INTERCHANGE OPERATIONAL ANALYSIS REPORT

I-75 at CR 484 Interchange

Marion County, Florida

Financial Project ID: 433651-1

Prepared For:
FLORIDA DEPARTMENT OF TRANSPORTATION
DISTRICT FIVE

January 2022

Interchange Operational Analysis Report (IOAR)

I-75 at CR 484 IOAR

433651-1

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.

		Date
Requestor	DocuSigned by: Beata Stys Palasz A2A8F033A2CE4FC... Beata Stys-Palasz, P.E. District Five	1/4/2022 | 2:50 PM EST Date
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SYSTEMS IMPLEMENTATION OFFICE

QUALITY CONTROL CERTIFICATION FOR INTERCHANGE ACCESS REQUEST SUBMITTAL

Submittal Date: 1/3/2022

FM Number: 433651-1

Project Title: I-75 at CR 484 Interchange Operational Analysis Report

District: Five

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Document Type: ☐ MLOU ☐ IJR ☐IMR ☒IOAR ☐OTHER____________________________

Status of Document (Only complete documents will be submitted for review; however, depending on the complexity of the project, interim reviews may be submitted as agreed upon in the MLOU)

Final IOAR Document

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.

Requestor DocuSigned by: Beata Stys Palasz A2A8F033A2CE4FC... Date: 1/4/2022 | 2:50 PM EST

Beata Stys-Palasz, P.E.

IRC DocuSigned by: Suraj Pamulapati FE89B6447E1043B... Date: 1/4/2022 | 2:52 PM EST

Suraj Pamulapati, P.E., PTOE

CERTIFICATION

BY

KITTELSON & ASSOCIATES, INC.

Financial Project ID: 433651-1

I, Michael P. Eagle, Florida P.E. Number 86645, have prepared and reviewed the Design Traffic for the above referenced FLORIDA DEPARTMENT OF TRANSPORTATION project. I have specifically followed the "Design Traffic Procedure (2012)" as adopted by the Florida Department of Transportation. Based on traffic count information, general data sources, and other pertinent information, the Design Traffic has been prepared using current traffic engineering, transportation planning, and Florida Department of Transportation practices and procedures.

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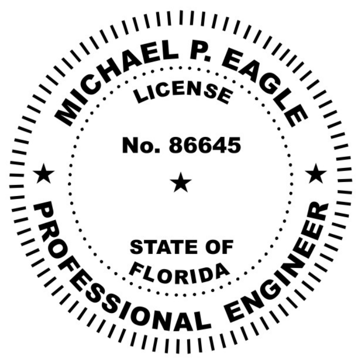


Michael P. Eagle, P.E. #86645

This item has been digitally signed and sealed by Michael P. Eagle, P.E., on January 3, 2022. Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

Michael P Eagle

Digitally signed by Michael P Eagle
Date: 2022.01.03 10:25:47 -05'00'

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

1. EXECUTIVE SUMMARY

The Florida Department of Transportation (FDOT) District Five has prepared an Interchange Operational Analysis Report (IOAR) for the proposed improvements at the I-75 at CR 484 interchange. The findings of the operational and safety analysis and the FHWA Policy Point discussion are summarized as follows:

Purpose and Need

- The purpose of this project is to add turn lanes to increase the safety and operational efficiency at the I-75 at CR 484 interchange and at the intersection of CR 484 at CR 475A.
- The need for the project is based on existing operational deficiencies at the existing I-75 interchange at CR 484. During average weekday conditions, the northbound left-turn movement at the CR 484/I-75 northbound ramps intersection approaches capacity (volume-to-capacity ratio of 0.99). During higher demand conditions (above average) this capacity constraint results in spillback onto the I-75 mainline during the PM peak hour, creating a safety concern. The project improvements are needed to improve the safety and operations of the I-75 mainline and CR 484 arterial.

Proposed Improvements

- The FDOT District Five is currently designing turn lane improvements at the I-75 at CR 484 interchange and CR 484 at CR 475A intersection.
    - I-75 Southbound Ramp at CR 484
        - Bring the southbound right-turn movement under signal control
        - Add a 2nd southbound right-turn lane
        - Provide additional storage for the downstream eastbound left-turn lanes at the I-75 northbound ramp
    - I-75 Northbound Ramp at CR 484
        - Add a 2nd eastbound left-turn lane
        - Add an exclusive westbound right-turn lane
        - Add a 2nd northbound left-turn lane
        - Widen the on-ramp to accommodate dual eastbound left-turn lanes
    - CR 475A/SW 16th Avenue at CR 484
        - Add a 2nd east bound left-turn lane
        - Add a 2nd northbound left-turn lane
        - Add an exclusive southbound right-turn lane
        - Widen the north leg of CR 475A to accommodate dual eastbound left-turn lanes

Future Traffic Operations

- The microsimulation (VISSIM) analysis shows that the Build Scenario provides improved operations to the No-Build scenario on the southbound off-ramp, the northbound ramps, and the CR 484 arterial.
    - These improvements are expected to mitigate queue spillback onto the interstate observed in the No-Build microsimulation analysis and reduce the maximum queue lengths along both off-ramps. Spillback onto the mainline I-75 lanes is not expected to occur under the Build scenario during Design Year (2034) peak hour.

- The improvements in the Build scenario reduce the travel times in both peak hours by at least 32% and at most 80% based on the simulation analysis conducted.
- Each of the network wide performance metrics such as average delay, average speed, total delay, latent demand, latent delay, and vehicles arrived perform better in the Build scenario when compared to the No-Build scenario.

Future Safety Performance

- The I-75 ramp and ramp terminal improvements are predicted to reduce crashes and save over $46.5 million in crash costs over the 10-year life cycle of the project.
- It is anticipated that crashes would be reduced at the CR 484/CR 475A intersection which would save nearly $2.5 million in crash costs under the Build configuration.
- The project improvements (interchange and arterial intersection improvements) are anticipated to reduce crashes by approximately 240 crashes, equating to approximately $49 million in in crash cost savings over the 10-year life cycle of the project.
- The access management improvements are anticipated to reduce overall crashes and reduce the number of severe injury crashes through the I-75 and CR 484 interchange area from a qualitative perspective.

FHWA Policy Points

- The proposed improvements satisfy FHWA's Two Policy Point Requirements included in the May 22, 2017 update to "Policy on Access to the Interstate System".
- Policy Point 1: 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, and ramp intersections with crossroad) or on the local street network based on both the current and the planned future traffic projections. The analysis should, particularly in urbanized areas, include at least the first adjacent existing or proposed interchange on either side of the proposed change in access (Title 23, Code of Federal Regulations (CFR), paragraphs 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, should 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 should 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 should 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)).
    - The microsimulation (VISSIM) analysis shows that the Build Scenario will improve operations over the existing and No-Build scenarios along the I-75 mainline, ramps, and the CR 484 arterial. The Build scenario improvements are expected to mitigate queues onto the interstate from the off-ramps that were observed in the No Build microsimulation analysis and have been observed in above average days in the field under the existing conditions.

  - Maximum queues in the Build scenario are expected to be reduced by up to 4,500 feet versus the No-Build scenario resulting in maximum queues of less than 450 feet during both design year (2034) peak hours. The maximum queues from the Build microsimulation analysis do not encroach into the portions of the ramp intended for deceleration. The Build scenario improvements are also expected to improve the arterial with increased intersection throughput (up to 53 percent) and improved travel times (up to 80 percent improvement) when compared to the No-Build scenario. The I-75 mainline operation remains the same between the Build and No-Build scenarios. The capacity constraints on the interstate will be evaluated/addressed by the ongoing I-75 Master Plan.
  - The results of the predictive safety analysis show the proposed improvements in the Build scenario are predicted to experience approximately 215 less crashes along the I-75 ramps and ramp terminals than the No-Build scenario, equating to approximately $46.5 million in crash cost savings over the 10-year life cycle of the project. It is also anticipated that crashes would be reduced at the CR 484 and CR 475A/SW 16th Avenue intersection by approximately 25 crashes which would save nearly $2.5 million in crash costs under the Build configuration. The overall project improvements are anticipated to reduce crashes by approximately 240 crashes, equating to approximately $49 million in in crash cost savings over the 10-year life cycle of the project.
- Policy Point 2: 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, such as managed lanes (e.g., transit or high occupancy vehicle and high occupancy toll lanes) or park and ride lots. The proposed access will be designed to meet or exceed current standards (23 CFR 625.2(a), 625.4(a)(2), and 655.603(d)). In rare instances where all basic movements are not provided by the proposed design, the report should include a full-interchange option with a comparison of the operational and safety analyses to the partial-interchange option. The report should also include the mitigation proposed to compensate for the missing movements, including wayfinding signage, impacts on local intersections, mitigation of driver expectation leading to wrong-way movements on ramps, etc. The report should describe whether future provision of a full interchange is precluded by the proposed design.
  - The existing interchange is a full diamond interchange providing full access to all traffic movements on the connecting crossroad (CR 484). The proposed improvements will maintain the current access to/from CR 484 and the existing gore points will remain unchanged as part of the proposed improvements.

The interchange improvements evaluated as part of the Build scenario fulfill the project's purpose and need and satisfy the FHWA Policy Points.

2. GENERAL PROJECT INFORMATION

2.1. Introduction

The Florida Department of Transportation (FDOT) District Five has prepared an Interchange Operational Analysis Report (IOAR) for the proposed turn lane improvements at the I-75 at CR 484 interchange and lane additions at CR 484 at CR 475A intersection in Marion County, Florida. The project location is illustrated in **Figure 1**. A Methodology Letter of Understanding (MLOU) was prepared and approved in September 2020 and is included in **Appendix A**.

2.2. Purpose and Need

The purpose of this project is to add turn lanes to increase the safety and operational efficiency at the I-75 at CR 484 interchange and at the intersection of CR 484 at CR 475A.

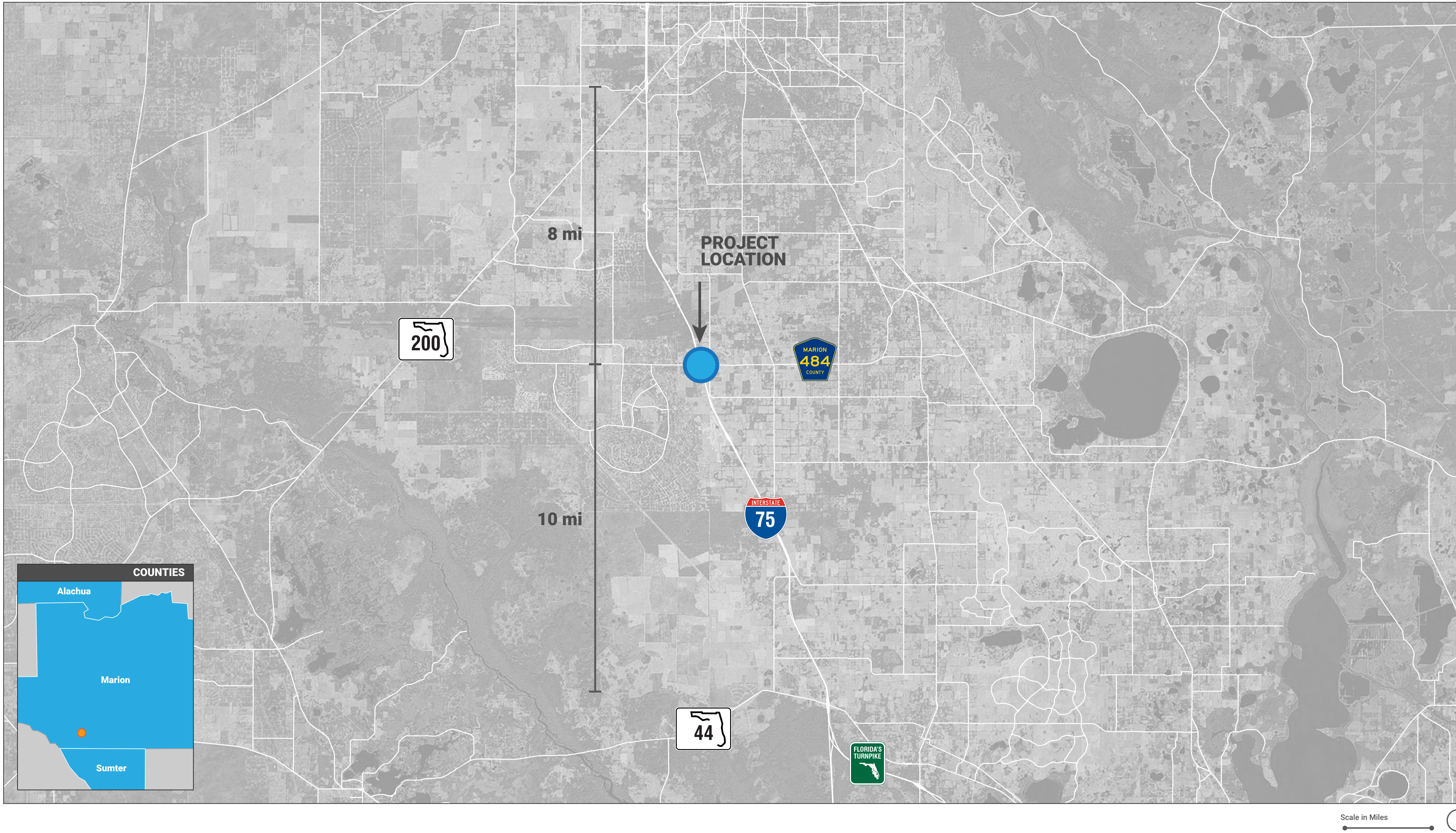
The purpose of this IOAR is to document the potential safety and operational impacts of the proposed turn lane modifications being proposed as part of the I-75 at CR 484 interchange improvement project.

The need for the project is based on existing operational deficiencies at the existing I-75 interchange at CR 484. During average weekday conditions, the northbound left-turn movement at the CR 484 at I-75 northbound ramps intersection approaches capacity (volume-to-capacity ratio of 0.99). During higher demand conditions (above average) this capacity constraint results in spillback onto the I-75 mainline during the PM peak hour, creating a safety concern. The project improvements are needed to improve the safety and operations of the I-75 mainline and CR 484 arterial.

2.3. Schedule and Funding

The following is the anticipated schedule for this project:

- Design: Ongoing
- ROW: Certified
- Letting for Construction: FY 2022 (February 2022)
- Construction: FY 2022 – FY 2024



FDOT

I-75 at CR 484 Interchange Operational Analysis Report

Project Location

Figure 1

2.4. Proposed Lane Additions

The FDOT District Five is currently designing turn lane improvements at the I-75 at CR 484 interchange and CR 484 at CR 475A intersection. **Figure 2** illustrates the proposed lane additions identified for the interchange area. The proposed concept is included in **Appendix B**. The following summarizes the lane additions developed as part of the Design Phase.

- I-75 Southbound Ramp at CR 484
  - Bring the southbound right-turn movement under signal control
  - Add a 2nd southbound right-turn lane
  - Provide additional storage for the downstream eastbound left-turn lanes at the I-75 northbound ramp
- I-75 Northbound Ramp at CR 484
  - Add a 2nd eastbound left-turn lane
  - Add an exclusive westbound right-turn lane
  - Add a 2nd northbound left-turn lane
  - Widen the on-ramp to accommodate dual eastbound left-turn lanes
- CR 475A/SW 16th Avenue at CR 484
  - Add a 2nd east bound left-turn lane
  - Add a 2nd northbound left-turn lane
  - Add an exclusive southbound right-turn lane
  - Widen the north leg of CR 475A to accommodate dual eastbound left-turn lanes

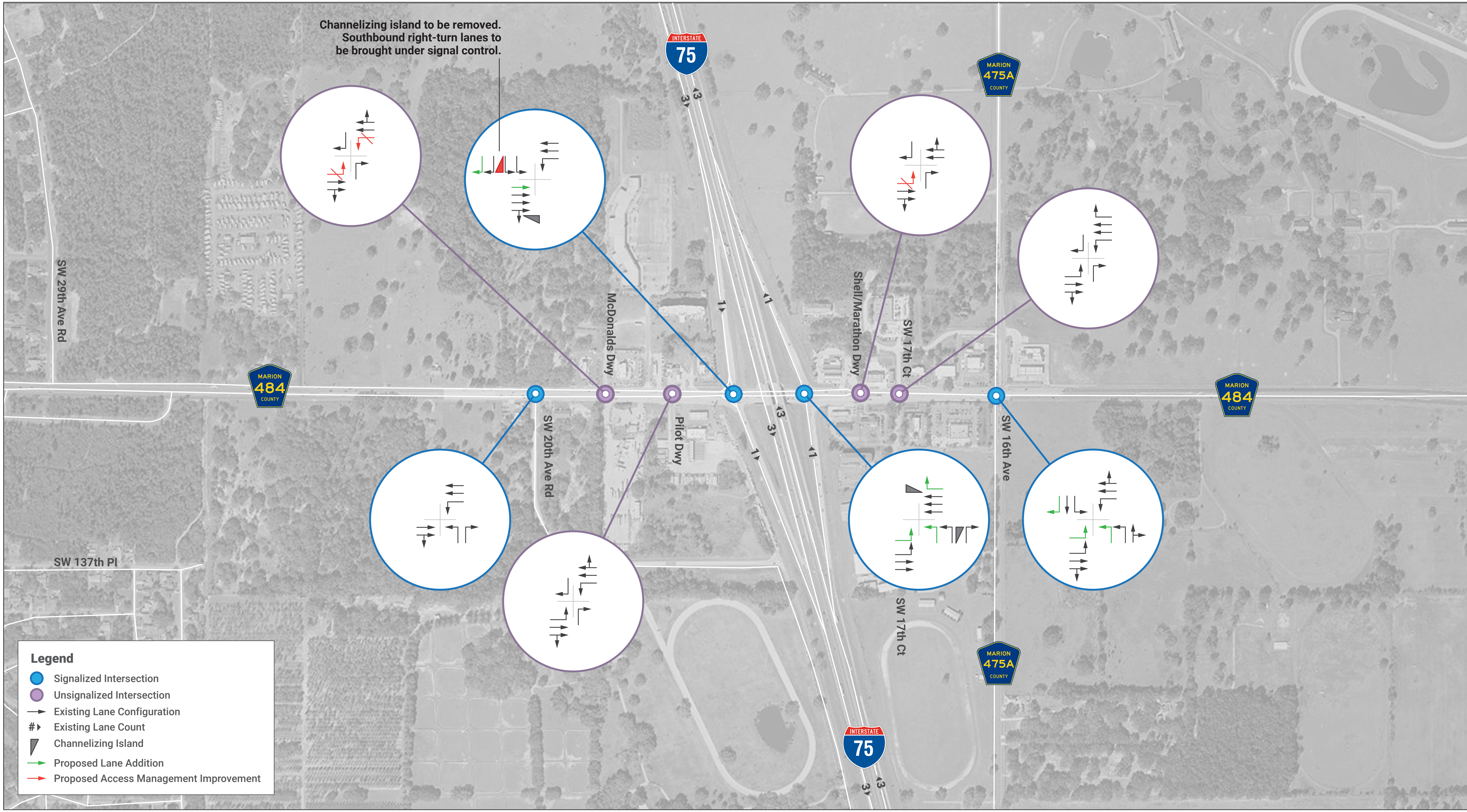
In addition to the intersection improvements summarized, access management improvements are also proposed and include consolidating median openings to allow for longer queue storage lengths at the signalized intersections.

The gore areas at the I-75 on-ramps and off-ramps will not be impacted by this improvement project. The minor modifications will not impact the number of access points to I-75, existing interchange configuration, or travel patterns.

2.5. Analysis Years

Traffic operations were analyzed for the existing year (2019) and the following future years:

- Opening Year – 2024
- Design Year – 2034



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I-75 at CR 484 Interchange Operational Analysis Report

Proposed Lane Configurations

Figure 2

2.6. Area of Influence

The area of influence (AOI) is shown graphically in **Figure 3** and summarized as follows.

Along cross streets: The study intersections within the AOI are as follows:

- CR 484 at SW 20th Ave Road (signalized)
- CR 484 at McDonald's Median Opening
- CR 484 at Pilot Median Opening
- CR 484 at southbound I-75 Ramps (signalized)
- CR 484 at northbound I-75 Ramps (signalized)
- CR 484 at Shell/Sonny's Median Opening
- CR 484 at SW 17th Court
- CR 484 at CR 475A/SW 16th Avenue (signalized)

Along I-75: The study ramps and freeway segments within the AOI are as follows:

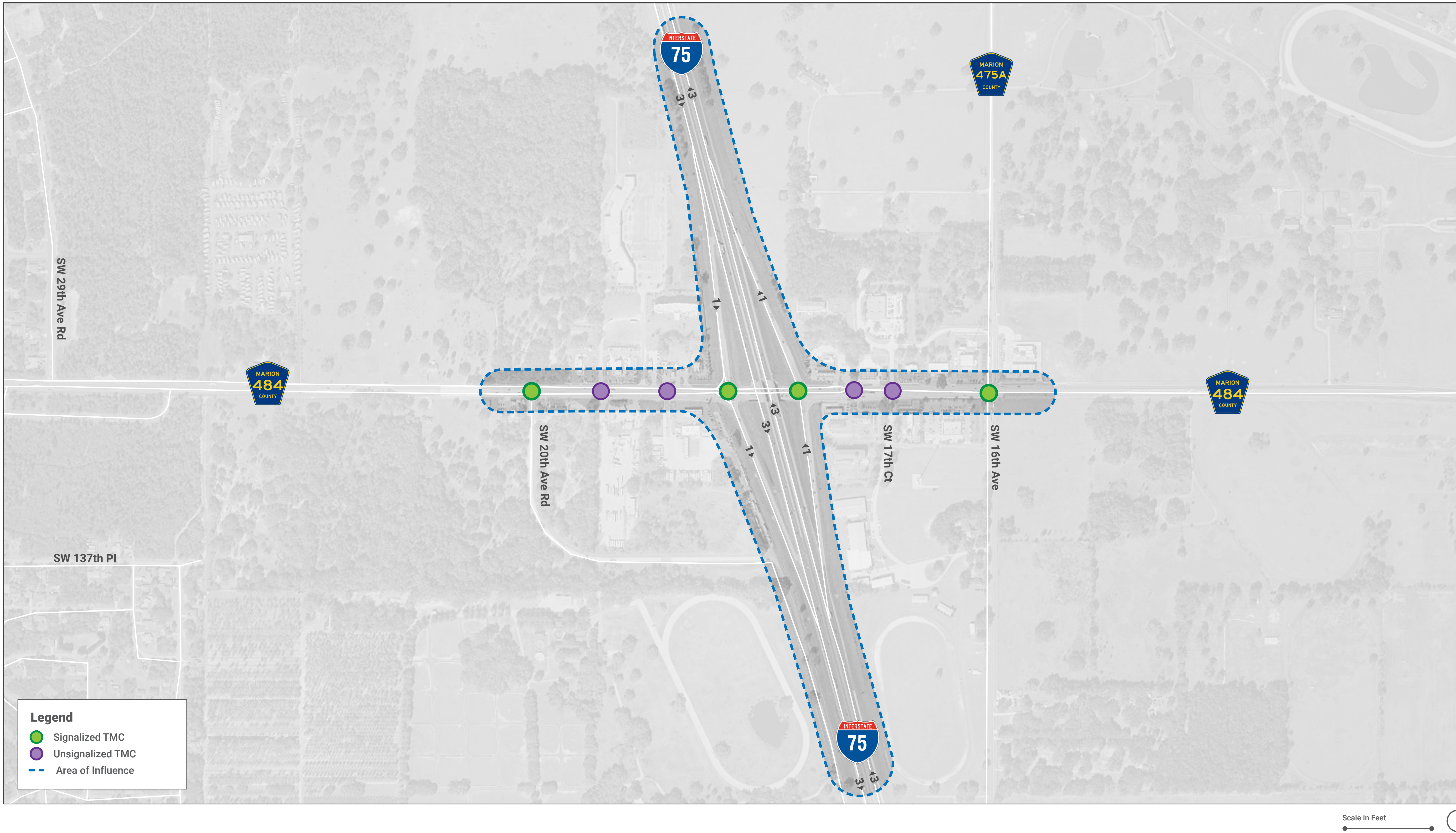
- I-75 northbound off-ramp to CR 484
- I-75 northbound on-ramp from CR 484
- I-75 southbound off-ramp to CR 484
- I-75 southbound on-ramp from CR 484
- I-75 north of CR 484
- I-75 south of CR 484

SR 44 and SR 200 are approximately 10 miles to the south and 8 miles to the north of the study interchange, respectively. Due to the distance between the adjacent interchanges, it is not expected that these interchanges will be impacted by operations at CR 484. Therefore, they are not included in the AOI.

2.7. Level of Service (LOS) Targets

The Level of Service performance targets for each roadway classification, including the ramp terminal intersections and the crossroad beyond the interchange ramp terminal intersections are identified below, consistent with the approved MLOU.

- I-75 Mainline and Ramps: LOS D
- State Arterial Facilities: LOS D
- County Arterial Facilities: LOS D



I-75 at CR 484 Interchange Operational Analysis Report

Area of Influence

Figure 3

3. DATA COLLECTION

3.1. Traffic Data

Traffic counts were obtained for the I-75 mainline, I-75 ramps, and the cross streets from the 2019 FDOT Florida Traffic Online database where available/needed. The following summarizes the field collected data available for this study. The data collection locations and type of count are illustrated in **Figure 4**. The raw data from the data collection efforts are included in **Appendix C**.

Six (6) hour intersection turning movement counts were collected for the AM and PM peak periods of 7:00 – 10:00 AM and 3:30 – 6:30 PM on December 11, 2019 at the following locations:

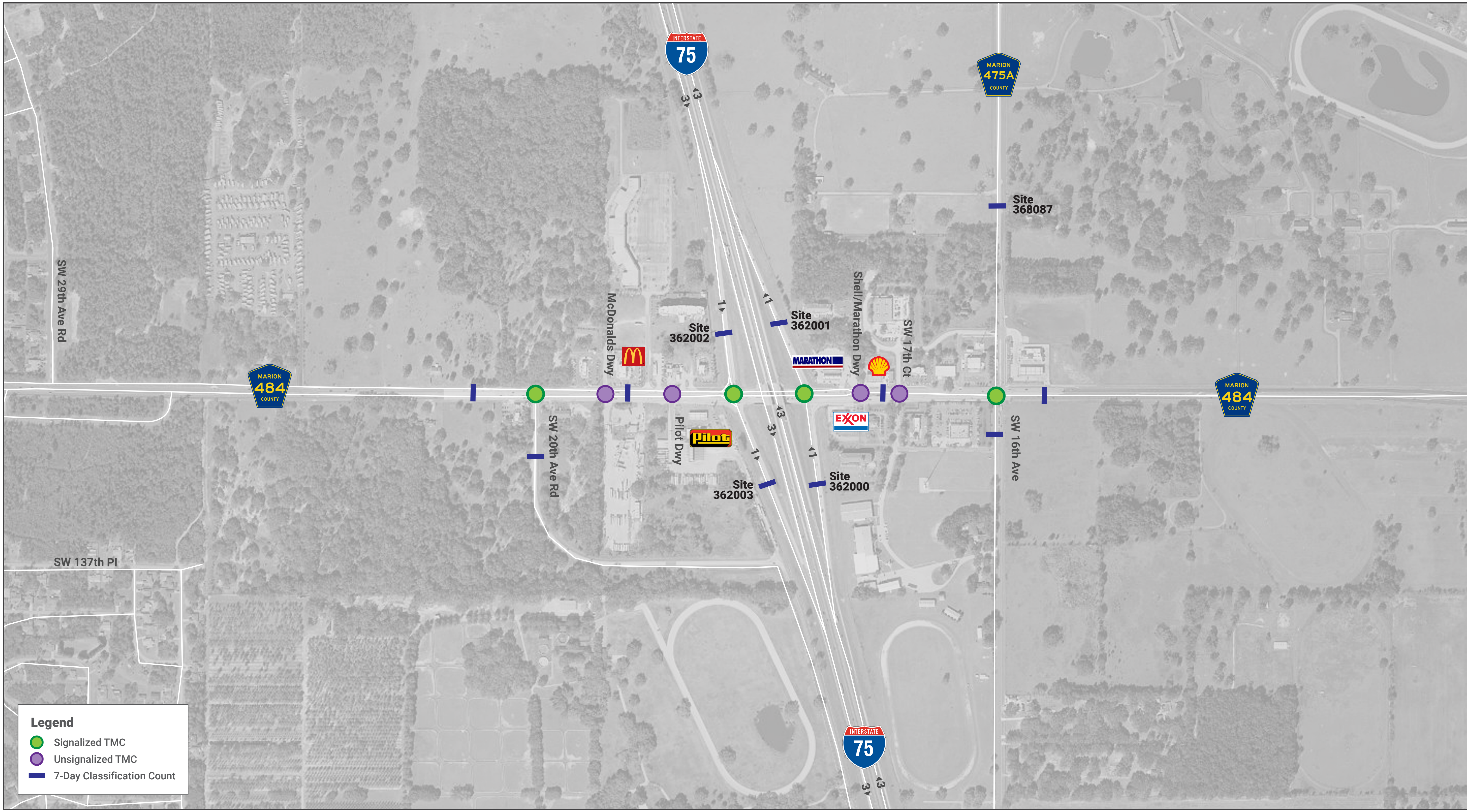
- CR 484 at SW 20th Ave Road (signalized)
- CR 484 at McDonald’s Median Opening
- CR 484 at Pilot Median Opening
- CR 484 at southbound I-75 Ramps (signalized)
- CR 484 at northbound I-75 Ramps (signalized)
- CR 484 at Shell/Sonny’s Median Opening
- CR 484 at SW 17th Court
- CR 484 at CR 475A/SW 16th Avenue (signalized)

Seven (7) day vehicle classification counts were collected between December 8 and December 14, 2019 at the following locations:

- On CR 484, west of SW 20th Ave Road (no FDOT site #)
- On SW 20th Ave Road, south of CR 484 (no FDOT site #)
- On CR 484, east of SW 20th Ave Road (no FDOT site #)
- On northbound I-75 off-ramp (FDOT Site 362000)
- On northbound I-75 on-ramp (FDOT Site 362001)
- On southbound I-75 off-ramp (FDOT Site 362002)
- On southbound I-75 on-ramp (FDOT Site 362003)
- On CR 484, east of CR 475A/SW 16th Avenue (no FDOT site #)
- On CR 475A/SW 16th Avenue, north of CR 484 (FDOT site 368087)
- On CR 484, west of CR 475A/SW 16th Avenue (no FDOT site #)
- On CR 475A/SW 16th Avenue, south of CR 484 (no FDOT site #)

3.2. Signal Timing Data

Signal timing data including time of day schedules, coordination splits, controller settings, and phasing sequences was requested from Marion County for each of the signalized intersections in the study area. The signal timing data is provided in **Appendix D**.



Scale in Feet
0 700
North

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I-75 at CR 484 Interchange Operational Analysis Report

Data Collection Locations

Figure 4

3.3. Planned and Programmed Projects

The FDOT Five Year Work Program and the Ocala Marion Transportation Planning Organization's (TPO) 2045 Long Range Transportation Plan (LRTP) were reviewed to identify planned and programmed projects along I-75 in the vicinity of the study location.

3.3.1. *Programmed Projects*

- I-75 (SR 93) from Turnpike (SR 91) to SR 200 PD&E study (443623-1)
  - Highway and PD&E – FY 2021
- I-75 (SR 93) from SR 200 to CR 234 PD&E study (443624-1)
  - Highway and PD&E – FY 2021
- CR 484 from SW 20th Avenue to CR 475A Landscaping (433651-4)
  - Highways/Preliminary Engineering – FY 2022
  - Highways/Construction – FY 2023
- I-75 Marion County Rest Areas Landscaping (437826-1)
  - Highway/Construction – FY 2025
- I-75 Marion County Rest Area Marion County from North of CR 484 to South of SR 200 (438562-1)
  - Highways/Preliminary – FY 2021
  - Highways/Construction – FY 2023
- Transportation needs on local roads under Priority 2: CR 484 from SW 49th Avenue to SW 20th Ave Road; Add two lanes. (Ocala/Marion LRTP)
- Transportation needs on local roads under Priority 2: CR 484 from 20th Ave Road to CR 475A; Add two lanes. (Ocala/Marion LRTP)

4. EXISTING CONDITIONS

4.1. Existing Roadway Characteristics

Roadway segment characteristics, including road names, area type, roadway type, FDOT access classification, number of lanes, and posted speed limit were reviewed using Straight Line Diagrams (SLDs), field evaluations, and aerial photography. **Table 1** summarizes existing characteristics for the roadways in the study area.

CR 484 is classified as an "urban principal arterial – other" east of I-75 and an "urban minor arterial" west of I-75. CR 484 is currently a four-lane divided arterial with a 45 mile-per-hour (mph) posted speed limit in the vicinity of the area of influence. Sidewalks, five-foot paved bicycle lanes, and curb and gutter are provided on both sides of CR 484 throughout the study area.

The study interchange is configured as a diamond interchange. The existing lane configurations at each of the eight intersections are illustrated in **Figure 5**. Each ramp terminal intersection along CR 484 includes a single exclusive left-turn lane onto either northbound or southbound I-75. The existing eastbound and westbound left-turn lanes are approximately 300 feet long underneath the I-75 bridge structure. Additional left-turn queue storage is provided in both directions in the form of an auxiliary through lane upstream of the adjacent ramp terminal intersection—these provide additional eastbound left turn storage of approximately 150 feet and additional westbound left turn storage of approximately 125 feet. The eastbound and westbound right-turn movements are channelized yield-controlled slip lanes; however, no exclusive right-turn lane storage is provided upstream of the slip lanes. The southbound I-75 ramp approach consists of dual left-turn lanes and an exclusive right-turn lane that is channelized and yield-controlled. The northbound I-75 ramp approach consists of a single left-turn lane and an exclusive right-turn lane that is channelized and yield-controlled.

CR 484 at CR 475A intersection is a four-legged signalized intersection to the east of the CR 484 interchange. The eastbound and westbound approaches consist of two through lanes while the northbound and southbound approaches consist of a single through lane. The eastbound and westbound approaches include a single exclusive left-turn lane measuring approximately 250 feet and 325 feet, respectively. The northbound approach includes an exclusive left-turn lane measuring approximately 275 feet and the southbound left-turn lane measures approximately 225 feet. No exclusive right-turn lanes are included at this intersection under the existing geometric configuration.

Table 1: Existing Roadway Characteristics

Characteristic	Roadway Segment					
	CR 484 (West of I-75)	CR 484 (East of I-75)	NB I-75 Off-Ramp	NB I-75 On-Ramp	SB I-75 Off-Ramp	SB I-75 On-Ramp
FDOT Roadway ID	N/A	N/A	36210006	36210008	36210007	36210005
Location (Milepost)	N/A	N/A	N/A	N/A	N/A	N/A
Functional Classification	Urban Minor Arterial	Urban Principal Arterial – Other	Ramp	Ramp	Ramp	Ramp
SIS Designation	Non-SIS	Non-SIS	SIS	SIS	SIS	SIS
Speed Limit	45	45	35*	N/A	35*	N/A
Lane Width	11 feet	11 feet	12 feet	12 feet	12 feet	12 feet
Shoulder Width	6 feet	6feet	6 feet	6 feet	6 feet	6 feet
Median	22 feet	22 feet	N/A	N/A	N/A	N/A
FDOT Access Classification	N/A	N/A	Class I	Class I	Class I	Class I
Curb and Gutter	Present	Present	None	None	None	None
Sidewalks	Present	Present	None	None	None	None
Bike Lanes	Present	Present	None	None	None	None
Street Lighting	Present	Present	None	None	None	None
Surrounding Land Uses	Commercial/Retail					

*Note: Advisory speed of 35 mph posted

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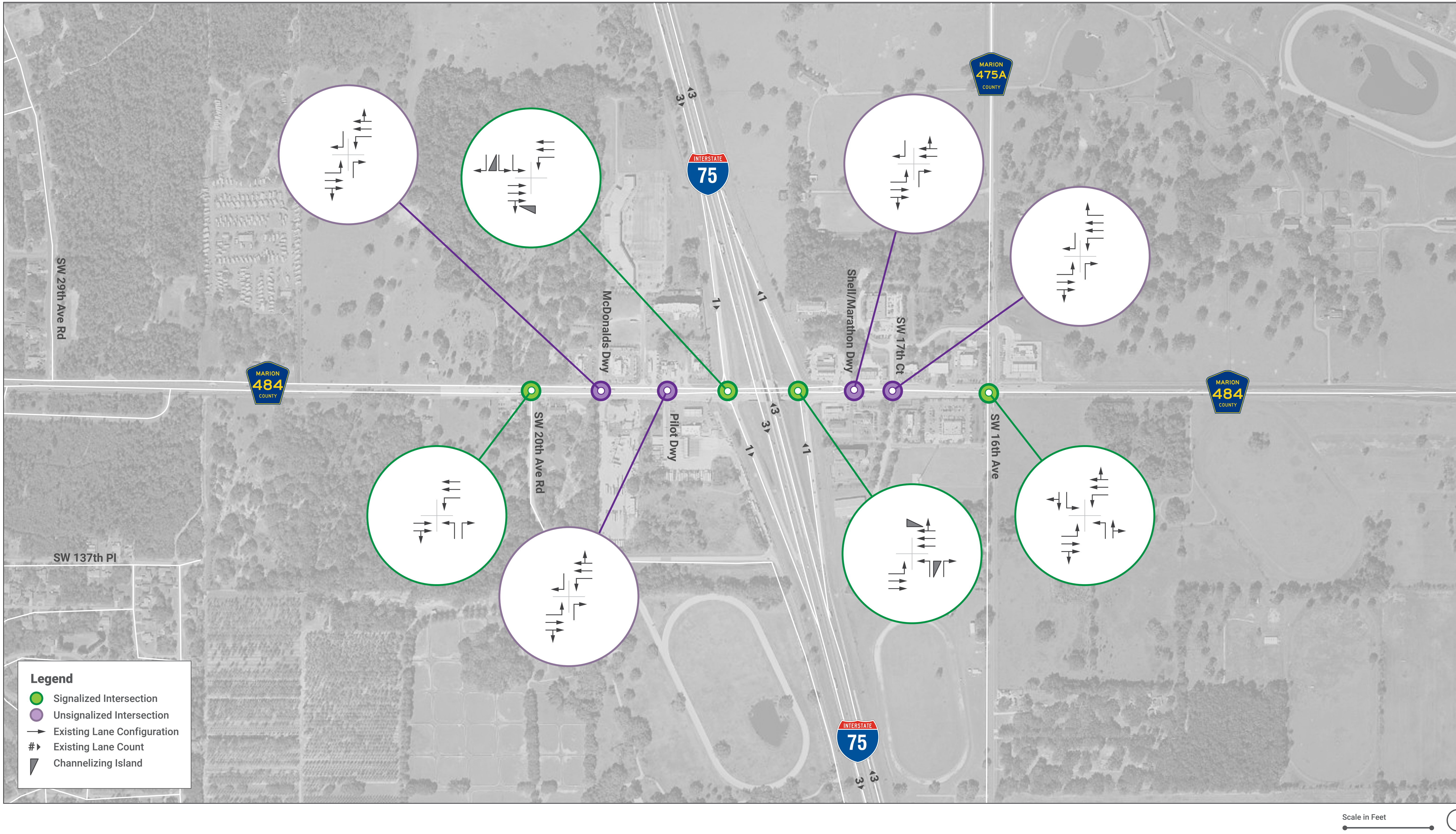

I-75 at CR 484 Interchange Operational Analysis Report

Existing Lane Configurations

Figure 5

4.2. Existing Traffic Characteristics

The following section summarizes the existing traffic characteristics including the estimation of system peak hours and existing traffic volumes/adjustments.

4.2.1. *Existing System Peak Hours*

The field collected data was reviewed to determine a system peak hour for the purposes of balancing counts and evaluating a consistent peak hour for the operational analyses (intersection, freeway, and microsimulation). The total entering intersection volume for each intersection was summed for the study area for each 15-minute bin collected. The 15-minute bins were summed together to determine the max total network hourly volume for each period collected. The existing peak hours are summarized as follows and in **Table 2**. The PM peak hour has a higher volume than the AM; therefore, it is expected that the Design Hour used in the Design Traffic process will be based upon the PM peak hour and its traffic characteristics.

- AM Peak Hour: 7:00 AM – 8:00 AM
- PM Peak Hour: 4:30 PM – 5:30 PM

Table 2: Existing (2019) System Peak Hour Summary

AM Peak				PM Peak			
Start Time	Total Networking Entering Intersection Volume	Total Hourly Network Entering Intersection Volume	Peak Hour	Start Time	Total Networking Entering Intersection Volume	Total Hourly Network Entering Intersection Volume	Peak Hour
7:00 AM	5,190			3:30 PM	5,213		
7:15 AM	5,441			3:45 PM	5,182		
7:30 AM	5,383			4:00 PM	5,505		
7:45 AM	5,462	21,476	**7:00AM -8:00AM**	4:15 PM	5,508	21,408	3:30PM -4:30PM
8:00 AM	4,758	21,044	7:15AM -8:15AM	4:30 PM	5,934	22,129	3:45PM -4:45PM
8:15 AM	4,593	20,196	7:30AM -8:30AM	4:45 PM	5,948	22,895	4:00PM -5:00PM
8:30 AM	4,626	19,439	7:45AM -8:45AM	5:00 PM	5,668	23,058	4:15PM -5:15PM
8:45 AM	4,223	18,200	8:00AM -9:00AM	5:15 PM	6,293	23,843	**4:30PM -5:30PM**
9:00 AM	3,891	17,333	8:15AM -9:15AM	5:30 PM	5,655	23,564	4:45PM -5:45PM
9:15 AM	4,245	16,985	8:30AM -9:30AM	5:45 PM	5,540	23,156	5:00PM -6:00PM
9:30 AM	4,106	16,465	8:45AM -9:45AM	6:00 PM	5,266	22,754	5:15PM -6:15PM
9:45 AM	4,007	16,249	9:00AM -10:00AM	6:15 PM	4,932	21,393	5:30PM -6:30PM

4.2.2. *Existing Traffic Volumes*

AM and PM peak period intersection turning movement counts were collected on December 11, 2020 and seven (7) day classification counts were collected from December 8-14, 2020. The collected turning movement counts and classification counts were adjusted using seasonal adjustment factors for I-75 and Marion County obtained from the 2019 Florida Traffic Online database to estimate 2019 average turning movement volumes and Annual Average Daily Traffic (AADTs) volumes. Seasonal factors are included in **Appendix E.** The 2019 AADTs are summarized in **Table 3**. The existing PM peak traffic characteristics are summarized in **Table 4**.

I-75 mainline counts were not field collected as part of the data collection efforts for this study. The 2019 Florida Traffic Online was used to summarize the existing AADT for the I-75 mainline at a selected anchor point location (Site 360317). The mainline I-75 AADTs were balanced directionally and the bi-directional AADTs on each I-75 segment were determined by summing the directional AADTs. The 2019 AADTs within the study area are shown in **Figure 6**. The seasonally adjusted intersection turning movement volumes used in the existing conditions analysis are illustrated in **Figure 7**.

Table 3: Existing (2019) AADTs

Roadway	Count Type	ADT*	Seasonal Adj. Factor	AADT
CR 484, west of SW 20th Ave Rd	Classification	27,938	0.98	27,500
SW 20th Ave Rd, south of CR 484		3,217	0.98	3,200
CR 484, east McDonald's Dwy		29,783	0.98	29,000
Southbound I-75 Off-Ramp		8,354	0.98	8,200
Northbound I-75 On-Ramp		9,474	0.98	9,300
Southbound I-75 On-Ramp		5,301	0.98	5,200
Northbound I-75 Off-Ramp		6,000	0.98	5,900
CR 484, west of SW 17th Ct		26,135	0.98	25,500
CR 475A/SW 16th Ave, north of CR 484		7,839	0.98	7,700
CR 475A/SW 16th Ave, south of CR 484		5,185	0.98	5,100
CR 484, east of CR 475A/SW 16th Ave		20,328	0.98	20,000

*Note: ADT represents the average weekday condition (Tuesday-Thursday).

Table 4: Existing (2019) PM Peak Hour Traffic Characteristics

Roadway	PM Peak Hour Volume	NB/EB	SB/WB	Peak-to-Daily Ratio	D
CR 484, west of SW 20th Ave Rd	2,304	783	1,521	8.25%	66.0%
SW 20th Ave Rd, south of CR 484	220	116	104	6.84%	52.9%
CR 484, east McDonald's Dwy	2,147	594	1,553	7.21%	72.3%
Southbound I-75 Off-Ramp	822	0	822	9.84%	100%
Northbound I-75 On-Ramp	480	480	0	5.06%	100%
Southbound I-75 On-Ramp	286	0	286	5.39%	100%
Northbound I-75 Off-Ramp	535	535	0	8.91%	100%
CR 484, west of SW 17th Ct	1,526	1,029	497	5.84%	67.5%
CR 475A/SW 16th Ave, north of CR 484	616	254	362	7.86%	58.8%
CR 475A/SW 16th Ave, south of CR 484	463	253	210	8.94%	54.6%
CR 484, east of CR 475A/SW 16th Ave	1,605	819	786	7.90%	51.0%

I-75 at CR 484 Interchange Operational Analysis Report

Existing (2019) Annual Average Daily Traffic

Figure 6

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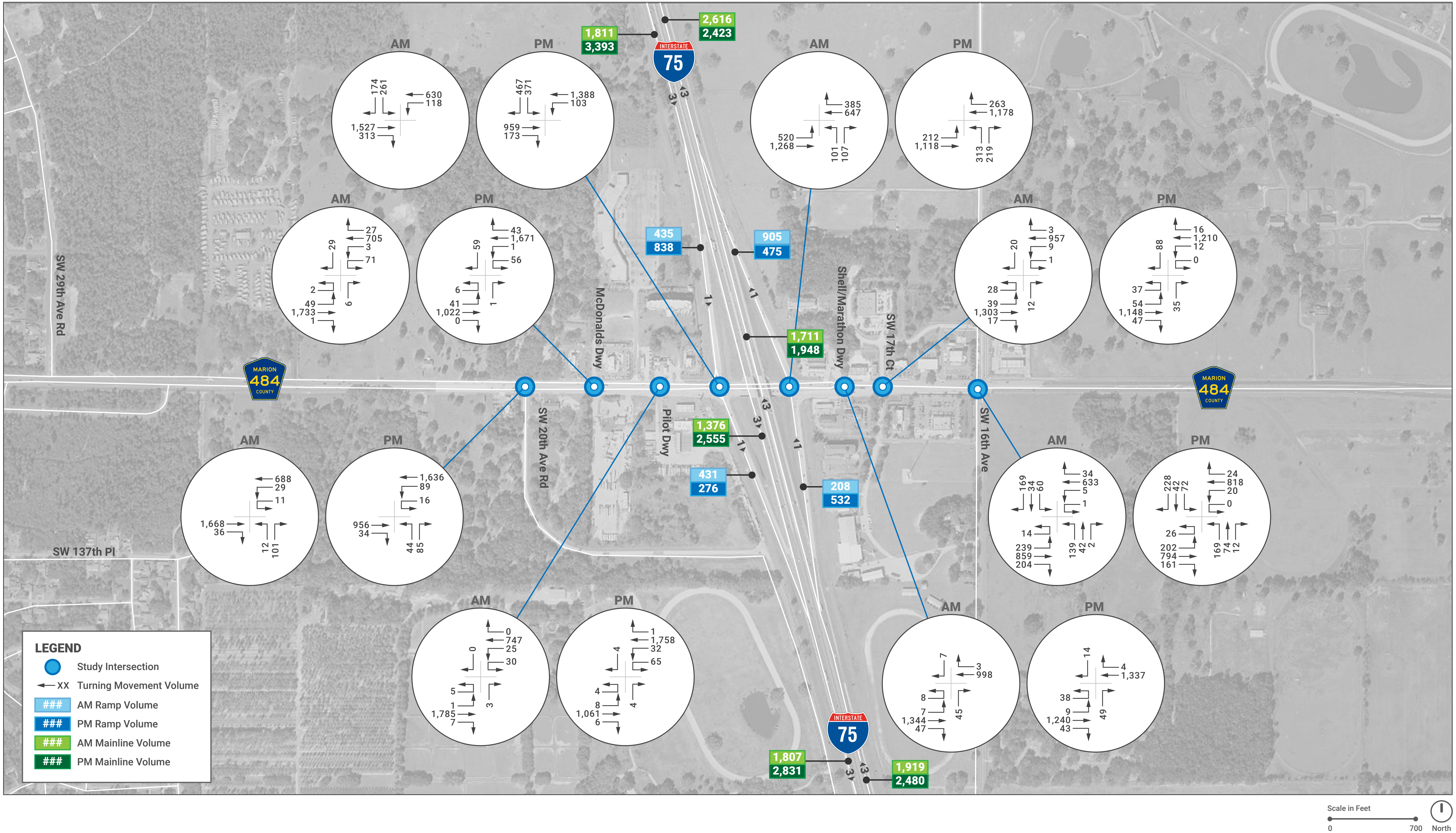


I-75 at CR 484 Interchange Operational Analysis Report

2019 AM/PM Peak Hour Volumes

Figure 7

4.3. Existing Traffic Operational Analysis

The following section summarizes the existing operational analysis results for the intersection and freeway evaluations. The intersections and freeway were analyzed using *Highway Capacity Manual* (HCM) 6th Edition methodologies, as implemented in Synchro and HCS software, respectively. U-turns were accounted for in the intersection analysis conducted in Synchro software. It is important to note that the HCM 6th Edition methodologies, as implemented in Synchro software, do not account for U-turns at signalized intersections.

4.3.1. *Intersection Operations*

The following summarizes the existing peak hour intersection operational results, focusing on individual movements at the study intersections. Detailed Synchro output reports are included in **Appendix F**. The intersection movement delay, LOS, and 95th percentile queues for each study intersection are summarized in **Table 5** through **Table 12**. The 95th percentile queues were rounded up to the nearest 25 feet. **Figure 8** illustrates the overall intersection delay and LOS for each of the intersections in the study area.

- CR 484 and SW 20th Avenue Road (Signalized Intersection)
  - The northbound right-turn movement operates at LOS F during the AM and PM peak while the northbound left-turn movement operates at LOS E during the AM peak and LOS F during the PM peak.
  - The v/c ratio for the AM peak for the northbound left-turn and right-turn movements are 0.10 and 0.83 respectively during the AM peak and 0.65 during the PM peak.
  - All other movements operate under capacity during the peak hours.
  - The overall intersection operates at LOS B or better during the existing AM and PM peak hours.
- Median Openings between SW 20th Avenue Road and the I-75 interchange
  - All movements operate under capacity during both peak hours. The critical movement operates at LOS C or better during both peak hours.
- CR 484 and I-75 Southbound Ramps (Signalized Intersection)
  - The southbound left-turn movement operates at LOS F during both AM and PM peaks.
  - The southbound left-turn operates near capacity with a v/c ratio of 0.85 in the AM peak and 0.91 in the PM peak.
  - All other movements operate under capacity during both peak hours.
  - The 95th percentile queue length does not reach the I-75 gore point during either existing peak hour.
  - The overall intersection operates at LOS C or better during both peak hours.
- I-75 Northbound Ramps and CR 484 (Signalized Intersection)
  - The northbound left-turn movement operates at LOS F in both the AM and PM peak hours. This movement operates at near capacity with a v/c ratio of 0.87 in the AM peak and 0.99 in the PM peak.
  - The 95th percentile queue length for the northbound left-turn movement is 650 feet during the existing PM peak hour (ramp length is approximately 1,175 feet).
  - The other movements at the intersection operate at LOS C or better and under capacity during both existing peak hours.
  - The overall intersection operates at LOS C or better during the existing AM and PM peak hours.

- Median openings between the I-75 interchange and CR 475A
  - All movements operate under capacity during both peak hours. The critical movement operates at LOS B or better during both peak hours.
- CR 484 and SW 16th Avenue/CR 475A (Signalized Intersection)
  - The southbound through/right-turn movement operates at LOS F during the AM and PM peak hours. The southbound right/through movement is approaching capacity in both peak hours with a v/c ratio of at least 0.90.
  - The 95th percentile queue for the northbound left-turn movement exceeds the overall turn lane length during the existing PM peak hour.
  - The overall intersection operates at LOS C during both peak hours.

Table 5: 2019 Peak Hour Intersection Operations – CR 484 at SW 20th Avenue Road

Approach	Movement	AM Peak Hour			PM Peak Hour			Turn Lane Length
		V/C	Delay (s) [LOS]	95% Queue (ft)	V/C	Delay (s) [LOS]	95% Queue (ft)	
Westbound	Left	0.13	6.9 (A)	25	0.18	2.6 (A)	25	130
	Through	0.26	0.2 (A)	25	0.54	0.7 (A)	25	-
	Approach	**0.26**	**0.50 (A)**	-	**0.52**	**0.8 (A)**	-	-
Northbound	Left	0.10	73.9 (E)	25	0.65	99.9 (F)	125	-
	Right	0.83	105.9 (F)	350	0.65	104.0 (F)	175	160
	Approach	**0.75**	**101.9 (F)**	**-**	**0.65**	**101.7 (F)**	**-**	**-**
Eastbound	Through	0.62	9.1 (A)	450	0.36	4.6 (A)	200	-
	Right	0.62	9.1 (A)	475	0.36	4.6 (A)	200	-
	Approach	**0.62**	**9.4 (A)**	-	**0.36**	**4.6 (A)**	-	-
Overall Intersection		**0.53**	**10.1 (B)**	-	**0.47**	**5.0 (A)**	-	-

Table 6: 2019 Peak Hour Intersection Operations – CR 484 at McDonald's Driveway

Approach	Movement	AM Peak Hour			PM Peak Hour			Turn Lane Length
		V/C	Delay (s) [LOS]	95% Queue (ft)	V/C	Delay (s) [LOS]	95% Queue (ft)	
Westbound	Left	0.17	14.3 (B)	25	0.07	9.4 (A)	25	170
Northbound	Right	0.02	17.7 (C)	25	0.00	10.4 (B)	0	-
Eastbound	Left	0.04	8.2 (A)	25	0.09	12.4 (B)	25	170
Southbound	Right	0.04	9.7 (A)	25	0.17	16.5 (C)	25	-

Table 7: 2019 Peak Hour Intersection Operations – CR 484 at Pilot Travel Center Driveway/H & D Services Driveway

Approach	Movement	AM Peak Hour			PM Peak Hour			Turn Lane Length
		V/C	Delay (s) [LOS]	95% Queue (ft)	V/C	Delay (s) [LOS]	95% Queue (ft)	
Westbound	Left	0.14	15.0 (B)	25	0.12	9.8 (A)	25	190
Northbound	Right	0.01	17.3 (C)	0	0.01	11.0 (B)	0	-
Eastbound	Left	0.01	8.5 (A)	0	0.03	12.6 (B)	25	170
Southbound	Right	N/A	N/A	N/A	0.01	15.7 (C)	0	-

Table 8: 2019 Peak Hour Intersection Operations – CR 484 at I-75 Southbound Ramps

Approach	Movement	AM Peak Hour			PM Peak Hour			Turn Lane Length
		V/C	Delay (s) [LOS]	95% Queue (ft)	V/C	Delay (s) [LOS]	95% Queue (ft)	
Westbound	Left	0.39	7.7 (A)	50	0.28	9.2 (A)	50	300
	Through	0.25	0.2 (A)	25	0.54	0.5 (A)	25	-
	Approach	**0.27**	**1.4 (A)**	-	**0.52**	**1.1 (A)**	-	-
Eastbound	Through	0.43	9.8 (A)	300	0.30	31.2 (C)	475	150
	Right	*	*	*	*	*	*	-
	Approach	**0.36**	**9.8 (A)**	-	**0.25**	**31.2 (C)**	-	-
Southbound	Left	0.85	81.6 (F)	275	0.91	95.7 (F)	375	300
	Right	*	*	*	*	*	*	350
	Approach	**0.51**	**81.6 (F)**	**-**	**0.40**	**95.7 (F)**	**-**	
Overall Intersection		**0.36**	**14.7 (B)**	-	**0.41**	**23.8 (C)**	-	-

*Yield-controlled right-turn bypass lane
Note: Overall off-ramp length is 1,150 feet (Distance from the stop bar to the I-75 mainline gore point)

Table 9: 2019 Peak Hour Intersection Operations – CR 484 at I-75 Northbound Ramps

Approach	Movement	AM Peak Hour			PM Peak Hour			Turn Lane Length
		V/C	Delay (s) [LOS]	95% Queue (ft)	V/C	Delay (s) [LOS]	95% Queue (ft)	
Westbound	Through	0.25	0.2 (A)	25	0.45	34.8 (C)	500	125
	Right	*	*	*	*	*	*	-
	Approach	**0.16**	**0.2 (A)**	-	**0.37**	**34.8 (C)**	-	-
Northbound	Left	0.87	110.3 (F)	250	0.99	115.7 (F)	650	-
	Right	*	*	*	*	*	*	350
	Approach	**0.42**	**110.3 (F)**	**-**	**0.58**	**115.7 (F)**	**-**	
Eastbound	Left	0.59	5.6 (A)	150	0.53	19.2 (B)	150	300
	Through	0.45	0.4 (A)	25	0.47	1.5 (A)	50	-
	Approach	**0.49**	**1.9 (A)**	-	**0.48**	**4.3 (A)**	-	-
Overall Intersection		**0.37**	**5.8 (A)**	-	**0.45**	**29.4 (C)**	-	-

*Yield-controlled right-turn bypass lane

Note: Overall off-ramp length is 1,170 feet (Distance from the stop bar to the I-75 mainline gore point)

Table 10: 2019 Peak Hour Intersection Operations – CR 484 at Exxon Gas Driveway/Shell/Marathon Gas Driveway

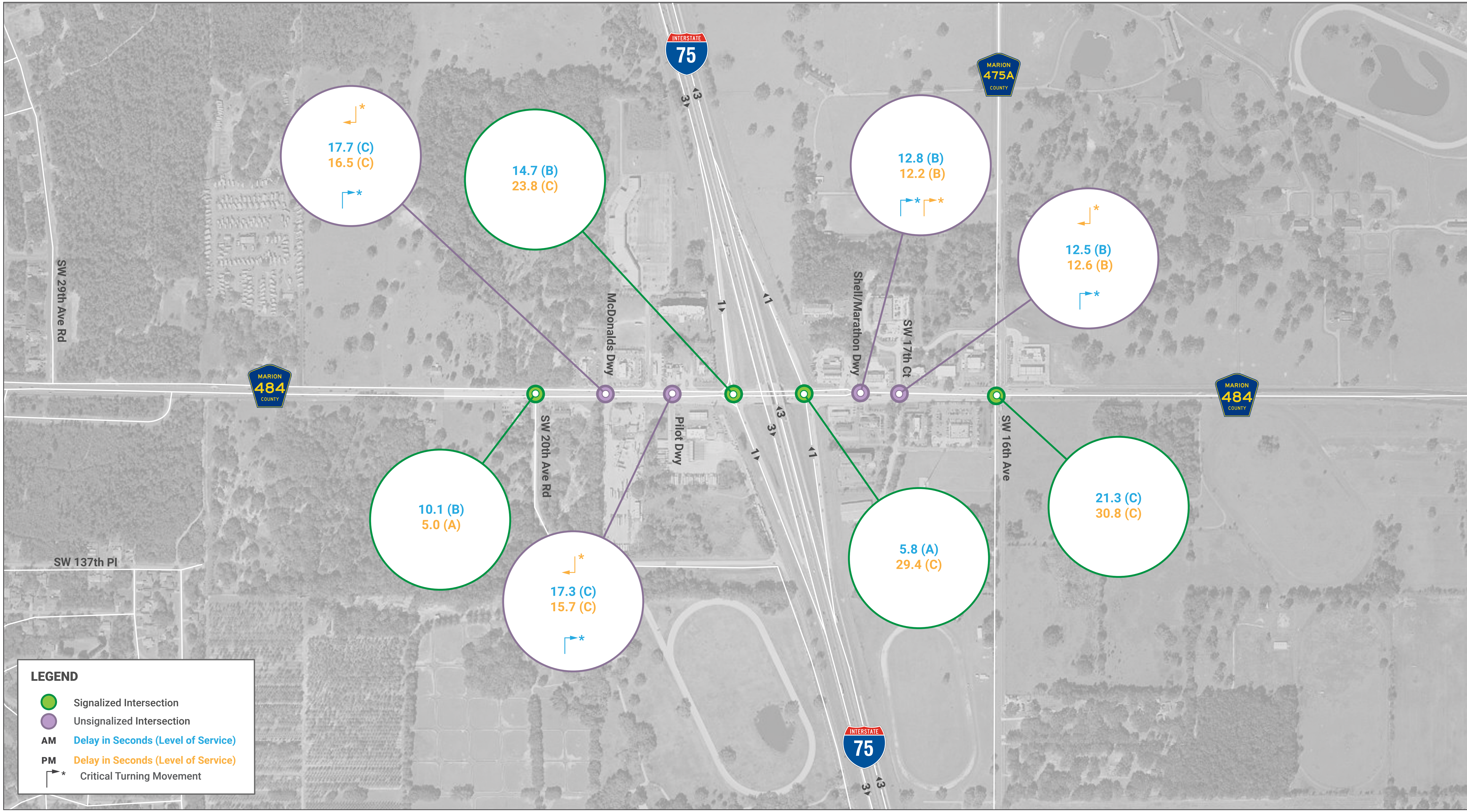
Approach	Movement	AM Peak Hour			PM Peak Hour			Turn Lane Length
		V/C	Delay (s) [LOS]	95% Queue (ft)	V/C	Delay (s) [LOS]	95% Queue (ft)	
Northbound	Right	0.09	12.8 (B)	25	0.10	12.2 (B)	25	-
Eastbound	Left	0.02	9.0 (A)	25	0.07	10.7 (B)	25	205
Southbound	Right	0.01	10.7 (B)	0	0.03	12.1 (B)	25	-

Table 11: 2019 Peak Hour Intersection Operations – CR 484 at SW 17th Court

Approach	Movement	AM Peak Hour			PM Peak Hour			Turn Lane Length
		V/C	Delay (s) [LOS]	95% Queue (ft)	V/C	Delay (s) [LOS]	95% Queue (ft)	
Westbound	Left	0.01	9.6 (A)	0	0.01	9.1 (A)	0	210
Northbound	Right	0.03	12.5 (B)	25	0.06	11.3 (B)	25	-
Eastbound	Left	0.08	9.1 (A)	25	0.13	10.5 (B)	25	155
Southbound	Right	0.03	10.7 (B)	25	0.17	12.6 (B)	25	-

Table 12: 2019 Peak Hour Intersection Operations – CR 484 at CR 475A/SW 16th Avenue

Approach	Movement	AM Peak Hour			PM Peak Hour			Turn Lane Length
		V/C	Delay (s) [LOS]	95% Queue (ft)	V/C	Delay (s) [LOS]	95% Queue (ft)	
Westbound	Left	0.02	15.0 (B)	25	0.07	17.5 (B)	25	320
	Through/Right	0.35	20.4 (C)	325	0.47	26.4 (C)	425	-
	Approach	**0.36**	**20.3 (C)**	-	**0.47**	**26.2 (C)**	-	-
Northbound	Left	0.71	62.9 (E)	250	0.78	66.4 (E)	300	250
	Through/Right	0.15	60.8 (E)	100	0.24	56.4 (E)	150	
	Approach	**0.54**	**62.4 (E)**	**-**	**0.53**	**63.1 (E)**	**-**	**-**
Eastbound	Left	0.49	12.8 (B)	175	0.55	18.9 (B)	175	250
	Through/Right	0.52	1.8 (A)	25	0.52	12.2 (B)	250	-
	Approach	**0.52**	**3.8 (A)**	-	**0.54**	**13.4 (B)**	-	-
Southbound	Left	0.24	62.8 (E)	125	0.24	56.7 (E)	125	215
	Through/Right	0.90	105.0 (F)	350	0.91	94.7 (F)	450	-
	Approach	**0.63**	**93.4 (F)**	**-**	**0.66**	**85.2 (F)**	**-**	**-**
Overall Intersection		**0.49**	**21.3 (C)**	-	**0.53**	**30.8 (C)**	-	-



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I-75 at CR 484 Interchange Operational Analysis Report

2019 AM/PM Peak Hour Intersection Operations

Figure 8

4.3.2. *Freeway Operations*

The technical methodology for this evaluation is based on Chapters 10, 12 and 14 of the Highway Capacity Manual (HCM) 6th Edition. The freeway segment capacities were analyzed individually as merge, diverge, and basic freeway segments. HCS version 7.7 was utilized for the freeway operational analysis.

4.3.3. *Assumptions*

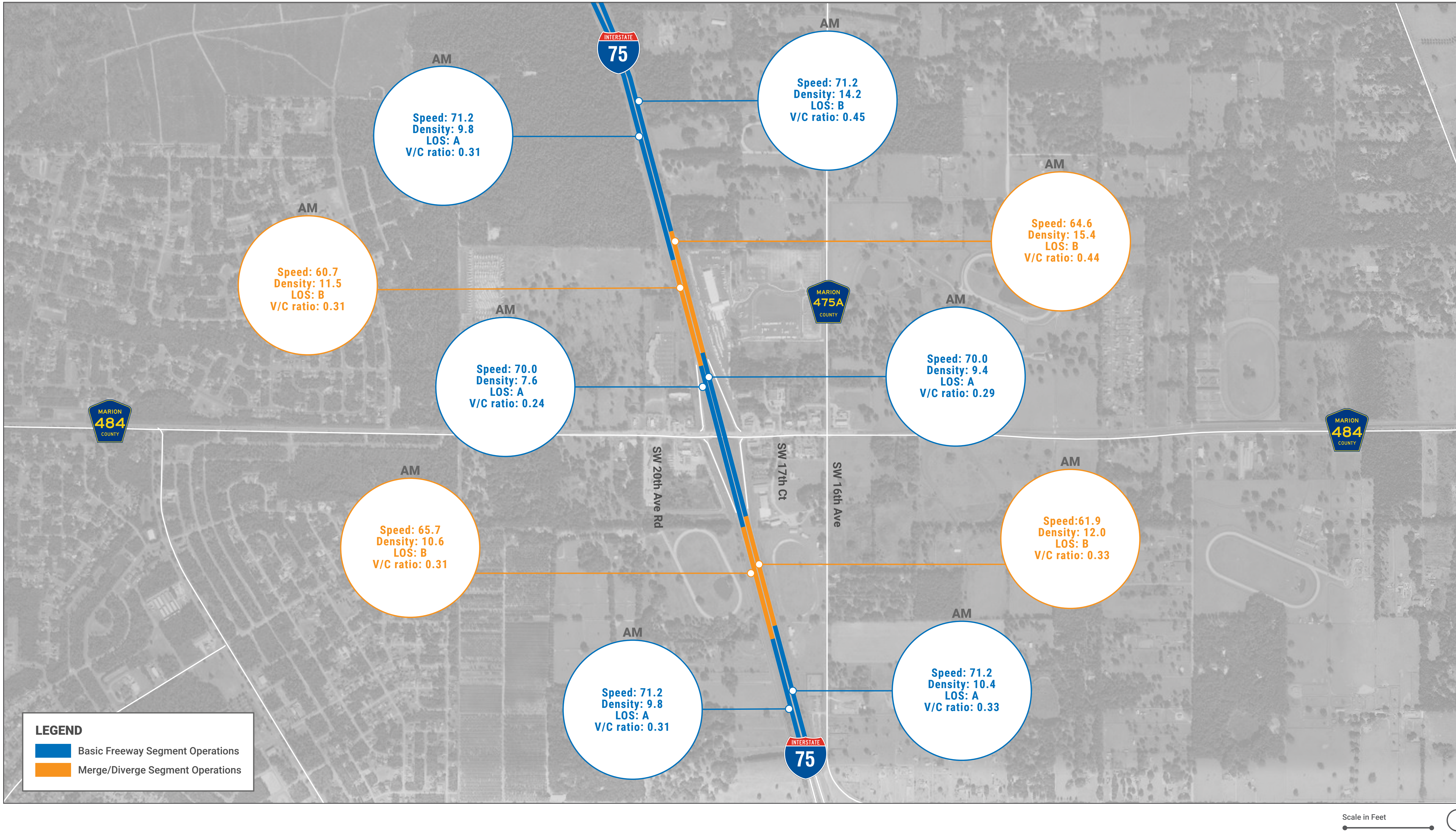
- Peak hour truck percentages
    - I-75 Mainline Truck Percentages (9.9 percent) were based on the approved MLOU.
    - Ramp truck percentages were based on the vehicular classification counts collected along each ramp (Ramp truck percentages are included in **Appendix G**)
- Base Free-flow speed of 75 mph for all mainline segments based on posted speed of 70 mph plus 5 mph.
- Base Ramp free-flow speed of 45 mph for the on-ramps and 35 mph for the off-ramps.
- Driver population is assumed to be a balanced mix of drivers.

4.3.4. *Operational Results*

A summary of the maximum speed, density and LOS and V/C ratio for each direction and peak hour is summarized in **Table 13**. The maximum v/c ratio observed in the northbound direction is 0.45 during the AM peak and 0.42 during the PM peak while the maximum v/c ratio observed in the southbound direction is 0.31 during the AM peak and 0.58 in the PM peak. The average speeds on I-75 are above 60 mph. The segments evaluated on I-75 operate at LOS C or better. The existing (2019) AM and PM peak hour performance metrics including v/c ratios, speed, and density-based LOS for each analysis segment and peak hour are illustrated in **Figure 9** and **Figure 10**, respectively. The inputs and output of the HCS analysis are provided in **Appendix G**.

Table 13: 2019 Peak Hour Freeway Operational Results

Direction	Roadway Segment	Analysis Type	Speed (mph)		Density (pc/mi/ln)		LOS		V/C Ratio	
			AM	PM	AM	PM	AM	PM	AM	PM
Northbound	South of CR 484 off-ramp	Basic Freeway	71.2	71.2	10.4	13.4	A	B	0.33	0.42
Northbound	CR 484 off-ramp	Diverge	61.9	60.9	12.0	15.7	B	B	0.33	0.42
Northbound	I-75 between CR 484 off-ramp & on-ramp	Basic Freeway	70.0	70.0	9.4	10.7	A	A	0.29	0.33
Northbound	CR 484 on-ramp	Merge	64.6	65.1	15.4	14.4	B	B	0.44	0.42
Northbound	North of CR 484 on-ramp	Basic Freeway	71.2	71.2	14.2	13.1	B	B	0.45	0.41
Southbound	North of CR 484 off-ramp	Basic Freeway	71.2	71.2	9.8	18.7	A	C	0.31	0.58
Southbound	CR 484 off-ramp	Diverge	60.7	60.4	11.5	21.7	B	C	0.31	0.58
Southbound	I-75 between CR 484 off-ramp & on-ramp	Basic Freeway	70.0	70.0	7.6	14.1	A	B	0.24	0.44
Southbound	CR 484 on-ramp	Merge	65.7	65.1	10.6	16.9	B	B	0.31	0.49
Southbound	South of CR 484 on-ramp	Basic Freeway	71.2	71.2	9.8	15.4	A	B	0.31	0.48



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I-75 at CR 484 Interchange Operational Analysis Report

2019 AM Peak Hour Freeway Operational Results

Figure 9

FDOT

I-75 at CR 484 Interchange Operational Analysis Report

2019 PM Peak Hour Freeway Operational Results

Figure 10

4.3.5. *VISSIM*

Microsimulation models were developed using VISSIM (PTV Software) to evaluate the existing and future conditions of the interstate system and interchange cross streets. VISSIM version 2020 was utilized for the microsimulation analysis consistent with the approved MLOU document. The existing models have been calibrated consistent with the calibration thresholds outlined in the MLOU. The calibration results and existing conditions results are included under separate cover in **Appendix H**.

4.4. **Historical Crash Analysis**

A historical safety analysis was conducted to support this IOAR. Crash data was obtained for CR 484 from just west of SW 20th Avenue to just east of CR 475A for the five-year period of 2014 through 2018. While the MLOU states 2013-2017 crash data would be utilized, this report reflects the most current crash data at the time the analysis was performed (2014-2018) and is consistent with the FDOT IARUG Safety Analysis Guidance document. Crash records were obtained from the FDOT State Safety Office Geographic Interface Software (SSOGis) and the University of Florida's Signal Four (S4) crash database. This section summarizes the CR 484 roadway crash rate/frequency statistics based on the safety analysis performed. A summary of the 2014 to 2018 crash data set in tabular and graphical format is also provided in **Appendix I**. Crashes on I-75 were not reviewed because the mainline gore points will not be modified as part of the interchange improvements.

4.4.1. *CR 484 Crash Statistics*

Figure 11 displays a summary of crash frequency by year along with their respective severity from 2014 to 2018 for the CR 484 study corridor. There was a total of 384 reported crashes during this period, 115 of which (30 percent) resulted in at least one injury and none of which resulted in a fatality. As displayed in **Figure 11**, crashes increased from 55 in 2014 to 93 in 2017. In 2018, crashes decreased to a total of 83.

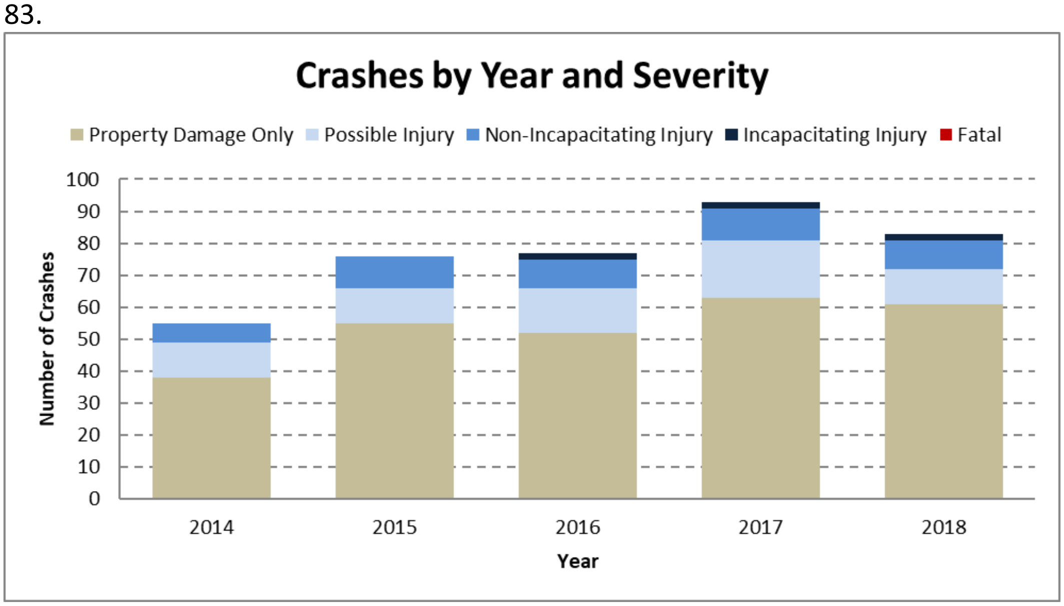


Figure 11: Crashes per Year – CR 484 from SW 20th Avenue to CR 475A

Figure 12 displays the crashes along CR 484 within the study area by type and severity for the five-year study period. The highest defined crash type observed was rear end, comprising 52 percent of the total crashes. Angle (13 percent) and left turn (12 percent) were the second and third highest defined crash types. Rear end, angle, and left-turn accounted for 88 percent of the injury crashes.

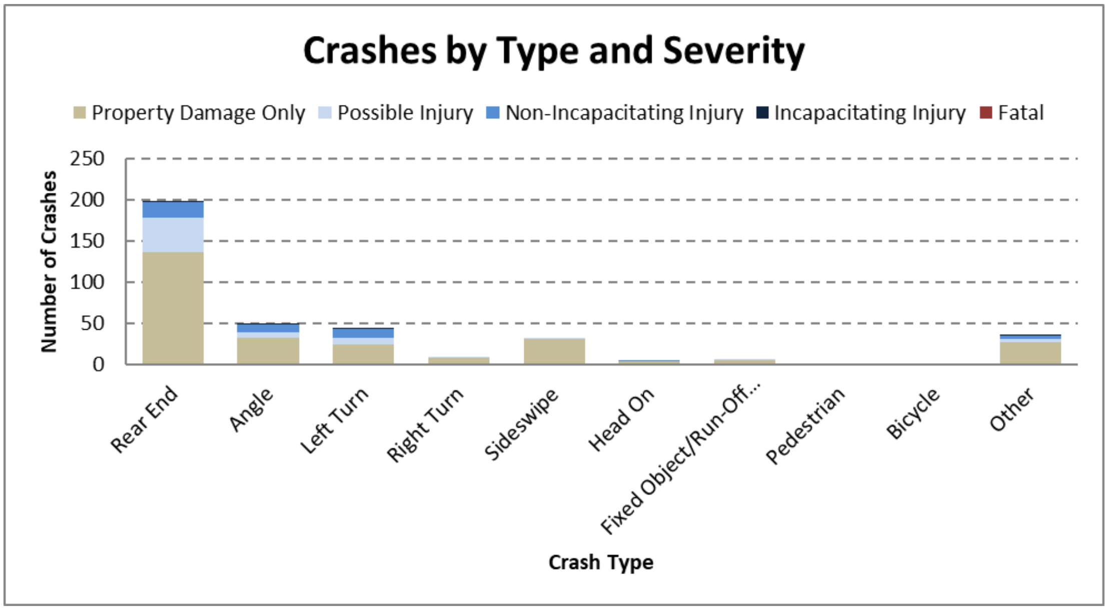


Figure 12: Crashes by Type and Severity – CR 484 from SW 20th Avenue to CR 475A

4.4.2. *Crash Rate and Frequency Analysis*

A crash rate and crash frequency analysis was performed for the CR 484 arterial. Actual crash rates, expressed as number of crashes per million vehicle miles traveled (MVMT), were calculated from the total number of crashes in a year, AADT, and the length of the segment/corridor based on the equation below:

Actual Crash Rate = (Number of crashes per year x 1,000,000) / (ADT x 365 x segment length)

Traffic data, such as functional classification and AADTs, were obtained from the Ocala/Marion TPO Traffic Counts & Trends Manual. The Ocala/Marion Traffic Counts Manual can be found in **Appendix J**. The calculated actual crash rates were compared to the critical crash rate to find the safety ratio for the CR 484 arterial. The critical crash rate is calculated using the Statewide average crash rates for similar facilities based on the equation below:

Critical Crash Rate = Statewide Average Crash Rate + (K Factor x SQRT {Statewide Average Crash Rate / Vehicle Exposure}) – (0.5 / Vehicle Exposure)

Where Vehicle Exposure = (ADT x 365 x Segment Length) / 1,000,000

Safety Ratio = Actual Crash Rate / Critical Crash Rate

Statewide average crash rates for Urban 4-5 Lane Two-Way Divided facilities were utilized for the CR 484 crash rate analysis. **Table 14** provides the crash rate and safety ratio summary for CR 484. The detailed crash rate analysis for the CR 484 arterial can be found in **Appendix J**. The crash rate analysis demonstrated that the crash rates for the CR 484 study corridor are higher than the average crash rates as compared against similar facilities.

Table 14: CR 484 Crash Rates and Safety Ratios

Arterial	From	To	5 Year Average Actual Crash Rate	5 Year Average Critical Crash Rate	Safety Ratio
CR 484	SW 20th Avenue	CR 475A	10.125	6.039	1.673

4.4.3. *Location Specific Crash Statistics*

Table 15 displays the crash frequency and highest crash types for five locations (three intersections and two segments) within the study area. The I-75 interchange ramp terminals were reviewed as one combined location instead of two separate intersections due to the lack of readily available eastbound vs westbound crash information. As displayed in the table, the I-75 interchange ramp terminals had the highest five-year crash frequency with 217 total crashes. The highest crash type across the locations was rear end, while the second highest crash type was angle or left-turn. A summary of the 2014 to 2018 location specific crash data set in tabular and graphical format is also provided in **Appendix I**.

Table 15: Location Specific Crash Frequency – 2014 to 2018

Location Type	From	To	5 Year Total Crash Frequency	Highest Crash Type 1	Highest Crash Type 2
Intersection	SW 20th Avenue		56	Rear End 70%	Left-Turn 11%
Segment	SW 20th Avenue	I-75 NB/SB Ramp Terminals	29	Rear End 55%	Left-Turn 17%
Intersection	I-75 NB/SB Ramp Terminals		217	Rear End 47%	Angle 14%
Segment	I-75 NB/SB Ramp Terminals	CR 475A	33	Rear End 58%	Angle 12%
Intersection	CR 475A		49	Rear End 49%	Angle 22%

4.4.4. *Contributing Factors*

As discussed in the previous sections, rear end crashes were the highest crash type for the CR 484 study corridor. Angle crashes were the second highest crash type for CR 484, followed by left-turn and sideswipe crashes. Contributing factors relating to the highest crash types in an urban arterial setting may be the following:

- Rear end
    - High traffic volumes may contribute to congestion/stop and go conditions during peak hours;
    - The presence of right-turning vehicles due to the numerous driveways and intersections, especially in locations where no right-turn lane is present; and
    - Sun glare issues may be present because this is an east/west roadway, leading to difficulty seeing stopped vehicles or red/yellow signals during the peak hours.
- Angle and left-turns
    - Permissive left-turn movements at traffic signals;
    - Numerous directional median openings in a short segment of roadway;
    - Left-turn lanes with negative offsets (left turning vehicles with obstructed view by an opposing left-turning vehicle; and
    - Misjudging oncoming vehicle’s speed or available gap to make the left-turn.
- Sideswipe
    - Sudden lane changes at intersections or around the I-75 interchange due to drivers not being properly positioned for their intended turn;
    - Sudden lane changes due to maneuvering around slow or turning vehicles.

5. SUBAREA MODEL DEVELOPMENT

The Florida Turnpike Statewide Model 2015 (TSM 2015) was used for this project and is consistent with the ongoing I-75 Master Plan (FM# 443623-1 and 443624-1). No changes were made to the TSM as part of this IOAR. The socio-economic data in the Turnpike Statewide Model was utilized as a basis for this evaluation and is currently being used by the ongoing I-75 PD&E Studies. The TSM adopts socio-economic data directly from the MPO/TPO land use data. In this version, the socio-economic data within the study area (Sumter and Marion County) were adopted from the year 2015 scenario in the CFRPMv6.1 with a base year of 2010 and horizon year of 2045.

5.1. Model Development

The following summarizes the existing year subarea model validation results and future year subarea model development efforts for the CR 484 corridor. A subarea model validation report was submitted to FDOT District 5 under separate cover as part of the I-75 PD&E Studies. The subarea validation report submitted as part of the I-75 Master Plan is included in **Appendix K**.

The boundary generally includes the area bounded by the I-75 & CR 470 interchange to the south, I-75 and SR 331 interchange to the north, US 27 to the west, and SR 35 to the east. The boundary for the model spanned 44 miles of freeway sections on I-75 from Turnpike to CR 234, as shown in **Figure 13**.

5.2. Subarea Model Validation

Figure 14 shows the base year (2015) volume-to-count (VC) comparisons of the 342 traffic count locations within the subarea. The coefficient of determination (R^2) value was 0.99 at the end of the final assignment, which indicates the model is closely approximating the counts. Typical model validation efforts have R^2 values from 0.85 to 0.90.

Percent root mean square error (RMSE%) was also calculated between the 2015 model volumes and counts. The results were compared with the standards outlined in Table 2-11 of the FSUTMS-Cube Model Calibration and Validation Standards. **Table 16** shows the RMSE% on the daily level. The subarea model's RMSE% for all the volume groups are better than FSUTMS's preferable standards.

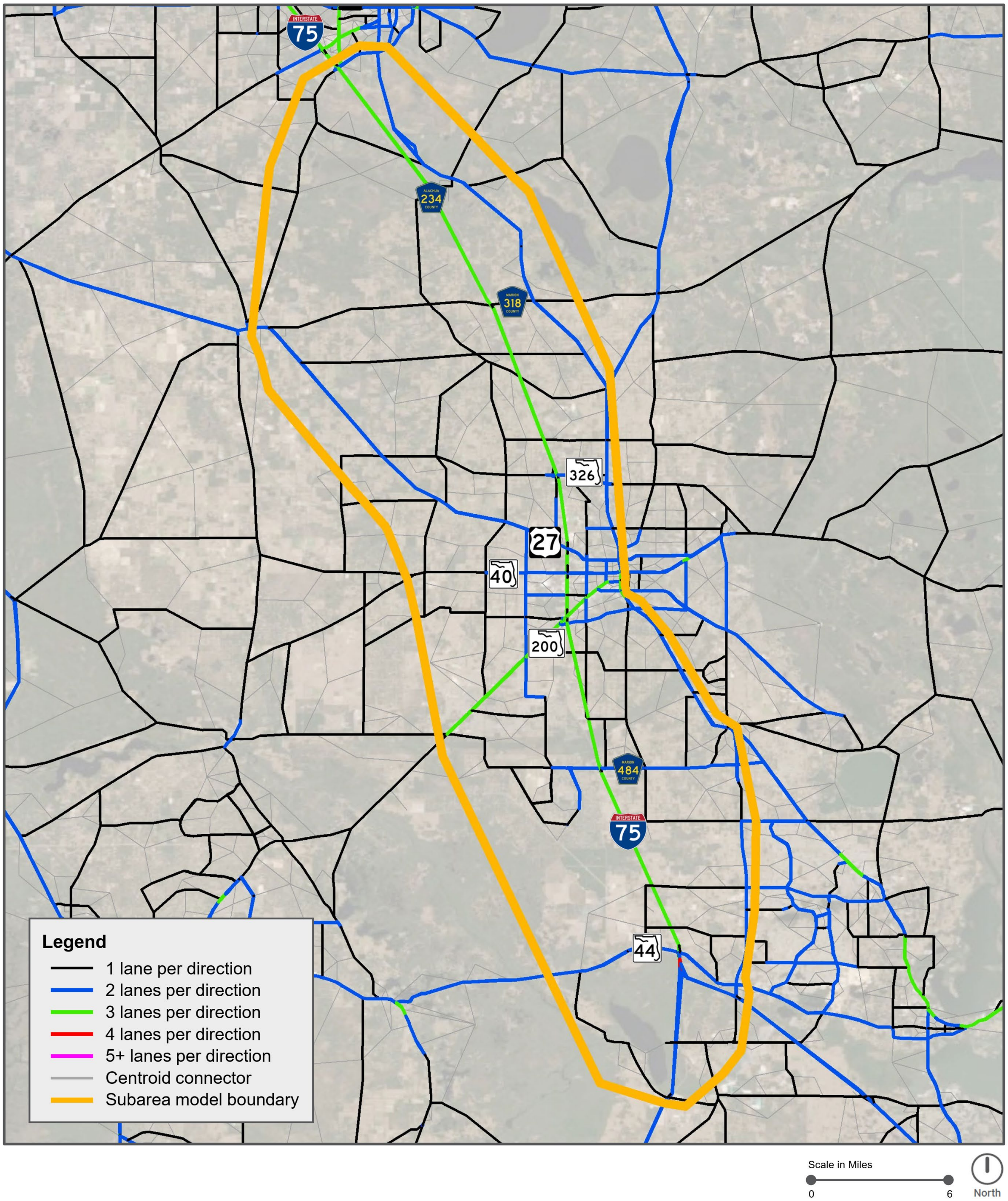


Figure 13: Subarea Model Boundaries

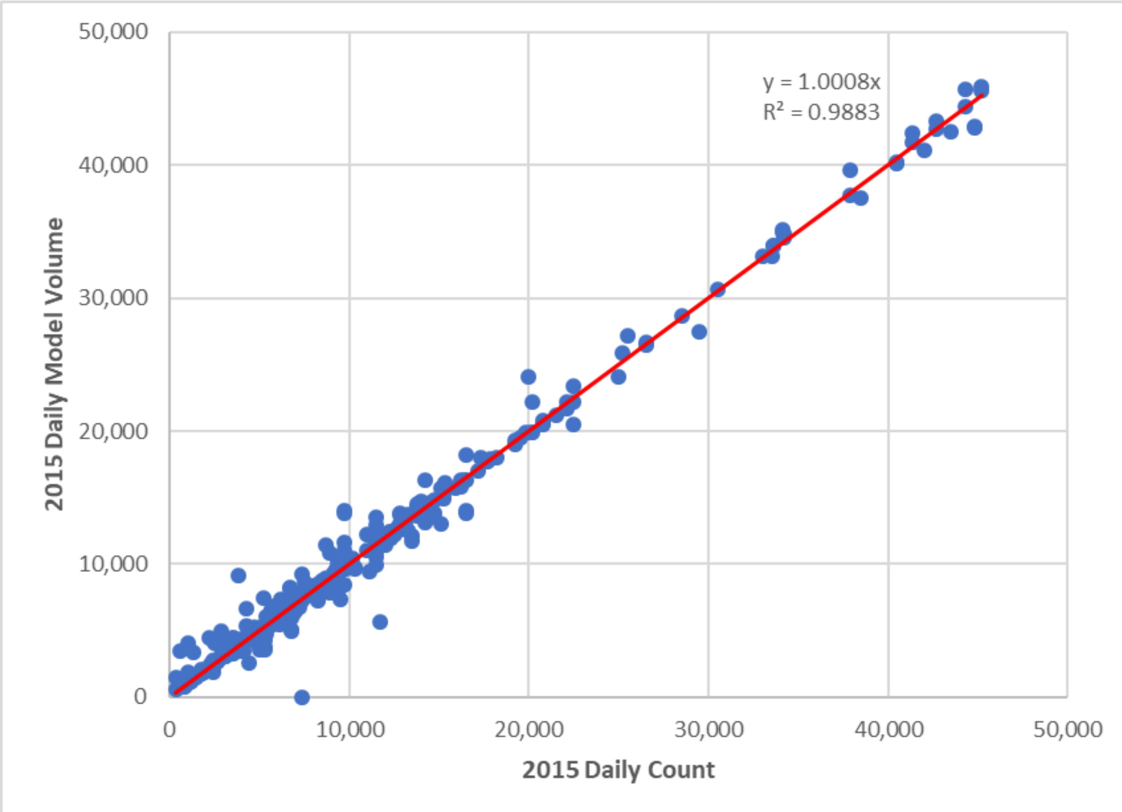


Figure 14: Base Year (2015) Volume-to-Count Comparisons

Table 16: RMSE% by Daily Volume Group of the Calibrated Subarea Model

Group	Volume Range (Vehicles/day)	FSUTMS Standards		# of Counts	RMSE%
		Acceptable	Preferable		
1	Less than 5,000	100%	45%	95	32%
2	5,000 - 9,999	45%	35%	115	16%
3	10,000 - 14,999	35%	27%	64	8%
4	15,000 - 19,999	30%	25%	23	6%
5	20,000 – 29,999	27%	15%	19	6%
6	30,000 - 49,999	25%	15%	26	2%
7	50,000 - 59,999	20%	10%	0	N/A
8	More than 60,000	19%	10%	0	N/A
Total		45%	35%	342	10%

The VC ratios of all facility types also meet the criteria on the daily level, as shown in **Table 17**. The VC ratio statistics for all facilities meet the criteria.

Table 17: VC Ratios by Facility Type of the Calibrated Subarea Model

Facility Type	# of Counts	Criteria	Count	Volume	V/C Diff%	Meets Criteria
Freeway	26	+/- 7%	926,900	925,612	-0.14%	YES
Arterial	192	+/- 15%	1,975,654	1,984,298	0.44%	YES
Collector	83	+/- 25%	693,300	689,956	-0.48%	YES
All	**342**	**+/-5%**	**3,802,054**	**3,827,410**	**0.67%**	**YES**

Based on the statistics discussed in this section, the subarea meets the RMSE% and VC ratio criteria at the daily level and the study corridor shows a close match to the counts. Therefore, the subarea model is considered validated and could be used to support the study area volume forecast.

5.3. Future Year Subarea Model Development

As part of the I-75 PD&E Studies, a future year (2045) subarea model was developed based on the TSM 2045 scenario. This future year model was provided for use in this IOAR to support development of future traffic projections. The model growth rates estimated from the provided model will be discussed in further detail in Section 7.2.

6. FUTURE TRAFFIC DEVELOPMENT

6.1. Recommended Design Traffic Factors

The procedures contained in FDOT's *Project Traffic Forecasting Handbook* (2019) result in initial estimates of future daily traffic volumes that would occur during the average day of the year. Several factors are then used to convert from daily volumes to the "design hour" volumes used for analysis. This section of the IMR documents pertinent data used for selecting the traffic factors to be applied in preparing the design hour volumes. These factors are important as they play a role in determining the appropriate number of lanes along a facility or design features such as pavement thicknesses. Key traffic factors include: K-factor, D-factor, and T-factor, which are further described as follows.

In general terms, the K-factor is the percentage of the daily traffic volume that occurs during the peak hour of the day. Specifically, the K-factor is used to convert an Annual Average Daily Traffic (AADT) volume into a two-way design hour volume (DHV) for a given roadway segment. The FDOT has implemented standardized K-factors to be used in traffic forecasting statewide. The Standard K-factor is dependent upon the area type and facility type for a given project. A standard K-factor of 9.0% is typically used for most urban arterials. This means that 9 percent of the daily traffic occurs in the design hour.

The D-factor represents the percentage of traffic traveling in each direction along a roadway segment during the design hour. For example, a D-Factor of 60 percent would represent 60 percent of the traffic traveling in the peak direction and the remaining 40 percent of traffic traveling in the opposite direction. By applying a D-factor to the previously developed two-way design hour volume, the directional design hourly volumes (DDHVs) are calculated for a given roadway segment. These segment DDHVs for each leg of an intersection are then utilized in developing design hour intersection volumes. The ratio of passenger vehicles and larger trucks is also important in the analysis and design of roadway improvements. T-factors identify the percentage of truck traffic utilizing the roadway during the design hour (DHT) as well as over the entire typical day (T_{24}).

6.1.1. *Standard K*

Standard K factors were obtained from the FDOT *Project Traffic Forecasting Handbook* (2019). These factors were established using statewide data measured at continuous count sites. The factors are based on area type and facility type, with considerations to typical peak periods of the day. The urban K factor, 9.0 percent, is recommended for all study roadway segments for the design hour analysis and is consistent with the approved MLOU.

6.1.2. *Directional (D) Factors*

A comprehensive review of the 2019 field collected volume and classification counts and the approach and departure volumes from the turning movement counts was completed to estimate the recommended D factors for the PM peak hour. The raw data and recommended D factors for each approach to each study intersection in the study area is included in **Appendix L**.

The existing 2019 data shows several locations where the directional factor direction was consistent between the AM and PM peak hours and many instances where the magnitude of the PM peak hour D factor is higher than the AM. These indicate that the use of a reciprocal methodology for the AM peak hour is a realistic projection of traffic patterns and therefore was used in this IOAR.

6.1.3. *Truck Factors*

The recommended T_{24} and DHT factors are consistent with the MLOU. The 2019 truck percentages for the I-75 ramps were reviewed and included in the analysis. The details of these truck percentages are included in **Appendix L**.

6.1.4. *Recommended Design Traffic Factors*

The recommended design factors used in this IOAR are shown in **Table 18** and are consistent with the approved MLOU.

Table 18: Recommended K, D, T24, and DHT Values

Roadway Segment	K factor	D factor	T factor	DHT
CR 484 west of SW 20th Ave Rd	9.0%	66.0%	8.6%	4.3%
SW 20th Ave Rd south of Hwy 484	9.0%	52.9%	20.3%	10.2%
CR 484 east of McDonald's Dwy	9.0%	72.3%	7.3%	3.7%
I-75 SB Off-Ramp to CR 484	9.0%	*	16.7%	8.3%
I-75 NB On-Ramp from CR 484	9.0%	*	12.8%	6.4%
I-75 SB On-Ramp from CR 484	9.0%	*	18.3%	9.2%
I-75 NB Off-Ramp to CR 484	9.0%	*	14.6%	7.3%
CR 484 west of SW 17th Ct	9.0%	67.5%	13.1%	6.6%
SW 16th Ave north of CR 484	9.0%	58.8%	7.8%	3.9%
SW 16th Ave south of CR 484	9.0%	54.6%	7.9%	3.9%
CR 484 east of SW 16th Ave	9.0%	51.0%	10.5%	5.3%
I-75	9.0%	52.5%	19.8%	9.9%

*** Note:** Additional details on the D factors for the ramps pairs is included in **Appendix L**.

7. TRAFFIC FORECASTING

An annual growth rate was selected for each roadway segment based upon comparison of historical volume trends, projected area-wide growth trends from the University of Florida's Bureau of Economic and Business Research (BEBR), and model growth rates. Future intersection turning movements were projected using accepted methodologies from the FDOT *Project Traffic Forecasting Handbook* (2019).

7.1. **Historic Growth Rates**

Historical AADTs were obtained from the 2019 FDOT Florida Traffic Online. Historic growth rates were evaluated using FDOT standard spreadsheets for linear trend analysis. Generally, only growth rates with an R^2 value greater than or equal to 75 percent should be considered when determining growth factors with historical trends. The FDOT Historical AADT reports and trends analyses for each count station are provided in **Appendix M**. The historical growth rates at each count station location along with their respective R^2 values are also summarized in **Table 19**. The linear historical growth rates for the study area were between -1.68 and +2.74 percent, all with R^2 values greater than 50 percent except the SW 16th Avenue station (FDOT Site # 368087).

Table 19: Summary of Historic Growth Rates within the Study Area

Year	I-75 NB Off-Ramp to CR 484	I-75 NB On-Ramp from CR 484	I-75 SB Off-Ramp to CR 484	I-75 SB On-Ramp from CR 484	SW 16 AVE	I-75, north of SR 44	I-75, south of SR 200
	FDOT Site	FDOT Site	FDOT Site	FDOT Site	FDOT Site	FDOT Site	FDOT Site
	362000	362001	362002	362003	368087	180188	360317
2019	5,800	9,500	7,600	4,700	5,400	81,000	97,200
2018	5,700	9,600	7,800	4,700	5,400	80,000	93,700
2017	5,600	9,400	7,700	4,600	-	78,000	94,500
2016	5,300	8,900	7,300	4,400	6,000	72,500	90,700
2015	5,200	8,800	7,000	4,200	5,800	75,500	87,000
2014	4,500	8,500	7,900	4,200	5,600	66,500	80,800
2013	4,300	8,500	7,000	4,200	4,800	64,000	77,500
2012	4,300	7,500	6,200	3,700	4,800	62,500	74,900
2011	4,400	8,100	7,000	4,200	5,200	67,500	75,100
2010	4,600	8,300	5,600	4,200	-	65,000	77,300
2009	4,100	7,500	6,200	3,900	-	61,500	76,100
2008	4,200	7,300	6,400	3,800	-	68,000	74,600
2007	5,100	8,400	7,000	4,300	-	69,500	82,700
2006	4,100	7,300	6,400	4,200	-	60,500	82,200
2005	4,200	7,500	6,300	4,000	-	62,500	79,900
2004	4,000	6,900	6,200	3,700	-	65,500	78,800
Annual Linear Growth Rate	2.74%	2.38%	1.89%	1.40%	1.47%	1.82%	1.53%
R^2	65.41%	80.59%	55.94%	54.12%	27.26%	61.07%	50.91%

7.2. Turnpike Statewide Model (TSM) Growth Rates

The Florida Turnpike Statewide Model with a base year 2015 and forecast year 2045 was used for the project. As noted in Section 5, this model is currently being used as part of the ongoing I-75 Master Plan and no changes were made to the model as part of this IOAR. The TSM is an AADT model; therefore, a model output conversion factor (MOCF) is not utilized. Base year and horizon year model plots are included in **Appendix N**. As summarized in **Table 20**, the average linear model growth rate along CR 484 ranged from -0.4 percent to 1.60 percent.

Table 20: Turnpike Statewide Model Growth Rates

Roadway Segment	2015 Model AADT	2045 Model AADT	Annual Volume Growth	Annual Growth Rate
CR 484 West of SW 20th Ave Rd	27,309	35,349	268	1.0%
SW 20th Ave Rd South of CR 484	Link not included in the TSM			
McDonald's Dwy South of CR 484	Link not included in the TSM			
Pilot Gas Station South of CR 484	Link not included in the TSM			
CR 484 West of I-75	27,309	35,349	268	1.0%
I-75 SB Off-Ramp to CR 484	8,357	12,248	130	1.6%
I-75 NB On-Ramp from CR 484	8,323	11,872	118	1.4%
I-75 NB Off-Ramp to CR 484	5,687	7,106	47	0.8%
I-75 SB On-Ramp from CR 484	5,195	6,871	56	1.1%
CR 484 East of I-75	26,573	33,635	235	0.9%
SW 17th Ct South of CR 484	Link not included in the TSM			
CR 484 West of SW 16th Ave	26,573	33,635	235	0.9%
SW 16th Ave North of CR 484	6,615	5,792	-27	-0.4%
CR 484 East of SW 16th Ave	19,958	27,842	263	1.3%
SW 16th Ave South of CR 484	Link not included in the TSM			

7.3. BEBR Growth Rates

The University of Florida's BEBR projections were obtained for Marion County. The BEBR projections show an estimate for 2019 and projections from 2020 to 2045. The low, medium, and high projections for 2045 are summarized in **Table 21**. Growth rates range from approximately 0.31 percent to 1.88 percent. BEBR population study data is provided in **Appendix O**.

It is important to note that the BEBR data accounts for countywide data and does not necessarily reflect expected growth on specific roadways or sub-areas of the county. It is useful in reviewing reasonableness of growth rates obtained from other sources such as travel demand models or historical AADT data. For example, the county is expected to grow and therefore, negative annual growth rates are unreasonable for use in this study.

Table 21: BEBR Population Growth Rates

Estimation	2019 Estimate	2045 Projection	Annual Growth Rate, Growth/Year (%)
Marion County			
Low	360,421	389,700	1,126 (0.31%)
Medium		460,800	3,861 (1.07%)
High		537,000	6,792 (1.88%)

Source: BEBR Volume 53, Bulletin 186, January 2020

7.4. Recommended Growth Rates and Future AADTs

Recommended growth rates were determined based on a comprehensive evaluation of historic, BEBR, and model growth rates. The applied linear growth rates, the AADT growth per year, and the forecast AADTs/DDHVs for CR 484 arterials and ramps are summarized in the tables as follows. Generally, the model growth per year was applied to the existing year counts. In instances where the model did not include links, engineering judgement was applied based on the land use characteristics and available land in the area remaining for future development.

In order to maintain the existing peak hour proportionality for each ramp pair (e.g., I-75 southbound off-ramp to CR 484 and I-75 northbound on-ramp from CR 484), the existing volumes for each ramp pair were summed to determine a “D factor”. The future AADTs for each ramp pair were added together and then Standard K and the resulting D factor was applied to estimate the future peak hour ramp volumes. This ensures the appropriate directionality between the two ramps is achieved during the peak hour while still capturing the growth at the daily level (Application of Standard K and D factor to the Design Year AADT).

The recommended growth rates, forecast AADTs, and forecast DDHVs are presented in **Table 22**. The 2024 AADTs and 2034 AADTs are illustrated in **Figure 15** and **Figure 16**, respectively. Notes on what source was used to select the recommended growth rate for each segment is also included in **Table 22**. It is important to note that the 2024 and 2034 AADTs are consistent between the No-Build and Build scenarios. The volume reassignment for peak hour volumes will be described in further detail in Section 8.

Table 22: Recommended Growth Rates, Forecast AADTs, and Forecast DDHVs

Roadway Segment	Recommended Growth Rate	Annual Volume Growth	Notes on Growth Rate Selection	Existing Year AADT	Future AADT		PM DDHV
					2024	2034	2034
SW 20th Ave Rd south of CR 484	1.00%	32	Link not included in the TSM, assumed 1% growth	#	#	#	166
CR 484 between SW 20th Ave Rd and McDonald's Dwy	1.00%	290	Model Growth Rate	29,000	30,500	33,500	1,886
CR 484 west of SW 20th Ave Rd	1.00%	275	Model Growth Rate	27,500	29,000	31,500	1,877
McDonald's Dwy north of CR 484	0.50%	n/a	Link not included in the TSM, assumed 0.5% growth	n/a	n/a	n/a	97
Pilot Gas Station South of CR 484	0.50%	n/a	Link not included in the TSM, assumed 0.5% growth	n/a	n/a	n/a	59
CR 484 east of McDonald's Dwy	1.00%	290	Model Growth Rate	29,000	30,500	33,500	1,911
CR 484 between SW 20th Ave Rd and McDonald's Dwy	1.00%	n/a	Model Growth Rate	n/a	n/a	n/a	2,039
SW 20th Ave Rd south of CR 484	0.50%	n/a	Link not included in the TSM, assumed 0.5% growth	n/a	n/a	n/a	116
CR 484 between SW 20th Ave Rd and I-75 SB ramps	1.00%	n/a	Model Growth Rate	n/a	n/a	n/a	2,251
CR 484 east of McDonald's Dwy	1.00%	290	Model Growth Rate	29,000	30,500	33,500	1,870
CR 484 between SW 20th Ave Rd and I-75 SB ramps	1.00%	290	Model Growth Rate	29,000	30,500	33,500	1,996
I-75 SB Off-Ramp to CR 484	1.65%	135	Model Slope	8,200	8,900	10,000	1,194
I-75 SB On-Ramp from CR 484	1.15%	60	Model Slope	5,200	5,500	6,100	405
I-75 NB On-Ramp from CR 484	1.34%	125	Model Slope	9,300	9,900	11,000	696
I-75 NB Off-Ramp to CR 484	0.85%	50	Model Slope	5,900	6,200	6,700	765
CR 484 between SW 17th Ct and I-75 NB ramps	1.00%	255	Model Growth Rate	25,500	#	#	1,894
Sonny's BBQ Driveway South of CR 484	0.50%	n/a	Link not included in the TSM, assumed 0.5% growth	n/a	n/a	n/a	53
CR 484 between Driveway and SW 17th Ct	1.00%	255	Model Growth Rate	25,500	27,000	29,500	1,347
CR 484 between SW 17th Ct and I-75 NB ramps	1.00%	n/a	Model Growth Rate	n/a	n/a	n/a	1,835
SW 17th Ct south of CR 484	1.00%	n/a	Link not included in the TSM, assumed 1% growth	n/a	n/a	n/a	68
CR 484 between SW 17th Ct and SW 16th Ave	1.00%	n/a	Model Growth Rate	n/a	n/a	n/a	1,429
CR 484 between Driveway and SW 17th Ct	1.00%	255	Model Growth Rate	25,500	27,000	29,500	1,333
SW 16th Ave north of CR 484	0.49%	38	TSM show negative growth, assumed min 0.5% growth	7,700	7,900	8,300	439
SW 16th Ave south of CR 484	1.00%	51	Link not included in the TSM, assumed 1% growth	5,100	5,400	5,900	290
CR 484 east of SW 16th Ave	1.00%	200	Model Growth Rate	20,000	21,000	23,000	1,225
CR 484 between SW 17th Ct and SW 16th Ave	1.00%	255	Model Growth Rate	25,500	27,000	29,500	1,343
I-75 between CR 484 and SR 200*	2.20%	2,130	Model Growth Rate	97,000	108,000	129,000	6,095
I-75 between SR 44 and CR 484	Future volumes determined based on balancing along the I-75 mainline from the anchor point location						

n/a - No AADT data available. The approach/departures from the peak hour TMCs were grown to estimate future DDHVs.
- Tube counts collected unreasonably low volumes when compared to the TMCs and were not used for estimating AADTs or for forecasting. The approach/departures from the peak hour TMCs were grown to estimate future DDHVs.
*I-75 mainline anchor point location.

I-75 at CR 484 Interchange Operational Analysis Report

2024 (No-Build and Build) Annual Average Daily Traffic

Figure 15

I-75 at CR 484 Interchange Operational Analysis Report

2034 (No-Build and Build) Annual Average Daily Traffic

Figure 16

8. DEVELOPMENT OF FUTURE INTERSECTION TURNING MOVEMENT VOLUMES

Design Year design-hour turning movement volumes were developed for two peak hours (i.e., AM and PM). Standard K and D factors were applied to the Design Year AADTs to estimate Directional Design Hour Volumes (DDHVs). Future intersection turning movement volumes were developed using the procedures described in NCHRP 765. This method is consistent with the acceptable tools described in FDOT's Project Traffic Forecasting Handbook (2019). The inputs and raw outputs from the forecasting spreadsheet are included in **Appendix P**.

As noted in the previous section, ramp pairs were combined and treated as a traditional leg for forecasting purposes. This approach is consistent with the way a regular 4-leg intersection is forecasted using the NCHRP 765 methodologies except the mainline freeway volume is not included. This approach also offers an advantage of ensuring balanced volumes along the arterial between the ramp terminal intersections. This approach was done for each ramp pair at the CR 484 interchange.

In order to maintain the use of the same K factor for the AM peak hour design year turning movement volumes, the future year AM turning movement volumes were developed by converting the PM peak hour volumes using a reciprocal movement methodology. For example, southbound right-turn movements in the PM design hour were assumed to be equal to eastbound left-turn movements in the AM design hour. This methodology results in an analysis that uses equivalent K factors for the AM and PM design hours while evaluating the opposite D factor directionality. The AM volumes were compared against existing AM turning movement counts to verify reasonableness. Adjustments were made accordingly to the AM reciprocal volumes where the reciprocal movements were lower than existing AM peak hour volumes.

8.1. Volume Adjustments/Balancing

The raw intersection turning movement volumes developed using the NCHRP 765 methodologies were reviewed against the existing turning movement volumes to ensure that volumes were not less in the future than the existing. Volumes along the arterials were balanced accordingly between ramp terminal intersections and between intersections where driveways do not exist. U-turn movements were considered at the unsignalized median opening intersections as they are prevalent in the existing condition due the existing access/geometry.

Volumes along the mainline of I-75 were balanced using an anchor point along the facility. The I-75 mainline segment between CR 484 and SR 200 was selected as the anchor point for balancing along I-75 as this segment includes a permanent count station (telemetered site 360317). The forecasted DDHV between CR 484 and SR 200 (summarized in **Table 22**) was anchored at this point and the downstream and upstream mainline values were calculated as ramp volumes exited or entered the mainline at the CR 484 interchange. This methodology was consistent between the No-Build and Build scenarios.

One set of peak hour volumes were developed for the 2034 AM and PM peak hours. The volumes for the No-Build scenario were balanced first. The Build volumes were adjusted based on volume reassignment to reflect the access management improvements as part of the Build scenario. For example, the first eastbound median opening just east of I-75 will be closed under the Build scenario.

The movements using the eastbound left-turn lane (e.g., eastbound left-turns) in the No-Build scenario were rerouted to the nearest downstream location where a U-turn movement could be performed. These volumes reached their destination via a westbound right-turn movement at the same intersection.

The following figures summarize the balanced 2034 AM and PM peak hour volumes for both the No-Build and Build scenarios:

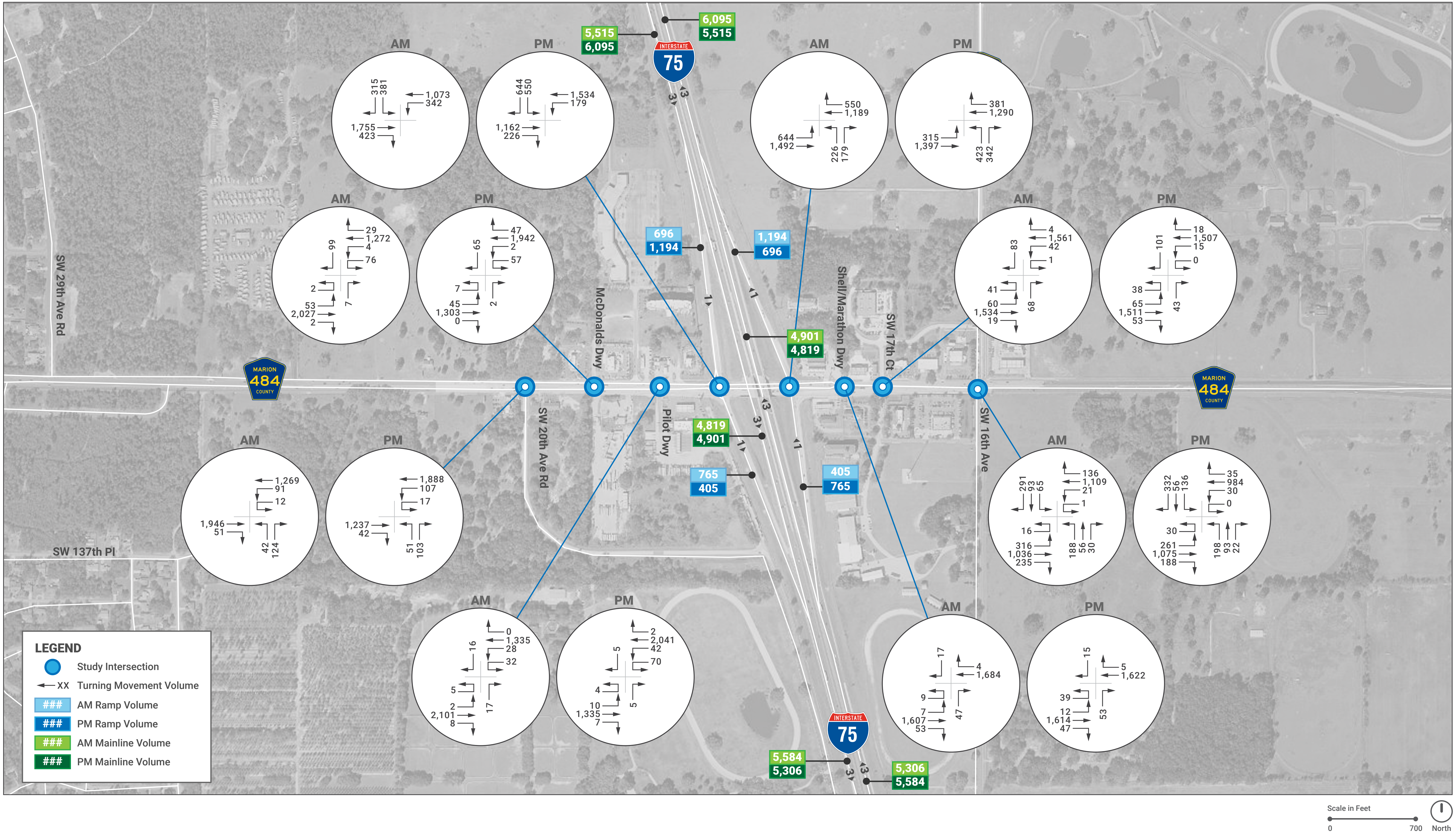
- 2034 AM/PM No-Build Scenario – **Figure 17**
- 2034 AM/PM Build Scenario – **Figure 18**

8.2. Development of 2024 Volumes

The opening year (2024) peak hour volumes were interpolated between the existing (2019) and design year (2034) peak hour volumes. This approach was used for the study intersections and for the mainline I-75 anchor point. The 2024 volumes were balanced along the mainline and between intersections using the same principles described in Section 8.1.

The following figures summarize the balanced 2024 AM and PM peak hour volumes for both the No-Build and Build scenarios:

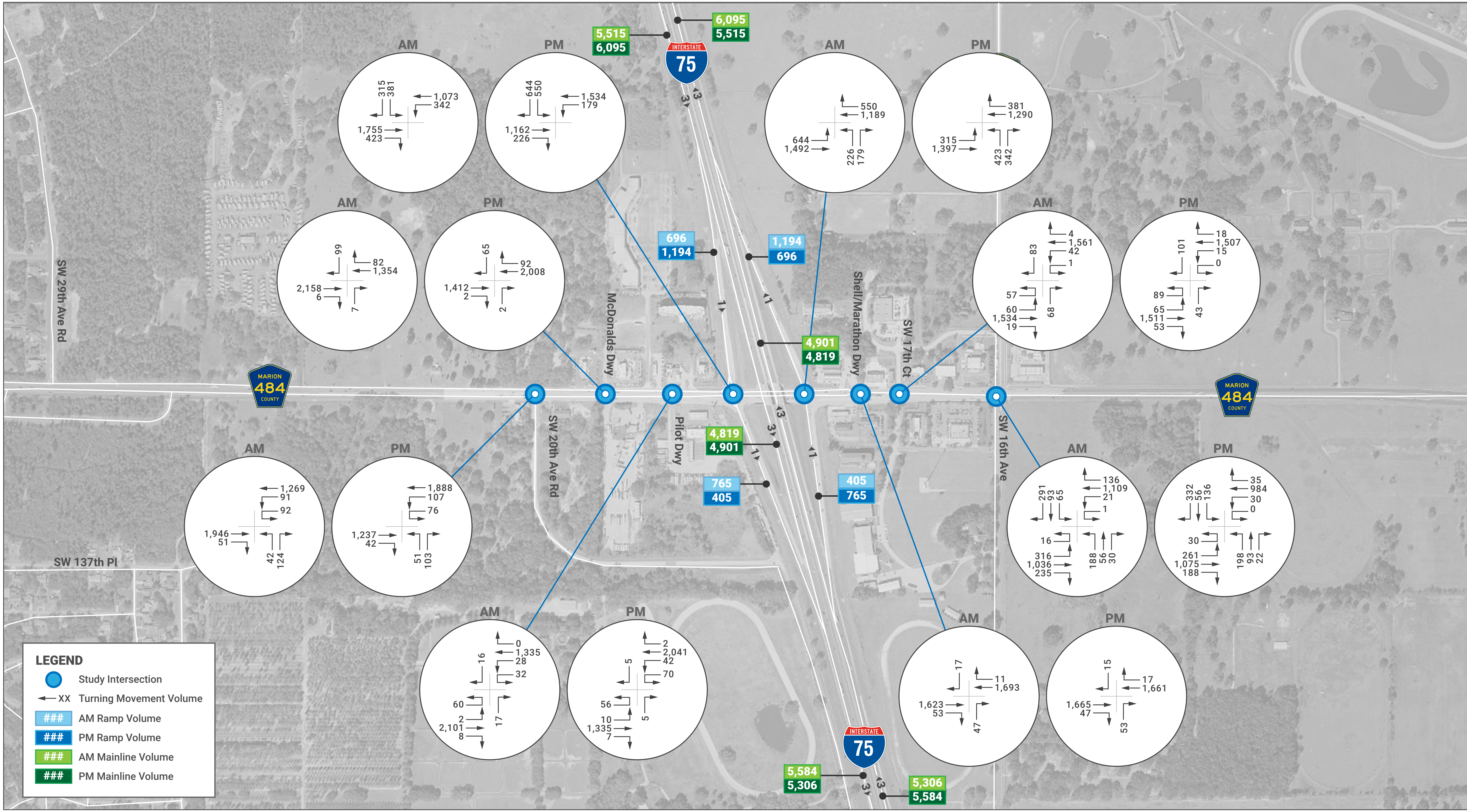
- 2024 AM/PM No-Build Scenario – **Figure 19**
- 2024 AM/PM Build Scenario – **Figure 20**



I-75 at CR 484 Interchange Operational Analysis Report

2034 (No-Build) AM/PM Peak Hour Volumes

Figure 17

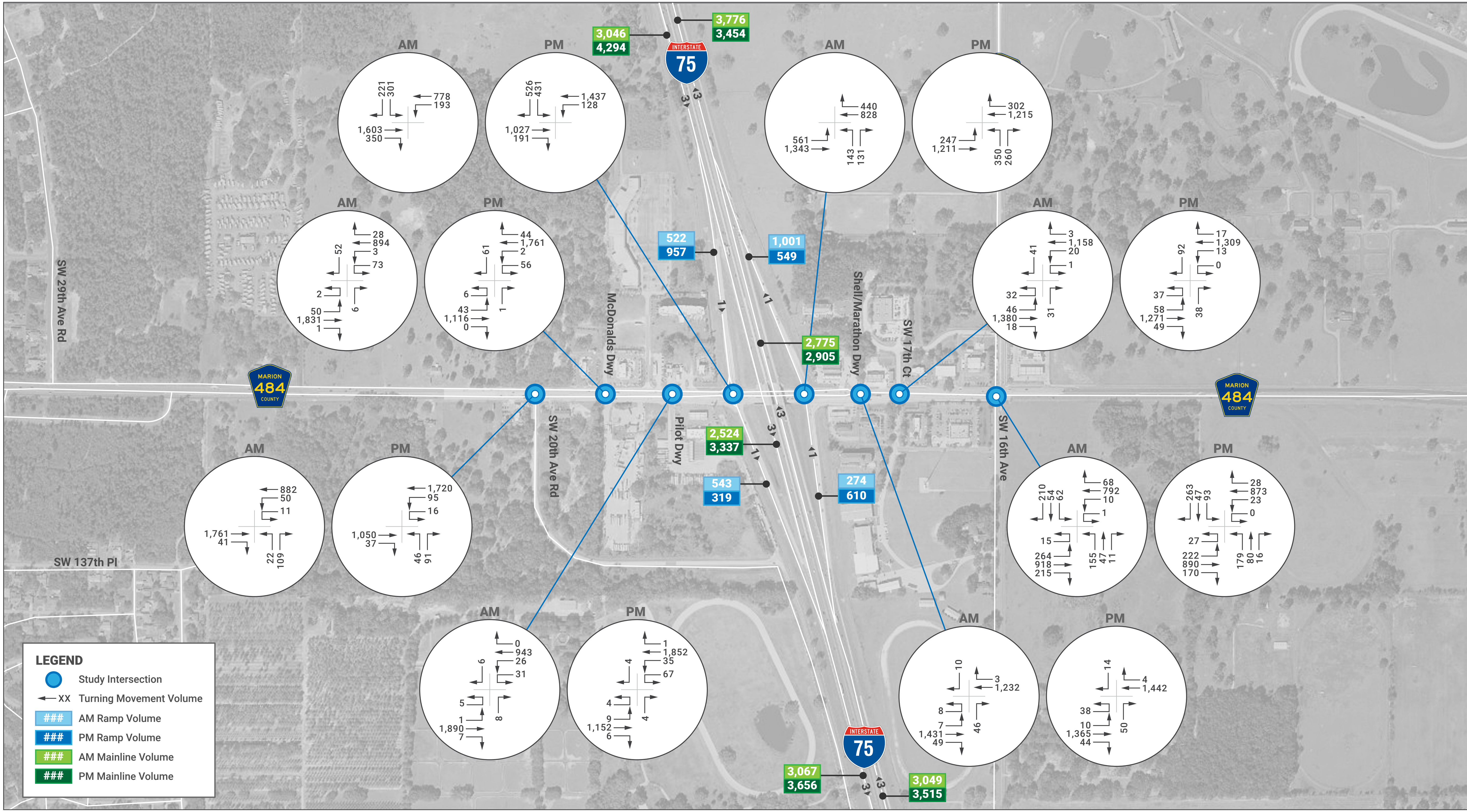


Scale in Feet
0
700
North

I-75 at CR 484 Interchange Operational Analysis Report

2034 (Build) AM/PM Peak Hour Volumes

Figure 18



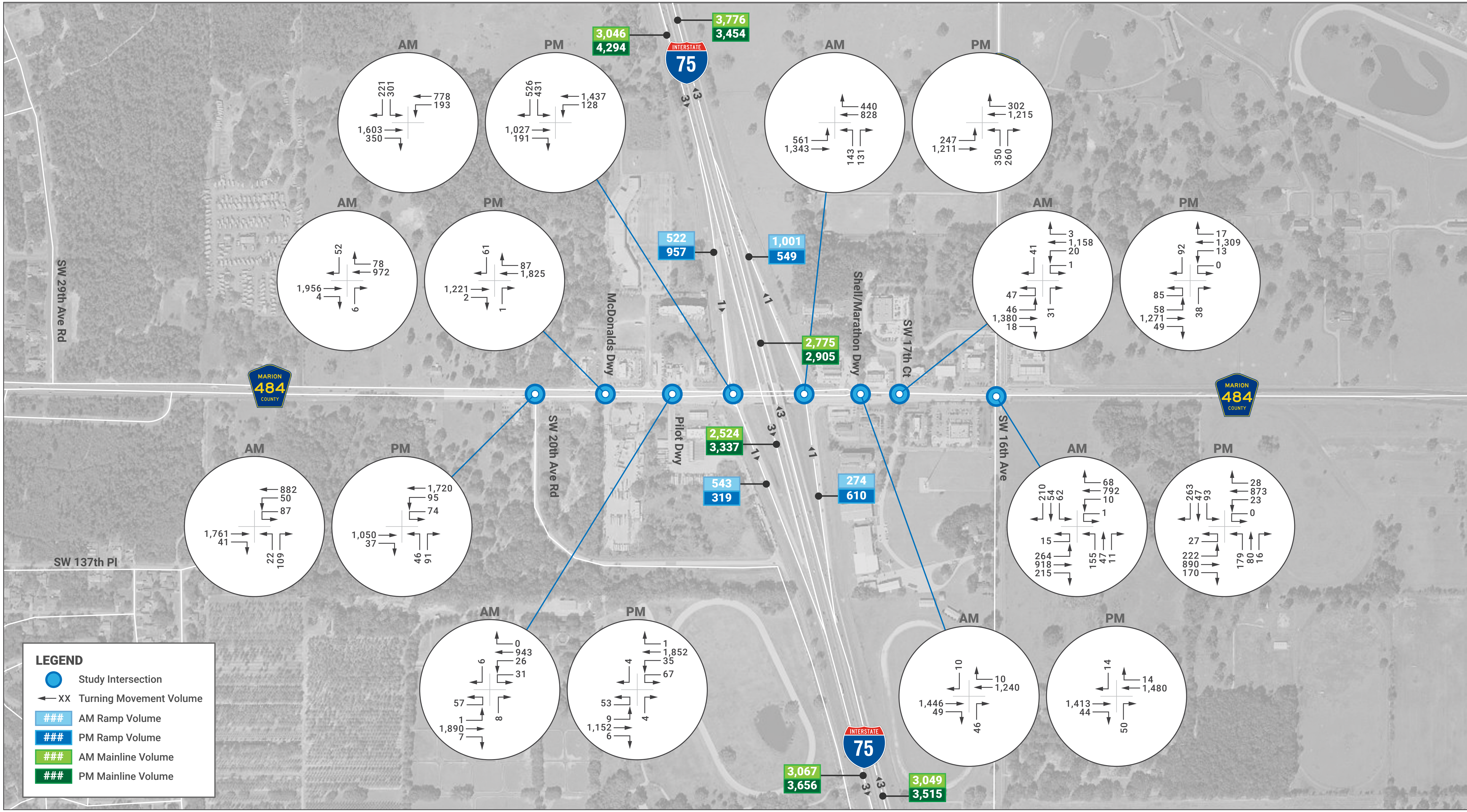
Scale in Feet
0 700
North

FDOT

I-75 at CR 484 Interchange Operational Analysis Report

2024 (No-Build) AM/PM Peak Hour Volumes

Figure 19



I-75 at CR 484 Interchange Operational Analysis Report

2024 (Build) AM/PM Peak Hour Volumes

Figure 20

9. FUTURE (NO-BUILD) OPERATIONAL ANALYSIS

The following section summarizes the future No-Build operational analysis results for the intersection and freeway evaluations.

9.1. Opening Year (2024) No-Build Operational Analysis

The following section summarizes the Opening Year (2024) No-Build operational analysis results for the intersection and freeway evaluations. The intersections and freeway were analyzed using *Highway Capacity Manual* (HCM) 6th Edition methodologies, as implemented in Synchro and HCS software, respectively. The signal timings were optimized as part of the intersection analyses conducted in Synchro software. U-turns were accounted for in the intersection analysis conducted in Synchro software. It is important to note that the HCM 6th Edition methodologies, as implemented in Synchro software, do not account for U-turns at signalized intersections.

9.1.1. *Opening Year (2024) No-Build Intersection Operations*

The 2024 peak hour intersection movement delay, LOS, and 95th percentile queues for each study intersection are summarized in **Table 23** through **Table 30**. Detailed Synchro output reports are included in **Appendix Q**. The 95th percentile queues were rounded up to the nearest 25 feet. Turn lane lengths shown in the result tables do not include the length of the taper.

The following summarizes specific movements that are expected to operate at LOS F during the 2024 peak hours:

- CR 484 and SW 20th Avenue Road (Signalized Intersection)
    - The northbound right-turn movement is expected to operate at LOS F during the AM and PM peak, while the northbound left-turn movement is expected to operate at LOS E during the AM peak and LOS F during the PM peak.
    - The 95th percentile queue lengths for the northbound right movement exceeds the overall turn lane length in both the AM and PM peaks.
- CR 484 and I-75 Southbound Ramps (Signalized Intersection)
    - Synchro results are reported for this intersection for an apples-to-apples comparison with the Build results (signal phasing limitation under the Build configuration).
    - The southbound left-turn movement is expected to operate at LOS F during the AM peak.
    - The southbound right-turn is expected to exceed the available turn lane length in the PM peak.
    - The westbound through movement is expected to operate at LOS F during the PM peak and the 95th percentile queue length is expected to spill back through the adjacent ramp terminal intersection.
- I-75 Northbound Ramps and CR 484 (Signalized Intersection)
    - The northbound left-turn movement is expected to operate at LOS F in both the AM and PM peak hours. This movement is expected to operate at near capacity with a v/c ratio of 0.87 in the AM peak and 0.93 in the PM peak.
    - The eastbound left-turn movement is expected to operate at LOS F during the PM peak with a 95th percentile queue length exceeding the turn lane length in both the AM and PM peaks.

- CR 484 and SW 16th Avenue/CR 475A (Signalized Intersection)
  - The southbound through/right-turn movement is expected to operate at LOS F during the AM and PM peak hours.
  - The southbound right/through movement is expected to approach capacity in both peak hours with a v/c ratio of at least 0.90.
  - The 95th percentile queue for the northbound left-turn movement is expected to exceed the overall turn lane length during the 2024 AM and PM peak hours.

Table 23: 2024 No-Build Peak Hour Intersection Operations – CR 484 at SW 20th Avenue Road

Approach	Movement	AM Peak Hour			PM Peak Hour			Turn Lane Length
		V/C	Delay (s) [LOS]	95% Queue (ft)	V/C	Delay (s) [LOS]	95% Queue (ft)	
Westbound	Left	0.22	9.0 (A)	50	0.21	2.9 (A)	25	130
	Through	0.30	0.3 (A)	25	0.58	0.8 (A)	25	-
	Approach	**0.30**	**0.7(A)**	-	**0.56**	**0.9 (A)**	-	-
Northbound	Left	0.18	75.2 (E)	50	0.68	101.9 (F)	125	-
	Right	0.81	101.9 (F)	350	0.60	98.3 (F)	175	160
	Approach	**0.70**	**96.5 (F)**	**-**	**0.63**	**100.3 (F)**	**-**	**-**
Eastbound	Through	0.66	10.2 (B)	500	0.39	4.8 (A)	200	-
	Right	0.66	10.2 (B)	525	0.39	4.8 (A)	225	-
	Approach	**0.66**	**10.2 (B)**	-	**0.39**	**4.8 (A)**	-	-
Overall Intersection		**0.54**	**10.4 (B)**	-	**0.50**	**5.1 (A)**	-	-

Table 24: 2024 No-Build Peak Hour Intersection Operations – CR 484 at McDonald's Driveway

Approach	Movement	AM Peak Hour			PM Peak Hour			Turn Lane Length
		V/C	Delay (s) [LOS]	95% Queue (ft)	V/C	Delay (s) [LOS]	95% Queue (ft)	
Westbound	Left	0.21	16.5 (C)	25	0.08	9.8 (A)	25	170
Northbound	Right	0.03	20.1 (C)	25	0.00	10.9 (B)	0	-
Eastbound	Left	0.05	8.5 (A)	25	0.11	13.3 (B)	25	170
Southbound	Right	0.07	10.4 (B)	25	0.19	18.1 (C)	25	-

Table 25: 2024 No-Build Peak Hour Intersection Operations – CR 484 at Pilot Travel Center Driveway/H & D Services Driveway

Approach	Movement	AM Peak Hour			PM Peak Hour			Turn Lane Length
		V/C	Delay (s) [LOS]	95% Queue (ft)	V/C	Delay (s) [LOS]	95% Queue (ft)	
Westbound	Left	0.16	16.7 (C)	25	0.14	10.2 (B)	25	190
Northbound	Right	0.03	19.2 (C)	25	0.01	11.4 (B)	0	-
Eastbound	Left	0.01	8.9 (A)	0	0.03	13.5 (B)	25	170
Southbound	Right	0.01	10.2 (B)	0	0.01	16.9 (C)	0	-

Table 26: 2024 No-Build Peak Hour Intersection Operations – CR 484 at I-75 Southbound Ramps

Approach	Movement	AM Peak Hour			PM Peak Hour			Turn Lane Length
		V/C	Delay (s) [LOS]	95% Queue (ft)	V/C	Delay (s) [LOS]	95% Queue (ft)	
Westbound	Left	0.74	49.3 (D)	300	0.63	42.1 (D)	175	300
	Through	0.29	10.8 (B)	275	0.81	109.6 (F)	1,025	-
	Approach	**0.42**	**18.5 (B)**	-	**0.69**	**104.0 (F)**	-	-
Eastbound	Through	0.67	17.3 (B)	725	0.64	37.8 (D)	525	-
	Right	*	*	*	*	*	*	*
	Approach	**0.67**	**17.3 (B)**	**-**	**0.64**	**37.8 (D)**	**-**	**-**
Southbound	Left	0.74	82.7 (F)	225	0.37	38.6 (D)	225	300
	Right	0.58	13.4 (B)	100	0.92	63.6 (E)	675	350
	Approach	**0.68**	**53.3 (D)**	**-**	**0.60**	**52.3 (D)**	**-**	**-**
Overall Intersection		**0.61**	**23.1 (C)**	-	**0.68**	**69.2 (E)**		-

*Yield-controlled right-turn bypass lane
Note: Overall off-ramp length is 1,150 feet (Distance from the stop bar to the I-75 mainline gore point)
Synchro results shown for an apples-to-apples comparison with the Build scenario results at this intersection.

Table 27: 2024 No-Build Peak Hour Intersection Operations – CR 484 at I-75 Northbound Ramps

Approach	Movement	AM Peak Hour			PM Peak Hour			Turn Lane Length
		V/C	Delay (s) [LOS]	95% Queue (ft)	V/C	Delay (s) [LOS]	95% Queue (ft)	
Westbound	Through	0.40	53.8 (D)	450	0.58	47.4 (D)	575	-
	Right	*	*	*	*	*	*	-
	Approach	**0.26**	**53.8 (D)**	-	**0.46**	**47.4 (D)**	-	-
Northbound	Left	0.87	99.0 (F)	300	0.93	87.7 (F)	650	-
	Right	*	*	*	*	*	*	350
	Approach	**0.45**	**99.0 (F)**	**-**	**0.53**	**87.7 (F)**	**-**	**-**
Eastbound	Left	0.96	46.1 (D)	575	0.74	86.2 (F)	450	300
	Through	0.49	0.4 (A)	25	0.53	42.3 (D)	850	-
	Approach	**0.63**	**13.9 (B)**	-	**0.57**	**49.7 (D)**	-	-
Overall Intersection		**0.48**	**29.6 (C)**	-	**0.52**	**53.2 (D)**	-	-

Note: Overall off-ramp length is 1,170 feet (Distance from the stop bar to the I-75 mainline gore point)
*Yield-controlled right-turn bypass lane

Table 28: 2024 No-Build Peak Hour Intersection Operations – CR 484 at Exxon Gas Driveway/Shell/Marathon Gas Driveway

Approach	Movement	AM Peak Hour			PM Peak Hour			Turn Lane Length
		V/C	Delay (s) [LOS]	95% Queue (ft)	V/C	Delay (s) [LOS]	95% Queue (ft)	
Northbound	Right	0.10	13.5 (B)	25	0.11	13.1 (B)	25	-
Eastbound	Left	0.02	9.6 (A)	25	0.08	11.1 (B)	25	205
Southbound	Right	0.02	11.6 (B)	25	0.03	12.6 (B)	25	-

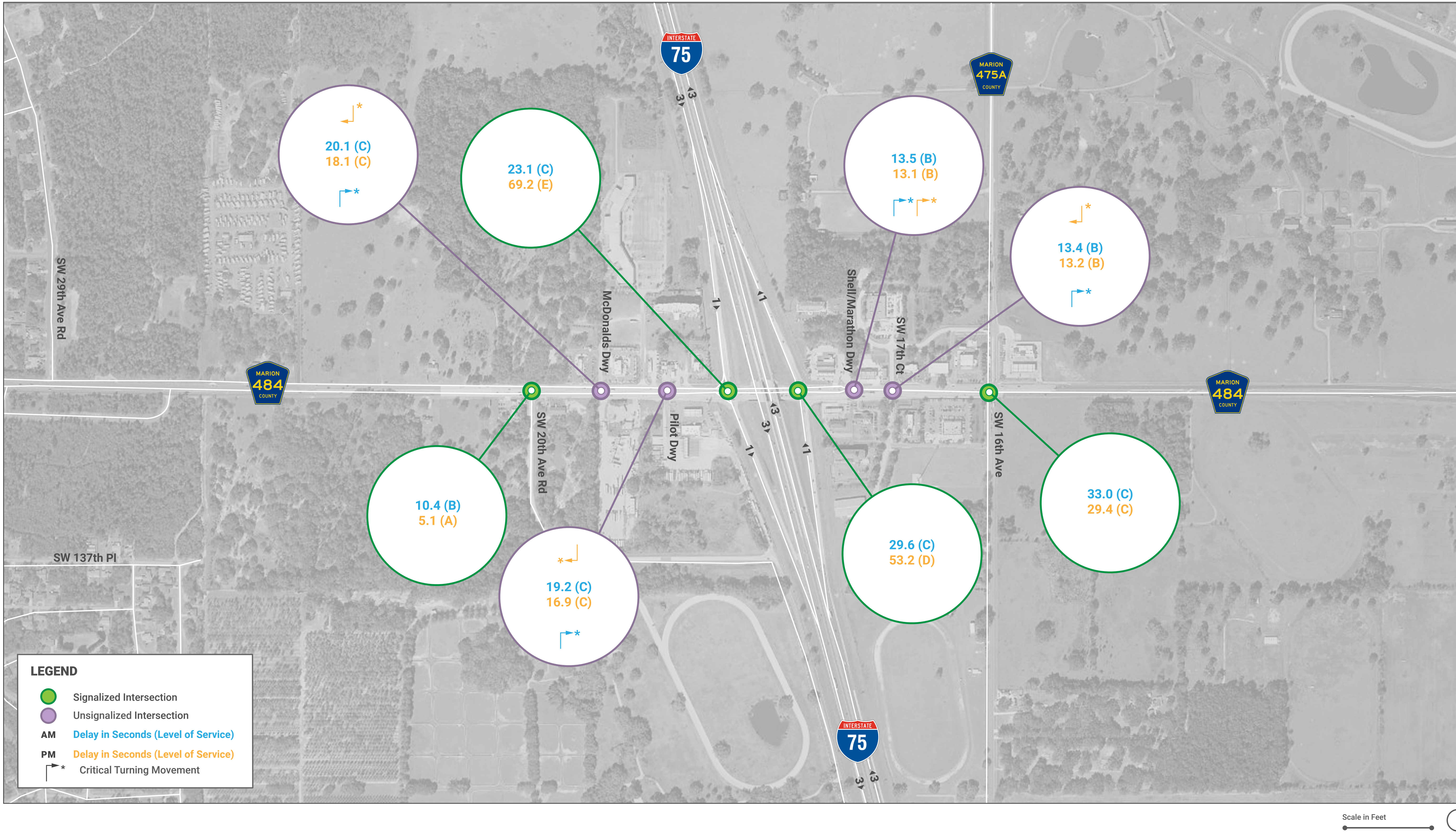
Table 29: 2024 No-Build Peak Hour Intersection Operations – CR 484 at SW 17th Court

Approach	Movement	AM Peak Hour			PM Peak Hour			Turn Lane Length
		V/C	Delay (s) [LOS]	95% Queue (ft)	V/C	Delay (s) [LOS]	95% Queue (ft)	
Westbound	Left	0.03	9.9 (A)	25	0.02	9.5 (A)	25	210
Northbound	Right	0.07	13.4 (B)	25	0.07	12.0 (B)	25	-
Eastbound	Left	0.10	10.0 (B)	25	0.15	11.0 (B)	25	155
Southbound	Right	0.08	11.9 (B)	25	0.18	13.2 (B)	25	-

Table 30: 2024 No-Build Peak Hour Intersection Operations – CR 484 at CR 475A/SW 16th Avenue

Approach	Movement	AM Peak Hour			PM Peak Hour			Turn Lane Length
		V/C	Delay (s) [LOS]	95% Queue (ft)	V/C	Delay (s) [LOS]	95% Queue (ft)	
Westbound	Left	0.04	19.3 (B)	25	0.07	20.0 (B)	25	320
	Through	0.48	26.9 (C)	450	0.54	31.9 (C)	500	-
	Right	0.48	26.8 (C)	450	0.54	31.8 (C)	525	-
	Approach	**0.48**	**26.8 (C)**	**-**	**0.54**	**31.5 (C)**	**-**	**-**
Northbound	Left	0.75	65.8 (E)	275	0.81	67.0 (E)	300	250
	Through/Right	0.15	56.1 (E)	100	0.24	54.5 (D)	175	-
	Approach	**0.55**	**63.3 (E)**	**-**	**0.54**	**62.7 (E)**	**-**	**-**
Eastbound	Left	0.68	20.6 (C)	225	0.64	21.6 (C)	200	250
	Through	0.57	22.5 (C)	525	0.59	2.6 (A)	50	-
	Right	0.57	22.6 (C)	525	0.59	2.7 (A)	50	-
	Approach	**0.60**	**22.2 (C)**	**-**	**0.61**	**5.9 (A)**	**-**	**-**
Southbound	Left	0.21	58.3 (E)	125	0.27	53.0 (D)	175	215
	Through/Right	0.90	92.5 (F)	425	0.92	96.5 (F)	500	-
	Approach	**0.62**	**84.7 (F)**	**-**	**0.66**	**84.8 (F)**	**-**	**-**
Overall Intersection		**0.56**	**33.0 (C)**	**-**	**0.59**	**29.4 (C)**	**-**	**-**

Figure 21 illustrates the overall intersection delay and LOS for each of the intersections in the study area. During the 2024 peak hours, the overall intersection LOS for each intersection is expected to be LOS E or better based on the HCM analysis.



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I-75 at CR 484 Interchange Operational Analysis Report

2024 No-Build AM/PM Peak Hour Intersection Operations

Figure 21

9.1.2. *Opening Year (2024) No-Build Freeway Operations*

The technical methodology for this evaluation is based on Chapters 10, 12, and 14 of the Highway Capacity Manual (HCM) 6th Edition. The freeway segment capacities were analyzed individually as merge, diverge, and basic freeway segments. HCS version 7.7 was utilized for the freeway operational analysis.

9.1.3. ***Assumptions***

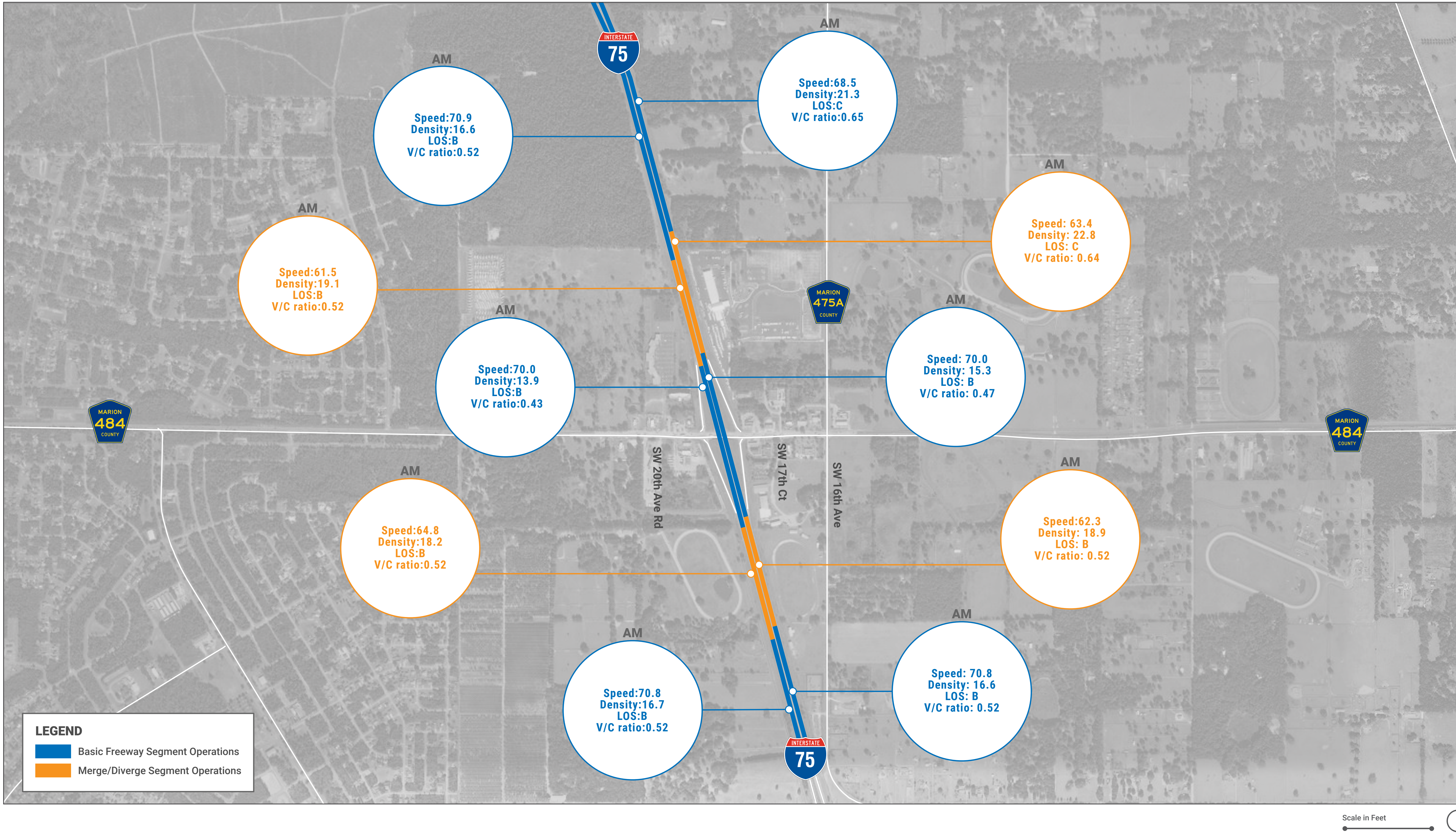
- Peak hour truck percentages
  - I-75 Mainline Truck Percentages (9.9 percent) were based on the approved MLOU.
  - Ramp truck percentages were based on the vehicular classification counts collected along each ramp and are consistent with the percentages used in the existing conditions.
- Base Free-flow speed of 75 mph for all mainline segments based on posted speed of 70 mph plus 5 mph.
- Base Ramp free-flow speed of 35 mph for off-ramps and 45 mph for on-ramps.
- Driver population is assumed to be a balanced mix of drivers.

9.1.4. ***No-Build Freeway Operational Results***

A summary of the maximum speed, density, LOS, and V/C ratio for each direction and peak hour is summarized in **Table 31**. The maximum v/c ratio observed in the northbound direction is 0.65 during the AM peak and 0.60 during the PM peak while the maximum v/c ratio observed in the southbound direction is 0.52 during the AM peak and 0.73 in the PM peak. The average speeds on I-75 are above 60 mph. All segments evaluated on I-75 are expected to operate at B or C. The No-Build (2024) AM and PM peak hour performance metrics including v/c ratios, speed, and density-based LOS for each analysis segment and peak hour are illustrated in **Figure 22** and **Figure 23**, respectively. The inputs and output of the HCS analysis are provided in **Appendix Q**.

Table 31: 2024 AM and PM Peak Hour Freeway Operational Results (No-Build)

Direction	Roadway Segment	Analysis Type	Speed (mph)		Density (pc/mi/ln)		LOS		V/C Ratio	
			AM	PM	AM	PM	AM	PM	AM	PM
Northbound	South of CR 484 off-ramp	Basic Freeway	70.8	69.6	16.6	19.5	B	C	0.52	0.60
	CR 484 off-ramp	Diverge	62.3	61.4	18.9	22.1	B	C	0.52	0.60
	I-75 between CR 484 off-ramp & on-ramp	Basic Freeway	70.0	69.9	15.3	16.0	B	B	0.47	0.50
	CR 484 on-ramp	Merge	63.4	64.2	22.8	20.6	C	C	0.64	0.59
	North of CR 484 on-ramp	Basic Freeway	68.5	69.8	21.3	19.1	C	C	0.65	0.59
Southbound	North of CR 484 off-ramp	Basic Freeway	70.9	65.6	16.6	25.2	B	C	0.52	0.73
	CR 484 off-ramp	Diverge	61.5	60.4	19.1	27.4	B	C	0.52	0.73
	I-75 between CR 484 off-ramp & on-ramp	Basic Freeway	70.0	69.3	13.9	18.6	B	C	0.43	0.57
	CR 484 on-ramp	Merge	64.8	64.3	18.2	21.9	B	C	0.52	0.63
	South of CR 484 on-ramp	Basic Freeway	70.8	69.1	16.7	20.4	B	C	0.52	0.63



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I-75 at CR 484 Interchange Operational Analysis Report

2024 No-Build AM Peak Hour Freeway Operational Results

Figure 22

Scale in Feet
0 1,500
North

FDOT

I-75 at CR 484 Interchange Operational Analysis Report

2024 No-Build PM Peak Hour Freeway Operational Results

Figure 23

9.2. Design Year (2034) No-Build Operational Analysis

The following section summarizes the Design Year (2034) No-Build operational analysis results for the intersection and freeway evaluations. The intersections and freeway were analyzed using *Highway Capacity Manual* (HCM) 6th Edition methodologies, as implemented in Synchro and HCS software, respectively. The signal timings were optimized as part of the intersection analyses conducted in Synchro software. U-turns were accounted for in the intersection analysis conducted in Synchro software. It is important to note that the HCM 6th Edition methodologies, as implemented in Synchro software, do not account for U-turns at signalized intersections. A microsimulation analysis using PTV VISSIM software was also conducted for the Design Year (2034) only.

9.2.1. *Design Year (2034) No-Build Intersection Operations*

The 2034 peak hour intersection movement delay, LOS, and 95th percentile queues for each study intersection are summarized in **Table 32** through **Table 39**. Detailed Synchro output reports are included in **Appendix R**. The 95th percentile queues were rounded up to the nearest 25 feet. Turn lane lengths shown in the result tables do not include the length of the taper.

The following summarizes specific movements that are expected to operate at LOS F during the 2034 peak hours:

- CR 484 and SW 20th Avenue Road (Signalized Intersection)
    - The northbound right-turn movement is expected to operate at LOS F during the AM and PM peak while the northbound left-turn movement is expected to operate at LOS E during the AM peak and LOS F during the PM peak.
    - The 95th percentile queue for the northbound right-turn movement is expected to exceed the turn lane length during both peak hours.
- I-75 Southbound Ramps and CR 484 (Signalized Intersection)
    - Synchro results are reported for this intersection for an apples-to-apples comparison with the Build results (signal phasing limitation under the Build configuration).
    - The overall intersection is expected to operate at LOS F in the 2034 PM peak hour.
    - The westbound left-turn movement 95th percentile queue is expected to exceed the available turn lane storage in the AM peak.
    - The westbound left-turn and through movements are expected to operate at LOS F during the PM peak hour.
    - Westbound 95th percentile queues are expected to spillback into the adjacent ramp terminal intersection which could result in queue spillback to the I-75 mainline.
    - The southbound right-turn 95th percentile queue is expected to exceed available turn lane length during the 2034 PM peak hour.
- I-75 Northbound Ramps and CR 484 (Signalized Intersection)
    - The northbound left-turn movement is expected to operate at LOS F in both the AM and PM peak hours. This movement is expected to operate at a v/c ratio of 0.95 in the AM peak and 0.96 in the PM peak.
    - Eastbound 95th percentile queues are expected to spillback into the adjacent ramp terminal intersection which could result in queue spillback to the I-75 mainline.
    - The eastbound left-turn movement is expected to operate at LOS F in both the AM and PM peak hours. This movement is expected to be over capacity during the AM peak with a v/c ratio of 1.10 and near capacity during the PM peak with a v/c ratio of 0.95.

The 95th percentile queue length is expected to exceed the turn lane length during both peak hours.

- CR 484 and SW 16th Avenue/CR 475A (Signalized Intersection)
  - The southbound through/right-turn movement is expected to operate at LOS F during the AM and PM peak hours. The 95th percentile queue for the southbound left-turn movement is expected to exceed turn lane length during the PM peak.
  - The westbound through and the westbound right-turn movements are expected to operate at LOS F during the AM peak.
  - The 95th percentile queue for the eastbound left-turn movement is expected to exceed the available storage during the AM peak hour and expected to operate at LOS F.
  - The 95th percentile queue for the northbound left-turn movement is expected to exceed the available storage during the AM and PM peak hour and is expected to operate at LOS F during the PM peak.

Figure 24 illustrates the overall intersection delay and LOS for each of the intersections in the study area. During the 2034 peak hours, the overall intersection LOS for each intersection is expected to be LOS F or better based on the HCM analysis.

Table 32: 2034 No-Build Peak Hour Intersection Operations – CR 484 at SW 20th Avenue Road

Approach	Movement	AM Peak Hour			PM Peak Hour			Turn Lane Length
		V/C	Delay (s) [LOS]	95% Queue (ft)	V/C	Delay (s) [LOS]	95% Queue (ft)	
Westbound	Left	0.48	20.4 (C)	125	0.29	4.0 (A)	25	130
	Through	0.44	0.5 (A)	25	0.64	1.0 (A)	25	-
	Approach	**0.50**	**1.8 (A)**	-	**0.62**	**1.2 (A)**	-	-
Northbound	Left	0.30	75.4 (E)	100	0.69	101.1 (F)	125	-
	Right	0.82	99.2 (F)	400	0.62	97.4 (F)	200	160
	Approach	**0.69**	**92.2 (F)**	**-**	**0.64**	**99.5 (F)**	**-**	**-**
Eastbound	Through	0.74	13.6 (B)	650	0.46	5.6 (A)	250	-
	Right	0.75	13.7 (B)	675	0.46	5.6 (A)	275	-
	Approach	**0.74**	**13.6 (B)**	-	**0.46**	**5.6 (A)**	-	-
Overall Intersection		**0.62**	**12.2 (B)**	-	**0.56**	**5.5 (A)**	-	-

Table 33: 2034 No-Build Peak Hour Intersection Operations – CR 484 at McDonald's Driveway

Approach	Movement	AM Peak Hour			PM Peak Hour			Turn Lane Length
		V/C	Delay (s) [LOS]	95% Queue (ft)	V/C	Delay (s) [LOS]	95% Queue (ft)	
Westbound	Left	0.29	22.0 (C)	25	0.09	10.6 (B)	25	170
Northbound	Right	0.04	25.0 (D)	25	0.00	11.7 (B)	0	-
Eastbound	Left	0.07	9.7 (A)	25	0.15	16.2 (C)	25	170
Southbound	Right	0.18	12.9 (B)	25	0.26	23.0 (C)	25	-

Table 34: 2034 No-Build Peak Hour Intersection Operations – CR 484 at Pilot Travel Center Driveway/H & D Services Driveway

Approach	Movement	AM Peak Hour			PM Peak Hour			Turn Lane Length
		V/C	Delay (s) [LOS]	95% Queue (ft)	V/C	Delay (s) [LOS]	95% Queue (ft)	
Westbound	Left	0.26	25.0 (C)	25	0.18	11.4 (B)	25	190
Northbound	Right	0.10	27.1 (D)	25	0.01	12.5 (B)	0	-
Eastbound	Left	0.01	10.2 (B)	0	0.05	17.2 (C)	25	170
Southbound	Right	0.03	12.1 (B)	25	0.02	22.1 (C)	25	-

Table 35: 2034 No-Build Peak Hour Intersection Operations – CR 484 at I-75 Southbound Ramps

Approach	Movement	AM Peak Hour			PM Peak Hour			Storage Length
		V/C	Delay (s) [LOS]	95% Queue (ft)	V/C	Delay (s) [LOS]	95% Queue (ft)	
Westbound	Left	0.86	73.0 (E)	β450	1.01	84.3 (F)	β225	300
	Through	0.42	25.2 (C)	450	0.95	116.5 (F)	β1,100	-
	Approach	**0.57**	**36.8 (D)**	**-**	**0.84**	**113.2 (F)**	**-**	**-**
Eastbound	Through	0.97	48.9 (D)	β1,025	0.86	76.7 (E)	625	150
	Right	*	*	*	*	*	*	*
	Approach	**0.97**	**48.9 (D)**	**-**	**0.86**	**76.7 (E)**	**-**	**-**
Southbound	Left	0.70	75.7 (E)	275	0.42	35.1 (D)	300	300
	Right	0.87	62.9 (E)	325	1.00	77.4 (E)	β1,000	350
	Approach	**0.70**	**69.9 (E)**	**-**	**0.65**	**57.9 (E)**	-	**-**
Overall Intersection		**0.63**	**48.3 (D)**	-	**0.78**	**86.0 (F)**	-	-

β 95th percentile volume exceeds capacity; queue may be longer.
*Yield-controlled right-turn bypass lane
Note: Overall off-ramp length is 1,150 feet (Distance from the stop bar to the I-75 mainline gore point)
Synchro results shown for an apples-to-apples comparison with the Build scenario results at this intersection.
The intersection analysis conducted in Synchro is an isolated intersection analysis and does not account for the interactions between intersections. Queue lengths along the ramps are longer and impact the I-75 mainline lanes based on the simulation analysis (see Section 9.3 for more details on the microsimulation analysis).

Table 36: 2034 No-Build Peak Hour Intersection Operations – CR 484 at I-75 Northbound Ramps

Approach	Movement	AM Peak Hour			PM Peak Hour			Turn Lane Length
		V/C	Delay (s) [LOS]	95% Queue (ft)	V/C	Delay (s) [LOS]	95% Queue (ft)	
Westbound	Through	0.64	65.0 (E)	625	0.68	54.1 (D)	625	-
	Right	*	*	*	*	*	*	*
	Approach	**0.44**	**65.0 (E)**	-	**0.52**	**54.1 (D)**	-	-
Northbound	Left	0.95	116.1 (F)	475	0.96	90.8 (F)	775	-
	Right	*	*	*	*	*	*	350
	Approach	**0.53**	**116.1 (F)**	**-**	**0.53**	**90.8 (F)**	**-**	**-**
Eastbound	Left	1.10	77.1 (F)	750	0.95	106.0 (F)	600	300
	Through	0.57	0.2 (A)	25	0.66	50.3 (D)	950	-
	Approach	**0.73**	**23.4 (C)**	-	**0.71**	**60.5 (E)**	-	-
Overall Intersection		**0.59**	**43.2 (D)**	-	**0.60**	**61.9 (E)**	-	-

Note: Overall off-ramp length is 1,170 feet (Distance from the stop bar to the I-75 mainline gore point)
The intersection analysis conducted in Synchro is an isolated intersection analysis and does not account for the interactions between intersections. Queue lengths along the ramps are longer and impact the I-75 mainline lanes based on the simulation analysis (see Section 9.3 for more details on the microsimulation analysis).
*Yield-controlled right-turn bypass lane

Table 37: 2034 No-Build Peak Hour Intersection Operations – CR 484 at Exxon Gas Driveway/Shell/Marathon Gas Driveway

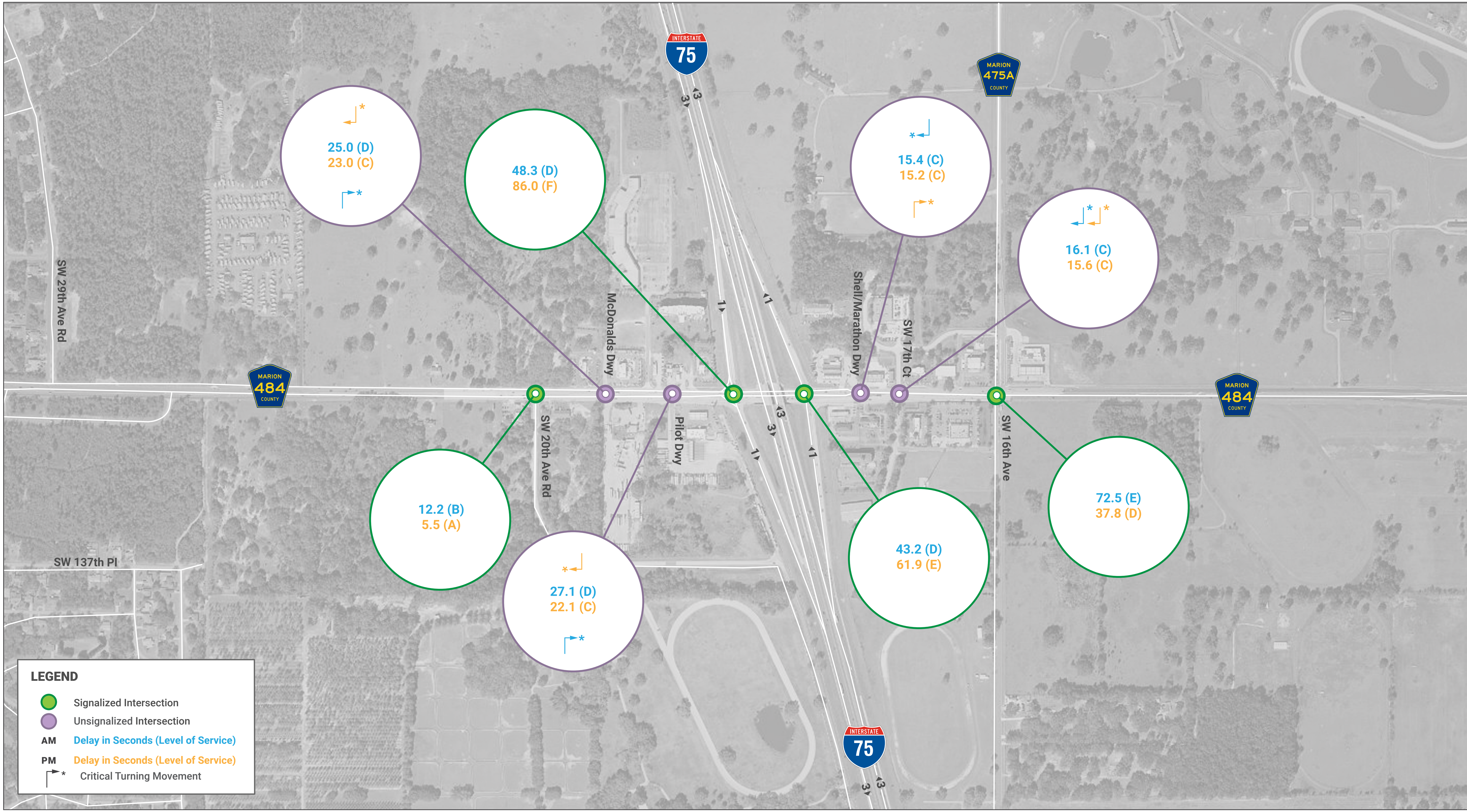
Approach	Movement	AM Peak Hour			PM Peak Hour			Turn Lane Length
		V/C	Delay (s) [LOS]	95% Queue (ft)	V/C	Delay (s) [LOS]	95% Queue (ft)	
Northbound	Right	0.12	15.2 (C)	25	0.14	15.2 (C)	25	-
Eastbound	Left	0.03	12.3 (B)	25	0.11	12.7 (B)	25	205
Southbound	Right	0.05	15.4 (C)	25	0.04	14.4 (B)	25	-

Table 38: 2034 No-Build Peak Hour Intersection Operations – CR 484 at SW 17th Court

Approach	Movement	AM Peak Hour			PM Peak Hour			Turn Lane Length
		V/C	Delay (s) [LOS]	95% Queue (ft)	V/C	Delay (s) [LOS]	95% Queue (ft)	
Westbound	Left	0.07	11.0 (B)	25	0.02	10.6 (B)	25	210
Northbound	Right	0.18	16.1 (C)	25	0.10	14.0 (B)	25	-
Eastbound	Left	0.20	13.3 (B)	25	0.19	12.9 (B)	25	155
Southbound	Right	0.21	16.1 (C)	25	0.24	15.6 (C)	25	-

Table 39: 2034 No-Build Peak Hour Intersection Operations – CR 484 at CR 475A/SW 16th Avenue

Approach	Movement	AM Peak Hour			PM Peak Hour			Turn Lane Length
		V/C	Delay (s) [LOS]	95% Queue (ft)	V/C	Delay (s) [LOS]	95% Queue (ft)	
Westbound	Left	0.14	34.4 (C)	25	0.12	25.1 (C)	50	320
	Through	0.98	83.1 (F)	1050	0.69	43.9 (D)	675	-
	Right	0.98	83.8 (F)	1075	0.69	43.7 (D)	700	
	Approach	**0.97**	**82.6 (F)**	-	**0.70**	**43.2 (D)**	-	-
Northbound	Left	0.88	78.1 (E)	350	0.91	81.8 (F)	350	250
	Through/Right	0.16	47.9 (D)	125	0.26	51.1 (D)	200	-
	Approach	**0.62**	**69.8 (E)**	**-**	**0.59**	**70.8 (E)**	**-**	**-**
Eastbound	Left	0.95	98.1 (F)	650	0.85	37.3 (D)	250	250
	Through	0.73	49.1 (D)	875	0.75	5.8 (A)	75	-
	Right	0.73	49.4 (D)	875	0.75	5.9 (A)	75	-
	Approach	**0.79**	**59.1 (D)**	-	**0.78**	**11.2 (B)**	-	-
Southbound	Left	0.18	50.8 (D)	125	0.35	49.4 (D)	225	215
	Through/Right	0.96	106.7 (F)	625	0.98	111.4 (F)	650	-
	Approach	**0.65**	**96.9 (F)**	**-**	**0.71**	**92.6 (F)**	**-**	**-**
Overall Intersection		**0.82**	**72.5 (E)**	-	**0.73**	**37.8 (D)**	-	-



Scale in Feet
0 700
North

I-75 at CR 484 Interchange Operational Analysis Report

2034 No-Build AM/PM Peak Hour Intersection Operations

Figure 24

9.2.2. *Design Year (2034) No-Build Freeway Operations*

The technical methodology for this evaluation is based on Chapters 10, 12, and 14 of the Highway Capacity Manual (HCM) 6th Edition. The freeway segment capacities were analyzed individually as merge, diverge, and basic freeway segments. HCS version 7.7 was utilized for the freeway operational analysis.

9.2.3. ***Assumptions***

- Peak hour truck percentages
  - I-75 Mainline Truck Percentages (9.9 percent) were based on the approved MLOU.
  - Ramp truck percentages were based on the vehicular classification counts collected along each ramp and are consistent with the percentages used in the existing conditions.
- Base Free-flow speed of 75 mph for all mainline segments based on posted speed of 70 mph plus 5 mph.
- Base Ramp free-flow speed of 35 mph for off ramps and 45 mph for on ramps.
- Driver population is assumed to be a balanced mix of drivers.

9.2.4. ***No-Build Operational Results***

A summary of the maximum speed, density and LOS and V/C ratio for each direction and peak hour is summarized in **Table 40**. The maximum v/c ratio observed in the northbound direction is 1.04 during the AM peak and 0.96 during the PM peak while the maximum v/c ratio observed in the southbound direction is 0.96 during the AM peak and 1.04 in the PM peak. The average speeds on I-75 are above 53 mph. I-75 within the influence area of the northbound CR 484 on-ramp and beyond is expected to operate at LOS F during the AM peak. During the PM peak, I-75 within the influence area of the southbound CR 484 off-ramp and beyond is expected to operate at LOS F during the PM peak. All other segments evaluated on I-75 are expected to operate at LOS D or E. The capacity constraints observed on I-75 within the influence area of the ramps will be evaluated/addressed as part of the ongoing I-75 Master Plan.

The No-Build (2034) AM and PM peak hour performance metrics including v/c ratios, speed, and density-based LOS for each analysis segment and peak hour are illustrated in **Figure 25** and **Figure 26**, respectively. The inputs and output of the HCS analysis are provided in **Appendix R**.

Table 40: 2034 AM and PM Peak Hour Freeway Operational Results (No-Build)

Direction	Roadway Segment	Analysis Type	Speed (mph)		Density (pc/mi/ln)		LOS		V/C Ratio	
			AM	PM	AM	PM	AM	PM	AM	PM
Northbound	South of CR 484 off-ramp	Basic Freeway	56.6	53.4	36.1	40.3	E	E	0.91	0.96
	CR 484 off-ramp	Diverge	62.0	61.2	33.0	35.2	D	D	0.91	0.96
	I-75 between CR 484 off-ramp & on-ramp	Basic Freeway	60.4	61.1	31.3	30.4	D	D	0.84	0.82
	CR 484 on-ramp	Merge	-	59.4	-	35.7	F	D	1.04	0.94
	North of CR 484 on-ramp	Basic Freeway	-	54.2	-	39.2	F	E	1.04	0.94
Southbound	North of CR 484 off-ramp	Basic Freeway	54.2	-	39.2	-	E	F	0.94	1.04
	CR 484 off-ramp	Diverge	61.3	-	34.7	-	D	F	0.94	1.04
	I-75 between CR 484 off-ramp & on-ramp	Basic Freeway	61.1	60.4	30.4	31.3	D	D	0.82	0.84
	CR 484 on-ramp	Merge	59.0	60.8	36.5	33.6	D	D	0.95	0.91
	South of CR 484 on-ramp	Basic Freeway	53.4	56.6	40.3	36.1	E	E	0.96	0.91

Note: HCS does not report Speed and Density when capacity is exceeded along a segment.

I-75 at CR 484 Interchange Operational Analysis Report

2034 No-Build AM Peak Hour Freeway Operational Results

Figure 25

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FDOT

I-75 at CR 484 Interchange Operational Analysis Report

2034 No-Build PM Peak Hour Freeway Operational Results

Figure 26

9.3. Design Year (2034) No-Build Microsimulation Evaluation

The following section summarizes the Design Year (2034) No-Build microsimulation analysis conducted using PTV VISSIM software.

9.3.1. *Model Development*

The future No-Build VISSIM models utilizes the same calibration parameters as the existing VISSIM models. There were no changes to the model geometry, driver behaviors and speed control. However, the signal timings were updated based on Synchro timing adjustments in section 9.2.1.

9.3.2. *Routes and Demand Volumes*

To develop the No-Build microsimulation analysis for the Design Year (2034), Origin-Destination (OD) inputs were developed. The VISUM ODME (Origin-Destination Matrix Estimation) procedure was used to develop the future year OD paths for the 2034 No-Build VISSIM simulations. The demand volumes developed in Section 8 were utilized as the demand volumes for 2034. These volumes were input into PTV VISUM and an ODME was completed to develop OD routes for use in the VISSIM analysis. The volumes and routes were reviewed as part of the VISSIM efforts to ensure the demands in VISSIM were consistent with the Design Traffic volumes.

9.3.3. *VISSIM Simulation Parameters*

Ten simulation runs were conducted for each of the 2034 AM and PM peak hour models for the No-Build scenario. The same traffic demand profile of peak hours (AM and PM), used for existing models, was applied to convert the peak hour volume into 15-min analysis intervals. The vehicle inputs were developed for each 15-minute analysis period within the peak hour, as well as a 15-minute warm-up period and 15-minute cool-down period.

9.3.4. *2034 No-Build VISSIM Analysis Results*

The following section summarizes the performance metrics for the 2034 No-Build AM and PM peak hour VISSIM models including the systemwide performance measures and the intersection node results.

9.3.5. *Network Wide Statistics*

Network wide statistics for the 2034 No-Build peak hours are shown in **Table 41**. As expected, without an increase in capacity (especially on I-75), the network experiences high levels of delay and lower average speeds network wide. There are also high levels of latent demand in the model.

Table 41: 2034 No-Build Network Wide Statistics

Network Wide Statistics	AM Network Wide Statistics	PM Network Wide Statistics
Average Delay (sec)	210	227
Average Speed (mph)	31	31
Total Delay (hr)	901	919
Latent Delay (sec)	788,292	839,306
Latent Demand (veh)	804	1,325
Vehicles arrived	13,111	12,217

9.3.6. *Intersection Results*

The performance measures of the signalized study intersections along CR 484 are summarized in **Figure 27 - Figure 34** including the average delay, average queue length and max queue length. The unsignalized intersections are included in **Appendix R**. The following summarizes key findings from the microsimulation analysis. It is important to note that the VISSIM microsimulation results are not directly comparable to the Synchro results due to the fact that the microsimulation analysis accounts for interactions between signals during oversaturated conditions, while Synchro and the HCM methodologies evaluate intersections in an isolated condition.

- CR 484 and I-75 southbound ramps
  - During the PM peak hour, the southbound right-turn and southbound left-turn movements recorded maximum queue lengths of approximately 4,700 feet and 4,788 feet, respectively, resulting in queue spillback onto the I-75 mainline lanes.
- CR 484 and I-75 northbound ramps
  - During the PM peak hour, the northbound left-turn and northbound right-turn movements recorded maximum queue lengths of approximately 4,300 feet and 2,100 feet, respectively, resulting in queue spillback onto the I-75 mainline lanes.
- CR 484 at SW 16th Avenue/CR 475A
  - Eastbound left-turn queues regularly extended beyond the existing storage length during both peak hours.
  - Eastbound queues are approaching the I-75 northbound ramp terminal intersection during the 2034 PM peak hour and the simulation showed impacts to the I-75 ramp terminal intersections, contributing to the queue spillback observed onto the I-75 mainline lanes.
- Severe congestion was observed on the CR 484 arterial during the AM and PM peaks.
  - Generally, queue impacts were observed between the signalized intersections along CR 484, resulting in poor traffic flow and in some cases gridlock along the arterial.
  - Eastbound queues extended approximately 3,700 feet at the SW 20th Avenue Road intersection during the AM peak hour.
  - Westbound queues along CR 484 extended approximately 2,700 feet at the SW 16th Avenue intersection during the AM peak hour.

AM - CR 484 & SW 20th Ave Rd

Movement	Demand Volume (veh)	Simulation Volume (veh)	Average Delay (sec)	Average Queue Length (ft)	Max Queue Length (ft)	Turn Lane Length (ft)*
NBL	42	46	69.5	19.6	100.1	-
NBR	124	120	75.7	54.9	212.2	160
EBT	1946	1253	69.2	3,088.5	3,731.4	-
EBR	51	33	48.6	3,088.1	3,731.0	-
WBU	12	11	61.5	6.5	81.3	130
WBL	91	79	24.6	6.5	81.3	130
WBT	1269	1073	4.9	18.2	199.2	-

Intersection (Node) ID 16
Note: Results shown are the average of 10 simulation runs.
Note: Queue lengths limited to distance to upstream node. This may affect some queue length measurements.
** Turn lane length does not include length of taper.*

Figure 27: CR 484 and SW 20th Avenue Road – 2034 No-Build AM Peak Node Results

PM - CR 484 & SW 20th Ave Rd

Movement	Demand Volume (veh)	Simulation Volume (veh)	Average Delay (sec)	Average Queue Length (ft)	Max Queue Length (ft)	Turn Lane Length (ft)*
NBL	51	32	205.2	77.4	169.9	-
NBR	103	58	365.7	316.1	469.4	160
EBT	1237	737	225.4	1,606.4	2,240.2	-
EBR	42	22	96.7	1,605.9	2,239.9	-
WBU	76	13	156.0	81.5	208.4	130
WBL	107	66	82.8	81.5	208.4	130
WBT	1888	1286	5.1	63.4	449.1	-

Intersection (Node) ID 16
Note: Results shown are the average of 10 simulation runs.
Note: Queue lengths limited to distance to upstream node. This may affect some queue length measurements.
** Turn lane length does not include length of taper.*

Figure 28: CR 484 and SW 20th Avenue Road – 2034 No-Build PM Peak Node Results

AM - CR 484 & I-75 SB Ramps

Movement	Demand Volume (veh)	Simulation Volume (veh)	Average Delay (sec)	Average Queue Length (ft)	Max Queue Length (ft)	Turn Lane Length (ft)*
SBL	381	374	79.8	121.3	357.9	300
SBR	315	291	11.3	14.9	163.3	300
EBT	1755	1120	34.2	218.8	760.2	-
EBR	423	275	11.1	29.7	304.3	-
WBL	342	280	30.9	58.2	344.0	300
WBT	1073	840	10.0	25.8	195.6	-

Intersection (Node) ID 19

Note: Results shown are the average of 10 simulation runs.

Note: Queue lengths limited to distance to upstream node. This may affect some queue length measurements.

** Turn lane length does not include length of taper.*

Figure 29: CR 484 and I-75 Southbound Ramps - 2034 No-Build AM Peak Node Results

PM - CR 484 & I-75 SB Ramps

Movement	Demand Volume (veh)	Simulation Volume (veh)	Average Delay (sec)	Average Queue Length (ft)	Max Queue Length (ft)	Turn Lane Length (ft)*
SBL	550	400	173.8	2,639.3	4,708.4	300
SBR	644	477	100.3	2,769.1	4,788.3	300
EBT	1162	637	161.9	484.5	747.0	-
EBR	226	128	115.8	7.5	117.8	-
WBL	179	110	38.6	21.1	188.5	300
WBT	1534	957	43.9	144.1	398.0	-

Intersection (Node) ID 19

Note: Results shown are the average of 10 simulation runs.

Note: Queue lengths limited to distance to upstream node. This may affect some queue length measurements.

** Turn lane length does not include length of taper.*

Figure 30: CR 484 and I-75 Southbound Ramps - 2034 No-Build PM Peak Node Results

AM - CR 484 & I-75 NB Ramps

Movement	Demand Volume (veh)	Simulation Volume (veh)	Average Delay (sec)	Average Queue Length (ft)	Max Queue Length (ft)	Turn Lane Length (ft)*
NBL	226	205	96.8	144.0	455.1	450
NBR	179	152	9.7	3.4	85.5	450
EBL	644	412	59.6	194.5	335.6	300
EBT	1492	1069	8.4	27.0	374.1	-
WBT	1189	917	45.3	241.7	433.0	-
WBR	550	447	31.5	7.1	101.7	125

Intersection (Node) ID 20
Note: Results shown are the average of 10 simulation runs.
Note: Queue lengths limited to distance to upstream node. This may affect some queue length measurements.
** Turn lane length does not include length of taper.*

Figure 31: CR 484 and I-75 Northbound Ramps - 2034 No-Build AM Peak Node Results

PM - CR 484 & I-75 NB Ramps

Movement	Demand Volume (veh)	Simulation Volume (veh)	Average Delay (sec)	Average Queue Length (ft)	Max Queue Length (ft)	Turn Lane Length (ft)*
NBL	423	305	156.9	2,740.4	4,342.4	450
NBR	342	231	128.5	1,090.3	2,164.8	450
EBL	315	186	63.8	100.8	280.8	300
EBT	1397	829	102.9	201.2	404.6	-
WBT	1290	776	85.2	288.1	433.2	-
WBR	381	237	57.6	0.0	0.0	125

Intersection (Node) ID 20
Note: Results shown are the average of 10 simulation runs.
Note: Queue lengths limited to distance to upstream node. This may affect some queue length measurements.
** Turn lane length does not include length of taper.*

Figure 32: CR 484 and I-75 Northbound Ramps - 2034 No-Build PM Peak Node Results

AM - CR 484 & SW 16th Ave

Movement	Demand Volume (veh)	Simulation Volume (veh)	Average Delay (sec)	Average Queue Length (ft)	Max Queue Length (ft)	Turn Lane Length (ft)*
NBL	188	190	81.8	72.0	299.8	250
NBT	56	53	46.2	18.6	124.8	-
NBR	30	31	25.8	32.0	159.9	-
SBL	65	58	113.7	16.3	90.7	215
SBT	93	84	152.5	493.5	758.0	-
SBR	291	257	168.2	494.4	758.8	-
EBU	16	45	108.3	207.0	648.8	250
EBL	316	232	78.8	207.0	648.8	250
EBT	1036	764	26.3	143.1	695.2	-
EBR	235	165	24.0	163.0	737.3	-
WBU	1	0	-	2.4	32.0	320
WBL	21	18	76.4	2.4	32.0	320
WBT	1109	891	126.6	2,078.9	2,719.2	-
WBR	136	109	120.5	2,123.2	2,766.6	-

Intersection (Node) ID 23
Note: Results shown are the average of 10 simulation runs.
Note: Queue lengths limited to distance to upstream node. This may affect some queue length measurements.
** Turn lane length does not include length of taper.*

Figure 33: CR 484 and CR 475A - 2034 No-Build AM Peak Node Results

PM - CR 484 & SW 16th Ave

Movement	Demand Volume (veh)	Simulation Volume (veh)	Average Delay (sec)	Average Queue Length (ft)	Max Queue Length (ft)	Turn Lane Length (ft)*
NBL	198	122	326.3	379.3	578.9	250
NBT	93	60	144.5	17.9	112.4	-
NBR	22	14	93.0	28.7	143.1	-
SBL	136	69	256.6	18.0	110.8	215
SBT	56	31	325.0	556.6	762.6	-
SBR	332	163	421.9	557.5	763.4	-
EBU	30	45	287.4	527.3	812.2	250
EBL	261	150	250.2	527.3	812.2	250
EBT	1075	689	25.3	450.6	833.8	-
EBR	188	115	21.9	481.0	875.9	-
WBU	0	0	-	2.6	36.6	320
WBL	30	23	93.6	2.6	36.6	320
WBT	984	693	215.2	1,296.4	1,937.5	-
WBR	35	26	153.8	1,338.3	1,984.9	-

Intersection (Node) ID 23
Note: Results shown are the average of 10 simulation runs.
Note: Queue lengths limited to distance to upstream node. This may affect some queue length measurements.
** Turn lane length does not include length of taper.*

Figure 34: CR 484 and CR 475A No-Build 2034 PM Peak Node Results

9.3.7. *Travel Time Results*

The travel time results for the No-Build 2034 peak hours are shown in **Table 42**. The observed travel times in the model are approximately three to four times longer than a free flow condition. For example, the end-to-end existing travel time along the study arterial (within the study limits) is approximately three minutes. Travel time markers were placed along CR 484 for the eastbound and westbound directions and on the northbound and southbound on-ramps.

Table 42: 2034 No-Build Travel Time Results

Peak Hour	Travel Time Run	Free-Flow Travel Time (min)	Simulated Travel Time (min)
AM	1: CR 484 EB	3.0	10.8
	2: CR 484 WB	3.0	9.4
	3: CR 484 EB to I-75 SB ramp	2.0	9.8
	4: CR 484 EB to I-75 NB ramp	3.0	12.4
	5: CR 484 WB to I-75 NB ramp	2.0	8.7
	6: CR 484 WB to I-75 SB ramp	3.0	9.3
PM	1: CR 484 EB	3.0	12.1
	2: CR 484 WB	3.0	9.7
	3: CR 484 EB to I-75 SB ramp	2.0	10.5
	4: CR 484 EB to I-75 NB ramp	3.0	12.4
	5: CR 484 WB to I-75 NB ramp	2.0	8.6
	6: CR 484 WB to I-75 SB ramp	3.0	9.0

9.4. Design Year (2034) No-Build Operational Summary

The operational analyses conducted for the Design Year (2034) No-Build AM and PM peak hours show congestion throughout the network (I-75 and along CR 484). The following summarizes the key findings from the Design Year (2034) No-Build analyses, focusing on the VISSIM microsimulation results:

- Intersection results
  - CR 484 and I-75 southbound ramps
    - During the PM peak hour, the southbound right-turn and southbound left-turn movements recorded maximum queue lengths of approximately 4,700 feet and 4,788 feet, respectively, resulting in queue spillback onto the I-75 mainline lanes.
  - CR 484 and I-75 northbound ramps
    - During the PM peak hour, the northbound left-turn and northbound right-turn movements recorded maximum queue lengths of approximately 4,300 feet and 2,100 feet, respectively, resulting in queue spillback onto the I-75 mainline lanes.
  - CR 484 at SW 16th Avenue/CR 475A
    - Eastbound left-turn queues regularly extended beyond the existing storage length during both peak hours
  - Severe congestion was observed on the CR 484 arterial during the AM and PM peaks.
    - Generally, queue impacts were observed between the signalized intersections along CR 484, resulting in poor traffic flow and in some cases gridlock along the arterial.
    - Eastbound queues extended approximately 3,700 feet at the SW 20th Avenue Road intersection during the AM peak hour.
    - Westbound queues along CR 484 extended approximately 2,700 feet at the SW 16th Avenue intersection during the AM peak hour.
- Travel times
  - The travel times along the arterial range between 8.6 to 12.4 minutes. These are approximately three times to four times longer than the free-flow travel time.
- I-75 mainline results
  - The capacity constraints observed on I-75 within the influence area of the ramps will be further evaluated and addressed as part of the ongoing I-75 Master Plan.

10. FUTURE (BUILD) OPERATIONAL ANALYSIS

The following section summarizes the future Build operational analysis results for the intersection and freeway evaluations for both the AM and PM peak hours of the future years (2024 and 2034).

10.1. Future Build Intersection Lane Configurations

The Build condition will include the following geometric changes at the study intersections:

- CR 484 at SW 20th Avenue
  - Extend existing westbound left-turn lane to 400 feet
- I-75 Southbound Ramp at CR 484
  - Add a 2nd southbound right-turn lane
  - Bring the southbound right-turn movement under signal control
  - Extend southbound left-turn lane to 500 feet
  - Extend southbound right-turn lane to 450 feet
  - Provide additional storage for the downstream eastbound left-turn lanes at the I-75 northbound ramp
- I-75 Northbound Ramp at CR 484
  - Add a 2nd eastbound left-turn lane (300 feet)
  - Add an exclusive westbound right-turn lane (200 feet)
  - Add a 2nd northbound left-turn lane (350 feet)
  - Widen the on-ramp to accommodate dual eastbound left-turn lanes
- CR 484 at SW 17th Court
  - Extend eastbound left-turn to 300 feet
- CR 484 at CR 475A/SW 16th Avenue
  - Add a 2nd eastbound left-turn lane (325 feet)
  - Add a 2nd northbound left-turn lane (250 feet)
  - Add an exclusive southbound right-turn lane (300 feet)
  - Widen the north leg of CR 475A to accommodate dual eastbound left-turn lanes

In addition to the intersection improvements summarized, access management improvements are also proposed and include consolidating median openings to allow for longer queue storage lengths at the signalized intersections. The proposed changes are shown in **Figure 35**.

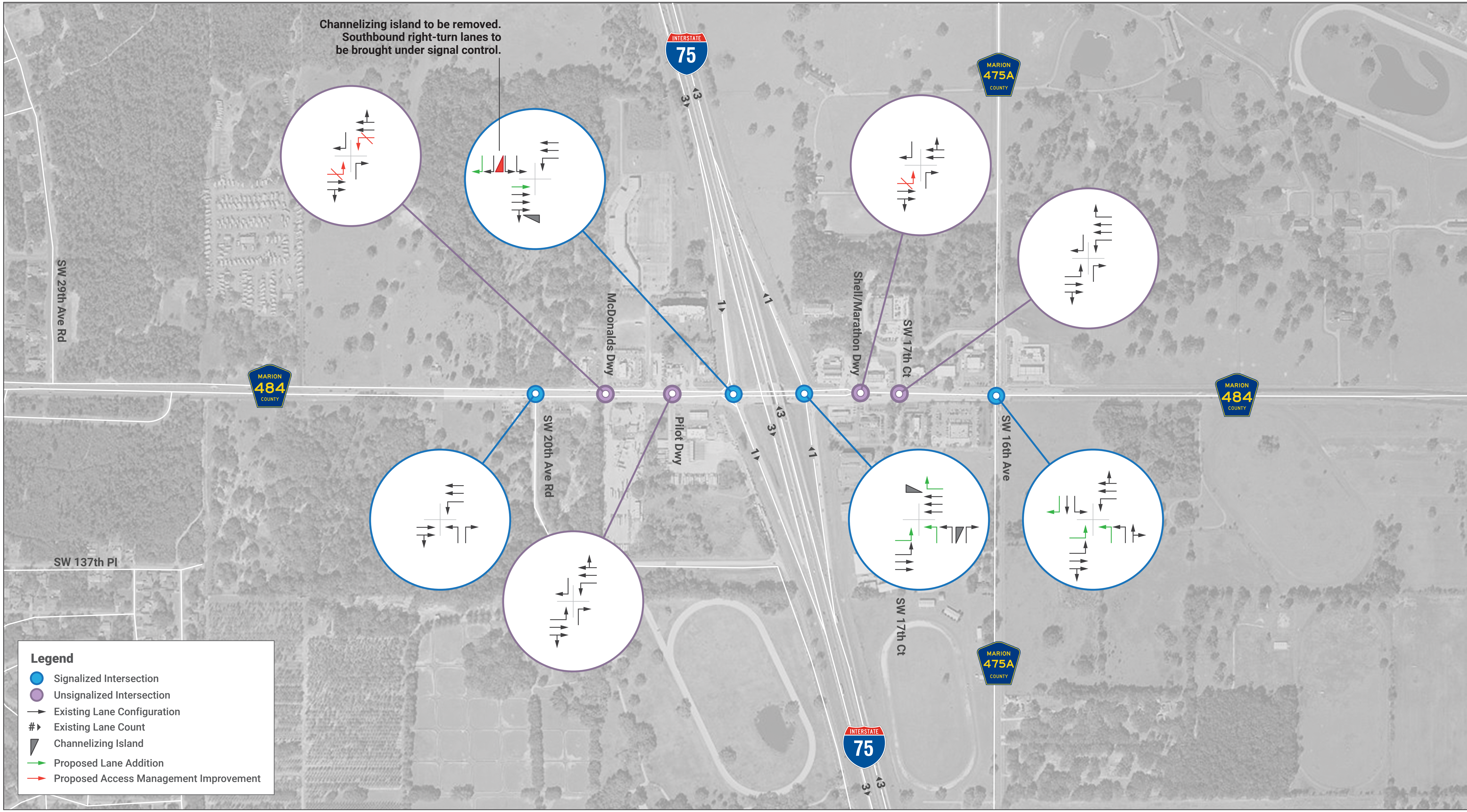

Channelizing island to be removed.
Southbound right-turn lanes to
be brought under signal control.
INTERSTATE 75
MARION 475A COUNTY
MARION 484 COUNTY
SW 29th Ave Rd
McDonalds Dwy
Pilot Dwy
SW 20th Ave Rd
Shell/Marathon Dwy
SW 17th Ct
SW 16th Ave
SW 137th Pl
Legend
Signalized Intersection
Unsignalized Intersection
Existing Lane Configuration
Existing Lane Count
Channelizing Island
Proposed Lane Addition
Proposed Access Management Improvement
Scale in Feet
0
700
North

Figure 35

10.2. Opening Year (2024) Build Operational Analysis

The following section summarizes the Opening Year (2024) Build operational analysis results for the intersection and freeway evaluations. The intersections and freeway were analyzed using *Highway Capacity Manual* (HCM) 6th Edition methodologies, as implemented in Synchro and HCS software, respectively. U-turns were accounted for in the intersection analysis conducted in Synchro software. It is important to note that the HCM 6th Edition methodologies, as implemented in Synchro software, do not account for U-turns at signalized intersections. For intersection configurations or unique signal phasing/controllers that cannot be analyzed in Synchro using the HCM methodologies, the Synchro outputs were reported (e.g., CR 484 at I-75 Southbound Ramps intersection).

Changes to the yellow and all-red clearance intervals from existing timings for the CR 484 and ramp terminal and CR 475A/SW 16th Avenue intersections were made consistent with the signalization plans for the improvement project.

10.2.1. *Opening Year (2024) Build Intersection Operations*

The 2024 peak hour Build intersection movement delay, LOS, and 95th percentile queues for each study intersection are summarized in **Table 43** through **Table 50**. Detailed Synchro output reports are included in **Appendix S**. The 95th percentile queues were rounded up to the nearest 25 feet. Turn lane lengths shown in the result tables do not include the length of the taper. **Figure 36** illustrates the overall intersection delay and LOS for each of the intersections in the study area. Each of the study intersections are expected to operate at an overall intersection LOS D or better and all movements at the study intersections are expected to operate under capacity during both 2024 peak hours.

The following summarizes specific movements that are expected to operate at LOS F during the 2024 peak hours:

- CR 484 and SW 20th Avenue Road (Signalized Intersection)
    - The northbound right-turn movement is expected to operate at LOS F during the AM and PM peak, while the northbound left-turn movement is expected to operate at LOS E during the AM peak and LOS F during the PM peak.
    - The 95th percentile queue lengths for the northbound right movements exceed the overall turn lane length in both the AM and PM peaks.
    - It is important to note that while the HCM results show failing movements, the microsimulation analysis does not show that additional improvements are needed.
- CR 484 and I-75 Southbound Ramps (Signalized Intersection)
    - The westbound left-turn movement is expected to operate at LOS F during the AM peak hour with a v/c ratio of 0.57.
    - Queue spillback onto the I-75 mainline is not anticipated based on the HCM results and was confirmed in the microsimulation analysis.
- I-75 Northbound Ramps and CR 484 (Signalized Intersection)
    - The northbound left-turn movement is expected to operate at LOS F in the AM peak hour with a v/c ratio of 0.75.
    - Queue spillback onto the I-75 mainline is not anticipated based on the HCM results and was confirmed in the microsimulation analysis.

- CR 484 and SW 16th Avenue/CR 475A (Signalized Intersection)
  - The westbound left-turn, northbound left-turn, southbound left-turn, and southbound right-turn movements are expected to operate at LOS F during both peak hours (all are expected to operate with a v/c ratio below 1.0).
  - The eastbound left-turn movement is expected to operate at LOS F during the PM peak hour (v/c ratio less than 1.0).
  - It is important to note that the VISSIM results show improvements in delay, throughput, and queues for the NBL movement when compared to the No-Build. While the HCM results show some disbenefit, the VISSIM results show improvements for each performance metric for this movement in both peak hours.

Table 43: 2024 Build Peak Hour Intersection Operations – CR 484 at SW 20th Avenue Road

Approach	Movement	AM Peak Hour			PM Peak Hour			Turn Lane Length
		V/C	Delay (s) [LOS]	95% Queue (ft)	V/C	Delay (s) [LOS]	95% Queue (ft)	
Westbound	Left	0.22	8.9 (A)	25	0.21	2.8 (A)	25	400
	Through	0.30	0.3 (A)	25	0.58	0.8 (A)	25	-
	Approach	**0.34**	**0.7 (A)**	**-**	**0.56**	**0.9 (A)**	**-**	**-**
Northbound	Left	0.19	75.5 (E)	50	0.69	103.1 (F)	125	-
	Right	0.82	103.7 (F)	350	0.61	99.3 (F)	175	160
	Approach	**0.71**	**98.0 (F)**	**-**	**0.64**	**101.4 (F)**	**-**	**-**
Eastbound	Through	0.65	10.1 (B)	500	0.39	4.8 (A)	200	-
	Right	0.66	10.1 (B)	525	0.39	4.8 (A)	225	-
	Approach	**0.66**	**10.1 (B)**	**-**	**0.39**	**4.8 (A)**	**-**	**-**
Overall Intersection		**0.55**	**10.4 (B)**	**-**	**0.51**	**5.1 (A)**	**-**	**-**

Table 44: 2024 Build Peak Hour Intersection Operations – CR 484 at McDonald's Driveway

Approach	Movement	AM Peak Hour			PM Peak Hour			Turn Lane Length
		V/C	Delay (s) [LOS]	95% Queue (ft)	V/C	Delay (s) [LOS]	95% Queue (ft)	
Northbound	Right	0.03	23.4 (C)	25	0.00	11.3 (B)	0	-
Southbound	Right	0.08	10.7 (B)	25	0.20	19.0 (C)	25	-

Table 45: 2024 Build Peak Hour Intersection Operations – CR 484 at Pilot Travel Center Driveway/H & D Services Driveway

Approach	Movement	AM Peak Hour			PM Peak Hour			Turn Lane Length
		V/C	Delay (s) [LOS]	95% Queue (ft)	V/C	Delay (s) [LOS]	95% Queue (ft)	
Westbound	Left	0.16	16.7 (C)	25	0.14	10.2 (B)	25	200
Northbound	Right	0.03	19.2 (C)	25	0.01	11.4 (B)	0	-
Eastbound	Left	0.07	9.2 (A)	25	0.17	15.7 (C)	25	180
Southbound	Right	0.01	10.2 (B)	0	0.01	16.9 (C)	0	-

Table 46: 2024 Build Peak Hour Intersection Operations – CR 484 at I-75 Southbound Ramps

Approach	Movement	AM Peak Hour			PM Peak Hour			Turn Lane Length
		V/C	Delay (s) [LOS]	95% Queue (ft)	V/C	Delay (s) [LOS]	95% Queue (ft)	
Westbound	Left	0.57	96.4 (F)	300	0.73	62.8 (E)	225	300
	Through	0.34	3.4 (A)	50	0.69	30.7 (C)	800	-
	Approach	**0.39**	**21.9 (C)**	**-**	**0.69**	**33.3 (C)**	**-**	**-**
Eastbound	Through	0.77	32.0 (C)	625	0.44	24.2 (C)	375	-
	Right	*	*	*	*	*	*	-
	Approach	**0.77**	**32.0 (C)**	**-**	**0.44**	**24.2 (C)**	**-**	**-**
Southbound	Left	0.42	57.6 (E)	200	0.51	53.7 (D)	275	500
	Right	0.60	15.4 (B)	50	0.79	13.8 (B)	75	450
	Approach	**0.50**	**39.7 (D)**	**-**	**0.66**	**31.8 (C)**	**-**	**-**
Overall Intersection		**0.60**	**30.3 (C)**	**-**	**0.68**	**30.0 (C)**	**-**	**-**

*Yield-controlled right-turn bypass lane
Note: Overall off-ramp length is 1,150 feet (Distance from the stop bar to the I-75 mainline gore point)
Synchro results shown in lieu of HCM 6th Edition results due to limitations in Synchro

Table 47: 2024 Build Peak Hour Intersection Operations – CR 484 at I-75 Northbound Ramps

Approach	Movement	AM Peak Hour			PM Peak Hour			Turn Lane Length
		V/C	Delay (s) [LOS]	95% Queue (ft)	V/C	Delay (s) [LOS]	95% Queue (ft)	
Westbound	Through	0.28	35.5 (D)	425	0.40	0.4 (A)	25	-
	Right	*	*	*	*	*	*	200
	Approach	**0.18**	**35.5 (D)**	-	**0.32**	**0.4 (A)**	-	-
Northbound	Left	0.75	84.4 (F)	150	0.86	78.0 (E)	325	350
	Right	*	*	*	*	*	*	350
	Approach	**0.39**	**84.4 (F)**	**-**	**0.49**	**78.0 (E)**	**-**	**-**
Eastbound	Left	0.92	58.7 (E)	375	0.87	84.3 (F)	250	300
	Through	0.47	0.3 (A)	25	0.47	0.5 (A)	25	-
	Approach	**0.60**	**17.5 (B)**	-	**0.54**	**14.7 (B)**	-	-
Overall Intersection		**0.43**	**26.0 (C)**	-	**0.44**	**16.3 (B)**	-	-

*Yield-controlled right-turn bypass lane
Note: Overall off-ramp length is 1,170 feet (Distance from the stop bar to the I-75 mainline gore point)

Table 48: 2024 Build Peak Hour Intersection Operations – CR 484 at Exxon Gas Driveway/Shell/Marathon Gas Driveway

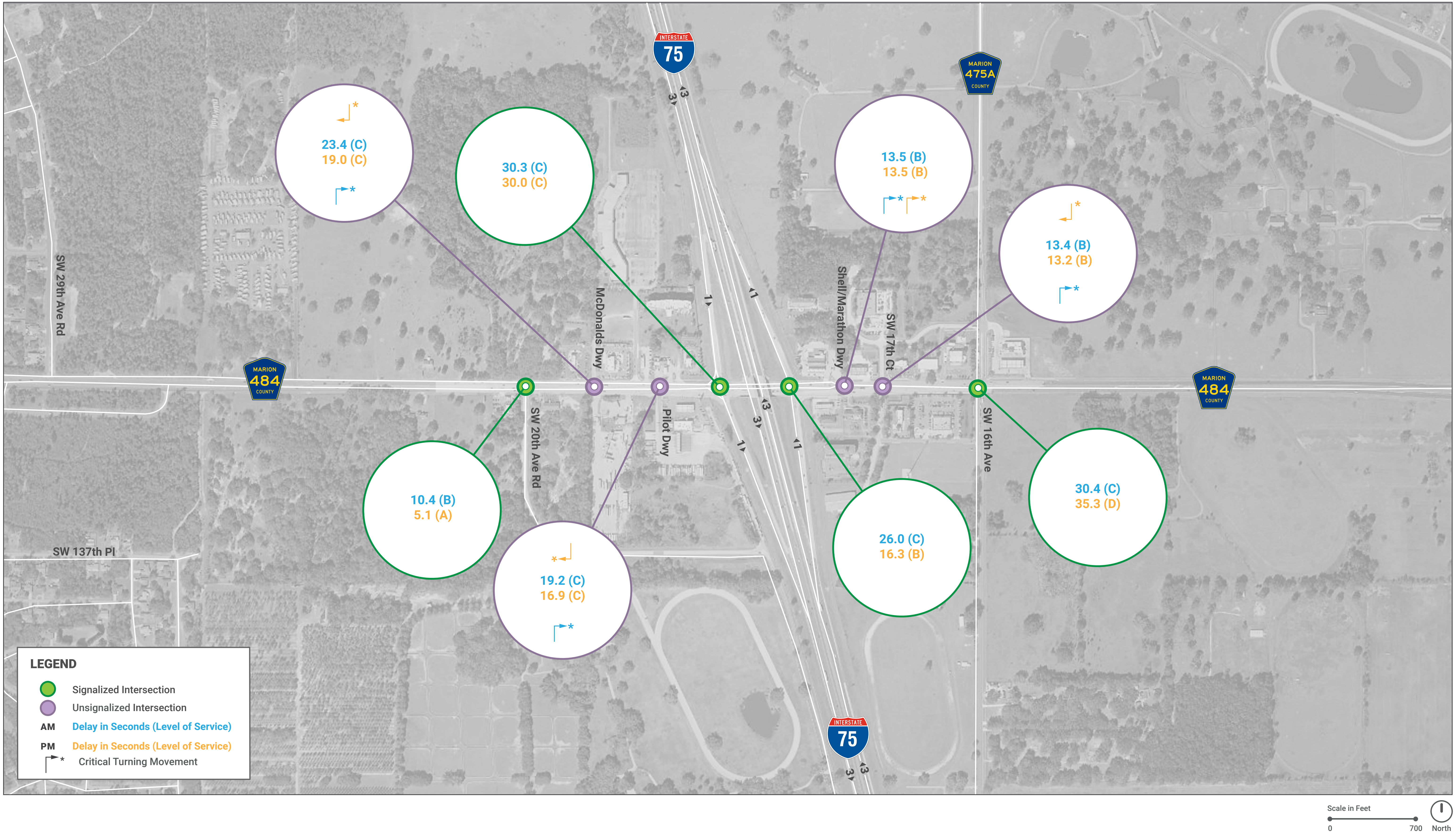
Approach	Movement	AM Peak Hour			PM Peak Hour			Turn Lane Length
		V/C	Delay (s) [LOS]	95% Queue (ft)	V/C	Delay (s) [LOS]	95% Queue (ft)	
Northbound	Right	0.10	13.5 (B)	25	0.11	13.5 (B)	25	-
Southbound	Right	0.02	11.8 (B)	25	0.03	12.9 (B)	25	-

Table 49: 2024 Build Peak Hour Intersection Operations – CR 484 at SW 17th Court

Approach	Movement	AM Peak Hour			PM Peak Hour			Turn Lane Length
		V/C	Delay (s) [LOS]	95% Queue (ft)	V/C	Delay (s) [LOS]	95% Queue (ft)	
Westbound	Left	0.03	9.9 (A)	25	0.02	9.5 (A)	25	150
Northbound	Right	0.07	13.4 (B)	25	0.07	12.0 (B)	25	-
Eastbound	Left	0.13	10.2 (B)	25	0.23	12.2 (B)	25	300
Southbound	Right	0.08	11.9 (B)	25	0.18	13.2 (B)	25	-

Table 50: 2024 Build Peak Hour Intersection Operations – CR 484 at CR 475A/SW 16th Avenue

Approach	Movement	AM Peak Hour			PM Peak Hour			Turn Lane Length
		V/C	Delay (s) [LOS]	95% Queue (ft)	V/C	Delay (s) [LOS]	95% Queue (ft)	
Westbound	Left	0.27	84.9 (F)	25	0.35	82.4 (F)	50	325
	Through	0.46	24.3 (C)	425	0.51	28.3 (C)	475	-
	Right	0.46	24.2 (C)	425	0.51	28.2 (C)	500	-
	Approach	**0.47**	**25.0 (C)**	**-**	**0.52**	**29.6 (C)**	**-**	**-**
Northbound	Left	0.78	85.0 (F)	175	0.82	92.0 (F)	200	250
	Through/Right	0.25	68.1 (E)	125	0.34	64.4 (E)	175	-
	Approach	**0.58**	**80.7 (F)**	**-**	**0.55**	**82.6 (F)**	**-**	**-**
Eastbound	Left	0.85	73.5 (E)	250	0.85	81.2 (F)	250	325
	Through	0.55	2.0 (A)	50	0.58	2.5 (A)	50	-
	Right	0.55	2.1 (A)	50	0.58	2.5 (A)	50	-
	Approach	**0.61**	**15.7 (B)**	**-**	**0.64**	**16.2 (B)**	**-**	**-**
Southbound	Left	0.66	86.0 (F)	150	0.83	92.3 (F)	225	200
	Through	0.26	68.9 (E)	125	0.17	62.2 (E)	100	-
	Right	0.88	88.9 (F)	325	0.88	86.5 (F)	400	300
	Approach	**0.74**	**84.2 (F)**	**-**	**0.79**	**84.8 (F)**	**-**	**-**
Overall Intersection		**0.58**	**30.4 (C)**	**-**	**0.61**	**35.3 (D)**	**-**	**-**



I-75 at CR 484 Interchange Operational Analysis Report

2024 Build AM/PM Peak Hour Intersection Operations

Figure 36

10.2.2. *Opening Year (2024) Build Freeway Operations*

The freeway operations were evaluated for the 2024 Build scenario. It is important to note that the results are identical to the 2024 No-Build scenario as the projected demands and geometry along the freeway and at the gore points of the ramps are identical.

10.2.3. *Freeway Build Operational Results*

A summary of the maximum speed, density, LOS, and V/C ratio for each direction and peak hour is summarized in **Table 51**. The maximum v/c ratio observed in the northbound direction is 0.65 during the AM peak and 0.60 during the PM peak while the maximum v/c ratio observed in the southbound direction is 0.52 during the AM peak and 0.73 in the PM peak.

The average speeds on I-75 are above 60 mph. All segments evaluated on I-75 are expected to operate at B or C. The Build 2024 AM and PM peak hour performance metrics including v/c ratios, speed, and density-based LOS for each analysis segment and peak hour are illustrated in **Figure 37** and **Figure 38**, respectively. The inputs and output of the HCS analysis are provided in **Appendix S**.

Table 51: 2024 AM and PM Peak Hour Freeway Operational Results (Build)

Direction	Roadway Segment	Analysis Type	Speed (mph)		Density (pc/mi/ln)		LOS		V/C Ratio	
			AM	PM	AM	PM	AM	PM	AM	PM
Northbound	South of CR 484 off-ramp	Basic Freeway	70.8	69.6	16.6	19.5	B	C	0.52	0.60
	CR 484 off-ramp	Diverge	62.3	61.4	18.9	22.1	B	C	0.52	0.60
	I-75 between CR 484 off-ramp & on-ramp	Basic Freeway	70.0	69.9	15.3	16.0	B	B	0.47	0.50
	CR 484 on-ramp	Merge	63.4	64.2	22.8	20.6	C	C	0.64	0.59
	North of CR 484 on-ramp	Basic Freeway	68.5	69.8	21.3	19.1	C	C	0.65	0.59
Southbound	North of CR 484 off-ramp	Basic Freeway	70.9	65.6	16.6	25.2	B	C	0.52	0.73
	CR 484 off-ramp	Diverge	61.5	60.4	19.1	27.4	B	C	0.52	0.73
	I-75 between CR 484 off-ramp & on-ramp	Basic Freeway	70.0	69.3	13.9	18.6	B	C	0.43	0.57
	CR 484 on-ramp	Merge	64.8	64.3	18.2	21.9	B	C	0.52	0.63
	South of CR 484 on-ramp	Basic Freeway	70.8	69.1	16.7	20.4	B	C	0.52	0.63

Scale in Feet 0 1,500 North

FDOT

I-75 at CR 484 Interchange Operational Analysis Report

2024 Build AM Peak Hour Freeway Operational Results

Figure 37

Scale in Feet
0 1,500
North

FDOT

I-75 at CR 484 Interchange Operational Analysis Report

2024 Build PM Peak Hour Freeway Operational Results

Figure 38

10.3. **Design Year (2034) Build Operational Analysis**

The following section summarizes the Design Year (2034) Build operational analysis results for the intersection and freeway evaluations. The intersections and freeway were analyzed using *Highway Capacity Manual* (HCM) 6th Edition methodologies, as implemented in Synchro and HCS software, respectively. U-turns were accounted for in the intersection analysis conducted in Synchro software. It is important to note that the HCM 6th Edition methodologies, as implemented in Synchro software, do not account for U-turns at signalized intersections. For intersection configurations or unique signal phasing/controllers that cannot be analyzed in Synchro using the HCM methodologies, the Synchro outputs were reported (e.g., CR 484 at I-75 Southbound Ramps intersection). A microsimulation analysis using PTV VISSIM software was also conducted for the Design Year (2034) only.

10.3.1. *Design Year (2034) Build Intersection Operations*

The 2034 peak hour Build intersection movement delay, LOS, and 95th percentile queues for each study intersection are summarized in **Table 52** through **Table 59.** The following summarizes the 2034 peak hour Build intersection operational results, focusing on individual movements at the study intersections. Detailed Synchro output reports are included in **Appendix T**. The 95th percentile queues were rounded up to the nearest 25 feet. Turn lane lengths shown in the result tables do not include the length of the taper.

Figure 39 illustrates the overall intersection delay and LOS for each of the intersections in the study area. Each of the study intersections are expected to operate at an overall intersection LOS D or better and all movements at the study intersections are expected to operate under capacity during both 2034 peak hours. The analysis shows the proposed improvements result in improved operations over the No-Build scenario. While the 2034 HCM results show potential queue spillback between the ramp terminal intersections (**Table 55** and **Table 56**), the 2034 microsimulation results do not show negative impacts to the ramp terminals or I-75 mainline.

The microsimulation analysis comparison of the No-Build and Build scenarios summarized in **Section 11** shows the improvements at the intersection level (node throughput), travel time improvements along the arterial, and mitigation of queue spillback onto the I-75 mainline. It is understood that the HCM results may show some differences when compared to microsimulation analysis; however, this IOAR was initiated prior to the release of the 2021 Traffic Analysis Handbook guidance of not reporting HCM results when also conducting microsimulation analysis.

The following summarizes specific movements that are expected to operate at LOS F during the 2024 peak hours.

- CR 484 and SW 20th Avenue Road (Signalized Intersection)
    - The northbound right-turn movement is expected to operate at LOS F during the AM and PM peak, while the northbound left-turn movement is expected to operate at LOS E during the AM peak and LOS F during the PM peak.
    - The 95th percentile queue lengths for the northbound right movements exceed the overall turn lane length in both the AM and PM peaks.
    - It is important to note that while the HCM results show failing movements, the microsimulation analysis does not show that additional improvements are needed.

- CR 484 and I-75 Southbound Ramps (Signalized Intersection)
  - The westbound left-turn movement is expected to operate at LOS F during the AM peak hour with a v/c ratio of 0.91.
  - Queue spillback onto the I-75 mainline is not anticipated based on the HCM results and was confirmed in the microsimulation analysis.
- I-75 Northbound Ramps and CR 484 (Signalized Intersection)
  - The northbound left-turn movement is expected to operate at LOS F in the AM peak hour with a v/c ratio of 0.82.
  - Queue spillback onto the I-75 mainline is not anticipated based on the HCM results and was confirmed in the microsimulation analysis.
- CR 484 and SW 16th Avenue/CR 475A (Signalized Intersection)
  - The westbound left-turn, northbound left-turn, southbound left-turn, and southbound right-turn movements are expected to operate at LOS F during both peak hours (all are expected to operate with a v/c ratio below 1.0).
  - The eastbound left-turn movement is expected to operate at LOS F during the PM peak hour (v/c ratio less than 1.0).
  - It is important to note that the VISSIM results show improvements in delay, throughput, and queues for the NBL movement when compared to the No-Build. While the HCM results show some disbenefit, the VISSIM results show improvements for each performance metric for this movement in both peak hours.

Table 52: 2034 Build Peak Hour Intersection Operations – CR 484 at SW 20th Avenue Road

Approach	Movement	AM Peak Hour			PM Peak Hour			Turn Lane Length
		V/C	Delay (s) [LOS]	95% Queue (ft)	V/C	Delay (s) [LOS]	95% Queue (ft)	
Westbound	Left	0.47	20.2 (C)	100	0.28	3.8(A)	25	400
	Through	0.44	0.5 (A)	25	0.64	1.0 (A)	25	-
	Approach	**0.50**	**1.8 (A)**	**-**	**0.63**	**1.2 (A)**	**-**	**-**
Northbound	Left	0.31	75.8 (E)	100	0.70	102.4 (F)	125	-
	Right	0.83	101.4 (F)	400	0.63	98.4 (F)	200	160
	Approach	**0.70**	**93.9 (F)**	**-**	**0.65**	**100.6 (F)**	**-**	**-**
Eastbound	Through	0.74	13.4 (B)	675	0.46	5.6 (A)	250	-
	Right	0.74	13.5 (B)	700	0.46	5.6 (A)	275	-
	Approach	**0.75**	**13.5 (B)**	**-**	**0.46**	**5.6 (A)**	**-**	**-**
Overall Intersection		**0.65**	**12.2 (B)**	**-**	**0.57**	**5.5 (A)**	**-**	**-**

Table 53: 2034 Build Peak Hour Intersection Operations – CR 484 at McDonald's Driveway

Approach	Movement	AM Peak Hour			PM Peak Hour			Turn Lane Length
		V/C	Delay (s) [LOS]	95% Queue (ft)	V/C	Delay (s) [LOS]	95% Queue (ft)	
Northbound	Right	0.05	31.3 (D)	25	0.00	12.4 (B)	0	-
Southbound	Right	0.20	13.5 (B)	25	0.30	26.9 (D)	50	-

Table 54: 2034 Build Peak Hour Intersection Operations – CR 484 at Pilot Travel Center Driveway/H & D Services Driveway

Approach	Movement	AM Peak Hour			PM Peak Hour			Turn Lane Length
		V/C	Delay (s) [LOS]	95% Queue (ft)	V/C	Delay (s) [LOS]	95% Queue (ft)	
Westbound	Left	0.26	25.0 (C)	25	0.18	11.4 (B)	25	200
Northbound	Right	0.10	27.1 (D)	25	0.01	12.5 (B)	0	-
Eastbound	Left	0.10	11.0 (B)	25	0.25	21.9 (C)	25	180
Southbound	Right	0.03	12.1 (B)	25	0.02	22.1 (C)	25	-

Table 55: 2034 Build Peak Hour Intersection Operations – CR 484 at I-75 Southbound Ramps

Approach	Movement	AM Peak Hour			PM Peak Hour			Turn Lane Length
		V/C	Delay (s) [LOS]	95% Queue (ft)	V/C	Delay (s) [LOS]	95% Queue (ft)	
Westbound	Left	0.91	107.7 (F)	650β	0.84	75.6 (E)	350β	300
	Through	0.48	6.6 (A)	100	0.82	37.6 (D)	875	-
	Approach	**0.58**	**30.7 (C)**	**-**	**0.82**	**41.6 (D)**	**-**	**-**
Eastbound	Through	0.96	44.1 (D)	725β	0.63	36.9 (D)	475	-
	Right	*	*	*	*	*	*	*
	Approach	**0.96**	**44.1 (D)**	**-**	**0.63**	**36.9 (D)**	**-**	**-**
Southbound	Left	0.48	56.7 (E)	250	0.52	47.2 (D)	325	500
	Right	0.69	15.0 (B)	75	0.84	22.5 (C)	175	450
	Approach	**0.58**	**37.8 (D)**	**-**	**0.69**	**33.9 (C)**	**-**	**-**
Overall Intersection		**0.64**	**38.7 (D)**	**-**	**0.77**	**37.9 (D)**	**-**	**-**

β 95th percentile volume exceeds capacity; queue may be longer.
*Yield-controlled right-turn bypass lane
Note: Overall off-ramp length is 1,150 feet (Distance from the stop bar to the I-75 mainline gore point)
Synchro results shown in lieu of HCM 6th Edition results due to limitations in Synchro

Table 56: 2034 Build Peak Hour Intersection Operations – CR 484 at I-75 Northbound Ramps

Approach	Movement	AM Peak Hour			PM Peak Hour			Turn Lane Length
		V/C	Delay (s) [LOS]	95% Queue (ft)	V/C	Delay (s) [LOS]	95% Queue (ft)	
Westbound	Through	0.43	45.1 (D)	600	0.45	0.5 (A)	25	-
	Right	*	*	*	*	*	*	200
	Approach	**0.29**	**45.1 (D)**	**-**	**0.35**	**0.5 (A)**	**-**	**-**
Northbound	Left	0.82	82.3 (F)	225	0.88	75.6 (E)	375	350
	Right	*	*	*	*	*	*	350
	Approach	**0.46**	**82.3 (F)**	**-**	**0.49**	**75.6 (E)**	**-**	**-**
Eastbound	Left	0.93	53.2 (D)	375	0.91	87.2 (F)	300	300
	Through	0.54	0.3 (A)	25	0.56	0.7 (A)	25	-
	Approach	**0.66**	**16.2 (B)**	**-**	**0.62**	**16.6 (B)**	**-**	**-**
Overall Intersection		**0.49**	**30.1 (C)**	**-**	**0.49**	**17.8 (B)**	**-**	**-**

*Yield-controlled right-turn bypass lane
Note: Overall off-ramp length is 1,170 feet (Distance from the stop bar to the I-75 mainline gore point)

Table 57: 2034 Build Peak Hour Intersection Operations – CR 484 at Exxon Gas Driveway/Shell/Marathon Gas Driveway

Approach	Movement	AM Peak Hour			PM Peak Hour			Turn Lane Length
		V/C	Delay (s) [LOS]	95% Queue (ft)	V/C	Delay (s) [LOS]	95% Queue (ft)	
Northbound	Right	0.13	15.7 (C)	25	0.15	16.4 (C)	25	-
Southbound	Right	0.05	15.4 (C)	25	0.04	14.9 (B)	25	-

Table 58: 2034 Build Peak Hour Intersection Operations – CR 484 at SW 17th Court

Approach	Movement	AM Peak Hour			PM Peak Hour			Turn Lane Length
		V/C	Delay (s) [LOS]	95% Queue (ft)	V/C	Delay (s) [LOS]	95% Queue (ft)	
Westbound	Left	0.07	11.0 (B)	25	0.02	10.6 (B)	25	150
Northbound	Right	0.18	16.1 (C)	25	0.10	14.0 (B)	25	-
Eastbound	Left	0.24	13.9 (B)	25	0.32	15.0 (B)	25	300
Southbound	Right	0.21	16.1 (C)	25	0.24	15.6 (C)	25	-

Table 59: 2034 Build Peak Hour Intersection Operations – CR 484 at CR 475A/SW 16th Avenue

Approach	Movement	AM Peak Hour			PM Peak Hour			Turn Lane Length
		V/C	Delay (s) [LOS]	95% Queue (ft)	V/C	Delay (s) [LOS]	95% Queue (ft)	
Westbound	Left	0.33	82.6 (F)	50	0.40	82.1 (F)	75	325
	Through	0.76	42.1 (D)	775	0.64	37.2 (D)	625	-
	Right	0.76	42.2 (D)	800	0.64	37.1 (D)	625	
	Approach	**0.76**	**42.8 (D)**	**-**	**0.64**	**38.5 (D)**	**-**	**-**
Northbound	Left	0.81	84.2 (F)	200	0.84	94.7 (F)	225	250
	Through/Right	0.24	61.2 (E)	150	0.38	63.6 (E)	225	-
	Approach	**0.58**	**77.9 (E)**	**-**	**0.56**	**83.6 (F)**	**-**	**-**
Eastbound	Left	0.86	79.3 (E)	300	0.88	83.9 (F)	250	325
	Through	0.69	30.3 (C)	425	0.74	5.4 (A)	75	-
	Right	0.69	30.5 (C)	425	0.74	5.6 (A)	75	-
	Approach	**0.73**	**40.2 (D)**	**-**	**0.77**	**19.0 (B)**	**-**	**-**
Southbound	Left	0.69	86.9 (F)	150	0.88	104.8 (F)	300	200
	Through	0.34	64.4 (E)	175	0.17	58.1 (E)	100	-
	Right	0.91	97.0 (F)	425	0.93	95.2 (F)	500	300
	Approach	**0.76**	**87.1 (F)**	**-**	**0.84**	**93.5 (F)**	**-**	**-**
Overall Intersection		**0.73**	**49.0 (D)**	**-**	**0.72**	**41.2 (D)**	**-**	**-**

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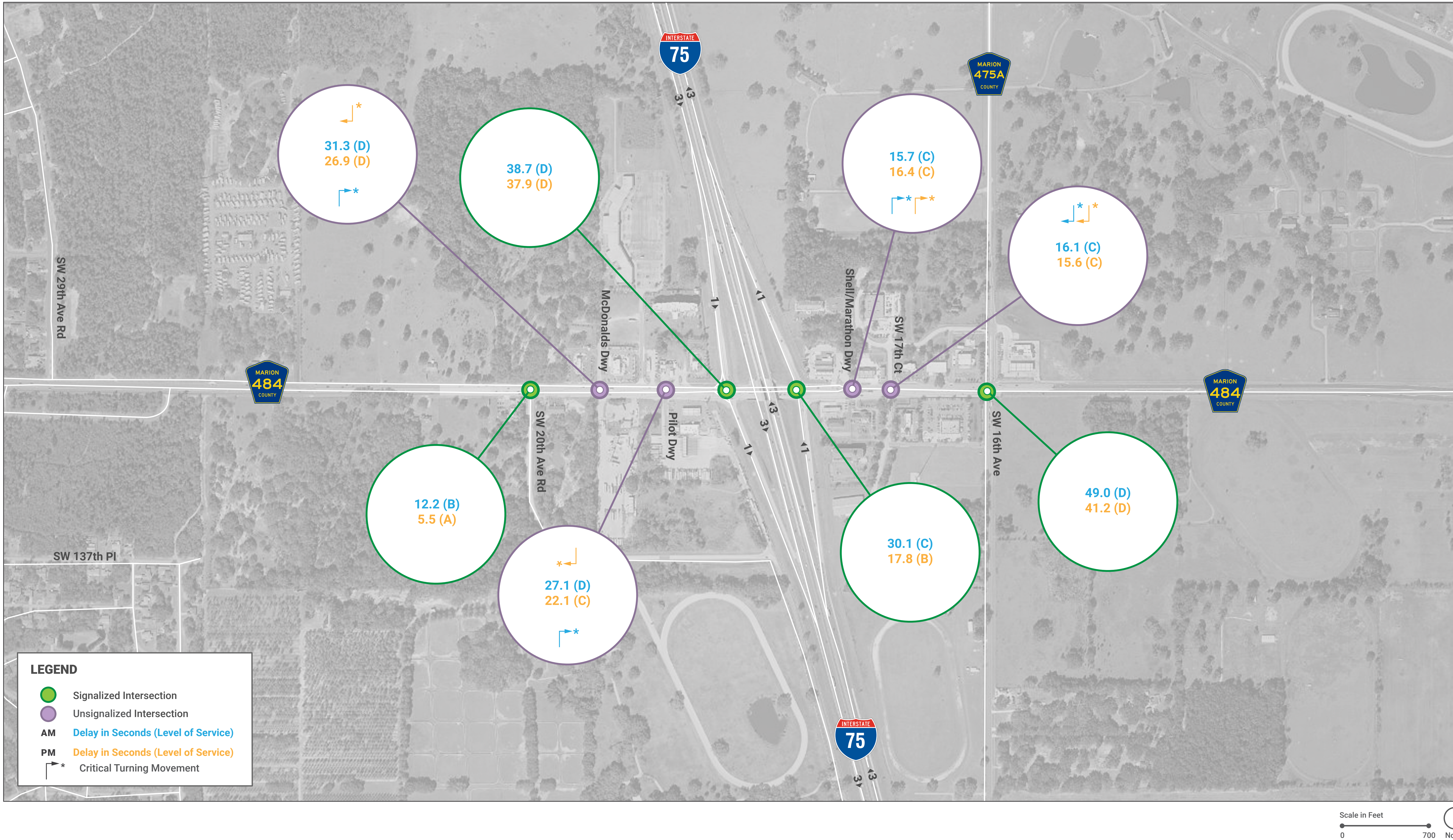

I-75 at CR 484 Interchange Operational Analysis Report

2034 Build AM/PM Peak Hour Intersection Operations

Figure 39

10.3.2. *Design Year (2034) Build Freeway Operations*

The freeway operations were evaluated for the 2034 Build scenario. It is important to note that the results are identical to the 2034 No-Build scenario as the projected demands and geometry along the freeway and at the gore points of the ramps are identical.

10.3.3. *Freeway Build Operational Results*

A summary of the maximum speed, density and LOS and v/c ratio for each direction and peak hour is summarized in **Table 60**. The maximum v/c ratio observed in the northbound direction is 1.04 during the AM peak and 0.96 during the PM peak while the maximum v/c ratio observed in the southbound direction is 0.96 during the AM peak and 1.04 in the PM peak. The average speeds on I-75 are above 53 mph. I-75 within the influence area of the northbound CR 484 on-ramp and beyond is expected to operate at LOS F during the AM peak. During the PM peak, I-75 within the influence area of the southbound CR 484 off-ramp and beyond is expected to operate at LOS F during the PM peak. All other segments evaluated on I-75 are expected to operate at LOS D or E.

The capacity constraints observed on I-75 within the influence area of the ramps will be evaluated/addressed as part of the ongoing I-75 Master Plan. The Build 2034 AM and PM peak hour performance metrics including v/c ratios, speed, and density-based LOS for each analysis segment and peak hour are illustrated in **Figure 40** and **Figure 41**, respectively. The inputs and output of the HCS analysis are provided in **Appendix T**.

Table 60: 2034 AM and PM Peak Hour Freeway Operational Results (Build)

Direction	Roadway Segment	Analysis Type	Speed (mph)		Density (pc/mi/ln)		LOS		V/C Ratio	
			AM	PM	AM	PM	AM	PM	AM	PM
Northbound	South of CR 484 off-ramp	Basic Freeway	56.6	53.4	36.1	40.3	E	E	0.91	0.96
	CR 484 off-ramp	Diverge	62.0	61.2	33.0	35.2	D	D	0.91	0.96
	I-75 between CR 484 off-ramp & on-ramp	Basic Freeway	60.4	61.1	31.3	30.4	D	D	0.84	0.82
	CR 484 on-ramp	Merge	-	59.4	-	35.7	F	D	1.04	0.94
	North of CR 484 on-ramp	Basic Freeway	-	54.2	-	39.2	F	E	1.04	0.94
Southbound	North of CR 484 off-ramp	Basic Freeway	54.2	-	39.2	-	E	F	0.94	1.04
	CR 484 off-ramp	Diverge	61.3	-	34.7	-	D	F	0.94	1.04
	I-75 between CR 484 off-ramp & on-ramp	Basic Freeway	61.1	60.4	30.4	31.3	D	D	0.82	0.84
	CR 484 on-ramp	Merge	59.0	60.8	36.5	33.6	D	D	0.95	0.91
	South of CR 484 on-ramp	Basic Freeway	53.4	56.6	40.3	36.1	E	E	0.96	0.91

Note: HCS does not report Speed and Density when capacity is exceeded along a segment.

FDOT

I-75 at CR 484 Interchange Operational Analysis Report

2034 Build AM Peak Hour Freeway Operational Results

Figure 40

FDOT

I-75 at CR 484 Interchange Operational Analysis Report

2034 Build PM Peak Hour Freeway Operational Results

Figure 41

10.4. Design Year (2034) Build Microsimulation Evaluation

The following section summarizes the Design Year (2034) Build microsimulation analysis conducted using PTV VISSIM software.

10.4.1. *Model Development*

The Build VISSIM models utilize the same calibration parameters as the existing VISSIM models. There geometry in the Build VISSIM models was updated based on the proposed improvements shown previously in **Figure 35**. Signal timings were updated also based on Synchro timing adjustments in section 10.3.1. It is noted that for the dual southbound right-turn lanes in the VISSIM, right-turn-on-red (RTOR) was allowed for the outside right-turn movement only (RTOR not allowed out of the inside lane) after coordination with FDOT.

10.4.2. *Routes and Demand Volumes*

The routes developed as part of the 2034 No-Build VISSIM models were updated based on the geometric improvements as part of the Build scenario. The volumes and routes were reviewed to ensure the demands in VISSIM were consistent with the Design Traffic volumes.

10.4.3. *VISSIM Simulation Parameters*

For consistency with the Design Year (2034) No-Build VISSIM models, ten simulation runs were conducted for the Design Year (2034) Build scenario.

10.4.4. *2034 Build VISSIM Analysis Results*

The following section summarizes the performance metrics for the Design Year (2034) Build AM and PM peak hour VISSIM models including the systemwide performance measures and the intersection node results.

10.4.5. *Network Wide Statistics*

Network wide statistics for the Design Year (2034) Build peak hours are summarized in **Table 61**. Improvements in each network wide performance measure were observed in the Build scenario when compared to the No-Build.

Table 61: 2034 Build Network Wide Statistics

Network Wide Statistics	AM Network Wide Statistics	PM Network Wide Statistics
Average Delay (seconds)	184	101
Average Speed (mph)	33	44
Total Delay (hr)	807	451
Latent Delay (sec)	246,220	71,689
Latent Demand (veh)	472	75
Vehicles arrived	13,585	14,390

10.4.6. *Intersection Results*

The performance measures of the signalized study intersections along CR 484 are summarized in **Figure 42 - Figure 49** including the average delay, average queue length, and max queue length. The unsignalized intersections are included in **Appendix T**. Key findings are as follows:

- The Build improvements at the ramp terminal intersections mitigated the queue spillback onto the I-75 mainline lanes observed in the No-Build scenario.
- The maximum queues along both ramps are expected to be less than 450 feet during both peak hours.
- The maximum queues from the microsimulation analysis do not encroach into the portions of the ramp intended for deceleration. Based on Table 10-5 of the AASHTO Greenbook, the deceleration distance needed to come to a stop condition is 615 feet.
  - The I-75 southbound off-ramp is approximately 1,150 feet. The maximum queue observed was approximately 430 feet. This leaves over 100 feet that could be used for additional storage/deceleration if needed.
  - The I-75 northbound off-ramp is approximately 1,170 feet. The maximum queue observed was approximately 380 feet. This leaves over 155 feet that could be used for additional storage/deceleration if needed.
- There was an increase in the number of vehicles processed through each intersection in the Build scenario as compared to the No-Build scenario with increased throughput at the study intersections ranging from 17% to 53%.
- When comparing the movement delays in the Build versus the No-Build, consideration should be given to not only the delay and queue metrics, but also throughput, as there are some latent delay impacts on the No-Build results (e.g., westbound right-turn movement at the I-75 northbound ramp terminal intersection).

AM - CR 484 & SW 20th Ave Rd

Movement	Demand Volume (veh)	Simulation Volume (veh)	Average Delay (sec)	Average Queue Length (ft)	Max Queue Length (ft)	Turn Lane Length (ft)*
NBL	42	45	70.1	19.4	93.5	-
NBR	124	121	42.7	37.6	193.7	160
EBT	1946	1635	39.9	2,229.8	3,076.1	-
EBR	51	41	26.4	2,229.5	3,075.7	-
WBU	92	84	53.3	40.6	197.5	400
WBL	91	88	55.2	40.6	197.5	400
WBT	1269	1201	2.7	9.4	190.6	-

Intersection (Node) ID 16

Note: Results shown are the average of 10 simulation runs.

Note: Queue lengths limited to distance to upstream node. This may affect some queue length measurements.

** Turn lane length does not include length of taper.*

Figure 42: CR 484 and SW 20th Avenue Road – 2034 Build AM Peak Node Results

PM - CR 484 & SW 20th Ave Rd

Movement	Demand Volume (veh)	Simulation Volume (veh)	Average Delay (sec)	Average Queue Length (ft)	Max Queue Length (ft)	Turn Lane Length (ft)*
NBL	51	48	75.9	24.0	114.3	-
NBR	103	97	10.9	9.0	120.4	160
EBT	1237	1205	6.4	22.8	287.0	-
EBR	42	39	4.6	22.3	286.6	-
WBU	76	75	7.9	3.6	76.1	400
WBL	107	98	13.8	3.6	76.1	400
WBT	1888	1774	2.2	11.1	252.4	-

Intersection (Node) ID 16

Note: Results shown are the average of 10 simulation runs.

Note: Queue lengths limited to distance to upstream node. This may affect some queue length measurements.

** Turn lane length does not include length of taper.*

Figure 43: CR 484 and SW 20th Avenue Road – 2034 Build PM Peak Node Results

AM - CR 484 & I-75 SB Ramps

Movement	Demand Volume (veh)	Simulation Volume (veh)	Average Delay (sec)	Average Queue Length (ft)	Max Queue Length (ft)	Turn Lane Length (ft)*
SBL	381	359	72.3	104.1	316.5	500
SBR	315	284	26.7	40.9	133.5	450
EBT	1755	1460	37.3	184.1	454.2	-
EBR	423	348	23.1	0.0	0.5	-
WBL	342	350	37.8	106.1	348.5	300
WBT	1073	1006	14.1	50.1	390.8	-

Intersection (Node) ID 19
Note: Results shown are the average of 10 simulation runs.
Note: Queue lengths limited to distance to upstream node. This may affect some queue length measurements.
** Turn lane length does not include length of taper.*

Figure 44: CR 484 and I-75 Southbound Ramps - 2034 Build AM Peak Node Results

PM - CR 484 & I-75 SB Ramps

Movement	Demand Volume (veh)	Simulation Volume (veh)	Average Delay (sec)	Average Queue Length (ft)	Max Queue Length (ft)	Turn Lane Length (ft)*
SBL	550	518	61.7	127.5	430.0	500
SBR	644	602	36.0	82.4	272.0	450
EBT	1162	1141	29.6	113.8	425.1	-
EBR	226	221	18.4	0.0	1.6	-
WBL	179	170	55.4	74.8	300.5	300
WBT	1534	1433	20.6	132.6	532.9	-

Intersection (Node) ID 19
Note: Results shown are the average of 10 simulation runs.
Note: Queue lengths limited to distance to upstream node. This may affect some queue length measurements.
** Turn lane length does not include length of taper.*

Figure 45:CR 484 and I-75 Southbound Ramps - 2034 Build PM Peak Node Results

AM - CR 484 & I-75 NB Ramps

Movement	Demand Volume (veh)	Simulation Volume (veh)	Average Delay (sec)	Average Queue Length (ft)	Max Queue Length (ft)	Turn Lane Length (ft)*
NBL	226	192	78.5	62.0	192.1	350
NBR	179	152	8.6	5.0	89.6	350
EBL	644	541	45.9	92.8	344.5	300
EBT	1492	1284	6.0	23.5	366.6	-
WBT	1189	1159	35.9	109.5	417.4	-
WBR	550	542	14.9	42.5	382.0	200

Intersection (Node) ID 20
Note: Results shown are the average of 10 simulation runs.
Note: Queue lengths limited to distance to upstream node. This may affect some queue length measurements.
** Turn lane length does not include length of taper.*

Figure 46: I-75 Northbound Ramps and CR 484 - 2034 Build AM Peak Node Results

PM - CR 484 & I-75 NB Ramps

Movement	Demand Volume (veh)	Simulation Volume (veh)	Average Delay (sec)	Average Queue Length (ft)	Max Queue Length (ft)	Turn Lane Length (ft)*
NBL	423	413	73.7	109.0	376.7	350
NBR	342	318	11.0	16.4	197.2	350
EBL	315	312	73.0	92.3	275.0	300
EBT	1397	1340	5.8	23.4	329.7	-
WBT	1290	1189	39.8	177.9	422.5	-
WBR	381	350	7.0	1.2	50.6	200

Intersection (Node) ID 20
Note: Results shown are the average of 10 simulation runs.
Note: Queue lengths limited to distance to upstream node. This may affect some queue length measurements.
** Turn lane length does not include length of taper.*

Figure 47: I-75 Northbound Ramps and CR 484 - 2034 Build PM Peak Node Results

AM - CR 484 & SW 16th Ave

Movement	Demand Volume (veh)	Simulation Volume (veh)	Average Delay (sec)	Average Queue Length (ft)	Max Queue Length (ft)	Turn Lane Length (ft)*
NBL	188	191	77.8	58.1	172.5	250
NBT	56	53	69.3	29.3	144.7	-
NBR	30	31	38.0	56.5	196.6	-
SBL	65	63	79.3	31.7	137.9	200
SBT	93	93	74.4	51.1	194.2	-
SBR	291	286	17.8	51.9	194.7	300
EBU	16	48	88.2	99.3	319.1	325
EBL	316	274	75.9	99.3	319.1	325
EBT	1036	890	23.6	138.1	762.6	-
EBR	235	192	22.4	6.0	143.4	-
WBU	1	0	-	-	-	325
WBL	21	22	21.4	1.0	26.0	325
WBT	1109	1118	34.2	183.3	704.8	-
WBR	136	136	30.7	209.8	749.7	-

Intersection (Node) ID 23
Note: Results shown are the average of 10 simulation runs.
Note: Queue lengths limited to distance to upstream node. This may affect some queue length measurements.
** Turn lane length does not include length of taper.*

Figure 48: CR 484 and CR 475A 2034 Build AM Peak Node Results

PM - CR 484 & SW 16th Ave

Movement	Demand Volume (veh)	Simulation Volume (veh)	Average Delay (sec)	Average Queue Length (ft)	Max Queue Length (ft)	Turn Lane Length (ft)*
NBL	198	180	200.6	220.6	413.4	250
NBT	93	90	86.0	41.1	207.1	-
NBR	22	21	71.6	68.8	259.0	-
SBL	136	123	88.9	80.7	299.8	200
SBT	56	56	93.4	109.5	280.6	-
SBR	332	307	59.0	110.2	281.0	300
EBU	30	66	92.3	104.8	321.7	325
EBL	261	252	82.4	104.8	321.7	325
EBT	1075	1055	20.5	110.3	562.2	-
EBR	188	181	16.6	12.8	173.4	-
WBU	0	0	-	-	-	325
WBL	30	30	48.5	2.2	33.7	325
WBT	984	935	89.1	504.8	1,002.2	-
WBR	35	34	70.1	538.1	1,047.1	-

Intersection (Node) ID 23
Note: Results shown are the average of 10 simulation runs.
Note: Queue lengths limited to distance to upstream node. This may affect some queue length measurements.
** Turn lane length does not include length of taper.*

Figure 49: CR 484 and CR 475A Build 2034 PM Peak Node Results

10.4.7. *Travel Time Results*

The travel time results for the future Build (2034) peak hours are shown in **Table 62**. The travel times measured in the Build scenario range between 2.1 and 7.3 minutes. This is approximately 32 to 80 percent improvement over the No-Build scenario. The VISSIM analysis shows that the Build scenario alleviates the traffic congestion along CR 484 observed in the No-Build analyses, which is consistent with the intersection performance results summarized previously and observations made in the VISSIM models.

Table 62: 2034 Build Travel Time Results

Peak Hour	Travel Time Run	Free-Flow Travel Time (min)	Simulated Travel Time (min)
AM	1: CR 484 EB	3.0	7.3
	2: CR 484 WB	3.0	3.8
	3: CR 484 EB to I-75 SB ramp	2.0	6.0
	4: CR 484 EB to I-75 NB ramp	3.0	7.2
	5: CR 484 WB to I-75 NB ramp	2.0	2.7
	6: CR 484 WB to I-75 SB ramp	3.0	4.1
PM	1: CR 484 EB	3.0	3.1
	2: CR 484 WB	3.0	5.5
	3: CR 484 EB to I-75 SB ramp	2.0	2.1
	4: CR 484 EB to I-75 NB ramp	3.0	3.7
	5: CR 484 WB to I-75 NB ramp	2.0	4.1
	6: CR 484 WB to I-75 SB ramp	3.0	5.3

10.5. Design Year (2034) Build Operational Summary

The operational analyses conducted for the Design Year (2034) Build AM and PM peak hours show improvements over the No-Build scenario. The following summarizes the key findings from the Design Year (2034) Build analyses, focusing on the VISSIM microsimulation results:

- Intersections
  - The Build improvements at the ramp terminal intersections mitigated the queue spillback onto the I-75 mainline lanes observed in the No-Build scenario.
  - The maximum queues along both ramps are expected to be less than 450 feet during both peak hours.
  - The maximum queues from the microsimulation analysis do not encroach into the portions of the ramp intended for deceleration. Based on Table 10-5 of the AASHTO Greenbook, the deceleration distance needed to come to a stop condition is 615 feet.
    - The I-75 southbound off-ramp is approximately 1,150 feet. The maximum queue observed was approximately 430 feet. This leaves over 100 feet that could be used for additional storage/deceleration if needed.
    - The I-75 northbound off-ramp is approximately 1,170 feet. The maximum queue observed was approximately 380 feet. This leaves over 155 feet that could be used for additional storage/deceleration if needed.
  - There was an increase in the number of vehicles processed through each intersection in the Build scenario as compared to the No-Build scenario with increased throughput at the study intersections ranging from 17% to 53%.
- Travel times
  - The travel times along the arterial range between 2.1 to 7.2 minutes. Travel time improvements were observed ranging from 32% – 80% in the Build scenario over the No-Build in both AM and PM peaks.
- I-75 mainline results
  - The capacity constraints observed on I-75 within the influence area of the ramps will be further evaluated and addressed as part of the ongoing I-75 Master Plan.

11. DESIGN YEAR (2034) VISSIM COMPARATIVE SUMMARY

The Design Year (2034) VISSIM microsimulation results for the No-Build and Build scenarios are summarized and directly compared in this section. The comparisons include intersection node, travel time, and network wide performance.

11.1. Intersection Node Comparison

Table 63 shows an increase in the number of vehicles processed through each intersection in the Build scenario as compared to the No-Build scenario. The Build scenario is expected to process between 17% and 53% more traffic through the study signalized intersections when compared to the No-Build scenario.

Table 63: Node Throughput Results (2034 No-Build vs 2034 Build)

Peak Hour	Intersection	No-Build	Build	Difference (Build vs. No-Build)
AM	CR 484 at SW 20th Ave Rd	2,614	3,217	**23%**
	CR 484 at I-75 SB Ramps	3,191	3,820	**20%**
	CR 484 at I-75 NB Ramps	3,214	3,873	**21%**
	CR 484 at CR 475A	2,896	3,396	**17%**
PM	CR 484 at SW 20th Ave Rd	2,214	3,336	**51%**
	CR 484 at I-75 SB Ramps	2,719	4,097	**51%**
	CR 484 at I-75 NB Ramps	2,575	3,927	**53%**
	CR 484 at CR 475A	2,200	3,331	**51%**

A comparison of the maximum queues observed in the microsimulation analyses along the I-75 ramps is shown in **Table 64**. As noted in the table, the No-Build maximum queues at both ramp terminal intersections are expected to spillback onto the I-75 mainline lanes in 2034 PM peak hour. The Build improvements are expected to mitigate the queue spillback and reduce max queues along the ramps by up to approximately 4,500 feet.

Table 64: Ramp Max Queue Comparison (2034 No-Build vs 2034 Build)

Peak Hour	Intersection	Movement	No-Build Queue (ft)	Build Queue (ft)	Difference in feet (Build vs. No-Build)
AM	CR 484 at I-75 SB Ramps	Left	358	317	**-41**
		Right	163	133	**-30**
	CR 484 at I-75 NB Ramps	Left	455	192	**-263**
		Right	86	90	**4**
PM	CR 484 at I-75 SB Ramps	Left	4,708*	430	**-4,278**
		Right	4,788*	272	**-4,516**
	CR 484 at I-75 NB Ramps	Left	4,342*	377	**-3,965**
		Right	2,165*	197	**-1,968**

*Queue spills back onto the I-75 mainline

11.2. Travel Time Comparison

Table 65 shows the travel time improvements in the Build scenario. The improvements in the Build scenario reduce the travel times in both peak hours by at least 32% and at most 80% based on the simulation analysis conducted.

Table 65: Travel Time Results (2034 No-Build vs 2034 Build)

Time Period	Travel Time Run	Travel Time No-Build (min)	Travel Time Build (min)	Difference (Build vs No-Build)
AM	1: CR 484 EB	10.8	7.3	**-32%**
	2: CR 484 WB	9.4	3.8	**-59%**
	3: CR 484 EB to I-75 SB ramp	9.8	6.0	**-39%**
	4: CR 484 EB to I-75 NB ramp	12.4	7.2	**-42%**
	5: CR 484 WB to I-75 NB ramp	8.7	2.7	**-69%**
	6: CR 484 WB to I-75 SB ramp	9.3	4.1	**-56%**
PM	1: CR 484 EB	12.1	3.1	**-74%**
	2: CR 484 WB	9.7	5.5	**-43%**
	3: CR 484 EB to I-75 SB ramp	10.5	2.1	**-80%**
	4: CR 484 EB to I-75 NB ramp	12.4	3.7	**-70%**
	5: CR 484 WB to I-75 NB ramp	8.6	4.1	**-52%**
	6: CR 484 WB to I-75 SB ramp	9.0	5.3	**-41%**

11.3. Network Performance Comparison

Table 66 shows the differences in the network wide statistics. The comparison shows that the improvements are expected in each performance measure category for the Build scenario when compared to the No-Build scenario in both peak hours. These improvements are noted in bold in the summary table.

Table 66: Network Wide Statistics (2034 No-Build vs Build)

Time Period	Scenario	Average Delay (seconds)	Average Speed (mph)	Total Delay (hr)	Latent Delay (sec)	Latent Demand (veh)	Vehicles arrived
AM	No Build	210	31	901	788,292	804	13,111
	Build	**184**	**33**	**807**	**246,220**	**472**	**13,585**
PM	No Build	227	31	919	839,306	1,325	12,217
	Build	**101**	**44**	**451**	**71,689**	**75**	**14,390**

12. COMPARATIVE SAFETY ANALYSIS

The purpose of the comparative safety analysis was to determine the safety impacts for improvements within the study's area of influence. To determine these impacts, a predicted crash frequency analysis was performed utilizing the Enhanced Interchange Safety Analysis Tool (ISATe) Build 06.10 – Modified to Include Present Worth Analysis. The ISATe analysis can be performed on three unique freeway features: freeway mainline, freeway ramps, and freeway ramp terminals. For purposes of the comparative analysis, only facilities with noted geometric differences between the No-Build and Build conditions were assessed. The following facilities/limits within the study's area of influence were noted to be different and analyzed in ISATe for the No-Build and Build conditions:

- Freeway Mainline – gore points for the interchange ramps remained unchanged and no other freeway mainline modifications were made, thus no changes between the No-Build and Build conditions.
- Freeway Ramps –
  - I-75 southbound off ramp to CR 484;
  - I-75 northbound off ramp to CR 484; and
  - I-75 northbound on ramp from CR 484.
- Freeway Ramp Terminals –
  - I-75 southbound ramp terminal intersection with CR 484; and
  - I-75 northbound ramp terminal intersection with CR 484.

The results of the ISATe analysis are presented in the **Ramp and Ramp Terminal Results** section.

In addition to the ramp and ramp terminal improvements, turn lane/signal phasing improvements are proposed at the CR 484/CR 475A intersection. The FDOT's Safety Performance for Intersection Control Evaluation (SPICE) tool was utilized to assess safety impacts at this intersection. The results of this analysis are discussed in the **Intersection Results** section. The opening year of the analysis was 2024 and the design year of the analysis was 2034.

Access management improvements are also proposed along CR 484 to reduce the number of conflict points and better align directional median openings with driveways. A qualitative analysis was performed for these proposed improvements, and the results are discussed in the **Access Management Qualitative Assessment** section.

12.1. Ramp and Ramp Terminal Results

Table 67 provides the results of the ISATe analysis for the interchange ramp and ramp terminal analyses. The preliminary ISATe crash prediction outputs were converted to Florida specific crash distributions using the 2022 FDM Table 122.6.4. Freeway ramp distributions were utilized for the ramps and the "All Roadways and Ramps" distribution was utilized for the ramp terminal intersections. Then FDOT KABCO crash costs from the 2022 FDM Table 122.6.2 were applied to obtain the total present value of crashes.

Table 67: No-Build vs Build ISATe Predicted Crash Frequency Results

Scenario/ Feature	Predicted Fatal Crashes	Predicted Injury Crashes	Predicted Property Damage Only Crashes	Total Predicted Crashes	Total Present Value
No-Build – Ramps	0.08	7.40	13.72	21.20	$2,500,000
No-Build – Ramp Terminals	3.35	182.80	292.39	478.54	$77,640,000
No-Build – Totals	***3.43***	***190.20***	***306.10***	***499.74***	***$80,140,000***
Build – Ramps	0.09	7.88	14.60	22.57	$2,660,000
Build – Ramp Terminals	1.05	91.37	169.39	261.80	$30,910,000
Build – Totals	***1.14***	***99.25***	***183.99***	***284.37***	***$33,570,000***
Difference – Build minus No-Build	***-2.30***	***-90.95***	***-122.11***	***-215.37***	***($46,570,000)***

Note: Some values in **Table 67** may not sum due to rounding from the ISATe output spreadsheets.

The results of the analysis show the proposed improvements are predicted to experience approximately 215 less crashes, which equates to over $46.5 million in crash cost savings over the 10-year life cycle of the project. A majority of this crash reduction is observed at the ramp terminal intersections due to the proposed condition being protected-only left turn operations, as opposed to the existing protected-permissive operations.

12.2. Intersection Results

The following improvements are proposed at the CR 484 and CR 475A intersection:

- Westbound Approach – Changing from protected-permissive to protected-only left turn operation.
- Southbound Approach –
    - Adding an exclusive right turn lane.
    - Changing from protected-permissive to protected-only left turn operation.
- Eastbound Approach – Adding a second left turn lane and changing from protected-permissive to protected-only left turn operation.
- Northbound Approach – Adding a second left turn lane and changing from protected-permissive to protected-only left turn operation.

As shown in **Table 68**, crashes at the CR 484/CR 475A intersection are predicted to decrease with the proposed improvements. This is largely due to changing the left turn signal operations from protected-permissive to protected only operations.

Table 68: No-Build vs Build SPICE Predicted Crash Frequency Results

Scenario/ Feature	Predicted Fatal + Injury Crashes	Predicted Property Damage Only Crashes	Total Predicted Crashes	Total Present Value
CR 484 and CR 475A No-Build	47.1	69.4	116.5	$11,386,534
CR 484 and CR 475A Build	36.9	54.2	91.1	$8,923,610
Difference – Build minus No-Build	***-10.2***	***-15.2***	***-25.4***	***($2,462,925)***

Note: Some values in **Table 68** may not sum due to rounding from the SPICE output spreadsheets.

12.3. Access Management Qualitative Assessment

A qualitative assessment was performed for the access management improvements along CR 484 within the study's area of influence. Overall, the total number of conflict points will be reduced based on the consolidation of directional median access points. The following bullets discuss the qualitative benefits of the improvements based on the reduction in conflict points along CR 484:

- Between SW 20th Avenue Road and I-75 Southbound Ramp Terminal Intersection –
  - Existing Condition – 4 total directional median openings (2 eastbound left turn lanes and 2 westbound left turn lanes) with a combined 8 conflict points for the left turn movements. Vehicles making U-turns from the directional median openings may also conflict with the multiple driveways in this segment.
  - Proposed Condition – 2 total directional median openings (1 eastbound left turn lane and 1 westbound left turn lane) with a combined 4 conflict points for the left turn movements. These directional median openings are better aligned with major commercial driveways in this segment.
  - Qualitative Benefit – Reduction in 4 total conflict points may lead to fewer crashes and fewer severe injury crashes, as the conflicts are between through and left turning vehicles. Consolidating the directional median openings will provide fewer visual distractions for drivers traveling along CR 484, since there will still be 13 combined driveways/access points along the north and south sides of the roadway.
- Between I-75 Northbound Ramp Terminal Intersection and CR 475A –
  - Existing Condition – 3 total directional median openings (2 eastbound left turn lanes and 1 westbound left turn lane) with a combined 6 conflict points for the left turn movements. Vehicles making U-turns from the directional median openings may also conflict with the multiple driveways in this segment.
  - Proposed Condition – 2 total directional median openings (1 eastbound left turn lane and 1 westbound left turn lane) with a combined 4 conflict points for the left turn movements. This directional median opening is located at SW 17th Court.
  - Qualitative Benefit – Reduction in 2 total conflict points may lead to fewer crashes and fewer severe injury crashes, as the conflicts are between through and left turning vehicles.

Based on the points noted above, the access management improvements are anticipated to reduce overall crashes and reduce the number of severe injury crashes through the I-75 and CR 484 interchange area from a qualitative perspective.

12.4. **Comparative Safety Analysis Summary**

The following bullets summarize the comparative safety analysis of the Build versus the No-Build conditions:

- The I-75 ramp and ramp terminal improvements are predicted to reduce crashes and save over $46.5 million in crash costs over the 10-year life cycle of the project.
- It is anticipated that crashes would be reduced at the CR 484/CR 475A intersection which would save nearly $2.5 million in crash costs under the Build configuration.
- The project improvements (interchange and arterial intersection improvements) are anticipated to reduce crashes by approximately 240 crashes, equating to approximately $49 million in in crash cost savings over the 10-year life cycle of the project.
- The access management improvements are anticipated to reduce overall crashes and reduce the number of severe injury crashes through the I-75 and CR 484 interchange area from a qualitative perspective.

Appendix U provides the detailed results of the comparative safety analysis.

13. OTHER CONSIDERATIONS

13.1. Conceptual Signing Plan

The conceptual signing plan for this project is included in **Appendix V**.

13.2. Environmental Considerations

A Type 1 Categorical Exclusion in support of Right-of-Way (Phase 43) was signed on June 1, 2020. A similar Type 1 Categorial Exclusion is anticipated for Construction. No environmental consideration was identified that could influence the outcome of the selection process.

13.3. Access Management

The improvements proposed as part of this IOAR will affect access management within the area of influence along CR 484. A public hearing for access management was held on October 20, 2016. All approvals are complete, and the access management changes have been vetted through the local agencies.

13.4. Design Exceptions/Variations

Design exceptions/variations are not anticipated, but if an exception/variation should arise it will be processed per FHWA and FDOT standards.

14. FEDERAL HIGHWAY ADMINISTRATION (FHWA) POLICY POINTS

The Federal Highway Administration (FHWA) regulates the addition and modification of access points along the interstate system. On May 22, 2017 FHWA issued an updated Policy on Access to the Interstate, which now includes two policy points that must be addressed before a new interchange or modification of access points to the interstate is approved. The following summarizes how the I-75 at CR 484 interchange improvement concept fulfills each requirement.

14.1. Policy Point 1

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, and ramp intersections with crossroad) or on the local street network based on both the current and the planned future traffic projections. The analysis should, particularly in urbanized areas, include at least the first adjacent existing or proposed interchange on either side of the proposed change in access (Title 23, Code of Federal Regulations (CFR), paragraphs 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, should 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 should 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 should 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)).

The microsimulation (VISSIM) analysis shows that the Build Scenario will improve operations over the existing and No-Build scenarios along the I-75 mainline, ramps, and the CR 484 arterial. The Build scenario improvements are expected to mitigate queues onto the interstate from the off-ramps that were observed in the No-Build microsimulation analysis and have been observed in above average days in the field under the existing conditions.

Maximum queues in the Build scenario are expected to be reduced by up to 4,500 feet versus the No-Build scenario resulting in maximum queues of less than 450 feet during both design year (2034) peak hours. The maximum queues from the Build microsimulation analysis do not encroach into the portions of the ramp intended for deceleration. The Build scenario improvements are also expected to improve the arterial with increased intersection throughput (up to 53 percent) and improved travel times (up to 80 percent improvement) when compared to the No-Build scenario. The I-75 mainline operation remains the same between the Build and No-Build scenarios. The capacity constraints on the interstate will be evaluated/addressed by the ongoing I-75 Master Plan.

The results of the predictive safety analysis show the proposed improvements in the Build scenario are predicted to experience approximately 215 less crashes along the I-75 ramps and ramp terminals than the No-Build scenario, equating to approximately $46.5 million in crash cost savings over the 10-year life cycle of the project. It is also anticipated that crashes would be reduced at the CR 484 and CR 475A/SW 16th Avenue intersection by approximately 25 crashes which would save nearly $2.5 million in crash costs under the Build configuration. The overall project improvements are anticipated to reduce crashes by approximately 240 crashes, equating to approximately $49 million in in crash cost savings over the 10-year life cycle of the project.

14.2. Policy Point 2

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, such as managed lanes (e.g., transit or high occupancy vehicle and high occupancy toll lanes) or park and ride lots. The proposed access will be designed to meet or exceed current standards (23 CFR 625.2(a), 625.4(a)(2), and 655.603(d)). In rare instances where all basic movements are not provided by the proposed design, the report should include a full-interchange option with a comparison of the operational and safety analyses to the partial-interchange option. The report should also include the mitigation proposed to compensate for the missing movements, including wayfinding signage, impacts on local intersections, mitigation of driver expectation leading to wrong-way movements on ramps, etc. The report should describe whether future provision of a full interchange is precluded by the proposed design.

The existing interchange is a full diamond interchange providing full access to all traffic movements on the connecting crossroad (CR 484). The proposed improvements will maintain the current access to/from CR 484 and the existing gore points will remain unchanged as part of the proposed improvements.

15. CONCLUSIONS

The Florida Department of Transportation (FDOT) District Five has prepared an Interchange Operational Analysis Report (IOAR) for the proposed improvements at the I-75 at CR 484 interchange. The findings of the operational and safety analysis are summarized as follows:

Purpose and Need

- The purpose of this project is to add turn lanes to increase the safety and operational efficiency at the I-75 at CR 484 interchange and at the intersection of CR 484 at CR 475A.
- The need for the project is based on existing operational deficiencies at the existing I-75 interchange at CR 484. During average weekday conditions, the northbound left-turn movement at the CR 484/I-75 northbound ramps intersection approaches capacity (volume-to-capacity ratio of 0.99). During higher demand conditions (above average) this capacity constraint results in spillback onto the I-75 mainline during the PM peak hour, creating a safety concern. The project improvements are needed to improve the safety and operations of the I-75 mainline and CR 484 arterial.

Future Traffic Operations

- The microsimulation (VISSIM) analysis shows that the Build Scenario provides improved operations to the No-Build scenario on the southbound off-ramp, the northbound ramps, and the CR 484 arterial.
    - These improvements are expected to mitigate queue spillback onto the interstate observed in the No-Build microsimulation analysis and reduce the maximum queue lengths along both off-ramps. Spillback onto the mainline I-75 lanes is not expected to occur under the Build scenario during Design Year (2034) peak hour.
- The improvements in the Build scenario reduce the travel times in both peak hours by at least 32% and at most 80% based on the simulation analysis conducted.
- Each of the network wide performance metrics such as average delay, average speed, total delay, latent demand, latent delay, and vehicles arrived perform better in the Build scenario when compared to the No-Build scenario.

Future Safety Performance

- The I-75 ramp and ramp terminal improvements are predicted to reduce crashes and save over $46.5 million in crash costs over the 10-year life cycle of the project.
- It is anticipated that crashes would be reduced at the CR 484/CR 475A intersection which would save nearly $2.5 million in crash costs under the Build configuration.
- The project improvements (interchange and arterial intersection improvements) are anticipated to reduce crashes by approximately 240 crashes, equating to approximately $49 million in in crash cost savings over the 10-year life cycle of the project.
- The access management improvements are anticipated to reduce overall crashes and reduce the number of severe injury crashes through the I-75 and CR 484 interchange area from a qualitative perspective.

Appendix A – MLOU

Appendix B – Proposed Interim Interchange Concept

Appendix C – Raw Count Data

Turning Movement Counts

Classification Counts

Appendix D – Signal Timings

Appendix E – Seasonal Factors

Appendix F – Synchro

2019 AM

2019 PM

Appendix G – HCS Inputs and Results

Appendix H – VISSIM Calibration and Existing Conditions Results Report

Appendix I – Historical Crash Data

Appendix J – Crash Rate Analysis

Appendix K – Model Validation Report

Appendix L – Design Traffic Factors

Appendix M – Historical AADT and Trends Report

Historical AADTs

Trends Analysis

Appendix N – Model Plots

Appendix O – BEBR

Appendix P – NCHRP 765 Inputs/Outputs

Appendix Q – 2024 No-Build Operational Analysis Reports

Synchro

HCS

Appendix R – 2034 No-Build Operational Analysis Reports

Synchro

HCS

VISSIM

Appendix S – 2024 Build Operational Analysis Reports

Synchro

HCS

Appendix T – 2034 Build Operational Analysis Reports

Synchro

HCS

VISSIM

Appendix U – Comparative Safety Analysis

ISATE Freeway Ramp Outputs

ISATE Freeway Terminal Outputs

SPICE Intersection Outputs

Appendix V – Conceptual Signing Plan