I-Drive Transit Feasibility and Alternative Technology Assessment

Design Traffic and Transit Engineering Report

June 2020

ABBREVIATIONS

AADT	Average Annual Daily Traffic
ACF	Axle Correction Factor
DTTER	Design Traffic and Transit Engineering Report
FDOT	Florida Department of Transportation
GL	General Lanes
HCM	Highway Capacity Manual
I-Drive	International Drive
OCCC	Orange County Convention Center
OIA	Orlando International Airport
PD&E	Project Development and Environment
PHF	Peak Hour Factor
POV	Privately Owned Vehicle
RCA	Roadway Conceptual Analysis
RIRO	Right In Right Out
SF	Seasonal Factor
TFATA	Transit Feasibility and Alternative Technology Assessment
TL	Transit Lanes
TMC	Turning Movement Count
TMV	Turning Movement Volume
TOR	Transit-Oriented Development

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1.0 Introduction

This "International Drive Design Traffic and Transit Engineering Report (DTTER)" provides a comprehensive analysis of traffic and travel demand conditions that is intended to guide the alternatives analysis and decision making process for the "International Drive Transit Feasibility and Alternative Technology Assessment (TFATA)" and its associated analysis on Tradeshow Boulevard. The Traffic and Transit elements of this report have been considered separately, but with consideration for the potential influences and trade-off between the modes. This DTTER is one component of the overall TFATA study, and final conclusions and recommendations will be documented in the "Transit Feasibility and Technology Assessment Report".

1.1 Project Background

The International Drive Transit Feasibility and Alternative Technology Assessment (TFATA) is analyzing the potential of implementing a premium transit service as an urban circulator operating within the International Drive District (I-Drive District).

The project purpose is to improve mobility options for a diverse set of travel markets within the rapidly growing I-Drive District, and to implement a sustainable multimodal system that reflects and complements the surrounding environment. The International Drive 2040 Vision Plan developed by Orange County includes a policy directive to enhance and sustain the economic viability of the I-Drive District and the Orange County Convention Center. Carefully planning and designing an effective premium transit system with multiple transportation modes can achieve this directive and will be essential to the existing and future growth of the I-Drive District.

1.2 Project Goals and Objectives

The purpose and need for a proposed premium transit investment in the I-Drive District is organized around the interrelated goals outlined below.

- **Support Multimodal Connectivity** – While the primary goal is to provide a transit circulator serving local trips in the I-Drive District, the proposed premium transit investment will also connect with other transit services serving key destinations within the Orlando region.
- **Serve Diverse Travel Markets and Needs** – A premium transit service will offer a frequent, convenient, and comfortable travel option within the I-Drive District for visitors, residents, conventioneers, and workers.
- **Sustain Economic Competitiveness and Development** – A premium transit service will provide cost effective infrastructure and mobility investment which will support global competitiveness and promote sustainable economic development within the I-Drive District.

The goals and objectives presented in this document will be utilized to develop evaluation measures to assist in analyzing the proposed transit alignment alternatives. The last section of this document summarizes how the stated goals and objectives will be integrated into the TFATA evaluation plan.

1.3 Report Objective

The objective of this report is to provide recommendations based on the traffic operations and travel conditions for implementing a new transit service in the study area, such as a streetcar or premium bus service. This is presented for the existing conditions and future conditions based on two possible transit solutions with exclusive transit phases, compared to a No-Action Alternative that includes transit lanes but no transit phases. Additionally, the traffic operations for Tradeshow Boulevard is specifically identified to support the reconstruction the corridor which is a new connection that will serves all traffic with specific facilities for transit and freight vehicles. The objective of this report can be broken down into four categories:

- Provide Orange County with traffic projections based on collected traffic counts
- Evaluate Tradeshow Boulevard roadway alternatives and their associated traffic operations
- Evaluate the traffic operational impacts of median versus curbside transit lanes along I-Drive
- Conduct a traffic analysis for the I-Drive study area alternatives that considers a No-Action Alternative (transit lanes without transit phases) and two Build Alternatives (transit lanes with transit phases)

The above four objectives of this DTTER are intended to support the overall TFATA conclusion and recommendations, but will not alone dictate a preferred alternative. The overall TFATA conclusion and recommendations will be documented in the final "Transit Feasibility and Technology Assessment Report".

1.4 Report Background Information

Previous transportation studies have been conducted for the International Drive area which include various roadway, volume, and traffic analyses. A summary of the major studies is presented in **Table 1-1**. A major ongoing project to be implemented by the TFATA study's Opening Year 2025 is the 90% design plans for the I-Drive transit lanes, where I-Drive is 4 general use lanes and 2 transit lanes.

Table 1-1. Previous Transportation Studies within the Study Area

Study Date	Study Name	Study Limits	Available Data
2019	*90% Construction Plans for I-Drive Transit Lanes*	From Destination Pkwy to Sand Lake Rd	• Roadway Plans • Signing and Pavement Marking Plans • Signalization Plans
2019	*Kirkman Road Preliminary Design Study (PDS) Report & Kirkman Road Extension Traffic Memorandum*	South of the Interchange on Kirkman Rd (SR 435) at Sand Lake Rd (SR 482) to the intersection of Kirkman Rd/Tradeshow Rd at Universal Blvd	• Validated Subarea OUATS Travel Demand Model • Traffic Forecasts for Years 2022, 2042
2018	*Universal Boulevard Pedestrian Safety Action Plan*	Universal Blvd from SR 528 to Sand Lake Rd	• Traffic Counts for Universal Blvd • Pedestrian and Bicycle Counts for Universal Blvd
2016	*International Drive Transportation Planning Study*	I-Drive from Destination Pkwy to Sand Lake Rd	• OCCC Attendance • Transit Ridership • Validated OUATS Travel Demand Model • Traffic Forecasts for Years 2020, 2030, 2040
2016	*International Drive Crosswalk Study*	I-Drive from Austrian Row to Convention Way	• Pedestrian Counts for I-Drive
2015	*SR 528 Widening Design Traffic Technical Memorandum (Florida's Turnpike Enterprise)*	SR 528 from I-4 to Florida's Turnpike	• Traffic Counts and Forecasts for the SR 528 Ramps

1.5 Study Area

The study area for a potential premium transit service is illustrated in **Figure 1-1**, including key roadway segments where the existing I-Ride Trolley operates between Sand Lake Road and Orange County's Destination Parkway Superstop, and continues further south to Sea Harbor Drive. The study area encompasses the Orange County Convention Center (OCCC) and surrounding land uses including hotels, restaurants, entertainment venues and theme parks. The five roadway segments being studied include:

- International Drive (I-Drive) from Sea Harbor Drive to Sand Lake Road,
- Via Mercado from I-Drive to Universal Boulevard,
- Destination Parkway from I-Drive to Tradeshow Boulevard,
- Tradeshow Boulevard from Destination Parkway to Universal Boulevard, and
- Universal Boulevard from Tradeshow Boulevard to Sand Lake Road.

The arrows on Figure 1 pointing to the north of Sand Lake Road and to the south of Sea Harbor Drive reflect an understanding that this study area is a subset of the I-Drive District, and that mobility options within the study area will need to consider multiple opportunities for subarea and regional expansion to the north and south, and potentially east and west.

This 2020 TFATA study area for a potential premium transit service was first established based on the 2016 planning study for a bus / transit lane project intended to accommodate a rubber tire system primarily operating on individual segments of International Drive, Universal Boulevard, and Via Mercado (the blue segments in **Figure 1-1**). Since 2016, the proposed bus / transit lane concept for International Drive has progressed into the final design phases. This 2020 TFATA study has been undertaken to not only include the 2016 study alignments but to also address the feasibility of a second generation modern street car or a state of the art mass transit service envisioned to provide expanded access to the surrounding land uses and service along additional roadways (the orange segments in **Figure 1-1**). Tradeshow Boulevard, from Destination Parkway to Universal Boulevard, plays a key role in this study, with the roadway being expanded and designed for freight accommodation, transit accommodation, and connection to the Kirkman Road extension.

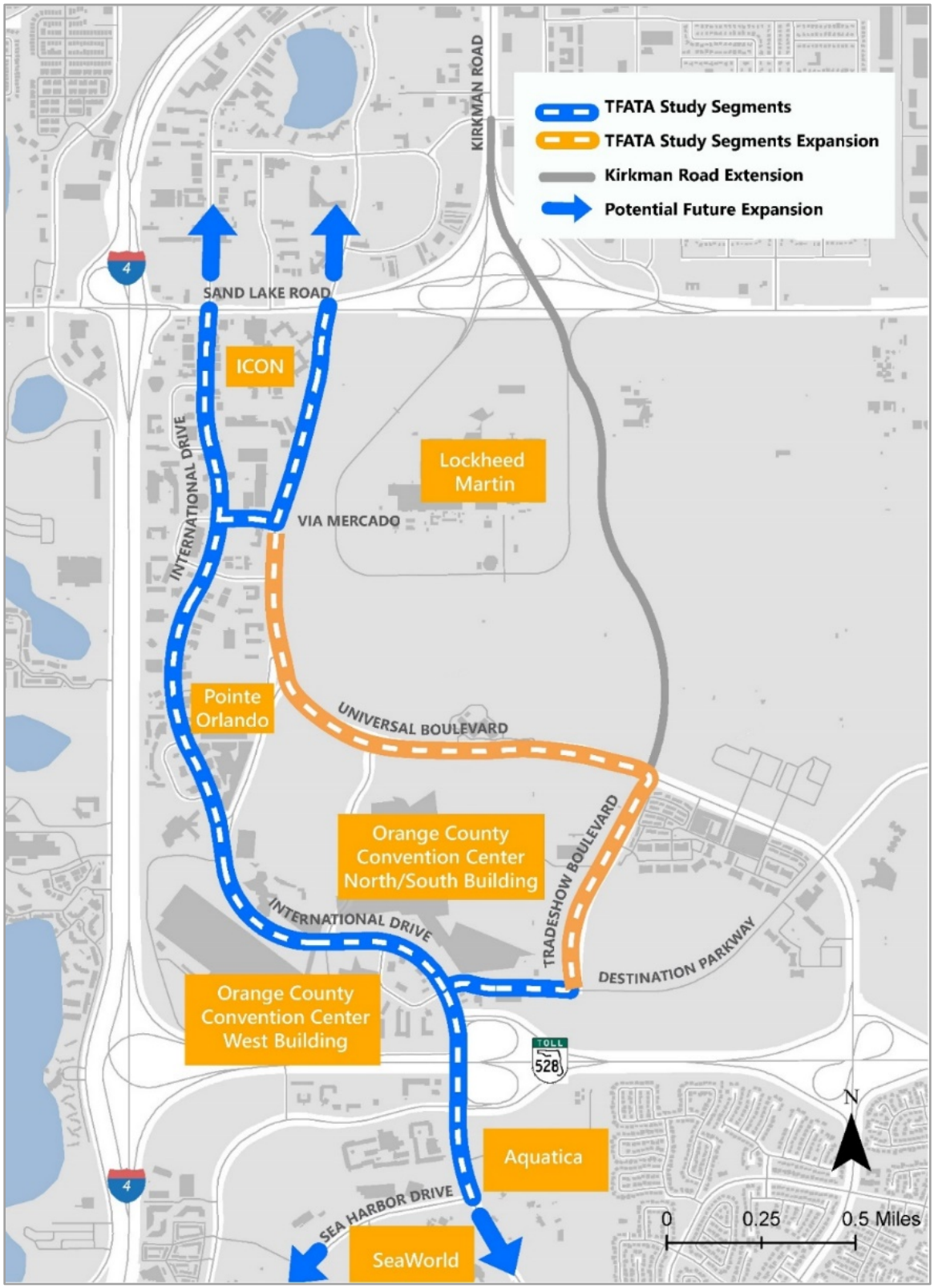


Figure 1-1. Study Area Map

1.5.1 Study Intersections

The study area, as shown in **Figure 1-1**, includes the following intersections:

- I-Drive at Sand Lake Road
- I-Drive at Jamaican Court
- I-Drive at Austrian Court via Mercado
- I-Drive at Pointe Plaza Avenue
- I-Drive at Convention Way
- I-Drive at Destination Parkway
- I-Drive at SR 528 Westbound Ramps
- I-Drive at SR 528 Eastbound Ramps/Westwood Boulevard
- Destination Parkway at Tradeshow Boulevard
- Universal Boulevard at Sand Lake Road
- Universal Boulevard at Pointe Plaza Avenue
- Universal Boulevard at Convention Way
- Universal Boulevard at Concourse Drive
- Universal Boulevard at Tradeshow Boulevard
- Universal Boulevard at Destination Parkway

1.6 Traffic Analysis Methodology

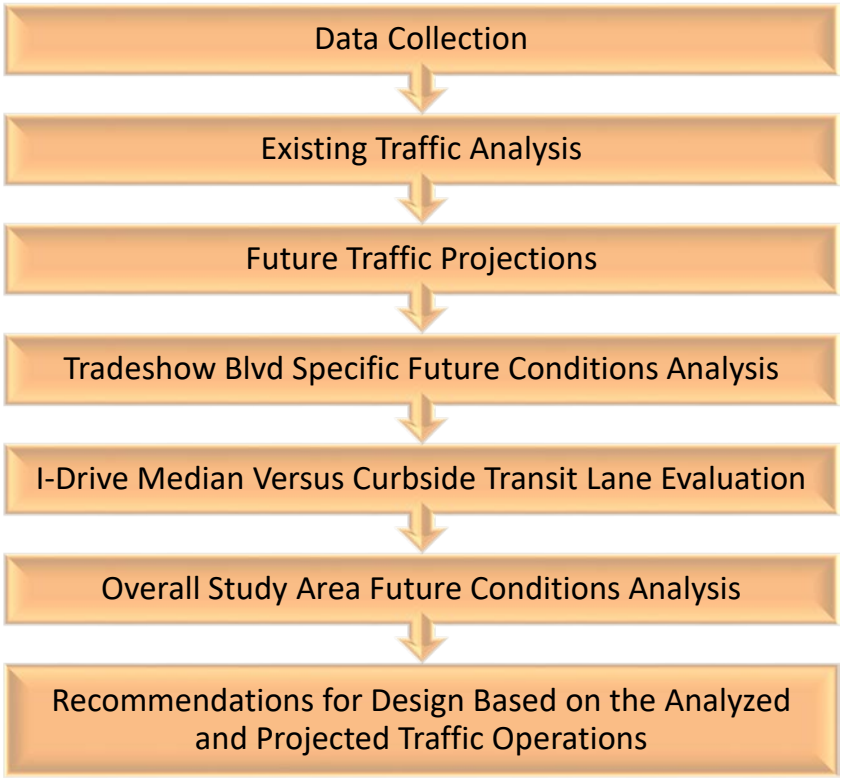
A traffic analysis methodology was developed and approved in January of 2020 to guide this report. This methodology is included as **Appendix A**.

1.7 Transit Analysis Methodology

A transit methodology was developed and approved in January of 2020 to support ridership estimates, transit characteristics, and transit impact on traffic analysis. This methodology is included as **Appendix A**.

1.8 Report Organization

This report is organized around the following sections:



2.0 Traffic Data Collection

2.1 Traffic Data Sources

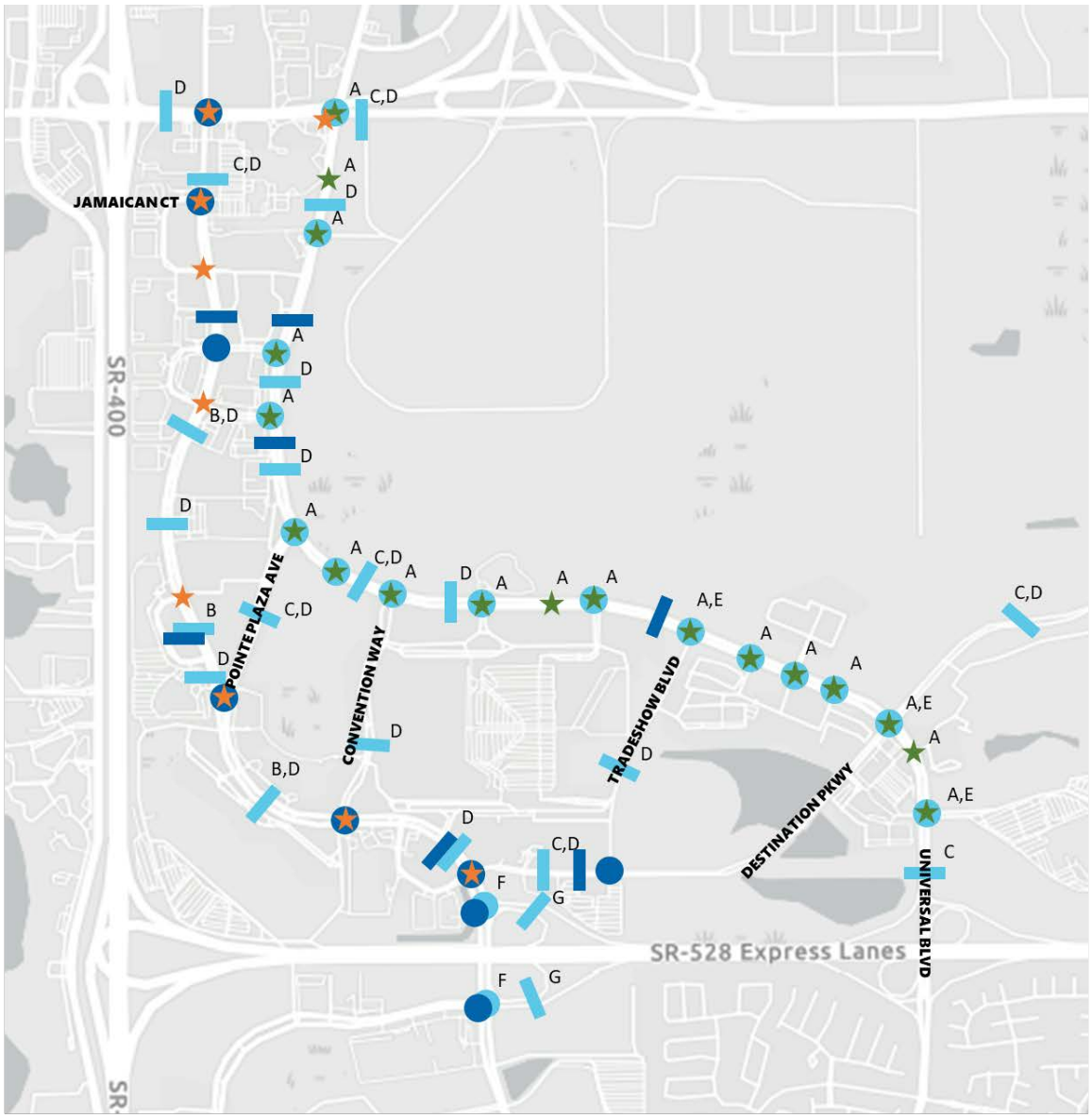
The primary traffic volume data sources used in this study include:

- 2020 Collected Traffic Counts
- Data from previous studies including: Kirkman Road Preliminary Design Study Traffic Forecasts, Universal Boulevard Pedestrian Safety Action Plan Traffic Counts, SR 528 Widening DTTM Traffic Forecasts for SR 528 Ramps
- Orange County Online Traffic Counts

2.2 Traffic Data Collected

Both 72-hour counts and 8-hour Turning Movement Counts (TMCs) were collected in January 2020. The data collection map is presented in **Figure 2-1** and locations are listed below. Raw data sheets for the traffic counts are available in **Appendix B.**

- 72-hour count locations:
    - I-Drive, North of Austrian Court
    - I-Drive, Between Samoan Court
    - I-Drive, North of Destination Parkway
    - Destination Parkway, West of Tradeshow Boulevard
    - Universal Boulevard, West of Tradeshow Boulevard
    - Universal Boulevard, North of Pointe Plaza Avenue
    - Universal Boulevard, North of via Mercado
- 8-hour turning movement count locations:
    - I-Drive at Sand Lake Road
    - I-Drive at Jamaican Court via Mercado
    - I-Drive at Austrian Court
    - I-Drive at Pointe Plaza Avenue
    - I-Drive at Convention Way
    - I-Drive at Destination Parkway
    - I-Drive at SR 528 Westbound Ramps
    - I-Drive at SR 528 Eastbound Ramps/Westwood Boulevard
    - Destination Parkway at Tradeshow Boulevard



Sources
A. Universal Blvd Pedestrian Safety Action Plan (2018)
B. I-Drive Crosswalk Study (2019)
C. Orange County Online Counts (2018)
D. I-Drive Planning Study (2016)
E. Kirkman Extension DTTM (2018/2019)
F. SR 528 Widening DTTM (2015)
G. TPK Counts (2019)

Legend
2020 TMC Location
2020 Bike/Ped/Pedi-Cab Count
2020 Roadway Count
TMC from Previous Study (Study Reference)
Ped/Bike Count from Previous Study
Roadway Count from Previous Study

Figure 2-1. Traffic Data Count Map

3.0 Existing Traffic Analysis

An operational analysis was conducted for the study corridors using Synchro 10 software and its application of the Highway Capacity Manual (HCM) 6th Edition. Network performance results were based on Synchro's Percentile Delay Analysis, given that the HCM does not provide network-level performance measures. The Synchro model was developed consistent with existing geometry. Google Earth was used to develop the model lane configurations and intersection control types. Posted speed limits along the corridor were input to the model link speeds. Existing signal timing plans were obtained from Orange County's Traffic Engineering Division and coded in the model. All analysis procedures followed the 2014 Florida Department of Transportation (FDOT) Traffic Analysis Handbook. Consistent with the traffic methodology, the performance measures are listed below.

Network performance measures:

- Total delay, average delay per vehicle, and unserved vehicles.

Intersection performance measures:

- Movement: LOS, delay, volume-to-capacity ratios, and 95th percentile queue lengths
- Overall Intersection: LOS, delay, max volume-to-capacity ratio

3.1 Segment Traffic Volumes

Using the 72-Hour classification counts, AADTs were calculated. The methodology for developing AADT from 72-hour traffic classification counts is provided below.

- Obtain the Seasonal Factor (SF) and the Axle Correction Factor (ACF) from FDOT Florida Traffic Online (2018).
- Apply the formula AADT = ADT x SF x ACF
- Balance AADTs along the corridor

Traffic count data collected from the field and from available sources was used to develop existing traffic characteristics for the project corridor. Based on the 24-Hour volume counts and 72-Hour classification counts, the peak hour traffic flow (measured K-Factor) and the directional split (measured D-Factor) for the roadways in the study area was calculated.

Note that AADT for other segments were collected from the various available sources including 2016 International Drive Transportation Planning Study, where I-Drive is 4-Lanes with 2 Transit Lanes. The base year traffic factor summary for the individual roadway segments is provided in **Table 3-1**. The Existing Year (2020) AADTs are shown in **Figure 3-1**.

Table 3-1. Existing Year (2020) Roadway Traffic Factor Summary

Major Road	From Segment	To Segment	Source	K-Factor		D-Factor	
				AM	PM	AM	PM
I-Drive	SR 528	Destination Pkwy	Previous Study	5.0	9.0	54.1	54.1
	Destination Pkwy	Convention Way	2020 Data	5.0	7.0	62.2	56.6
	Convention Way	Pointe Plaza	Previous Study	5.0	9.0	54.1	54.1
	Pointe Plaza Ave	Austrian Ct	2020 Data	3.0	6.0	51.3	55.8
	Austrian Ct	Jamaican Ct	2020 Data	3.0	7.0	50.0	61.3
	Jamaican Ct	Sand Lake Rd	Previous Study	5.0	9.0	54.1	54.1
Tradeshow Blvd	Destination Pkwy	Universal Blvd	Previous Study	5.0	9.0	54.1	54.1
Destination Pkwy	I-Drive	Tradeshow Blvd	2020 Data	5.0	9.0	53.4	61.5
	Tradeshow Blvd	Universal Blvd	Previous Study	5.0	9.0	60.0	60.0
Universal Blvd	Destination Pkwy	Tradeshow Blvd	Previous Study	5.0	9.0	55.9	55.9
	Tradeshow Blvd	Concourse Dr	2020 Data	5.0	3.0	66.0	53.0
	Concourse Dr	Convention Way	Previous Study	5.0	9.0	55.9	55.9
	Convention Way	Pointe Plaza Ave	Previous Study	5.0	9.0	55.9	55.9
	Pointe Plaza Ave	Sand Lake Rd	2020 Data	5.0	9.0	55.9	55.9
Sand Lake Rd	I-Drive	Universal Blvd	Previous Study	5.0	9.0	55.9	55.9

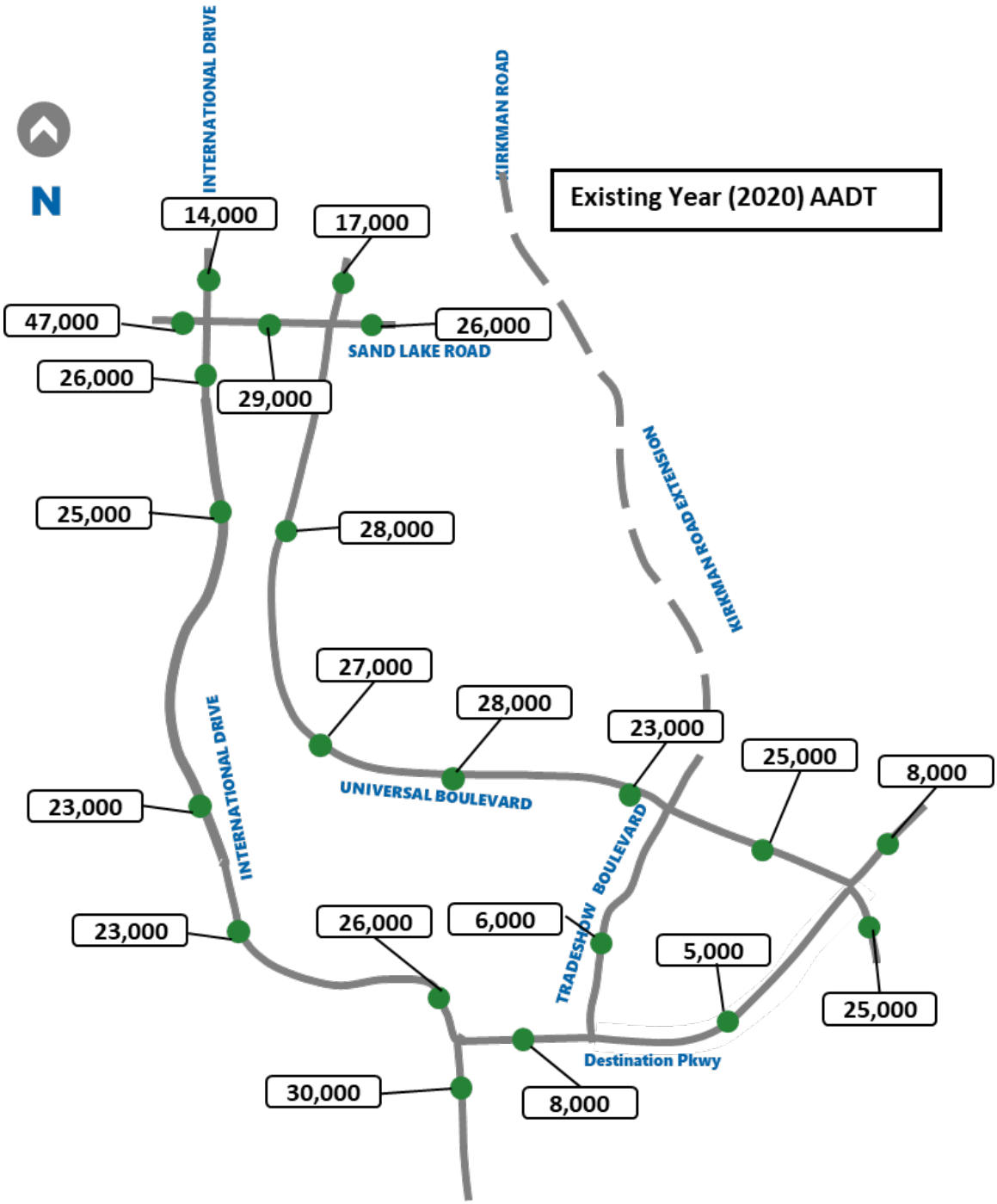


Figure 3-1. Existing Year (2020) AADT

3.2 Intersection Traffic Volumes

The existing traffic for the study area was developed by first establishing a global AM and PM peak hour. A study area summation of volumes was calculated to find the AM and PM hours with the highest traffic volume and the peak hours were selected based on intersection-level peak hours consistently seen across the corridor in the 2020 TMCs. Additional consideration was given to critical, higher volume intersections such as International Drive at Destination Parkway. The global AM and PM peak hour was selected as 8:00 to 9:00 A.M. and 5:00 to 6:00 P.M., respectively.

Existing 2020 intersection turning movement counts, peak hour factors (PHFs), and truck percentages were then calculated based on the global peak hour. A summary of the intersection peak hour factors and truck percentages is provided in **Table 3-2.** More detailed information providing truck percentages per intersection approach is located in **Appendix C.**

Table 3-2. Existing Year (2020) Truck Percentages and Peak Hour Factors

Major Road	Cross Street	AM Peak Hour		PM Peak Hour	
		PHF	**Truck Percentages**	**PHF**	**Truck Percentages**
I-Drive	Sand Lake Rd	0.94	2.0% – 8.0 %	1.00	1.0% – 2.0 %
	Jamaican Ct North	0.87	6.0% – 8.0 %	0.93	1.0% – 4.0 %
	Austrian Ct / via Mercado	0.93	5.0% – 9.0 %	0.93	0.0% – 3.0 %
	Pointe Plaza Ave	0.85	2.0% – 7.0 %	0.85	3.0% – 4.0 %
	Convention Way	0.90	4.0% – 8.0 %	0.93	1.0% – 3.0 %
	Destination Pkwy	0.89	4.0% – 8.0 %	0.97	1.0% – 4.0 %
	SR 528 North Ramp	0.81	2.0% – 8.0 %	0.95	1.0% – 3.0 %
	SR 528 South Ramp	0.94	2.0% – 3.0 %	0.93	1.0% – 2.0 %
Destination Pkwy	Tradeshow Blvd	0.62	4.0% – 74.0 %	0.96	2.0% – 47.0 %
Universal Blvd	Sand Lake Rd	0.94	4.0% – 8.0 %	0.99	1.0% – 2.0 %
	Pointe Plaza Ave	0.94	4.0% – 9.0 %	0.94	1.0% – 2.0 %
	Convention Way	0.95	0.0% – 15.0 %	0.88	0.0% – 6.0 %
	Concourse Dr	0.97	0.0% – 3.0 %	0.92	0.0% – 2.0 %
	Tradeshow Blvd	0.94	3.0% – 8.0 %	0.95	1.0% – 2.0 %
	Destination Pkwy	0.94	2.0% – 8.0 %	0.93	1.0% – 3.0 %

Next, intersection TMCs were seasonally adjusted using the seasonal factors from FDOT Florida Traffic Online, which can be found in **Appendix D.** Finally, TMCs were balanced along the study corridor by adding or subtracting traffic volumes. The balancing avoided unreasonable adjustments by considering existing driveways and major generators/attractors such as parking decks, hotels, shopping plazas, and restaurants. Balanced 2020 AM and PM peak hour turning movement counts are presented in **Figure 3-2.**

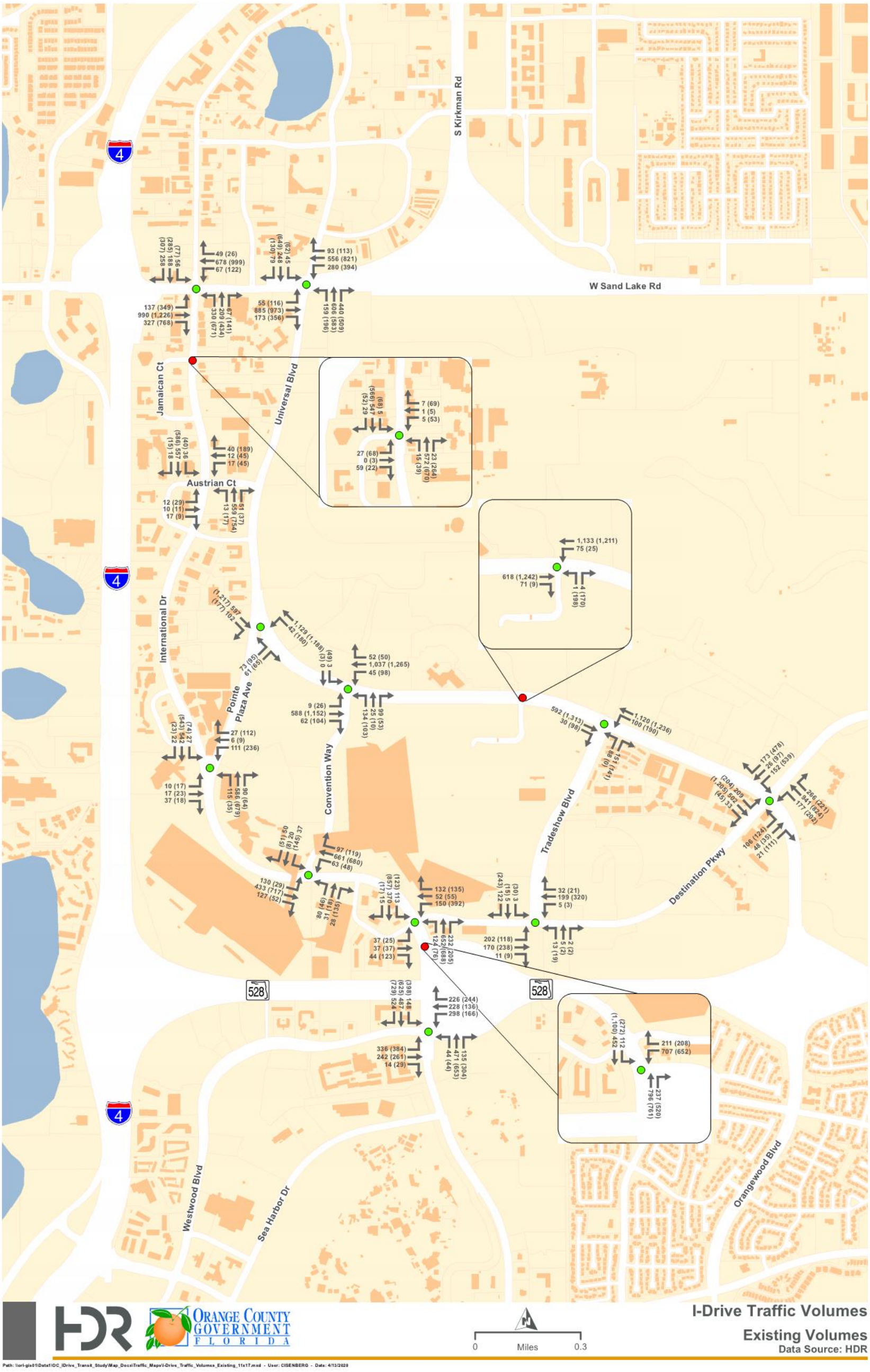


Figure 3-2. Existing Year (2020) Turning Movement Volumes

3.3 Network Operations

The overall network performance is presented in **Table 3-3.** Synchro output reports are located in **Appendix E.** The network performance in the PM peak shows the increased PM traffic volume experiencing approximately 20% more delay per vehicle, resulting in almost 50% more total delay. In both the AM and PM, all traffic volume is served in the network.

Table 3-3. Existing Year (2020) Network Performance

Performance Measure	AM Peak Hour	PM Peak Hour
Average Delay (sec/veh)	25	29
Total Delay (hr)	229	385
Number of Unserved Vehicles	0	0

3.4 Intersection Traffic Operations

The Existing Year 2020 intersection performance summary is presented in **Table 3-4**. Detailed movement performance tables including delay, LOS, V/C ratio, and 95th percentile queue length, per movement, are located in **Appendix F**.

As shown in the tables, the two Tradeshow Boulevard stop-controlled intersections operate at LOS F due to having a minor street movement delay of greater than 50 seconds in the AM peak. Between the AM and PM peak, there are three intersections where one or more movements has delay greater than 80 seconds and cycle failure is likely to occur in the peak period: Universal Boulevard at Sand Lake Road, I-Drive at Sand Lake Road, and Universal Boulevard at Destination Parkway.

Table 3-4. Existing Year (2020) Intersection Results

Major Rd	Cross Street	AM Peak Hour			PM Peak Hour		
		Max V/C	**Delay**	**LOS**	**Max V/C**	**Delay**	**LOS**
I-Drive	Sand Lake Rd	0.65	29.0	C	1.05[1]	53.5	D
	Jamaican Ct (North)	0.42	18.9	B	0.57	7.3	A
	Austrian Ct / via Mercado	0.44	17.1	B	0.51	25.9	C
	Pointe Plaza Ave	0.84	25.5	C	0.67	30.2	C
	Convention Way	0.45	41.6	D	0.68	40.0	D
	Destination Pkwy	0.54	25.4	C	0.59	32.8	C
	SR 528 Westbound Ramps	1.0	48.9	D	0.86	27.7	C
	SR 528 Eastbound Ramps	0.65	30.2	C	0.97	32.8	C
Destination Pkwy	Tradeshow Blvd*	0.40	111.8	F	0.47	30.7	D
Universal Blvd	Sand Lake Rd	1.13	43.8	D	0.96	49.8	D
	Pointe Plaza Ave	0.57	21.9	C	0.65	31.4	C
	Convention Way	0.62	26.5	C	0.81	26.3	C
	Concourse Dr	0.37	4.6	A	0.43	18.7	B
	Tradeshow Blvd*	0.87	62.9	F	0.88	77.8	F
	Destination Pkwy	0.83	35.3	D	1.31	77.0	E

*Stop controlled intersection

[1] The northbound movement on I-Drive is at capacity and delay is over 80 seconds per vehicle

4.0 Design Traffic Development

To analyze future years, the Existing Year AADTs were projected out to the Future Years using a linear growth rate and then converted into turning movement volumes using K- and D-Factors. The future years analyzed were:

- Opening Year 2025
- Interim Year 2035
- Design Year 2045

4.1 Travel Demand Modeling and Growth Rate Selection

The growth rate was developed using information from multiple sources, including: historical traffic counts, travel demand models, population forecasts, recently completed studies in the area, and surrounding land use and planned development. The travel demand model used was the Orlando Urban Area Transportation Study (OUATS) regional travel demand model, which takes into account future land use, roadway projects, and socio-economic data, was used to calculate model growth rates. Traffic forecasts generated from the travel demand model has reviewed for reasonableness and compared to traffic forecasts generated from a historical trend analysis of available counts.

Future year traffic projections considered route diversion due to the Kirkman Road extension by adding the new roadway into the travel demand model, and also accounted for increased volume at the intersection of Universal Boulevard at Tradeshow Boulevard/Kirkman Road due to the increasing capacity of Tradeshow Boulevard and the Kirkman Road Extension connection.

The growth rates selected for I-Drive corridor and surrounding roadways, as coordinated with Orange County, are presented in **Figure 4–1** as annual linear rates. A growth rate for Universal Boulevard is not shown since traffic projections were developed from previous study data.

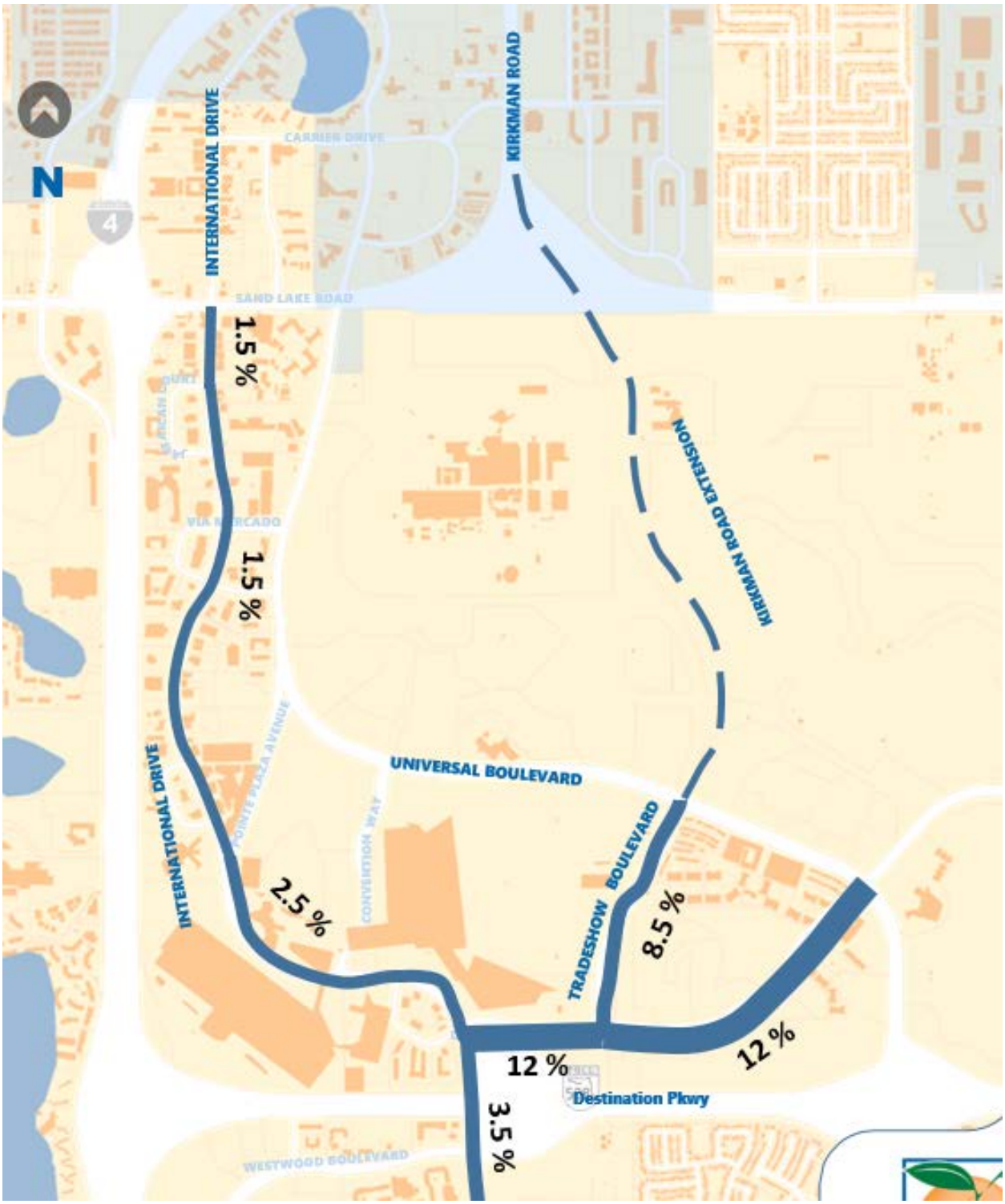


Figure 4-1. Study Area Growth Rates

4.2 Future Segment Traffic Volumes

The growth rates presented in the previous section were applied to the Existing Year AADT to generate Opening Year (2025), Interim Year (2035), and Design Year (2045) AADTs.

A summary of the K- and D- Factors are presented in **Table 4–1** and **Table 4–2**. The K-Factor is a standard value based on area and facility type and the D-Factor is a value within a range based on roadway type. The 2020 measured values were calculated from the 72-hour field count data. The K- and D-Factors were developed in a similar way as the growth rate, using multiple sources to derive an appropriate value for the context of the area and study.

In the AM peak hour, the measured K-Factors were relatively low due to the unique nature of the study area that captures visitor, local, and commuter travel throughout multiple hours of the day. In the PM peak hour, measured K-Factors varied between 6% and 11% which was higher than the AM K-Factor measured at each location. These values made sense with the various late afternoon and late night destinations in the I-Drive area. Given the study area characteristics, the K-factor used in the analysis was 5% for the AM peak and 9% for the PM peak. The PM peak K-Factor is the Standard K used for planning a design analyses, as specified in the FDOT Traffic Forecasting Handbook. The AM peak K-Factor used in the analysis deviated from the Standard K to avoid artificially inflating the volumes since the study area experiences greater peak spreading than a standard commuter study area does. Further, the PM peak hour carries a higher overall volume and will be the controlling peak in design.

Table 4-1. K-Factor Summary

Major Road	From Segment	To Segment	AM Peak Hour		PM Peak Hour	
			Measured K-Factor	**Used in Analysis**	**Measured K-Factor**	**Used in Analysis**
I-Drive	Jamaican Ct	Austrian Ct	3%	5%	7%	9%
	Austrian Ct	Pointe Plaza Ave	3%		6%	
	Convention Way	Destination Pkwy	5%		7%	
Universal Blvd	Jamaican Ct	Austrian Ct	4%	5%	11%	9%
	Austrian Ct	Pointe Plaza Ave	4%		8%	
	Concourse Dr	Tradeshow Blvd	5%		3%	
Destination Pkwy	I-Drive	Tradeshow Blvd	5%	5%	9%	9%
Tradeshow Blvd	Destination Pkwy	Universal Blvd	5%	5%	9%	9%

Table 4-2. D-Factor Summary

Major Road	From Segment	To Segment	AM Peak Hour			PM Peak Hour		
			Peak Dir	**Measured D-Factor**	**Used in Analysis**	**Peak Dir**	**Measured D-Factor**	**Used in Analysis**
I-Drive	Jamaican Ct	Austrian Ct	NB	50.0	51.3 - 62.2	NB	61.3	54.1 - 61.3
	Austrian Ct	Pointe Plaza Ave	NB	51.3		NB	55.8	
	Convention Way	Destination Pkwy	NB	62.2		SB	56.0	
Universal Blvd	Jamaican Ct	Austrian Ct	NB	54.1	54.1 - 66.0	NB	54.5	52.2 - 54.5
	Austrian Ct	Pointe Plaza Ave	NB	56.1		SB	52.2	
	Concourse Dr	Tradeshow Blvd	NB	66.0		SB	53.3	
Destination Pkwy	I-Drive	Tradeshow Blvd	EB	53.4	53.4	WB	61.5	61.5
Tradeshow Blvd	Destination Pkwy	Universal Blvd	NB	54.1	54.1	NB	54.1	54.1

The future year AADTs for the study area are displayed in **Figure 4-2** and **Figure 4-3**.

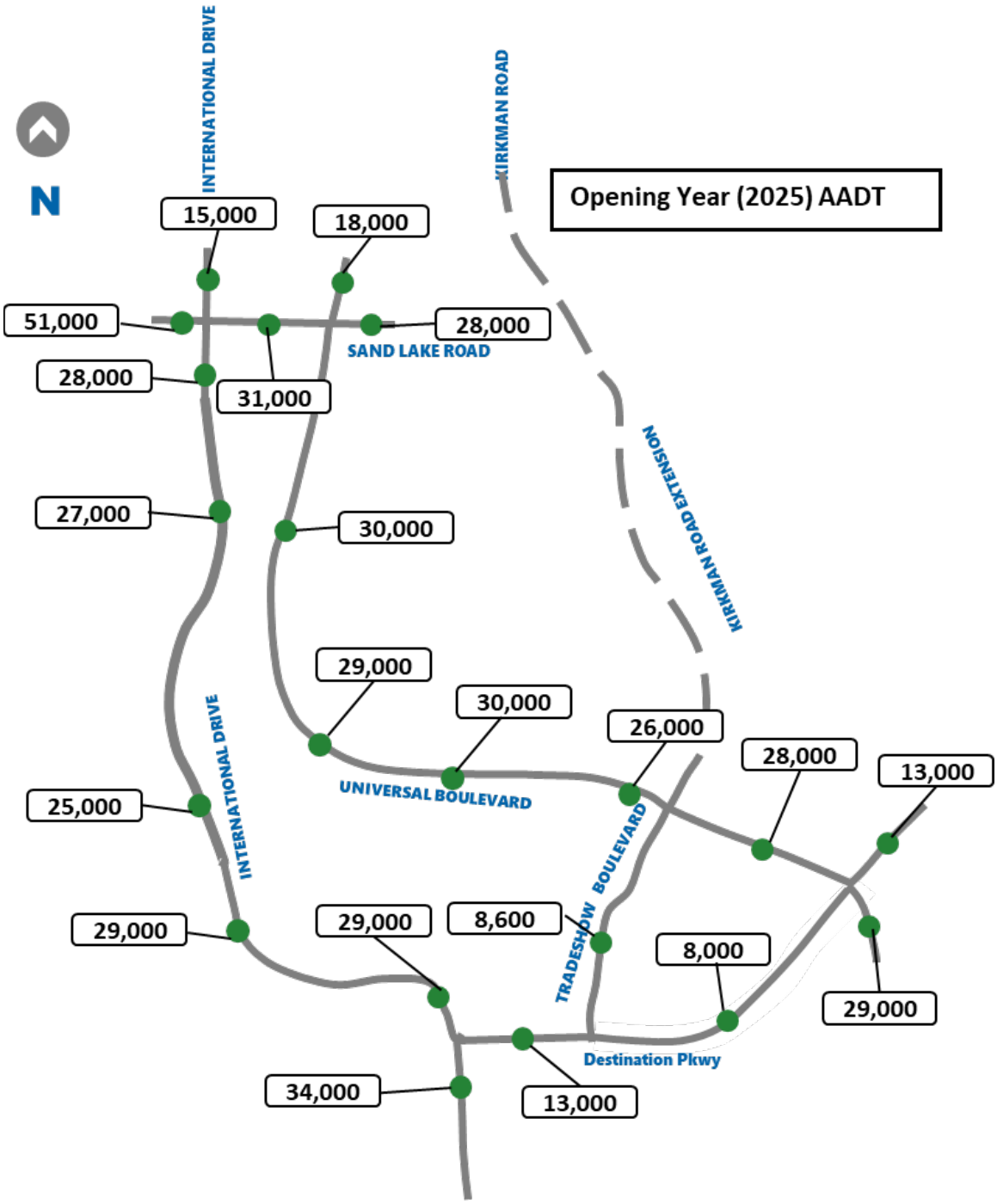


Figure 4-2. Opening Year (2025) AADT

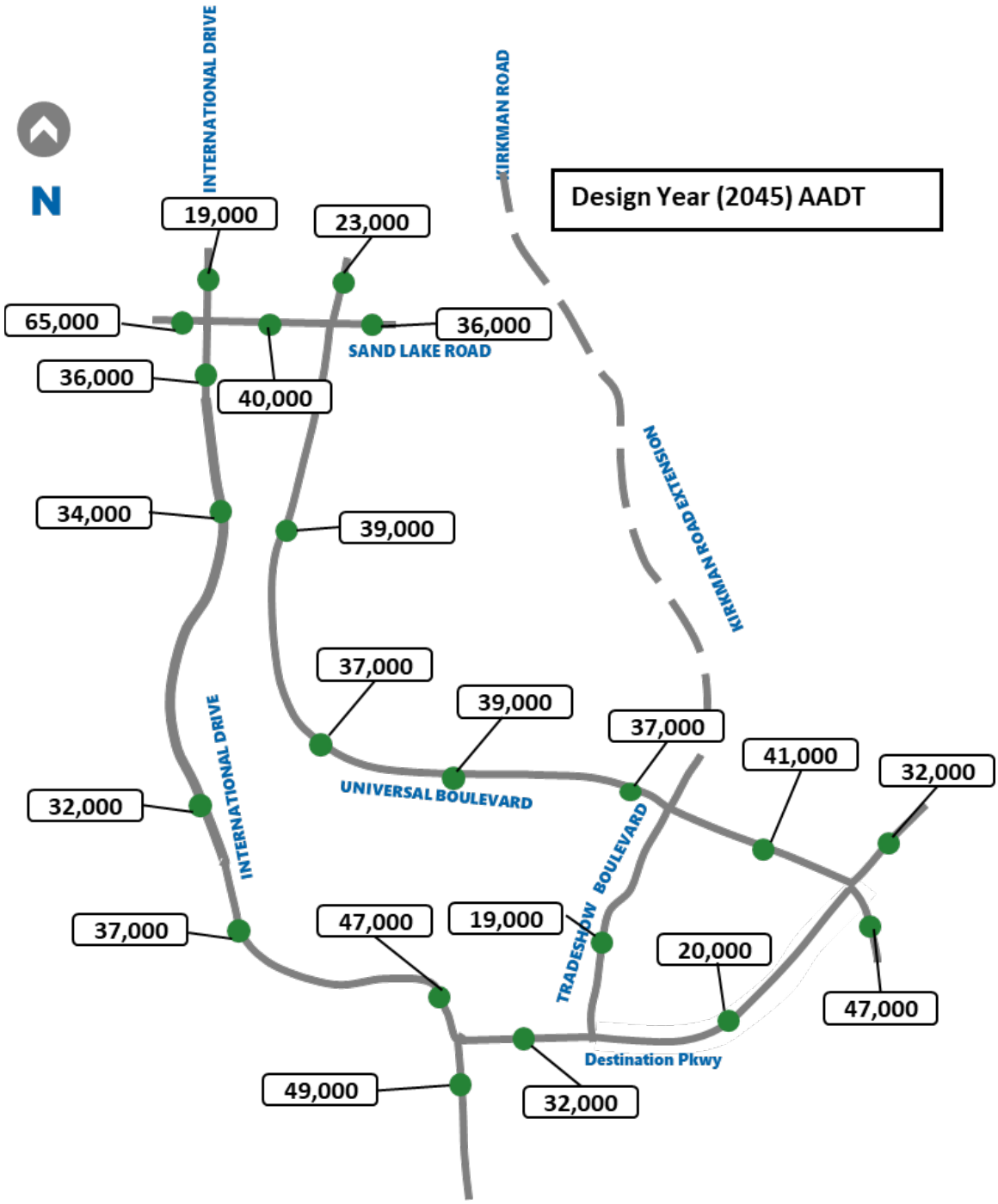


Figure 4-3. Design Year (2045) AADT

4.3 Future Intersection Traffic Volumes

Once growth rates and traffic factors were established, the FDOT approved TURNS5-V2014 tool was used to develop future turn volumes for both AM and PM peak hours at each study intersection. TURNS5-V2014 estimates future turning volumes by balancing inflow and outflow AADTs and calculates DDHVs based on the recommended K- and D-Factors of the intersecting roads. Intersection DDHVs were balanced and adjusted to obtain reasonable inflows and outflows between upstream and downstream intersections. Engineering judgment was also applied to ensure reasonable growth was achieved for all turning movements for the Opening Year 2025 and the Design Year 2045. The Interim Year 2035 volumes were developed by linearly interpolating between the 2025 and the 2045 volumes. The TURNS5 worksheets are provided in **Appendix G**. The Opening Year 2025, Interim Year 2035, and Design Year 2045 turning movement volumes are provided in **Figure 4–4** though **Figure 4–6**.

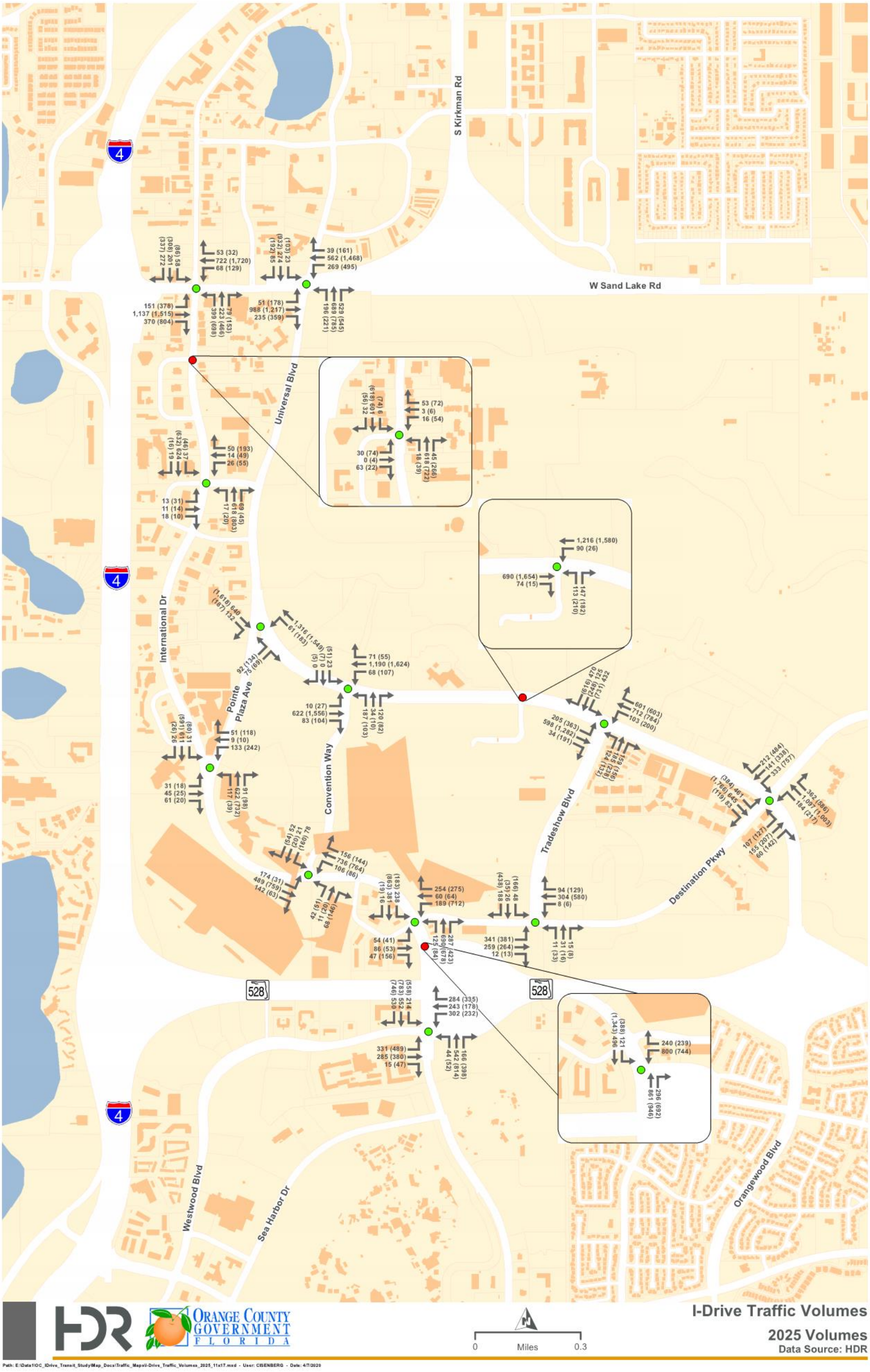


Figure 4-4. Opening Year (2025) Turning Movement Volumes

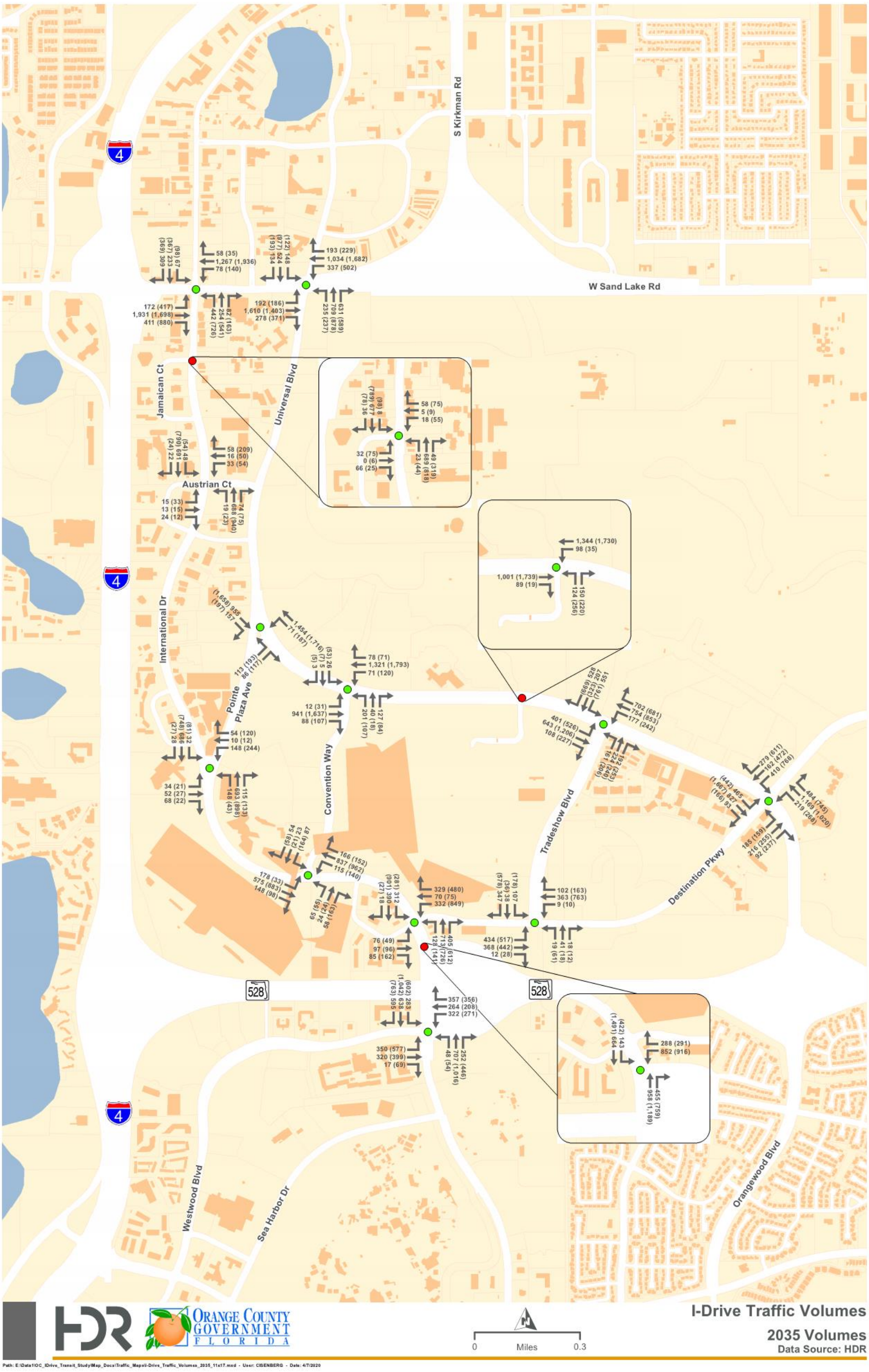


Figure 4-5. Interim Year (2035) Turning Movement Volumes

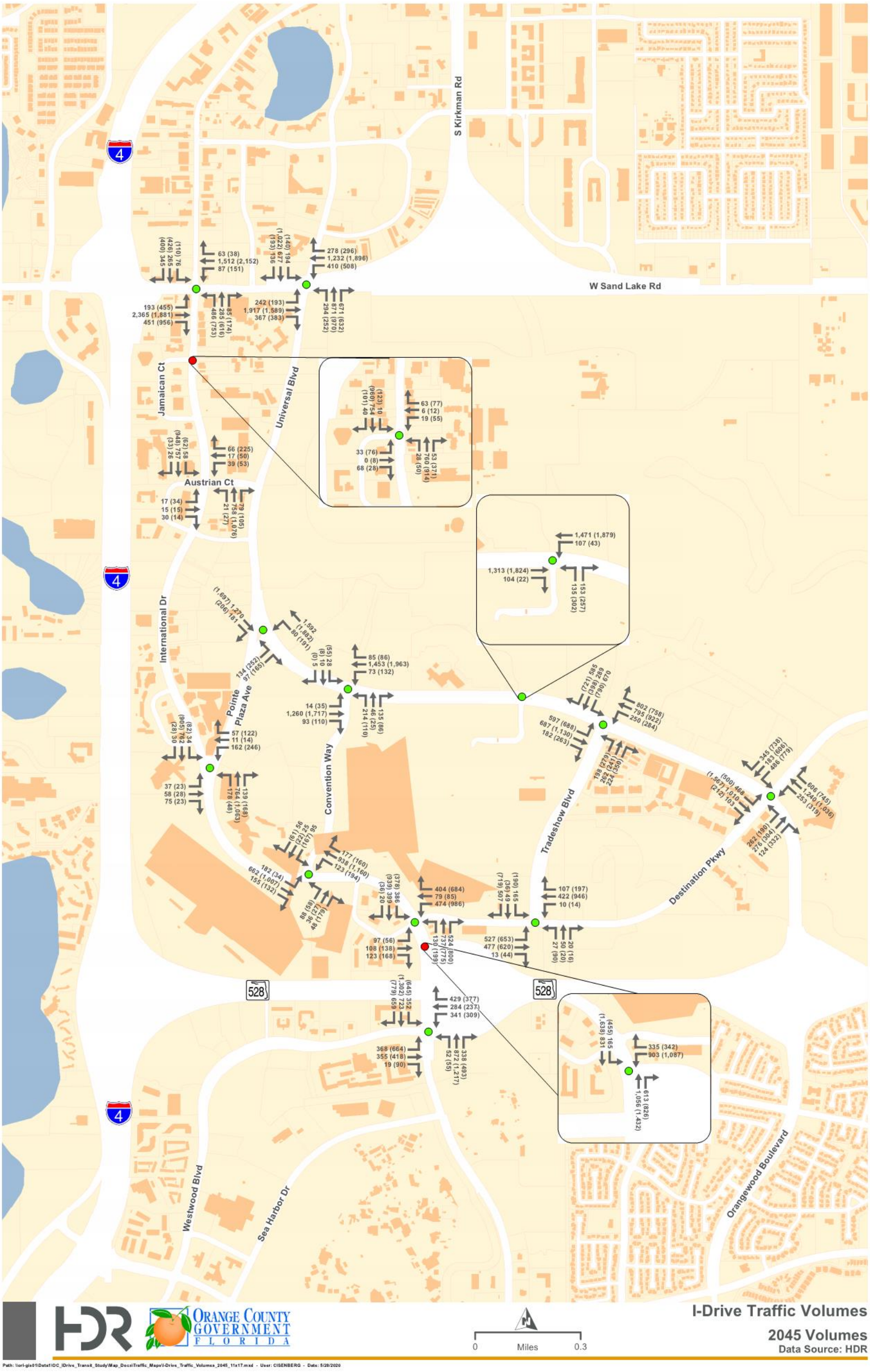


Figure 4-6. Design Year (2045) Turning Movement Volumes

5.0 Tradeshow Boulevard Alternatives Analysis

A Tradeshow Boulevard Roadway Conceptual Analysis (RCA), that fully documents the Tradeshow Boulevard alternatives analysis, was prepared concurrently with this DTTER. This section summarizes the considered Tradeshow Boulevard typical section alternatives, alternative improvement concepts and turn lane configurations, and traffic analysis results. A Preferred Tradeshow Boulevard Alternative is presented at the end of the section and is incorporated into the TFATA Study Area Build Alternatives in **Section 8.0**. The Tradeshow Boulevard RCA Report is located in **Appendix H**. The Existing Year 2020 typical section is shown in **Figure 5-1** for reference.

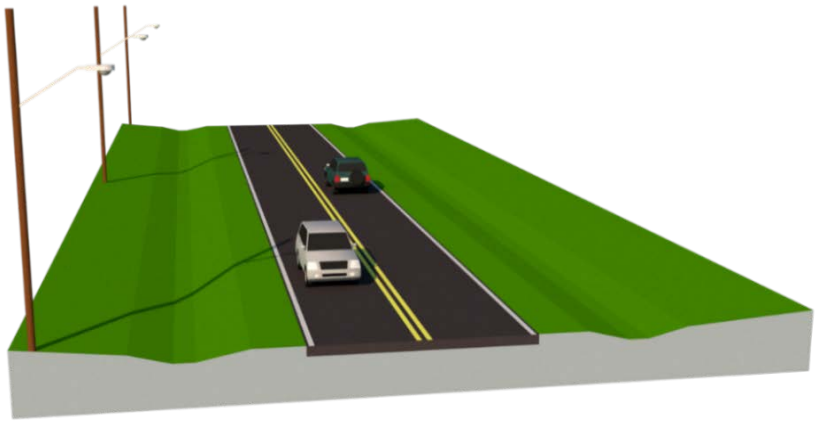


Figure 5-1. Existing Year (2020) Tradeshow Blvd Typical Section

5.1 Typical Section Alternatives

Three (3) typical section alternatives were developed to address the corridor's mobility needs. Each of these alternatives provide additional roadway vehicular capacity, better bicycle and pedestrian accommodations, and the potential for integration with modified transit services with the planned future developments along the Tradeshow Boulevard study area. The alternatives differ in how they address transit and delivery freight accommodations. The traffic operations needs are addressed via access management. This section outlines the elements of each Alternative highlighting the distinct features. Each of the alternatives incorporates a four-lane to eight-lane roadway with considerations to transit only lanes and a truck access road.

5.1.1 Alternative Concept 1: 4 General Use Lanes + 2 Median Transit Lanes + Truck Access Road

This typical section incorporates 4 general use lanes (2 on each side of the roadway), and 2 additional dedicated transit lanes that run through the median. A 24-foot 1-way southbound truck staging lane is also provided for freight accommodations. For pedestrian and bicycle accommodations, there is a 10-foot shared use path on both sides of Tradeshow Boulevard. This alternative is within the existing Right-of-Way, and there are no expected parcel impacts. See **Figure 5-2** for the typical section.

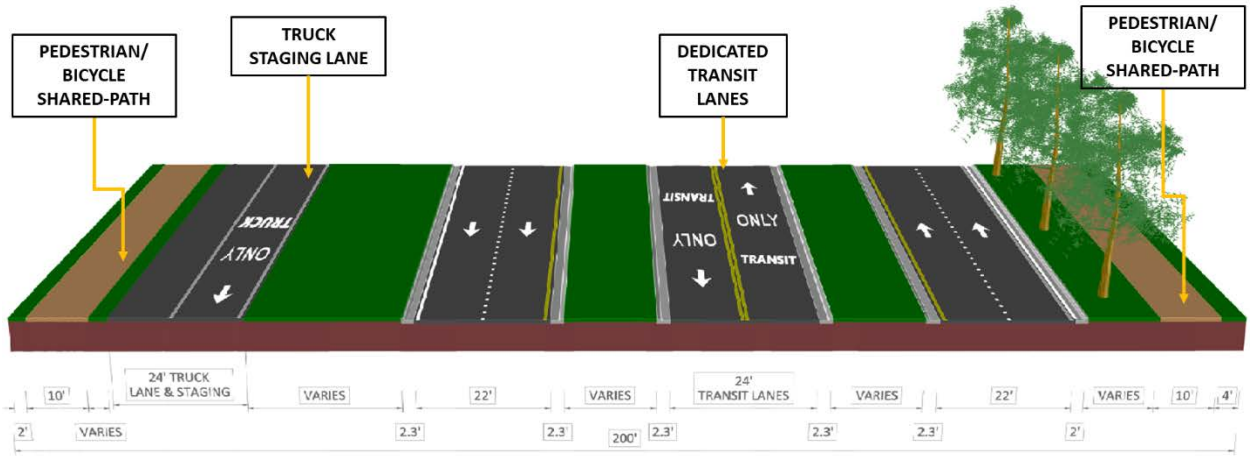


Figure 5-2. Tradeshow Blvd Alternative Concept 1 Typical Section

5.1.2 Alternative Concept 2: 4 General Use Lanes + 2 Transit Lanes (Curbside) + Truck Access Road

This typical section incorporates 4 general use lanes (2 on each side of the roadway), and 2 additional dedicated curbside transit lanes on both sides of the roadway. A 24-foot 1-way southbound truck staging lane is also provided for freight accommodations. For pedestrian and bicycle accommodations, there is a 10-foot shared use path on both sides of Tradeshow Boulevard. This alternative is within the existing Right-of-Way, and there are no expected parcel impacts. See **Figure 5-3** for the typical section.

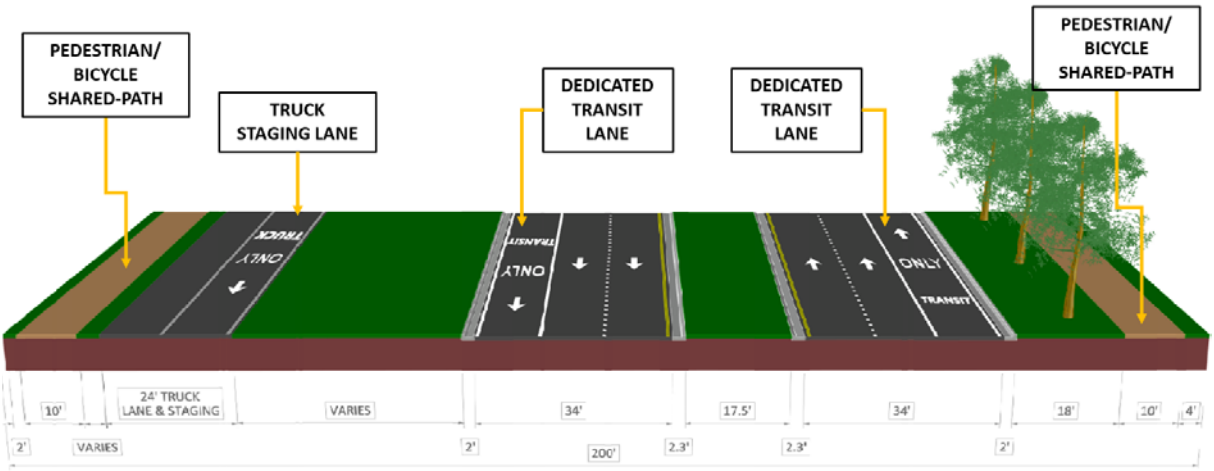


Figure 5-3. Tradeshow Blvd Alternative Concept 2 Typical Section

5.1.3 Alternative Concept 3: 6 General Use Lanes + 2 Transit Lanes (Curbside)

This typical section incorporates 6 general use lanes (3 on each side of the roadway), and 2 additional dedicated curbside transit lanes on both sides of the roadway. For pedestrian and bicycle accommodations, there is a 10-foot shared use path on both sides of Tradeshow Boulevard. This alternative is within the existing Right-of-Way, and there are no expected parcel impacts. See **Figure 5-4** for the typical section.

Figure 5-4. Tradeshow Blvd Alternative Concept 3 Typical Section

5.2 Future Year Traffic Analysis

To support the Tradeshow Boulevard RCA, a corridor capacity analysis was performed using the 2012 FDOT Generalized Service Volume Tables for urbanized areas on non-state roads. A subarea intersection analysis was also conducted for the three Alternative Concepts, which included the intersections listed below and shown in **Figure 5-5**. The full-length alternative concepts with the analyzed intersection lane configurations are shown in **Figure 5-6**. Note the Freight U-Turn intersection, located between the OCCC Freight Access Road and Universal Boulevard, was added as a design feature to supplement the main freight entrance, which is a right-in-right-out (RIRO) intersection in Alternative 1 and 3. It also provides access to the southbound truck staging lane in Alternatives 1 and 2.

- Destination Parkway at Tradeshow Boulevard
- Tradeshow Boulevard at OCCC Parking Access Road
- Tradeshow Boulevard at OCCC Freight Access Road
- Universal Boulevard at Tradeshow Boulevard/Kirkman Road Extension

Figure 5-5. Tradeshow Blvd Analysis Intersections

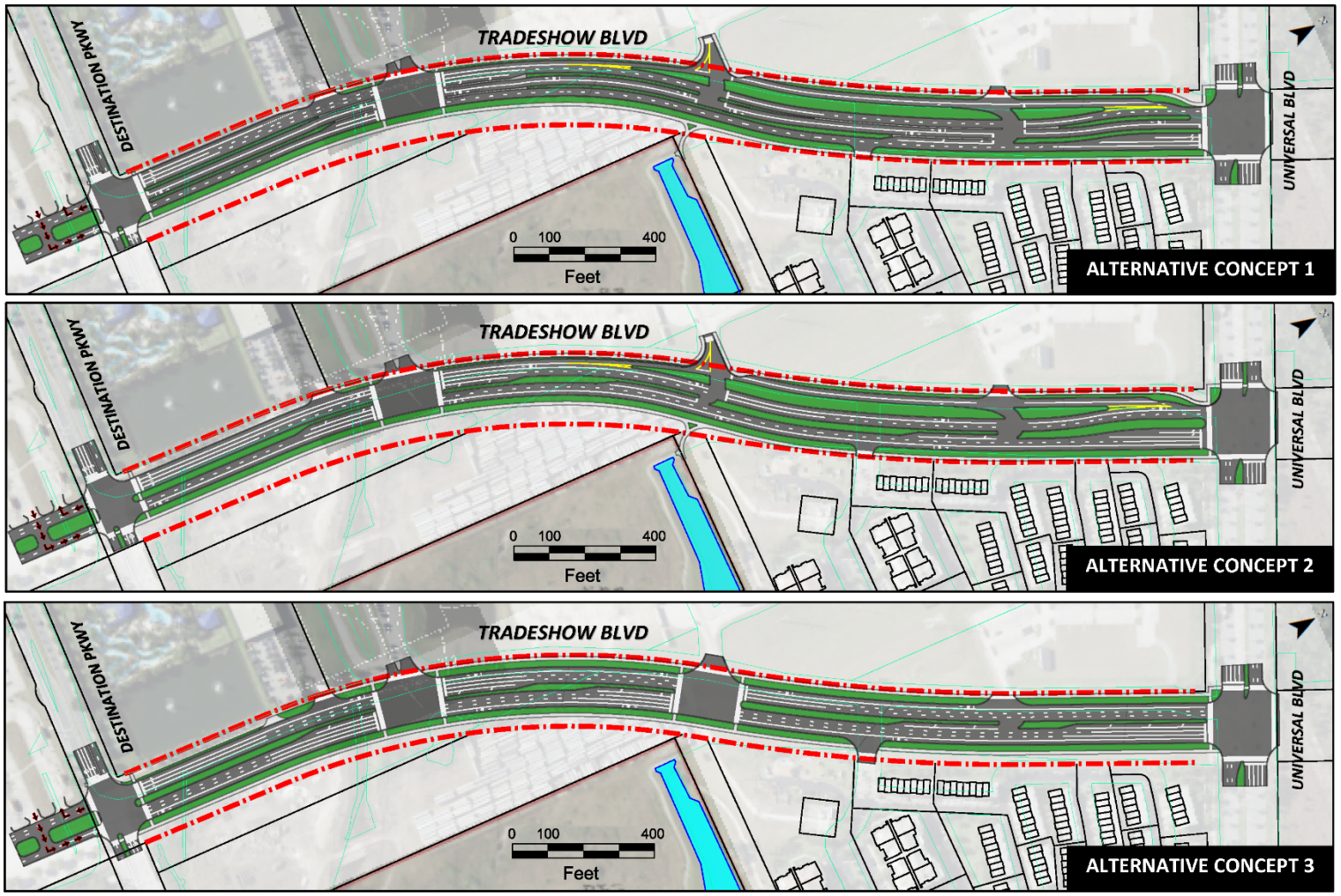


Figure 5-6. Tradeshow Blvd Alternative Concept Layouts

5.2.1 Segment Level Traffic Operations

Roadway capacity was analyzed for the vehicular general use travel lanes (GLs). **Table 5-1** presents the 2045 AADT compared to the daily capacity calculated from the FDOT 2012 Generalized Service Volume Tables. With the 2045 AADT being 19,000 vehicles, a 4-lane facility with a capacity of 30,000 vehicles is anticipated to accommodate the Design Year demand. The 6-lane facility, while also anticipated to accommodate the demand, would be underutilized with more than half of the capacity remaining.

Table 5-1. Design Year (2045) Capacity Analysis for Tradeshow Blvd Analysis

Tradeshow Blvd Segment	Alternative Concept 1 *4 GL + 2 Median TL*		Alternative Concept 2 *4 GL + 2 Curbside TL*		Alternative Concept 3 *6 GL + 2 Curbside TL*	
	2045 AADT	**Daily GL Capacity**	**2045 AADT**	**Daily GL Capacity**	**2045 AADT**	**Daily GL Capacity**
Destination Pkwy to Universal Blvd	19,000	30,000	19,000	30,000	19,000	45,000

5.2.2 Intersection Traffic Operations

Intersection operational analyses were based on methodology from the Highway Capacity Manual (HCM), 6th Edition and calculated in Synchro 10. The HCM 6th Edition methodology requires strict adherence to standard dual ring NEMA phasing. For study intersections that could not be analyzed with HCM 6th Edition due to non-standard phasing, HCM 2000 results were reported. At signalized intersections in the Alternative Concepts, transit signal phases were coded into Synchro as 12 second hold phases. Synchro reports are provided in **Appendix E**[1].

The intersection traffic operational results are presented in **Table 5-2** through **Table 5-5**. In the 2045 AM and PM peak hours, the system connection intersections at Destination Parkway and Universal Boulevard operate at LOS E or better for all alternatives. At Destination Parkway, Alternatives 1 and 2 operate almost identically since the turn configurations are the same. However, Alternative 3 operates worse with additional delay, with the same lane configuration, due to the southbound u-turn volume experienced as a result of accommodating the right out only (RO) movement from the OCCC Parking Access Road. The intersection operational results reveal that the additional roadway capacity in Alternative 3 does not provide any benefit to intersection operations at the system connection intersections since the turn lane configurations and signal timing dictate results.

[1] The HCM output reports from Synchro do not explicitly report the transit hold phase, however the 12 second hold phase can be back checked by subtracting the intersection movement green times and clearance times, for phases in either ring 1 or ring 2, from the intersection cycle length.

Table 5-2. Opening Year (2025) AM Peak Intersection Results for Tradeshow Blvd Analysis

Tradeshow Blvd Intersection	Alternative Concept 1 *4 GL + 2 Median TL*				Alternative Concept 2 *4 GL + 2 Curbside TL*				Alternative Concept 3 *6 GL + 2 Curbside TL*			
	Control Type	**Max V/C**	**Delay**	**LOS**	**Control Type**	**Max V/C**	**Delay**	**LOS**	**Control Type**	**Max V/C**	**Delay**	**LOS**
Universal Blvd		0.69	48.0	D		0.69	48.0	D		0.69	48.0	D
OCCC Freight Access Rd	Free (RIRO)	-	-	-		0.19	8.9	A	STOP (RIRO)	-	1.4	-
OCCC Parking Access Rd		0.50	11.8	B		0.50	11.9	B	STOP (RO)	-	1.8	-
Destination Pkwy[1]		0.85	43.1	D		0.85	45.0	D		0.83	58.9	E

[1]Alternative 3 results are less favorable than Alternatives 1 and 2 due to the SBU movement required to accommodate the OCCC Parking Access Eastbound Right Out Only

Table 5-3. Opening Year (2025) PM Peak Intersection Results for Tradeshow Blvd Analysis

Tradeshow Blvd Intersection	Alternative Concept 1 *4 GL + 2 Median TL*				Alternative Concept 2 *4 GL + 2 Curbside TL*				Alternative Concept 3 *6 GL + 2 Curbside TL*			
	Control Type	**Max V/C**	**Delay**	**LOS**	**Control Type**	**Max V/C**	**Delay**	**LOS**	**Control Type**	**Max V/C**	**Delay**	**LOS**
Universal Blvd		0.90	61.7	E		0.88	66.9	E		0.87	64.8	E
OCCC Freight Access Rd	Free (RIRO)	-	-	-		0.21	7.2	A	STOP (RIRO)	-	1.2	-
OCCC Parking Access Rd		0.46	8.6	A		0.46	8.2	A	STOP (RO)	-	1.5	-
Destination Pkwy[1]		0.84	58.3	E		0.84	63.3	E		0.85	67.5	E

[1]Alternative 3 results are less favorable than Alternatives 1 and 2 due to the SBU movement required to accommodate the OCCC Parking Access Eastbound Right Out Only

Table 5-4. Design Year (2045) AM Peak Intersection Results for Tradeshow Blvd Analysis

Tradeshow Blvd Intersection	Alternative Concept 1 *4 GL + 2 Median TL*				Alternative Concept 2 *4 GL + 2 Curbside TL*				Alternative Concept 3 *6 GL + 2 Curbside TL*			
	Control Type	**Max V/C**	**Delay**	**LOS**	**Control Type**	**Max V/C**	**Delay**	**LOS**	**Control Type**	**Max V/C**	**Delay**	**LOS**
Universal Blvd		0.95	64.8	E		0.96	63.8	E		0.95	63.6	E
OCCC Freight Access Rd	Free (RIRO)	-	-	-		0.27	18.1	B	STOP (RIRO)	-	2.9	-
OCCC Parking Access Rd		0.65	13.5	B		0.65	13.4	B	STOP (RO)	-	3.0	-
Destination Pkwy[1]		0.98	63.9	E		0.98	65.8	E		1.1	85.8	F

[1]Alternative 3 results are less favorable than Alternatives 1 and 2 due to the SBU movement required to accommodate the OCCC Parking Access Eastbound Right Out Only

Table 5-5. Design Year (2045) PM Peak Intersection Results for Tradeshow Blvd Analysis

Tradeshow Blvd Intersection	Alternative Concept 1 *4 GL + 2 Median TL*				Alternative Concept 2 *4 GL + 2 Curbside TL*				Alternative Concept 3 *6 GL + 2 Curbside TL*			
	Ctrl Type	**Max V/C**	**Delay**	**LOS**	**Ctrl Type**	**Max V/C**	**Delay**	**LOS**	**Ctrl Type**	**Max V/C**	**Delay**	**LOS**
Universal Blvd		0.98	73.2	E		0.98	73.0	E		0.98	70.7	E
OCCC Freight Access Rd	Free (RIRO)	-	-	-		0.53	12.6	B	STOP (RIRO)	0.66	3.4	-
OCCC Parking Access Rd		0.68	12.7	B		0.68	13.1	B	STOP (RO)	0.55	3.1	-
Destination Pkwy[1]		0.94	55.3	E		0.96	53.5	D		0.95	65.0	E

[1]Alternative 3 results are less favorable than Alternatives 1 and 2 due to the SBU movement required to accommodate the OCCC Parking Access Eastbound Right Out Only

5.3 Preferred Tradeshow Boulevard Alternative

Consistent with the RCA report, the preferred typical section and alignment is Alternative Concept 1: 4 General Use Lanes + 2 Median Transit Lanes + Truck Access Road. The traffic analysis results show that this configuration will support acceptable traffic operations in Design Year 2045. Roadway volume is under capacity and intersection performance is LOS B or better for the OCCC Parking Road and Freight Access Road intersection, and LOS E or better at the boundary intersections. Alternative 1 and 2 yield similar LOS and delay results, however additional considerations such as lane changing, access management, and non-motorized accommodation, as discussed in RCA, support Alternative Concept 1 as the preferred.

6.0 I-Drive Median versus Curbside Transit Lane Selection

The impact on general vehicular traffic operation of median running transit lanes versus curbside running transit lanes was evaluated using three primary metrics: increased signal delay due to a required transit hold phase, eliminated lane(s) due to transit lane alignment, and increased pedestrian calls due to a nearby transit stop location. Right-turn lane elimination was not a primary consideration since the movement could still occur during the through phase of the signal, which is typically allocated the most green time in a signal cycle. However, left-turn lane elimination or signalization may require a permitted movement to become protected only, reduce the total lanes on the intersection approach, or reroute movements to a different intersection to complete the left-turn movement. The comparison matrix per I-Drive intersection is provided in **Table 6-1**. As identified in the table, the median transit lanes have more adverse impacts to vehicular traffic operations than the curbside running lanes do, as presented with similar stop locations. For that reason, only the curbside transit lanes are advanced for additional analysis.

Beyond the traffic operational impacts, there are user comfort, access management, and stationing considerations between the median and curbside transit lanes being evaluated in the "Transit Feasibility and Technology Assessment Report". A summary of the advantages and disadvantages is offered below, which favors curbside transit lanes:

Median Transit Lanes

- Pedestrians need to cross part of roadway regardless of direction of travel
- Requires left-boarding transit vehicles limiting the use of the median transit lanes for other transit systems (LYNX and I-Ride Trolley)
- Potential impacts to existing median landscape
- Potential need for mid-block crossings to provide pedestrian access at some station locations that cannot be placed near a signalized intersections due to space requirements

Curbside Transit Lanes

- Pedestrians are not required to cross travel lanes if origin/destination is on same side of street as stop
- Minimizes impacts to existing median openings (left-turn lanes)
- Can use conventional right-boarding vehicles

Table 6-1. Median versus Curbside Comparative Matrix

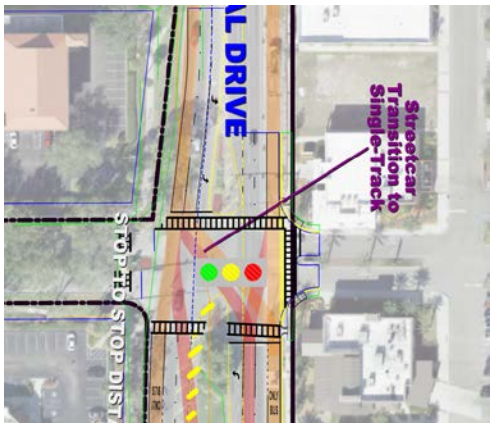
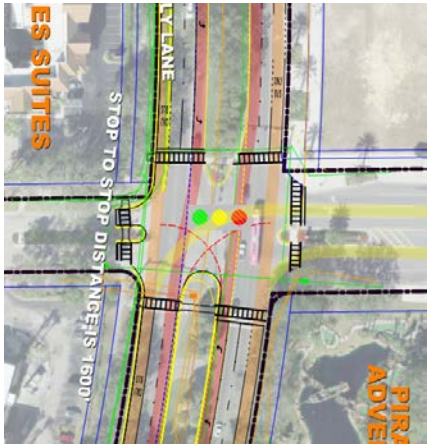
I-Drive Intersection	Alternative Image (Red Alignment/Stations – Median, Orange Alignment/Stations – Curbside)	Traffic Operational Consideration	**Median** Transit Lanes	**Curbside** Transit Lanes	Preferred Option?
Jamaican Ct (North)		Increased Signal Delay (Transit Phase Required)	Moderate Impact	Low Impact	Curbside
		Eliminated Lane(s)	Moderate Impact	Low Impact	Curbside
		Increased Pedestrian Calls	Moderate Impact	Moderate Impact	N/A
Via Mercado		Increased Signal Delay (Transit Phase Required)	Moderate Impact	Low Impact	Curbside
		Eliminated Lane(s)	High Impact	Low Impact	Curbside
		Increased Pedestrian Calls	Moderate Impact	Moderate Impact	N/A

Table 6-1. Median versus Curbside Comparative Matrix (Continued)

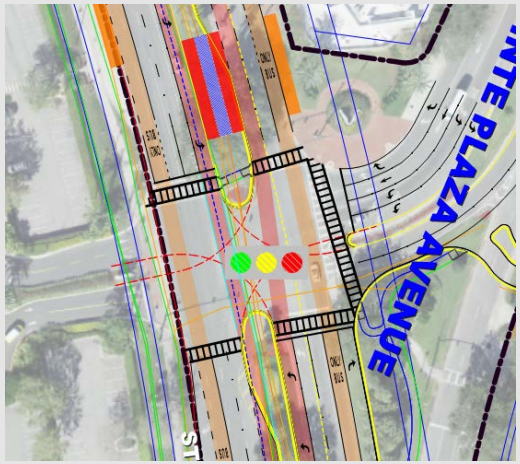
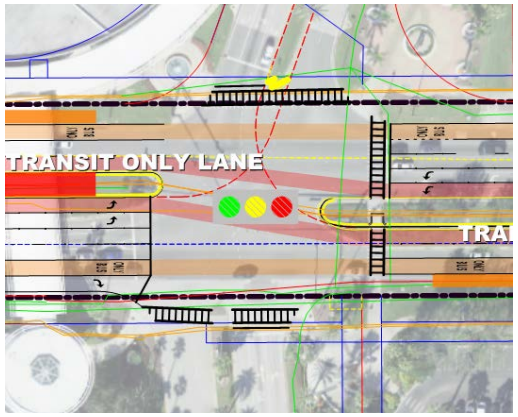
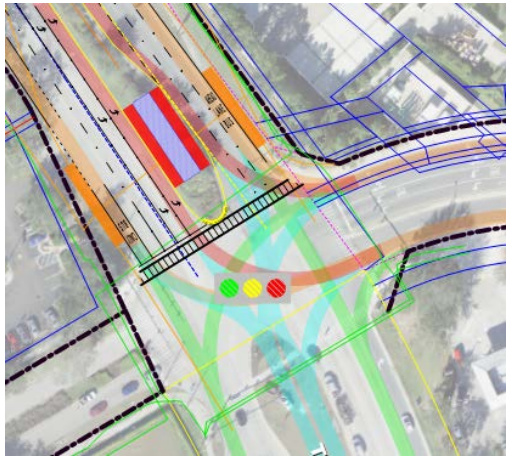
I-Drive Intersection	Alternative Image (Red Alignment/Stations – Median, Orange Alignment/Stations – Curbside)	Traffic Operational Consideration	**Median** Transit Lanes	**Curbside** Transit Lanes	Preferred Option?
Pointe Plaza Ave		Increased Signal Delay (Transit Phase Required)	Moderate Impact	Low Impact	Curbside
		Eliminated Lane(s)	High Impact	Low Impact	Curbside
		Increased Pedestrian Calls	High Impact	Moderate Impact	Curbside
Convention Way		Increased Signal Delay (Transit Phase Required)	High Impact	Moderate Impact	Curbside
		Eliminated Lane(s)	High Impact	Low Impact	Curbside
		Increased Pedestrian Calls	High Impact	Moderate Impact	Curbside

Table 6-1. Median versus Curbside Comparative Matrix (Continued)

I-Drive Intersection	Alternative Image (Red Alignment/Stations – Median, Orange Alignment/Stations – Curbside)	Traffic Operational Consideration	**Median** Transit Lanes	**Curbside** Transit Lanes	Preferred Option?
Destination Pkwy		Increased Signal Delay (Transit Phase Required)	High Impact	High Impact	N/A
		Eliminated Lane(s)	Moderate Impact	Low Impact	Curbside
		Increased Pedestrian Calls	High Impact	Moderate Impact	Curbside

7.0 TFATA Study Area Alternatives

The three study area alternatives considered for the traffic analysis, all including some form of transit lanes, are listed below. In the No-Action Alternative, the transit lanes would accommodate LYNX, I-Ride Trolley, potential OCCC shuttle bus activity, and vehicles turning in and out of adjacent driveways or parking lots. In Build Alternative 1 and 2, the transit lanes would also accommodate all of the same services as in No-Action, in addition to the new premium transit service.

- No-Action Alternative
  - Transit lanes are assumed along I-Drive, consistent with the 90% plans
  - Without transit phases
  - I-Drive typical section is 4 general use and 2 transit
  - Tradeshow Boulevard matches the Kirkman Road Extension
- Build Alternative 1: I-Drive Only Transit Alignment
  - Transit lanes are assumed along I-Drive, consistent with the TFATA Transit Alignment 1 (**Figure 7-2**)
  - With transit phases
  - I-Drive typical section is 4 general use and 2 transit
  - Tradeshow Boulevard matches the preferred Alternative Concept 1
- Build Alternative 2: I-Drive/Universal Boulevard Transit Alignment
  - Transit lanes are assumed along I-Drive but shift to Universal Boulevard at Via Mercado, consistent with the TFATA Transit Alignment 2 (**Figure 7-3**)
  - With transit phases
  - I-Drive typical section is 4 general use and 2 transit
  - Tradeshow Boulevard matches the preferred Alternative Concept 1

The main difference between Build Alternative 1 and Build Alternative 2 is that the transit alignment shifts north of Austrian Court and affects the Sand Lake Road intersection where a transit hold phase must be considered. In both Build Alternatives, the I-Drive transit lanes run from Westwood Boulevard to Pointe Plaza Ave. The transit phases implemented in each of the alternatives is compared in **Table 7-1**, and also shown in the alternative **Figures 7-1** through **7-3** in the next section. The standard transit signal hold phase modeled in Synchro was 12 seconds (5 seconds of minimum green, 4.8 seconds of yellow clearance, 2 seconds of all-red, rounded to 12 seconds). In the No-Action Alternative, there is one transit phase on Universal Boulevard at Tradeshow Boulevard/Kirkman Road to reflect the Kirkman Road plans. In the Build Alternatives, transit phases were included at intersections where the transit service would need to make a turning movement such as at I-Drive and Destination Parkway, or get through an intersection to meet route schedules, such as at Sand Lake Road. Transit phases were omitted at intersections where the service could run concurrently with the through movement and not adversely impact service. A transit phase was included on I-Drive at Convention Way to conservatively account for modifications in service due to Convention Center events.

Table 7-1. Transit Signal Phases Modeled

Major Rd	Cross Street	Transit Signal Hold Phase Modeled?		
		No-Action	Build Alternative 1	Build Alternative 2
I-Drive	Sand Lake Rd	No	Yes, 12 seconds	No
	Jamaican Ct (North)	No	No	No
	Austrian Ct / via Mercado	No	No	Yes, 12 seconds
	Pointe Plaza Ave	No	No	No
	Convention Way	No	Yes, 12 seconds	Yes, 12 seconds
	Destination Pkwy	No	Yes, 12 seconds	Yes, 12 seconds
	SR 528 Westbound Ramps	No	No	No
	SR 528 Eastbound Ramps	No	No	No
Destination Pkwy	Tradeshow Blvd	No	Yes, 12 seconds	Yes, 12 seconds
Universal Blvd	Sand Lake Rd	No	No	Yes, 12 seconds
	Via Mercado	No	No	Yes, 12 seconds
	Pointe Plaza Ave	No	No	No
	Convention Way	No	No	No
	Concourse Dr	No	No	No
	Tradeshow Blvd	Yes, 12 seconds	Yes, 12 seconds	Yes, 12 seconds
	Destination Pkwy	No	No	No

7.1 No-Action Alternative

The No-Action alternative, shown in **Figure 7-1**, includes the Kirkman Road Extension build out and the I-Drive Transit Lane build out based on the 90% plans (4 general use lanes and 2 transit lanes). The 90% plans are included in **Appendix I**. For Tradeshow Boulevard, this alternative assumes 4 general use lanes (2 on each side of the roadway), which reflects this build out of the Kirkman Road Extension.

Figure 7-1. No-Action Alternative

7.2 Build Alternative 1: I-Drive Only Transit Alignment

This alternative, shown in **Figure 7-2**, considers transit lanes along I-Drive with transit phases at select signalized intersections to enhance the transit lane build out through technology improvement. The preferred Tradeshow Boulevard alternative of 4 General Use Lanes + 2 Median Transit Lanes + Truck Access Road, as previously discussed in **Section 5.0**, is included in this Build Alternative.

Figure 7-2. Build Alternative 1: I-Drive Only Transit Alignment

7.3 Build Alternative 2: I-Drive/Universal Boulevard Transit Alignment

This alternative, shown in **Figure 7-3**, considers transit lanes along I-Drive, that shift to Universal Boulevard on the north end, with transit phases at select signalized intersections to enhance the transit lane build out through technology improvement. The preferred Tradeshow Boulevard alternative of 4 General Use Lanes + 2 Median Transit Lanes + Truck Access Road is included in this Build Alternative.

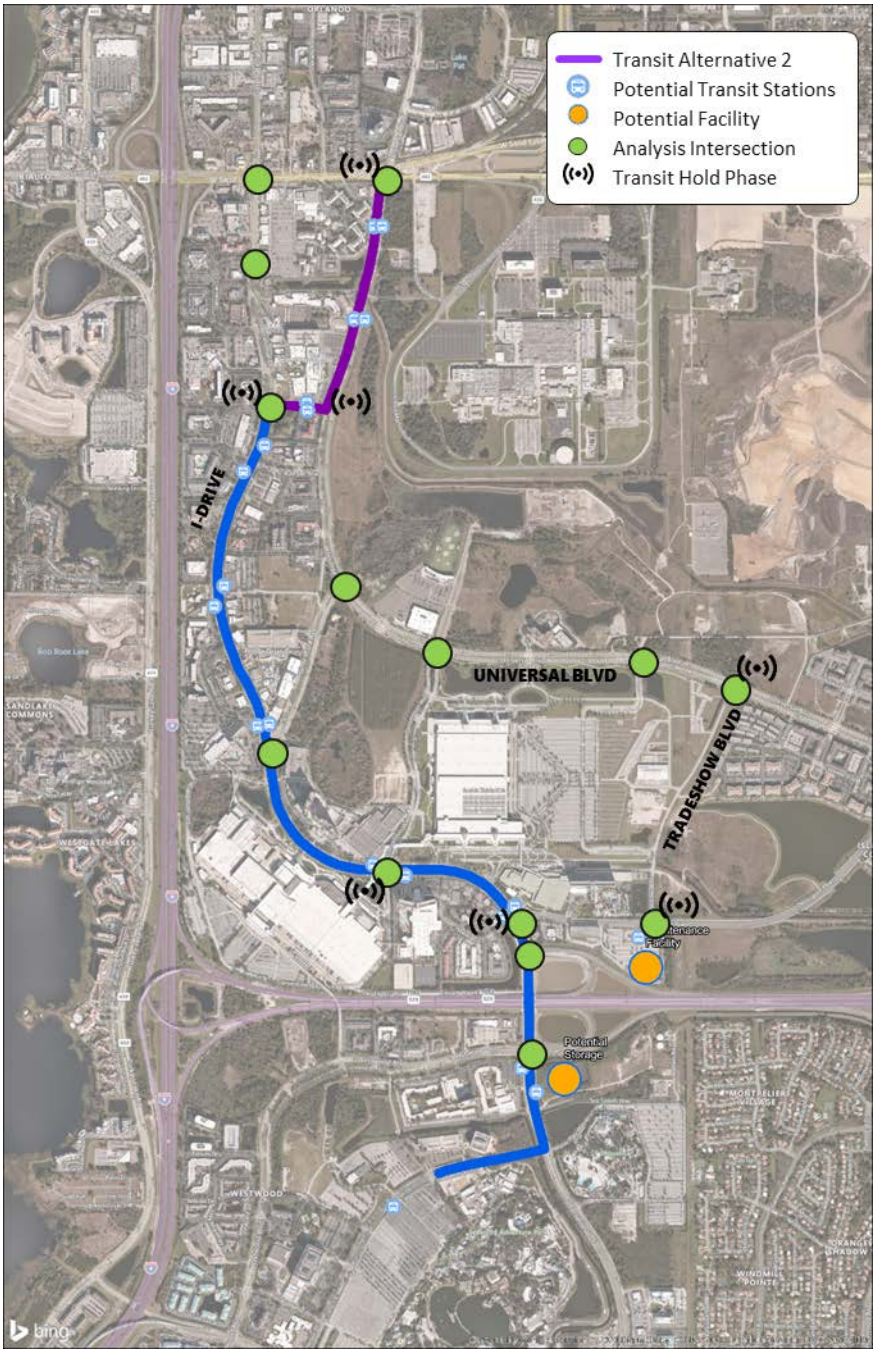


Figure 7-3: Build Alternative 2: I-Drive/Universal Blvd Transit Alignment

8.0 TFATA Study Area Alternatives Traffic Operations Analysis

A future year traffic operational analysis was conducted for Opening Year 2025, Interim Year 2035, and Design Year 2045. For all future year alternatives, Synchro inputs such as truck percentages and PHFs were carried forward from the Existing Year model. For each alternative, corridor cycle lengths and splits were optimized, giving consideration to high volume cross street movements. For the Build Alternatives, transit phases were coded into Synchro as 12 second hold phases. Transit stops were not modeled in Synchro as each alternative has a dedicated transit lane where stopping would not impact traffic flow. Performance measures were consistent with the existing year analysis and are listed below.

Network performance measures:

- Total delay, average delay per vehicle, and unserved vehicles.

Intersection performance measures:

- Movement: LOS, delay, volume-to-capacity ratios, and 95th percentile queue lengths
- Overall Intersection: LOS, delay, max volume-to-capacity ratio

Network performance measures were used to compare the No-Build Alternative and Build Alternatives on a system-level. Network results can objectively compare different alternatives and provide a general feel of how drivers will experience trips. Intersection operational analyses were based on methodology from the Highway Capacity Manual (HCM), 6th Edition and calculated in Synchro 10. The HCM 6th Edition methodology requires strict adherence to standard dual ring NEMA phasing. For study intersections that could not be analyzed with HCM 6th Edition due to non-standard phasing, HCM 2000 results were reported. Synchro reports are included in **Appendix E**.

Throughout all analysis years and alternatives, capacity and delay results may differ due to signal timing, signal phasing, and coordination strategies.

8.1 2025 Traffic Operations

In Opening Year 2025, the three alternatives operate similarly to one another in both the AM and PM peak hours. This is due to the network along I-Drive and Universal Boulevard being mostly under-capacity and able to service the study area demand. Although Build Alternatives 1 and 2 reserve signal time for transit phases, the operations do not significantly degrade relative to the No-Action Alternative.

8.1.1 Network

The Alternative results are tabulated in **Table 8-1**. In Opening Year 2025, the AM peak hour yields similar results for all alternatives, with minor differences due to signal timing and transit phases in the Build Alternatives. In the PM peak hour, the study area average delay for Build Alternative 1 and 2 is only increased by 4 seconds per vehicle in the PM peak hour relative to the No-Action Alternative. Also in the PM peak hour, the Build Alternative 2 shows the lowest number of unserved vehicles due to the Tradeshow Boulevard improvements relative to No-Action, and the transit signal phase being located at the intersection of Sand Lake Road and Universal Boulevard instead of Sand Lake Road at I-Drive relative to Build Alternative 1.

Table 8-1. Opening Year (2025) Network Performance

Performance Measure	No-Action	Build Alternative 1	Build Alternative 2
2025 AM Peak			
Average Delay (sec/veh)	28	29	30
Total Delay (hr)	330	349	365
Number of Unserved Vehicles	0	21	38
2025 PM Peak			
Average Delay (sec/veh)	41	45	45
Total Delay (hr)	753	825	820
Number of Unserved Vehicles	564	678	476

8.1.2 Intersections

Delay and LOS results for are summarized in **Table 8-2**. Detailed movement performance tables including delay, LOS, V/C ratio, and 95th percentile queue length are provided **Appendix F**. In Opening Year 2025, all intersections in Build Alternative 1, except for I-Drive at Sand Lake Road, operate at LOS E or better. However, this intersection is also failing in the No-Action Alternative. Universal Boulevard at Sand Lake Road in Build Alternative 2 operates at LOS F, worse than Build Alternative 1, due to the transit phase implemented here in Build Alternative 2.

Table 8-2. Opening Year (2025) Intersection Results

Major Rd	Cross Street	No-Action AM (PM)			Build Alternative 1 AM (PM)			Build Alternative 2 AM (PM)		
		Max V/C	Delay	LOS	Max V/C	Delay	LOS	Max V/C	Delay	LOS
I-Drive	Sand Lake Rd	0.85 (1.28)	38.3 (97.3)	D (F)	0.89 (1.40)	44.4 (108.2)	D (F)	0.85 (1.28)	38.3 (97.3)	D (F)
	Jamaican Ct (North)	0.33 (0.52)	14.3 (21.5)	B (C)	0.57 (0.62)	13.2 (17.1)	B (B)	Same as Build Alternative 1		
	Austrian Ct / via Mercado	0.80 (0.89)	22.5 (47.6)	C (D)	0.80 (0.89)	22.5 (47.6)	C (D)	0.57 (0.85)	37.9 (54.3)	D (D)
	Pointe Plaza Ave	0.67 (0.69)	21.9 (23.8)	C (C)	0.68 (0.69)	22.0 (23.9)	C (C)	Same as Build Alternative 1		
	Convention Way	0.78 (0.80)	32.0 (35.4)	C (D)	0.79 (0.80)	38.3 (43.9)	D (D)	Same as Build Alternative 1		
	Destination Pkwy	0.87 (0.87)	34.8 (53.5)	C (D)	0.99 (0.99)	49.2 (66.3)	D (E)	Same as Build Alternative 1		
	SR 528 Westbound Ramps	0.82 (0.78)	20.2 (16.0)	C (B)	0.84 (0.84)	21.6 (24.7)	C (C)	Same as Build Alternative 1		
	SR 528 Eastbound Ramps	0.69 (0.81)	27.9 (39.4)	C (D)	0.64 (0.79)	28.3 (39.8)	C (D)	Same as Build Alternative 1		
Destination Pkwy	Tradeshow Blvd	1.00 (1.03)	52.0 (47.2)	D (D)	0.66 (0.82)	39.5 (41.4)	D (D)	Same as Build Alternative 1		
Universal Blvd	Sand Lake Rd	0.88 (0.96)	39.2 (61.5)	D (E)	0.88 (0.95)	39.2 (62.3)	D (E)	0.80 (1.03)	49.9 (77.6)	D (E)
	Pointe Plaza Ave	0.69 (0.83)	18.9 (31.4)	B (C)	0.70 (0.97)	20.1 (33.0)	C (C)	Same as Build Alternative 1		
	Convention Way	0.82 (0.79)	19.8 (19.8)	B (B)	0.70 (0.78)	19.3 (20.3)	B (C)	Same as Build Alternative 1		
	Concourse Dr	0.42 (0.51)	10.2 (9.4)	B (A)	0.43 (0.50)	11.9 (13.1)	B (B)	Same as Build Alternative 1		
	Tradeshow Blvd	0.74 (0.96)	61.9 (68.9)	E (E)	0.71 (0.90)	50.6 (60.3)	D (E)	Same as Build Alternative 1		

8.2 2035 Traffic Operations

In Interim Year 2035, the operations on Destination Parkway begin to differentiate between the No-Action Alternative and the Build Alternative, with some intersections now experiencing LOS F. Destination Parkway at Tradeshow Boulevard experiences LOS F in the No-Action Alternative because there is only one eastbound left-turn lane and one southbound right-turn lane whereas the Build Alternatives include eastbound dual left-turn lanes and dual southbound right-turn lanes. I-Drive at Destination Parkway experiences LOS F in the PM peak hour in the Build Alternatives due to the inclusion of the transit signal hold phase that is not included in the No-Action Alternative.

8.2.1 Network

The network results for Interim Year 2035 are displayed in **Table 8-3**. The No-Action Alternative has the lowest delay and number of unserved vehicles. In the Build Alternatives, the delay is similar but the number of unserved vehicles is lower in Build Alternative 2.

Table 8-3. Interim Year (2035) Network Performance

Performance Measure	No-Action	Build Alternative 1	Build Alternative 2
2035 AM Peak			
Average Delay (sec/veh)	38	43	43
Total Delay (hr)	571	634	639
Number of Unserved Vehicles	174	473	492
2035 PM Peak			
Average Delay (sec/veh)	48	53	52
Total Delay (hr)	998	1,104	1,077
Number of Unserved Vehicles	928	1,270	1,413

8.2.2 Intersections

The intersection results for Interim Year 2035 are displayed in **Table 8-4**. The results show that in the No-Action Alternative, the intersection on Destination Parkway at Tradeshow Boulevard is now expected to operate at LOS F due to the lack of intersection improvements. In the Build Alternatives, the Sand Lake Road intersections continue to operate at LOS F. I-Drive at Destination Parkway also becomes LOS F in the PM peak hour, which is due to the high volume increase to and from Destination Parkway that cannot be accommodated in the signal cycle with the transit phase. Compared to Build Alternative 1, Universal Boulevard at Sand Lake Road operates at LOS F in the AM and PM peak hours in Build Alternative 2 due to the transit phase implemented there as opposed to on I-Drive at Sand Lake Rd.

Table 8-4. Interim Year (2035) Intersection Results

Major Rd	Cross Street	No-Action AM (PM)			Build Alternative 1 AM (PM)			Build Alternative 2 AM (PM)		
		Max V/C	Delay	LOS	Max V/C	Delay	LOS	Max V/C	Delay	LOS
International Dr	Sand Lake Rd	1.16 (1.43)	83.5 (121.8)	F (F)	1.34 (1.61)	91.5 (142.9)	F (F)	1.16 (1.43)	83.5 (122.6)	F (F)
	Jamaican Ct (North)	0.32 (0.57)	14.1 (16.6)	B (B)	0.63 (0.67)	14.1 (18.4)	B (B)	Same as Build Alternative 1		
	Austrian Ct / via Mercado	0.84 (0.86)	33.6 (48.6)	C (D)	0.84 (0.86)	33.6 (48.6)	C (D)	0.65 (0.91)	38.9 (52.7)	D (D)
	Pointe Plaza Ave	0.75 (0.77)	23.3 (25.4)	C (C)	0.75 (0.77)	23.4 (25.4)	C (C)	Same as Build Alternative 1		
	Convention Way	0.71 (0.87)	33.4 (41.6)	C (D)	0.82 (0.91)	42.1 (52.2)	D (D)	Same as Build Alternative 1		
	Destination Pkwy	0.81 (1.15)	52.2 (75.3)	D (E)	1.19 (1.25)	69.7 (84.6)	E (F)	Same as Build Alternative 1		
	SR 528 Westbound Ramps	0.86 (0.88)	24.7 (29.7)	C (C)	0.87 (0.88)	26.0 (31.7)	C (C)	Same as Build Alternative 1		
	SR 528 Eastbound Ramps	0.68 (0.84)	31.6 (46.4)	C (D)	0.68 (0.83)	32.1 (46.6)	C (D)	Same as Build Alternative 1		
Destination Pkwy	Tradeshow Blvd	1.90 (1.91)	136.3 (141.9)	F (F)	0.87 (0.87)	45.6 (48.9)	D (D)	Same as Build Alternative 1		
Universal Blvd	Sand Lake Rd	1.28 (1.03)	76.9 (61.7)	E (E)	1.28 (1.07)	76.6 (71.0)	E (E)	1.24 (1.09)	99.1 (94.3)	F (F)
	Pointe Plaza Ave	0.73 (0.88)	21.0 (34.3)	C (C)	0.74 (0.86)	21.1 (33.8)	C (C)	Same as Build Alternative 1		
	Convention Way	0.86 (0.78)	22.4 (22.1)	C (C)	0.82 (0.80)	21.8 (21.1)	C (C)	Same as Build Alternative 1		
	Concourse Dr	0.47 (0.62)	10.0 (14.6)	B (B)	0.43 (0.63)	12.7 (15.4)	B (B)	Same as Build Alternative 1		
	Tradeshow Blvd	0.84 (0.98)	62.1 (71.5)	E (E)	0.81 (0.91)	55.5 (65.3)	E (E)	Same as Build Alternative 1		

8.3 2045 Traffic Operations

In Design Year 2045, the less effective network operations are driven by key intersections such as I-Drive at Sand Lake Road, I-Drive at Destination Parkway, and Universal Boulevard at Sand Lake Road. The remaining intersections are generally under capacity, with an intersection LOS of E or better.

8.3.1 Network

The network results for Design Year 2045 are displayed in **Table 8-5**. In Design Year 2045, the Build Alternatives are slightly worse than the No-Action in all of the reported metrics which reflects the installation of transit signal phases. However, the unserved demand in the PM peak hour being between 2,033 and 2,153 vehicles in all Alternatives indicates that network degradation is not primarily due to transit signal installation, and the No-Action alternative cannot accommodate the vehicular demand.

Table 8-5. Design Year (2045) Network Performance

Performance Measure	No-Action	Build Alternative 1	Build Alternative 2
2045 AM Peak			
Average Delay (sec/veh)	49	54	56
Total Delay (hr)	867	936	968
Number of Unserved Vehicles	1,230	1,379	1,490
2045 PM Peak			
Average Delay (sec/veh)	61	62	62
Total Delay (hr)	1,407	1,468	1,445
Number of Unserved Vehicles	2,095	2,153	2,033

8.3.2 Intersections

The intersection results for Design Year 2045 are displayed in **Table 8-6.** The delay increases seen from 2025 to 2035 continue with additional intersections operating at LOS F in 2045. Note some intersection results may improve in 2045 relative to earlier years due to signal timing and coordination modifications.

The notable intersections are I-Drive at Sand Lake Road and I-Drive at Universal Boulevard, where both operate now at LOS F for all Alternatives. Considering the transit installation at either location, the delay and V/C increase on I-Drive at Sand Lake Road is more severe in Build Alternative 1 than it is on Universal Boulevard at Sand Lake Road. In Build Alternative 1 in the PM peak, the max V/C at the intersection of I-Drive at Sand Lake Road is 1.86 and the intersection delay is 184.6. In Build Alternative 2 in the PM peak, the max V/C at the intersection of Universal Boulevard at Sand Lake Road is 1.14 and the intersection delay is 113.7 seconds per vehicle.

Another notable location is I-Drive at Destination Parkway, which is overcapacity in all alternatives. Given the approximate 12% annual increase in volume on Destination Parkway, the volume to and from Destination Parkway (northbound right-turn, southbound left-turn, westbound right-turn, and westbound left-turn) cannot be accommodated in the existing lane configurations. If the projected future volumes

are reached in future years, there will be a need for roadway improvements at the intersection of I-Drive and Destination Parkway. Improvements including a second northbound left-turn lane and a second eastbound right-turn lane could be added at a later time to alleviate some of the increased delay and increase flexibility with the signal cycle allocation, potentially assigning further time to transit service.

8.4 Right-Turn Queues

An additional assessment of the interaction of the transit and non-transit uses of the BAT lanes was conducted to determine if dwell time at the new premium transit stations would impact traffic operations. To make this determination, the distance between the stop bar and the new stations was used as a proxy for right turn queue storage. Right-turn queue lengths at the intersections along the I-Drive transit route are summarized in **Table 8-7**. Based on the results, is not expected that right turn operations at the signalized intersections will be effected by transit operations. This implies that the right turn movements at signalized intersections will cause additional delays for transit vehicles beyond the normal corridor travel speeds described in the Transit Operation Plan. A major contributing reason for the limited interaction of the right turn queue is because right-turning vehicles can complete the movement during the mainline through phase at most of the signalized intersections. For example, at the intersection of I-Drive and Pointe Plaza Ave, the forecast has 168 northbound right-turn vehicles in the 2045 PM peak hour and uses a signal cycle of 120 seconds. There would be 30 signal cycles in the hour with 6 northbound right-turn vehicles per signal cycle if distributed evenly over the hour (rounding up from 5.6). Those 6 vehicles can primarily be accommodated in the through phase of the signal and therefore queuing from northbound right-turn vehicles unable to clear the signal is minimal.

8.5 Micro-Simulation

The Future Year PM peak hour Synchro model data was transferred into Vissim to present a 3D video of traffic operations for the TFATA Study Area Alternatives comparison. The Vissim model relies on calibration from recently completed studies where Vissim models were used. The Vissim model shows how vehicular traffic flows through the study area and how it interacts with the transit flow. Animations are being prepared separately and will be submitted to the County for viewing.

Table 8-6. Design Year (2045) Intersection Results

Major Rd	Cross Street	No-Action AM (PM)			Build Alternative 1 AM (PM)			Build Alternative 2 AM (PM)		
		Max V/C	Delay	LOS	Max V/C	Delay	LOS	Max V/C	Delay	LOS
International Dr	Sand Lake Rd	1.41 (1.60)	126.3 (151.3)	F (F)	1.59 (1.86)	142.5 (184.6)	F (F)	1.41 (1.60)	126.3 (151.3)	F (F)
	Jamaican Ct (North)	0.66 (0.75)	14.6 (20.0)	B (B)	0.67 (0.75)	14.6 (20.0)	B (B)	Same as Build Alternative 1		
	Austrian Ct / via Mercado	0.98 (0.90)	35.8 (51.1)	D (D)	0.98 (0.90)	35.8 (51.1)	D (D)	0.85 (1.05)	41.5 (64.3)	D (E)
	Pointe Plaza Ave	0.79 (0.84)	25.0 (27.8)	C (C)	0.79 (0.83)	25.3 (27.5)	C (C)	Same as Build Alternative 1		
	Convention Way	0.84 (0.97)	34.9 (51.7)	C (D)	0.92 (0.95)	48.1 (56.3)	D (E)	Same as Build Alternative 1		
	Destination Pkwy	0.98 (1.29)	67.8 (105.8)	E (F)	1.30 (1.30)	90.5 (121.1)	F (F)	Same as Build Alternative 1		
	SR 528 Westbound Ramps	0.89 (0.92)	29.2 (42.9)	C (D)	0.89 (0.92)	31.1 (42.9)	C (D)	Same as Build Alternative 1		
	SR 528 Eastbound Ramps	0.73 (0.88)	36.7 (57.3)	D (E)	0.72 (0.88)	37.1 (57.4)	D (E)	Same as Build Alternative 1		
Destination Pkwy	Tradeshow Blvd	2.45 (2.06)	253.3 (186.2)	F (F)	0.97 (0.95)	55.5 (63.0)	E (E)	Same as Build Alternative 1		
Universal Blvd	Sand Lake Rd	1.39 (1.21)	105.8 (72.6)	F (E)	1.39 (1.21)	108.3 (85.0)	F (F)	1.69 (1.14)	142.5 (113.7)	F (F)
	Pointe Plaza Ave	0.85 (0.91)	28.0 (39.1)	C (D)	0.84 (0.88)	27.1 (45.1)	C (D)	Same as Build Alternative 1		
	Convention Way	0.85 (0.82)	25.1 (22.4)	C (C)	0.84 (0.82)	24.7 (22.4)	C (C)	Same as Build Alternative 1		
	Concourse Dr	0.49 (0.79)	9.4 (18.7)	A (B)	0.49 (0.79)	14.1 (21.3)	B (C)	Same as Build Alternative 1		
	Tradeshow Blvd	0.98 (1.07)	86.1 (77.7)	F (E)	0.96 (0.98)	63.9 (73.8)	E (E)	Same as Build Alternative 1		

Table 8-7. Right-Turn Queues along I-Drive

Major Road	Cross Street	Premium Bus Service							
		↓ Southbound ↓				↑ Northbound ↑			
		2045 Right-Turn Vehicles (vph)	2045 Right-Turn 95th Queue (feet)	Nearest Upstream Transit Stop (feet)	Transit Stop Impacted? (2025 / 2045)	2045 Right-Turn Vehicles (vph)	2045 Right-Turn 95th Queue (feet)	Nearest Upstream Transit Stop (feet)	Transit Stop Impacted? (2025 / 2045)
AM Peak Hour									
I-Drive	**Jamaican Ct (North)**	32 vph	0	N/A	N/A	45 vph	0	625	No / No
	Austrian Ct / via Mercado	19 vph	0	50	No / No	69 vph	5	400	No / No
	Pointe Plaza Ave	26 vph	0	100	No / No	91 vph	36	1,075	No / No
	Convention Way	142 vph	3	450	No / No	156 vph	23	425	No / No
	Destination Pkwy	16 vph	0	25	No / No	287 vph	116	N/A	N/A
PM Peak Hour									
I-Drive	**Jamaican Ct (North)**	101 vph	30	N/A	N/A	371 vph	67	625	No / No
	Austrian Ct / via Mercado	33 vph	0	50	No / No	105 vph	43	400	No / No
	Pointe Plaza Ave	28 vph	0	100	No / No	168 vph	43	1,075	No / No
	Convention Way	132 vph	0	450	No / No	160 vph	12	425	No / No
	Destination Pkwy	36 vph	0	25	No / No	800 vph	132	N/A	N/A

8.6 TFATA Study Area Traffic Alternative

Build Alternative 2: I-Drive/Universal Blvd Transit Alignment, is projected to serve general traffic with fewer impacts. Build Alternative 2 maintains an LOS of E or better at all intersections not failing in the No-Action Alternative in 2045. Build Alternative 2 results in minimal delay increase when compared to the No-Action Alternative, but will provide significant improvement in transit accommodation through exclusive transit signal phasing. While transit alignment is ultimately decided on a multitude of factors, with heavy emphasis on ridership and origin-destination locations, the traffic analysis supports more favorable results for Build Alternative 2 over Build Alternative 1 due to the lesser impact to operations at I-Drive at Sand Lake Road. Further, I-Drive at Sand Lake Road is immediately adjacent to the I-4 ramp terminal intersection so as operations degrade, it may cause spillback effects at the ramp terminals. Build Alternative 2 also offers the advantage of having more eastbound and westbound queue storage on Sand Lake Road than Build Alternative 1.

9.0 Future Traffic Operations with Transit Mode Shift

The study area traffic analysis in **Section 8.0** did not consider any reduction in vehicle trips due to the installation of the transit lanes. However, the installation of transit lanes along International Drive and Tradeshow Boulevard may result in a mode shift for some users from personal vehicle use to transit use. The "Transit Feasibility and Technology Assessment Report" is documenting the transit ridership and mode shift estimates.

10.0 Recommendations for Design

This Design Traffic and Transit Engineering Report documented the traffic forecasting conducted for the I-Drive TFATA study area and the associated traffic analysis conducted to support the Tradeshow Boulevard RCA, the median versus curbside running transit lane selection, and the TFATA study area alternative (transit alignment) selection.

The Tradeshow Boulevard design is recommended to follow Alternative Concept 1: 4 General Use Lanes + 2 Median Transit Lanes + Truck Access Road. Other considerations for Tradeshow Boulevard are:

- In Opening Year 2025, it is recommended that, where feasible, new dual left-turn lanes on Tradeshow Boulevard or Destination Parkway be installed as singles with the second left-turn lane striped out to avoid inducing demand or constructing a network before Universal's Epic Universe traffic patterns have normalized.
- Flashing yellow arrows, requiring four-section signal heads, could be used to allow for protected left-turn signal operation during hours of transit service and permitted left-turn service during off peak transit service hours to reduce unnecessary idle time.

For the TFATA study area alternative, the Build Alternative 2: I-Drive/Universal Boulevard Transit Alignment, has a less adverse impact on general vehicular traffic operations. If Build Alternative 2 is precluded, or superseded by other analysis or constraints, Build Alternative 1: I-Drive Only Transit Alignment is favored over the No-Action Alternative since it addresses the purpose of the project, to enhance mobility options within the study area. Other considerations for the TFATA study area alternatives are:

- During design, if any of the proposed transit stops are relocated to be in the vehicular travel way, it is recommended that a follow-up traffic analysis be conducted to evaluate the impact of bus blockages to the vehicular flow.
- Any transit signal technology included in design should be compatible with the selected transit service – street car or premium bus – that is documented in the final TFATA report.
  While the analysis in this report assumes the transit runs on schedule, transit signal priority can be valuable for the corridor in the event the bus is running behind schedule and needs to queue jump.

While this report provides a traffic operational assessment and traffic operational recommendations, the full evaluation for the transit alignment alternatives and the overall recommendation of the preferred transit alternative is made in the "Transit Feasibility and Alternative Technology Assessment Report".