Interchange Operational Analysis Report (IOAR)

I-295 at SR 15 (US 17) to South of Wells Road Build Improvement

FPID # 435575-1-32-01

Duval & Clay Counties, Florida

Prepared for

Florida Department of Transportation

District Two

June 2021

PROFESSIONAL ENGINEER CERTIFICATION

I hereby certify that I am a registered professional engineer in the State of Florida practicing engineering for Arcadis U.S., Inc and that I have supervised the preparation of and approve the analysis, findings, options, conclusions, and technical advice hereby reported for:

PROJECT: Interchange Operational Analysis Report (IOAR)
I-295 at SR 15 (US 17) to South of Wells Road Build Improvements
FPID # 435575-1-32-01
Duval & Clay Counties, Florida

The engineering work represented by this document was performed through the following duly authorized engineering business:

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Certificate of Authorization No. 7917

This report provides preliminary engineering analyses for the proposed interchange improvements along SR 15 (US 17/Roosevelt Boulevard). Any engineering analyses, documents conclusions, or recommendations relied upon from other professional sources or provided by others are referenced accordingly in the following report.

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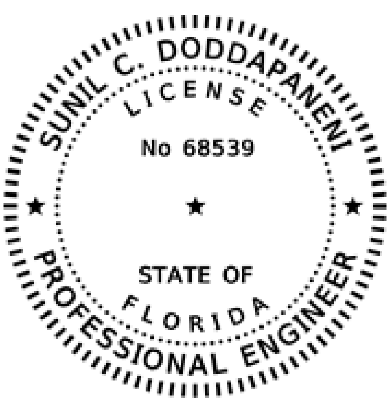

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Interchange Operational Analysis Report (IOAR)

Build Improvements

For I-295 at SR 15 (US 17) to South of Wells Road

FPID: 435575-1-32-01

Florida Department of Transportation

Determination of Safety, Operational and Engineering Acceptability

Acceptance of this document indicates successful completion of the review and determination of safety, operational and engineering acceptability of the Interchange Access Request. Approval of the access request is contingent upon compliance with applicable Federal requirements, specifically the National Environmental Policy Act (NEPA) or Department's Project Development and Environment (PD&E) Procedures. Completion of the NEPA/PD&E process is considered approval of the project location design concept described in the environmental document.

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QUALITY CONTROL CERTIFICATION FOR INTERCHANGE ACCESS REQUEST SUBMITTAL

Submittal Date: June 2021

FM Number: 435575-1-32-01

Project Title: IOAR for I-295 at SR 15 (US 17) to South of Wells Road Build Improvements

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Interchange Operational Analysis Report (IOAR)

Quality Control (QC) Statement

This document has been prepared following FDOT Procedure Topic No. 525-030-160 (New or Modified Interchanges) and complies with the FHWA two policy requirements. Appropriate District level quality control reviews have been conducted and all comments and issues have been resolved to their satisfaction. A record of all comments and responses provided during QC review is available in the project file or Electronic Review Comments (ERC) system.

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EXECUTIVE SUMMARY

The US 17/Roosevelt Boulevard (SR 15) from south of Wells Road to Collins Road serves as an important access point in Duval and Clay Counties' transportation network. It provides connectivity to major employers such as Naval Air Station (NAS) Jacksonville and Fleming Island. The Florida Department of Transportation (FDOT) District Two completed a Project Development and Environment (PD&E) Study to evaluate several enhancements to improve traffic operations and safety at this key interchange with I-295.

During peak periods, traffic queues from SR 15 ramp terminal intersections extend onto I-295 mainline creating congestion and causing crashes. Therefore, this project is needed to improve operational and safety issues along SR 15 within the study limits. This project proposes to address the following issues at the I-295 and SR 15 interchange:

- Southbound congestion on SR 15 interferes with traffic exiting to Naval Air Station Jacksonville.
- During the PM peak, traffic exiting from I-295 northbound to SR 15 queues several miles onto the right lanes of I-295 northbound.
- Backup onto I-295 from the I-295 southbound off-ramp is also observed during peak hours.

In addition, several other needs related to roadway capacity/deficiencies, system linkage, legislation/plan consistency, social demands or economic development, modal interrelationships and hurricane evacuation support the need for these proposed improvements.

This IOAR document aims to evaluate Build Alternative operational and safety results and compare with the No-Build Alternative. The following FHWA policy points serve as primary decision criteria used in the approval of IOAR.

Federal Highway Administration (FHWA) Policy Points

1. Proposal does not adversely impact operational safety of the existing freeway

An operational and safety analysis has concluded that the proposed change in access does not have a significant adverse impact on the safety and operation of the Interstate facility (which includes mainline lanes, existing, new, or modified ramps, ramp intersections with crossroad) or on the local street network based on both the current and the planned future traffic projections. The analysis shall, particularly in urbanized areas, include at least the first adjacent existing or proposed interchange on either side of the proposed change in access (23 CFR 625.2(a), 655.603(d) and 771.111(f)). The crossroads and the local street network, to at least the first major intersection on either side of the proposed change in access, shall be included in this analysis to the extent necessary to fully evaluate the safety and operational impacts that the proposed change in access and other transportation improvements may have on the local street network (23 CFR 625.2(a) and 655.603(d)). Requests for a proposed change in access must include a description and assessment of the impacts and ability of the proposed changes to safely and efficiently collect, distribute and accommodate traffic on the Interstate facility, ramps, intersection of ramps with crossroad, and local street network (23 CFR 625.2(a) and 655.603(d)). Each request must also include a conceptual plan of the type and location of the signs proposed to support each design alternative (23 U.S.C. 109(d), and 23 CFR 655.603(d)).

For this IOAR study, the VISSIM analysis was conducted to evaluate the performance of the study corridor (SR 15) for the Exisitng Year (2019), the Opening Year (2025) and Design Year (2045) for both No-Build and Build conditions. The operational analysis results indicate that several intersections along SR 15, especially I-295 ramp terminal interchange intersections operate at failing conditions (LOS F or E) mainly due to peak period demand exceeding the available capacity.

Also, due to failing conditions of I-295 ramp terminal interchange intersections, the I-295 northbound and southbound ramp queues extend to the I-295 mainline, which deteriorates the mainline operations. With the increase in traffic for future conditions, the traffic operations further deteriorate if no improvements are implemented along SR 15. The proposed improvements listed in **Section 4-2** will improve traffic operations and the safety of the study corridor over No-Build conditions.

An operational analysis performed for the Build conditions showed improved traffic operations that decrease excessive delays throughout the study area, thereby improving safety compared to the No-Build conditions. The queue lengths on the I-295 northbound and southbound off-ramps, which spill back onto the I-295 mainline in the No-Build conditions, will significantly improve in the Build conditions. In the Design Year (2045), average queue lengths along the I-295 northbound and southbound off-ramps for the left movements are reduced by **92 percent** and **76 percent** in the AM peak hour compared to No-Build conditions, respectively. Similar, a **99 percent** and **93 percent** reduction in the PM Peak Hour compared to No-Build conditions, respectively.

Table E-1 compares No-Build and Build Alternatives intersection delay for I-295 ramp terminal intersections during AM and PM peak hour.

Table E-1: VISSIM Overall Ramp Terminal Intersection Delay

Intersection Delay (seconds/vehicle)	Opening Year (2025)					
	AM Peak Hour			PM Peak Hour		
	No-Build	Build	Percentage Improvement	No-Build	Build	Percentage Improvement
I-295 NB Off Ramp and SR 15	38.7	32.5	16%	46.4	24.6	47%
I-295 SB Off Ramp and SR 15	37.8	17.1	55%	57.3	11.1	81%
Intersection Delay (seconds/vehicle)	**Design Year (2045)**					
	AM Peak Hour			**PM Peak Hour**		
	No-Build	**Build**	**Percentage Improvement**	**No-Build**	**Build**	**Percentage Improvement**
I-295 NB Off Ramp and SR 15	138.3	53.3	66%	260.7	144.6	45%
I-295 SB Off Ramp and SR 15	84.4	40.7	52%	318.3	25	92%

VISSIM analysis results indicate, as shown in **Table E-1**, the proposed build improvements significantly improve traffic operations at I-295 ramp terminal intersections compared to No-Build conditions. The operational benefits with proposed build improvements range from **16 percent** to **92 percent** reduction in intersection delay during peak hours.

Table E-2 provides a comparison of network-wide MOEs for Opening Year (2025) and Design Year (2045) for both No-Build and Build conditions during AM and PM peak periods.

Table E-2: Traffic Operational Analysis Comparison

Network-wide MOEs	Opening Year (2025)					
	AM Peak			PM Peak		
	No-Build	Build	Percentage Improvement	No-Build	Build	Percentage Improvement
Average Speeds (mph) across 6-hours	24	34	42%	21	35	67%
Average Delay (sec/veh) across 6-hours	160	54	66%	213	53	75%
Latent Demand at End of 6-hours (Vehicles)	0	0	0%	0	0	0%
Network-wide MOEs	**Design Year (2045)**					
	AM Peak			**PM Peak**		
	No-Build	**Build**	**Percentage Improvement**	**No-Build**	**Build**	**Percentage Improvement**
Average Speeds (mph) across 6-hours	17	22	29%	12	22	83%
Average Delay (sec/veh) across 6-hours	305	189	38%	504	196	61%
Latent Demand at End of 6-hours (Vehicles)	8,148	1,493	82%	8,114	1,429	82%

The study area experiences approximately 659 crashes during five years (2013 to 2017). The predominant crash type for this area was front to rear collisions accounting for 44.5 percent of the crashes attributed to the congested conditions within the study area. The predicted safety analysis results indicated that the traffic safety performance improved significantly with the Build improvements compared with the No-Build conditions. The Build improvements reduce the ramp and ramp terminals predicted average crash frequency by approximately **14.3 percent** and **15.2 percent** in the Opening Year (2025) and Design Year (2045) compared to No-Build conditions, respectively. The overall predicted crash reduction for the study area is **6.0 percent** and **6.7 percent** in the Opening Year (2025) and Design Year (2045), respectively.

The project also provides safety benefits within the study area by reducing both the high severity crashes and property damage only crashes. The annual crash costs predicted for the Build Alternative are lower than the No-Build Alternative by approximately 1.3million dollars and 2.4 million dollars in the Opening Year (2025) and Design Year (2045), respectively. This is approximately 5.7 percent reduction and 7.0 percent reduction in the crash costs in the Opening Year (2025) and the Design Year (2045), respectively. The Build Alternative reduces the overall crash cost by approximately 38.3 million dollars over the entire life of the project when compared to the No-Build Alternative, as shown in **Table 6-3**.

Therefore, the proposed build improvements for the project improves overall traffic operations and safety of the study corridor (SR 15).

2. A full interchange with all traffic movements at a public road is provided

The proposed access connects to a public road only and will provide for all traffic movements. Less than "full interchanges" may be considered on a case-by-case basis for applications requiring special access for managed lanes (e.g., transit, HOVs, HOT lanes) or park and ride lots. The proposed access will be designed to meet or exceed current standards for federal-aid projects on the interstate system (23 CFR 625.2(a), 625.4(a)(2), and 655.603(d)).

The improvements proposed along SR 15 from south of Wells Road to Collins Road will provide full interchange access and caters to all traffic movements from SR 15 to/from I-295.

The Build Alternative was designed to meet all current FDOT and FHWA design standards of federal-aid projects on the interstate system.

1.0 INTRODUCTION

1.1 Background

The US 17/Roosevelt Boulevard (SR 15) from south of Wells Road to Collins Road serves as an important access point in Duval and Clay Counties' transportation network. It provides connectivity to major employers such as Naval Air Station (NAS) Jacksonville and Fleming Island. The Florida Department of Transportation (FDOT) District Two completed a Project Development and Environment (PD&E) Study to evaluate several enhancements to improve traffic operations and safety at this key interchange with I-295. Improvements developed under this PD&E Study include ramp and intersection improvements at SR 15 and the I-295 off-ramps, Eldridge Avenue, Old Orange Park Road, and Wells Road. A project location map is provided in **Figure 1-1**. An Interchange Operations Analysis Report (IOAR) was approved under the Programmatic Agreement by FDOT District Two and FDOT Central Office in August 2018.

FDOT District Two evaluated a Build Alternative that will improve traffic operations and safety at this key interchange with the available construction funding and requests approval of an IOAR to incorporate these modifications. An approved July 2020 Methodology Letter of Understanding (MLOU) (**Appendix A**) summarizes and documents all methodology agreements reached between the FDOT District Two Interchange Review Team, FDOT Central Office and FHWA for these proposed build improvements. This IOAR has been developed per FDOT Policy No 000 525-015 (Approval of New or Modified Access to Limited Access Highways on Strategic Intermodal System (SIS)), FDOT Procedure No. 525-030-160 (Approval of New or Modified Interchange Access to Limited Access Facilities on SIS), Interchange Access Request User's Guide, and the FDOT Project Traffic Forecasting Handbook (Procedure No 525-030-120).

1.2 Project Description

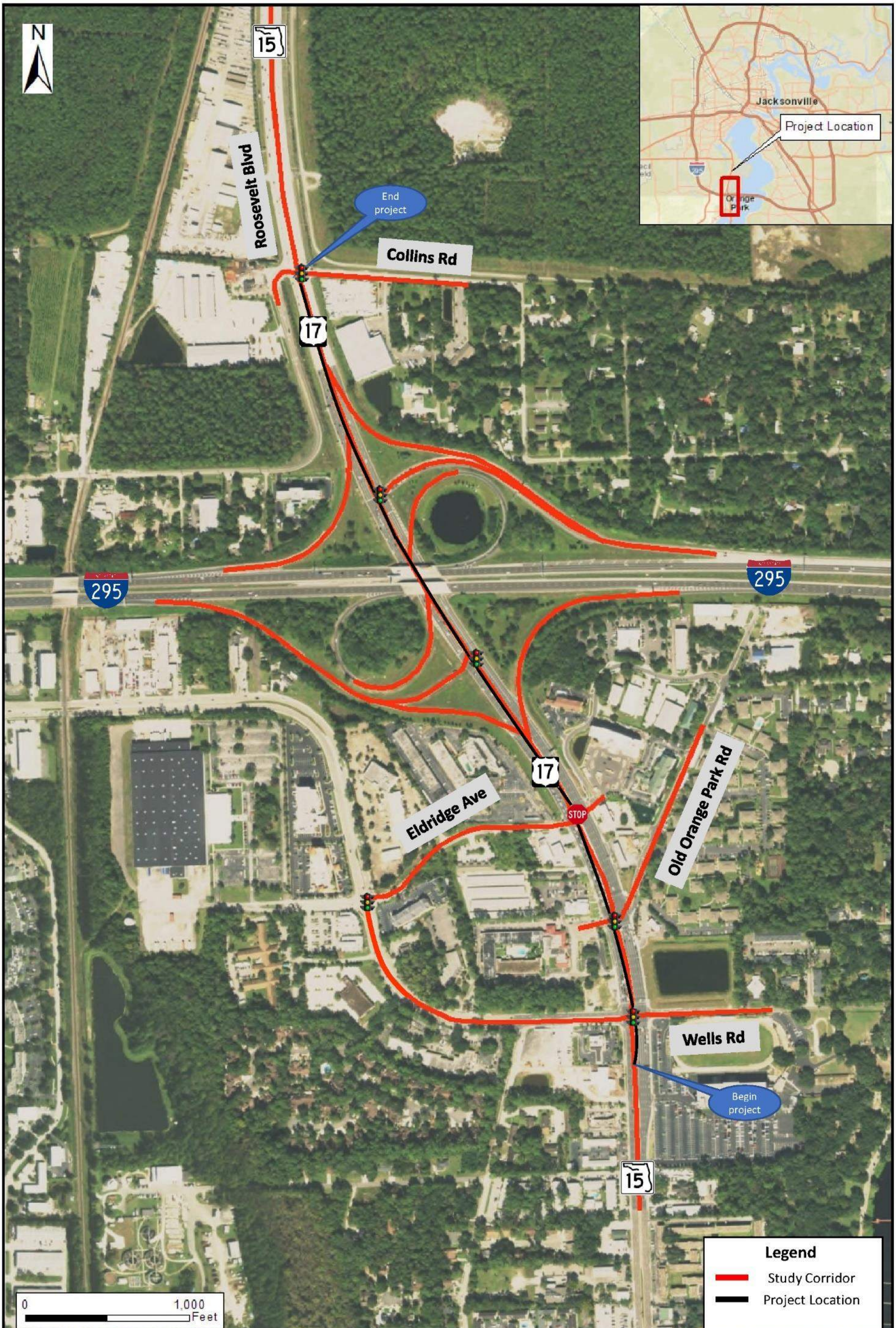
This project will construct build operational and safety improvements along SR 15 from south of Wells Road to Collins Road that includes I-295 ramp terminal intersections to relieve congestion and improve safety along the study area.

This project is identified in the North Florida Transportation Planning Organization's (TPO) 2040 Long Range Transportation Plan (LRTP), the FY 2017-2021 Transportation Improvement Program (TIP), and in the FDOT's Statewide Transportation Improvement Program (STIP).

1.3 Purpose and Need

1.3.1 Purpose

The purpose of this project is to complete build improvements that improve operations and safety conditions at I-295 and SR 15 interchange and along SR 15 from south of Wells Road to Collins Road within available funding for completing these improvements. During peak travel times, traffic queues onto I-295 from SR 15 and is creating backups and causing crashes. Therefore, the proposed interchange improvements at the ramp terminals and the intersections' improvements at Eldridge Avenue, Old Orange Park Road and Wells Road will improve traffic operations as well as safety along SR 15 within the study limits.



FDOT	I-295 at SR 15 (US 17) to South of Wells Road Improvements	Project Location Map	Figure 1-1 Page 2

1.3.2 Need

This project is needed to improve operational and safety deficiencies near I-295 and SR 15 interchange areas. The operational and safety improvements, consisting of interchange improvements at I-295 and SR 15 and modifications to the intersections of SR 15 with Eldridge Avenue, Old Orange Park Road and Wells Road, are expected to relieve congestion and reduce crashes on I-295 around SR 15 interchange. This project proposes to address the following issues at the I-295 and SR 15 interchange:

- Southbound congestion on SR 15 interferes with traffic exiting the Naval Air Station Jacksonville.
- During the PM peak, traffic exiting from I-295 northbound to SR 15 queues several miles onto the right lanes of I-295 northbound.
- Backup onto I-295 from the I-295 southbound off-ramp is also observed during peak hours.

Several other needs related to roadway capacity/deficiencies, system linkage, legislation/plan consistency, social demands or economic development, modal interrelationships and hurricane evacuation were identified and addressed in the PD&E study completed for this project (August 2018) and supports the need for these proposed improvements.

1.4 Project Location

The project is located in the southwestern area of the City of Jacksonville, in Duval and Clay Counties, Florida, as presented in **Figure 1-1**. The project study area consists of a mile-long segment along SR 15 between the signalized intersections of Wells Road to the south and Collins Road to the north. It consists of SR 15, the on-/off-ramps to/from I-295, and cross streets (Wells Road, Old Orange Park Road, Eldridge Avenue, Collins Road) that connect to these roadways within the project limits. The on and off-ramps from I-295 feed/attract traffic in the project study area.

2.0 METHODOLOGY

2.1 Overview

Traffic volumes for this IOAR utilize volumes developed following the procedures stipulated in the approved July 2020 MLOU.

2.2 Analysis Years

The years used for the travel demand forecasting are:

- Base Year 2015
- Horizon Year 2045

The years used for the traffic analysis are:

- Existing Year 2019
- Opening Year 2025
- Design Year 2045

The analysis years proposed for the IOAR are consistent with the approved July 2020 MLOU.

2.3 Area of Influence

The project is located in the southwestern area of the City of Jacksonville, in Duval and Clay Counties, Florida and is presented in **Figure 2-1**. The project study area consists of a mile-long segment along SR 15 between the signalized intersections of Wells Road to the south and Collins Road to the north. It consists of SR 15, the on/off-ramps to/from I-295, and cross streets (Wells Road, Old Orange Park Road, Eldridge Avenue, Collins Road) that connects these roadways within the project limits. The on and off-ramps from I-295 feed/attract traffic in the project study area. The study area includes five signalized intersections and one un-signalized intersection along SR 15:

1. SR 15 and Wells Road − *Signalized*
2. SR 15 and Old Orange Park Road − *Signalized*
3. SR 15 and Eldridge Avenue/Loop − *Un-signalized*
4. SR 15 and I-295 southbound ramps − *Signalized*
5. SR 15 and I-295 northbound ramps − *Signalized*
6. SR 15 and Collins Road – *Signalized*

The signalized intersection of Wells Road at Eldridge Avenue is considered as an adjacent intersection to the project study area.

The area of influence does not include the I-295 mainline, ramp merge, and diverge locations. The main purpose of this project is to improve traffic operations along SR 15 corridor within the study limits. The proposed SR 15 corridor improvements will not have any adverse impacts on I-295. The PD&E project (FPID 213345-9-22-01) will include improvements along I-295 from SR 13 (San Jose Boulevard) to SR 21 (Blanding Boulevard).

I-295 at SR 15 (US 17) to South of Wells Road Improvements	Project Area of Influence	Figure 2-1
		Page 5

2.4 Data Collection

Due to COVID-19, Existing Year (2020) data collection was not possible as typical travel patterns were not reflected due to the mandate for people to work from home or attend school virtually. Therefore, this IOAR utilizes available FTO 2019 I-295 mainline and ramp data and develop an Existing Year (2019) condition traffic volume diagram using area growth rates and FTO volumes to evaluate an Existing Year (2019) for this project. Additional existing conditions data that was necessary to understand recent land use changes included:

- Existing Roadway Characteristics Data (*Source* – ***Field Visits and Google Maps***)
  - Roadway Geometry
  - Number of Lanes
- Traffic Volume (*Source* – ***FDOT and I-295 Western Beltway Feasibility Study***)
  - Turning movement and tube counts performed near the study area intersections for existing conditions.
  - Opening Year (2025) and Design Year (2045) traffic volume projections – Completed using the Traffic Forecasting Technical Memorandum prepared with the approved August 2018 IOAR
  - FDOT Traffic Information Online Counts
- Control Data (*Source* – ***Field Visits and City of Jacksonville***)
  - Signal Timing Data
  - Stop/Yield Sign Inventory
  - Regulatory/Advisory Speed Limits

2.5 Traffic Data and Factors

The traffic factors used for the IOAR are summarized in **Table 2-1**. The most recent (Year 2019) K-, D-, T-24, and DHT Factors for various roadway within the study area from the FDOT tool are used. PHF is the Peak Hour Factor showing a measure of traffic demand fluctuation during the peak hours and a recommended default value (0.95) for urban areas, per guidance from FDOT Traffic Analysis Handbook. The T_{24} factor is the percentage of heavy vehicles during a 24-hour period and the T_f factor is the percentage of heavy vehicles during the peak hour. The K factor is the proportion of AADT occurring in the peak hour. The D factor is the proportion of Design Hourly Volume (DHV) occurring in the heavier direction (directional split). The Model Output Conversion Factor (MOCF) was obtained from the latest information provided by FTO for Duval/Clay Counties.

Table 2-1: Traffic Factors

Roadway	K	D	T_{24}(1)	T_f(1)	PHF(2)	MOCF(1)
I-295	9.0%(x)	55.3%	12.5%	6.3%	0.95	0.98
SR 15 (Roosevelt Blvd)	9.0%	54.1%	5.9%	3.0%	0.95	0.98
Wells Rd and Cross Streets	9.0%	54.1%	1.3%	0.7%	0.95	0.98

Note:
(1) Year 2019 FDOT Traffic Online Factors. (x) – FDOT I-295 showed an 8% K factor, but this study proposes to use a 9% K factor to be consistent with the arterials, other locations, and with Standard K factor
(2) FDOT Traffic Analysis Handbook, March 2014

The Opening Year (2025) and Design Year (2045) traffic volumes developed following the procedures stipulated in the approved July 2020 MLOU for traffic operational evaluations of this IOAR.

2.6 Future Volume Forecasting

New traffic forecasting was completed for this IOAR. Future volume forecasting was completed as per the approved July 2020 MLOU provided in **Appendix A**. The methodology utilized for the development of design traffic volumes for this project followed the procedures summarized below:

Existing Year (2019) traffic counts were compiled and balanced along the study area. Traffic volume information available from FTO for Year 2019 was utilized for I-295 mainline and ramps and this data was used to determine the turning movement counts for the study area intersections utilizing the previous approved IOAR Existing Year (2014) intersection turn percentages. Peak hour and direction of travel was determined for AM and PM conditions. All Existing Year (2019) traffic data were balanced for mainline, ramps and intersections.

The Northeast Regional Planning Model (NERPM) Activity Based (AB2) Version 1 developed by the North Florida Transportation Planning Organization (NFTPO) was the approved forecasting model for the development of future year daily and peak hour traffic projections within the study area. The NERPM AB2 Version 1 is based on the Florida Standard Urban Transportation Modeling Structure (FSUTMS) and is recognized by FDOT District Two, FDOT Central Office, FHWA and the NFTPO as an acceptable travel demand forecasting tool. The use of this model is consistent with other on-going planned and programmed projects in northeast Florida. This latest version of NERPM AB2 Version 1 available for public projects has a Base Year 2015 and Cost Feasible Year 2045.

The model networks and attributes along the SR 15 corridor (between South of Holly Point Drive West to North of Norman Street) and within a two-mile radius were thoroughly reviewed for accuracy and verification. Validation checks were performed on the network. Upon the completion of updating the NERPM AB2 Version 1 future year conditions with the proposed roadway improvements for this project, the Base Year (2015) and Horizon Year (2045) models were run.

Growth rates were developed between the Base and Horizon Year model volumes and verified for reasonableness by comparing with other independent data sources such as historical growth rates from FTO count stations, and compound growth rates from population and employment data from BEBR. The Design Year (2045) traffic volumes (AADTs) were generated by applying the selected annual average growth rate to Existing Year (2019) traffic volumes and from the NERPM modeling. After the reasonableness checks performed for the AADTs completed, the final Design Year (2045) AADT projections were established for the I-295 mainline and SR 15 ramps. The difference of the projected model volume between the No-Build Alternative and the Build Alternative were minimal, therefore, the same set of volume was used for the two alternatives **Table 2-2** and **Table 2-3** summarize the AADT evaluation and recommended growth rate established for this project.

Table 2-2: Study Area AADT Evaluation Summary

Roadway	Location	2019 Count	2019 Model Volume	2045 Model Volume	2025 Interpolated Growth Rate	2045 Final
I-295	South of SR 15 Interchange	163,000	151,724	244,776	181,700	270,000
SR 15 Interchange	NB I-295 off-ramp	25,000	25,172	31,056	28,100	41,800
	SB I-295 on-ramp from NB SR 15	15,500	22,208	28,652	17,400	25,900
	SB I-295 on-ramp from SB SR 15	9,300	12,069	14,896	10,700	15,900
	SB I-295 off-ramp	14,500	14,870	26,820	16,100	26,300
	NB I-295 on-ramp from NB SR 15	8,800	10,856	16,814	11,200	18,200
	NB I-295 on-ramp from SB SR 15	3,900	561	7,304	4,900	8,100
I-295	North of SR 15 Interchange	140,400	118,561	221,019	157,700	239,000
SR 15	SR 15 North of Collins Rd	43,000	52,074	64,552	48,500	72,000
	SR 15 between I-295 and Eldridge Ave	80,000	102,581	158,355	81,300	120,800
	SR 15 North of Kingsley Ave	62,000	59,782	80,844	69,900	103,800
Wells Rd	Wells Rd	25,000	35,589	52,712	28,100	41,800

Table 2-3: Study Area Growth Rates Summary

Roadway	Location	Historical Growth	2019 Model to 2045 Model	2019 Count to 2045 Final AADT	Accepted Growth
I-295	South of SR 15 Interchange	2.9%	1.9%	2.0%	2.0%
SR 15 Interchange	NB I-295 off-ramp	2.0%	0.8%	2.0%	2.0%
	SB I-295 on-ramp from NB SR 15	2.0%	1.0%	2.0%	2.0%
	SB I-295 on-ramp from SB SR 15	2.0%	0.8%	2.1%	2.0%
	SB I-295 off-ramp	2.5%	2.3%	2.3%	2.5%
	NB I-295 on-ramp from NB SR 15	2.5%	1.7%	2.8%	2.5%
	NB I-295 on-ramp from SB SR 15	2.5%	10.4%	2.9%	2.5%
I-295	North of SR 15 Interchange	2.9%	2.4%	2.1%	2.0%
SR 15	SR 15 North of Collins Rd	2.0%	0.8%	2.0%	2.0%
	SR 15 between I-295 and Eldridge Ave	2.0%	1.7%	1.6%	2.0%
	SR 15 North of Kingsley Ave	2.0%	1.2%	2.0%	2.0%
Wells Rd	Wells Rd	2.0%	1.5%	2.0%	2.0%

The Existing Year (2019) and Horizon Year (2045) NERPM AB2 Version 1 roadway networks with PSWADT are provided in **Appendix B** of this report. FTO, BEBR, and census data used to determine growth rate reasonableness are provided in **Appendix C**.

The Directional Design Hourly Volume (DDHVs) were calculated by applying the respective K- and D-factors to the final established AADTs for I-295 mainline and ramps and were converted into turning movement values by applying the existing percentages to the DDHV values. For side street Design Year (2045) volumes, the growth rates established for the study area were applied to the intersection entry volumes to establish the side street demand volumes. The DDHV turning movements were developed by applying existing turning percentages to the intersection approach DDHVs. The DDHVs were balanced and adjusted so that the intersection turns balance with the ramp traffic. The volumes were then balanced along the arterials. The traffic projections were also checked for reasonableness. Coordination was done with other ongoing studies within the area to maintain consistency between the studies. The Opening Year (2025) traffic DDHVs were developed by interpolating the Opening Year (2025) numbers between the Existing Year (2019) and finalized Design Year (2045) DDHVs. The balanced Opening Year (2025) and Design Year (2045) turning movement volumes developed for this project are provided in **Section 4**.

2.7 VISSIM Analysis Procedure

The microsimulation analysis using VISSIM software was conducted to evaluate the traffic operational performance of the study area. A corridor-wide microsimulation analysis enhances the capability of capturing the network-wide vehicular interaction between the individual roadway elements (mainline segments, ramp junctions and arterial intersections). VISSIM models developed for the approved August 2018 IOAR were used for the Existing Year (2019) conditions. Visual observations were made to confirm speeds and queues were consistent with site visit observations for the Existing Year (2019) to ensure the calibration parameters are still valid for the microsimulation analysis of this IOAR. Due to peak spreading (congestion that occurs beyond the peak hour) in the study area, a six-hour analysis period was modeled between 5:45 AM and 11:45 AM for the AM peak period and between 3:45 PM and 9:45 PM for the PM peak period. The 15-minute peak period volume percentages from the approved August 2018 IOAR traffic volume were applied to the 2019, 2025, and 2045 balanced peak hour volumes in order to obtain six-hour volumes for the VISSIM analysis.

VISSIM is a stochastic model that produces different results by changing the random seed numbers. To ensure that model variation does not skew the results, a total of 10 model runs with varying random seeds was performed to achieve statistical significance. The microsimulation performed is consistent with guidelines provided in the FHWA Toolbox Volume III and the FDOT's Interchange Access Request User Guide and Traffic Analysis Handbook.

The following sections document the modeling methodology used for performing VISSIM microsimulation operational analysis.

2.7.1 Modeling Analysis Years and Alternatives

The VISSIM models were developed for the AM and PM peak periods for the following analysis years and alternatives:

- Existing Year (2019)
- Opening Year (2025) No-Build
- Opening Year (2025) Build
- Design Year (2045) No-Build
- Design Year (2045) Build

2.7.2 Model Traffic Volumes

All VISSIM model scenarios utilized AM and PM peak period volumes and 15-minute flow rates developed from the future year traffic forecasts performed for this study.

2.7.3 VISSIM Measures of Effectiveness

The following measures of effectiveness (MOEs) based on the VISSIM analysis results were used to evaluate the operational performance of the proposed improvements:

- System level – Average total and latent delay, average delay, average speed, vehicles served, and latent demand.
- Link level – Speeds.

- Intersection level – Delay, level of service, and queue length.

2.7.4 Level of Service Criteria

The established Level of Service (LOS) target for this project is a minimum of LOS D. The improvements for the study area intersections were targeted toward achieving this LOS.

3.0 EXISTING CONDITIONS

The following sections provide a discussion and evaluation of the existing conditions within the SR 15 from Collins Road to south of Wells Road. This discussion includes existing land use data, transportation systems data, existing traffic data, and existing operating conditions.

3.1 Existing Land Use

The land use around SR 15 from Collins Road to south of Wells Road is primarily commercial with residential areas along the on and off-ramps of I-295. Agricultural and forest land uses are present to the north end of the project. **Figure 3-1** shows the study area's existing land use.

3.2 Existing Roadway Network

The existing transportation network within the study area consists of a major interstate highway, I-295, with an interchange at a major urban arterial, SR 15. **Figure 3-2** shows the existing conditions lane configuration and **Table 3-1** summarizes the functional classification and number of lanes for each facility within the study area.

Table 3-1: Functional Classification of Study Area Roadways

Roadway	From	To	Functional Classification	Number of Lanes
I-295	West of SR 15	East of SR 15	Urban Interstate	6
SR 15	Wells Road	Collins Road	Urban Principal Arterial	6

SR 15 is an urban principal arterial consisting of three lanes in the northbound and southbound direction. SR 15 serves both residential and commercial properties within the area of influence and is the primary route of access to the NAS Jacksonville which is located approximately 2 miles north of the I-295 and SR 15 interchange. South of I-295, it is the only major arterial that serves the residential and commercial developments located west side of St. Johns River.

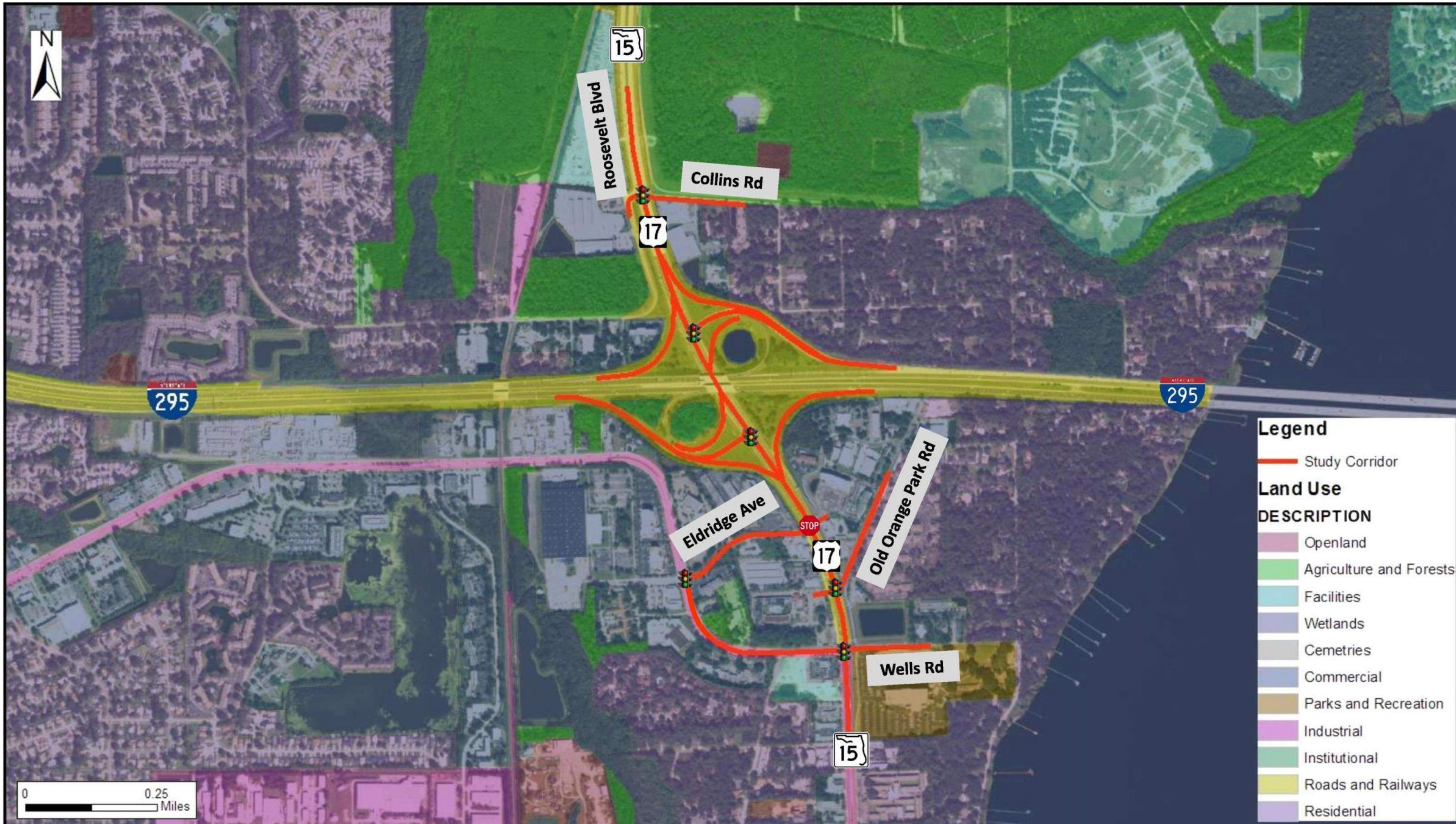
3.3 Existing Operational Performance

This section summarizes the VISSIM and Synchro operational analysis performed for the area of influence to assess existing traffic conditions. The facility under analysis include SR 15 from Collins Road to south of Wells Road.

3.3.1 Existing Traffic Data

Due to COVID-19, as typical travel patterns were not reflected due to the mandate for people to work from home or attend school virtually, Existing Year (2020) data collection was not possible. Traffic volume information available from FTO for Year 2019 were utilized for I-295 mainline and ramps. This data was used to determine the turning movement counts for the study area intersections utilizing the previous approved IOAR Existing Year (2019) intersection turn percentages. Peak hour and direction of travel were determined for AM and PM conditions. All Existing Year (2019) traffic data were balanced for mainline, ramps, and intersections as shown in **Figure 3-3**.

Existing Year (2019) condition traffic volume information along with the 15-minute peak period volume percentages from the Phase 1 SIMR models and existing signal timings were used to develop six-hour AM and PM peak period VISSIM models.

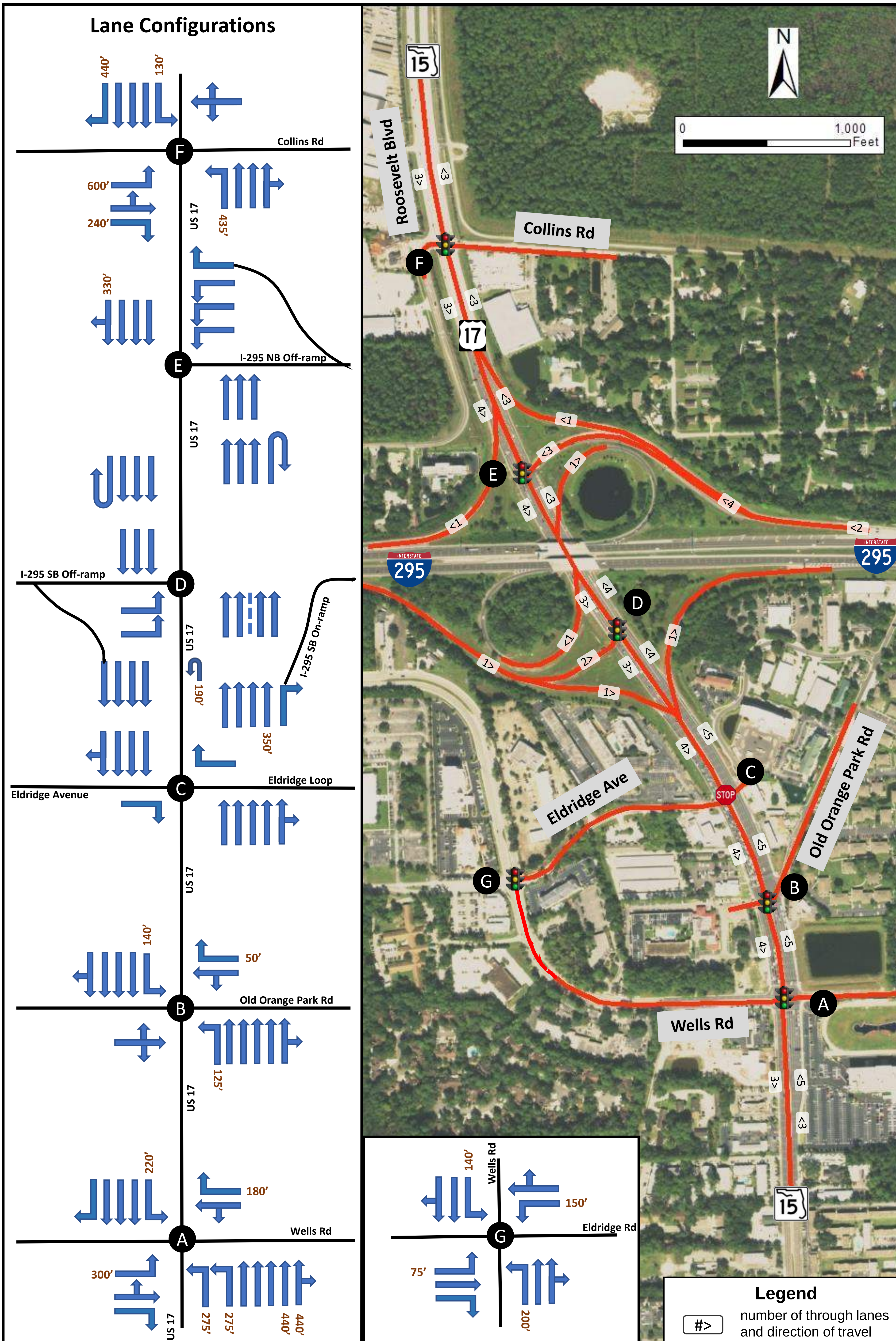


FDOT

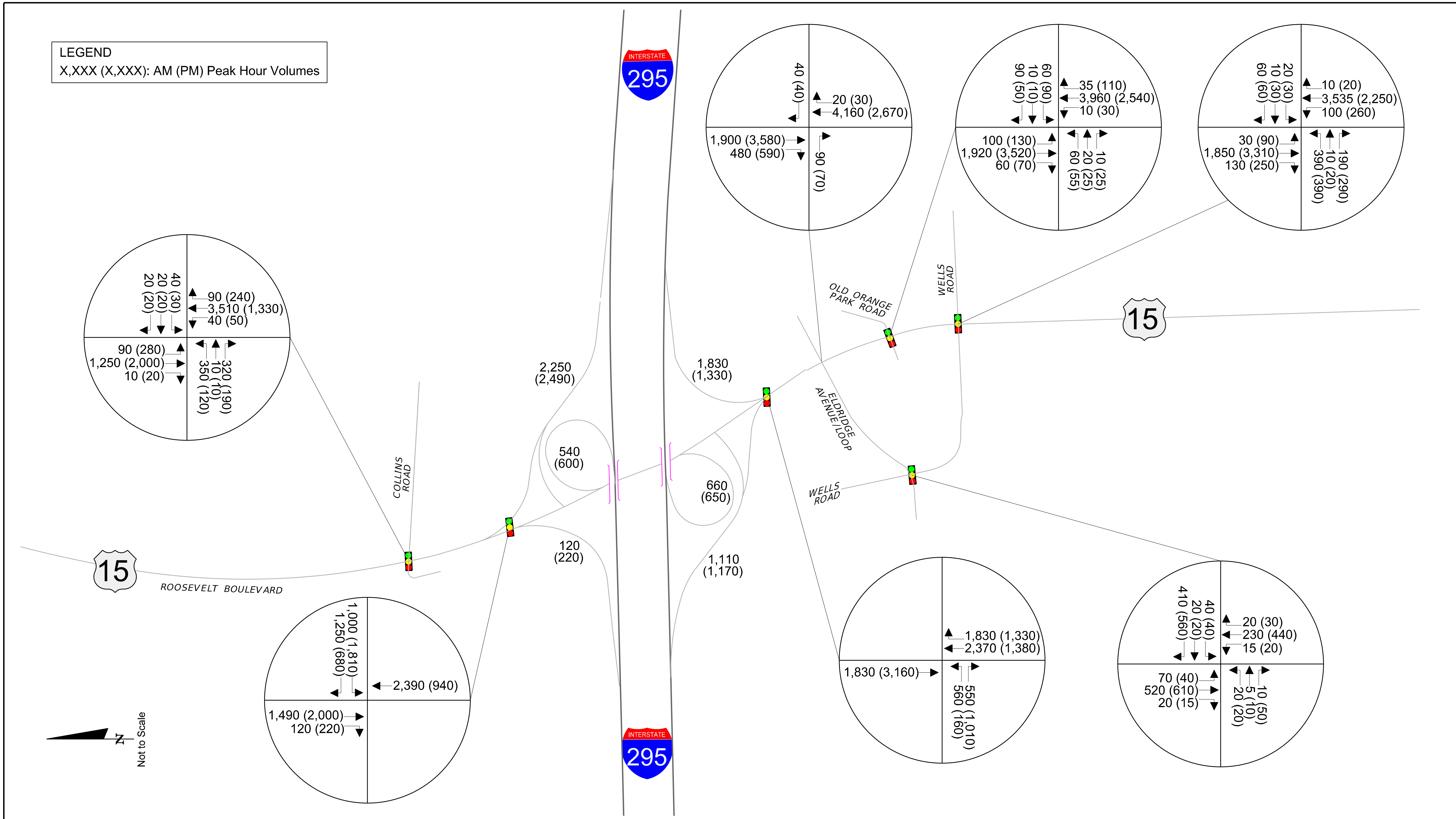
I-295 at SR 15 (US 17) to South of Wells Road Improvements

Existing Land Use Map

Figure 3-1



FDOT	I-295 at SR 15 (US 17) to South of Wells Road Improvements	Existing Condition Lane Configurations	Figure 3-2
			Page 13



FDOT

I-295 (SR 9A) at SR 15 (US 17) to South of Wells Road

Existing Year (2019) Peak Hour Volumes

Page 1 of 1

Figure 3-3

3.3.2 Existing Operational Analysis

A detailed operational analysis using Synchro and VISSIM microsimulation models developed from calibrated Existing Year (2014) condition models from the approved August 2018 IOAR was completed for the Existing Year (2019) AM and PM peak period conditions. The purpose of this analysis was to establish the baseline operational conditions for evaluating future year operational characteristics. The results of the operational analysis are presented to outline the quantitative performance of SR 15 from south of the Wells Road to Collins Road. The results provide an understanding of the broader and detailed operational issues under the Existing Year (2019) condition. The average of 10 model run results with varying random seeds were reported for evaluation.

Raw output values from the model runs and the Existing Year (2019) condition models are provided in **Appendix D**.

The following parameters were analyzed for the Existing Year (2019) condition:

- Traffic Volume Evaluations
  - Total Vehicle Demand
  - Vehicles Denied Entry (Latent Demand)
  - Vehicles Served

- System-wide Average Delay
- System-wide Average Speed
- Link Level Speeds
- Intersection Level Average Delay and Queue Lengths

Traffic Volume Evaluations – Total Vehicle Demand

Table 3-2 shows the total vehicular demand entered into the VISSIM models for each hour during the six-hour AM and PM peak period VISSIM simulation.

Table 3-2: Total Vehicle Demand - Existing Year (2019) Condition

Year	Alternative	Hour 1	Hour 2	Hour 3	Hour 4	Hour 5	Hour 6	TOTAL
2019	AM Peak Period	7,234	10,146	9,253	7,581	6,549	6,794	**47,557**
	PM Peak Period	9,764	10,029	8,232	5,401	4,304	3,393	**41,123**

Traffic Volume Evaluation – Vehicles Denied Entry (Latent Demand)

Total vehicles that are denied entry and are stuck behind the entry nodes in the VISSIM models during each hour of the six-hour AM and PM peak period VISSIM simulation were evaluated. The values reported from VISSIM for the total vehicles denied entry are cumulative across each hour of the simulation and are discussed below.

Figure 3-4 summarizes the vehicles denied entry into the network by hour as observed in the microsimulation.

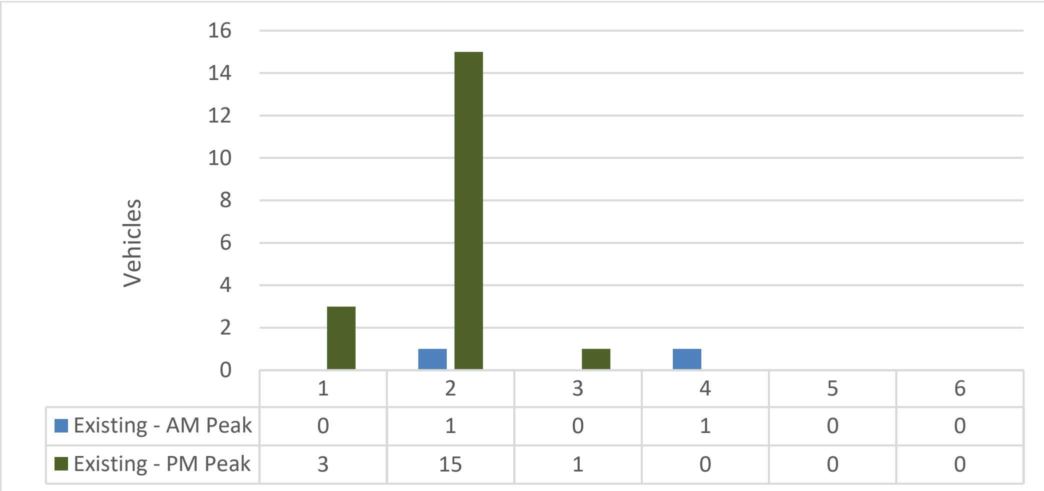


Figure 3-4: Existing Year (2019) Condition - Vehicles Denied Entry (vehicles)

Findings and Observations:

During the AM Peak Period, no vehicles are denied entry at the end of six-hour simulation period. The following conditions were observed during the PM Peak Period:

- Vehicles are denied entry at I-295 northbound off-ramp and also along SR 15 southbound mainline north of Collins Road because of the downstream bottleneck conditions.
- The vehicles that cannot enter the network are served during Hour 4 of the peak period.
- No vehicles are denied entry at the end of six-hour simulation period.

Traffic Volume Evaluations – Total Vehicle Served

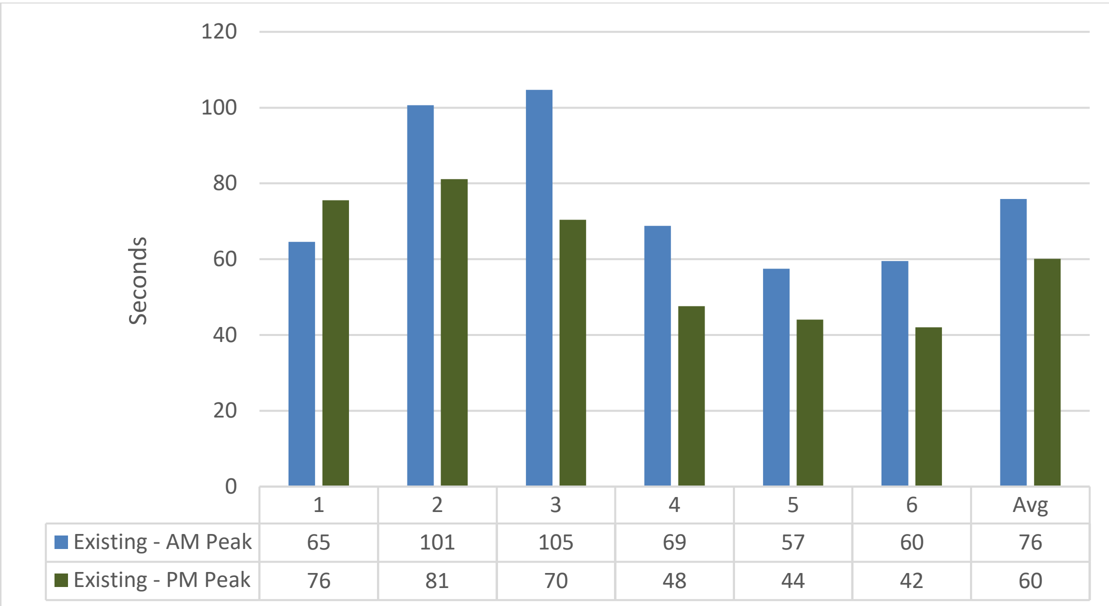
Table 3-3 shows the total vehicles served in the VISSIM models for each hour during the six-hour AM and PM peak period VISSIM simulation.

Table 3-3: Total Vehicle Served – Existing Year (2019) Condition

Year	Alternative	Hour 1	Hour 2	Hour 3	Hour 4	Hour 5	Hour 6	TOTAL
2019	AM Peak Period	7,234	10,145	9,254	7,580	6,550	6,794	**47,557**
	PM Peak Period	9,761	10,017	8,246	5,402	4,304	3,393	**41,123**

System-wide Average Delay

Figure 3-5 shows the system-wide average delay in seconds per vehicle for the AM and PM peak periods during each hour of the six-hour simulation.



	1	2	3	4	5	6	Avg
Existing - AM Peak	65	101	105	69	57	60	76
Existing - PM Peak	76	81	70	48	44	42	60

Figure 3-5: Existing Year (2019) Condition - System-wide Average Delay (seconds per vehicle)

Findings and Observations:

AM Peak Period:

- Under the Existing Year (2019) condition, an average delay of 65 seconds per vehicle for Hour 1 was observed; it increases to a maximum of 105 seconds per vehicle during Hour 3 and reduced to 60 seconds per vehicle by Hour 6.
- An average delay of approximately 76 seconds per vehicle is observed over the entire six-hour simulation period for the study area.

PM Peak Period:

- Under the Existing Year (2019) condition, an average delay of 76 seconds per vehicle for Hour 1 was observed; it increases to a maximum of 81 seconds per vehicle during Hour 2 and reduced to 42 seconds per vehicle by Hour 6.
- An average delay of approximately 60 seconds per vehicle is observed over the entire six-hour simulation period for the study area.

System-wide Average Speeds

Figure 3-6 shows the system-wide average speeds for the AM and PM peak periods during each hour of the six-hour simulation.

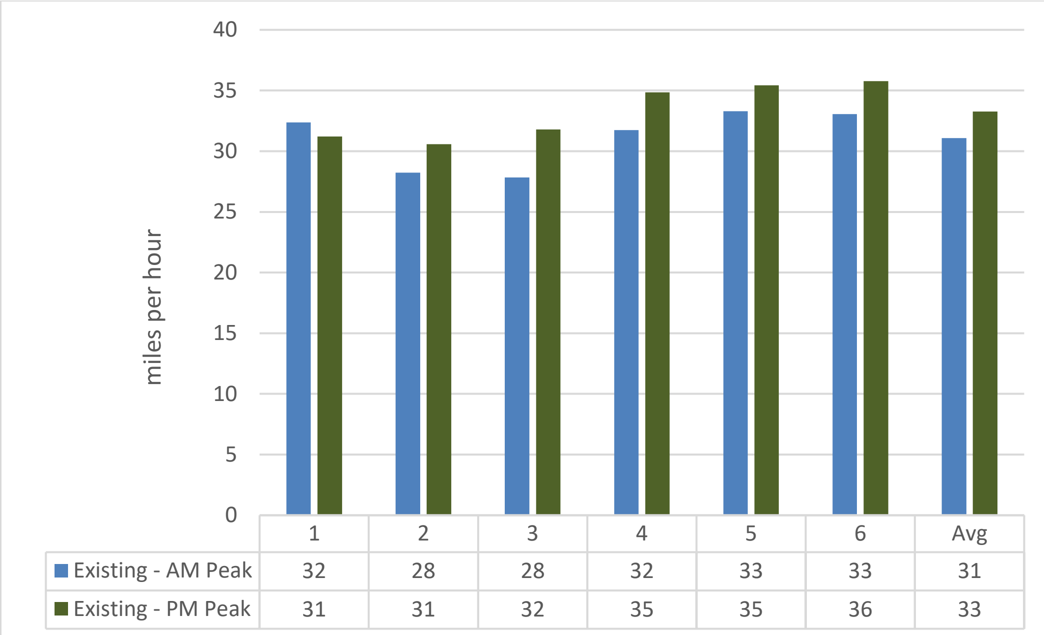


Figure 3-6: Existing Year (2019) Condition - System-wide Average Speed (miles per hour)

Findings and Observations:

AM Peak Period:

- Under the Existing Year (2019) condition, the speed decreases from 32 mph to 28 mph from Hour 1 to Hour 2 of the simulation; however, it gradually increased to a maximum of 33 mph by Hour 6.
- An average speed of approximately 31 mph is observed over the entire six-hour simulation period for the study area.

PM Peak Period:

- Under the Existing Year (2019) condition, the speed of 31 mph was maintained from Hour 1 to Hour 2 of the simulation; however, it gradually increased to a maximum of 36 mph by Hour 6.
- An average speed of approximately 33 mph is observed over the entire six-hour simulation period for the study area.

Intersection Level Operational Performance

The Existing Year (2019) Intersection level average delays for intersection and individual approaches were evaluated for SR 15 using Synchro. Synchro models will also support in optimatization of signal timings for the future years analysis.

Average Delays

Intersection average delay values for SR 15 during peak hour for the AM and PM peak period conditions for Existing Year (2019) were evaluated using Synchro. Intersection average delays are shown in **Table 3-4**. The intersection individual movement delay and LOS is shown in **Appendix D**

Table 3-4: Intersection Average Delays and LOS from Synchro – Existing Year (2019) Condition

Intersection	AM Peak		PM Peak	
	Delay (Seconds)	LOS	Delay (Seconds)	LOS
Collins Road and SR 15	57.8	E	25.1	C
I-295 northbound off-ramp and SR 15	174.0	F	38.6	D
I-295 southbound off-ramp and SR 15	19.3	C	8.5	A
Old Orange Park Road and SR 15	25.6	C	23.8	C
Wells Road and SR 15	36.2	D	59.5	E
Wells Road and Eldridge Avenue	10.8	B	21.8	C

Note: Delay presented is from Synchro Version 10.0.

Findings and Observations:

AM Peak Hour:

- Under the Existing Year (2019) conditions, the I-295 northbound off-ramp and SR 15 intersection operates at LOS F with an average delay of approximately three minutes per vehicle because of the heavy traffic exiting from I-295 northbound to SR 15.
- An average delay of nearly one minute per vehicle is observed during peak hour at the Collins Road and SR 15 intersection.
- All other intersections operate with acceptable LOS during AM peak hour.

PM Peak Hour:

- Under the Existing Year (2019) conditions, during PM peak hour, the Wells Road and SR 15 intersection operates at LOS E with an average delay of nearly one minute per vehicle due to the heavy traffic along SR 15, which increases delay on traffic coming from eastbound and westbound of Wells Road.
- All other intersections operate with acceptable LOS during PM peak hour.

3.3.3 Crash and Safety Information

Crash data, available through SSOGis, was collected between January 1, 2013 and December 31, 2017 (a five-year period) along Park Avenue/Roosevelt Boulevard (SR 15/US 17), study area interchange ramps, and major cross streets within the area of influence. A crash data analysis was performed to quantify the frequency and severity of crashes. This evaluation identified needs associated with the safety of the existing facility.

A total of 659 crashes occurred within the study limits during the analysis period out of which 2 were fatal crashes, 215 were injury crashes, and 442 were Property Damage Only (PDO) crashes. A summary of the crash severity is provided in **Table 3-5**. The study area documented a total of two fatalities and both reported alcohol consumption as a major contributing factor. One of the fatalities involved a pedestrian.

Table 3-5: Study Area Crash Summary

Years	Fatality	Injury	PDO[1]	Total
2013	1	49	102	152
2014	0	41	68	109
2015	0	44	92	136
2016	0	42	89	131
2017	1	39	91	131
Total	2	215	442	659
Percentage	**0.3%**	**32.6%**	**67.1%**	**100.0%**

1) PDO - Property Damage Only

The predominant crash type was front to rear collisions (about 44.5 percent) which can be attributed to congestion in the region. A summary of crash types is provided in in **Figure 3-7**.

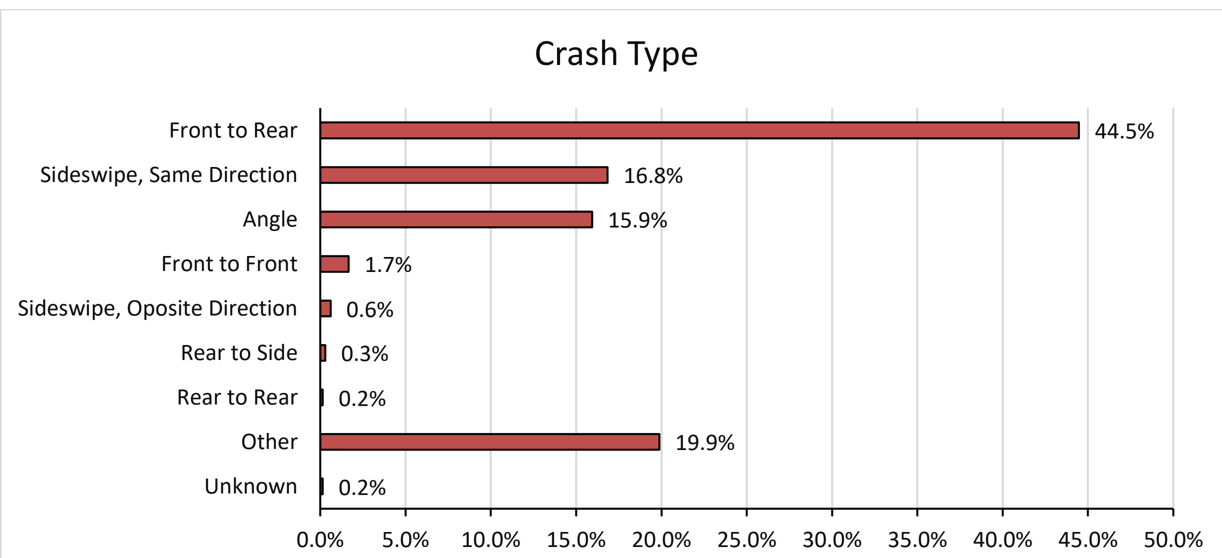


Figure 3-7: Crash Types

Crash rates along the SR 15 were calculated from the crash data obtained from the SSOGis for the latest available five years (2013 to 2017) and compared with the 2016 Statewide Average Crash Rate as summarized in **Table 3-6**. The highest computed crash rate along the entire study segment of SR 15 was approximately 420 crashes per 100 Million Vehicle Miles Traveled (MVMT). This crash rate is lower than the statewide average crash rate of 539 crashes per MVMT. Additionally, the highest computed crash rate among all the intersections within the study area was determined to be approximately 0.26 crashes per Million Entering Vehicles (MEV), which is lower than the statewide average crash rate (0.53 crashes per MEV). Therefore, all the computed crash rates did not exceed the average statewide crash rate for both segments and intersections.

Table 3-6: Crash Rate Along SR 15 (2013-2017)

No.	Segment/Intersection Name	Length (mi)	2019 AADT	Crash Rate	Statewide Average Crash Rate
1	South of Wells-1	0.08	65,900	54.1	539.0
2	South of Wells-2	0.12	65,900	205.7	539.0
3	Between Wells and Old Orange Park	0.10	68,400	47.5	539.0
4	Between Old Orange Park and I-295 NB Ramp Terminal Intersection - 1	0.21	80,000	168.6	539.0
5	Between Old Orange Park and I-295 NB Ramp Terminal Intersection - 2	0.09	54,600	183.5	539.0
6	Between I-295 SB Ramp Terminal Intersection and I-295 SB On-Ramp	0.06	59,200	380.2	539.0
7	Between I-295 SB On-Ramp and I-295 NB On-Ramp	0.06	68,500	128.3	539.0
8	Between I-295 NB On-Ramp and I-295 NB and SR 15 Ramp Terminal Intersection	0.05	59,700	122.3	539.0
9	Between I-295 NB and SR 15 Ramp Terminal Intersection and I-295 SB On-Ramp	0.05	44,900	161.8	539.0
10	Between I-295 SB On-Ramp and I-295 SB Off-Ramp	0.05	48,800	214.6	539.0
11	Between I-295 SB Off-Ramp and SR 15 and Collins Intersection	0.14	59,000	420.1	539.0
12	SR 15 and Wells Road	N/A	80,100	0.23	0.53
13	SR 15 and Old Orange Park Intersection	N/A	73,700	0.26	0.53
14	Wells Road and Eldridge Avenue	N/A	23,400	0.09	0.53
15	I-295 SB Off-Ramp and SR 15 Ramp Terminal	N/A	53,100	0.14	0.53
16	I-295 NB Off-Ramp and SR 15 Ramp Terminal	N/A	52,700	0.11	0.53

Notes:

Segment Crashes reported in Crash per 100 Million Vehicle Miles Traveled (MVMT)

Intersection Crashes reported in Crash per Million Entering Vehicles (MEV)

The safety analysis concluded traffic congestion is the major contributing factor for crashes within the study area.

Crash data is provided in **Appendix E**

4.0 ALTERNATIVES

As part of this IOAR, the following alternatives have been considered for the Opening Year (2025) and Design Year (2045) analyses:

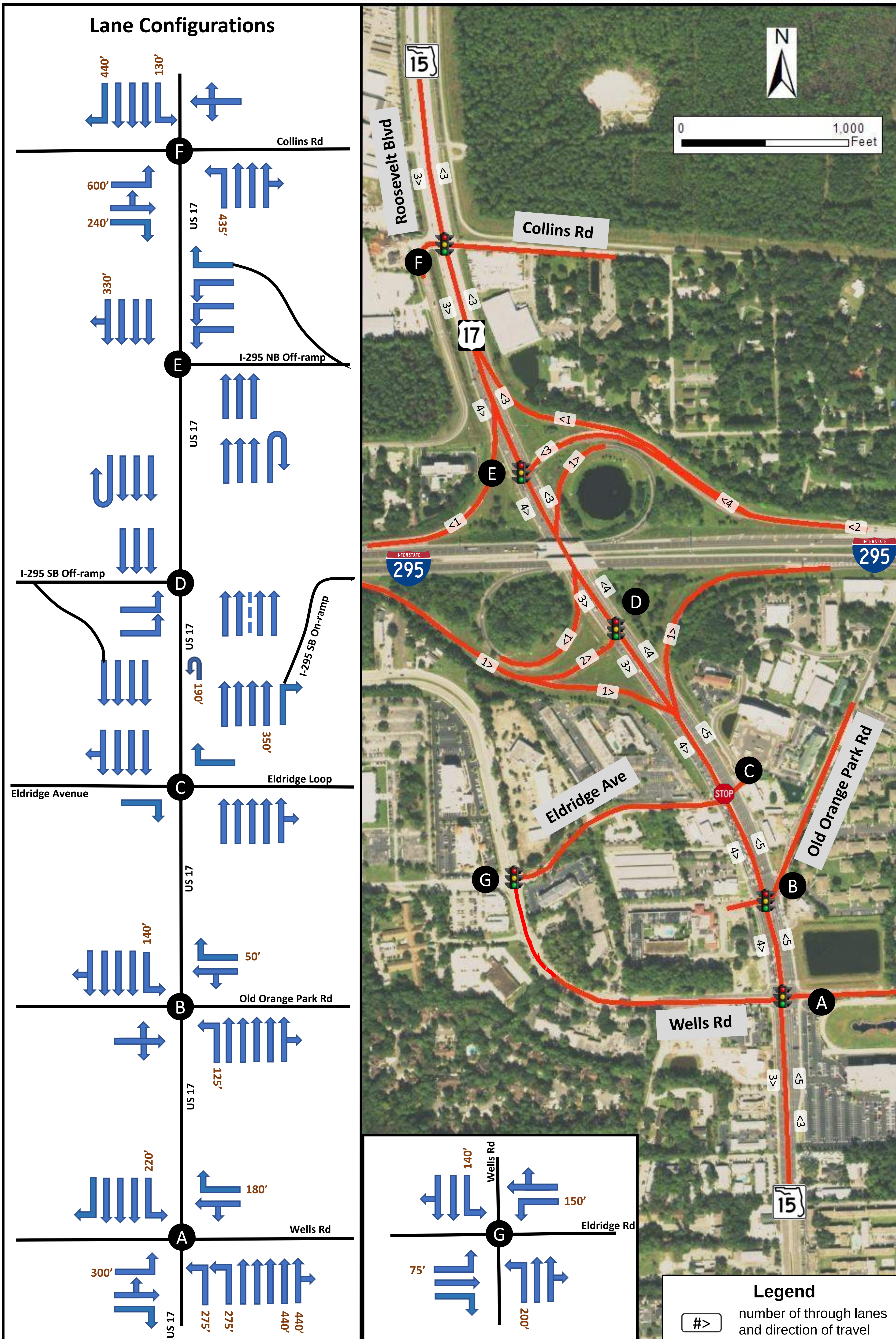
- No-Build Alternative
- Build Alternative

These alternatives were evaluated to assess their effectiveness in meeting the future travel demand of the area as well as minimizing physical and social impacts while enhancing the safety within the study area.

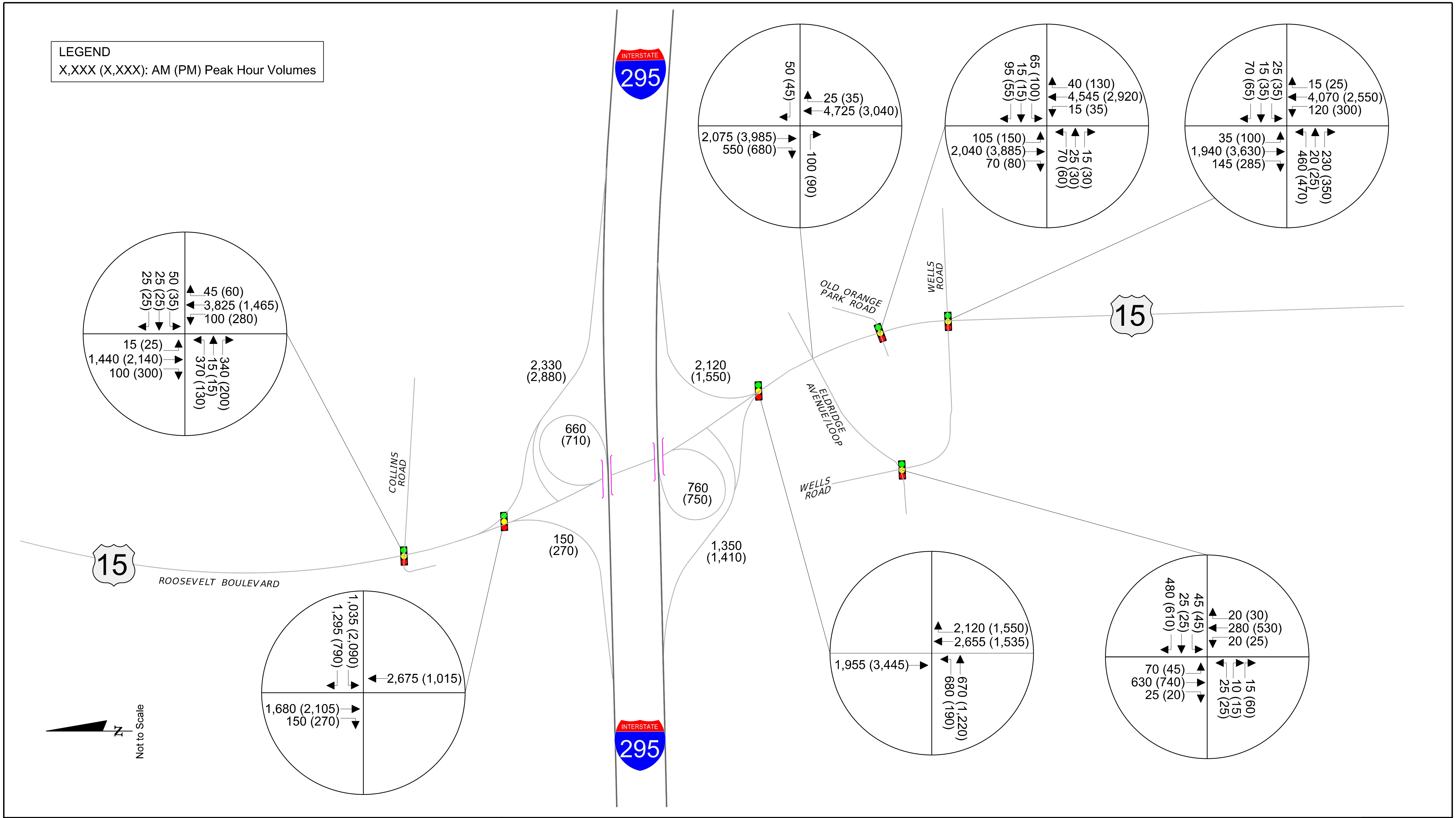
4.1 No-Build Alternative

This alternative considers existing geometry and operational conditions with future traffic volumes. It serves as the baseline for comparative analysis with the Build Alternative. This alternative utilizes lane configuration similar to existing conditions as shown on **Figure 4-1.** This alternative includes optimized signal timings, phasing and offsets for signalized intersections along the project study area. Additionally, Opening Year (2025) and Design Year (2045) No-Build Directional Design Hourly Volumes (DDHV) are provided in **Figure 4-2 and Figure 4-3**.

The No-Build Alternative provides benefits related to economic and construction impacts. However, the approved August 2018 IOAR established the necessity to make infrastructure improvements to improve traffic operations and safety at the existing interchange that will not be addressed with this alternative.



FDOT	I-295 at SR 15 (US 17) to South of Wells Road Improvements	No-Build Alternative Lane Configurations	Figure 4-1
			Page 23

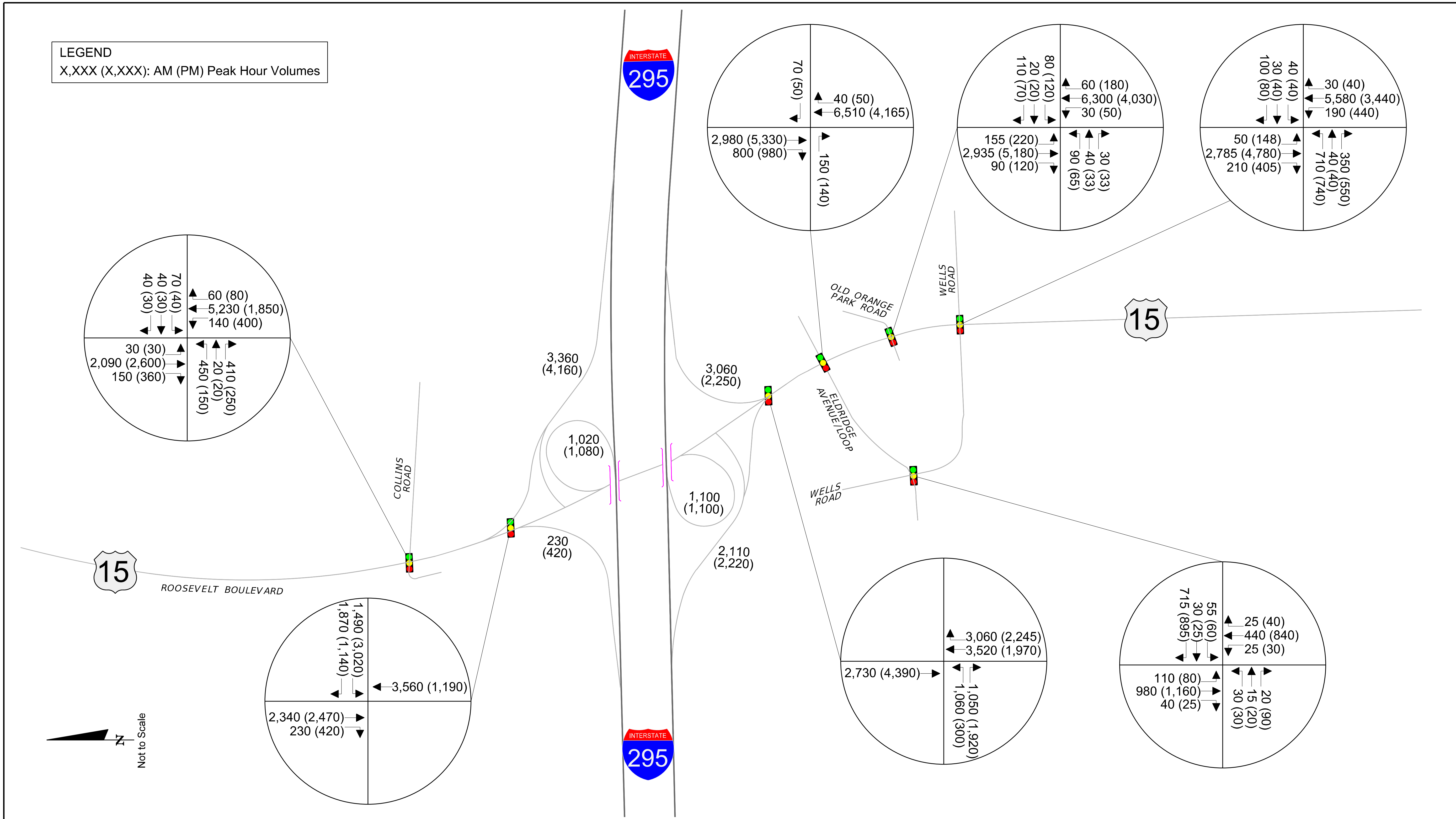


FDOT

I-295 (SR 9A) at SR 15 (US 17) to South of Wells Road

No-Build Alternative
Opening Year (2025)
Peak Hour Volumes

Figure 4-2



FDOT

I-295 (SR 9A) at SR 15 (US 17) to South of Wells Road

No-Build Alternative
Opening Year (2045)
Peak Hour Volumes

Page 1 of 1

Figure 4-3

4.2 Build Alternative

Improvements included in the Build Alternative are summarized below.

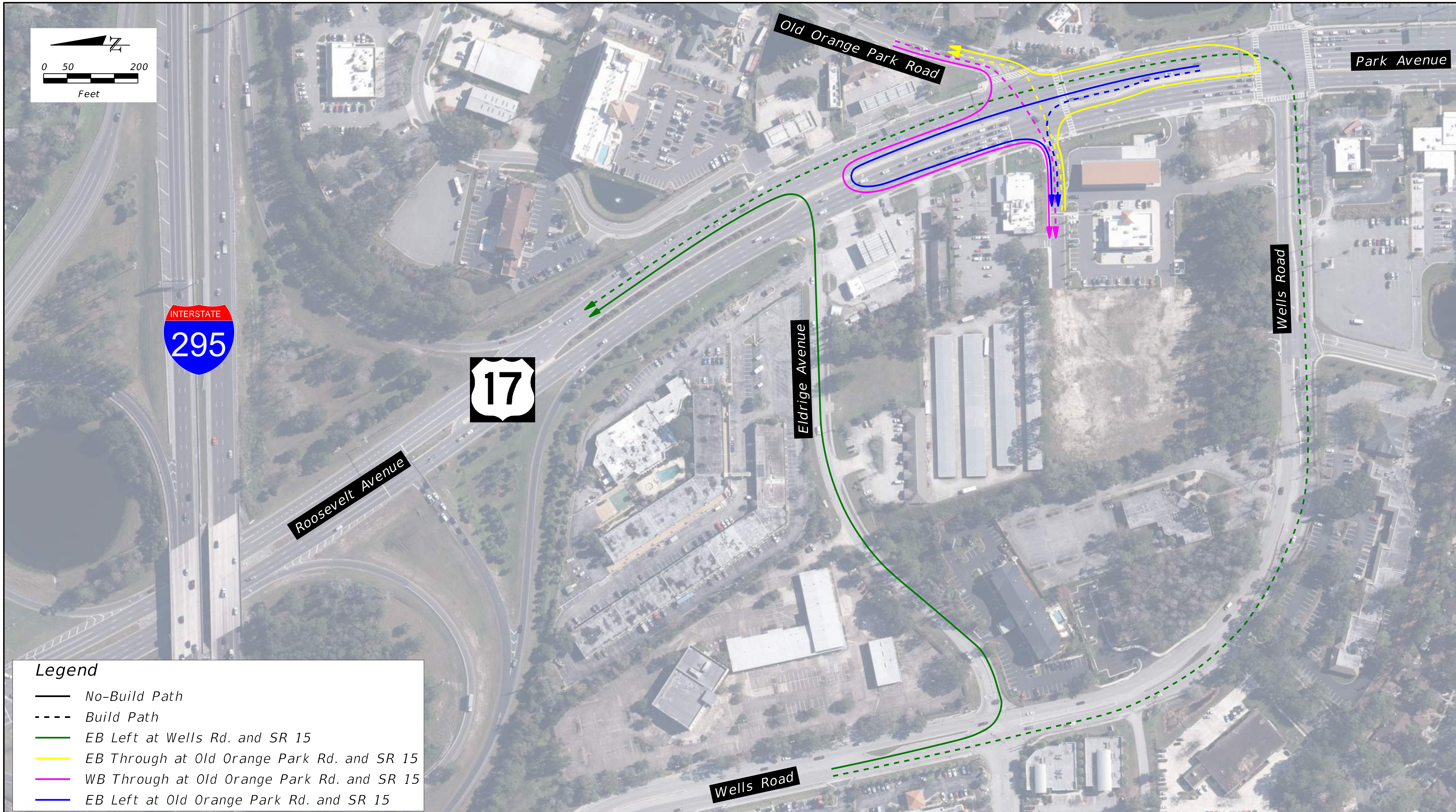
1. Improvements at Wells Road intersection:
    - New median at the south approach
    - Restriping of south intersection approach
    - Restriping to accommodate bike lanes along SR 15
    - Convert eastbound dual left turn into a single through lane and provide dual right-turn lanes
2. Improvements North of Wells Road to Old Orange Park Road:
    - New bike lane and improved sidewalks in both directions of SR 15
    - Elimination of northbound left turn near Old Orange Park Road intersection
    - Restriping to accommodate bike lanes
3. Improvements from Old Orange Park Road to Eldridge Avenue:
    - Channelized right turn lane from Old Orange Park Road to NB SR 15
    - New bike lane and improved sidewalks in both directions of SR 15
    - Install a left turn storage lane to facilitate U-turns south of Eldridge Avenue
4. Improvements to Eldridge Avenue Intersection:
    - Signalize the intersection of Eldridge Avenue and SR 15 to work as a quadrant intersection for the Wells Road at Eldridge Avenue intersection and Wells Road at SR 15 intersection
    - Additional eastbound left-turn bays to SR 15 to facilitate triple left turns onto SR 15
    - Improve Eldridge Avenue between Wells Road and SR 15 to accommodate a new shared center auxiliary turn lane
    - Realignment of westbound Eldridge Avenue lane to accommodate southbound to westbound channelized right turn lane
    - Restriping/intersection improvements at Wells Road and Eldridge Avenue signalized intersection
5. Improvements from I-295 southbound off-ramp:
    - New bike lane and sidewalk improvements in both directions of SR 15
    - I-295 southbound off-ramp - Convert existing single off-ramp lane to a triple right turn movement by constructing two additional right turn lanes and realigning the off-ramp with a new signalized intersection at SR 15.
6. Improvements from I-295 southbound off-ramp to I-295 northbound Off-ramp:
    - New bike lane and sidewalk improvements in both directions of SR 15
    - Construct one auxiliary turn lane in the southbound directions of SR 15 with a traffic separator between the off-ramp intersections
    - I-295 northbound off-ramp - Convert existing signal off-ramp lane to a triple right turn movement by constructing two additional right turn lanes and realigning the off-ramp with a new signalized intersection at SR 15.
7. Improvements north of I-295 northbound off-ramp:
    - New bike lane and sidewalk improvements in both directions of SR 15
    - Begin auxiliary turn lane in the southbound direction of SR 15 with a traffic separator for the off-ramp traffic
    - Construct an additional thru lane in the northbound direction that merges with the exclusive left turn lane downstream of the Collins Road intersection

In addition to the geometric roadway improvements listed above, operational improvements with the Build Alternative included optimizing signal timings and phasing for all signalized intersections within the area of influence. The following existing traffic pattern is re-routed to offer a better traffic operation with the Build Alternative as shown in **Figure 4-4:**

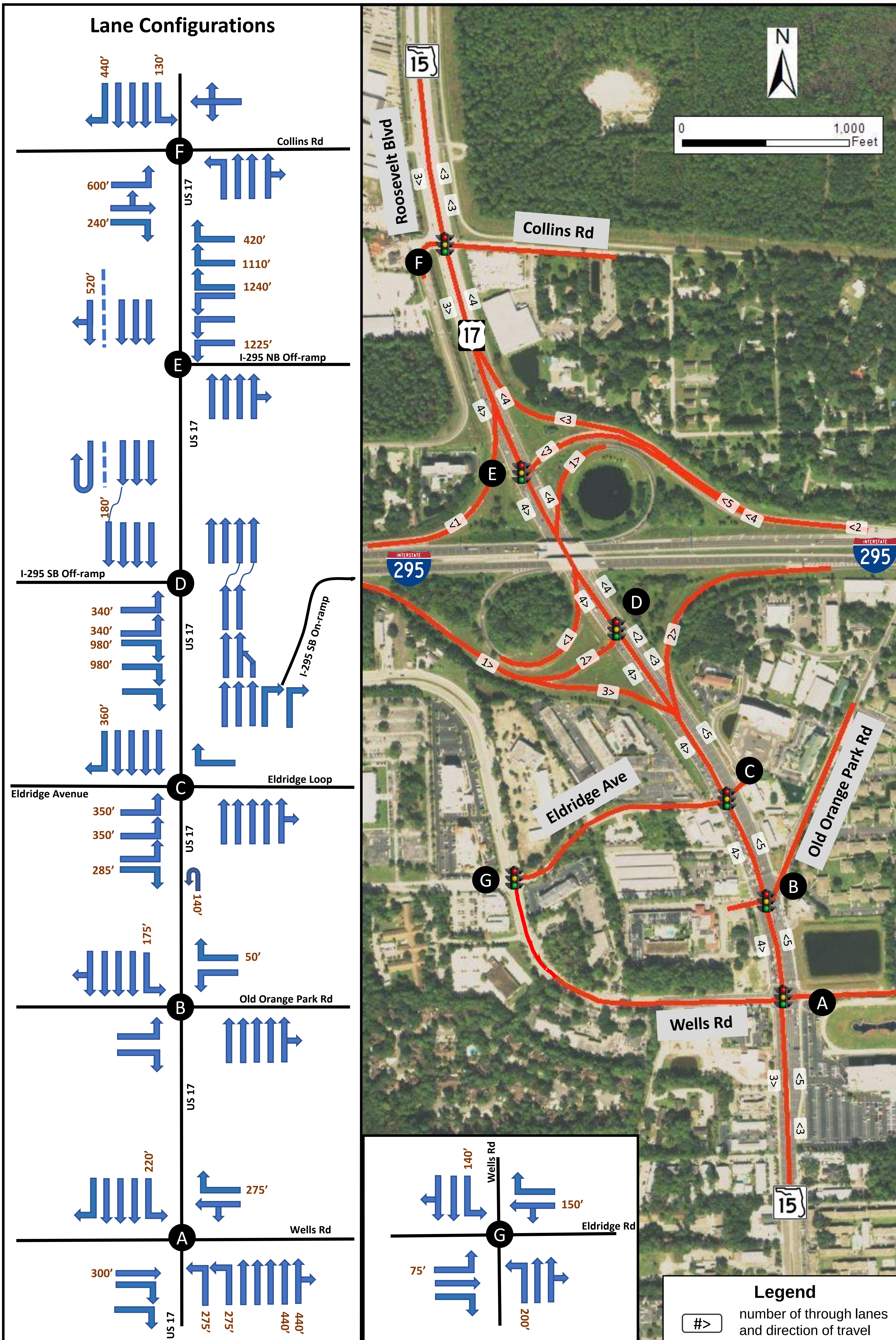
- Eastbound left movement at Wells Road and SR 15 intersection is re-routed to Eldridge Avenue to access SR 15 northbound.
- Westbound through and northbound left movements at Old Orange Park and SR 15 intersection are re-routed to use the U-turn pocket near SR 15 and Eldridge Avenue to cross SR 15.
- Eastbound through movement at Old Orange Park and SR 15 intersection makes a U-turn at Wells Road and SR 15 intersection to complete their movements.

Also, restriping at the Wells Road and Eldridge Avenue intersection, lengthened storage bays for entry and exit ramps to/from SR 15 and I-295, and a traffic signal at the intersection of Eldridge Avenue with SR 15 were considered. The proposed modifications were designed to meet current standards for federal-aid projects on the interstate and conform to AASHTO design standards.

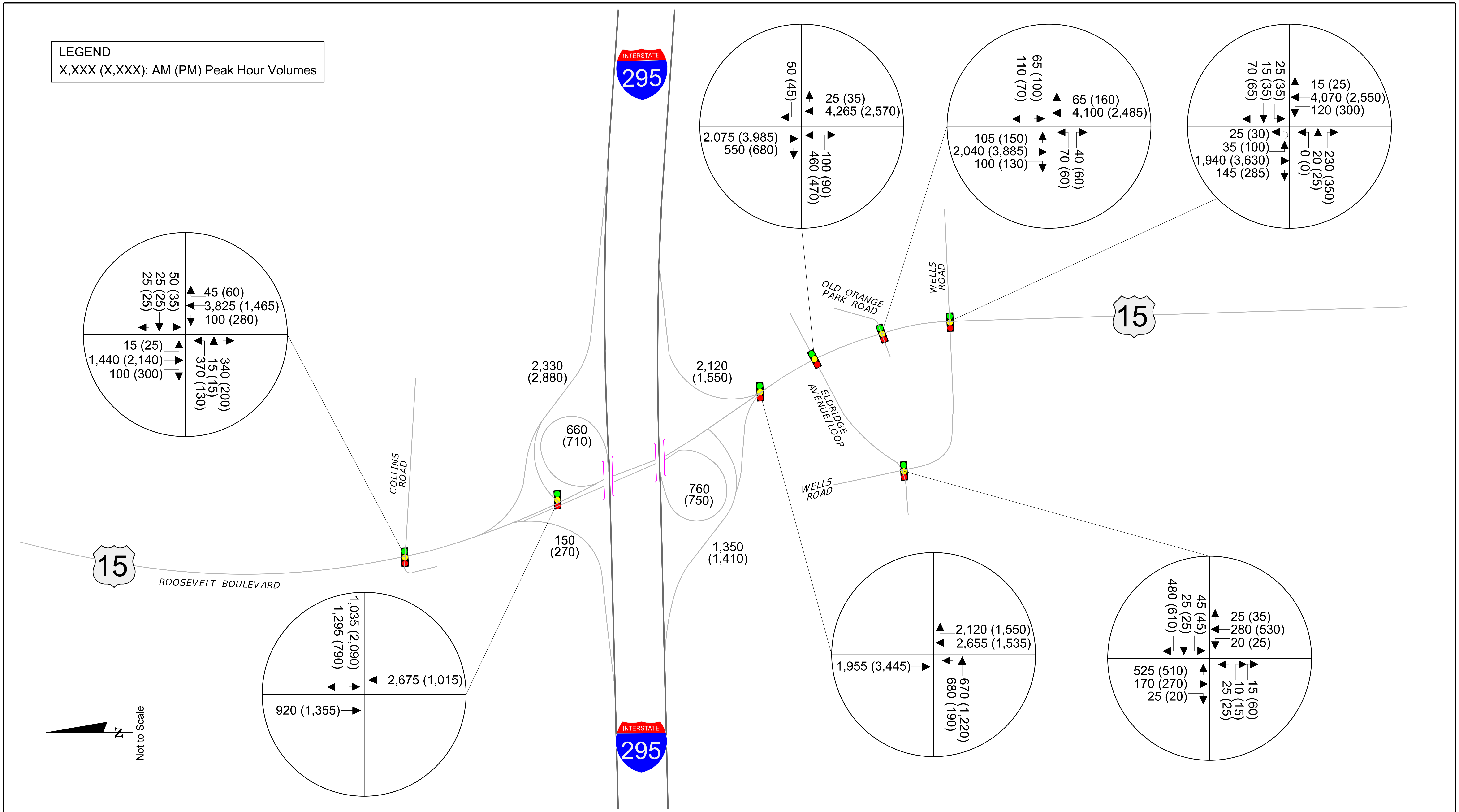
Figure 4-5 provides the lane configuration of the Build Alternative. A conceptual design and signing and marking plans of this alternative are provided in **Appendix F**. Additionally, Opening Year (2025) and Design Year (2045) DDHV are provided in **Figure 4-6 and Figure 4-7**.



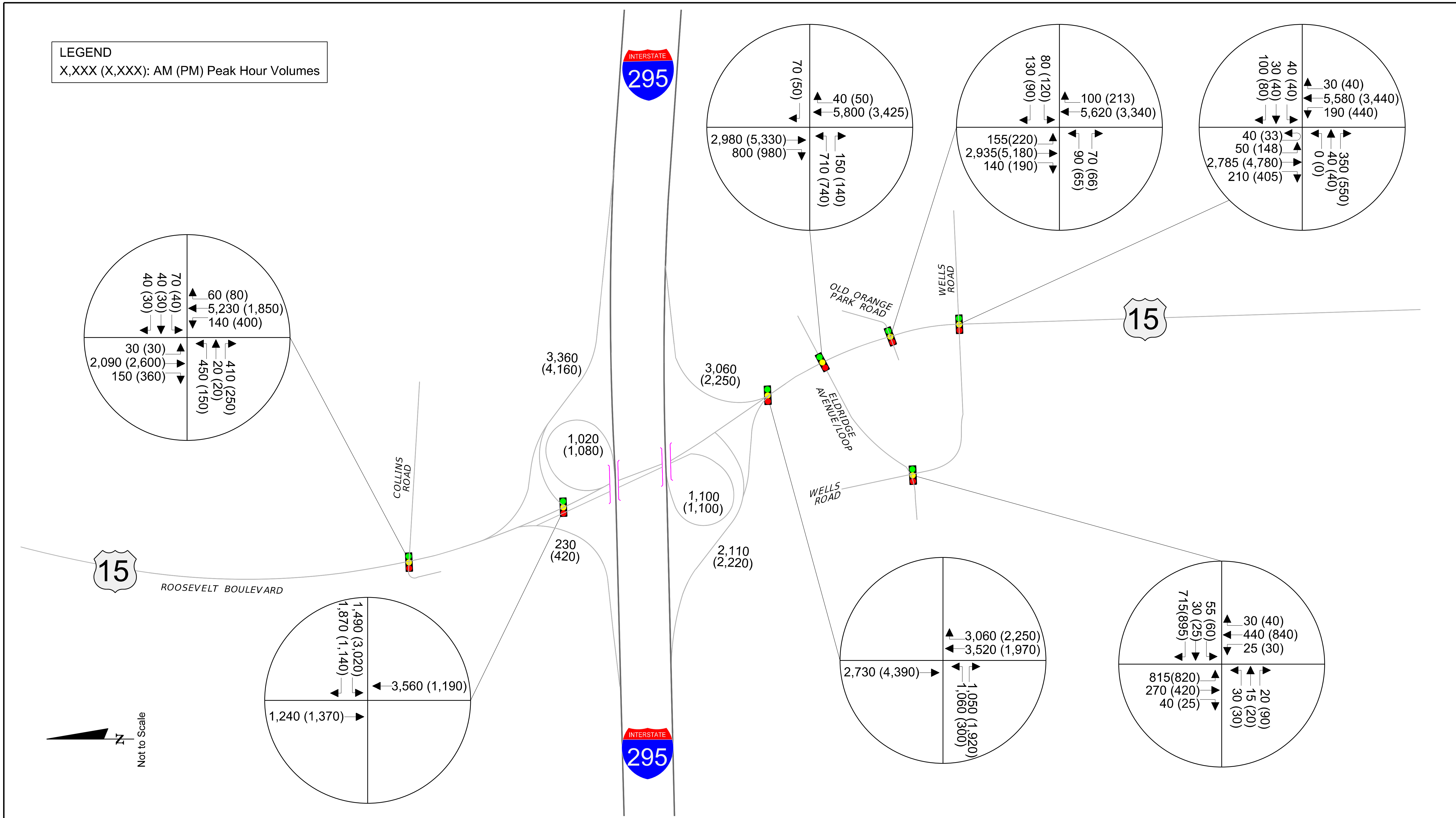
FDOT	I-295 (SR 9A) at SR 15 (US 17) to South of Wells Road	Build Alternative Traffic Rerouting	Figure 4-4
			Page 28



FDOT	I-295 at SR 15 (US 17) to South of Wells Road Improvements	Build Alternative Lane Configurations	Figure 4-5
			Page 29



FDOT	I-295 (SR 9A) at SR 15 (US 17) to South of Wells Road	Build Alternative Opening Year (2025) Peak Hour Volumes	Page 1 of 1	Figure 4-6 Page 30



FDOT	I-295 (SR 9A) at SR 15 (US 17) to South of Wells Road	Build Alternative Opening Year (2045) Peak Hour Volumes	Page 1 of 1	Figure 4-7 Page 31

5.0 EVALUTATION OF ALTERNATIVES

This section discusses the analysis of the alternatives based on traffic operations. It documents the analyses performed for the No-Build and Build Alternative using VISSIM software. A detailed microsimulation analysis using VISSIM software was conducted to evaluate the system-wide and location specific operational performance of each alternative. The primary objective of the VISSIM modeling was to evaluate traffic operational conditions along SR 15 with the proposed build improvements.

VISSIM models were prepared for No-Build Alternative and Build Alternative for Opening Year (2025) and Design Year (2045) for both AM and PM peak periods. A six-hour simulation analysis was conducted for both Opening Year (2025) and Design Year (2045). Existing heavy vehicle percentages were retained. The VISSIM analysis conducted for all models summarized the average of ten random seed simulation runs resulting in statistically significant outputs that account for stochastic variation in the model results.

Appendix D provides the No-Build Alternative and Build Alternative VISSIM models and output files.

5.1 Operational Analysis

A detailed operational analysis comparison was completed for the No-Build Alternative and Build Alternative considered for I-295 at SR 15 to south of the Wells Road improvements using VISSIM software. The results of the operational analysis are presented to outline the quantitative performance achieved along SR 15 and at intersections within the study corridor. The results provide an understanding of broader and detailed operational issues under the No-Build Alternative and the benefits achieved with the proposed improvements with the Build Alternative.

The results from the operational analysis conducted are presented in the following sections. The operational analysis comparison of the No-Build and Build Alternatives are summarized into three sections:

- System Level Operational Performance
- Link Level Operational Performance
- Intersection Level Operational Performance

5.1.1 System Level Operational Performance

A system level performance comparison of the No-Build Alternative and the Build Alternative was performed. To compare alternatives, the following MOEs were used to summarize network-wide performance:

- Traffic Volume Evaluations
  - Total Vehicle Demand
  - Vehicles Denied Entry (Latent Demand)
  - Vehicles Served
- System-wide Average Delay
- System-wide Average Speed

Traffic Volume Evaluations – Total Vehicle Demand

Table 5-1 shows the total vehicular demand entered into the VISSIM models for each hour during the six-hour AM and PM peak period VISSIM simulation.

Table 5-1: Total Vehicle Demand - No-Build Alternative and Build Alternative

AM Peak Period							
Year	Hour 1	Hour 2	Hour 3	Hour 4	Hour 5	Hour 6	**TOTAL**
2025	8,195	11,491	10,480	8,586	7,416	7,697	**53,863**
2045	11,680	16,381	14,939	12,238	10,571	10,971	**76,780**
PM Peak Period							
Year	Hour 1	Hour 2	Hour 3	Hour 4	Hour 5	Hour 6	**TOTAL**
2025	11,136	11,440	9,389	6,160	4,909	3,870	**46,903**
2045	15,350	15,770	12,943	8,490	6,766	5,332	**64,649**

Traffic Volume Evaluation – Vehicles Denied Entry (Latent Demand)

Total vehicles that are denied entry and are stuck behind the entry nodes in the VISSIM models during each hour of the six-hour AM and PM peak period VISSIM simulation were evaluated. The values reported from the VISSIM models for the total vehicles denied entry are cumulative across each hour of the simulation and are shown in **Table 5-2.**

Table 5-2: Vehicles Denied Entry - No-Build and Build Alternative

AM Peak Period								
Year	Alternative	Hour 1	Hour 2	Hour 3	Hour 4	Hour 5	Hour 6	**Total**
2025	No-Build	0	584	992	589	0	0	**2,165**
	Build	0	1	0	1	0	0	**2**
	Percent Reduction*	0%	100%	100%	100%	0%	0%	**100%**
2045	No-Build	577	4,078	7,071	8,005	7,905	8,148	**35,784**
	Build	11	2,210	3,795	3,680	2,463	1,493	**13,652**
	Percent Reduction *	98%	46%	46%	54%	69%	82%	**62%**
PM Peak Period								
Year	Alternative	Hour 1	Hour 2	Hour 3	Hour 4	Hour 5	Hour 6	**Total**
2025	No-Build	318	1,321	1,324	418	10	0	**3,391**
	Build	0	1	0	0	0	0	**1**
	Percent Reduction *	100%	100%	100%	100%	100%	0%	**100%**
2045	No-Build	6,120	12,328	15,588	14,205	11,669	8,114	**68,024**
	Build	2,741	5,418	6,506	5,492	3,747	1,429	**25,333**
	Percent Reduction *	55%	56%	58%	61%	68%	82%	**63%**

*Percent reduction compared to the No-Build Alternative

Findings and Observations:

AM Peak Period:

Opening Year (2025)

- Because of the congestion and bottleneck conditions, vehicles are denied entry along northbound SR 15 mainline between the project limits and on other side streets with the No-Build Alternative.

- Nearly all entry nodes were clear of denied entry vehicles in the Build Alternative model.
- Hour 3 in the No-Build Alternative had the maximum number of vehicles denied entry while no vehicles were denied entry with the Build conditions operational analysis.
- Vehicles that could not enter the network during the first four hours of the No-Build Alternative microsimulation were served during Hour 5 of the peak period.
- No vehicles are shown to have been denied entry at the end of six-hour simulation with either the No-Build or the Build Alternative.

Design Year (2045)

- The No-Build Alternative model accumulated vehicles behind entry nodes during each hour of the simulation and did not process all these vehicles by the end of the six-hour simulation. By the end of the six-hour simulation, 8,148 vehicles were denied entry equating to approximately 10.6 percent of the total demand by the end of the Hour 6 of the simulation.
- The Build Alternative accumulated 1,493 vehicles at the end of six-hour simulation, which is equivalent to 1.9 percent of the total demand by the end of the Hour 6 of the simulation.
- The Build Alternative model is noted to have approximately 6,655 less denied entry vehicles when compared to the No-Build Alternative at the end of six-hour simulation period.

PM Peak Period:

Opening Year (2025)

- Because of the downstream bottleneck conditions, vehicles are denied entry at I-295 northbound off-ramp and along southbound SR 15 mainline north of Collins Road with the No-Build Alternative.
- The No-Build Alternative model accumulated vehicles behind entry nodes during each hour of the first five-hour simulation period with the highest denied entry of 1,324 vehicles during Hour 3.
- No vehicles are denied entry at the end of six-hour simulation with either the No-Build Alternative or the Build Alternative.

Design Year (2045)

- The No-Build Alternative model accumulated vehicles behind entry nodes during each hour of the simulation and did not process all these vehicles by the end of the six-hour simulation.
- A total of 8,114 vehicles were still stuck behind the entry node at the end of six-hour simulation period in the No-Build Alternative. This equates to 12.6 percent of the total demand entered in VISSIM model at the end of the Hour 6 of the simulation.
- The Build Alternative showed less vehicles denied entry at the end of six-hour simulation period compared to No-Build Alternative. The Build Alternative accumulated 1,429 vehicles at the end of six-hour simulation period. These denied entry vehicles are equivalent to 2.2 percent of the total demand by the end of the Hour 6 of the simulation.

<u>Traffic Volume Evaluations – Vehicles Served</u>

Table 5-3 summarizes the vehicles served through the network during all six hours of the AM and PM peak period VISSIM simulations.

Table 5-3: Vehicles Served

AM Peak Period									
Year	Alternative	Hour 1	Hour 2	Hour 3	Hour 4	Hour 5	Hour 6	**TOTAL**	**Percent Increase***
2025	No-Build	8,195	10,907	10,072	8,989	8,005	7,697	**53,863**	-
	Build	8,195	11,490	10,481	8,585	7,417	7,697	**53,863**	**0.00%**
2045	No-Build	11,103	12,880	11,946	11,304	10,671	10,728	**68,632**	-
	Build	11,669	14,182	13,354	12,353	11,788	11,941	**75,287**	**9.70%**
PM Peak Period									
Year	Alternative	Hour 1	Hour 2	Hour 3	Hour 4	Hour 5	Hour 6	**TOTAL**	**Percent Increase***
2025	No-Build	10,818	10,437	9,386	7,066	5,317	3,880	**46,903**	-
	Build	11,136	11,439	9,390	6,160	4,909	3,870	**46,903**	**0.00%**
2045	No-Build	9,230	9,562	9,683	9,873	9,302	8,887	**56,535**	-
	Build	12,609	13,093	11,855	9,504	8,511	7,650	**63,220**	**11.82%**

*Percent increase compared to the No-Build Alternative

Findings and Observations:

AM Peak Period:

- An approximate **three percent** increase in the system-wide vehicles served was observed in the Opening Year (2025) with the Build Alternative when compared with the No-Build Alternative at the end of the peak hour (Hour 2).
- An increase in the system-wide vehicles served is observed in Design Year (2045) with the Build Alternative processing approximately **7.8 percent** more traffic than the No-Build Alternative at the end of the peak hour (Hour 2).

PM Peak Period:

- Approximately 1,320 more vehicles are served with the Build Alternative under Opening Year (2025) when compared to the No-Build Alternative at the end of the peak hour (Hour 2).
- A significant increase in the system-wide vehicles served is observed in Design Year (2045) with the Build Alternative processing approximately **36.8 percent** more traffic than the No-Build Alternative at the end of the peak hour (Hour 2), respectively.
- An increase in the system-wide vehicles served is observed in Design Year (2045) with the Build Alternative processing **11.82 percent** more traffic than the No-Build Alternative at the end of the entire six-hour simulation.

System-wide Average Delay

Table 5-4 shows the system-wide average delay in seconds per vehicle from VISSIM models during each hour of the six-hour AM and PM peak period simulation for the No-Build and Build Alternatives. The Build Alternative show a reduction in system-wide average delay which suggest that the Build Alternative relieve overall congestion within the study area and improve operations.

Table 5-4: System-wide Average Delay (Seconds per Vehicle)

				AM Peak Period						
Year	Alternative	Hour 1	Hour 2	Hour 3	Hour 4	Hour 5	Hour 6	**TOTAL**	**AVERAGE**	Percent Reduction*
2025	No-Build	71	202	231	212	178	64	**960**	**160**	-
	Build	51	67	60	51	48	49	**326**	**54**	66%
2045	No-Build	133	331	389	368	314	297	**1,831**	**305**	-
	Build	75	207	272	236	184	160	**1,135**	**189**	38%
				PM Peak Period						
Year	Alternative	Hour 1	Hour 2	Hour 3	Hour 4	Hour 5	Hour 6	**TOTAL**	**AVERAGE**	Percent Reduction*
2025	No-Build	190	270	255	251	232	81	**1,279**	**213**	-
	Build	63	68	60	46	42	41	320	**53**	75%
2045	No-Build	558	574	535	496	470	390	**3,022**	**504**	-
	Build	225	233	230	160	161	166	**1,175**	**196**	61%

*Percent reduction in delay when compared with the No-Build Alternative using the average delay values across all hours of the simulation.

Findings and Observations:

AM Peak Period:

- During Opening Year (2025), the average delay is approximately **1.8 minutes per vehicle** less with the Build Alternative when compared to the No-Build Alternative. This delay savings is an approximate 66 percent reduction for Build Alternative when compared with the No-Build Alternative.
- During Design Year (2045), the highest average delays are reported in Hour 3 with both the No-Build Alternative and Build Alternative. The highest average delays reported during the indicated hours are approximately 6.5 minutes in the No-Build Alternative and 4.53 minutes in the Build Alternative. Over all six hours of simulation, the Build Alternative reported an approximate delay savings of 38 percent when compared with the No-Build Alternative.

PM Peak Period:

- During Opening Year (2025), the average delay is approximately **2.7 minutes per vehicle** less with the Build Alternative when compared to the No-Build Alternative. This delay savings is an approximate 75 percent reduction for the Build Alternative when compared with the No-Build Alternative.
- During Design Year (2045), the highest average delays are reported in Hour 2 with both the No-Build Alternative and the Build Alternative. The highest average delays reported during the indicated hours are approximately 9.6 minutes in the No-Build Alternative and approximately 3.9 minutes in the Build Alternative. Over all six hours of simulation, the Build Alternative reported an approximate delay savings of 61 percent when compared with the No-Build Alternative.

System-wide Average Speeds

Table 5-5 shows the system-wide average speeds from VISSIM models during each hour of the six-hour AM and PM peak period simulation for the No-Build and Build Alternatives. Although link level speeds are a preferred practice of comparison between alternatives, a system level comparison is helpful in the evaluation of the overall operations of the system.

Table 5-5: System-wide Average Speeds (miles per hour)

AM Peak Period									
Year	Alternative	Hour 1	Hour 2	Hour 3	Hour 4	Hour 5	Hour 6	**AVERAGE**	Percent Increase*
2025	No-Build	31	21	19	20	22	32	**24**	-
	Build	34	32	33	34	35	35	**34**	42%
2045	No-Build	25	15	13	14	16	17	**17**	-
	Build	31	21	18	19	21	23	**22**	29%
PM Peak Period									
Year	Alternative	Hour 1	Hour 2	Hour 3	Hour 4	Hour 5	Hour 6	**AVERAGE**	Percent Increase*
2025	No-Build	22	18	19	18	20	32	**21**	-
	Build	33	33	34	36	36	36	**35**	67%
2045	No-Build	10	10	11	12	12	13	**12**	-
	Build	21	20	20	23	23	22	**22**	83%

*Percent increase in average speeds when compared with the No-Build Alternative

Findings and Observations:

AM Peak Period:

- During Opening Year (2025), the average speed across the entire six-hour simulation between No-Build Alternative and the Build Alternative differs by approximately ten mph (an approximate 42 percent increase in average speeds when compared to No-Build Alternative).
- In the Opening Year (2025) the speeds dropped from 31 mph to 19 mph from Hour 1 to Hour 3 of the simulation for the No-Build Alternative. However, average speeds above 32 mph were maintained during the entire six-hour period for the Build Alternative.
- During Design Year (2045), the average speed across the entire six -hour simulation was noted as 17 mph with the No-Build Alternative. The Build Alternative noted average speeds of 22 mph.
- During Design Year (2045), Hour 3 of the simulation reported the minimum speed for the two alternatives. Average speeds during Hour 3 of the simulation were 13 mph with the No-Build Alternative and 18 mph with the Build Alternative.

PM Peak Period:

- During Opening Year (2025), the average speed across the entire six-hour simulation was documented as 14 mph higher with the Build Alternative when compared with the No-Build Alternative; accounting for an approximate 67 percent increase in average speeds with the proposed improvements.
- In the Opening Year (2025) the speed dropped from 22 mph to 18 mph from Hour 1 to Hour 2 of the simulation for the No-Build Alternative. However, average speeds above 33 mph were maintained during the entire six-hour period for the Build Alternative.
- During Design Year (2045), the average speed across the entire six-hour simulation between No-Build Alternative and the Build Alternative differs by approximately ten mph.
- In the Design Year (2045) No-Build Alternative simulation, speeds were maintained to about ten mph throughout the six-hour simulation period, with the lowest speed of ten mph during Hour 1 and Hour 2 of the simulation. With the Build Alternative, average speeds above 20 mph were maintained during the entire six-hour simulation, with an average speed of 22 mph noted at the end of Hour 6 of simulation.

5.1.2 Link Level Operational Performance

Link Level Speed Evaluation:

A link level speed performance comparison of the No-Build and the Build Alternatives was performed to compare operational performance at a link level. Link level speeds were evaluated for SR 15 links in northbound and southbound direction within the VISSIM models for the No-Build and the Build Alternative.

The Build Alternative in all the cases outperformed the No-Build Alternative, and a detailed description of the findings and observations are provided below.

Findings and Observations:

Opening Year (2025) AM Peak Period:

- No-Build Conditions
    - Northbound SR 15 (Peak Direction): Travel speeds ranged from six mph to 43 mph during the six-hour simulation period, with relatively low travel speeds upstream of I-295 southbound on-ramp during Hours 2 through 5.
    - Southbound SR 15: Travel speeds ranged from eight mph to 43 mph during the six-hour simulation period, with relatively low travel speeds noted along the segments of SR 15 between Old Orange Park Road to Wells Road throughout the simulation period.
    - I-295 Ramps: The I-295 southbound off-ramp operated at travel speeds ranging from 20 mph to 55 mph during the six-hour simulation period, with relatively low travel speed during hours 2 through 3.

- Build Alternative Conditions
    - Northbound SR 15 (Peak Direction): The operations improved significantly along the northbound direction of SR 15 with the Build Alternative. However, lower travel speeds compared to the No-Build Alternative were observed on the segment between the two ramp terminal intersections and on the segment north of Collins Avenue. The reduction in speeds is caused by additional traffic being processed at Wells Road intersection and the off-ramps in addition to a lane drop along SR 15 just south of the southbound ramp terminal intersection.
    - Southbound SR 15: The operations improved significantly along the southbound direction of SR 15 with the Build Alternative. However, the geometric improvements together with the optimization of the signal timings caused additional traffic being processed which led to a slight decrease in travel speed along the segments between the the southbound ramp terminal intersection and Collins Avenue.
    - I-295 Ramps: The congestion experienced in the No-Build Alternative is dissipated with the improvements proposed in the Build Alternative.

Opening Year (2025) PM Peak Period:

- No-Build Conditions
    - Northbound SR 15: Travel speeds ranged between 15 mph and 44 mph, with relatively low travel speeds

observed upstream of I-295 southbound on-ramp during Hours 1 through 3.
  - Southbound SR 15 (Peak Direction): Travel speeds ranged between nine mph to 44 mph, with relatively low travel speeds from south of Wells Road to downstream of I-295 northbound off-ramp during Hour 1 through the beginning of Hour 4.
  - I-295 Ramps: The queues along I-295 southbound off-ramp extended on to the freeway during Hour 1 through Hour 3 of the simulation period.

- Build Alternative Conditions
  - Northbound SR 15: The operations improved significantly along the northbound direction of SR 15 with the Build Alternative. However, lower travel speeds compared to the No-Build Alternative were observed on the segement between Wells Road and Old Orange Park Road, the segment between the two ramp terminal intersections, and on the segment north of Collins Avenue. The reduction in speeds is caused by additional traffic being processed at Wells Road intersection and the off-ramps in addition to a lane drop along SR 15 just south of the southbound ramp terminal intersection.
  - Southbound SR 15 (Peak Direction): The operations improved significantly along the southbound direction of SR 15 with the Build Alternative. However, the geometric improvements together with the optimization of the signal timings caused additional traffic being processed which led to a slight decrease in travel speed along the segment between the ramp terminal intersections.
  - I-295 Ramps: The congestion experienced in the No-Build Alternative is dissipated with the improvements proposed in the Build Alternative.

Design Year (2045) AM Peak Period:

- No-Build Conditions
  - Northbound SR 15 (Peak Direction): Travel speeds ranged from five mph to 43 mph during the six-hour simulation period, with relatively low travel speeds observed upstream of I-295 northbound on-ramp across the six-hour simulation period.
  - Southbound SR 15: Travel speeds ranged from eight mph to 42 mph during the six-hour simulation period with travel speeds below the acceptable operating travel speeds observed between Wells Road and Old Orange Park Road during hours 1 to 6.
  - I-295 Ramps: The I-295 southbound off-ramp backs up into the freeway during the middle of Hour 2 through Hour 4 and I-295 northbound off-ramp has reduced travel speeds during Hour 2 through Hour 6 with queues extending on to the mainline I-295.

- Build Alternative Conditions
  - Northbound SR 15 (Peak Direction): The operations improved significantly along the northbound direction of SR 15 with the Build Alternative. However, lower travel speeds compared to the No-Build Alternative were observed on the segment upstream of I-295 northbound on-ramp and on the segment north of Collins Avenue. The reduction in speeds is caused by additional traffic being processed at Wells Road intersection and the off-ramps in addition to a lane drop along SR 15 just south of the southbound ramp terminal intersection.
  - Southbound SR 15: The operations improved significantly along the southbound direction of SR 15 with the Build Alternative. However, the geometric improvements together with the optimization of the signal timings caused additional traffic being processed which led to a slight decrease in travel speed along the

segments between the the southbound ramp terminal intersection and Collins Avenue.
- I-295 Ramps: The congestion experienced in the No-Build Alternative is dissipated with the improvements proposed in the Build Alternative.

Design Year (2045) PM peak period:

- No-Build Conditions
  - Northbound SR 15: Travel speeds ranged from 17 mph to 44 mph are observed during the six-hour simulation period.
  - Southbound SR 15 (Peak Direction): Travel speeds ranged from two mph to 33 mph during the six-hour simulation period. The congestion observed along segments between southbound ramp terminal intersection and Wells Road does not dissipate before the end of Hour 6 of the simulation.
  - I-295 Ramps: The queue along I-295 southbound off-ramp extends on to the freeway during Hour 1 through Hour 6 with an average travel speed of three mph. In addition, travel speed reduction was noted along the I-295 northbound off-ramp with an average travel speed of 27 mph during the six-hour simulation period.

- Build Alternative Conditions
  - Northbound SR 15: The operations improved significantly along the northbound direction of SR 15 with the Build Alternative. However, lower travel speeds compared to the No-Build Alternative were observed on the segement between Wells Road and Old Orange Park Road, the segment between the two ramp terminal intersections, and on the segment north of Collins Avenue. The reduction in speeds is caused by additional traffic being processed at Wells Road intersection and the off-ramps in addition to a lane drop along SR 15 just south of the southbound ramp terminal intersection.
  - Southbound SR 15 (Peak Direction): The operations improved significantly along the southbound direction of SR 15 with the improvements proposed in the Build Alternative.
  - I-295 Ramps: The congestion experienced in the No-Build Alternative is dissipated with the improvements proposed in the Build Alternative.

5.1.3 Intersection Level Operational Performance

Average delays and queue lengths for intersections and individual approaches were evaluated using VISSIM for the No-Build and the Build Alternatives.

5.1.3.1 Intersection Delays and Level of Service Results

The intersection average delay was evaluated between the No-Build and Build Alternatives for both the AM and PM peak hours as summarized in **Table 5-6**. The intersection individual movement delay and LOS for Opening Year (2025) and Design Year (2045) for both No-Build Alternative and Build Alternative are shown in **Appendix D.**

Table 5-6: Average Delays and LOS from VISSIM - No-Build and Build Alternative

Signalized Intersections	AM Peak										PM Peak									
	Opening Year (2025)					Design Year (2045)					Opening Year (2025)					Design Year (2045)				
	No-Build		Build		Percent Reduction	No-Build		Build		Percent Reduction	No-Build		Build		Percent Reduction	No-Build		Build		Percent Reduction
	Delay (Seconds)	LOS	Delay (Seconds)	LOS		Delay (Seconds)	LOS	Delay (Seconds)	LOS		Delay (Seconds)	LOS	Delay (Seconds)	LOS		Delay (Seconds)	LOS	Delay (Seconds)	LOS	
Collins Road and SR 15	23.8	C	25.3	C	-6%	53.4	D	58.5	E	-10%	27.4	C	23.2	C	15%	531.5	F	249.5	F	53%
I-295 NB off-ramp and SR 15	38.7	D	32.5	C	16%	138.3	F	53.3	D	61%	46.4	D	24.6	C	47%	260.7	F	144.6	F	45%
I-295 SB off-ramp and SR 15	37.8	D	17.1	B	55%	84.4	F	40.7	D	52%	57.3	E	11.1	B	81%	318.3	F	25.0	C	92%
Eldridge Avenue and SR 15	51.6	D	11.5	B	78%	141.3	F	51.6	D	63%	25.4	C	11.0	B	57%	45.9	D	31.1	C	32%
Old Orange Park Road and SR 15	34.0	C	8.6	A	75%	43.4	D	33.3	C	23%	22.8	C	8.1	A	64%	30.4	C	17.0	B	44%
Wells Road and SR 15	76.9	E	11.7	B	85%	114.2	F	60.4	E	47%	105.2	F	22.1	C	79%	123.5	F	42.2	D	66%
Wells Road and Eldridge Avenue	15.9	B	9.5	A	40%	23.8	C	78.6	E	-230%	17.4	B	12.1	B	30%	16.8	B	92.8	F	-452%
Total Intersection Delay	278.7		116.2			598.8		376.4			301.9		112.2			1,327.1		602.2		
Overall Intersections Average Delay	39.8		16.6			85.5		53.8			43.1		16.0			189.6		86.0		
Percentage Reduction	-		58%			-		37%			-		63%			-		55%		

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Findings and Observations:

AM Peak Hour:

- During Opening Year (2025), the average delay across the entire corridor between No-Build Alternative and Build Alternative differ by nearly 23.2 seconds per vehicle. The Build Alternative show a 58 percent reduction of the overall intersections average delay. All study area intersections operate at acceptable LOS values (LOS D or better) with the Build Alternative. Heavy traffic along the SR 15 causes the following movements to operate with LOS F: eastbound through, and all the westbound movements at Collins Road and SR 15 intersection.
- During Design Year (2045), all intersections with the Build Alternative operate better than intersections with the No-Build Alternative except for Collins Road and SR 15 intersection, and Wells Road and Eldridge Avenue intersection which has an approximately 5.1 seconds per vehicle and 54.8 seconds per vehicle increase in delay per vehicle when compared to No-Build Alternative, respectively. These are adjacent intersections and improvements at these intersections will be considered with other planned projects to help mitigate future delays.
- Overall, both Opening Year (2025) and Design Year (2045) had a significant reduction in average delay per vehicle with the Build Alternative when compared with the No-Build Alternative indicating better traffic operations.

PM Peak Hour:

- During Opening Year (2025), the average delay across the entire corridor between the No-Build Alternative and the Build Alternative differ by nearly 27.1 seconds per vehicle. The Build Alternative show a 63 percent reduction of overall intersections average delay when compared to the No-Build Alternative. All study area intersections operate at acceptable LOS values (LOS D or better) with the Build Alternative. Heavy traffic along the SR 15 causes the following movements to operate with LOS F: westbound through and left, and northbound left movements at Wells and SR 15 intersection; eastbound left and right at Eldridge Avenue and SR 15; and westbound through and left movements at Collins Road and SR 15 intersection.
- During Design Year (2045), all intersections with the Build Alternative operate better than intersections with the No-Build Alternative except for Wells Road and Eldridge Avenue intersection which has an approximately 76.0 seconds per vehicle increase in delay when compared to No-Build Alternative. This is attributed by re-routing the eastbound left movement at Wells Road and SR 15 intersection to eastbound left movement at Wells Road and Eldridge Avenue intersection to access SR 15 northbound. Improvements at this intersection will be considered with other planned projects to help mitigate future delays.
- Overall, both Opening Year (2025) and Design Year (2045) had a significant reduction in average delay per vehicle with Build Alternative when compared with the No-Build Alternative indicating better traffic operations.

5.1.3.2 Queue Lengths Results

Intersection average queue lengths were evaluated during both the AM and PM peak hours for the No-Build and Build Alternatives. Tables with average queue lengths for the No-Build and the Build Alternative are summarized in **Table 5-7** through **Table 5-10** as described below:

- Table 5-7 – No-Build Alternative - Opening Year (2025) – Average Queue Lengths
- Table 5-8 –Build Alternative – Opening Year (2025) – AverageQueue Lengths
- Table 5-9 – No-Build Alternative – Design Year (2045) – Average Queue Lengths
- Table 5-10 –Build Alternative – Design Year (2045) – Average Queue Lengths

Table 5-11 provides the average queue length analysis summary for the No-Build and Build Alternatives.

Table 5-7: No-Build Alternative – Opening Year (2025) – Average Queue Lengths

Intersection	Approach	Movement	AM Peak Average Queue Length (feet)	PM Peak Average Queue Length (feet)	Available Storage (feet)
Collins Road and SR 15	Collins Road EB	Left	131	54	2,225
		Through and Left	131	54	2,225
		Right	7	16	230
	Collins Road WB	Left	129	52	1,100
		Through	129	52	1,100
		Right	145	52	1,100
	SR 15 NB	Left	4	61	430
		Through	104	13	1,170
		Through and Right	112	18	1,170
	SR 15 SB	Left	1	6	125
		Through	43	240	8,500
		Right	1	15	430
I-295 NB Off Ramp and SR 15	I-295 NB	Left	214	353	1,105
		Right	0	0	840
	SR 15 NB	Through	283	68	820
	SR 15 SB	Through	19	199	1,220
I-295 SB Off Ramp and SR 15	I-295 SB	Left	338	59	335
		Right	0	0	730
	SR 15 NB	Through	102	0	820
	SR 15 SB	Through	85	248	820
Eldridge Avenue and SR 15	Eldridge Avenue EB	Right	4	11	295
	Eldridge Avenue WB	Right	45	7	125
	SR 15 NB	Through	383	18	565
		Right	316	11	565
	SR 15 SB	Through	0	328	840
		Right	5	293	400

Legend

- (green) Average queue length lower than available storage during both peak hours (both AM and PM peak hour)
- (red) Average queue length exceeds available storage during one peak hour (AM or PM peak hour)
- (orange) Average queue length exceeds available storage during both peak hours (both AM and PM peak hour)

Intersection	Approach	Movement	AM Peak Average Queue Length (feet)	PM Peak Average Queue Length (feet)	Available Storage (feet)
Old Orange Park Road and SR 15	Old Orange Park EB	Left	57	59	640
		Through	57	59	640
		Right	65	59	640
	Old Orange Park WB	Left	35	99	1,650
		Through	35	99	1,650
		Right	30	0	100
	SR 15 NB	Left	7	21	125
		Through	297	33	385
		Through and Right	342	46	385
	SR 15 SB	Left	67	65	175
		Through	36	192	500
		Through and Right	36	192	500
Wells Road and SR 15	Wells Road EB	Through and Left	203	176	250
		Right	203	197	1,670
	Wells Road WB	Through and Left	23	0	1,400
		Right	11	3	295
	SR 15 NB	Left	46	7,001	310
		Through	4,442	7,001	1,638
		Through and Right	4,485	7,045	440
	SR 15 SB	Left	21	42	250
		Through	80	205	542
		Through and Right	94	223	542
Wells Road and Eldridge Avenue	Eldridge Avenue EB	Left	3	4	75
		Through	0	1	542
		Through and Right	1	2	542
	Eldridge Avenue WB	Through and Left	0	0	1,070
		Through	12	25	1,070
		Right	19	36	110
	Wells Road NB	Left	3	2	200
		Through	21	34	1,610
		Through and Right	25	39	1,610
	Wells Road SB	Left	13	9	140
		Through	36	47	2,200
		Through and Right	33	45	2,200

Legend

- Average queue length lower than available storage during both peak hours (both AM and PM peak hour)
- Average queue length exceeds available storage during one peak hour (AM or PM peak hour)
- Average queue length exceeds available storage during both peak hours (both AM and PM peak hour)

Table 5-8: Build Alternative – Opening Year (2025) – Average Queue Lengths

Intersection	Approach	Movement	AM Peak Average Queue Length (feet)	PM Peak Average Queue Length (feet)	Available Storage (feet)
Collins Road and SR 15	Collins Road EB	Left	121	54	2,225
		Through	104	40	2,225
		Right	100	42	230
	Collins Road WB	Left	119	40	1,100
		Through	119	40	1,100
		Right	117	37	1,100
	SR 15 NB	Left	5	54	430
		Through	148	10	1,170
		Right	148	10	1,170
	SR 15 SB	Left	1	6	125
		Through	73	270	8,500
		Right	73	270	430
I-295 NB Off Ramp and SR 15	I-295 NB	Left	74	118	1,105
		Right	92	29	1,110
	SR 15 NB	Through	359	85	790
	SR 15 SB	Through	41	93	1,225
I-295 SB Off Ramp and SR 15	I-295 SB	Left	122	36	1,883
		Right	76	153	980
	SR 15 NB	Through	35	157	830
	SR 15 SB	Through	71	0	830
Eldridge Avenue and SR 15	Eldridge Avenue EB	Left	116	224	350
		Right	1	9	285
	Eldridge Avenue WB	Right	6	2	125
	SR 15 NB	Through	38	4	460
		Right	49	7	460
	SR 15 SB	Through	6	29	470
		Right	0	0	360

Legend

- Average queue length lower than available storage during both peak hours (both AM and PM peak hour)
- Average queue length exceeds available storage during one peak hour (AM or PM peak hour)
- Average queue length exceeds available storage during both peak hours (both AM and PM peak hour)

Intersection	Approach	Movement	AM Peak Average Queue Length (feet)	PM Peak Average Queue Length (feet)	Available Storage (feet)
Old Orange Park Road and SR 15	Old Orange Park EB	Left	35	34	640
		Right	0	1	640
	Old Orange Park WB	Left	27	50	1,650
		Right	9	3	100
	SR 15 NB	Through	56	27	395
		Right	56	27	395
	SR 15 SB	Left	34	58	140
		Through	0	3	1,432
		Right	0	3	1,432
Wells Road and SR 15	Wells Road EB	Through	9	9	1,670
		Right	9	36	1,670
	Wells Road WB	Through and Left	16	38	1,400
		Right	1	0	295
	SR 15 NB	Left	36	430	310
		Through	58	35	1,638
		Through and Right	67	48	440
	SR 15 SB	Left	26	50	250
		Through	26	34	542
		Right	33	36	542
Wells Road and Eldridge Avenue	Eldridge Avenue EB	Left	3	8	75
		Through	3	6	542
		Right	1	3	542
	Eldridge Avenue WB	Left	9	11	110
		Through and Right	9	11	1,070
	Wells Road NB	Left	3	2	200
		Through	15	35	1,610
		Through and Right	8	23	1,610
	Wells Road SB	Left	12	18	140
		Through	2	2	2,200
		Through and Right	0	0	2,200

Legend

- (green) Average queue length lower than available storage during both peak hours (both AM and PM peak hour)
- (red) Average queue length exceeds available storage during one peak hour (AM or PM peak hour)
- (orange) Average queue length exceeds available storage during both peak hours (both AM and PM peak hour)

Table 5-9: No-Build Alternative – Design Year (2045) – Average Queue Lengths

Intersection	Approach	Movement	AM Peak Average Queue Length (feet)	PM Peak Average Queue Length (feet)	Available Storage (feet)
Collins Road and SR 15	Collins Road EB	Left	1,538	69	2,225
		Through and Left	1,538	69	2,225
		Right	1,432	153	230
	Collins Road WB	Left	623	83	1,100
		Through	623	83	1,100
		Right	623	97	1,100
	SR 15 NB	Left	6	47	430
		Through	3,518	10	1,170
		Through and Right	3,532	15	1,170
	SR 15 SB	Left	4	0	125
		Through	80	4,271	8,500
		Right	2	5	430
I-295 NB Off Ramp and SR 15	I-295 NB	Left	*6,715	*11,990	1,105
		Right	*9,725	*3,968	840
	SR 15 NB	Through	302	62	820
	SR 15 SB	Through	45	1,106	1,220
I-295 SB Off Ramp and SR 15	I-295 SB	Left	#2,854	#711	335
		Right	#2,392	#4,848	730
	SR 15 NB	Through	157	0	820
	SR 15 SB	Through	191	591	820
Eldridge Avenue and SR 15	Eldridge Avenue EB	Right	11	46	295
	Eldridge Avenue WB	Right	186	6	125
	SR 15 NB	Through	414	15	565
		Right	343	8	565
	SR 15 SB	Through	60	635	840
		Right	72	547	400

Legend

- (green) Average queue length lower than available storage during both peak hours (both AM and PM peak hour)
- (red) Average queue length exceeds available storage during one peak hour (AM or PM peak hour)
- (orange) Average queue length exceeds available storage during both peak hours (both AM and PM peak hour)

Notes:

* - Right turn queue extends to the mainline and blocks access to the left turn movement. To capture the delay experienced by left turn vehicles while waiting to access the left turn storage, queue length from the right turn movement is distributed proportionately based on the right turn/left turn volumes.

- Left turn queue extends to the mainline and blocks access to the right turn movement. To capture the delay experienced by right turn vehicles while waiting to access the right turn storage, queue length from the left turn movement is distributed proportionately based on the right turn/left turn volumes.

Intersection	Approach	Movement	AM Peak Average Queue Length (feet)	PM Peak Average Queue Length (feet)	Available Storage (feet)
Old Orange Park Road and SR 15	Old Orange Park EB	Left	82	67	640
		Through	82	67	640
		Right	82	67	640
	Old Orange Park WB	Left	43	6	1,650
		Through	43	78	1,650
		Right	39	1	100
	SR 15 NB	Left	12	19	125
		Through	341	14	385
		Through and Right	390	23	385
	SR 15 SB	Left	184	221	175
		Through	118	316	500
		Through and Right	118	316	500
Wells Road and SR 15	Wells Road EB	Through and Left	442	436	250
		Right	421	393	1,670
	Wells Road WB	Through and Left	21	49	1,400
		Right	18	3	295
	SR 15 NB	Left	28	7,112	310
		Through	6,721	7,112	1,638
		Through and Right	6,766	7,157	440
	SR 15 SB	Left	20	87	250
		Through	150	228	542
		Through and Right	167	251	542
Wells Road and Eldridge Avenue	Eldridge Avenue EB	Left	1	11	75
		Through	1	3	542
		Through and Right	1	5	542
	Eldridge Avenue WB	Through and Left	0	32	1,070
		Through	39	63	1,070
		Right	49	62	110
	Wells Road NB	Left	2	1	200
		Through	33	27	1,610
		Through and Right	41	0	1,610
	Wells Road SB	Left	25	13	140
		Through	100	63	2,200
		Through and Right	98	62	2,200

Legend

- (green) Average queue length lower than available storage during both peak hours (both AM and PM peak hour)
- (red) Average queue length exceeds available storage during one peak hour (AM or PM peak hour)
- (orange) Average queue length exceeds available storage during both peak hours (both AM and PM peak hour)

Table 5-10: Build Alternative – Design Year (2045) – Average Queue Lengths

Intersection	Approach	Movement	AM Peak Average Queue Length (feet)	PM Peak Average Queue Length (feet)	Available Storage (feet)
Collins Road and SR 15	Collins Road EB	Left	2,180	69	2,225
		Through	2,162	53	2,225
		Right	2,190	92	230
	Collins Road WB	Left	868	99	1,100
		Through	868	99	1,100
		Right	868	99	1,100
	SR 15 NB	Left	30	206	430
		Through	126	13	1,170
		Right	103	12	1,170
	SR 15 SB	Left	1	1	125
		Through	145	4,285	8,500
		Right	145	4,285	430
I-295 NB Off Ramp and SR 15	I-295 NB	Left	498	166	1,105
		Right	114	29	1,110
	SR 15 NB	Through	513	136	790
	SR 15 SB	Through	66	1,160	1,225
I-295 SB Off Ramp and SR 15	I-295 SB	Left	672	47	1,883
		Right	197	291	980
	SR 15 NB	Through	494	445	830
	SR 15 SB	Through	267	0	830
Eldridge Avenue and SR 15	Eldridge Avenue EB	Left	889	853	350
		Right	436	741	285
	Eldridge Avenue WB	Right	7	4	125
	SR 15 NB	Through	297	3	460
		Right	266	19	460
	SR 15 SB	Through	118	69	470
		Right	0	0	360

Legend

- (green) Average queue length lower than available storage during both peak hours (both AM and PM peak hour)
- (red) Average queue length exceeds available storage during one peak hour (AM or PM peak hour)
- (orange) Average queue length exceeds available storage during both peak hours (both AM and PM peak hour)

Intersection	Approach	Movement	AM Peak Average Queue Length (feet)	PM Peak Average Queue Length (feet)	Available Storage (feet)
Old Orange Park Road and SR 15	Old Orange Park EB	Left	227	45	640
		Right	42	1	640
	Old Orange Park WB	Left	4	179	1,650
		Right	29	59	100
	SR 15 NB	Through	272	79	395
		Right	272	79	395
	SR 15 SB	Left	330	60	140
		Through	16	118	1,432
		Right	14	111	1,432
Wells Road and SR 15	Wells Road EB	Through	13	9	1,670
		Right	23	44	1,670
	Wells Road WB	Through and Left	39	55	1,400
		Right	9	0	295
	SR 15 NB	Left	35	115	310
		Through	6,431	78	1,638
		Through and Right	6,486	96	440
	SR 15 SB	Left	247	53	250
		Through	32	98	542
		Right	40	103	542
Wells Road and Eldridge Avenue	Eldridge Avenue EB	Left	26	8	75
		Through	14	17	542
		Right	2	6	542
	Eldridge Avenue WB	Left	47	27	110
		Through and Right	47	27	1,070
	Wells Road NB	Left	6	9	200
		Through	44	269	1,610
		Through and Right	42	263	1,610
	Wells Road SB	Left	620	726	140
		Through	2	1	2,200
		Through and Right	1	0	2,200

Legend

- (green) Average queue length lower than available storage during both peak hours (both AM and PM peak hour)
- (red) Average queue length exceeds available storage during one peak hour (AM or PM peak hour)
- (orange) Average queue length exceeds available storage during both peak hours (both AM and PM peak hour)

Table 5-11: Average Queue Length Analysis Summary – No-Build and Build Alternative

Description	Opening Year (2025)		Design Year (2045)	
	No-Build	Build	No-Build	Build
Average queue length lower than available storage during both peak hours (both AM and PM peak hour) (Green)	56	56	45	49
Average queue length exceeds available storage during one peak hour (AM or PM peak hour) (Red)	2	1	7	5
Average queue length exceeds available storage during both peak hours (both AM and PM peak hour) (Orange)	2	0	8	3

Findings and Observations:

Opening Year (2025):

- No-Build Condition: The congestion on the corridor resulted in average queue lengths for the northbound through and shared through and right lane at SR 15 and Wells Road intersection to exceed the available storage in both AM and PM peak hour. The available storage was also exceeded at the I-295 southbound off-ramp and SR 15 ramp terminal intersection for eastbound left movement in the AM Peak and the northbound left movement at SR 15 and Wells Road in the PM Peak. All other approaches have observed queue lengths lower than available storage in No-Build condition.
- Build Alternative Condition: The operations improved significantly with the Build Alternative when compared with the No-Build conditions. Only one movement had queue length exceeded the available storage in PM peak.

Design Year (2045):

- No-Build Condition: Due to increased traffic volumes between Opening Year (2025) and Design Year (2045), the congestion increases resulting in eight movements with the average queue lengths exceeding available storage in both AM and PM peak hours, and seven movements with the average queue lengths exceeding available storage during one peak hour. All other approaches have observed queue lengths lower than available storage with the No-Build conditions.
- Build Alternative Condition: The operations improved significantly with the Build Alternative when compared with the No-Build conditions with five movements with the average queue lengths exceeding available storage during one peak hour, and three movements exceeding available strorage during both peak hours.

5.2 Summary of Operational Analysis

The Build Alternative evaluated for this project improve traffic operations along the study area. All metrics from the No-Build and Build VISSIM models show that the Build Alternative provide superior traffic operations when compared to the No-Build Alternative. VISSIM node results show significant delay and LOS improvement at the SR 15 and I-295 ramp terminal intersections. The following is the summary of the operational analysis results:

1) Delay and LOS at the I-295 and SR 15 interchange: During the Opening Year (2025), the Build Alternative shows an improvement in LOS for I-295 northbound off-ramp and I-295 southbound off-ramp and SR 15 ramp terminals from **LOS D to LOS C** and **LOS D to LOS B**, respectively in the AM Peak Hour, and from **LOS D to LOS C** and **LOS E to LOS B**, respectively in the PM Peak Hour when compared to No-Build Alternative. During the Design Year (2045), the Build Alternative shows significant delay reduction for I-295 northbound off-ramp and I-295 southbound off-ramp and SR 15

ramp terminals of approximately **1.4 minutes per vehicle** and **0.7 minute per vehicle**, respectively in the AM Peak Hour, and approximately **1.9 minutes per vehicle** and **4.9 minutes per vehicle**, respectively in the PM Peak Hour when compared with the No-Build Alternative.

2) Queue Lengths on the ramps: The queue lengths on the I-295 northbound and southbound off-ramps which spill back into the freeway mainline with the No-Build Alternative are significantly improved with the Build Alternative. In the Design Year (2045), average queue lengths along the I-295 northbound and southbound off-ramps for the left movements are reduced by **92 percent** and **76 percent**, respectively in the AM Peak Hour, and **99 percent** and **93 percent**, respectively in the PM Peak Hour, when compared with the No-Build Alternative.

3) Delay and LOS of the Overall study area: The overall study area shows decrease in delay by **58 percent** and **63 percent** in the AM Peak Hour and PM Peak Hour, respectively during the Opening Year (2025), and **37 percent** and **55 percent** in the AM Peak Hour and PM Peak Hour, respectively during the Design Year (2045) when compared with the No-Build Alternative indicating better traffic operations.

4) The Wells Road at SR 15 intersection has significant delays under existing conditions which are expected to increase to 114.1 seconds in the AM peak and 123.5 seconds in the PM peak during 2045 conditions. The Build Alternative proposes a Quadrant Intersection for the Wells Road at Eldridge Avenue and Wells Road at SR 15 intersection. With these improvements, the Eldridge Avenue at SR 15 intersection operates at **LOS D or better** during design year conditions for both AM and PM peaks as summarized in Table 5-6. Also, the Wells Road at SR 15 intersection shows **47 percent** and **66 percent** reduction in delay during both AM and PM peak hours, respectively, in design year (2045) with the Build Alternative when compared with the No-Build Alternative.

5.3 Cost Comparison

A cost comparison of the No-Build Alternative and Build Alternative is provided in **Table 5-12**. **Appendix G** shows the Long Range Estimate (LRE) cost for this project.

Table 5-12: Comparison of Alternative Cost Estimates

Item	Build Alternative
Estimated Construction Costs	$15,419,600.00
Engineering Costs (10%)	$1,542,000.00
Construction Engineering and Inspection (12%)	$1,850,400.00
Estimated Right of Way Costs	$2,009,900.00
Total Costs (1)	**$20,821,900.00**

(1) Total Cost = LRE Construction Costs + Engineering Costs + CEI + Estimated Right of Way Costs

6.0 PREDICTIVE SAFETY ANALYSIS

6.1 Build Alternative Safety Evaluations

A crash predictive method analysis was performed as per Chapter 12 of the AASHTO Highway Safety Manual (HSM) First Edition and Chapter 18 of the AASHTO HSM Supplement utilizing the Urban and Suburban Arterials spreadsheet and the Enhanced Interchange Safety Analysis Tool (ISATe) to obtain an estimate of the predicted average crash frequency during the Opening Year (2025) and the Design Year (2045) associated with two alternatives: the No Build Alternative, and the improvements with the Build Alternative. The No Build Alternative uses the existing roadway geometry. The Build Alternative contains all the proposed roadway geometry modifications as described in **Section 4**.

The Build Alternative requires significant changes in the geometric design as described in **Section 4**, therefore, the Empirical Bayes (EB) method was not applied for all alternatives in order to have consistent results.

A summary of the predicted average crash frequency obtained by HSM analysis is presented in **Table 6-1**. **Appendix H** presents the input data used to perform the predictive safety analysis and the output summary for all the alternatives evaluated.

Table 6-1: Predicted Average Crash Frequency (Crashes/Year)

Analysis Year	Location	Alternative	Predicted Crash Frequency by Severity					Total	Percent Change
			K	A	B	C	PDO		
2025	Ramps	No-Build	0.07	0.59	1.99	3.90	8.10	14.65	-1.0%
		Build	0.07	0.56	1.89	3.70	8.28	14.50	
	Ramp Terminals	No-Build	0.37	2.10	6.48	10.68	20.92	40.54	-19.1%
		Build	0.32	1.81	5.60	9.23	15.83	32.79	
	Total	No-Build	0.44	2.69	8.47	14.58	29.02	55.19	
		Build	0.39	2.38	7.49	12.93	24.11	47.29	-14.3%
	Intersections	No-Build	0.33	1.89	5.83	9.61	30.64	48.30	3.5%
		Build	0.34	1.95	6.01	9.91	31.77	49.99	
	Arterial Segments	No-Build	0.22	1.25	3.85	6.35	32.81	44.48	-6.0%
		Build	0.20	1.17	3.62	5.96	30.84	41.80	
	Total	No-Build	0.55	3.14	9.68	15.96	63.46	92.78	
		Build	0.54	3.12	9.63	15.87	62.61	91.79	-1.1%
	Overall	**No-Build**	**0.98**	**5.83**	**18.15**	**30.53**	**92.47**	**147.97**	
		Build	**0.93**	**5.50**	**17.12**	**28.80**	**86.72**	**139.07**	**-6.01%**
2045	Ramps	No-Build	0.10	0.83	2.78	5.46	11.06	20.24	-0.2%
		Build	0.10	0.80	2.67	5.24	11.40	20.21	
	Ramp Terminals	No-Build	0.60	3.46	10.67	17.58	31.26	63.57	-20.0%
		Build	0.51	2.91	8.99	14.81	23.62	50.84	
	Total	No-Build	0.71	4.29	13.45	23.04	42.32	83.81	
		Build	0.61	3.71	11.66	20.05	35.02	71.04	-15.2%
	Intersections	No-Build	0.46	2.65	8.18	13.47	43.08	67.84	3.0%
		Build	0.47	2.72	8.39	13.82	44.44	69.84	
	Arterial Segments	No-Build	0.29	1.68	5.18	8.54	44.11	59.80	-5.6%
		Build	0.28	1.58	4.89	8.06	41.65	56.46	
	Total	No-Build	0.75	4.33	13.36	22.01	87.19	127.64	
		Build	0.75	4.30	13.28	21.88	86.09	126.30	-1.1%
	Overall Results	**No-Build**	**1.46**	**8.62**	**26.81**	**45.05**	**129.51**	**211.45**	
		Build	**1.35**	**8.01**	**24.93**	**41.93**	**121.11**	**197.34**	**-6.67%**

The analysis indicates that the total predicted average crash frequency along the I-295 ramps and ramp terminal intersection is around 55.2 crashes per year in the Opening Year (2025) and 83.8 crashes per year in the Design Year (2045) for the No-Build Alternative. The Build improvements reduces the ramp and ramp terminals predicted average frequency to about 47.3 crashes per year and 71.0 crashes per year in the Opening Year (2025) and Design Year (2045) respectively. This is about a **14.3 percent reduction** and a **15.2 percent reduction** in the Opening Year (2025) and Design Year (2045) respectively.

For arterial segments and intersections along SR 15 the total predicted average crash frequency is around 92.8 crashes per year in the Opening Year (2025) and 127.6 crashes per year in the Design Year (2045) for the No-Build Alternative. The Build improvements decreases the predicted average frequency to about 91.8 crashes per year and 126.3 crashes per year in the Opening Year (2025) and Design Year (2045) respectively. This is about a **1.0 crash per year decrease** and a **1.3 crash per year decrease** in the Opening Year (2025) and Design Year (2045) respectively.

The Wells Road at SR 15 intersection has significant delays under existing conditions which are expected to increase to 114.1 seconds in the AM peak and 123.5 seconds in the PM peak during 2045 conditions. The Build Alternative proposes a Quadrant Intersection for the Wells Road at Eldridge Avenue intersection and Wells Road at SR 15 intersection. Per the FDOT spacing guidelines, the new intersection at Eldridge Road does not meet the minimum signal spacing of 1,320 feet for an urban area. However, with these improvements, the Eldridge Avenue at SR 15 intersection operates at LOS D or better during design year conditions for both AM and PM peaks. Also, the Wells Road at SR 15 intersection shows at least a 50 percent reduction in delay during both AM and PM peak hours in design year. In addition, PDO, fatal and injury crashes are shown to be reduced. The Build improvements shows safety improvement along the entire facility within the study area by reducing crashes when compared to the No-Build Alternative.

For the entire facility evaluated the total predicted average crash frequency is around 148.0 crashes per year in the Opening Year (2025) and 211.5 crashes per year in the Design Year (2045) for the No-Build Alternative. The Build Alternative decreases the predicted average frequency to about 139.1 crashes per year and 197.3 crashes per year in the Opening Year (2025) and Design Year (2045) respectively. This is about a **6.0 percent decrease** and a **6.7 percent decrease** in the Opening Year (2025) and Design Year (2045) respectively.

The Build improvements shows safety improvement along the entire facility within the study area by reducing both the high severity crashes and property damage only crashes when compared to the No-Build Alternative. A detailed segment by segment comparison between the two analyzed alternatives as presented in **Appendix H.**

6.2 Safety Benefits

The Build Alternative improvements show a reduction in the both high severity and property damage only crashes when compared to No-Build Alternative. To compare the benefits of potential crash reduction resulting from the Build Alternative when compared to the No-Build Alternative, crash costs were applied for evaluation.

Predicted average crash frequencies at different severity levels were converted to monetary values by using the FDOT KABCO crash costs from Table 122.6.2 of the 2020 Florida Design Manual. **Table 6-2** and **Table 6-3** provides a summary of the predicted crash costs of the two alternatives and crash cost savings over the life span of the project (2025-2045), respectively.

Table 6-2: Summary of Predicted Crash Costs

Analysis Year	Description	Crash Severity					Total	Annual Benefit
		K	A	B	C	PDO		
Cost per Crash-KABCO Scale		$10,670,000	$872,612	$174,018	$106,215	$7,700		
2025	No Build	$10,508,736	$5,087,468	$3,158,425	$3,243,196	$712,039	$22,709,864	
	Build	$9,908,993	$4,798,112	$2,978,960	$3,059,349	$667,769	$21,413,183	$1,296,681
2045	No Build	$15,552,914	$7,517,919	$4,665,270	$4,785,429	$997,255	$33,518,787	
	Build	$14,448,896	$6,990,399	$4,339,002	$4,453,455	$932,578	$31,164,330	$2,354,457

Source: FDOT KABCO Crash Costs, Table 122.6.2, 2020 FDOT FDM

Table 6-3: Summary of Predicted Crash Cost Savings Over the Life Span of the Project (2025-2045)

Analysis Year	Crash Cost Savings by Crash Severity					Annual Benefit
	K	A	B	C	PDO	
2025	($599,743)	($289,356)	($179,464)	($183,847)	($44,270)	($1,296,681)
2026	($624,957)	($301,264)	($186,805)	($191,253)	($45,291)	($1,349,569)
2027	($650,170)	($313,173)	($194,145)	($198,660)	($46,311)	($1,402,458)
2028	($675,384)	($325,081)	($201,485)	($206,066)	($47,331)	($1,455,347)
2029	($700,598)	($336,989)	($208,825)	($213,472)	($48,352)	($1,508,236)
2030	($725,812)	($348,897)	($216,165)	($220,879)	($49,372)	($1,561,125)
2031	($751,025)	($360,806)	($223,505)	($228,285)	($50,392)	($1,614,013)
2032	($776,239)	($372,714)	($230,846)	($235,691)	($51,413)	($1,666,902)
2033	($801,453)	($384,622)	($238,186)	($243,098)	($52,433)	($1,719,791)
2034	($826,666)	($396,530)	($245,526)	($250,504)	($53,453)	($1,772,680)
2035	($851,880)	($408,438)	($252,866)	($257,910)	($54,474)	($1,825,569)
2036	($877,094)	($420,347)	($260,206)	($265,317)	($55,494)	($1,878,457)
2037	($902,308)	($432,255)	($267,546)	($272,723)	($56,514)	($1,931,346)
2038	($927,521)	($444,163)	($274,887)	($280,130)	($57,535)	($1,984,235)
2039	($952,735)	($456,071)	($282,227)	($287,536)	($58,555)	($2,037,124)
2040	($977,949)	($467,979)	($289,567)	($294,942)	($59,575)	($2,090,013)
2041	($1,003,162)	($479,888)	($296,907)	($302,349)	($60,596)	($2,142,901)
2042	($1,028,376)	($491,796)	($304,247)	($309,755)	($61,616)	($2,195,790)
2043	($1,053,590)	($503,704)	($311,587)	($317,161)	($62,636)	($2,248,679)
2045	($1,078,804)	($515,612)	($318,928)	($324,568)	($63,657)	($2,301,568)
2045	($1,104,017)	($527,521)	($326,268)	($331,974)	($64,677)	($2,354,457)
Total Cost	($17,889,483)	($8,577,207)	($5,310,187)	($5,416,119)	($1,143,946)	($38,336,943)

Note: (X,XXX)-Decrease in crash cost

The annual crash costs predicted for the Build Alternative are lower than the No-Build Alternative by approximately **1.3million dollars** and **2.4 million dollars** in the Opening Year (2025) and Design Year (2045), respectively. This is approximately **5.7 percent reduction** and **7.0 percent reduction** in the crash costs in the Opening Year (2025) and the Design Year (2045), respectively. The Build Alternative reduces the overall crash cost by approximately **38.3 million dollars** over the entire life of the project when compared to the No-Build Alternative.

7.0 PROJECT SCHEDULE AND FUNDING PLAN

The improvements proposed as part of the Build Alternative at the I-295 interchange with SR 15 to south of Wells Road are performed under the Programmatic agreement with FHWA. Therefore, FDOT Central Office will conduct necessary review and assessment of the justification for the proposed changes to the interstate access. This project is funded in the FDOT Work Program as Financial Project Identification Number (FIN) 435575-1-32-01. Funding is summarized in **Table 7-1**.

Table 7-1: Funding for FIN 435575-1-32-01 – I-295 at SR 15 to South of Wells Road

Fiscal Year	2021	2022	2023	2024	2025
PD&E Study					**(On-Going)**
Amount:	$2,087	-	-	-	-
Preliminary Engineering					**(On-Going)**
Amount:	$9,213	-	-	-	-
Right of Way					**(On-Going)**
Amount:	$1,662,885	$659,901	-	-	-
Railroad and Utilities					**(On-Going)**
Amount:	-	$3,000,000	-	-	-
Construction					**(On-Going)**
Amount:	-	$20,301,192	-	$296,623	-
Item Total:	**$1,674,185**	**$23,961,093**	**-**	**$296,623**	**-**

8.0 SUMMARY AND CONCLUSIONS

This IOAR documents the VISSIM traffic operational analysis and safety evaluations performed to evaluate the improvements proposed with the Build Alternative. Details of the improvements proposed are provided in **Section 4** and a conceptual layout and signing and marking plans of the Build Alternative are provided in **Appendix F**. The LRE construction cost estimate for the Build Alternative is approximately $20.8 million.

Traffic analyses shows that the Build Alternative provides significant reduction in vehicle delays, improves vehicular speeds and decreases the latent demand within the study area when compared with the No-Build Alternative. The Build Alternative improves traffic operations and safety during Opening Year (2025) and Design Year (2045) for both AM and PM peak periods.

The VISSIM analysis demonstrates that all the MOEs improve with the Build Alternative, providing the much-needed benefits to traffic operations within the study area.

Table 8-1 provides a side-by-side comparison of the six-hour peak period simulations of No-Build and Build Alternatives' operational analyses summary for Opening Year (2025) and Design Year (2045) AM and PM peak periods.

Table 8-1: Traffic Operational Analysis Comparison

Network wide MOEs	Opening Year (2025)					
	AM Peak			PM Peak		
	No-Build	Build	Percentage Improvement	No-Build	Build	Percentage Improvement
Average Speeds (mph) across 6-hours	24	34	42%	21	35	67%
Average Delay (sec/veh) across 6-hours	160	54	66%	213	53	75%
Latent Demand at End of 6-hours (Vehicles)	0	0	0%	0	0	0%
Network wide MOEs	**Design Year (2045)**					
	AM Peak			**PM Peak**		
	No-Build	**Build**	**Percentage Improvement**	**No-Build**	**Build**	**Percentage Improvement**
Average Speeds (mph) across 6-hours	17	22	29%	12	22	83%
Average Delay (sec/veh) across 6-hours	305	189	38%	504	196	61%
Latent Demand at End of 6-hours (Vehicles)	8,148	1,493	82%	8,114	1,429	82%

Apart from system level evaluation presented above, **Table 5-6** provides an overview of the VISSIM intersection level operational performance of the No-Build and Build Alternatives. A summary of this analysis results is presented below:

AM Peak Hour:

- During Opening Year (2025), the average delay across the entire corridor between No-Build Alternative and Build Alternative differ by nearly 23.2 seconds per vehicle. The Build Alternative show a 58 percent reduction of the overall intersections average delay. All study area intersections operate at acceptable LOS values (LOS D or better) with the Build Alternative. Heavy traffic along the SR 15 causes the following movements to operate with LOS F: eastbound through, and all the westbound movements at Collins Road and SR 15 intersection.
- During Design Year (2045), all intersections with the Build Alternative operate better than intersections with the No-Build Alternative except for Collins Road and SR 15 intersection, and Wells Road and Eldridge Avenue intersection which has an approximately 5.1 seconds per vehicle and 54.8 seconds per vehicle increase in

delay per vehicle when compared to No-Build Alternative, respectively. These are adjacent intersections and improvements at these intersections will be considered with other planned projects to help mitigate future delays.

- Overall, both Opening Year (2025) and Design Year (2045) had a significant reduction in average delay per vehicle with the Build Alternative when compared with the No-Build Alternative indicating better traffic operations.

PM Peak Hour:

- During Opening Year (2025), the average delay across the entire corridor between the No-Build Alternative and the Build Alternative differ by nearly 27.1 seconds per vehicle. The Build Alternative show a 63 percent reduction of overall intersections average delay when compared to the No-Build Alternative. All study area intersections operate at acceptable LOS values (LOS D or better) with the Build Alternative. Heavy traffic along the SR 15 causes the following movements to operate with LOS F: westbound through and left, and northbound left movements at Wells and SR 15 intersection; eastbound left and right at Eldridge Avenue and SR 15; and westbound through and left movements at Collins Road and SR 15 intersection.
- During Design Year (2045), all intersections with the Build Alternative operate better than intersections with the No-Build Alternative except for Wells Road and Eldridge Avenue intersection which has an approximately 76.0 seconds per vehicle increase in delay when compared to No-Build Alternative. This is attributed by re-routing the eastbound left movement at Wells Road and SR 15 intersection to eastbound left movement at Wells Road and Eldridge Avenue intersection to access SR 15 northbound. Improvements at this intersection will be considered with other planned projects to help mitigate future delays.
- Overall, both Opening Year (2025) and Design Year (2045) had a significant reduction in average delay per vehicle with Build Alternative when compared with the No-Build Alternative indicating better traffic operations..

The results from the VISSIM system-wide and intersection level operational analysis indicate that the Build Alternative outperforms No-Build Alternative in all MOE categories evaluated. Therefore, the project will improve traffic operations within the I-295 at SR 15 interchange area and along SR 15 from south of Wells Road to Collins Road.

The project also provides an increased safety benefits by reducing the overall crash cost by approximately **38.3 million dollars** over the entire life of the project when compared to the No-Build Alternative as shown in **Table 6-3**.

Therefore, this project improves both traffic operations and safety within the I-295 and SR 15 to the south of Wells Road study limits and is the recommended alternative.

9.0 FEDERAL HIGHWAY ADMINSTRATION (FHWA) POLICY POINTS

The purpose of this IOAR document is to evaluate Build Alternative operational and safety results and compare with the No-Build Alternative. The following FHWA policy points serve as primary decision criteria used in the approval of IOAR.

1. Proposal does not adversely impact operational safety of the existing freeway

An operational and safety analysis has concluded that the proposed change in access does not have a significant adverse impact on the safety and operation of the Interstate facility (which includes mainline lanes, existing, new, or modified ramps, ramp intersections with crossroad) or on the local street network based on both the current and the planned future traffic projections. The analysis shall, particularly in urbanized areas, include at least the first adjacent existing or proposed interchange on either side of the proposed change in access (23 CFR 625.2(a), 655.603(d) and 771.111(f)). The crossroads and the local street network, to at least the first major intersection on either side of the proposed change in access, shall be included in this analysis to the extent necessary to fully evaluate the safety and operational impacts that the proposed change in access and other transportation improvements may have on the local street network (23 CFR 625.2(a) and 655.603(d)). Requests for a proposed change in access must include a description and assessment of the impacts and ability of the proposed changes to safely and efficiently collect, distribute and accommodate traffic on the Interstate facility, ramps, intersection of ramps with crossroad, and local street network (23 CFR 625.2(a) and 655.603(d)). Each request must also include a conceptual plan of the type and location of the signs proposed to support each design alternative (23 U.S.C. 109(d), and 23 CFR 655.603(d)).

For this IOAR study, the VISSIM analysis was conducted to evaluate the performance of the study corridor (SR 15) for the Exisitng Year (2019), the Opening Year (2025) and Design Year (2045) for both No-Build and Build conditions. The operational analysis results indicate that several intersections along SR 15, especially I-295 ramp terminal interchange intersections operate at failing conditions (LOS F or E) mainly due to peak period demand exceeding the available capacity. Also, due to failing conditions of I-295 ramp terminal interchange intersections, the I-295 northbound and southbound ramp queues extend to the I-295 mainline, which deteriorates the mainline operations. With the increase in traffic for future conditions, the traffic operations further deteriorate if no improvements are implemented along SR 15. The proposed improvements listed in **Section 4-2** will improve traffic operations and the safety of the study corridor over No-Build conditions.

An operational analysis performed for the Build conditions showed improved traffic operations that decrease excessive delays throughout the study area, thereby improving safety compared to the No-Build conditions. The queue lengths on the I-295 northbound and southbound off-ramps, which spill back onto the I-295 mainline in the No-Build conditions, will significantly improve in the Build conditions. In the Design Year (2045), average queue lengths along the I-295 northbound and southbound off-ramps for the left movements are reduced by **92 percent** and **76 percent** in the AM peak hour compared to No-Build conditions, respectively. Similar, a **99 percent** and **93 percent** reduction in the PM Peak Hour compared to No-Build conditions, respectively.

VISSIM analysis results indicate, as shown in **Table 5-6** the proposed build improvements significantly improve traffic operations at I-295 ramp terminal intersections compared to No-Build conditions. The operational benefits with proposed build improvements range from **16 percent** to **92 percent** reduction in intersection delay during peak hours.

The study area experiences approximately 659 crashes during five years (2013 to 2017). The predominant crash type for this area was front to rear collisions accounting for 44.5 percent of the crashes attributed to the congested conditions within the study area. The predicted safety analysis results indicated that the traffic safety performance improved significantly with the Build improvements compared with the No-Build conditions. The Build improvements reduce the ramp and ramp terminals predicted average crash frequency by approximately **14.3 percent** and **15.2 percent** in the Opening Year (2025) and Design Year (2045) compared to No-Build conditions, respectively. The overall predicted crash reduction for the study area is **6.0 percent** and **6.7 percent** in the Opening Year (2025) and Design Year (2045), respectively.

The project also provides safety benefits within the study area by reducing both the high severity crashes and property damage only crashes. The annual crash costs predicted for the Build Alternative are lower than the No-Build Alternative by approximately 1.3million dollars and 2.4 million dollars in the Opening Year (2025) and Design Year (2045), respectively. This is approximately 5.7 percent reduction and 7.0 percent reduction in the crash costs in the Opening Year (2025) and the Design Year (2045), respectively. The Build Alternative reduces the overall crash cost by approximately 38.3 million dollars over the entire life of the project when compared to the No-Build Alternative, as shown in **Table 6-3**.

Therefore, the proposed build improvements for the project improves overall traffic operations and safety of the study corridor (SR 15).

3. A full interchange with all traffic movements at a public road is provided

The proposed access connects to a public road only and will provide for all traffic movements. Less than "full interchanges" may be considered on a case-by-case basis for applications requiring special access for managed lanes (e.g., transit, HOVs, HOT lanes) or park and ride lots. The proposed access will be designed to meet or exceed current standards for federal-aid projects on the interstate system (23 CFR 625.2(a), 625.4(a)(2), and 655.603(d)).

The improvements proposed along SR 15 from south of Wells Road to Collins Road will provide full interchange access and caters to all traffic movements from SR 15 to/from I-295.

The Build Alternative was designed to meet all current FDOT and FHWA design standards of federal-aid projects on the interstate system.