EBT		~3685	242	m#3187	m339
	EBR	425	0	0	m0	m19
	WBL	580	~341	256	#546	m248
	WBT		629	1,616	830	1,627
	WBR	725	0	0	m0	m0
	NBL	325	157	166	#239	249
	NBT		~358	217	#583	#388
	SBT		20	20	58	57
SR 414 @ Gateway Drive	EBL	310	337	267	m287	m#373
	EBT		145	0	m0	0
	WBT		449	1,295	575	#1421
	WBR	170	1	1	8	6
	SBR		90	~236	14	#420
SR 434 @ SR 414 Ramps	EBL	600	386	409	439	#538
	EBR	750	46	6	111	47
	WBL	900	67	~518	94	#653
	WBR	900	195	~997	260	#1148
	NBL	500	67	84	102	125
	NBT		250	~733	309	#828
	NBR	825	0	0	76	3
	SBL	1000	359	152	415	200
	SBT		563	401	636	449
	SBR	800	0	0	73	61
Maitland Summit Blvd @ SR 414 EB Ramps	EBL	450	276	125	356	191
	EBT		186	54	218	82
	EBR		0	0	42	56
	NBT		49	54	69	74
	NBR	300	228	45	313	91
	SBL		21	98	45	151
	SBT		30	174	250	228
Maitland Summit Blvd @ SR 414 WB Ramps	WBL	510	318	390	384	520
	WBT		21	165	33	206
	WBR		170	0	238	36
	NBL		28	72	51	112
	NBT		74	57	117	83
	SBT		24	110	46	144
	SBR		0	237	2	385
Keller Rd @ SR 414 Ramps	EBL	400	8	8	22	22
	EBR		0	0	0	0
	WBL	525	419	69	469	97
	WBR	285	110	31	214	68
	NBL	250	36	185	65	239
	NBT		88	288	134	395
	NBR		0	0	0	0
	SBL	275	117	315	167	#412
	SBT		88	31	134	60
	SBR	475	0	0	0	0
Lake Destiny Rd @ I-4 Ramps	WBL	365	172	52	240	97
	WBR		0	0	0	0
	NBT		21	46	48	86
	NBR		0	0	30	54
	SBL	300	79	172	132	239
	SBT		27	16	53	29
SR 414 @ Hope Rd	EBL	485	73	73	#136	#135
	EBT		0	0	0	0
	WBT		~1758	~1278	#1809	#1344
	WBR	200	21	12	37	23
	SBR		0	0	0	0

Notes: ~ indicates volume exceeds capacity, queue is theoretically infinite,
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m indicates volume for 95th percentile queue is metered by upstream signal.

Table 5-21. 2045 Build 50th and 95th Percentile Queue Lengths

Intersection	Movement	Storage Length (ft)	50th Percentile		95th Percentile	
			AM Peak	PM Peak	AM Peak	PM Peak
Hiawassee Rd @ SR 414 Ramps	EBL	500	157	110	#226	151
	EBR	500	245	0	#430	49
	WBL	600	90	122	132	165
	WBR	600	0	0	0	0
	NBL	350	46	105	73	146
	NBT		287	283	349	360
	NBR	400	0	0	39	35
	SBL	300	8	8	22	21
	SBT		472	292	569	394
	SBR	300	7	0	66	42
US 441 @ SR 414 Eastbound Ramps	EBL	390	207	129	288	198
	EBR		350	30	428	82
	NBT		270	453	340	598
	NBR	250	0	32	84	94
	SBL	490	224	244	m194	m293
	SBT		278	77	m137	m248
US 441 @ SR 414 Westbound Ramps	EBL	450	4	9	16	26
	EBT		18	32	45	70
	EBR	450	94	79	196	#270
	WBL	425	84	~404	138	#625
	WBT		130	88	224	163
	WBR	425	199	153	#464	#369
	NBL	500	98	90	#220	m149
	NBT		150	~1177	335	#421
	NBR					
	SBL	450	101	~270	166	#448
	SBT		923	326	#1118	399
	SBR	450	0	0	0	0
SR 414 @ Bear Lake Rd/ Rose Ave	EBL	630	314	458	413	#618
	EBT		1,866	1,044	1,943	1,203
	EBR	630	36	27	83	91
	WBL	550	545	609	#756	m655
	WBT		410	1,647	355	1,495
	WBR	375	21	22	16	m22
	NBL	330	265	179	#465	256
	NBT		415	645	535	#825
	NBR	420	445	307	567	378
	SBL	575	235	170	321	#278
	SBT		656	410	#884	527
	SBR	350	141	0	257	86

Notes: ~ indicates volume exceeds capacity, queue is theoretically infinite,
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m indicates volume for 95th percentile queue is metered by upstream signal.

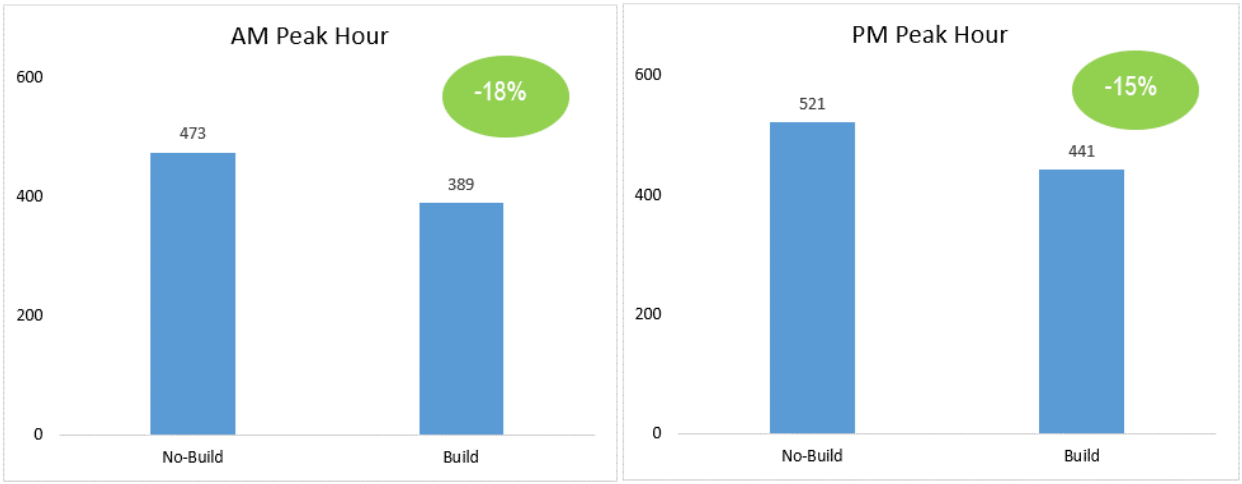
Table 5-21. 2045 Build 50th and 95th Percentile Queue Lengths (Cont.)

Intersection	Movement	Storage Length (ft)	50th Percentile		95th Percentile	
			AM Peak	PM Peak	AM Peak	PM Peak
SR 414 @ Magnolia Homes Road	EBL	425	10	11	m14	m19
	EBT		327	163	357	865
	EBR	425	0	4	m0	m5
	WBL	580	394	503	#574	m554
	WBT		156	1,200	169	1,357
	WBR	725	0	0	m0	m0
	NBL	325	223	158	#345	232
	NBT		195	10	#346	121
	SBT		20	21	56	57
SR 414 @ Gateway Drive	EBL	310	363	211	m383	405
	EBT		0	0	0	0
	WBT		325	954	469	1,095
	WBR	170	1	1	9	8
	SBR		164	264	240	#412
SR 434 @ SR 414 Ramps	EBL	600	435	255	504	319
	EBR	750	71	67	141	118
	WBL	900	65	~530	94	#664
	WBR	900	208	~1007	273	#1158
	NBL	500	180	295	237	366
	NBT		406	~783	476	#875
	NBR	825	0	0	79	20
	SBL	1000	331	144	393	191
	SBT		645	353	709	399
	SBR	800	0	40	78	182
Maitland Summit Blvd @ SR 414 EB Ramps	EBL	450	306	141	389	209
	EBT		201	57	233	85
	EBR		0	0	42	57
	NBT		55	59	77	80
	NBR	300	247	42	334	86
	SBL		20	100	44	154
	SBT		74	175	100	230
Maitland Summit Blvd @ SR 414 WB Ramps	WBL	510	319	390	386	#576
	WBT		24	185	37	236
	WBR		186	0	254	37
	NBL		31	82	56	#135
	NBT		91	62	127	85
	SBT		24	109	46	140
	SBR		0	313	2	#514
Keller Rd @ SR 414 Ramps	EBL	400	8	8	22	22
	EBR		0	0	0	0
	WBL	525	419	69	469	97
	WBR	285	110	31	214	68
	NBL	250	40	205	70	259
	NBT		88	288	134	395
	NBR		0	0	0	0
	SBL	275	117	315	167	#412
	SBT		88	32	135	62
	SBR	475	0	0	0	0
Lake Destiny Rd @ I-4 Ramps	WBL	365	172	52	240	97
	WBR		0	0	0	0
	NBT		21	46	48	86
	NBR		0	0	30	54
	SBL	300	79	172	132	239
	SBT		27	16	53	29
SR 414 @ Hope Rd	EBL	485	73	73	#136	#135
	EBT		0	0	0	0
	WBT		~2142	~1811	#2176	#1857
	WBR	200	21	12	37	23
	SBR		0	0	0	0

Notes: ~ indicates volume exceeds capacity, queue is theoretically infinite,
 # indicates 95th percentile volume exceeds capacity, queue may be longer, and
m indicates volume for 95th percentile queue is metered by upstream signal.

A comparison of cumulative intersection control delay (sum of average delay for all intersections) between No-Build and Build in 2045 is shown in **Figure 5-13**, for the intersections within the PD&E study limits including Maitland Summit Boulevard. The figure shows that delay at the intersections along the study corridor is expected to be about 15-18 percent lower with the Build alternative compared to the No-Build. This is due to traffic diversion from the arterial portion of SR 414 to the proposed toll lanes. The toll lanes will provide additional capacity at a high speed to alleviate existing and future congestion and enhance safety. This isolated intersection analysis does not take into account the additional benefit associated with reduced delay and travel time for the traffic diverted to the proposed toll lanes in the Build alternative. The Build demand is higher than No-Build demand. Overall, the Build is expected to process more demand than the No-Build and improve operations and safety in the region.

Figure 5-13. 2045 Cumulative Intersection Control Delay



6. Conclusion

The preferred Build alternative, Alternative 4 with Option 1 Concept ramp connections, considers a two-mile four-lane tolled expressway extension of the SR 414/John Land Apopka Expressway from the current terminus at US 441 to the SR 434 interchange. The alternative is an expressway bypass of the SR 414 arterial, in which the arterial intersections remain, including Bear Lake Road/Rose Avenue, Eden Park Road, Magnolia Homes Road, and Gateway Drive. Travel pattern analysis using INRIX and Streetlight data showed that 60 percent of the traffic west of the project travels through the study area to the Maitland Center office park, I-4, and SR 414 east of I-4, with 20 percent destined to US 441 and the other 20 percent destined to the neighborhoods in the study area.

The No-Build alternative analysis assumed widening of SR 414 to six lanes from US 441 to SR 434. The Build alternative is expected to have a higher east-west throughput compared to the No-Build within the project limits. Overall, the projected 2045 AADT for the Build (112,000) is 58 percent higher than the No-Build (70,900), in the highest volume section. The Build alternative provides for traffic growth of 77 percent, from 2025 (63,400) to 2045 (112,000).

The arterial intersection configurations within the study corridor were initially screened using the Intersection Capacity Evaluation (ICE) tools. The Capacity Analysis for Planning of Junctions (CAP-X) tool recommended Displaced Left Turn geometry for each of the intersections; however due to right-of-way constraints and the elevated expressway piers in the medians, the existing intersections configurations and control were maintained. Some of the improvements suggested at Bear Lake intersection (adding dual eastbound and westbound left turn lanes) could not be accommodated due to right-of-way impacts and Bear Lake Road/Rose Avenue being two-lane facilities feeding traffic into residential neighborhoods. The traffic patterns could change significantly with the project build and thereby reduce some of the cut through traffic using these neighborhood streets. In addition to the proposed toll lanes, the preferred Build alternative includes the extension of a third eastbound lane from the project terminus at SR 434 to Maitland Summit Boulevard, to enhance operations.

The analysis showed that delay at the intersections along the study corridor is expected to be about 15-18 percent lower with the Build alternative compared to the No-Build in 2045. This is due to traffic diversion from the arterial portion of SR 414 to the proposed toll lanes. This isolated intersection analysis does not take into account the additional user benefit associated with reduced delay and travel time for the traffic diverted to the proposed toll lanes in the Build alternative.

The traffic analysis showed that the SR 414 Expressway Extension will improve traffic operations in the study area in the Build condition over the No-Build condition. The SR 414 Expressway Extension provides an opportunity for high-speed travel between the SR 414 John Land Apopka Expressway and the improvements on SR 414 as part of the I-4 Ultimate project. This connectivity provides relief to the latent traffic demand of east-west travel, providing an alternative in west Orange and Seminole Counties. The toll lanes will provide additional capacity at a high speed to alleviate existing and future congestion and enhance safety in the region.

APPENDICES – Provided Seperately

Appendix A
Traffic Counts
FDOT Traffic Data

Appendix B

Existing Conditions – Land Use, Transit & Bicycle/Pedestrian

Appendix C

2019 Existing Conditions HCS Freeway Analysis

Appendix D

2019 Existing Conditions Synchro Analysis
Signal Timings

Appendix E

Crash Analysis

Appendix F

Intersection Capacity Evaluation – CAP-X and ICE Forms

Appendix G

2025 and 2045 Synchro Analysis

Appendix H
2045 Loaded Travel Demand Model Network Plots