

**INTERCHANGE OPERATIONAL ANALYSIS REPORT (IOAR)**  
**INTERSTATE 4 (SR 400) AT THONOTOSASSA ROAD (SR 566)**  
**HILLSBOROUGH COUNTY, FLORIDA**

FPID #443317-1-52-01

**Prepared for:**  
**FLORIDA DEPARTMENT OF TRANSPORTATION**  
**DISTRICT 7**  
**11201 N McKinley Drive**  
**Tampa, Florida 33612**



October 2021

# Interchange Operational Analysis Report (IOAR)

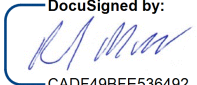
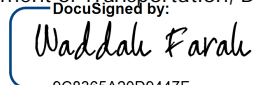
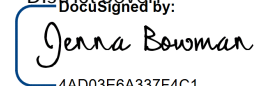
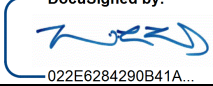
## I-4 at Thonotosassa Road (SR 566)

FPID: 443317-1-52-01



### Florida Department of Transportation Determination of Safety, Operational and Engineering Acceptability

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

Requestor	<div>DocuSigned by:</div>  <div>CADF49BFE536492...</div>	10/12/2021   8:28 AM EDT
	Richard Moss, P.E. Florida Department of Transportation, District 7	Date
Interchange Review Coordinator	<div>DocuSigned by:</div>  <div>9C8365A20D9447F...</div>	10/12/2021   8:47 AM EDT
	Waddah Farah, EI District Seven	Date
Systems Management Administrator	<div>DocuSigned by:</div>  <div>4AD03E6A337F4C1...</div>	11/10/2021   4:16 PM EDT
	Jenna Bowman, PE Systems Implementation Office – Central Office	Date
State Chief Engineer	<div>DocuSigned by:</div>  <div>022E6284290B41A...</div>	11/12/2021   10:35 AM EDT
	Will Watts, P.E. Central Office	Date

SYSTEMS IMPLEMENTATION OFFICE

QUALITY CONTROL CERTIFICATION FOR INTERCHANGE ACCESS REQUEST SUBMITTAL

Submittal Date: 10/11/2021

FM Number: 443317-1-52-01

Project Title: I-4 at Thonotosassa Road (SR 566) Interchange Operational Analysis Report (IOAR)

District: Seven

Requestor: Richard Moss, PE

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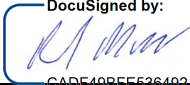
Document Type: ☐ MLOU ☐ IJR ☐ IMR ☒ IOAR ☐ OTHER \_\_\_\_\_

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)

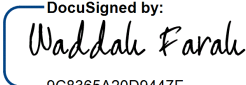
I-4 at Thonotosassa Road (SR 566) IOAR

Quality Control (QC) Statement

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

Requestor   
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Richard Moss, P.E., Director of Transportation  
Development, FDOT D7

10/12/2021 | 8:28 AM EDT  
Date: \_\_\_\_\_

IRC   
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Waddah Farah, EI, FDOT D7 DIRC

10/12/2021 | 8:47 AM EDT  
Date: \_\_\_\_\_

### PROFESSIONAL ENGINEER CERTIFICATION

I hereby certify that I am a registered professional engineer in the State of Florida and that this study has been prepared in accordance with FDOT and FHWA methodologies and guidelines. I certify that I have prepared/supervised the preparation of this study, traffic analysis, findings, and recommendations for the following project:

#### INTERCHANGE OPERATIONAL ANALYSIS REPORT (IOAR)

INTERSTATE 4 (SR 400) AT THONOTOSASSA ROAD (SR 566)

HILLSBOROUGH COUNTY, FLORIDA

FPID #443317-1-52-01





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## EXECUTIVE SUMMARY

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### EXECUTIVE SUMMARY

The purpose of this Interchange Access Request (IAR) is to evaluate current traffic operations, identify operational deficiencies, and recommend operational improvements for the I-4 at Thonotosassa Road (SR 566) interchange.

The need for this project is to improve safety and alleviate existing traffic congestion and excessive vehicle queues at the I-4 at Thonotosassa Road (SR 566) westbound off-ramp terminal intersection and the influence area.

The proposed improvements include:

- Installing a traffic signal at the I-4 westbound ramps terminal intersection
- Convert the existing northbound right turn lane at the I-4 eastbound ramp terminal intersection to a second northbound through lane
- Adding a right turn lane from northbound Thonotosassa Road (SR 566) to I-4 eastbound on-ramp
- Widen Thonotosassa Road (SR 566) from two lanes to four lanes between I-4 eastbound and I-4 westbound ramp terminal intersections
- Signal timing coordination (cycle length and offsets) between traffic signals

The proposed improvements at the I-4/Thonotosassa Road ramp terminal intersections will improve the operations of the intersections when compared to the No-Build conditions. The proposed improvements will also improve safety by reducing the I-4 westbound off-ramp queues and the impact to the I-4 mainline that are expected to occur in the No-Build conditions. Also, the proposed improvements are expected to reduce the total crashes at the I-4 westbound ramp terminal intersection by 39%. The cost estimate for the proposed improvements is \$3,683,210 including design and construction as shown in the FDOT Five-Year Work Program (FY 2022 to FY 2026).

The improvements identified in this IAR meet the Federal Highway Administration (FHWA) two policy points:

- **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*

## EXECUTIVE SUMMARY

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*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 purpose of this IOAR is to improve safety and alleviate the excessive queue at the I-4 at Thonotosassa Road (SR 566) westbound off-ramp terminal intersection. The proposed improvements will improve the operations of the I-4 westbound off-ramp as summarized below when compared to No-Build conditions:
- Opening Year (2025): The LOS of the WB off-ramp left turn movement will improve from LOS F to LOS D in the AM peak hour and from LOS F to LOS C in the PM peak hour. The vehicle queue for the I-4 WB left turn movement will be reduced 84% and 85% during the AM and PM peak hour, respectively. All movement at the ramp terminal intersections will operate at LOS D or better and none of the movement queues exceed available storage.
- Design Year (2045): The LOS of the WB off-ramp left turn movement will improve from LOS F to LOS E during both AM and PM peak hours. Under No-build conditions, the vehicle queue for the I-4 WB off-ramp left turn is expected to exceed the available storage and impact the I-4 mainline operations during the AM peak hour. Under Build conditions, the vehicle queue for the westbound left turn movement will be reduced 80% and 78% during the AM and PM peak hour, respectively, and no impact to the I-4 mainline is expected.
  - The northbound left turn movement at the westbound ramp terminal intersection will operate at LOS F during both AM and PM peak hours and the queue will exceed the available storage during both peak hours.
  - At the eastbound ramp terminal intersection, the eastbound right turn movement will operate at LOS F during both peak hours, but the queues are not expected to impact the mainline I-4 operations. The northbound through will also operate at LOS F during both peak hours but the queue will not exceed the available storage. The southbound left turn movement queue will exceed available storage during both peak hours.
- The design year for an IOAR is 10 years after opening year. The year of failure of the for the improvements is Year 2039. By Year 2039, the I-4 westbound ramp terminal

## EXECUTIVE SUMMARY

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intersection will operate at LOS E during the AM peak hour with the northbound left queue operating at LOS F and the northbound left turn queue exceeding the storage length. The westbound left turn will operate at LOS E but the queue of 440 feet is not expected to impact mainline I-4 operations which is the main purpose of the improvements.

- Between Year 2035 and 2040 an evaluation of the study area is recommended to evaluate if additional improvements are needed along Thonotosassa Road in the interchange study area
  - The operational and safety analysis demonstrate that the proposed improvements improve the safety and operation of the interchange by significantly reducing the queues for the I-4 westbound off-ramp when compared to No-Build conditions.
  - The total number of crashes at the ramp terminal intersections is expected to be reduced by 39%.
  - A conceptual signing plan has been prepared for the IAR.
- **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 proposed improvements will not alter the existing configuration of the I-4 and Thonotosassa Road interchange. The existing I-4 interchange at Thonotosassa Road provides access to public roads only. The proposed improvements at the interchange will maintain full access to Thonotosassa Road and accommodate all movements.

## INTRODUCTION

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### 1.0 INTRODUCTION

The Florida Department of Transportation (FDOT) conducted an I-4 Interchange Needs Evaluation Study to evaluate current traffic operations and identify operational deficiencies at the interchanges along I-4 from east of I-75 to the western connection of SR 570 (Polk Parkway). The study's primary goal was to identify problems at the interchanges off-ramps that cause safety and operational issues on the I-4 mainline. Proposed recommendations focused on small-scale, cost-feasible projects that can be funded through current FDOT programs. The I-4 Interchange Needs Evaluation Study was conducted concurrently with the I-4 Project Development and Environment (PD&E) Study. This Interchange Operational Analysis Report (IOAR) focus on the I-4 at Thonotosassa Road (SR 566) interchange. The I-4 Interchange Needs Evaluation Study is included in **Appendix A**.

I-4 is designated a SIS highway corridor as part of Florida's Strategic Intermodal System (SIS). *"The SIS represents a statewide network of high-priority transportation facilities, including Florida's largest and most significant airports, spaceports, deep-water seaports, freight rail terminals, passenger rail and intercity bus terminals, rail corridors, waterways, highways, military access facilities, intermodal logistic centers, and fixed guideway transit corridors. These facilities represent the state's primary means for moving people and freight between Florida's diverse regions, as well as between Florida and other states and countries".*<sup>1</sup>

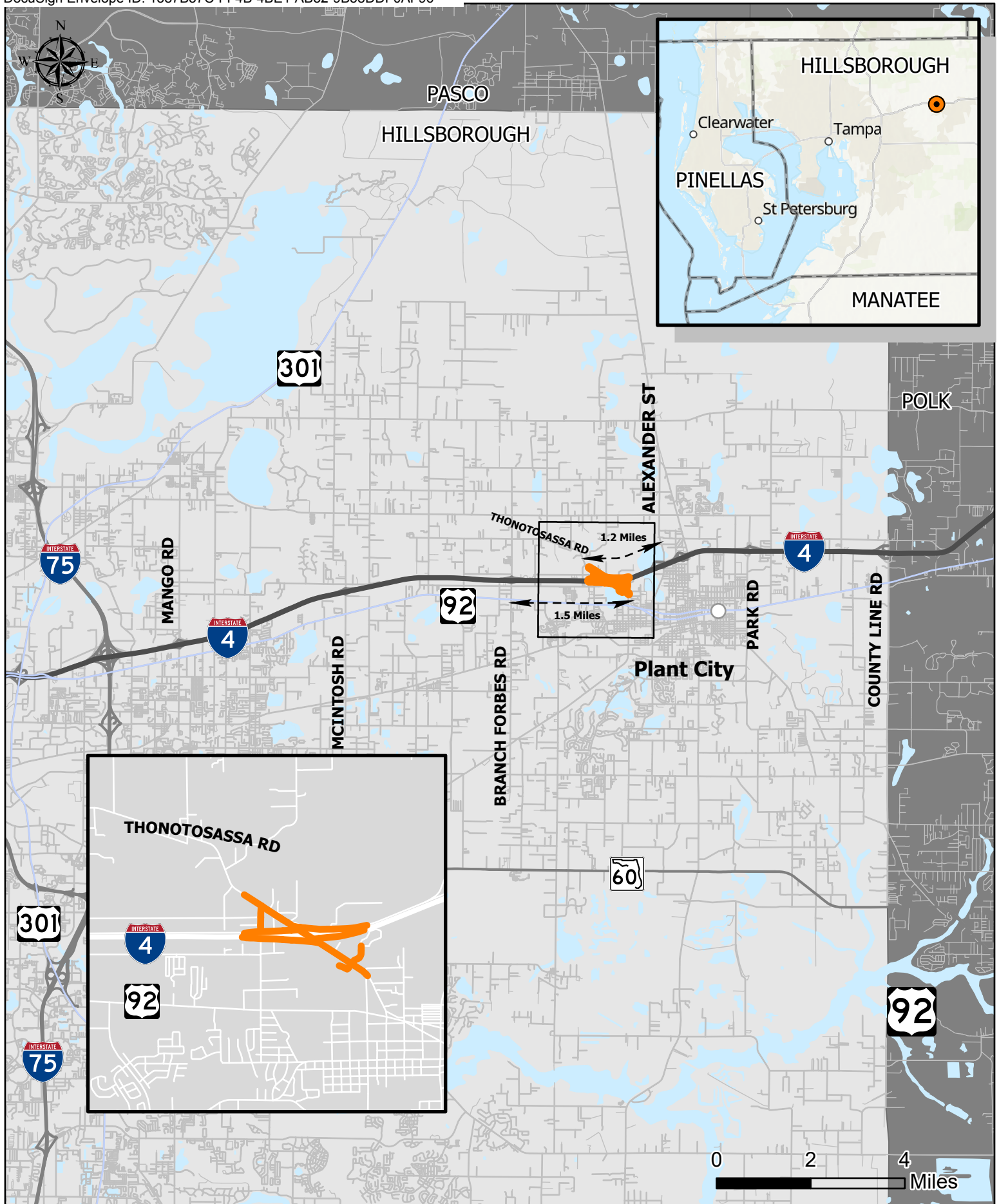
I-4 at Thonotosassa Road (SR 566) is a tight-diamond interchange configuration located approximately 1.5 miles east of the I-4 at Branch Forbes Road Interchange and 1.2 miles west of I-4 at Alexander Street Interchange. The interchange has an approximate 45-degree skew angle relative to the I-4 mainline creating the tight-diamond layout. Thonotosassa Road (SR 566) connects to US 92 south of the interchange and provides a direct connection to Plant City. **Figure 1-1** shows the location map of the interchange.

### 1.1 Purpose and Need

The purpose of this IOAR is to document the Safety, Operational and Engineering (SO&E) acceptability of transportation improvements proposed for the I-4 and Thonotosassa Road (SR 566) interchange. The need for this project is to improve safety and alleviate excessive vehicle queues at the I-4 at Thonotosassa Road (SR 566) westbound off-ramp and improve the operation of the ramp terminal intersections.

<sup>1</sup> *Strategic Intermodal System Handbook, Section 1: Strategic System Background, 2020*





## INTRODUCTION

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The need for this project is based on observed operational deficiencies during field observations conducted during the Interchanges Evaluation. Long queues at the westbound off-ramp were observed because the vehicles must wait on gaps along Thonotosassa Road to make the left turn. Also, left turn queues from northbound left turn movements along Thonotosassa Road (SR 566) were observed blocking the I-4 eastbound ramp terminal intersection. Based on the projected queues from the I-4 westbound off-ramp and future traffic volumes, a need to install traffic signal at the I-4 westbound off-ramp terminal intersection and extend the storage length of the northbound left turn lane at the I-4 westbound ramp terminal intersection were identified to minimize impacts to I-4 mainline operations and safety.

## STUDY METHODOLOGY

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### 2.0 STUDY METHODOLOGY

The methodology discussed in this section was used to conduct the I-4 at Thonotosassa Road (SR 566) IOAR. This report follows the guidelines in the *FDOT Interchange Access Request User's Guide* dated January 2018, the current guideline at the time the IAOR process was initiated. The approved Methodology Letter of Understanding (MLOU) is included in **Appendix B**.

- Available 72-hour bi-directional vehicle approach counts and turning movement counts collected were used in this study.
- Field observations conducted at the I-4 at Thonotosassa Road interchange study area during the morning and afternoon peak hours during the I-4 Interchange Needs Evaluation Study are summarized. Field observations was conducted in May 2021 to confirm the observations taken during the I-4 Interchange Needs Evaluation Study.
- Crash data from FDOT Crash Analysis Reporting (CAR) Online and the FDOT State Safety Office GIS (SSOGis) for the most recent five-year period available were used for safety analysis.
- 72-hour counts were converted to Annual Average Daily Traffic (AADT) by applying a seasonal factor (SF) and an axle correction factor (ACF). Design Hour factor (K) and the Directional Distribution (D) factor were applied to the AADTs to obtain the directional design hourly volume (DDHV).
- Evaluation of existing conditions was performed using Synchro 11 and the Highway Capacity Manual (HCM) 6th Edition results were reported.
- The years of analysis for this study are:
  - Existing Year – 2020
  - Opening Year – 2025
  - Design Year – 2045
- Year 2025 and 2045 volumes were estimated by applying a growth rate to the existing year AADT since the Tampa Bay Regional Planning Model version 9.1 sub area validation did not reasonably reflect corridor level guidelines for this interchange.
- Future condition traffic analyses were performed for No-Build Conditions and Build Alternative using Synchro 11 and HCM 6th Edition results were reported.
- A safety analysis in accordance with the 2018 FDOT Interchange Access Request User's Guide was conducted.

## STUDY METHODOLOGY

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- Design for this project is scheduled for Fiscal Year 2022 and Construction for Fiscal Year 2024.
- A signing plan was developed for the Build Alternative.
- FHWA Policy Points are discussed.
- Other topics addressed in the IOAR include:
  - Access Management
  - Coordination with other agencies/consistency with area transportation plans,
  - Design exceptions and variances, and
  - Environmental considerations

## EXISTING INTERCHANGE CONDITIONS

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### 3.0 EXISTING INTERCHANGE CONDITIONS

I-4 at Thonotosassa Road (SR 566) is a tight-diamond interchange configuration located approximately 1.5 miles east of the I-4 at Branch Forbes Road Interchange and has an approximate 45-degree skew angle relative to the I-4 mainline creating the tight-diamond layout. Thonotosassa Road connects to US 92 south of the interchange and provides a direct connection to Plant City. The Area of Influence (AOI) along Thonotosassa Road (SR 566) is from south of Goldfinch Drive (approximately 1,540 feet south of the interchange) to north of Whitehurst Road (approximately 1,495 feet north of the interchange) as shown in **Figure 3-1**. Thonotosassa Road (SR 566) is a four-lane divided urban minor arterial roadway from I-4 south to US 92 with a posted speed limit of 45 mph. North of the interchange, Thonotosassa Road is a two-lane undivided County major urban collector with a posted speed limit of 45 mph. Thonotosassa Road is one of the three roads with access to I-4 that leads to parking facilities for the Strawberry Festival.

Businesses located south of the interchange include Plant City Crossing Shopping Center, McDonald's, Starbucks, Waffle House, Applebee's, Sonny's BBQ, Outback, Carrabba's, and RaceTrac and Wawa gas stations. Businesses on the north side include Circle K store with Shell Gas station and A Stepping Stone AC & Heating.

I-4 at Thonotosassa Road (SR 566) eastbound off-ramp improvements were completed in 2016. The improvements included a second right turn lane operated under signal control for the eastbound I-4 to southbound Thonotosassa Road movement as well as closing the median opening on Thonotosassa Road which serviced Starbucks and the Wawa convenience store and gasoline service center driveway. A signalized U-turn movement is now provided at the eastbound I-4/Thonotosassa Road ramp terminal intersection to facilitate traffic diverted by the closed median opening.

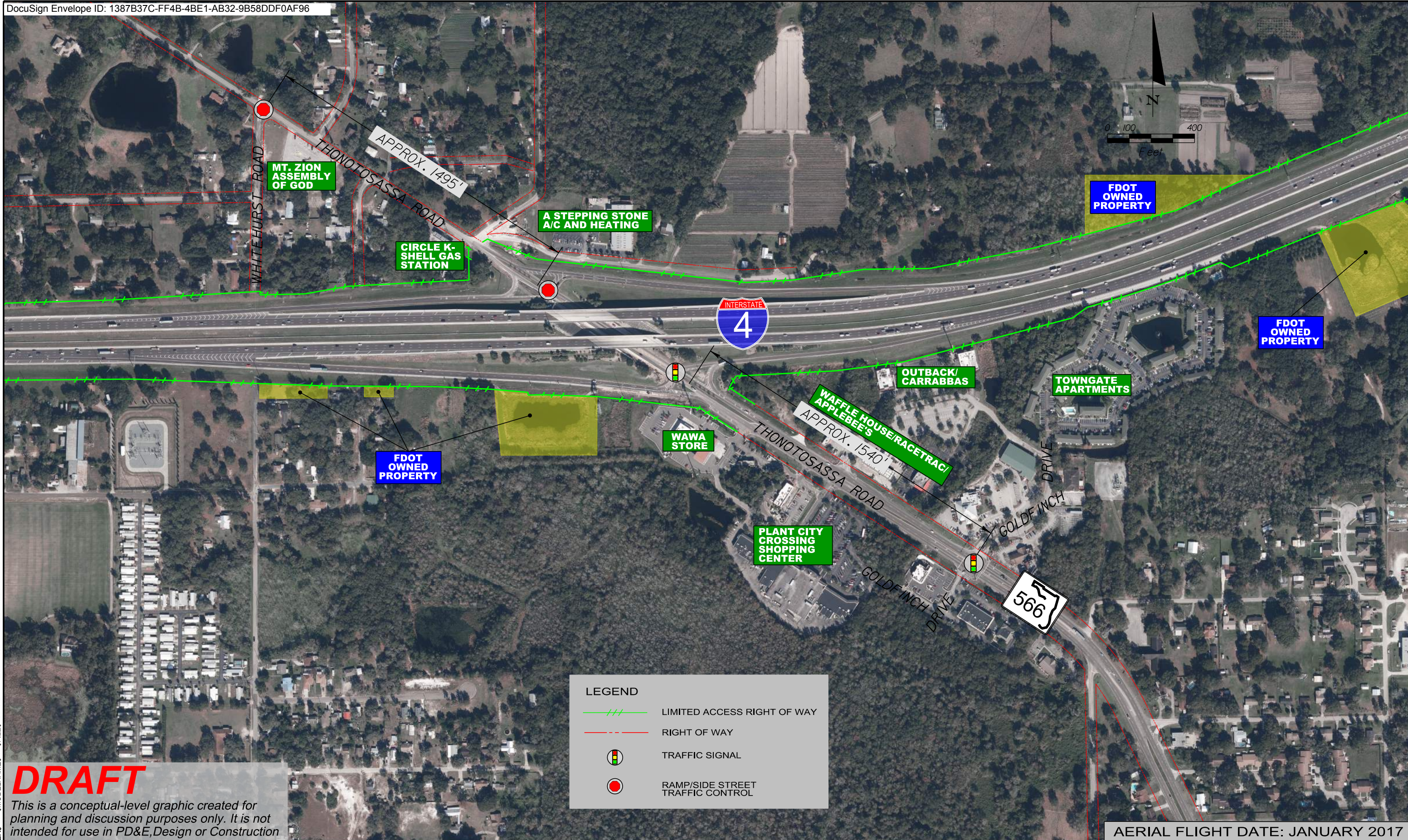
**Figure 3-2** shows the existing geometry and traffic control features of the intersections in the AOI of the interchange.

#### 3.1 Field Observations

AM and PM Peak hour field observations were conducted at the I-4 at Thonotosassa Road (SR 566) interchange during the I-4 Interchange Evaluation study on Wednesday, February 25, 2015. Below is a summary of the observations. The field observations are included in **Appendix C**.

Field reviews and observations were performed between July 2018 and September 2018 with the D7 Secretary, Traffic Ops, and FHWA to talk about the improvements and the observations were confirmed.



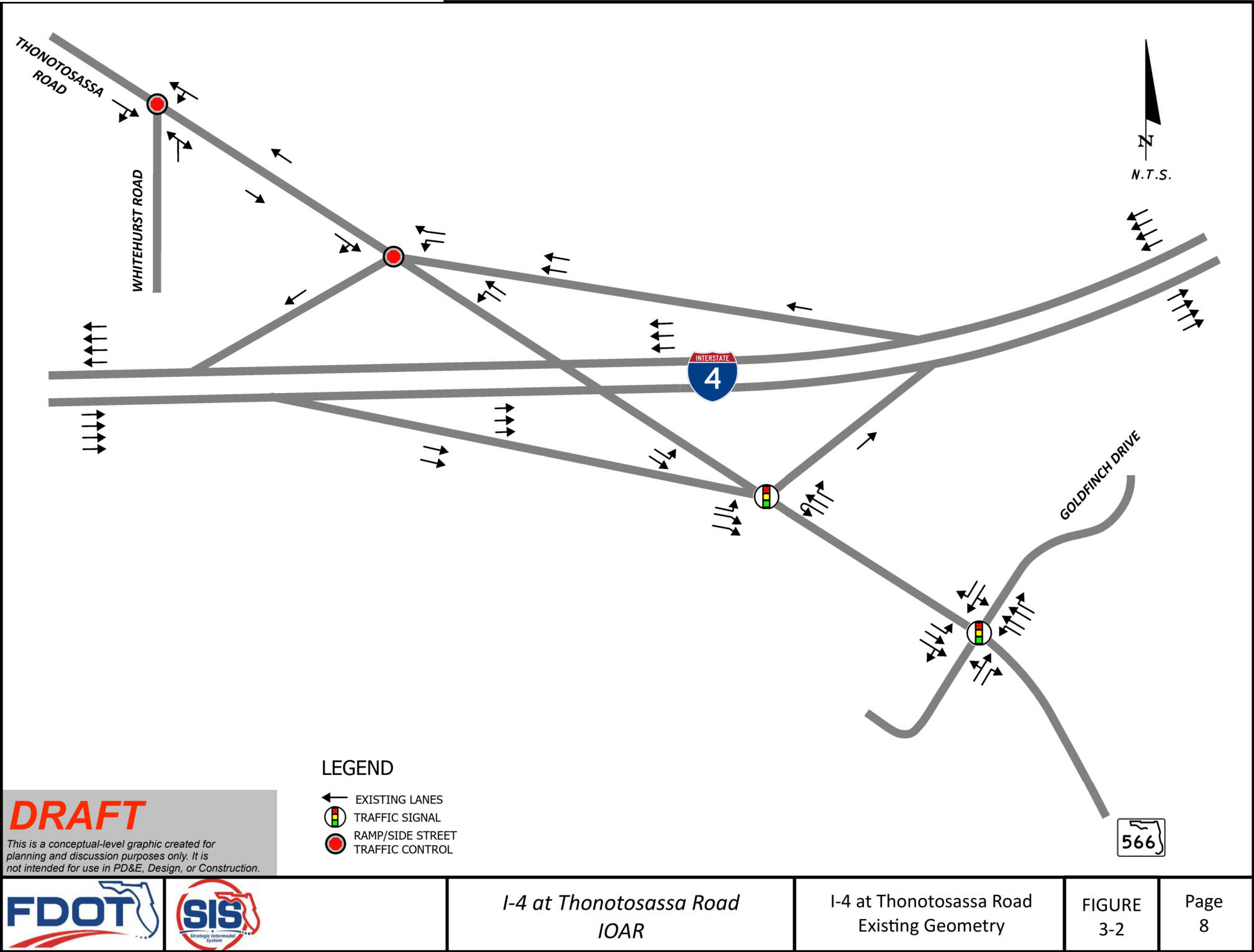


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This is a conceptual-level graphic created for planning and discussion purposes only. It is not intended for use in PD&E, Design or Construction

AERIAL FLIGHT DATE: JANUARY 2017





## EXISTING INTERCHANGE CONDITIONS

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An additional field observation was conducted on May 18, 2021 during the AM and PM peak hours at the I-4 westbound and the observations are summarized below. The observations are similar to the ones documented in the I-4 Interchange Needs Study taken outside of the Strawberry Festival days.

### 3.1.1 I-4 Westbound Ramps:

- **AM Peak Hour**
  - 7:43 am: Eight vehicles in queue on the I-4 westbound off-ramp left turn to southbound Thonotosassa Road.
  - 7:48 am: Ten cars in queue on the I-4 westbound off-ramp left turn to southbound Thonotosassa Road.
- **PM Peak Hour**
  - 5:15 pm: Four cars in queue on the I-4 westbound off-ramp left turn to southbound Thonotosassa Road.
  - 5:25 pm: Five cars in queue on the I-4 westbound off-ramp left turn to southbound Thonotosassa Road.



## EXISTING (2020) TRAFFIC VOLUMES AND OPERATIONAL ANALYSIS

### 4.0 EXISTING (2020) TRAFFIC VOLUMES AND OPERATIONAL ANALYSIS

#### 4.1 Annual Average Daily Traffic Volumes

AADTs for the I-4 at Thonotosassa Road (SR 566) Interchange Study area were collected from different sources:

- 72-hour bi-directional counts conducted in the study area from March 3, 2020 through March 5, 2020, before the Florida Governor mandated stay-at-home order
- Florida Traffic Online (FTO) 2019 ADDT data
- Recent studies in the study area

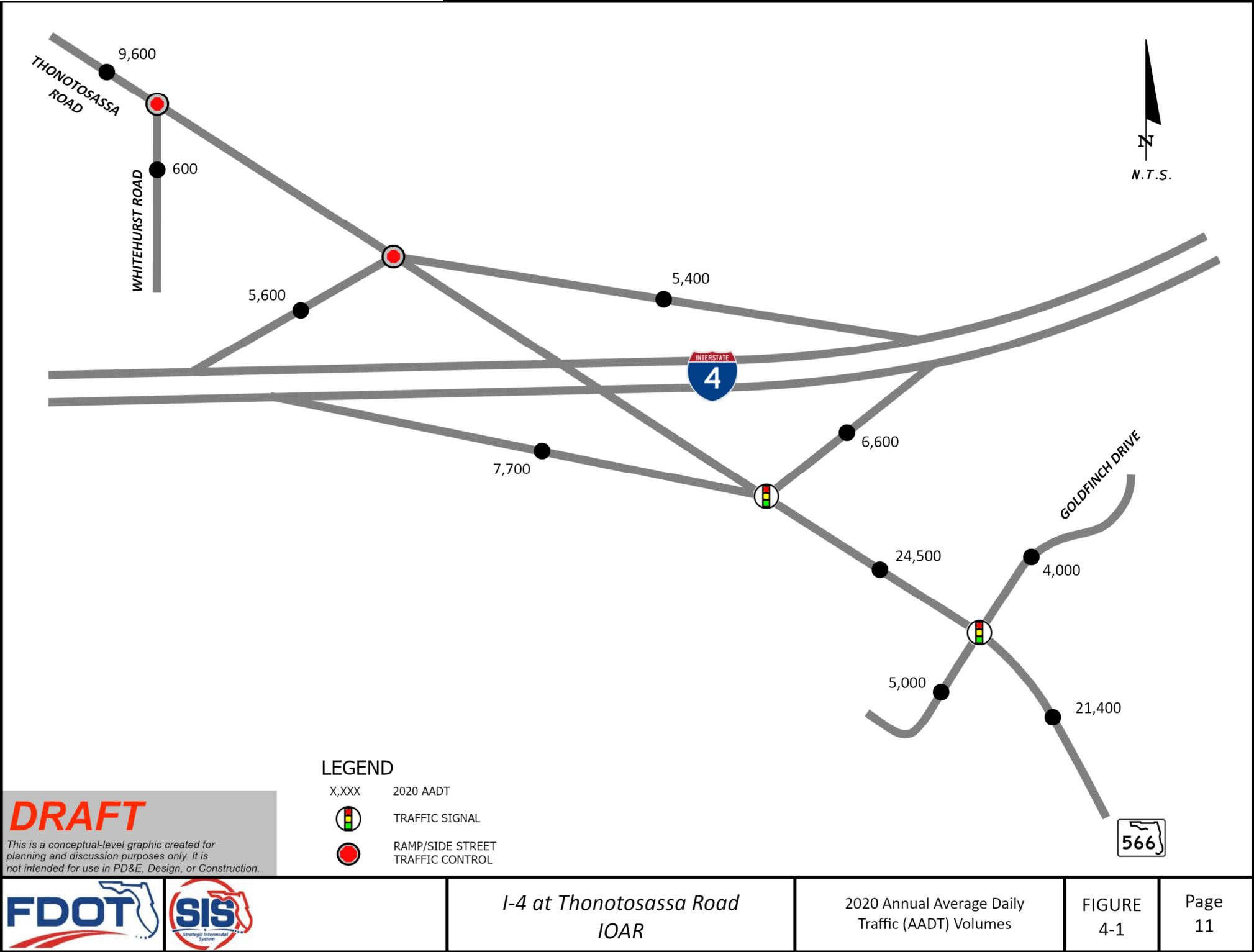
A seasonal factor (SF) of 0.95 and an axle correction factor (ACF) of 0.94 were applied to the 72-hour bi-directional counts to calculate the AADT. For some of the segments, where there was an equipment malfunction, ADDTs were taken from recent studies in the AOI and the FTO and a growth factor was applied. The Existing Year (2020) AADTs are summarized on **Table 4-1** and shown graphically on **Figure 4-1**. The 72-hour counts, data from FTO and recent studies, growth factor, and the AADT calculations are included in **Appendix D**.

**Table 4-1: Existing Year (2020) AADTs**

Location	2020 AADT (Rounded)
I-4 EB off-ramp to Thonotosassa Road	7,700
I-4 EB on-ramp from Thonotosassa Road	6,600
I-4 WB off-ramp to Thonotosassa Road	5,400
I-4 WB on-ramp from Thonotosassa Road	5,600
Thonotosassa Road south of I-4	24,500
Whitehurst Road west of Thonotosassa Road	600
Thonotosassa Road north of Whitehurst Road	9,600
Thonotosassa Road south of Goldfinch Dr	21,400
Goldfinch Dr east of Thonotosassa Road	4,000
Goldfinch Dr west of Thonotosassa Road	5,000

#### 4.2 Traffic Factors

The K and D factors are the percentage of daily traffic volumes occurring during the peak hour and the proportion of traffic traveling in the peak direction, respectively. FDOT adopted a Standard K for roadways to apply between the planning and design phases, making the K factor consistent among all phases of a project. The D factor was obtained by comparing the FTO Online, 72-hour counts, and the turning movement counts. A K factor of 9.0% and a D factor of 58% were used in the study.



## EXISTING (2020) TRAFFIC VOLUMES AND OPERATIONAL ANALYSIS

Design Hour Trucks (DHT) is the percentage of truck traffic during the design hour. A DHT of 5.0% was used in the report based on historical truck percentage at the I-4 ramps. The traffic factors are shown in **Table 4-2**.

**Table 4-2: Traffic Factors**

K Factor	D Factor	DHT
9.00 %	58%	5%

### 4.3 Turning Movement Volumes

The K and D factors were applied to the 2020 AADTs to obtain the DDHVs. The intersection turning volumes were determined by applying turning movement percentages derived from existing turning movement counts (TMCs) to the segment DDHVs. Once the segment DDHVs and intersection turning movements were calculated, the existing design hour traffic volumes were subsequently adjusted and balanced through the system. The TMCs were performed on Tuesday, March 3, 2020 from 6:00 am to 9:00 am and from 3:00 pm to 6:00 pm.

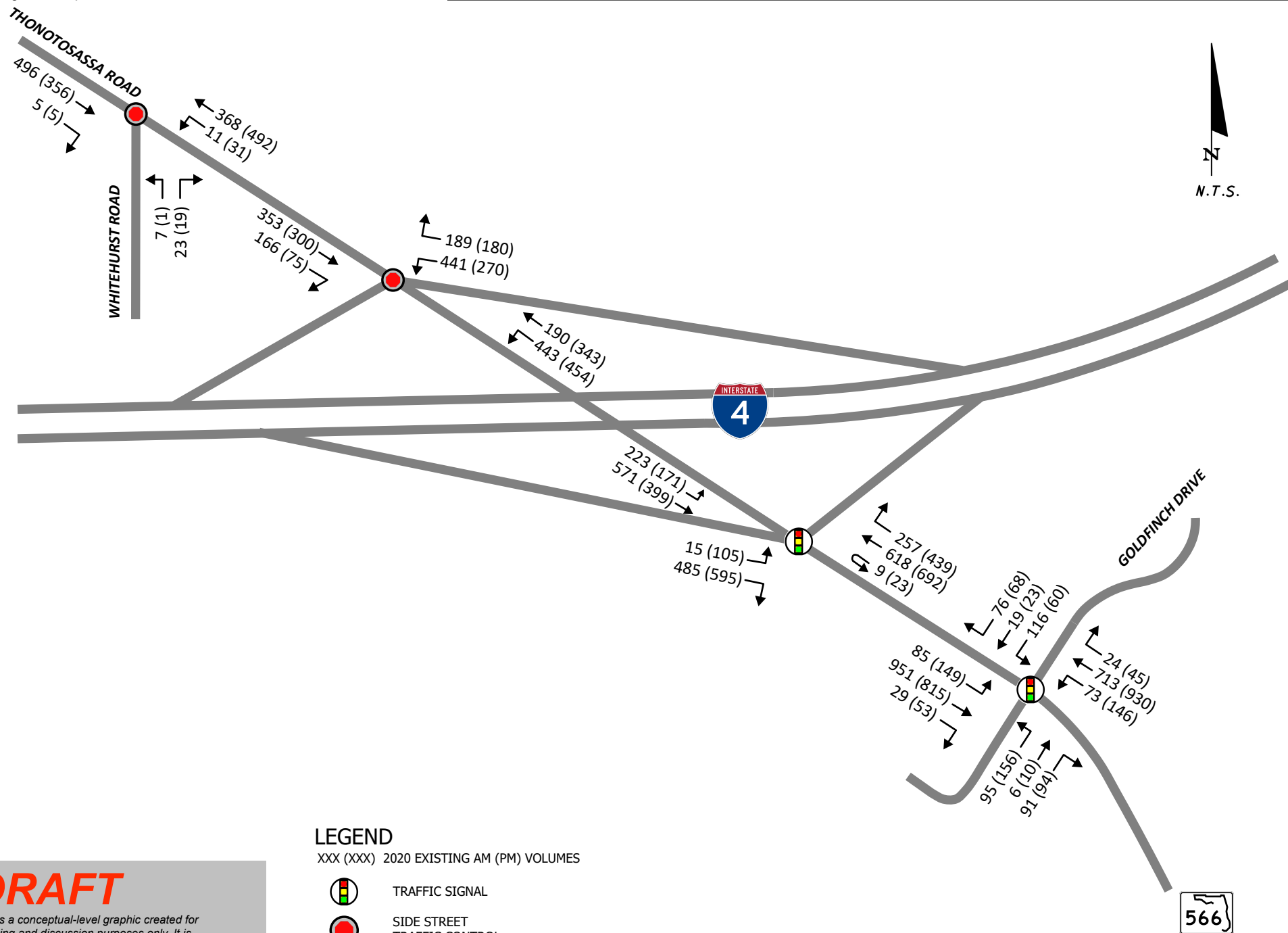
The Existing Year 2020 AM and PM peak hours turning movement volumes are shown in **Figure 4-2**. The DDHVs and turning movement volume calculation spreadsheet are included in **Appendix E**.

### 4.4 Existing (2020) Operational Analysis

There are two unsignalized intersections and two signalized intersections along Thonotosassa Road (SR 566) within the study area. The analysis of the existing signalized intersections was performed using existing signal phasing/timing information obtained from City of Plant City. The intersections operations were analyzed using Synchro 11 and the Highway Capacity Manual (HCM), 6<sup>th</sup> edition results are summarized in **Tables 4-3 and Table 4-5**. A target Level of Service (LOS) of D is established for the study area. The key measures of effectiveness are 95<sup>th</sup> percentile queue and delay for overall intersection and individual movements.

The peak hour factor (PHF) for the study area intersections ranged from 0.92 to 0.96 with an average of 0.95; therefore, a PHF of 0.95 was used for all analyzed intersections **Table 4-3** shows the delay and LOS for the existing conditions during the AM and PM peak hours. **Table 4-5** shows the vehicle queue results for the intersection movements.

**Table 4-3 and Table 4-5** shows the I-4 westbound off-ramp operating at LOS F during both peak hours with excessive delay and vehicle queues. The queues that exceeds the storage for that movement are shown in bold and highlighted in yellow in **Table 4-4**. The Existing Year (2020) Synchro results and the signal timing information are included in **Appendix F**.

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*I-4 at Thonotosassa Road*  
IOAR

I-4 at Thonotosassa Road (SR 566)  
Existing Year (2020)  
Turning Movement Volumes

FIGURE  
4-2

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## EXISTING (2020) TRAFFIC VOLUMES AND OPERATIONAL ANALYSIS

**Table 4-3: Existing Year (2020) Intersection Delay and LOS Results**

Approach	Movement	AM Peak Hour			PM Peak Hour		
		Delay (sec)	LOS	Approach LOS	Delay (sec)	LOS	Approach LOS
Intersection: Thonotosassa Road at Whitehurst Road*							
Westbound	Left	8.5	A		8.1	A	
Northbound	Left/Right	13.5	B	B	11.0	B	B
Intersection: Thonotosassa Road at I-4 WB Ramps*							
Westbound	Left	2298.4	F	F	1615.3	F	F
	Right	10.7	B		12.4	B	
Northbound	Left	10.1	B		9.8	A	
Intersection: Thonotosassa Road at I-4 EB Ramps**							
Eastbound	Left	23.3	C	C	26.4	C	D
	Right	31.6	C		40.8	D	
Southbound	Left	21.3	C	B	25.4	C	B
	Through	10.4	B		10.5	B	
Northbound	Through	32.2	C	C	48.7	D	D
Intersection			24.2	C	Intersection	35.3	D
Intersection: Thonotosassa Road at Goldfinch Road							
Eastbound	Left	10.0	B	B	12.3	B	B
	Thru/Right	17.7	B		16.5	B	
Westbound	Left	11.3	B	B	11.6	B	B
	Through	14.0	B		16.6	B	
	Right	10.7	B		11.3	B	
Northbound	Left/Thru	63.5	E	D	273.1	F	F
	Right	24.7	C		25.8	C	
Southbound	Left/Thru	175.8	F	F	39.0	D	C
	Right	24.0	C		24.4	C	
Intersection			27.8	C	Intersection	33.9	C

\*Per HCM 6<sup>th</sup> Edition: For Two Way Stop Control (TWSC) intersections only minor movements delay and LOS are reported. HCM 6<sup>th</sup> Edition does not calculate LOS for major street thru movements and approaches or for the whole intersection. \*\*HCM 6<sup>th</sup> edition does not evaluate U-turn movements and unsignalized delay (NB Right) is excluded from calculations for approach delay and intersection delay.

As indicated in Table 4-3 footnote, HCM 6<sup>th</sup> edition does not evaluate U-turn movements or provided delay/LOS results for the unsignalized NB right movement at I-4 EB ramp terminal intersection, therefore, HCM 2000 results are included in **Table 4-4** for those movements.

**Table 4-4: Existing Year HCM 2000 results for I-4 EB Ramp Terminal Movements**

Movement	Storage (ft)	AM Peak Hour		PM Peak Hour	
		Delay (sec/veh)/ LOS	95 <sup>th</sup> Percentile Queue (ft)	Delay (sec/veh)/ LOS	95 <sup>th</sup> Percentile Queue (ft)
NB U-turn	260	10.8/B	5	9.6/A	11
NB Right	1,500*	12.7/B	42	13.5/B	81

\*Outside NB through lane ends as a right turn lane at the I-4 EB on-ramp

## EXISTING (2020) TRAFFIC VOLUMES AND OPERATIONAL ANALYSIS

**Table 4-5: Existing Year (2020) Intersection Vehicle Queues**

Intersection	Movement	Storage (ft)	AM Peak Hour Queues (95 <sup>th</sup> Percentile)		PM Peak Hour Queues (95 <sup>th</sup> Percentile)	
			Veh	Feet**	Veh	Feet**
Thonotosassa Road at Whitehurst Road	WB Left	1,500	0.0	0	0.1	3
	NB Left/Right	825	0.2	5	0.1	3
Thonotosassa Road at I-4 WB Ramps	WB Left	2,100	51.5	1,288	30.7	768
	WB Right	950	0.9	23	1.1	28
	NB Left	65	1.9	48	1.9	48
Thonotosassa Road at I-4 EB Ramps	EB Left	2,500	0.4	10	3.3	83
	EB Right	2,850	15.2	380	20.7	518
	SB Left	130	4.5	113	4.0	100
	SB Thru	600	8.5	213	6.9	173
	NB Thru	1,500	17.2	430	25.2	630
Thonotosassa Road at Goldfinch Road	EB Left	250	0.9	23	1.7	43
	EB Thru/Right	1,500	8.7	218	7.7	193
	WB Left	300	0.8	20	1.7	43
	WB Through	560	5.4	135	8.1	203
	WB Right	200	0.3	8	0.6	15
	NB Left/Thru	200	4.7	118	16.9	423
	NB Right	200	2.2	55	2.3	58
	SB Left/Thru	600	11.2	280	2.8	70
	SB Right	200	1.8	45	1.6	40

\*For ramps, the storage was determined as the length of the ramp or as the storage lane length when provided

\*\*Queue in feet estimated by multiplying the number of vehicles times 25 ft.

The storage (ft) length shown in **Table 4-5** were determined as follows:

- On I-4 eastbound off-ramp, the left turn storage length of 2,500 ft is the length of the ramp from the stop bar to the gore including the deceleration length. The right turn total storage length is the length of the ramp from stop bar to the including the deceleration length plus additional 350 ft of the second right turn lane.
- For I-4 westbound off-ramp, the left turn storage of 2,100 ft is the length of the ramp from the stop bar to the gore including the deceleration length. The westbound right turn lane storage length includes deceleration length.
- For all intersections, the total storage lengths for the left and right turn movements includes storage length plus deceleration length.

## TRAVEL DEMAND FORECASTING

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### 5.0 TRAVEL DEMAND FORECASTING

The travel demand forecast for this IOAR was developed in accordance with the procedures in the 2019 FDOT Project Traffic Forecasting Handbook. Annual Average Daily Traffic (AADTs) and design hour volumes were computed for each roadway within the area of influence (AOI) following the process described herein.

#### 5.1 Travel Demand Model Validation

The Tampa Bay Regional Planning Model (TBRPM) Version 9.1 (v9.1) is the adopted travel demand model for this study area. The TBRPM v9.1 is a time-of-day based four-step model with Base Year 2015 and Horizon Year (Cost Affordable Year) 2045.

Prior to utilizing the traffic assignment generated by a travel demand model for forecasting, a validation of the model should be performed to ascertain its ability to reasonably replicate travel demand in the area of influence. The extent and depth of this validation depends on the scope of each project; however, at a minimum, the capability of the Base Year model to replicate available counts should be evaluated, as well as the proper coding of the networks.

For this project, the validation consisted of assessing the reasonableness of the TBRPM v9.1 Base Year 2015 highway assignment output by means of calculating model output-to-count ratios in those links where counts were available. To this end, the 2015 Peak Season Weekday Average Daily Traffic (PSWADT) volumes generated by the model were converted to 2015 AADT by applying the Model Output Conversion Factor (MOCF) obtained from FTO Peak Season Factor Category Report. The model AADTs were then compared to 2015 AADTs volumes obtained from the I-4 Interchange Needs Evaluation Report from east of I-75 to the western connection of SR 570 (Polk Parkway) and FDOT's FTO.

The Cost Affordable Year 2045 model network was reviewed for consistency with planned projects in the study area.

The results of the validation revealed that the 2015 Base Year Model either under-assigned or over-assigned traffic on critical non-interstate links within the AOI, in some cases quite significantly with volume-to-count ratios as low as 0.19 on Thonotosassa Road north of Whitehurst Road and as high as 2.79 on the I-4 westbound exit ramp to Thonotosassa Road. The results of the highway assignment validation are tabulated in **Appendix G**.

Since the travel demand model did not reasonably replicate existing travel behavior on the non-interstate links within the AOI, it was concluded that the application of off-model methods would be more appropriate to estimate the project future year traffic volumes.

**TRAVEL DEMAND FORECASTING**

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Off-model methods refer to the analysis conducted to determine the growth rate of the corridor since the travel demand model did not reasonably replicate existing travel behavior and the analysis and methodology is explained in **Section 5.2**.

**5.2 Project Traffic Forecast**

For the off-model forecast methodology, Existing Year 2020 AADTs and AM/PM peak hour volumes were obtained from traffic count data. The 2020 AADTs were computed by applying the appropriate Seasonal Factors (SF) and Axle Correction Factors (ACF) obtained from FDOT’s FTO to the field recorded Average Daily Traffic (ADT) counts. The 2020 peak hour intersection turning movement volumes were obtained from field collected turning movement counts (TMCs).

Design Year 2045 AADTs were developed by applying a growth rate to the Existing Year AADTs. Opening Year 2025 AADTs were then determined through interpolation of Existing Year and Design Year AADTs.

Traffic factors were applied to the future year AADTs to obtain Opening and Design Year segment design hour volumes (DHVs) and directional design hour volumes (DDHVs). Lastly, the AM and PM peak hour intersection turning movement volumes for the future horizon years (i.e., 2025 and 2045) were determined by applying turning movement percentages derived from existing TMCs to the segment DDHVs.

Since the project’s proposed improvements are not expected to result in any travel pattern changes, one set of future year volumes were developed for each analysis year to evaluate both the No Build and Build scenarios.

**5.2.1 Growth Rate Analysis**

A robust analysis was undertaken to determine the appropriate growth rate for the corridor. The growth rate analysis included a detailed assessment of historical traffic growth trends, travel demand model highway assignment growth (TBRPM 2015/2045), and socio-economic growth (TBRPM 2015/2045).

Population projections produced by the Bureau of Economic and Business Research (BEBR) were also analyzed; however, the data is representative of countywide trends and does not reflect the localized growth expected in the vicinity of the project interchange; therefore, it was decided that socio-economic data for the AOI from the 2015 and 2045 TBRPM were going to be used for the growth rate analysis. Considering all previously discussed sources of information, a compounded annual growth rate of 2.0% was recommended for the IOAR AOI.

**Table 5-1 and Figure 5-1** show the projected Opening Year (2025) and Design Year (2045) AADTs.



## TRAVEL DEMAND FORECASTING

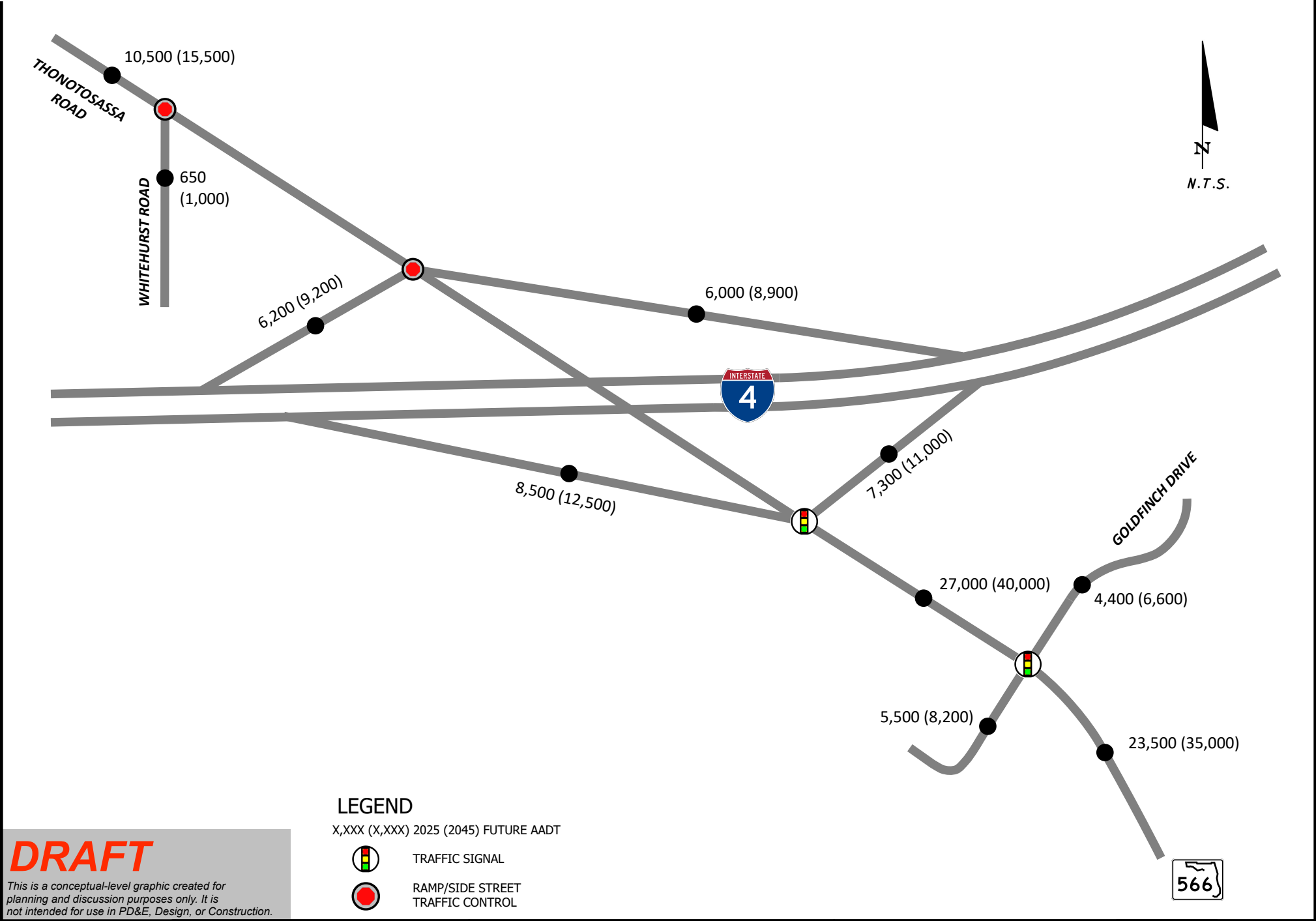
Tables summarizing the historical traffic, travel demand model assignment, and socio-economic growth analyses are provided in **Appendix H** for further reference. **Appendix H** also includes the FDOT Historic Traffic Trends Analysis Tool output reports.

**Table 5-1: Opening Year (2025) and Design Year (2045) AADTs**

Location	Year 2020	Opening Year 2025	Year 2025 Rounded	Design Year 2045	Year 2045 Rounded
I-4 EB off-ramp	7,700	8,501	8,500	12,633	12,500
I-4 EB on-ramp	6,600	7,287	7,300	10,828	11,000
I-4 WB off-ramp	5,400	5,962	6,000	8,859	8,900
I-4 WB on-ramp	5,600	6,183	6,200	9,187	9,200
Thonotosassa Road south of I-4	24,500	27,050	27,000	40,195	40,000
Whitehurst Road west of Thonotosassa Road	600	662	650	984	1,000
Thonotosassa Road north of Whitehurst Road	9,600	10,599	10,500	15,750	15,500
Thonotosassa Road south of US Goldfinch Dr	21,400	23,627	23,500	35,109	35,000
Goldfinch Dr east of Thonotosassa Road	4,000	4,416	4,400	6,562	6,600
Goldfinch Dr west of Thonotosassa Road	5,000	5,520	5,500	8,203	8,200

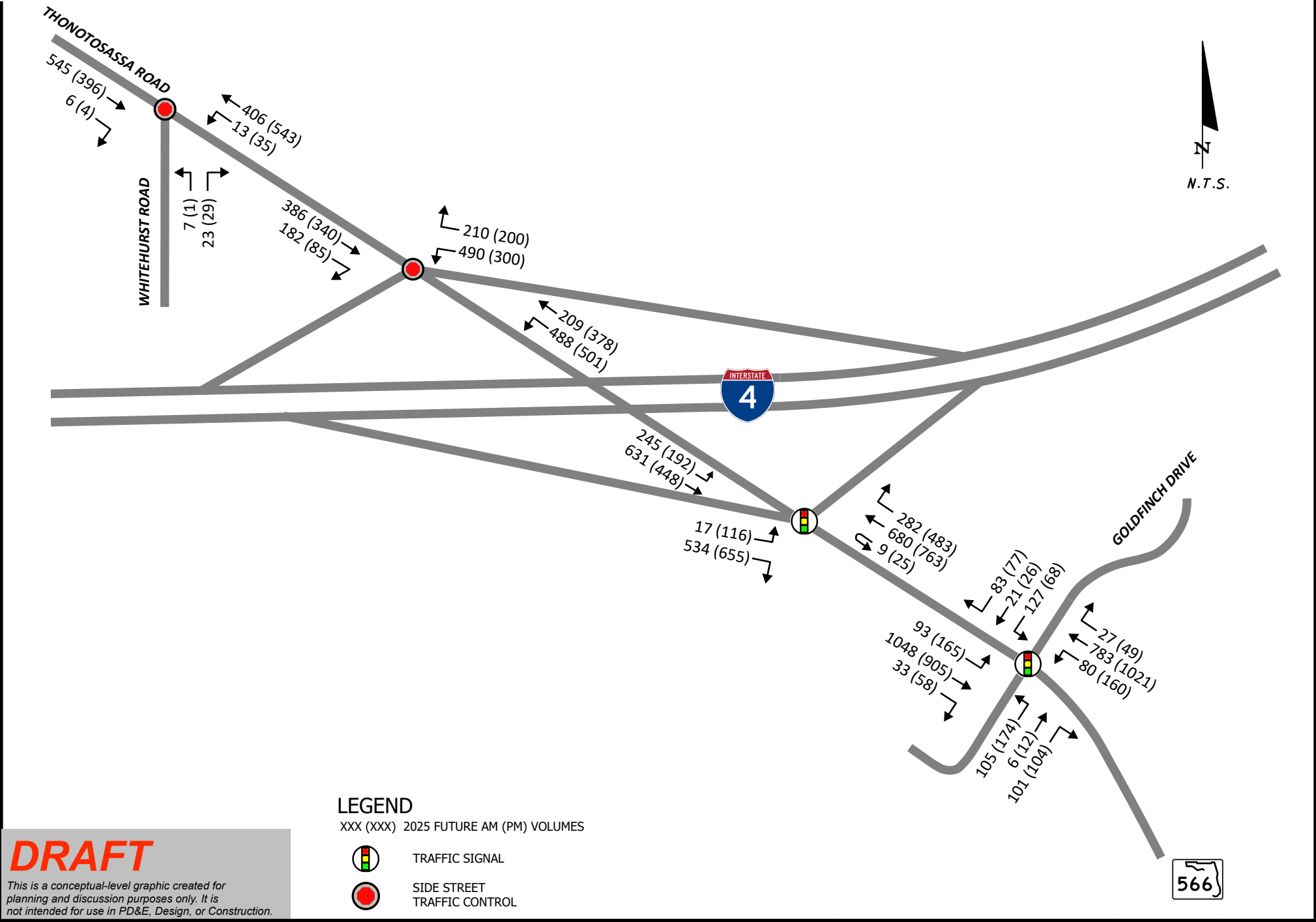
### 5.2.2 Project Traffic Volumes

The DDHVs for the Opening Year (2025) and Design Year (2045) were developed by multiplying the AADT volume by the design traffic factors (Standard K and D factors) described in **Section 4.2**. Peak hour intersection turning movement volumes were obtained from the design hourly volumes using the existing turning movement percentages. **Figures 5-2 and 5-3** show the design hourly volume for the Opening and Design Years, respectively. The DDHVs and turning movement volume calculation spreadsheets are included in **Appendix I**.



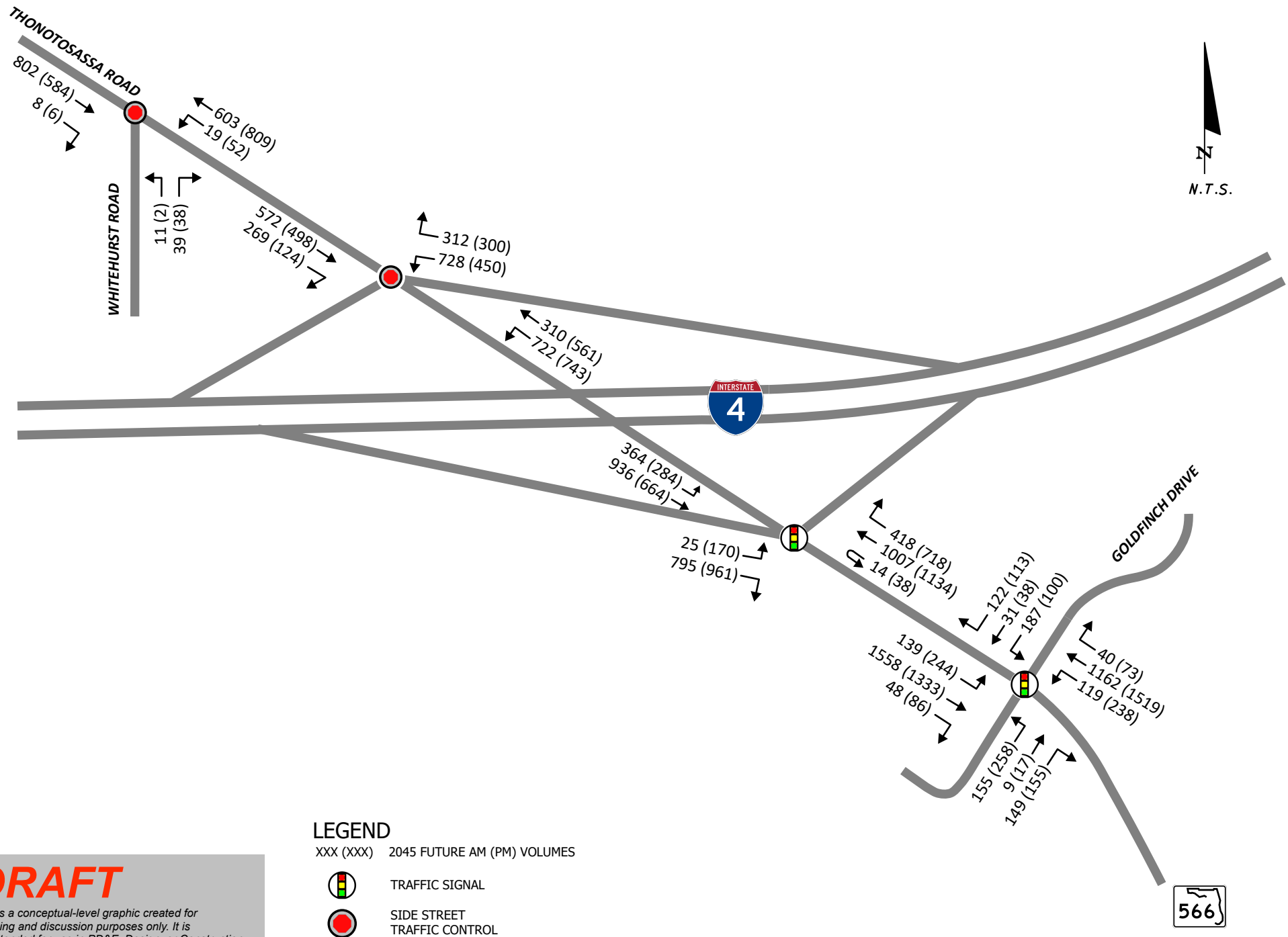
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*I-4 at Thonotosassa Road  
IOAR*

I-4 at Thonotosassa Road (SR 566)  
Design Year (2045)  
Turning Movement Volumes

FIGURE  
5-3

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ALTERNATIVES CONSIDERED AND ANALYSIS

6.0 ALTERNATIVES CONSIDERED AND ANALYSIS

The I-4 at Thonotosassa Road (SR 566) traffic analysis was conducted for the following scenarios:

- No-Build Conditions
- Build Alternative

The No-Build Conditions and the Preferred Alternative were evaluated for years 2025 and 2045.

6.1 Alternatives Considered

6.1.1 No-Build Alternative

The No-Build Alternative includes existing conditions for Opening Year (2025) and Design Year (2045) analysis. There are no planned or programmed improvements anticipated to be constructed in the AOI.

6.1.2 Build Alternative

The Build Alternative consists of Transportation Systems Management and Operations (TSM&O) strategies plus additional improvements in the AOI based on field observations and projected future traffic volumes. The Build Alternative includes:

- Installing a traffic signal at the I-4 westbound ramps terminal intersection and adding an additional westbound left tun lane to create dual westbound left turn lanes.
- Convert the existing northbound right turn lane at the I-4 eastbound ramp terminal intersection to a second northbound through lane
- Adding a right turn lane from northbound Thonotosassa Road (SR 566) to I-4 eastbound on-ramp
- Widen Thonotosassa Road (SR 566) from two lanes to four lanes between I-4 eastbound and I-4 westbound ramp terminal intersections
- Signal timing coordination (cycle length and offsets) between traffic signals

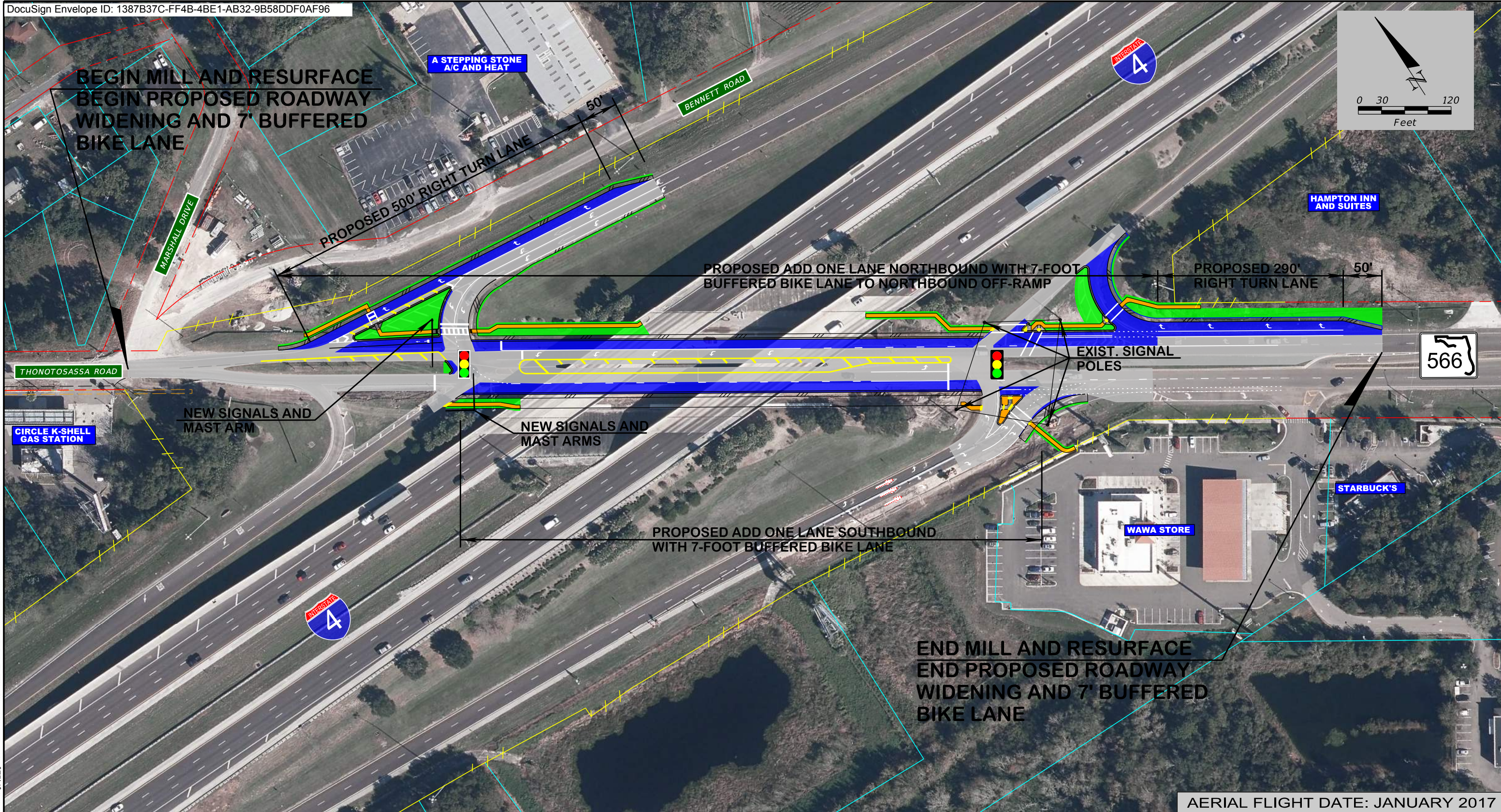
The Build Alternative improvements are shown in **Figure 6-1**. The Build Alternative lane configuration is shown in **Figure 6-2**.

6.2 No-Build Conditions Analysis

6.2.1 Year 2025 Analysis

**Table 6-1** shows the delay and level of service (LOS) for the No-Build Conditions during the AM and PM peak hours for Opening Year 2025 and **Table 6-2** shows the vehicle queue results.


















AERIAL FLIGHT DATE: JANUARY 2017

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**LEGEND**

	ROADWAY WIDENING		GRASSED MEDIAN/ISLAND		PROPOSED RIGHT-OF-WAY		EXISTING TRAFFIC SIGNAL
	CONCRETE SIDEWALK/TRAFFIC SEPARATOR		NEW ROADWAY CONSTRUCTION		EXISTING L/A RIGHT-OF-WAY		PROPOSED TRAFFIC SIGNAL
	BRIDGE WIDENING		EXISTING R/W		PROPOSED L/A RIGHT-OF-WAY		
					EXISTING PARCEL LINE		



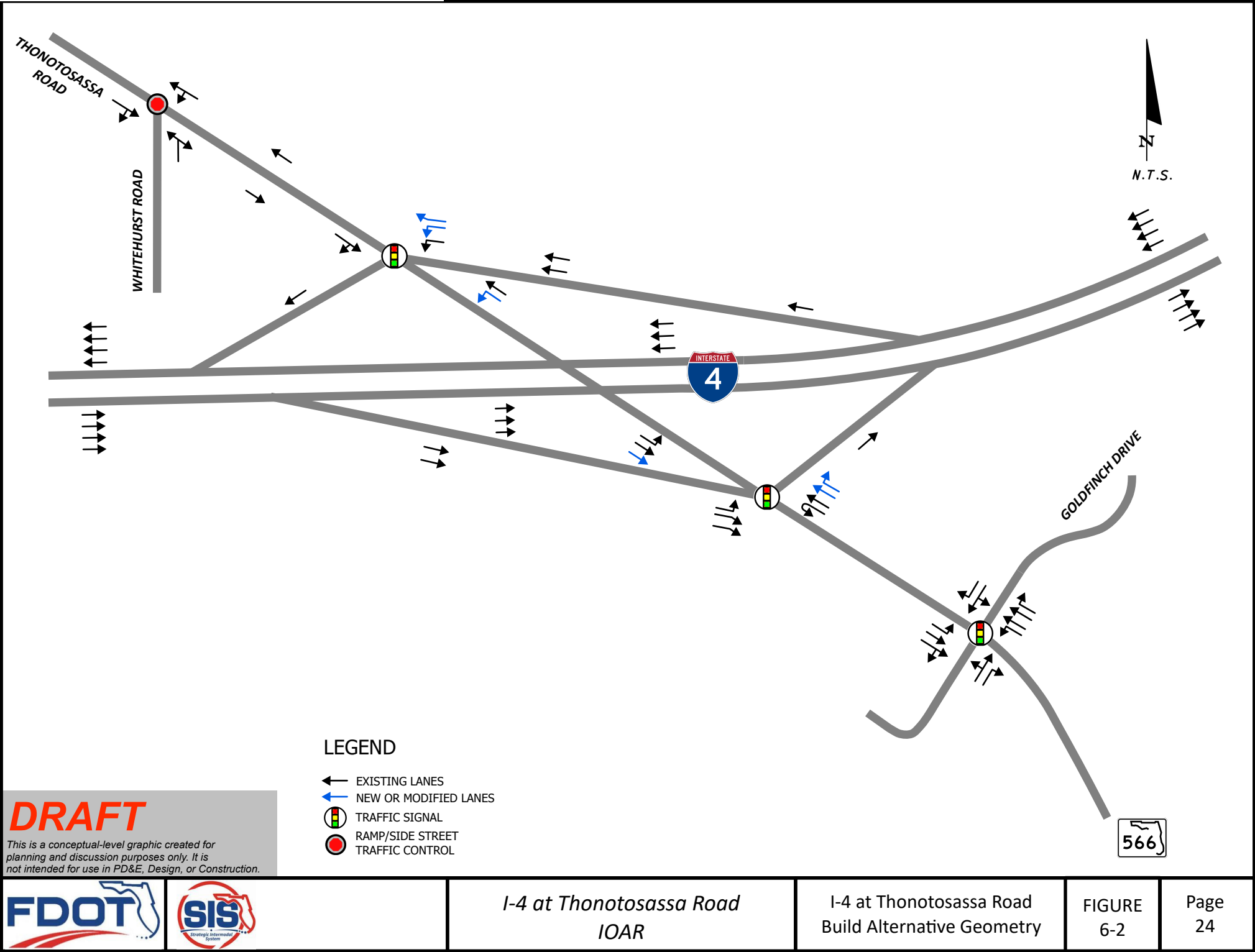
**I-4 AT THONOTOSASSA ROAD (SR 566) IOAR**

I-4 AT THONOTOSASSA ROAD (SR 566) INTERCHANGE IMPROVEMENTS

FIGURE 6-1

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## ALTERNATIVES CONSIDERED AND ANALYSIS

**Table 6-1: Opening Year (2025) No-Build Intersection Delay and LOS Results**

Approach	Movement	AM Peak Hour			PM Peak Hour		
		Delay (sec)	LOS	Approach LOS	Delay (sec)	LOS	Approach LOS
Intersection: Thonotosassa Road at Whitehurst Road*							
Westbound	Left	8.7	A		8.3	A	
Northbound	Left/Right	14.4	B	B	11.3	B	B
Intersection: Thonotosassa Road at I-4 WB Ramps*							
Westbound	Left	3687.5	F	F	2742.2	F	F
	Right	11.1	B		13.3	B	
Northbound	Left	10.7	B		10.5	B	
Intersection: Thonotosassa Road at I-4 EB Ramps**							
Eastbound	Left	26.2	C	D	26.5	C	D
	Right	39.9	D		46.1	D	
Southbound	Left	42.4	D	C	42.8	D	C
	Through	13.6	B		12.0	B	
Northbound	Through	43.8	D	D	87.9	F	F
Intersection		33.5		C	Intersection	52.4	D
Intersection: Thonotosassa Road at Goldfinch Road							
Eastbound	Left	10.1	B	B	13.6	B	B
	Thru/Right	19.5	B		17.8	B	
Westbound	Left	11.8	B	B	12.3	B	B
	Through	14.0	B		17.8	B	
	Right	10.5	B		11.2	B	
Northbound	Left/Thru	105.6	F	E	376.5	F	F
	Right	27.6	C		29.4	C	
Southbound	Left/Thru	242.3	F	F	58.8	E	D
	Right	25.6	C		26.1	C	
Intersection		34.6		C	Intersection	42.8	D

\*Per HCM 6<sup>th</sup> Edition: For Two Way Stop Control (TWSC) intersections only minor movements delay and LOS are reported. HCM 6<sup>th</sup> Edition does not calculate LOS for major street thru movements and approaches or for the whole intersection. \*\*HCM 6<sup>th</sup> edition does not evaluate U-turn movements and unsignalized delay (NB Right) is excluded from calculations for approach delay and intersection delay.

The results show the operations of the I-4 westbound off-ramp are expected to continue to worsen if the intersection keeps its current configuration for both peak hours. During the PM peak hour, the northbound through movement is expected to operate at LOS F.

**Table 6-2** shows a queue of 1,510 ft for the I-4 westbound off-ramp during the AM peak hour. Even though the available storage on the ramp is expected to accommodate the queue length, the projected queue is getting close to affect I-4 mainline operations. **Table 6-2** also shows the southbound left turn movement queue will exceed the available storage during both peak hours. The No-Build Synchro results are included in **Appendix J**.



## ALTERNATIVES CONSIDERED AND ANALYSIS

**Table 6-2: Opening Year (2025) No-Build Intersection Vehicle Queues**

Intersection	Movement	Storage (ft)	AM Peak Hour Queues (95 <sup>th</sup> Percentile)		PM Peak Hour Queues (95 <sup>th</sup> Percentile)	
			Veh	Feet*	Veh	Feet*
Thonotosassa Road at Whitehurst Road	WB Left	1,500	0.0	0	0.1	3
	NB Left/Right	825	0.2	5	0.2	5
Thonotosassa Road at I-4 WB Ramps	WB Left	2,100	60.4	1,510	36.8	920
	WB Right	950	1.1	28	1.4	35
	NB Left	65	2.4	60	2.3	58
Thonotosassa Road at I-4 EB Ramps	EB Left	2,500	0.5	13	3.8	95
	EB Right	2,850	18.8	470	23.5	588
	SB Left	130	10.8	270	9.0	225
	SB Through	600	11.8	298	8.6	215
	NB Through	1,500	23.5	588	37.8	945
Thonotosassa Road at Goldfinch Road	EB Left	250	1.0	25	2.0	50
	EB Thru/Right	1,500	10.1	253	8.9	223
	WB Left	300	0.9	23	1.8	45
	WB Through	560	6.1	153	9.2	230
	WB Right	200	0.3	8	0.6	15
	NB Left/Thru	200	7.4	185	21.8	545
	NB Right	200	2.7	68	2.9	73
	SB Left/Thru	600	14.4	360	4.3	108
	SB Right	200	2.1	53	2.0	50

\*Queue in feet estimated by multiplying the number of vehicles times 25 ft.

As indicated in Table 6-1 footnote, HCM 6th edition does not evaluate U-turn movements or provided delay/LOS results for the unsignalized NB right movement at I-4 EB ramp terminal intersection. Therefore, HCM 2000 results are included in Table 6-3 for those movements.

**Table 6-3: 2025 No-Build HCM 2000 results for I-4 EB Ramp Terminal Movements**

Movement	Storage (ft)	AM Peak Hour		PM Peak Hour	
		Delay (sec/veh)/ LOS	95 <sup>th</sup> Percentile Queue (ft)	Delay (sec/veh)/ LOS	95 <sup>th</sup> Percentile Queue (ft)
NB U-turn	260	11.0/B	6	10.0/A	12
NB Right	1,500*	13.7/B	55	14.4/B	116

\*Outside NB through lane ends as a right turn lane at the I-4 EB on-ramp

## ALTERNATIVES CONSIDERED AND ANALYSIS

### 6.2.2 Year 2045

**Table 6-4** shows the delay and level of service (LOS) for the No-Build Conditions for Design Year 2045 during the AM and PM peak hours and **Table 6-5** shows the vehicle queue results.

**Table 6-4: Design Year (2045) No-Build Intersection Delay and LOS Results**

Approach	Movement	AM Peak Hour			PM Peak Hour		
		Delay (sec)	LOS	Approach LOS	Delay (sec)	LOS	Approach LOS
Intersection: Thonotosassa Road at Whitehurst Road*							
Westbound	Left	9.7	A		9.0	A	
Northbound	Left/Right	22.8	C	C	14.7	B	B
Intersection: Thonotosassa Road at I-4 WB Ramps*							
Westbound	Left	49846.1	F	F	36278.8	F	F
	Right	14.4	B		23.6	C	
Northbound	Left	21.2	C		18.7	C	
Intersection: Thonotosassa Road at I-4 EB Ramps**							
Eastbound	Left	26.3	C	F	29.3	C	F
	Right	97.1	F		190.1	F	
Southbound	Left	183.0	F	E	86.0	F	D
	Through	35.3	D		17.8	B	
Northbound	Through	281.3	F	F	367.8	F	F
Intersection			147.4	F	Intersection	199.5	F
Intersection: Thonotosassa Road at Goldfinch Road							
Eastbound	Left	13.8	B	E	78.1	E	D
	Thru/Right	73.1	F		42.3	D	
Westbound	Left	16.2	B	B	62.0	E	D
	Through	18.5	B		55.3	F	
	Right	10.2	B		10.7	B	
Northbound	Left/Thru	320.3	F	F	804.7	F	F
	Right	63.7	E		74.3	E	
Southbound	Left/Thru	592.5	F	F	301.2	F	F
	Right	40.0	D		36.9	D	
Intersection			90.9	F	Intersection	109.4	F

\*Per HCM 6<sup>th</sup> Edition: For Two Way Stop Control (TWSC) intersections only minor movements delay and LOS are reported. HCM 6<sup>th</sup> Edition does not calculate LOS for major street thru movements and approaches or for the whole intersection. \*\*HCM 6<sup>th</sup> edition does not evaluate U-turn movements and unsignalized delay (NB Right) is excluded from calculations for approach delay and intersection delay.

The results show the operations of the I-4 westbound off-ramp are expected to continue to worsen if the intersection keeps its current configuration for both peak hours. The I-4 eastbound ramp terminal intersection is also expected to operate at LOS F during both peak hours with the eastbound right, southbound left and northbound left turn movements operating at LOS F during both peak hours. The Goldfinch intersection is expected to also operate at LOS F during both AM and PM peak hours, but the failing LOS is not a result of the I-4 ramp terminal operations.

## ALTERNATIVES CONSIDERED AND ANALYSIS

**Table 6-5** shows a queue of 2,448 ft for the I-4 westbound off-ramp during the AM peak hour that are expected to affect I-4 mainline operations. Although long queues are shown for the I-4 eastbound off-ramp, the queue is not expected to affect the I-4 mainline operations. At the EB ramp terminal intersection, the queues for the southbound left turn, southbound through and northbound through movements will exceed available storage.

**Table 6-5: Design Year (2045) No-Build Intersection Vehicle Queues**

Intersection	Movement	Storage (ft)	AM Peak Hour Queues (95 <sup>th</sup> Percentile)		PM Peak Hour Queues (95 <sup>th</sup> Percentile)	
			Veh	Feet*	Veh	Feet*
Thonotosassa Road at Whitehurst Road	WB Left	1,500	0.1	3	0.2	5
	NB Left/Right	825	0.8	20	0.3	8
Thonotosassa Road at I-4 WB Ramps	WB Left	2,100	97.9	2,448	61.4	1,535
	WB Right	950	2.5	63	4.3	108
	NB Left	65	8.5	213	7.7	193
Thonotosassa Road at I-4 EB Ramps	EB Left	2,500	0.8	2	6.0	150
	EB Right	2,850	34.8	870	51.6	1,290
	SB Left	130	25.0	625	12.6	315
	SB Through	600	29.9	748	15.5	388
	NB Through	1,500	96.4	2,410	124.1	3,103
Thonotosassa Road at Goldfinch Road	EB Left	250	1.6	40	9.9	248
	EB Thru/Right	1,500	30.5	763	20.0	500
	WB Left	300	1.4	35	8.4	210
	WB Through	560	10.8	270	24.1	603
	WB Right	200	0.5	13	1.0	25
	NB Left/Thru	200	18.1	453	41.2	1,030
	NB Right	200	7.2	180	8.1	203
	SB Left/Thru	600	30.3	758	15.3	383
	SB Right	200	4.3	108	3.8	95

\*Queue in feet estimated by multiplying the number of vehicles times 25 ft.

As indicated in Table 6-4 footnote, HCM 6th edition does not evaluate U-turn movements or provided delay/LOS results for the unsignalized NB right movement at I-4 EB ramp terminal intersection. Therefore, HCM 2000 results are included in Table 6-6 for those movements.

The No-Build Synchro results are included in **Appendix J**.

## ALTERNATIVES CONSIDERED AND ANALYSIS

**Table 6-6: 2045 No-Build HCM 2000 results for I-4 EB Ramp Terminal Movements**

Movement	Storage (ft)	AM Peak Hour		PM Peak Hour	
		Delay (sec/veh)/ LOS	95 <sup>th</sup> Percentile Queue (ft)	Delay (sec/veh)/ LOS	95 <sup>th</sup> Percentile Queue (ft)
NB U-turn	260	20.6/C	12	17.5/B	24
NB Right	1,500*	20.6/C	183	39.5/D	#508**

\*Outside NB through lane ends as a right turn lane at the I-4 EB on-ramp

\*\*#: 95<sup>th</sup> percentile volume exceeds capacity, queue may be longer

### 6.3 Build Analysis

The improvements included in Figure 6-1 and discussed in Section 6.1.2 are included in the Year 2025 Build Analysis. The lane utilization factor was adjusted for the northbound through movement at the I-4 eastbound ramp terminal intersection to account for the downstream left turn drop at the I-4 westbound ramp terminal intersection.

#### 6.3.1 Year 2025 Build Analysis

**Tables 6-7 and 6-8** summarize the intersections operational analysis results for the Year 2025 Build. The results on **Tables 6-7** shows the Build Alternative will improve the operations of the I-4 westbound and eastbound off-ramps and the overall ramp terminal intersections when compared to the No-Build conditions. The ramp terminal intersections are expected to operate at LOS D or better and the vehicle queues at the off-ramps will be reduced significantly. The only failing movements are the northbound left/through and southbound left/through at the Goldfinch Road intersection and these movements are not affected by the interchange improvements.

**Table 6-8** shows a queue exceeding the storage length for the northbound left/through movement at the Goldfinch Road intersection during the PM peak hour, but this is not caused by the interchange improvements and will not affect the operations along Thonotosassa Road (SR 566).

As indicated in Table 6-7 footnote, HCM 6th edition does not evaluate U-turn movements or provided delay/LOS results for the unsignalized NB and WB right turn movements at I-4 EB and I-4 WB ramp terminal intersections, respectively. Therefore, HCM 2000 results are included in **Table 6-9** for those movements.

The 2025 Build Synchro results are included in **Appendix K**.

## ALTERNATIVES CONSIDERED AND ANALYSIS

**Table 6-7: Opening Year (2025) Build Intersection Delay and LOS Results**

Approach	Movement	AM Peak Hour			PM Peak Hour		
		Delay (sec)	LOS	Approach LOS	Delay (sec)	LOS	Approach LOS
Intersection: Thonotosassa Road at Whitehurst Road*							
Westbound	Left	8.7	A		8.3	A	
Northbound	Left/Right	14.4	B	B	11.3	B	B
Intersection: Thonotosassa Road at I-4 WB Ramps**							
Westbound	Left	41.8	D	D	34.0	C	C
Southbound	Thru/Right	27.3	C	C	27.0	C	C
Northbound	Left	19.5	B	B	16.8	B	B
	Thru	6.6	A		3.0	A	
Intersection			26.6	C	Intersection	19.0	B
Intersection: Thonotosassa Road at I-4 EB Ramps**							
Eastbound	Left	25.3	C	D	27.3	C	D
	Right	40.9	D		54.6	D	
Southbound	Left	19.6	B	A	15.4	B	A
	Through	0.1	A		0.2	A	
Northbound	Through	23.9	C	C	24.7	C	C
Intersection			20.6	C	Intersection	27.9	C
Intersection: Thonotosassa Road at Goldfinch Road							
Eastbound	Left	10.1	B	B	13.6	B	B
	Thru/Right	19.5	B		17.8	B	
Westbound	Left	11.8	B	B	12.3	B	B
	Through	14.0	B		17.8	B	
	Right	10.5	B		11.2	B	
Northbound	Left/Thru	105.6	F	E	376.5	F	F
	Right	27.6	C		29.4	C	
Southbound	Left/Thru	242.3	F	F	58.8	E	D
	Right	25.6	C		26.1	C	
Intersection			34.6	C	Intersection	42.8	D

\*Per HCM 6<sup>th</sup> Edition: For Two Way Stop Control (TWSC) intersections only minor movements delay and LOS are reported. HCM 6<sup>th</sup> Edition does not calculate LOS for major street thru movements and approaches or for the whole intersection. \*\*HCM 6<sup>th</sup> edition does not evaluate U-turn movements and unsignalized movements delay is excluded from calculations for approach delay and intersection delay.

## ALTERNATIVES CONSIDERED AND ANALYSIS

**Table 6-8: Opening Year (2025) Build Intersection Vehicle Queues**

Intersection	Movement	Storage (ft)	AM Peak Hour Queues (95 <sup>th</sup> Percentile)		PM Peak Hour Queues (95 <sup>th</sup> Percentile)	
			Veh	Feet*	Veh	Feet*
Thonotosassa Road at Whitehurst Road	WB Left	1,500	0.0	0	0.1	3
	NB Left/Right	825	0.2	5	0.2	5
Thonotosassa Road at I-4 WB Ramps	WB Left	2,700	9.8	245	5.7	143
	SB Thru	1,500	11.6	290	10.4	260
	NB Left	600	8.5	213	8.1	203
	NB Thru	600	2.5	63	1.9	48
Thonotosassa Road at I-4 EB Ramps	EB Left	2,500	0.5	13	3.9	98
	EB Right	2,850	19.1	478	24.0	600
	SB Left	130	4.2	105	3.2	80
	SB Thru	600	0.1	3	0.1	3
	NB Thru	1,500	9.6	240	10.2	255
Thonotosassa Road at Goldfinch Road	EB Left	250	1.0	25	2.0	50
	EB Thru/Right	1,500	10.1	253	8.9	223
	WB Left	300	0.9	23	1.8	45
	WB Through	560	6.1	153	9.2	230
	WB Right	200	0.3	8	0.6	15
	NB Left/Thru	200	7.4	185	21.8	545
	NB Right	200	2.7	68	2.9	73
	SB Left/Thru	600	14.4	360	4.3	108
	SB Right	200	2.1	53	2.0	50

\*Queue in feet estimated by multiplying the number of vehicles times 25 ft.

**Table 6-9: 2025 Build HCM 2000 results for I-4 WB and I-4 EB Ramp Terminal Movements**

Movement	Storage (ft)	AM Peak Hour		PM Peak Hour	
		Delay (sec/veh)/LOS	95 <sup>th</sup> Percentile Queue (ft)	Delay (sec/veh)/LOS	95 <sup>th</sup> Percentile Queue (ft)
WB Right	550	29.8/C	58	29.7/C	57
NB U-turn	260	17.7/B	8	18.4/B	28
NB Right	340	20.8/C	55	22.1/C	72

### 6.3.2 Year 2045

**Tables 6-10 and 6-11** summarize the intersection operations results for Year 2045 Build analysis.

The I-4 westbound ramp terminal intersection will operate at LOS F during the AM peak hour, but the westbound off-ramp operations and queue length will improve significantly compared to the No-Build conditions and there is plenty of storage to accommodate the westbound off-ramp

## ALTERNATIVES CONSIDERED AND ANALYSIS

**Table 6-10: Design Year (2045) Build Intersection Delay and LOS Results**

Approach	Movement	AM Peak Hour			PM Peak Hour		
		Delay (sec)	LOS	Approach LOS	Delay (sec)	LOS	Approach LOS
Intersection: Thonotosassa Road at Whitehurst Road*							
Westbound	Left	9.7	A		9.0	A	
Northbound	Left/Right	22.8	C	C	14.7	B	B
Intersection: Thonotosassa Road at I-4 WB Ramps**							
Westbound	Left	71.0	E	E	76.4	E	E
	Right	0.0	A		0.0	A	
Southbound	Thru/Right	73.0	E	E	59.2	E	E
Northbound	Left	260.7	F	F	71.9	F	D
	Thru	23.5	C		6.4	A	
Intersection			123.9	F	Intersection	53.7	D
Intersection: Thonotosassa Road at I-4 EB Ramps**							
Eastbound	Left	34.4	C	F	37.3	D	F
	Right	159.1	F		208.5	F	
Southbound	Left	38.3	D	B	35.0	C	B
	Through	4.2	A		0.0	A	
Northbound	Through	92.3	F	F	71.2	F	E
Intersection			76.1	E	Intersection	92.6	F
Intersection: Thonotosassa Road at Goldfinch Road							
Eastbound	Left	19.6	B	E	91.3	F	D
	Thru/Right	73.1	F		42.3	D	
Westbound	Left	29.2	B	B	77.3	E	E
	Through	19.3	B		55.3	F	
	Right	10.5	B		10.7	B	
Northbound	Left/Thru	320.3	F	F	804.7	F	F
	Right	63.7	E		74.3	E	
Southbound	Left/Thru	592.5	F	F	301.2	F	F
	Right	40.0	D		36.9	D	
Intersection			91.8	F	Intersection	111.1	F

\*Per HCM 6<sup>th</sup> Edition: For Two Way Stop Control (TWSC) intersections only minor movements delay and LOS are reported. HCM 6<sup>th</sup> Edition does not calculate LOS for major street thru movements and approaches or for the whole intersection. \*\*HCM 6<sup>th</sup> edition does not evaluate U-turn movements and unsignalized movements delay is excluded from calculations for approach delay and intersection delay.

queue. The northbound left turn movement will operate at LOS F during both AM and PM peak hours and the queue will exceed the available storage during both peak hours.

At the eastbound ramp terminal intersection, the eastbound right turn movement will operate at LOS F during both peak hours, but the queues are not expected to impact the mainline I-4 operations. The northbound through will also operate at LOS F during both peak hours but the queue will not exceed the available storage. The southbound left turn movement queue will exceed available storage during both peak hours.

## ALTERNATIVES CONSIDERED AND ANALYSIS

**Table 6-11: Design Year (2045) Build Intersection Vehicle Queues**

Intersection	Movement	Storage (ft)	AM Peak Hour Queues (95 <sup>th</sup> Percentile)		PM Peak Hour Queues (95 <sup>th</sup> Percentile)	
			Veh	Feet*	Veh	Feet*
Thonotosassa Road at Whitehurst Road	WB Left	1,500	0.1	3	0.2	5
	NB Left/Right	825	0.8	20	0.3	8
Thonotosassa Road at I-4 WB Ramps	WB Left	2,700	20.0	500	13.6	340
	SB Thru	1,500	30.1	753	24.1	603
	NB Left	600	63.0	1,575	33.0	825
	NB Thru	600	10.1	253	5.9	148
Thonotosassa Road at I-4 EB Ramps	EB Left	2,500	1.1	28	8.0	200
	EB Right	2,850	44.6	1,115	57.6	1,440
	SB Left	130	12.0	300	8.6	215
	SB Thru	600	2.8	70	0.0	0
	NB Thru	1,500	28.3	708	24.3	608
Thonotosassa Road at Goldfinch Road	EB Left	250	2.6	65	12.2	305
	EB Thru/Right	1,500	30.5	763	20.0	500
	WB Left	300	3.1	78	10.3	258
	WB Through	560	11.0	275	24.1	603
	WB Right	200	0.5	13	1.0	25
	NB Left/Thru	200	18.1	453	41.2	1,030
	NB Right	200	7.2	180	8.1	203
	SB Left/Thru	600	30.3	758	15.3	383
	SB Right	200	4.3	108	3.8	95

\*Queue in feet estimated by multiplying the number of vehicles times 25 ft

The Goldfinch intersection is expected to also operate at LOS F during both AM and PM peak hours, but the failing LOS is not a result of the I-4 ramp terminal operations. **Table 6-11** shows a queue exceeding the storage length for the northbound left/through, southbound left/through movement and westbound through movements, but this is not caused by the interchange improvements.

As indicated in Table 6-7 footnote, HCM 6<sup>th</sup> edition does not evaluate U-turn movements or provided delay/LOS results for the unsignalized NB and WB right turn movements at I-4 EB and I-4 WB ramp terminal intersections, respectively. Therefore, HCM 2000 results are included in **Table 6-12** for those movements.

The 2045 Build Synchro results are included in **Appendix K**.



## ALTERNATIVES CONSIDERED AND ANALYSIS

**Table 6-12: 2045 Build HCM 2000 results for I-4 WB and I-4 EB Ramp Terminal Movements**

Movement	Storage (ft)	AM Peak Hour		PM Peak Hour	
		Delay (sec/veh)/ LOS	95 <sup>th</sup> Percentile Queue (ft)	Delay (sec/veh)/ LOS	95 <sup>th</sup> Percentile Queue (ft)
WB Right	550	38.4/D	76	46.7/D	85
NB U-turn	260	23.9/C	23	22.6/C	42
NB Right	340	29.0/C	152	33.8/C	276

### 6.3.3 Year of Failure Analysis

The purpose of this IOAR is to identify short term improvements to address the safety and operations of the I-4 westbound off-ramp. The design year for an IOAR is 10 years after opening year. The year of failure of the for the improvements is **Year 2039**. By Year 2039, the I-4 westbound ramp terminal intersection will operate at LOS E during the AM peak hour with the northbound left queue operating at LOS F and the northbound left turn queue exceeding the storage length. The westbound left turn will operate at LOS E but the queue of 440 feet is not expected to impact mainline I-4 operations which is the main purpose of the improvements.

Between Year 2035 and 2040 an evaluation of the study area is recommended to evaluate if additional improvements are needed along Thonotosassa Road in the interchange study area. The Year 2039 AM analysis are included in **Appendix K**.

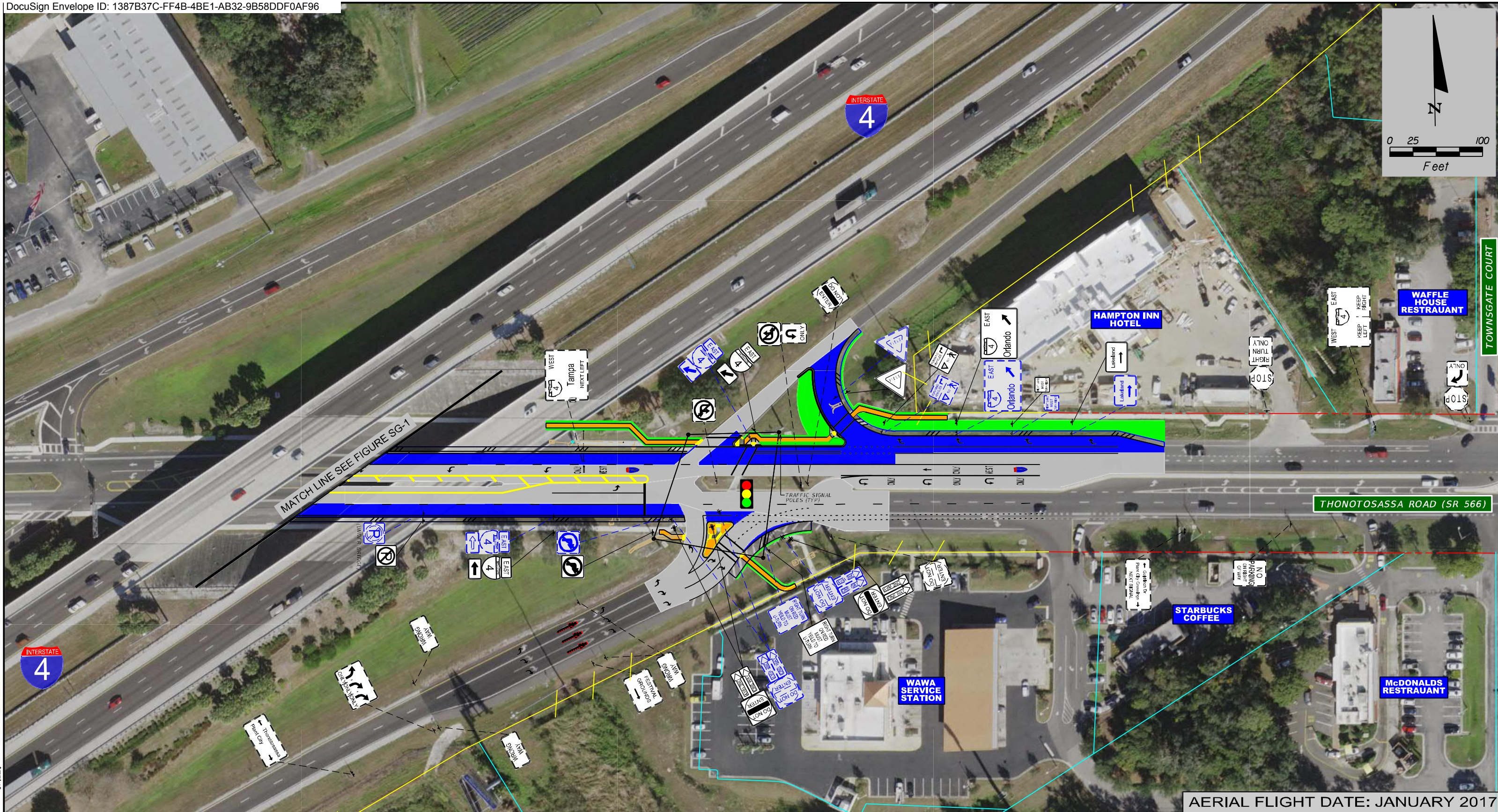
## 6.4 Build Alternative Conceptual Signing Plan

**Figures 6-3 and 6-4** show the proposed signing plan for the build alternative. New signage will be required because of changes in lane configuration and the installation of the traffic signal. Relocation and updates to existing signs are also proposed.

## 6.5 Design Exceptions and Variations

No design exceptions or variations are expected for the proposed improvements.





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### LEGEND

- |                   |                            |                         |                               |
|-------------------|----------------------------|-------------------------|-------------------------------|
| ROAD WIDENING     | EXISTING L/A RIGHT-OF-WAY  | EXISTING TRAFFIC SIGNAL | EXISTING SIGN TO REMAIN       |
| CONCRETE SIDEWALK | EXISTING R/W               | PROPOSED TRAFFIC SIGNAL | EXISTING SIGN TO BE REMOVED   |
| SOD - TURF        | EXISTING PARCEL LINE (GIS) | PROPOSED SIGN           | EXISTING SIGN TO BE RELOCATED |



## THONOTOSASSA ROAD INTERCHANGE OPERATIONAL ANALYSIS REPORT (IOAR)

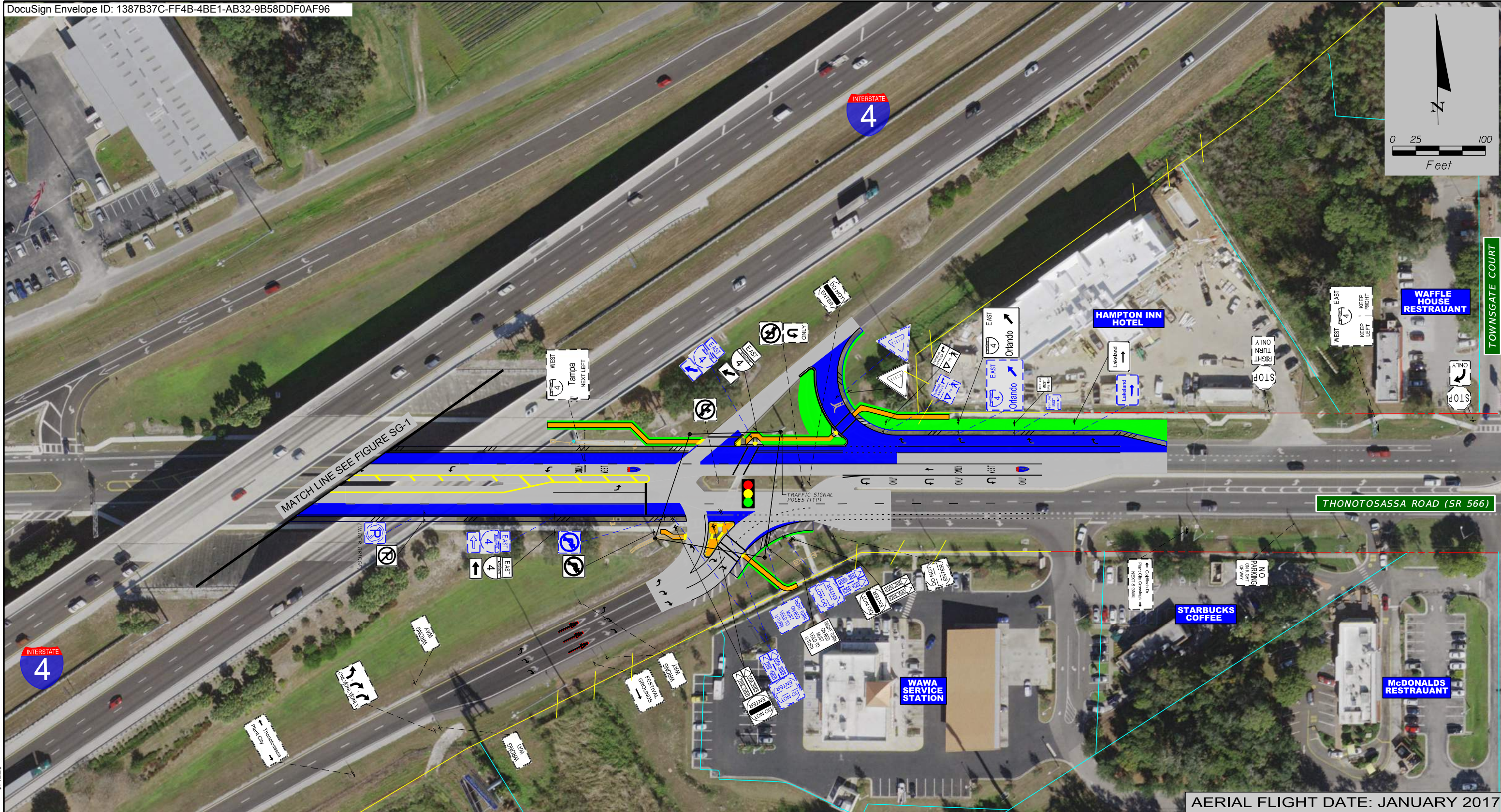
I-4 AT THONOTOSASSA ROAD  
INTERCHANGE IMPROVEMENT

PROPOSED SIGNAGE CONCEPT

FIGURE 6-4

35





<b>DRAFT</b> <i>This is a conceptual-level graphic created for planning and discussion purposes only. It is not intended for use in PD&amp;E, Design or Construction</i>	<b>LEGEND</b> ROAD WIDENING CONCRETE SIDEWALK SOD - TURF EXISTING L/A RIGHT-OF-WAY EXISTING R/W EXISTING PARCEL LINE (GIS)	EXISTING TRAFFIC SIGNAL PROPOSED TRAFFIC SIGNAL PROPOSED SIGN	EXISTING SIGN TO REMAIN EXISTING SIGN TO BE REMOVED EXISTING SIGN TO BE RELOCATED	THONOTOSASSA ROAD INTERCHANGE OPERATIONAL ANALYSIS REPORT (IOAR)		I-4 AT THONOTOSASSA ROAD INTERCHANGE IMPROVEMENT		PROPOSED SIGNAGE CONCEPT	
				FIGURE 6-4		36			



## SAFETY ANALYSIS

### 7.0 SAFETY ANALYSIS

Crash data for the I-4 ramps was obtained from the FDOT D7 Crash Data Management System, which pulls data from the FDOT Crash Analysis Reporting (CAR) Online, and crash data for Thonotosassa Road was obtained from FDOT State Safety Office GIS (SSOGis). Crash data was provided for the available last five-year period from January 1, 2014 to December 31, 2018.

The I-4 at Thonotosassa Road (SR 566) interchange influence area for which crash data was analyzed includes 1.196 mile of I-4 from MP 26.193 (0.30 mile west of the I-4 eastbound off-ramp) to MP 27.389 (0.30 mile east of the I-4 westbound off-ramp) and each of the ramps. The crash data for Thonotosassa Road includes 1,000 feet south of the Goldfinch Drive intersection to 1,000 feet north of the Whitehurst Road intersection. **Table 7-1** provides a summary of the total crashes per year in the study area and the location of the crashes. **Table 7-2** provides a summary of the crash severity along I-4, the ramps, and Thonotosassa Road.

**Table 7-1: Number of Crashes (2014-2018)**

Year	Location			Total
	I-4 mainline	I-4 on/off ramps	Thonotosassa Road	
2014	50	7	6	63
2015	41	8	9	58
2016	65	6	11	82
2017	75	9	16	100
2018	84	15	15	114
<b>Total</b>	<b>315</b>	<b>45</b>	<b>57</b>	<b>417</b>

**Table 7-2: Crash Severity (2014-2018)**

Location	Total Number of Crashes	Number of Fatal Crashes	Number of Fatalities	Number of Injury Crashes	Number of Injuries	Number of Property Damage Only (PDO) Crashes
I-4 mainline	315	0	0	121	188	194
I-4 on/off ramps	45	0	0	16	24	29
Thonotosassa Road	57	0	0	30	44	27
<b>Total</b>	<b>417</b>	<b>0</b>	<b>0</b>	<b>167</b>	<b>256</b>	<b>250</b>

## SAFETY ANALYSIS

As shown in **Tables 7-1 and Table 7-2**, 417 crashes occurred in the I-4 at Thonotosassa Road Interchange AOI, of which 167 were injury crashes, resulting in 256 injuries. No fatal crashes occurred in the AOI during the five years of analysis. 250 of crashes resulted in property damaged only (PDO). On average, the crash frequency for the I-4 at Thonotosassa Road interchange AOI is 83 crashes per year.

**Table 7-3** summarizes the types of crashes. The most predominant crash types are rear end with 219 crashes (53%), hit fixed object with 65 crashes (16%), sideswipe with 55 crashes (13%), and angle with 25 crashes (6%).

**Table 7-3: Crash Type Summary**

Type of Crash	Location			Total
	I-4 mainline	I-4 on/off-ramps	Thonotosassa Road	
Rear End	180	23	16	219
Angle	2	5	18	25
Sideswipe	46	5	4	55
Head-on	2	0	0	2
Hit Fixed Object	59	4	2	65
Hit Non-Fixed Object	6	0	0	6
Single Vehicle	15	2	0	17
Bike	0	0	1	1
Run Off Road	1	0	0	1
Pedestrian	0	0	1	1
Right Turn	0	2	0	2
Left Turn	1	3	15	19
Unknown/Other	3	1	0	5
<b>Total</b>	<b>315</b>	<b>45</b>	<b>57</b>	<b>417</b>

**Table 7-4** shows the common cause of crash is operating a motor vehicle in a careless or negligent manner with 221 crashes (53%) followed by failed to yield the right-of-way with 38 crashes (9%).

**Table 7-5** shows 284 of the crashes (68%) occurred at daylight, and **Table 7-6** shows 325 of the crashes (80%) occurred on dry pavement.

## SAFETY ANALYSIS

**Table 7-4: Cause of Crashes**

Type of Crash	Location			Total
	I-4 mainline	I-4 on/off-ramps	Thonotosassa Road	
Failed to Keep in Proper Lane	28	4	3	35
Followed too Closely	10	3	3	16
Failed to Yield Right-of-Way	8	8	22	38
No Contributing Action	31	1	4	36
Other Contributing Actions	10	3	1	14
Improper Turn	0	0	3	3
Operated MV in Careless or Negligent Manner	191	21	9	221
Drove Too Fast for Conditions	8	0	0	8
Ran off Roadway	3	1	1	5
Over-Correcting/Over-Steering	6	1	0	7
Unknown	15	1	4	20
Improper Passing	2	1	1	4
Swerved or Avoided: Due to Wind, Slippery Surface, MV, Object, Non-Motorist in Roadway, etc.	3	0	0	3
Operated MV in Erratic, Reckless or Aggressive Manner	0	0	1	1
Ran Stop Sign	0	1	0	1
Ran Red Light	0	0	5	5
<b>Total</b>	<b>315</b>	<b>45</b>	<b>57</b>	<b>417</b>

**Table 7-5: Lightning Conditions**

Type of Crash	Location			Total
	I-4 mainline	I-4 on/off-ramps	Thonotosassa Road	
Daylight	223	28	33	284
Dark-Lighted	70	13	17	100
Dusk	9	3	2	14
Dark-Not Lighted	2	0	2	4
Dawn	10	1	3	14
Unknown	1	0	0	1
<b>Total</b>	<b>315</b>	<b>45</b>	<b>57</b>	<b>417</b>

## SAFETY ANALYSIS

**Table 7-6: Pavement Conditions**

Type of Crash	Location			Total
	I-4 mainline	I-4 on/off-ramps	Thonotosassa Road	
Dry	238	37	50	325
Wet	77	8	6	91
Mud, Dirt Gravel	0	0	1	1
<b>Total</b>	<b>315</b>	<b>45</b>	<b>57</b>	<b>417</b>

**Table 7-7** shows the economic loss of the interchange study area using the FDOT KABCO injury classification scale crash costs. The costs were taken from the *2021 FDOT Design Manual Table 122.6.2* and are included in **Appendix L**.

**Table 7-7: 2014-2018 Crash Estimated Economic Loss**

Crash Severity	Crash Cost	Number of Crashes	Economic Loss
Fatal (K)	\$10,670,000	0	\$0
Severe Injury (A)	\$872,612	15	\$13,089,180
Moderate Injury (B)	\$174,018	65	\$11,311,170
Minor Injury (C)	\$106,215	87	\$9,240,705
Property Damage Only (O)	\$7,700	250	\$1,925,000
<b>Total</b>		<b>417</b>	<b>\$35,566,055</b>

**Table 7-8** shows the intersection crash rate for the intersections in the AOI. The 2020 Annual Average Daily Traffic (AADT) volume taken during the data collection process were used to determine the crashes per million vehicles entering the intersection. The intersection crash rate for the I-4 WB ramp terminal intersections is just lower than the statewide average. The projected traffic volumes for the I-4 westbound off-ramp are expected to worsen the operations of the ramp terminal intersections and projected queues spillback for the off-ramp might impact the safety along I-4 mainline.

## SAFETY ANALYSIS

**Table 7-8: Average Intersection Crash Rates (2014-2018)**

Branch Forbes Road Intersection	Number of Crashes	Crash Rate (MEV) <sup>1</sup>	Statewide Average Crash Rate
Whitehurst Road	0	0.000	0.386
I-4 WB Ramp Terminal	33	1.644	1.686
I-4 EB Ramp Terminal	18	0.575	1.686
Goldfinch Drive	34	4.140	0.544

<sup>1</sup>Million entering vehicles

The Build Alternative improvements for the I-4 ramps and Thonotosassa Road (SR 566) intersection includes adding a traffic signal at the I-4 WB ramp terminal and widening Thonotosassa Road between I-4 EB and I-4 WB ramp terminal intersections. A crash modification factor (CMF) of 0.61 was obtained from the USDOT/FHWA CMF Clearinghouse. CMF ID 7848 represents a reduction of 39% in total crashes. Therefore, the improvement is expected to reduce 39% of the 28 applicable crashes (of the total of 33 crashes) that occur at the I-4 WB ramp terminal intersection.

CMFs are available for converting 2-lane undivided roadways to 4 lane divided roadways but not for available for 2-lane divided to 4-lane divided roadways. The section of Thonotosassa Road between ramp terminal intersection is a divided roadway. Even though there are no CMFs for converting 2-lane divided to a 4-lane divided roadway, the widening provides additional capacity on this segment, reducing queue length and congestion when compared to No-build conditions.

The CMFs information is included in **Appendix M**.



## CONSISTENCY WITH OTHER PLANS/PROJECTS

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### 8.0 CONSISTENCY WITH OTHER PLANS/PROJECTS

The I-4 at Thonotosassa Road IOAR is consistent with the I-4 Project Development and Environment (PD&E) Study from east of 50th Street to the western connection of Polk Parkway as well as the latest adopted transportation plans.

The I-4 at Thonotosassa Road Interchange improvement is included in the Hillsborough Metropolitan Planning Organization (MPO) Five Year Cost Feasible Transportation Improvement Program (TIP) adopted on June 30, 2020 as shown in **Appendix N**.

PROJECT FUNDING PLAN AND SCHEDULE

9.0 PROJECT FUNDING PLAN AND SCHEDULE

The project is funded as a Design-Bid-Build. Preliminary Engineering is funded for Fiscal Year (FY) 2022 and Construction for FY 2024. The funding for project 443317-1 is summarized in **Table 9-1** and included in **Appendix O**.

Table 9-1: Project Funding for Build Alternative

Phase	Fiscal Year				
	2022	2023	2024	2025	2026
Preliminary Engineering					
Amount	\$734,994				
Construction					
Amount			\$2,948,216		
Total	\$734,994		\$2,948,216		

Source: FDOT Five-Year Work Program (FY 2022 to FY 2026)

## **ACCESS MANAGEMENT PLAN**

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### **10.0 ACCESS MANAGEMENT PLAN**

The access management plan within the area of influence will not change by the proposed improvements to the I-4 ramp terminal intersections.

## **ENVIRONMENTAL CONSIDERATIONS**

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### **11.0 ENVIRONMENTAL CONSIDERATIONS**

There are no anticipated environmental concerns because all improvements are within the interchange right-of-way.

## FHWA POLICY POINTS

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### 12.0 FHWA POLICY POINTS

The following FHWA policy points were followed during this IOAR.

**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 purpose of this IOAR is to improve safety and alleviate the excessive queue at the I-4 at Thonotosassa Road (SR 566) westbound off-ramp terminal intersection. The proposed improvements will improve the operations of the I-4 westbound off-ramp as summarized below when compared to No-Build conditions:
  - Opening Year (2025): The LOS of the WB off-ramp left turn movement will improve from LOS F to LOS D in the AM peak hour and from LOS F to LOS C in the PM peak hour. The vehicle queue for the I-4 WB left turn movement will be reduced 84% and 85% during the AM and PM peak hour, respectively. All movement at the ramp terminal intersections will operate at LOS D or better and none of the movement queues exceed available storage.
  - Design Year (2045): The LOS of the WB off-ramp left turn movement will improve from LOS F to LOS E during both AM and PM peak hours. Under No-build conditions, the vehicle queue for the I-4 WB off-ramp left turn is expected to exceed the available storage and impact the I-4 mainline operations during the AM peak hour. Under Build conditions, the vehicle queue for the westbound left turn movement will be reduced 80% and 78% during the AM and PM peak hour, respectively, and no impact to the I-4 mainline is expected.



## FHWA POLICY POINTS

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- The northbound left turn movement at the westbound ramp terminal intersection will operate at LOS F during both AM and PM peak hours and the queue will exceed the available storage during both peak hours.
- At the eastbound ramp terminal intersection, the eastbound right turn movement will operate at LOS F during both peak hours, but the queues are not expected to impact the mainline I-4 operations. The northbound through will also operate at LOS F during both peak hours but the queue will not exceed the available storage. The southbound left turn movement queue will exceed available storage during both peak hours.
- The design year for an IOAR is 10 years after opening year. The year of failure of the for the improvements is Year 2039. By Year 2039, the I-4 westbound ramp terminal intersection will operate at LOS E during the AM peak hour with the northbound left queue operating at LOS F and the northbound left turn queue exceeding the storage length. The westbound left turn will operate at LOS E but the queue of 440 feet is not expected to impact mainline I-4 operations which is the main purpose of the improvements.
- Between Year 2035 and 2040 an evaluation of the study area is recommended to evaluate if additional improvements are needed along Thonotosassa Road in the interchange study area
- The operational and safety analysis demonstrate that the proposed improvements improve the safety and operation of the interchange by significantly reducing the queues for the I-4 westbound off-ramp when compared to No-Build conditions.
- The total number of crashes at the ramp terminal intersections is expected to be reduced by 39%.
- A conceptual signing plan has been prepared for the IAR.

**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*

## **FHWA POLICY POINTS**

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*should describe whether future provision of a full interchange is precluded by the proposed design.*

- The proposed improvements will not alter the existing configuration of the I-4 and Thonotosassa Road interchange. The existing I-4 interchange at Thonotosassa Road provides access to public roads only. The proposed improvements at the interchange will maintain full access to Thonotosassa Road and accommodate all movements.

## RECOMMENDATION

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### 13.0 RECOMMENDATION

The purpose of this IOAR is to evaluate current traffic operations, identify operational deficiencies, and recommend operational improvements for the I-4 at Thonotosassa Road interchange.

The need for this project is to improve safety and alleviate existing traffic congestion and excessive vehicle queues at the I-4 at Thonotosassa Road westbound off-ramp terminal intersection and the influence area.

The proposed improvements include:

- Installing a traffic signal at the I-4 westbound ramps terminal intersection
- Convert the existing northbound right turn lane at the I-4 eastbound ramp terminal intersection to a second northbound through lane
- Adding a right turn lane from northbound Thonotosassa Road (SR 566) to I-4 eastbound on-ramp
- Widen Thonotosassa Road (SR 566) from two lanes to four lanes between I-4 eastbound and I-4 westbound ramp terminal intersections
- Signal timing coordination (cycle length and offsets) between traffic signals

The operational and safety analysis demonstrate that the proposed improvements identified in this IOAR will improve the safety and operation of the interchange by significantly reducing the queues for the I-4 eastbound and westbound off-ramps when compared to No-build conditions for Opening Year 2025.

The safety and operations of the interchange will also improve significantly for Design Year 2045, even though the I-4 at Thonotosassa WB ramp terminal intersection is expected to operate at LOS F during the AM peak hour. Under No-Build conditions, the operations of the intersection will continue to deteriorate, and the I-4 westbound off-ramp queues are expected to impact the I-4 mainline during the AM peak hour.