



LPGA BOULEVARD FROM US 92 (SR 600) TO WILLIAMSON BOULEVARD PD&E STUDY

FPID: 448456-1-22-01

PROJECT TRAFFIC ANALYSIS REPORT

The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by the Florida Department of Transportation (FDOT) pursuant to 23 U.S.C. § 327 and a Memorandum of Understanding dated May 26, 2022, and executed by the Federal Highway Administration and FDOT.

June 11, 2023



STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
TECHNICAL REPORT COVERSHEET

650-050-38
ENVIRONMENTAL
MANAGEMENT
08/22

PROJECT TRAFFIC ANALYSIS REPORT

Florida Department of Transportation

District Five

LPGA Boulevard Project Development and Environment (PD&E) Study

Limits of Project: From U.S. 92 to Williamson Boulevard

Volusia County, Florida

Financial Management Number: 448456-1-22-01

ETDM Number: 14332

Date: June 11, 2023

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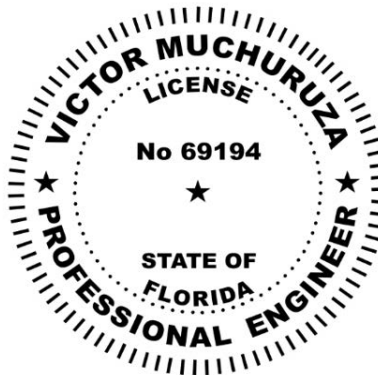
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STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
PROJECT TRAFFIC ASSUMPTION FORM

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MANAGEMENT
06/17

Traffic forecast for the project was developed using:	
Travel Demand Model	Growth Rates
Type of Travel Demand Model Used: ☒ Metropolitan Planning Model ☐ Other Model (<i>specify</i>) _____	Growth rates discussion is included in Section 5.4 of the PTAR
Is the travel demand model based on the latest adopted Long Range Transportation Plan?	
☒ YES	☐ NO
2021 _____ Date when MPO adopted the latest Long Range Transportation Plan 2015 _____ Base Year of Travel Demand Model 2045 _____ Horizon Year of Travel Demand Model Long Range Transportation Plan documentation is available at (provide web address): https://www.r2ctpo.org/planning-studies/long-range-transportation-plan/	Explain why
Traffic Data and Factors	
Standard K = <u>Table 3-2</u> D Factor = <u>Table 3-2</u> T _{Daily} = <u>Table 3-1</u>	Data Collection Year = <u>2021</u> Opening Year = <u>2030</u> Interim Year = _____ Design Year = <u>2050</u>
Discuss any changes in land use, economics, population and employment data since the model was built. A thorough review of CFRPM 7 was conducted in coordination with the City of Daytona Beach and Volusia County planning staff as well as the R2CTPO. CFRPM 7.0 was reviewed and validated at a subarea level. The 2045 socioeconomic data for the 15 TAZs were updated in the 2045 model to account planned developments in the subarea.	
Traffic Analysis Assumptions	
Discuss study area, data calibration/validation parameters, analysis tools, analysis periods and MOEs. The study area was divided into two segments. Segment 1, arterial, from US 92 to just south of Tournament Drive. Segment 2, interchange area, from Tournament Drive to Clyde Morris Boulevard. Segment 1 used Synchro analysis while Segment 2 used Vissim microsimulation. Details for microsimulation is provided in the Interchange Modification Report (IMR) as a separate cover.	

Executive Summary

The Florida Department of Transportation (FDOT) is conducting a Project Development and Environment (PD&E) Study for LPGA Boulevard from US 92 (International Speedway Boulevard) to Williamson Boulevard within the City of Daytona Beach in Volusia County (approximately 6.6 miles). The PD&E Study evaluates proposed corridor, intersections, and interchange improvements which involve widening of LPGA Boulevard including the addition of bicycle and pedestrian facilities and modifications to the LPGA Boulevard/Interstate 95 (I-95) interchange.

This Project Traffic Analysis Report (PTAR) has been prepared in accordance with guidance provided in the FDOT PD&E Manual. Additionally, this PTAR is being prepared concurrently with the Interchange Modification Report (IMR) which documents operational and safety analyses for improvements to the I-95 interchange. In order to minimize duplication of documentation, the PTAR references most of the analysis documented in the IMR included in **Appendix B**.

The purpose of the LPGA Boulevard PD&E project is to accommodate existing and projected future travel demand, enhance safety, and improve operations for the LPGA Boulevard corridor and the I-95 interchange. The need for the project is based on existing and future transportation demand and safety along the LPGA Boulevard corridor and at the interchange area. Improvements are necessary to address congestion and enhance the safety of travel conditions along LPGA Boulevard and at the I-95 interchange area.

Existing and future planned developments within and in the vicinity of LPGA Boulevard, including Tomoka North, Tomoka Village, Tymber Creek Village, Bayberry, Avalon Daytona, and Mosaic are expected to result to substantial increases in density of both population and employment in the study area. This will increase traffic to levels that would exceed the maximum service volumes for the existing LPGA Boulevard corridor. Annual Average Daily Traffic (AADT) volumes on LPGA Boulevard west of Tymber Creek Road are expected to grow from 12,000 vehicles in 2021 to 36,000 vehicles in 2050, and from 44,000 vehicles in 2021 east of I-95 interchange to 78,000 vehicles in 2050.

There were 1,354 crashes reported within the study area between January 1, 2015, and December 31, 2019, an average of 270 crashes per year. The most predominant crash type reported was rear-end crashes (37%). Additionally, there were 11 fatal crashes, 414 injury crashes and 929 property damage only crashes reported for the overall study area. The highest numbers of crashes correspond to the locations with deficient level of service (LOS), i.e., LOS F. These include the I-95 northbound off-ramp to LPGA Boulevard with crashes at the intersection's right turn yield condition; the I-95 southbound loop on-ramp from LPGA Boulevard westbound with crash types associated with the signalized intersection, and the eastbound approach of LPGA Boulevard to Williamson Boulevard.

This PD&E Study has been identified in the River to Sea Transportation Planning Organization (R2CTPO) Connect 2045 Long Range Transportation Plan (LRTP) as eligible for state and federal funding and Fiscal Year (FY) 2022/23 to FY 2026/27 Transportation Improvement Program (TIP).

The PD&E and Design phases for this project are funded for FY 2021/2022. Right of Way phase is partially funded for FY 2026/2027. Construction phase is not currently funded.

This PTAR documents the results of safety and operational analyses for the proposed improvements with respect to impacts and benefits on the LPGA Boulevard corridor and the I-95 interchange. The PD&E study has developed and evaluated improvement alternatives that would widen LPGA Boulevard to accommodate the Design Year 2050 travel demand. The Build Alternative consists of widening LPGA Boulevard from a two-lane facility to a four-lane divided facility between US 92 and Tymber Creek Road, widening LPGA Boulevard from a two-lane facility to a six-lane divided facility between Tymber Creek Road and Tomoka Farms Road, and widening LPGA Boulevard to an eight-lane divided facility between Tomoka Farms Road to Williamson Boulevard. The Build Alternative also includes geometric modification of the I-95 interchange to a Signalized Turbine Interchange that will spread traffic across the interchange area and control traffic movements at interchange ramp terminal intersections with two-phase signals. The Signalized Turbine Interchange concept allows for full movements to and from I-95.

The results of traffic analysis showed that under the No Build Alternative, all study intersections would operate at LOS F during the AM and PM peak hours during the Design Year 2050. Additionally, the Design Year 2050 AADTs far exceed the capacities of the existing segments. The congestion results in high vehicles being denied entry to the network.

Under the Build Alternative in the Design Year 2050, all freeway segments and all the entrance and exit ramps are anticipated to operate at LOS C or better during both AM and PM peak hours in the Design Year 2050 except the I-95 southbound lanes between LPGA Boulevard and US 92 and I-4 off ramp as discussed in the IMR (**Appendix B**). Additionally, all the study intersections are projected to operate at LOS D or better except Tymber Creek Road, Tomoka Farms Road, Technology Boulevard, Williamson Boulevard, Concierge Boulevard, and Clyde Morris Boulevard intersections which are expected to operate at LOS E or F. However, the Build conditions of these intersections showed substantial reductions in delays as compared to No Build conditions. Based on the findings in this report, implementation of the improvements proposed in the Build Alternative is expected to significantly improve traffic operations as compared to the No Build Alternative.

The Signalized Turbine Interchange is projected to improve operations at the interchange area while providing additional benefits of reduced delays, emergency vehicle access, additional evacuation routes and improved connectivity for the region.

The results of safety analysis showed that the Build Alternative is anticipated to incur a substantially lesser predicted crash cost than the No Build Alternative over the analysis period.

The proposed improvements of widening of LPGA Boulevard, modifying the I-95 interchange to a Signalized Turbine Interchange, and improving the study area intersections is anticipated to provide substantial operational and safety benefits over the No Build Alternative. Other factors such as environmental impacts, right of way and constructions costs will be evaluated in determining the preferred alternative as part of the PD&E alternatives analysis.

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Appendix B Interchange Modification Report (IMR)
Appendix C Synchro Analysis for Existing Conditions
Appendix D Intersection Control Evaluation
Appendix E Synchro Analysis for Future Conditions
Appendix F Safety Analysis Memorandums

1 Introduction

This Project Traffic Analysis Report (PTAR) documents the results of safety and operational analyses for the proposed improvements with respect to impacts and benefits on the LPGA Boulevard corridor and the I-95 interchange in accordance with guidance provided in the FDOT PD&E Manual. The PTAR references the Interchange Modification Report (IMR) which documents operational and safety analyses for improvements to the Interstate 95 (I-95) interchange and is included in **Appendix B**.

1.1 Project Description

The Florida Department of Transportation (FDOT) is conducting a Project Development and Environment (PD&E) Study for LPGA Boulevard from US 92 (International Speedway Boulevard) to Williamson Boulevard within the City of Daytona Beach in Volusia County (approximately 6.6 miles). The proposed improvements involve widening of LPGA Boulevard which will include the addition of bicycle and pedestrian facilities and modifications to the LPGA Boulevard/ I-95 interchange.

A project location map is provided in **Figure 1-1**. The existing LPGA Boulevard is a two-lane roadway from US 92 to Tomoka Farms Road (east of the Tomoka River), a four-lane roadway from Tomoka Farms Road to the I-95 Southbound Ramps, and a six-lane roadway from the I-95 Southbound Ramps over I-95 to Williamson Boulevard. There are 14 intersections along the corridor including ramp terminals at the I-95 interchange, ten of which are signalized.

LPGA Boulevard is a County Road maintained by Volusia County, except between Tomoka Farms Road and Technology Boulevard/Outlet Boulevard where FDOT maintains the limited access right-of-way to the I-95 interchange. Most of LPGA Boulevard does not have paved shoulders and sidewalks, and there are only limited areas of sidewalks between Tymber Creek Road and Williamson Boulevard.

I-95 is a six-lane, Strategic Intermodal System (SIS) facility and is a hurricane evacuation route. The I-95 interchange at LPGA Boulevard (Exit 265) is a partial cloverleaf interchange, or parclo interchange, with six on and off ramps. This interchange is located approximately 3.5 miles north of the I-95 and US 92 interchange and approximately 2.6 miles south of the I-95 and S.R. 40 interchange.

1.2 Project Purpose and Need

The purpose of this project is to accommodate existing and projected future travel demand, enhance safety, and improve operations for the LPGA Boulevard corridor and the I-95 interchange.

The need for the project is based on existing and future transportation demand and safety along the LPGA Boulevard corridor and at the interchange area. Improvements are necessary to address unacceptable levels of service (LOS) (below target LOS D for state maintained facilities



Figure 1-1 | Project Location Map

and LOS E for Volusia County maintained facilities) and enhance the safety of travel conditions along LPGA Boulevard and at the I-95 interchange area.

1.2.1 Transportation Demand

LPGA Boulevard from US 92 to Williamson Boulevard is currently operating near capacity. A review of existing (2021) traffic volumes in the project area showed an Annual Average Daily Traffic (AADT) of 12,000 vehicles per day for LPGA Boulevard from US 92 to Tomoka Farms Road and an AADT of up to 44,000 vehicles per day from Tomoka Farms Road through the I-95 interchange to Williamson Boulevard. Large, approved developments and active construction projects (such as LPGA Preserve, Indian Road Warehouse, and Tomoka Village), in combination with additional planned growth in the vicinity of LPGA Boulevard, are expected to increase traffic to levels that would exceed maximum service volumes for two-lane and six-lane, non-state, signalized roadways per the 2020 FDOT Quality/Level of Service (QLOS) Handbook. Future (2050) travel demands along LPGA Boulevard are expected to double or triple in some locations. The AADT between US 92 and Tymber Creek Road is expected to reach 36,000 vehicles per day. Heavy volumes are expected east of the I-95 interchange where AADT will reach 78,000 vehicles per day in 2050. These volumes will significantly exceed the existing roadway capacity and cause LPGA Boulevard to operate at LOS F.

The target LOS for I-95 and LPGA Boulevard is LOS D per FDOT and LOS E per Volusia County. The I-95 freeway segment approaching LPGA Boulevard currently functions at LOS D or better. Based on anticipated growth, the quality of traffic flow on I-95 and LPGA Boulevard in the study area is expected to decline in future years. Without improvements, to the LPGA Boulevard corridor, the intersections on LPGA Boulevard, as well as the I-95 off-ramps are anticipated to operate over capacity in the future resulting in longer travel times to reach workplaces, schools, and businesses.

1.2.2 Safety

A review of crash data reported in the study area for the five-year period from January 1, 2015 to December 31, 2019 indicates there were 1,354 crashes, an average of 270 crashes per year. The most predominant crash type reported for the overall study area is rear-end crashes (37%). There were eleven reported fatal crashes, 414 injury crashes and 929 property-damage-only crashes reported for the overall study area.

The highest numbers of crashes correspond to the locations with deficient LOS. These include the I-95 northbound off-ramp to LPGA Boulevard with crashes during the intersection's right turn yield condition, the I-95 southbound loop on-ramp from LPGA Boulevard westbound with crash types associated with the signalized intersection, and the eastbound approach of LPGA Boulevard to Williamson Boulevard. There are also high numbers of crashes at the intersections and uncontrolled access points along LPGA Boulevard. Most of LPGA Boulevard lacks pedestrian and bicycle facilities, which creates unsafe conditions for nonmotorized users. Between 2015 and 2019 nine pedestrian and bicycle crashes were reported within the PD&E study area.

Without improvements to the LPGA Boulevard corridor and at the I-95 interchange, the number of crashes is expected to continue to rise as future traffic volumes are projected to increase substantially, compromising the safety for both vehicular and nonmotorized users.

1.2.3 Project Status

The proposed improvements for this project are listed in the River to Sea Transportation Planning Organization (R2CTPO) Connect 2045 Long Range Transportation Plan (LRTP) and Fiscal Year (FY) 2022/23 to FY 2026/27 Transportation Improvement Program (TIP). Currently the PD&E and Design phases for this project are funded in FY 2021/2022 FDOT Work Program. Right-of-way phase is partially funded in FY 2026/2027. Construction phase is not currently funded.

2 Traffic Analysis Method

The analysis methodology follows the *2021 FDOT Traffic Analysis Handbook* and the Traffic Analysis Methodology documentation found in **Appendix A**.

The study intersections were analyzed using a two-phase project development approach:

- Phase 1 – Preliminary Screening
- Phase 2 – Detailed Operational Analysis

Preliminary alternatives were developed and screened in a Phase 1 Intersection Control Evaluation (ICE) to eliminate non-viable alternatives. The Build Alternative recommended from Phase 1 and the No Build Alternative were analyzed in detail in Phase 2 analysis.

2.1 Study Area

The study corridor is approximately 6.6 miles and includes 14 intersections as illustrated in **Figure 2-1**. The following intersections were evaluated for the study:

- Signalized Intersections
 - o LPGA Boulevard at US 92 (SR 600)
 - o LPGA Boulevard at Tournament Drive
 - o LPGA Boulevard at Tymber Creek Road
 - o LPGA Boulevard at Champions Drive
 - o LPGA Boulevard at Tomoka Farms Road
 - o LPGA Boulevard at I-95 Southbound Ramps
 - o LPGA Boulevard at I-95 Northbound Ramps
 - o LPGA Boulevard at Technology Boulevard
 - o LPGA Boulevard at Williamson Boulevard
 - o LPGA Boulevard at Clyde Morris Boulevard
- Unsignalized Intersections
 - o LPGA Boulevard at Welshinger-Butler Circle (South Intersection)
 - o LPGA Boulevard at Welshinger-Butler Circle (North Intersection)
 - o LPGA Boulevard at International Tennis Drive / International Golf Drive
 - o LPGA Boulevard at Concierge Boulevard

2.2 Data

In order to quantify operational and safety performance of the existing conditions and proposed improvements along LPGA Boulevard in the study area, segment volumes, intersection turning movement volumes (TMVs), origin-destination (OD) data, and crash information were collected from various sources.



Figure 2-1 | Project Study Area

2.3 Analysis Years

The years used for travel demand forecasting were:

- Base Year 2015
- Horizon Year 2045

The years used for the traffic operational analysis were:

- Existing Year 2021
- Opening Year 2030
- Design Year 2050

2.4 Analysis Periods

The study corridor has two distinct sections with different traffic operational characteristics. The section between US 92 and Tournament Drive has intersections that are spaced apart and does not experience recurring congestion. As such the traffic analysis for this section was conducted for one-hour peaks in the morning (AM peak hour) and in the afternoon (PM peak hour).

The section of LPGA Boulevard between Tournament Drive and Williamson Boulevard has closely spaced intersections and experiences recurring congestion. The traffic analysis for this section was conducted for three-hour peak periods in the morning (AM peak period) and in the afternoon (PM peak period). The total analysis time was four hours to include 30-minute shoulder periods.

2.5 Analysis Tools

The methodologies specified in the Highway Capacity Manual (HCM, 6th Edition) and Synchro/SimTraffic Version 11 were used to evaluate intersections and arterial segments for the section between US 92 and west of Tournament Drive.

The section of the project between Tournament Drive and Williamson Boulevard was evaluated using Vissim, version 2021.00-12, microsimulation. Details of the microsimulation analysis are documented in the IMR prepared as part of this project, included in **Appendix B**.

2.6 Analysis Approach

2.6.1 Travel Demand Forecasting

The development of future traffic was based on procedures contained in the FDOT 2019 *Project Traffic Forecasting Handbook*. The Central Florida Regional Planning Model Version 7.0 (CFRPM 7) was used to forecast future year traffic demand. Methods and assumptions used in the future traffic forecast are in accordance with FDOT's established policies and procedures, including those detailed in the *Project Traffic Forecasting Handbook, 2019* and the *Florida Standard Urban Transportation Modeling System (FSUTMS) User's Manual*. The details of forecasting process and the results are documented in the Project Traffic Forecast Memorandum (PTFM) included in **Appendix A**.

2.6.2 Traffic Operational Measures of Effectiveness

LOS is the primary measure of effectiveness for this traffic analysis. The target LOS for I-95 and LPGA Boulevard is LOS D (FDOT maintained section) and LOS E (Volusia County maintained sections).

For the analysis of the section between US 92 and Tournament Drive, the Measures of Effectiveness (MOEs) reported from the Synchro using the HCM 6th Edition report include:

- LOS, delay, and Volume-to-Capacity (V/C) ratio
- 95th percentile queue lengths.

Additionally, SimTraffic was used to evaluate arterial segments between US 92 and Tournament Drive because Synchro arterial level of service does not provide results for segments which terminate at roundabouts. As such, SimTraffic was used to analyze travel time and arterial speed along LPGA Boulevard. Additionally, because the demand on LPGA Boulevard is expected to significantly exceed capacity of the existing two-lane facility vehicle denied entry was used as another MOE to inform the network throughput. Denied entry is a count of vehicles that are unable to enter a link due to congestion.

For the analysis section between Tournament Drive and Clyde Morris Boulevard, the following measures were collected from the Vissim analysis:

- Network-wide measures: total delay, average delay, total travel time, average speed, and latent demand.
- Arterial segments: travel time and speed along LPGA Boulevard.
- Intersections and ramp terminals: intersection delay, movement delay, estimated intersection LOS, and average and maximum queue lengths.
- Freeway segments: speed, density and LOS

2.6.3 Safety Analysis

A quantitative safety analysis was performed utilizing crash data from January 1, 2015 through December 31, 2019. Crash data was reviewed to determine any crash trends or patterns, crash contributing causes, and locations with crash rates higher than the statewide average.

The safety analysis also included an evaluation of the safety performance of the proposed improvements and comparison with the No Build Alternative. A quantitative safety analysis was performed consistent with the *2022 FDOT Interchange Access Request User's Guide Safety Analysis Guidance*. Methodology from the HSM Chapters 12 (Urban and Suburban Arterials), 18 (Freeways), and 19 (Ramps), HSM Spreadsheets (Urban and Suburban Arterials Spreadsheet v3.1), and the Interchange Safety Tool Enhanced (ISATe) were used.

3 Data Collection

Field reviews, traffic counts, database and document research, and desktop analyses were completed as part of the data collection process. Data collection included identifying existing roadway, interchange and intersection configurations, vehicular traffic volumes, and crash history along LPGA Boulevard and I-95 in the study area.

3.1 Existing Traffic Volumes

Traffic counts were collected at key study area roadway segments and intersections in November 2021 and December 2021. Additionally, existing volumes available from the FDOT Traffic Online (2021), Volusia County AADT Spreadsheet (2022), StreetLight data, and data from previous projects within the study area were reviewed. The data collection map is shown in **Figure 3-1**. The field data collection sheets are included in **Appendix A**. The 2021 field count locations are described as follows:

- Eight-hour vehicle turning movement counts were collected in the morning between 6:00 AM and 10:00 AM and in the afternoon between 3:00 PM and 7:00 PM at the following study intersections:
 - LPGA Boulevard at US 92 (signalized)
 - LPGA Boulevard at Welshinger-Butler Circle South (unsignalized)
 - LPGA Boulevard at Welshinger-Butler Circle North (unsignalized)
 - LPGA Boulevard at International Golf Drive/International Tennis Drive (unsignalized)
 - LPGA Boulevard at Tournament Drive (signalized)
 - LPGA Boulevard at Tymber Creek Road (signalized)
 - LPGA Boulevard at Champions Drive (signalized)
 - LPGA Boulevard at Tomoka Farms Road (signalized)
 - LPGA Boulevard at I-95 Southbound Ramps (signalized)
 - LPGA Boulevard at I-95 Northbound Ramps (signalized)
 - LPGA Boulevard at Technology Boulevard/Outlet Boulevard (signalized)
 - LPGA Boulevard at Williamson Boulevard (signalized)
 - LPGA Boulevard at Concierge Boulevard (unsignalized)
 - LPGA Boulevard at Clyde Morris Boulevard (signalized)
- 48-hour classification counts will be taken at the following locations
 - High School Driveway, west of LPGA Boulevard
 - International Tennis Drive, west of LPGA Boulevard
 - International Golf Drive, east of LPGA Boulevard
 - Tournament Drive, west of LPGA Boulevard
 - Tournament Drive, east of LPGA Boulevard
 - Tymber Creek Road, west of LPGA Boulevard
 - Champions Drive, south of LPGA Boulevard

- Champions Drive, north of LPGA Boulevard
- Tomoka Farms Road, north of LPGA Boulevard
- Tomoka Farms Road, south of LPGA Boulevard
- Technology Boulevard north of LPGA Boulevard
- Technology Boulevard south of LPGA Boulevard
- Williamson Boulevard north of LPGA Boulevard
- Williamson Boulevard south of LPGA Boulevard
- Clyde Morris Boulevard north of LPGA Boulevard
- Clyde Morris Boulevard south of LPGA Boulevard
- 72-hour classification counts will be taken at the following locations:
 - LPGA Boulevard north of US 92
 - LPGA Boulevard north of Welshinger-Butler Circle (South)
 - LPGA Boulevard north of International Golf Drive
 - LPGA Boulevard north of Tournament Drive
 - LPGA Boulevard east of Tymber Creek Road
 - LPGA Boulevard east of Champions Drive
 - LPGA Boulevard east of Tomoka Farms Road
 - LPGA Boulevard west of Technology Boulevard
 - LPGA Boulevard east of Technology Boulevard
 - LPGA Boulevard east of Williamson Boulevard
 - LPGA Boulevard east of Clyde Morris Boulevard
 - I-95 Southbound off-ramp to LPGA Boulevard
 - I-95 Southbound loop on-ramp from LPGA Boulevard
 - I-95 Southbound on-ramp from LPGA Boulevard
 - I-95 Northbound loop on-ramp from LPGA Boulevard
 - I-95 Northbound off-ramp to LPGA Boulevard
 - I-95 Northbound on-ramp from LPGA Boulevard
 - I-95 north of LPGA Boulevard
 - I-95 south of LPGA Boulevard
 - I-95 Southbound on-ramp from S.R. 40
 - I-95 Northbound off-ramp to S.R. 40
 - I-95 Southbound off-ramp to US 92
 - I-95 Northbound on-ramp from US 92
 - US 92 east of LPGA Boulevard
 - US 92 west of LPGA Boulevard

The lane configurations were obtained from November 2021 FDOT aerials and field verified in January and April 2022. **Figure 3-2** shows the Existing Year 2021 lane configurations

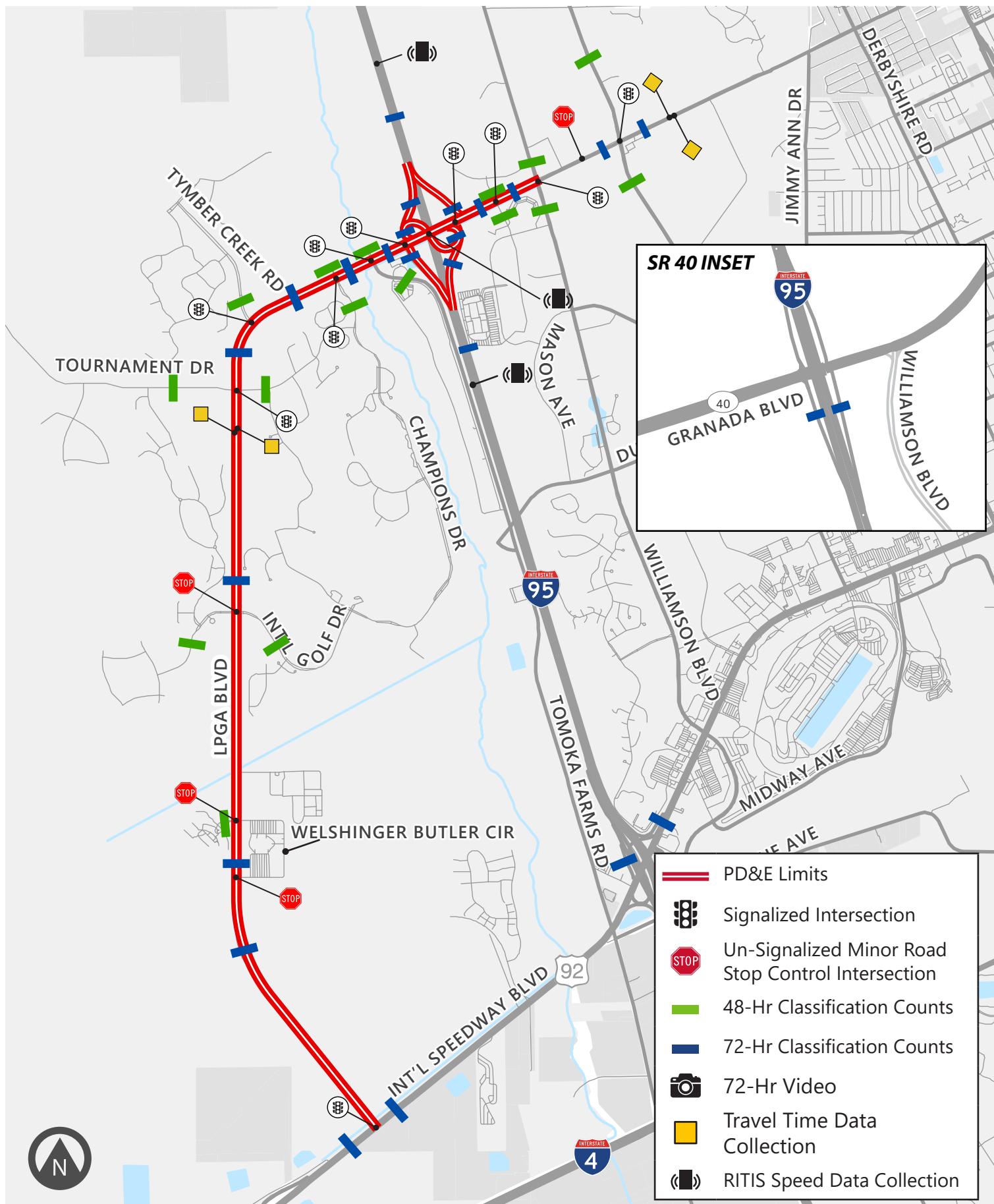
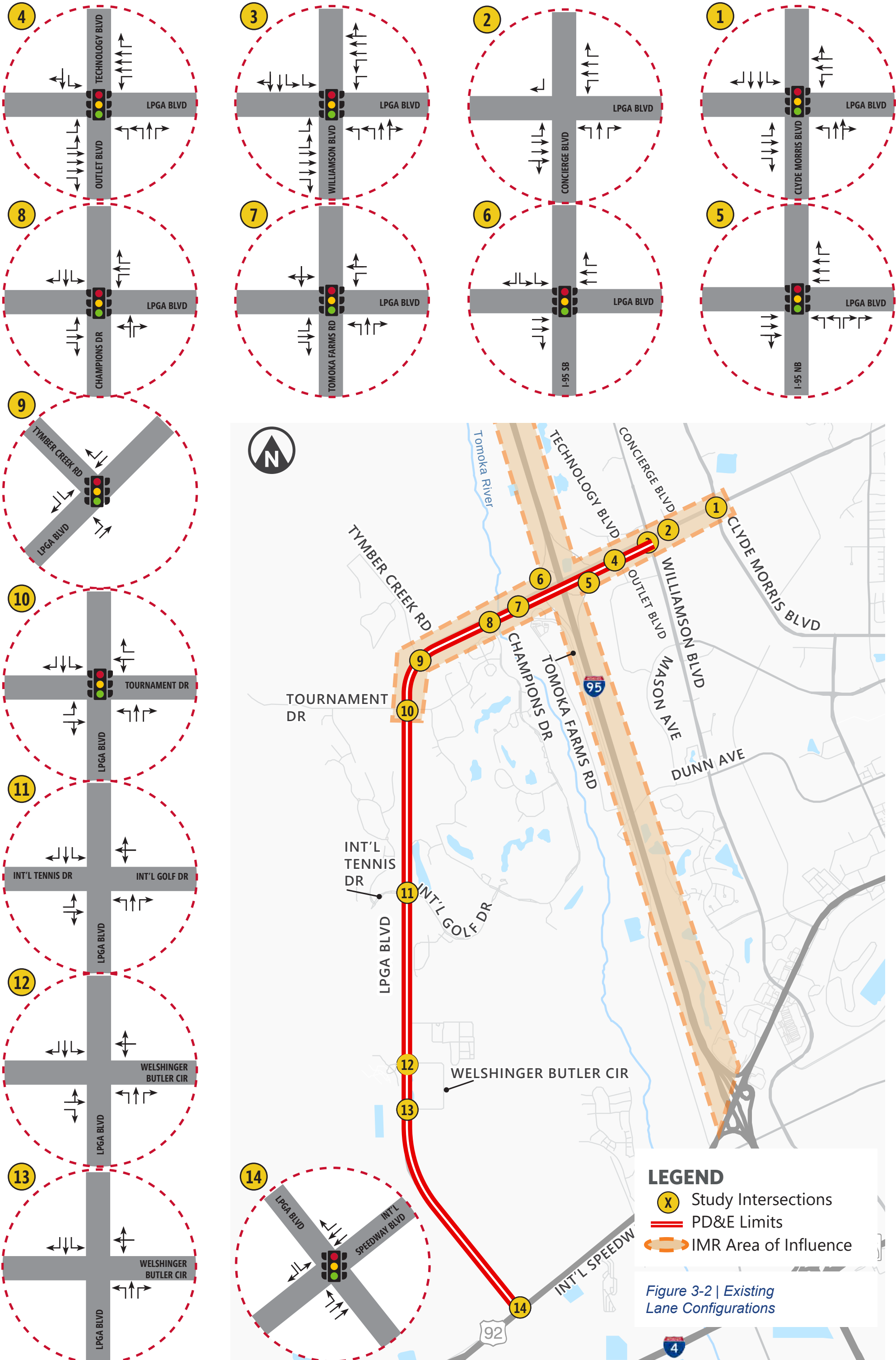


Figure 3-1 | Data Collection Map



3.2 Calibration Data

Travel times and travel speeds were collected from the Regional Integrated Transportation Information System (RITIS) for I-95 and in the field for LPGA Boulevard. Additionally, Google typical traffic information was consulted to supplement the data collected. OD data was collected from StreetLight.

3.2.1 Land Use Data

Existing land uses were verified through a review of the City of Daytona Beach and Volusia County comprehensive plans. Future land uses and allowable development thresholds were obtained from the comprehensive plans supplemented with local information from Volusia County and the City of Daytona Beach planning staff.

3.2.2 Network Geometry

Scaled aerial photography was used to code the base Vissim network, including intersection lane configurations, stop bar locations, and turn pocket lengths. The high-resolution aerials were also used to accurately model merge, weave, and diverge segments.

3.2.3 Signal Operations and Stop Control

Signal timing and phasing plans used in the analysis were provided by Volusia County. It should be noted that LPGA Boulevard within the I-95 interchange area uses adaptive traffic signal control system. Signal heads were verified in Google Earth and on the field for compatibility with the applied phasing structure.

3.2.4 Existing Year (2021) Peak Hour Volumes

Existing Year 2021 AM and PM peak hour volumes were derived from the peak hour turning movement counts collected at the study area intersections. At each intersection, the AM and PM peak hour volumes were established by identifying the highest hourly volume (highest volume for four consecutive 15-minute intervals) for each period. These counts were seasonally adjusted based the date and location of the count. The seasonally adjusted peak hour intersection volumes entering and exiting adjacent intersections along LPGA Boulevard were compared and adjusted for the AM and PM peak hours to provide a balanced flow over the network. This process was necessary due to the differences in traffic volumes between intersections caused by the different peak hour periods and varying days of the data collection. Adjustments considered existing land use and any access points/intersections/driveways between intersections that could have an impact on network traffic flow. The final balanced Existing Year 2021 AM/PM peak hour volumes are shown in **Figure 3-3**. **Figure 3-4** shows the Existing Year 2021 AADT and DDHV.

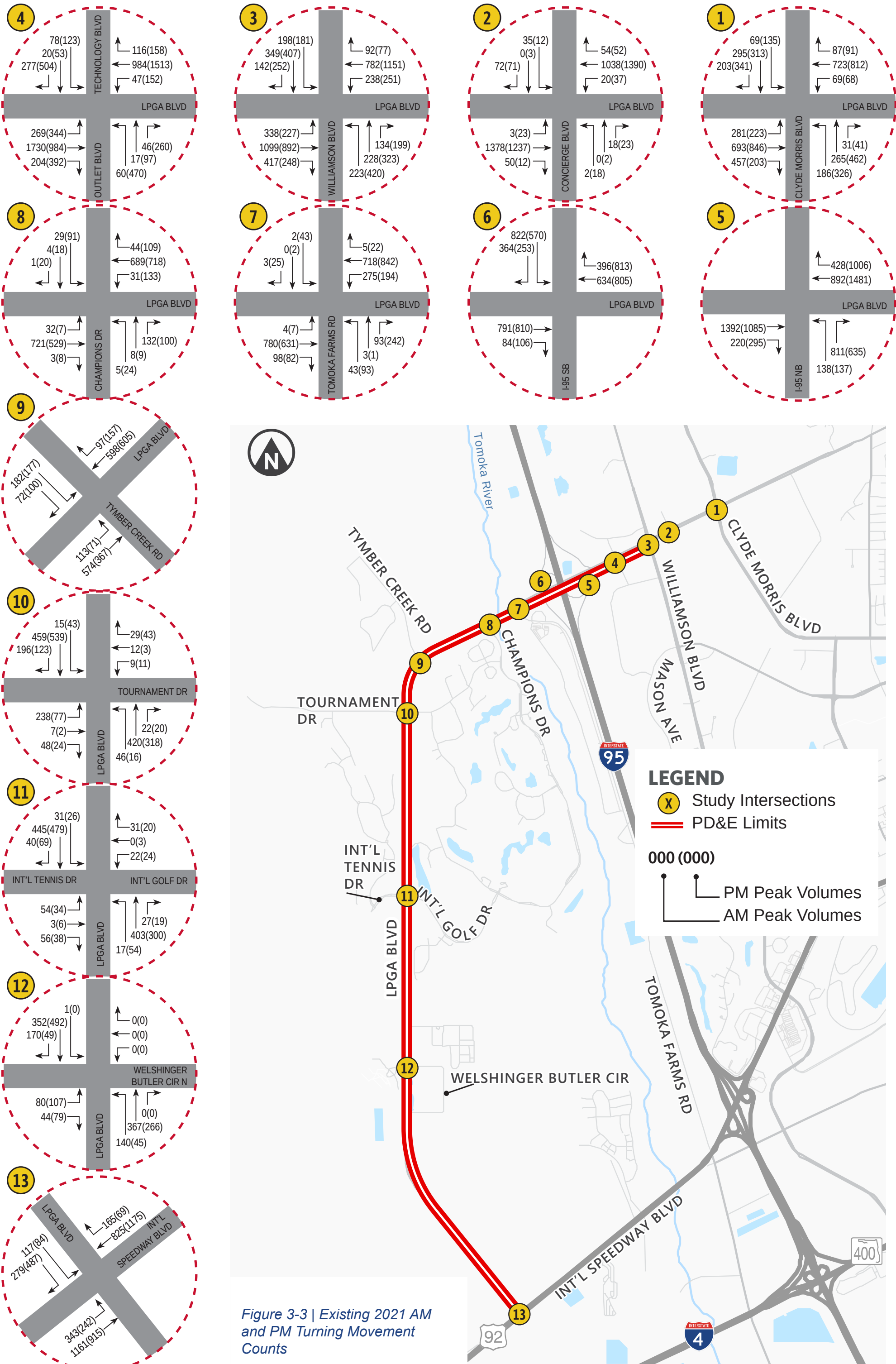


Figure 3-3 | Existing 2021 AM and PM Turning Movement Counts

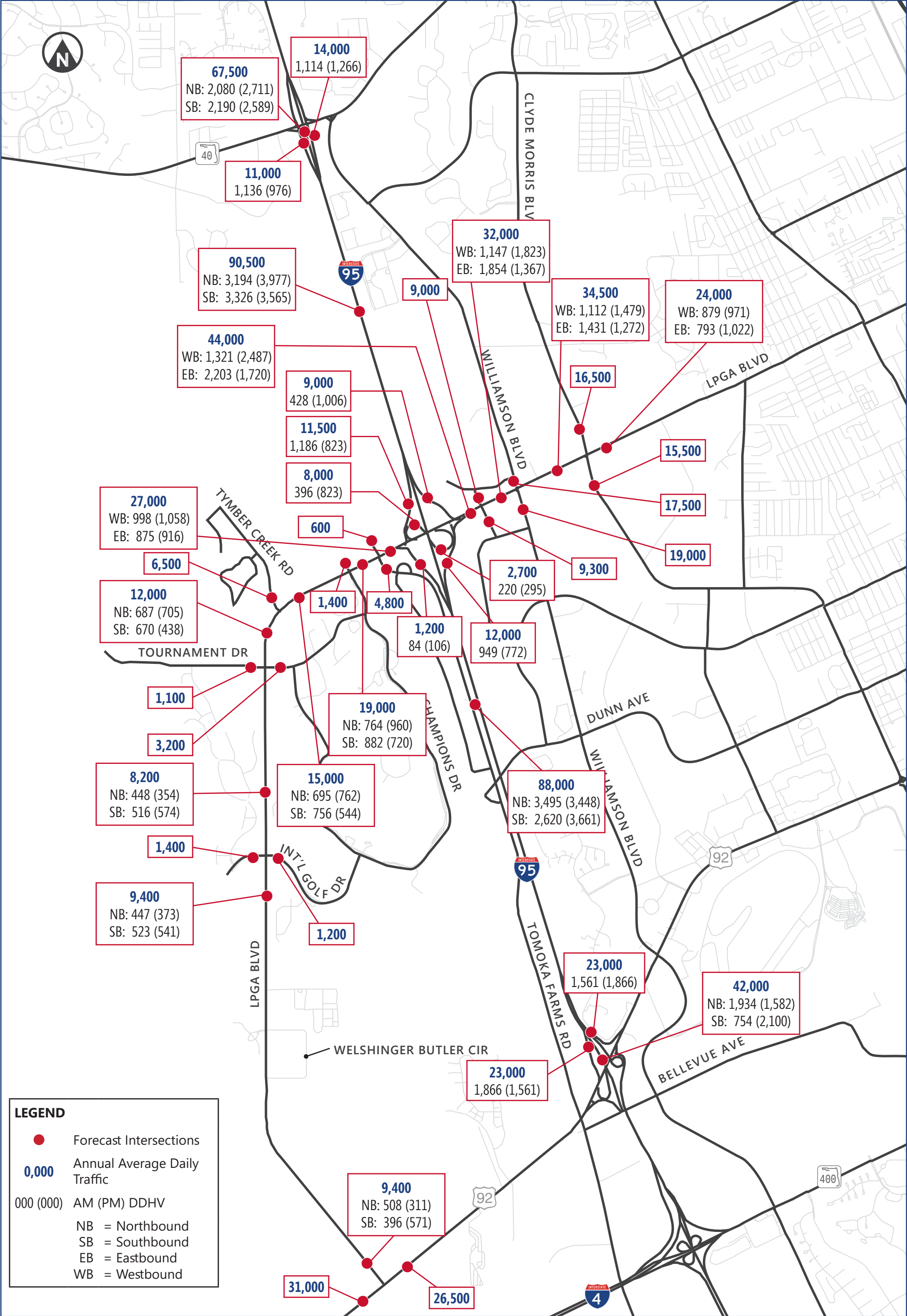


Figure 3-4 | Existing Year 2021 AADT and DDHV

3.2.5 Existing Year (2021) Traffic Characteristics

A summary of the existing traffic conditions within the study area including heavy vehicle percentages, daily volumes, peak hour volume to daily volume ratio, and directional splits (D) are presented in **Table 3-1** and **Table 3-2**. It is noted that the study area has unique peaking characteristics and travel patterns given the existing commercial area east of I-95, and the developing residential area west of I-95. The peaking characteristics and travel patterns cause a large fluctuation and deviation from the standard K and D values for similar area types. This necessitated the use of measured traffic factors shown in **Table 3-1** and **Table 3-2**. More detailed traffic factors for each segment are in the PTFM in **Appendix A**. Daily Truck factors were obtained from the Florida Traffic Online (FTO) and the recommended Truck Factors (T_f) are shown in **Table 3-1**. Recommended K and D factors are shown in **Table 3-2**.

Table 3-1 | Heavy Vehicle Percentages from Vehicle Classification Counts

Location	AM Truck %	PM Truck %	Daily Truck %	T_{24}^*	Rec. T_f
US 92 East of LPGA Blvd.	6.0%	4.2%	6.7%	8.9%	4.6%
US 92 West of LPGA Blvd.	7.1%	4.1%	7.4%	8.9%	4.6%
LPGA Blvd. from US 92 to Welshinger-Butler Cir. (S)	6.6%	3.0%	6.8%	8.9%	4.6%
LPGA Blvd. from International Tennis Dr to Tournament Dr.	6.7%	5.9%	7.5%	8.9%	4.6%
LPGA Blvd. from Tournament Dr. to Tymber Creek Rd.	4.7%	5.0%	5.7%	8.9%	4.6%
LPGA Blvd. from Tymber Creek Rd. to Champions Dr.	3.2%	3.1%	3.9%	8.9%	4.6%
LPGA Blvd. from Champions Dr. to Tomoka Farms Rd.	4.4%	4.4%	4.8%	8.9%	4.6%
LPGA Blvd. from Tomoka Farms Rd. to I-95	4.5%	3.7%	5.3%	8.9%	4.6%
LPGA Blvd. from I-95 to Technology Blvd.	2.1%	1.5%	2.4%	6.7%	3.1%
LPGA Blvd. from Technology Blvd. to Williamson Blvd.	4.9%	3.0%	3.3%	6.7%	3.1%
LPGA Blvd. from Williamson Blvd. to Clyde Morris Blvd.	2.9%	2.3%	3.0%	4.9%	3.1%
LPGA Blvd. from East of Clyde Morris Blvd.	4.1%	3.9%	3.8%	4.9%	3.1%
I-95 SB off ramp	3.0%	3.8%	6.0%	17.7%	11.5%
I-95 SB on loop ramp	11.6%	2.9%	7.0%	17.7%	11.5%
I-95 SB on ramp	7.3%	2.8%	4.8%	17.7%	11.5%
I-95 NB on loop ramp	6.9%	3.6%	8.4%	17.7%	11.5%
I-95 NB off ramp	6.4%	4.4%	6.3%	17.7%	11.5%
I-95 NB on ramp	8.5%	2.3%	5.5%	17.7%	11.5%
I-95 N of LPGA Blvd.	12.5%	11.0%	18.0%	17.7%	11.5%
I-95 S of LPGA Blvd.	12.3%	10.1%	17.0%	17.7%	11.5%
SR 40 NB on ramp	2.6%	2.7%	4.5%	17.7%	11.5%
SR 40 SB on ramp	3.6%	2.5%	4.4%	17.7%	11.5%
WB US 92 SB off ramp	9.8%	12.1%	14.1%	8.9%	11.5%
EB US 92 NB on ramp	10.7%	1.5%	3.3%	5.1%	11.5%

*Data obtained from FTO.

Table 3-2 | Existing Traffic Characteristics

Segment	AM Peak Hour		PM Peak Hour		Recommended K	Recommended D
	Peak to Daily Ratio	D	Peak to Daily Ratio	D		
LPGA Blvd. Between US 92 and Welshinger-Butler Cir.	9%	55%	9%	65%	8.5%	58.6%
LPGA Blvd. Between International Golf Dr. and Tournament Dr.	10%	56%	8%	51%	8.5%	58.6%
LPGA Blvd. Between Tournament Dr. and Tymber Creek Rd.	10%	57%	4%	93%	8.5%	58.6%
LPGA Blvd. Between Tymber Creek Rd. and Champions Dr.	9%	50%	8%	55%	8.5%	58.6%
LPGA Blvd. Between Champions Dr. and Tomoka Farms Rd.	8%	53%	8%	53%	8.5%	58.6%
LPGA Blvd. Between Tomoka Farms Rd. and I-95 Ramps	8%	73%	8%	68%	8.5%	58.6%
LPGA Blvd. Between I-95 Ramps and Technology Blvd	7%	63%	8%	59%	7.5%	57.0%
LPGA Blvd. Between Technology/Outlet and Williamson Blvd	8%	61%	8%	57%	7.5%	57.0%
LPGA Blvd. Between Williamson Blvd. and Clyde Morris Blvd.	8%	56%	8%	55%	7.5%	57.0%
LPGA Blvd. Between east of Clyde Morris Blvd.	7%	50%	8%	54%	7.5%	57.0%
LPGA Blvd. Interchange Southbound Off Ramp	11%	100%	7%	100%	8.0%	61.0%
LPGA Blvd. Interchange Southbound On Ramp Loop	5%	100%	10%	100%	8.0%	61.0%
LPGA Blvd. Interchange Southbound On Ramp	7%	100%	12%	100%	8.0%	61.0%
LPGA Blvd. Interchange Northbound On Ramp Loop	7%	100%	11%	100%	8.0%	61.0%
LPGA Blvd. Interchange Northbound On Ramp	5%	100%	11%	100%	8.0%	61.0%
LPGA Blvd. Interchange Northbound Off Ramp	8%	100%	7%	100%	8.0%	61.0%
US 92 west of LPGA Blvd	9%	57%	9%	57%	9.0%	57.6%
US 92 East of LPGA Blvd	9%	57%	9%	55%	9.0%	57.6%
International Tennis/Golf Dr. West of LPGA Blvd	7%	64%	9%	60%	9.0%	57.0%
International Tennis/Golf Dr. East of LPGA Blvd.	8%	52%	8%	59%	9.0%	57.0%
Tournament Dr. West of LPGA Blvd.	7%	51%	9%	55%	9.0%	57.0%
Tournament Dr. East of LPGA Blvd.	17%	54%	7%	56%	9.0%	57.0%
Tymber Creek Dr. North of LPGA Blvd.	6%	50%	7%	53%	9.0%	57.0%
Champions Dr. South of LPGA Blvd.	11%	78%	13%	57%	9.0%	57.0%
Champions Dr. North of LPGA Blvd.	8%	59%	16%	52%	10.0%	57.0%
Tomoka Farms Rd. South of LPGA Blvd.	11%	71%	12%	60%	10.0%	57.0%
Tomoka Farms Rd. North of LPGA Blvd.	5%	53%	12%	52%	8.5%	57.0%
Technology/ Outlet Blvd. South of LPGA Blvd.	4%	69%	13%	55%	8.5%	57.0%
Williamson Blvd. South of LPGA Blvd.	7%	64%	8%	52%	8.0%	57.0%
Williamson Blvd. North of LPGA Blvd.	6%	53%	8%	58%	8.0%	57.0%
Clyde Morris Blvd. South of LPGA Blvd.	7%	62%	8%	58%	8.0%	57.0%
Clyde Morris Blvd. North of LPGA Blvd.	7%	56%	9%	51%	8.0%	57.0%
SR 40 Interchange Southbound On Ramp	10%	100%	8%	100%	8.0%	100.0%
SR 40 Interchange Northbound Off Ramp	9%	100%	9%	100%	8.0%	100.0%
US 92 Interchange Southbound Off Ramp	8%	100%	8%	100%	8.0%	100.0%
US 92 Interchange Northbound On Ramp	3%	100%	10%	100%	8.0%	100.0%
I-95 South of LPGA Interchange	6%	51%	8%	57%	8.0%	53.0%
I-95 North of LPGA Interchange	7%	54%	7%	53%	8.0%	53.0%

3.2.6 Crash Data

Crash data for the state-maintained roadways were extracted from the FDOT Crash Analysis Reporting (CAR) System database for the five-year period from January 2015 through December 2019. Crash data from CAR System was obtained by roadway segment and then refined to only include crashes that occurred within the study area limits by milepost.

Crash data for non-state-maintained roadways was obtained from University of Florida's Signal Four Analytics website for the five-year period from January 2015 through December 2019.

The crash data included collisions occurring at LPGA Boulevard, interchanges, ramps, and the crossroad segment within the study area.

4 Existing Conditions Analysis

4.1 Multimodal Evaluation

4.1.1 Pedestrian Accommodations

LPGA Boulevard currently has minimal existing pedestrian accommodations. There are sporadic paved shoulders along the roadway. There are pedestrian crosswalks at the intersections with Tournament Drive, Champions Drive, Technology Boulevard/Outlet Boulevard and Williamson Boulevard. A new sidewalk (approximately 0.88 miles) was recently constructed on the north side of LPGA Boulevard between Tournament Drive and Champions Drive. It should be noted that there is an elementary school located along Tournament Drive approximately one mile north of LPGA Boulevard. Additionally, sidewalks are located on both sides of LPGA Boulevard between Technology Boulevard/Outlet Boulevard and Williamson Boulevard for approximately 0.38 miles. However, both sidewalks dead end at the fence near the I-95 northbound ramp terminal intersections. The existing shoulders are not continuous and do not all meet American with Disability Act (ADA) requirements for pedestrian use.

Traffic counts did not show pedestrian activity along this corridor. Field review confirmed such finding. However, as the land use adjacent to LPGA Boulevard is transitioning to suburban residential, the level of pedestrian activity is expected to increase in the future.

Since the pedestrian LOS is driven by the presence of sidewalk. The project area has 20% sidewalk coverage operates within LOS F. Additionally, the level of pedestrian level of traffic stress (PLTS) along LPGA Boulevard within the project area is 4 (high stress) as the facility is difficult or impassible by users who are walking. PLTS is affected by existence of sidewalks, continuity of sidewalk, posted speed and separation of vehicles and pedestrians.

4.1.2 Bicycle Facilities

LPGA Boulevard currently has no designated bicycle lanes within the project limits, therefore bicycles operates at LOS F. There is intermittent paved shoulder that can be used as a bicycle lane. Also, per Chapter 316.2065 Florida Statutes, bicycles may use travel lanes when a designated bicycle lane or paved shoulder is not present. However, sharing of the roadway by bicyclists and vehicles may be unsafe as the section between US 92 and Tymber Creek Road has a posted speed limit of 55 miles per hour. Traffic counts did not show bicyclist activity along this corridor.

The level of bicycle level of traffic stress (BLTS) along LPGA Boulevard within the project area is 4 (high stress) as the biking conditions are unsafe (high speed with lack of dedicated bike lanes).

4.1.3 Transit Facilities

The Volusia County transit system (VOTRAN) does not currently have service within the project limits. Bus service is available along Williamson Boulevard but does not offer service west of the

intersection with LPGA Boulevard. VOTRAN Route 60 (East/West Connector) uses US 92 from Deland to Daytona but only crosses the beginning point of the project limits without stopping.

Additionally, there are no transfer stations or park-and-ride areas within the project limits.

4.2 Existing Year (2021) Traffic Operational Analysis

4.2.1 I-95 Mainline and Ramp Junctions Analysis

The existing condition analysis results for I-95 mainline and ramp merge/diversion areas are documented in the IMR included in **Appendix B**.

4.2.2 Intersection Analysis

The methodologies specified in HCM 6, and Synchro Version 11 were used to evaluate arterial segments and intersections and for the section of LPGA Boulevard between US 92 and west of Tournament Drive. The section of the project between Tournament Drive and Williamson Boulevard was evaluated using Vissim microsimulation. Details of microsimulation analysis are summarized in this report and documented in detail in the IMR prepared as part of this project and included in **Appendix B**. The IMR also includes analysis of interchange ramp junctions and I-95 mainline.

Synchro models were completed utilizing the existing lane geometry. Existing truck percentages for each approach and existing intersection peak hour factors were used in these models. Synchro results are included in **Appendix C**.

Appendix C also includes movement delay, LOS and V/C ratios results for the intersections within the section between US 92 and Tournament Drive.

Table 4-1 shows the delay and LOS results based on the HCM 6 for each study intersection. The traffic operational analysis results show the following intersections are currently operating at LOS E or worse in at least one peak period/hour:

- Welshinger-Butler Circle (North Intersection)
- Williamson Boulevard
- Concierge Boulevard

Table 4-2 shows the existing queue length results rounded up to the nearest 25 feet for each movement.

4.2.3 Arterial Segment Analysis

Synchro/SimTraffic Version 11 was used to analyze the operations of arterial segments. **Table 4-3** summarizes the arterial speeds and travel times by direction and peak period under the existing conditions for LPGA Boulevard section between US 92 and Tournament Drive. The table also provides the average network denied entry count per peak hour. As shown in **Table 4-3**, LPGA Boulevard section between US 92 and Tournament Drive currently has arterial travel time of 371.3 seconds/vehicle (s/veh) and 285.1 s/veh in the AM and PM peak periods respectively for

the northbound direction. And arterial travel time of 410.9 s/veh and 332.4 s/veh in the AM and PM peak periods respectively for the southbound direction.

For the LPGA Boulevard section between Tournament Drive and Clyde Morris Boulevard, the Vissim travel times and speeds were used to assess the arterial operations. **Table 4-4** shows the average travel times and speeds for the Existing Year 2021. As shown, the travel time results are between six and eight minutes.

Existing Year 2021 Vissim networkwide measures (total delay, average delay, total travel time, average speed, and latent demand) are documented in the IMR included in **Appendix B**.

Table 4-1 | Existing Year (2021) Intersections Traffic Operational Results

Intersection	Measurement Location	AM		PM	
		Delay (s/veh)	LOS	Delay (s/veh)	LOS
US 92*	Intersection	14.4	B	25.1	C
Welshinger-Butler Circle (North Intersection)**	Eastbound Left Through	102.1	F	54.1	F
International Tennis Drive / International Golf Drive**	Eastbound Left	34.8	D	28.9	D
	Westbound Left	30.7	D	30.9	D
Tournament Drive***	Intersection	30.4	C	12.7	B
Tymber Creek Road***	Intersection	25.3	C	16.2	B
Champions Drive***	Intersection	46.7	D	19.6	B
Tomoka Farms Road***	Intersection	32.2	C	40.4	D
I-95 Southbound Ramps***	Intersection	32.4	C	26.5	C
I-95 Northbound Ramps***	Intersection	22.4	C	29.5	C
Technology Boulevard***	Intersection	20.5	C	51.0	D
Williamson Boulevard***	Intersection	53.4	D	64.3	E
Concierge Boulevard****	Northbound Left	17.0	C	29.5	D
	Southbound Right	10.6	B	100.0	F
Clyde Morris Boulevard***	Intersection	38.1	D	47.4	D

*Signalized intersection, HCM 6 Signalized intersections results reported.

**Unsignalized intersection, HCM 6 Two-Way STOP-Controlled intersections (TWSC) results reported for minor roadway critical movements.

***Vissim intersection delay reported, LOS estimated using HCM 6 thresholds.

****Vissim TWSC, critical minor movements delay reported, LOS estimated used HCM 6 thresholds.

LPGA Boulevard from US 92 (SR 600) to Williamson Boulevard PD&E Study
Project Traffic Analysis Report

Table 4-2 | Existing Year (2021) Queue Length Analysis

Intersection	Roadway	Approach	Movement	Queue Length (ft)	
				AM	PM
US 92*	US 92	Eastbound	EBL	175	175
			EBT	125	200
		Westbound	WBT	225	425
			WBR	25	25
	LPGA Boulevard	Southbound	SBL	125	100
			SBR	50	375
Welshinger-Butler Circle (North Intersection)**	Welshinger-Butler Circle	Eastbound	EBL	125	125
			EBR	25	25
		Westbound	WBLTR	-	-
	LPGA Boulevard	Northbound	NBL	25	25
			NBT	-	-
			NBR	-	-
		Southbound	SBL	0	0
			SBT	-	-
International Tennis Drive / International Golf Drive**	International Tennis Drive / International Golf Drive	Eastbound	EBL	50	25
			EBT	25	25
		Westbound	WBL	25	25
			WBT	25	25
	LPGA Boulevard	Northbound	NBL	25	25
			NBT	-	-
			NBR	-	-
		Southbound	SBL	25	25
			SBT	-	-
			SBR	-	-
Tournament Drive***	Tournament Drive	Eastbound	EBL	900	200
			EBT	175	100
			EBR	175	100
		Westbound	WBL	100	75
			WBT	100	75
			WBR	75	100
	LPGA Boulevard	Northbound	NBL	75	50
			NBT	475	225
			NBR	50	50
		Southbound	SBL	50	50
			SBT	625	350
Tymber Creek Road***	LPGA Boulevard	Eastbound	EBL	225	125
			EBT	750	325
		Westbound	WBT	825	500
			WBR	75	100
	Tymber Creek Road	Southbound	SBL	350	225
			SBR	150	175
Champions Drive***	LPGA Boulevard	Eastbound	EBL	75	25
			EBT	2575	525

LPGA Boulevard from US 92 (SR 600) to Williamson Boulevard PD&E Study
Project Traffic Analysis Report

Intersection	Roadway	Approach	Movement	Queue Length (ft)	
				AM	PM
		Westbound	EBR	25	25
			WBL	100	250
			WBT	675	1000
			WBR	50	75
	Champions Drive	Northbound	NBL	75	125
			NBT	75	125
			NBR	250	125
		Southbound	SBL	100	300
			SBT	50	75
			SBR	50	100
Tomoka Farms Road***	LPGA Boulevard	Eastbound	EBL	25	50
			EBT	1200	1075
			EBR	50	50
		Westbound	WBL	525	325
			WBT	925	1050
			WBR	925	1050
	Tomoka Farms Road	Northbound	NBL	150	250
			NBT	50	25
			NBR	175	450
		Southbound	SBL	50	275
			SBT	50	275
			SBR	50	275
I-95 SB Ramps - Existing**	LPGA Boulevard	Eastbound	EBT	600	450
			EBR	0	0
		Westbound	WBT	450	625
			WBR	0	0
	I-95 SB Ramps	Southbound	SBL	800	625
			SBR	175	200
I-95 NB Ramps - Existing**	LPGA Boulevard	Eastbound	EBT	650	625
			EBR	0	0
		Westbound	WBT	225	575
			WBR	0	0
	I-95 NB Ramps	Northbound	NBL	175	150
			NBR	550	600
Technology Boulevard***	LPGA Boulevard	Eastbound	EBL	425	525
			EBT	500	425
			EBR	75	300
		Westbound	WBL	175	650
			WBT	325	1275
			WBR	150	175
	Technology Boulevard	Northbound	NBL	150	600
			NBT	75	225
			NBR	125	225
		Southbound	SBL	225	325
			SBT	100	150
			SBR	150	375
Williamson Boulevard***	LPGA Boulevard	Eastbound	EBL	400	325

LPGA Boulevard from US 92 (SR 600) to Williamson Boulevard PD&E Study
Project Traffic Analysis Report

Intersection	Roadway	Approach	Movement	Queue Length (ft)	
				AM	PM
	Williamson Boulevard	Westbound	EBT	475	300
			EBR	475	125
			WBL	375	575
			WBT	500	825
			WBR	550	875
		Northbound	NBL	300	450
			NBT	350	450
			NBR	350	450
		Southbound	SBL	225	250
			SBT	525	700
Concierge Boulevard***	LPGA Boulevard	Eastbound	SBR	525	700
			EBL	25	100
			EBT	100	0
		Westbound	EBR	100	0
			WBL	75	75
	Concierge Boulevard	Northbound	WBT	0	700
			WBR	0	0
			NBL	50	75
		Southbound	NBT	50	50
			NBR	75	75
Clyde Morris Boulevard***	LPGA Boulevard	Eastbound	SBL	0	0
			SBT	0	0
			SBR	150	325
		Westbound	EBL	375	475
			EBT	225	450
	Clyde Morris Boulevard	Northbound	EBR	300	150
			WBL	150	175
			WBT	650	850
		Southbound	WBR	675	900
			NBL	425	625
		Westbound	NBT	300	400
			NBR	325	450
			SBL	200	350
			SBT	300	325
			SBR	175	325

*Signalized intersection, HCM 6 Signalized Intersection, 95th percentile queue results reported.

**Unsignalized intersection, HCM 6 TWSC, 95th percentile queue results reported.

***Vissim movement maximum queue lengths.

Table 4-3 | LPGA Boulevard from US 92 to Tournament Drive Existing Year (2021) Arterial Travel Time and Speed

Segment	Distance	AM Peak Hour			PM Peak Hour		
		Travel Time (s/veh)	Arterial Speed (mph)	Network Denied Entry (veh)	Travel Time (s/veh)	Arterial Speed (mph)	Network Denied Entry (veh)
Northbound							
From US 92 to Welshinger-Butler Circle (North Intersection)	1.9 mi	129.9	51	0	124.3	54	0
From Welshinger-Butler Circle (North Intersection) to International Golf Blvd	1.1 mi	76.7	51		76.6	52	
From International Golf Blvd to Tournament Drive	1.2 mi	90.3	47		84.2	50	
Northbound from US 92 to Tournament Drive	4.1 mi	296.9	50		285.1	52	
Southbound							
From Tournament Drive to International Golf Blvd	1.2 mi	83.9	50	0	83.0	51	0
From International Golf Blvd to Welshinger-Butler Circle (North Intersection)	1.1 mi	78.4	50		78.0	51	
From Welshinger-Butler Circle (North Intersection) to US 92	1.9 mi	170.2	41		171.3	39	
Southbound from Tournament Drive to US 92	4.1 mi	332.4	45		332.4	45	

Table 4-4 | LPGA Boulevard from Tournament Drive to Clyde Morris Boulevard Existing Year (2021) Travel Time and Speed

Direction	LPGA Blvd Segment	Distance	AM Peak Hour		PM Peak Hour	
			Travel Time	Avg Speed	Travel Time	Avg Speed
Eastbound	From Tournament Dr to Clyde Morris Blvd	2.5 mi	7.7 min	19.6 mph	5.9 min	25.5 mph
Westbound	From Clyde Morris Blvd to Tournament Dr	2.5 mi	5.8 min	26.0 mph	7.2 min	20.9 mph

4.3 Historical Crash Analysis

A five-year crash data analysis was completed for crashes reported between January 1, 2015 and December 31, 2019. The historical crash analysis is summarized in the following sections and documented in detail in the Safety Analysis Technical Memorandum included in **Appendix F**.

4.3.1 Overall Study Area

For the five-year crash analysis period, there were 1,354 crashes reported within the limits of the study, which includes both LPGA Boulevard and I-95 crashes. The 1354 total crashes is distributed over study segments as follows: 583 (along LPGA Boulevard), 9 (along US 92), 68 (at the I-95 ramps), and 694 (along I-95 mainline). Of the 1,354 reported crashes, 11 were fatal crashes, 414 are injury crashes and 929 are property damage only crashes. (**Table 4-5**).

Table 4-5 | Overall Study Area Crash Severity

Criteria	Year					Total
	2015	2016	2017	2018	2019	
Number of Fatal Crashes	2	2	2	2	3	11
Number of Injury Crashes	68	89	72	102	83	414
Number of Property Damage Only Crashes	139	184	187	205	214	929
Total Crashes	209	275	261	309	300	1354

The most predominant crash type reported for the overall study area is rear-end crashes (37%) with off road (16%) and sideswipe crashes (16%) tied for the second most predominant crash types. Crash types for the overall study area are shown in **Table 4-6**.

Table 4-6 | Overall Study Area Crash Types

Crash Type	Year					Total	Percentage
	2015	2016	2017	2018	2019		
Angle	15	21	19	24	22	101	7.5%
Animal	4	3	4	3	2	16	1.2%
Head On	1	2	4	4	2	13	1.0%
Left turn	9	12	15	12	15	63	4.7%
Off Road	42	47	44	46	40	219	16.2%
Pedestrian/Bicycle	0	3	1	1	1	6	0.4%
Rear-End	71	95	91	122	125	501	37.2%
Right Turn	1	0	0	0	0	1	0.1%
Roll over	11	12	7	14	10	54	4.0%
Sideswipe	24	51	46	47	49	217	16.0%
Other/Unknown	31	29	30	36	34	160	11.7%
Total Crashes	209	275	261	309	300	1354	100%

Figure 4-1 shows a crash heat diagram of locations where crashes were reported within the study area. The most prominent locations for crashes that occurred along LPGA Boulevard are within the I-95 interchange area, including the intersections of LPGA Boulevard with Williamson Boulevard and Clyde Morris Boulevard. The intersection of LPGA Boulevard with US 92 intersection also has a high concentration of crashes. The 11 reported fatal crashes are depicted with a red circle in the heat diagram with two fatal crashes clustered at the Clyde Morris Boulevard intersection and two fatal crashes clustered on I-95 at the southbound on-ramp. Other fatal crashes are shown as single points.

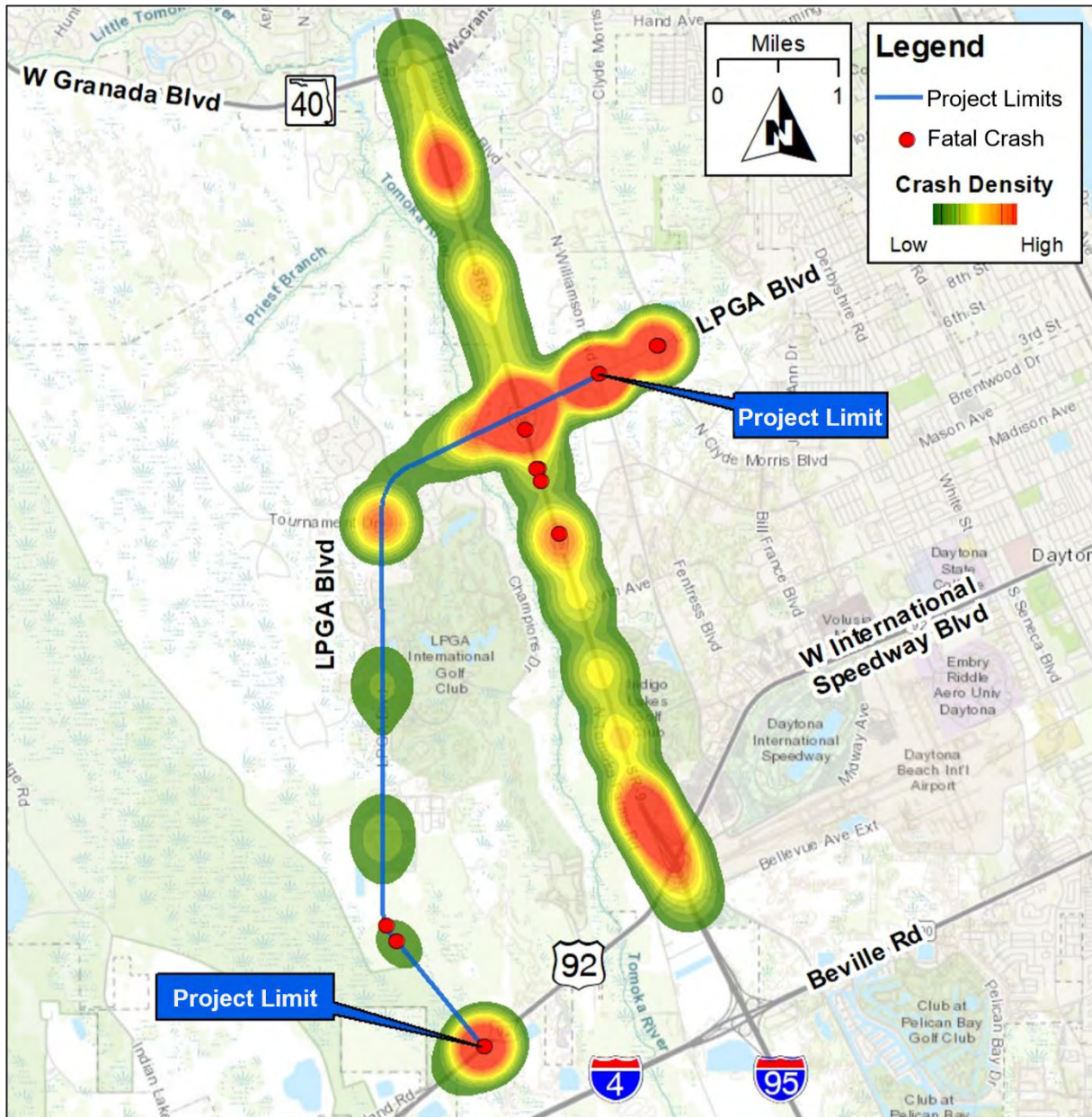


Figure 4-1 | Heat Diagram of Crash Severity

4.3.2 LPGA Boulevard

The five-year crash data showed 583 total crashes were reported to occur on LPGA Boulevard within the study area. Of the 583 crashes, six were fatal crashes, 180 were injury crashes and 397 were property damage only crashes (**Table 4-7**). The fatal crashes that occurred along LPGA Boulevard are summarized in **Table 4-8** and documented in detail in Safety Analysis Technical Memorandum included in **Appendix F**.

Table 4-7 | Crash Severity along LPGA Boulevard

Criteria	Year					Total
	2015	2016	2017	2018	2019	
Number of Fatal Crashes	1	0	2	0	3	6
Number of Injury Crashes	28	39	27	44	42	180
Number of Property Damage Only Crashes	60	75	78	90	94	397
Total Crashes	89	114	107	134	139	583

Table 4-8 | Summary of Fatal Crashes Occurred Along LPGA Boulevard

Year	Location	Crash Type	Road Conditions	Cause of Crash
2015	US 92 / International Speedway	Rear-End	Daylight/Dry	Motor vehicle in transport
2017	Clyde Morris Blvd	Left Turn	Daylight/Dry	Motor vehicle in transport
2017	US 92/LPGA Blvd	Angle	Daylight/Dry	Operated in a careless or negligent manner
2019	Williamson Blvd	Right Angle	Dark/Dry	Motor vehicle in transport
2019	Clyde Morris Blvd	Left Turn	Daylight/Dry	Motor vehicle in transport
2019	Welshinger-Butler Circle	Single Vehicle-Other*	Daylight/Dry	Other non-fixed object

* This crash also involved a pedestrian, who died.

The six (6) reported fatal crashes are summarized as follows:

1. 2015 - Three vehicles were traveling north on LPGA Boulevard (1 mile north of US 92) where there was a flag man for Volusia County controlling in the roadway who motioned for vehicle three to stop. Vehicle three stopped and vehicle two stopped behind but vehicle one struck vehicle two in the rear forcing vehicle two into the rear of vehicle three. Vehicle two ran off the road to the right and vehicle three ran off the road to the left.
2. 2017 - Vehicle one was traveling westbound on LPGA toward the intersection of Clyde Morris Boulevard while vehicle two went to make a left turn as vehicle one ran the red light crashing into vehicle two and rolling on top of vehicle three.
3. 2017 - Vehicle one was traveling east on US 92 and turned left in front of vehicle two traveling west on US 92 to go north on LPGA Boulevard. Vehicle two struck the passenger side of vehicle one.

Both drivers of the vehicles were transported to hospitals and the passenger of vehicle one was pronounced dead at the scene.

4. 2019 - Vehicle one was traveling north on Williamson Boulevard and vehicle two was traveling west on LPGA Boulevard. Vehicle one failed to stop for the traffic control device resulting in a crash.
5. 2019 - Vehicle one was traveling eastbound on LPGA Boulevard and made a left turn onto Clyde Morris Boulevard in front of vehicle two causing a crash. Vehicle two was traveling westbound on LPGA Boulevard.
6. 2019 - Vehicle one was driving southbound on LPGA toward US 92 with excessive speed failing to negotiate a curve in the roadway, crashing into a sign and being ejected from the car landing in a retention pond near Welshinger-Butler Circle.

Table 4-9 lists the crashes along LPGA Boulevard by crash type. As shown in **Table 4-9**, the most predominant crash types recorded for this roadway segment were rear-end crashes (51.9%) and left turn crashes (11.4%) as the second most predominant crash type.

Table 4-9 | Crash Types along LPGA Boulevard

Crash Type	Year					Total	Percent of Total
	2015	2016	2017	2018	2019		
Angle	8	9	8	13	8	46	7.9%
Animal	3	2	4	2	2	13	2.2%
Head On	0	1	2	4	1	8	1.3%
Left turn	9	12	15	11	15	62	11.4%
Off Road	5	5	4	1	5	20	3.0%
Pedestrian/Bicycle	0	2	1	1	0	4	0.7%
Rear End	43	58	49	69	79	298	51.9%
Right turn	1	0	0	0	0	1	0.2%
Roll over	1	2	2	3	3	11	1.5%
Sideswipe	4	10	9	15	16	54	8.2%
Other/Unknown	15	13	13	15	10	66	11.9%

The crash history at each of the intersections along LPGA Boulevard was further analyzed and summarized in **Table 4-10**. The Clyde Morris Boulevard intersection is included in the LPGA Boulevard analysis due to the traffic analysis study area extending to this intersection. Data was collected for each approach to the intersection for a length of 250 feet or to the turn lane taper, whichever was longer. The intersection of Champion Drive had animal crashes as the most predominant crash type. The US 92 intersection had a high percentage of reported angle crashes with 22% of the crashes. The Tournament Drive, Tomoka Farms Road and Clyde Morris Boulevard intersections had a high number of reported left turn crashes with 22%, 18% and 24% respectively. Two crashes at Tournament Drive and Williamson Boulevard intersections were pedestrian involved. Fatal crashes were reported at US 92, Williamson Boulevard, and Clyde Morris Boulevard intersections. 187 fatal and injury crashes were reported at the intersection which accounted for about 35% of all intersection crashes.

LPGA Boulevard from US 92 (SR 600) to Williamson Boulevard PD&E Study

Draft Safety Analysis Technical Memorandum

Table 4-10 | LPGA Boulevard Crash Types by Intersection

Crash	US 92	Welshinger-Butler Circle South	Welshinger-Butler Circle North	International Golf Drive	Tournament Drive	Tymer Creek Road	Champion Drive	Tomoka Farms Road	I-95 Southbound Off Ramp	I-95 Northbound Off Ramp	Technology / Outlet Boulevard	Williamson Boulevard	Clyde Morris Boulevard	Total	Percent of Total
Angle	18	-	-	1	4	-	-	7	2	2	3	3	4	44	8.4%
Animal	-	1	1	-	1	-	4	-	-	-	-	1	-	8	1.5%
Head on	1	-	1	-	1	-	-	-	-	1	1	1	1	7	1.3%
Left turn	5	-	1	1	11	-	-	9	5	-	-	7	24	63	12.0%
Off Road	-	-	-	-	2	-	1	2	-	-	1	1	1	8	1.5%
Pedestrian/Bicycle	-	-	-	-	1	-	-	-	-	-	-	-	1	2	0.4%
Rear end	48	-	2	1	22	3	2	16	11	15	27	88	45	280	53.2%
Right Turn	-	-	-	-	-	-	-	1	-	-	-	1	-	2	0.4%
Roll Over	-	-	-	-	1	-	-	-	-	-	-	3	-	4	0.8%
Sideswipe	1	-	-	1	3	-	-	5	-	-	4	14	9	37	7.0%
Other/Unknown	10	-	3	2	4	-	3	9	3	4	-	20	13	71	13.5%
Total Crashes	83	1	8	6	50	3	10	49	21	22	36	139	98	526	100%
Fatal Crashes	1	-	-	-	-	-	-	-	-	-	-	1	2	4	0.7%
Injury Crashes	43	-	3	3	13	2	3	14	6	9	28	26	33	183	34.8%
Property Damage Only Crashes	39	1	5	3	37	1	7	35	15	13	8	112	63	339	64.5

4.3.3 US 92 Segment

The five-year crash data analysis found nine (9) total reported crashes for the US 92/SR 600 roadway segment, within the study area, which does not include the crashes at the LPGA Boulevard intersection. **Table 4-11** shows that there were zero (0) fatal crashes, four (4) injury and five (5) property damage crashes reported along US 92. The number of reported injury crashes is 44% of the total crashes reported for this segment.

Table 4-11 | Severity of Crashes Along US 92

Crash Severity Type	Year					Total
	2015	2016	2017	2018	2019	
Number of Fatal Crashes	0	0	0	0	0	0
Number of Injury Crashes	0	0	1	3	0	4
Number of Property Damage Only Crashes	2	1	0	1	1	5
Total Crashes	2	1	1	4	1	9

As shown in **Table 4-12**, the most predominant crash type recorded for this roadway segment was rear end crashes (67%) and second most predominant crash type was angle crashes and left turn crashes (11% each) for the reported five-year period. In **Table 4-13** the predominant cause of crash reported for US 92 is reported to be operated motor vehicle in a careless or negligent manner (44%).

Table 4-12 | US 92/SR 600 Crash Types

Crash Type	Year					Total	Percent of Total
	2015	2016	2017	2018	2019		
Angle	1	0	0	0	0	1	11%
Left Turn	0	0	0	1	0	1	11%
Rear End	1	1	1	3	0	6	67%
Total	2	1	1	4	1	9	100%

Table 4-13 | US 92/SR 600 Cause of Crash

Cause of Crash	Year					Total	Percent of Total
	2015	2016	2017	2018	2019		
Failed to Keep in Proper Lane	1	0	0	1	0	2	22%
Followed Too Closely	1	0	0	1	0	2	22%
Operated MV in Careless or Neglect	0	1	1	2	0	4	44%
Unknown	0	0	0	0	1	1	11%
Total Crashes	2	1	1	4	1	9	100%

4.3.4 I-95 at LPGA Blvd Interchange Ramps

The crash on each ramp (two off-ramps and four on-ramps) is shown in **Table 4-14**. This analysis includes crashes that occurred on the ramp segments only (ramp terminal intersections crashes are included in LPGA Boulevard analysis). **Table 4-14** shows that the I-95 southbound off-ramp had the highest number of reported crashes with 34 total crashes and 12 injury crashes. The I-95 northbound off-ramp had the second highest number of crashes with 22 crashes and nine injury crashes. The ramps with the least number of reported crashes were the I-95 southbound on-ramp from eastbound LPGA Boulevard and I-95 northbound on-ramp from westbound LPGA Boulevard with two reported crashes each. This crash pattern could be attributed to traffic operations along LPGA Boulevard as off-ramps experience more congestion than on-ramps.

Table 4-14 | Crash Severity On I-95 Ramps

Location	Severity/Crash Type		Year					Total
			2015	2016	2017	2018	2019	
I-95 Northbound Off Ramp	Total Crashes		2	5	3	8	4	22
	Severity	Injury	0	4	1	2	2	9
		Property Damage Only	2	1	2	6	2	13
	Crash Type	Angle	0	1	0	0	0	1
		Head On	0	1	0	0	0	1
		Rear-End	2	0	2	6	4	14
		Rollover	0	0	1	2	0	3
		Off Road	0	3	0	0	0	3
I-95 Southbound On Ramp	Total Crashes		1	1	0	0	0	2
	Severity	Property Damage Only	1	1	0	0	0	2
	Crash Type	Off road	1	1	0	0	0	2
I-95 Northbound On Ramp	Total Crashes		0	1	1	1	0	3
	Severity	Injury	0	0	0	1	0	1
		Property Damage Only	0	1	1	0	0	2
	Crash Type	Angle	0	0	0	1	0	1
		Rollover	0	1	0	0	0	1
		Rear-End	0	0	1	0	0	1
I-95 Southbound On Ramp	Total Crashes		0	2	2	0	1	5
	Severity	Property Damage Only	0	2	2	0	1	5
	Crash Type	Rollover	0	1	0	0	0	1
		Off road	0	1	2	1	0	4
I-95 Southbound Off Ramp	Total Crashes		2	10	5	10	7	34
	Severity	Injury	1	4	3	4	0	12
		Property Damage Only	1	6	2	6	7	22
	Crash Type	Angle	0	1	0	1	0	2
		Off road	0	1	1	1	2	5
		Rear-End	1	4	2	4	5	16
		Rollover	1	1	2	1	0	5
		Sideswipe	0	2	0	3	0	5
		Unknown	0	1	0	0	0	1
I-95 Northbound On Ramp	Total Crashes		0	0	1	1	0	2
	Severity	Property Damage Only	0	0	1	1	0	2
	Crash Type	Rear-End	0	0	1	1	0	2
		Sideswipe	0	0	1	0	0	1

As shown in the **Table 4-15**, the most predominant crash type recorded along the ramps was rear-end crashes (47%) and run off road crashes (21%) was the second most predominant crash type.

Table 4-15 | Crash Types On I-95 at LPGA Boulevard Ramps

Crash Type	Year					Total	Percent of Total
	2015	2016	2017	2018	2019		
Angle	0	2	1	1	0	4	6%
Head On	0	1	0	0	0	1	1%
Off Road	1	6	3	1	3	14	21%
Rear-End	3	4	4	12	9	32	47%
Rollover	1	3	3	3	0	10	15%
Sideswipe	0	2	1	3	0	6	9%
Other/Unknown	0	1	0	0	0	1	1%
Total Crashes	5	19	12	20	12	68	100%

4.3.5 I-95 Mainline

The five-year crash data analysis found 694 total reported crashes for the I-95 mainline within the study limits, which extend from US92 ramps to SR 40 ramps. Of the 694 reported crashes on I-95 mainline, five were fatal crashes, 208 were injury crashes, and 481 were property damage only crashes (**Table 4-16**).

Table 4-16 | I-95 Mainline Crash Severity

Criteria	Year					Total
	2015	2016	2017	2018	2019	
Number of Fatal Crashes	1	2	0	2	0	5
Number of Injury Crashes	39	42	40	48	39	208
Number of Property Damage Only Crashes	73	97	101	101	109	481
Total Crashes	113	141	141	151	148	694

There were five (5) reported fatal crashes, 208 injury crashes and 481 property damage only crashes reported on I-95 mainline for the five-year analysis period. The five (5) reported fatal crashes were:

1. 2015 - Driver one was driving a motorcycle and made an evasive changing lane from the outside lane to the middle lane when the vehicle was overturned and threw driver one to the inside lane. Driver one was reported fatal on the scene.
2. 2016 - Vehicle one was traveling south on I-95 in the outside lane when it stuck a pedestrian walking north along the outside I-95 lane. The police report listed no contributing action from driver one of vehicle one as a cause of crash, but the pedestrian was reported to have a positive drug test.
3. 2016 - Vehicle one lost control for unknown reasons making the vehicle spin out of control across the roadway before crashing into the tree line and overturning.

4. 2018 - Vehicle one was traveling at a high-speed southbound on I-95 in the center lane when vehicle two entered the southbound center lane due to a lane merge. Vehicle one failed to slow in time and collided with vehicle two. Driver of vehicle one was pronounced deceased on the scene.
5. 2018 - Vehicle one experienced a front right tire blow in the middle lane traveling south on I-95, causing vehicle one to leave it travel lane and enter vehicle two travel lane, the outside lane, causing left rear of vehicle one strike the front of vehicle two. After the collision, vehicle one rolled onto the roof and vehicle two entered the median, struck the guardrail causing vehicle two to become airborne into the northbound lanes on I-95 rolling onto its left side. Passenger of vehicle two was pronounced deceased two days after the crash was reported.

The fatal crashes that occurred along I-95 mainline are summarized in **Table 4-17** and documented in detail in Safety Analysis Technical Memorandum (**Appendix F**).

Table 4-17 | I-95 Mainline Fatal Crash Summary

Year	Location	Crash Type	Road Conditions	Cause of Crash
2015	I-95 northbound	Rollover	Wet	Swerved or avoided
2016	I-95 southbound	Pedestrian	Dark	No contributing action reported for driver of vehicle one
2016	I-95 northbound	Off road	Wet	Failed to keep in proper lane
2018	I-95 southbound	Rear-end	Dark	Operated motor vehicle in a careless or negligent manner
2018	I-95 southbound	Sideswipe	Dark	Failed to keep in proper lane

As shown in the **Table 4-18** the most predominant crash types recorded on I-95 mainline were run off road crashes (27%), rear-end crashes (24%), and sideswipe crashes (23%).

Table 4-18 | I-95 Mainline Crash Types

Crash Type	Year					Total	Percent of Total
	2015	2016	2017	2018	2019		
Angle	6	10	10	10	14	50	7.2%
Animal	1	1	0	1	0	3	0.4%
Head on	1	0	2	0	1	4	0.6%
Off Road	36	36	37	44	32	185	26.7%
Pedestrian/Bicycle	0	1	0	0	1	2	0.3%
Rear-End	24	32	37	38	37	168	24.1%
Rollover	9	7	2	8	7	33	4.8%
Sideswipe	20	39	36	29	33	157	22.6%
Other/Unknown	16	15	17	21	23	92	13.3%
Total Crashes	113	141	141	151	148	694	100%

The predominant cause of crash reported along I-95 mainline is operated motor vehicle in a careless or negligent manner (24%) with failed to keep proper lane (23%) as the second most predominant cause of crash.

All crash data used in the crash data evaluation is provided in **Appendix F**.

Table 4-19 | I-95 Mainline Contributing Cause of Crash

Cause of Crash	Year					Total	Percent of Total
	2015	2016	2017	2018	2019		
Drove too Fast for Conditions	5	4	10	14	7	40	5.8%
Failed to Keep in Proper Lane	19	28	34	40	36	157	22.6%
Failed to Yield Right Of Way	1	6	6	1	6	20	2.8%
Followed Too Closely	1	0	4	4	2	11	1.6%
Improper Backing	0	0	1	0	0	1	0.1%
Improper Passing	0	2	2	2	2	8	1.2%
Improper Turning	0	0	0	1	0	1	0.1%
No Contributing Action	23	30	25	24	29	131	18.9%
Operated MV in Careless or Neglect	27	39	30	41	32	169	24.3%
Over-Correcting/Over Steering	3	1	0	1	2	7	1.0%
Ran Off Roadway	6	3	7	7	10	33	4.8%
Swerved or Avoided	3	3	0	0	0	6	0.9%
Unknown	18	18	13	12	18	79	11.4%
Other	7	7	9	4	4	31	4.5%
Total Crashes	113	141	141	151	148	694	100%

4.3.6 Crash Rates

Crash rates for the study area were calculated in million vehicle miles traveled (MVMT) and then compared to statewide crash rate averages for similar facilities. The segment and intersections crash rates calculated for LPGA Boulevard are documented in detail in Safety Analysis Technical Memorandum (**Appendix F**).

The segment crash rates were calculated based on the number of crashes that occurred within the five-year crash analysis period, length of roadway, and AADT volumes. The intersection crash rates were calculated based on the number of crashes that occurred within the five-year crash analysis period and the AADT volumes entering the intersection. Existing Year 2021 AADT volumes used to calculate crash rates and were obtained from the PTFM (**Appendix A**).

The segment crash rates calculated for LPGA Boulevard are shown in **Table 4-20** and include 20 segments. The intersections crash rates calculated for LPGA Boulevard are shown in **Table 4-21**

and include 12 intersections. The crash rate for the I-95 south of LPGA Boulevard exceeded the statewide average crash rate for interstate facilities. Additionally, LPGA Boulevard intersections with US 92, Tournament Drive, Tomoka Farms Road, Williamson Boulevard exceeded the statewide average crash rates.

Table 4-20 | Crash Rates for all Segments

Crash Rate for Segments									
Description	Length (Miles)	Total Crash Value	Ranking	2021 AADT	Annual Crash Frequency	Crash Rate (MVMT)		State Avg Crash Rate for Similar Facilities	Exceed State Average
						Value	Ranking		
LPGA Blvd (US 92 to Welshinger-Butler Circle South)	1.54	8	7	9,400	1.6	0.30	18	3.654	No
LPGA Blvd (Welshinger-Butler Circle South to Welshinger-Butler Circle North)	0.30	5	12	9,400	1.0	0.97	7	3.654	No
LPGA Blvd (Welshinger-Butler Circle North to International Golf Drive)	1.09	8	7	9,400	1.6	0.43	14	3.654	No
LPGA Blvd (International Golf Drive to Tournament Drive)	1.17	2	17	8,200	0.4	0.11	20	3.654	No
LPGA Blvd (Tournament Drive to Tymber Creek Road)	0.36	4	14	12,000	0.8	0.51	10	3.654	No
LPGA Blvd (Tymber Creek Road to Champion Drive)	0.50	6	9	15,000	1.2	0.44	13	3.654	No
LPGA Blvd (Champion Drive to Tomoka Farms Road)	0.21	2	17	19,000	0.4	0.27	19	3.654	No
LPGA Blvd (Tomoka Farms Road to I-95 Southbound Off Ramp)	0.21	4	14	27,000	0.8	0.39	15	3.654	No
LPGA Blvd (I-95 Southbound Off Ramp to I-95 Northbound Off Ramp)	0.28	62	3	35,500	12.4	3.42	1	3.634	No
LPGA Blvd (I-95 Northbound Off Ramp to Technology/ Outlet Boulevard)	0.23	6	9	44,000	1.2	0.32	16	3.634	No
LPGA Blvd (Technology/Outlet Boulevard to Williamson Boulevard)	0.24	6	9	32,000	1.2	0.44	12	3.634	No
LPGA Blvd (Williamson Boulevard to Clyde Morris Blvd)	0.48	24	5	34,500	4.8	0.79	8	3.634	No
I-95 (South of LPGA Blvd)	2.37	449	1	88,000	89.8	1.18	6	0.976	Yes
I-95 (North of LPGA Blvd)	2.96	245	2	90,500	49.0	0.50	11	0.976	No
I-95 NB Off Ramp	0.60	22	6	12,000	4.4	1.67	5	N/A	N/A
LPGA Blvd EB-SB on Ramp	0.40	2	17	1,200	0.4	2.28	3	N/A	N/A
LPGA Blvd EB-NB on Ramp	0.30	3	16	2,700	0.6	0.61	9	N/A	N/A
LPGA Blvd WB-SB on Ramp	0.20	5	12	8,000	1.0	1.71	4	N/A	N/A
I-95 SB off Ramp	0.50	34	4	11,500	6.8	3.24	2	N/A	N/A
LPGA Blvd WB-NB on Ramp	0.40	2	17	9,000	0.4	0.30	17	N/A	N/A

Table 4-21 | Crash Rates for Intersections

Crash Rate for Intersections						
Road Intersecting LPGA Boulevard	Total Crash Value	2021 AADT	Annual Crash Frequency	Crash Rate (MVMT)	State Avg Crash Rate for Similar Facilities	Exceed State Average
US 92	83	66,000	16.6	0.69	0.333	Yes
Welshinger-Butler Circle (North)	8	19,000	1.6	0.23	0.367	No
International Tennis Dr/ International Golf Dr	6	21,700	1.2	0.15	0.367	No
Tournament Dr	50	23,400	10.0	1.17	0.367	Yes
Tymber Creek Rd	3	33,300	0.6	0.05	0.333	No
Champion Dr	10	37,000	2.0	0.15	0.333	No
Tomoka Farms Rd	49	51,700	9.8	0.52	0.367	Yes
I-95 Southbound Off Ramp	21	114,000	4.4	0.11	0.419	No
I-95 Northbound Off Ramp	22	114,000	4.2	0.10	0.419	No
Technology Blvd/ Outlet Blvd	36	94,000	7.2	0.21	0.623	No
Williamson Blvd	139	102,300	27.8	0.74	0.623	Yes
Clyde Morris Blvd	98	98,000	1.6	0.04	0.623	No

5 Future Traffic Forecasts

Future forecasted volumes were developed based on procedures contained in the *2019 FDOT Project Traffic Forecasting Handbook* using the CFRPM 7. A subarea model was developed to validate the base year model. The model validation results are summarized in PTFM (**Appendix A**). Future year forecasted volumes were developed to represent the expected travel demand, and a single set of volumes was used for No-Build and Build

5.1 Socioeconomic Model Data Review

A thorough review of CFRPM 7 was conducted in coordination with the City of Daytona Beach and Volusia County planning staff as well as the R2CTPO. A review of CFRPM 7 was done to ensure reasonableness between the model and the 2015 field conditions. Population, population density, employment and employment density were inspected by using Google Earth imagery for each traffic analysis zone (TAZ) within the study area. Upon review, it was determined that the model showed reasonableness within the study area and no changes were necessary for the year 2015 CFRPM model socioeconomic data.

Population and employment data from the 2045 CFRPM model were also compared with the 2015 base year data to check for any discrepancies. A considerable amount of the TAZs show substantial development in the study area. The 2045 socioeconomic data for the 15 TAZs were updated in the 2045 model based on the coordination with City of Daytona Beach, City of Ormond Beach, and Volusia County planning staff.

5.2 Future Roadway Network Review

The CFRPM network was reviewed for connectivity, area type, functional classification, number of lanes and turn prohibitors. Although certain changes were made for the base year 2015 model validation purposes which are discussed later, it was determined that no changes to the roadway network needed to be made to the 2015 base year network to incorporate the year 2015 field roadway conditions.

The 2045 R2CTPO LRTP (Connect 2045) and Fiscal Year (FY) 2022/23 to FY 2026/27 TIP were compared against the planning horizon (2045) Cost Feasible Plan model to achieve a baseline. The 2045 Cost Feasible Plan model was checked against the following projects:

- I-95 Interchange at SR 5 (US 1) – PD&E/EMO Study
- I-95 at Maytown Road – New interchange – PD&E/EMO Study
- I-95/SR 9 From south of Bridge 790079 to Flagler County line – Resurfacing
- I-95/SR 9 From South of Dunn Avenue to Airport Road – Resurfacing
- I-95 – 0.5 miles north of SR 44 to 1.6 miles north of US 92 – Add lanes and reconstruct
- I-95 Interchange at Pioneer Trail – New Interchange
- US 1 – Resurfacing from Woodland Ave to Flagler County Line
- I-95 at LPGA Boulevard Interchange – PD&E/EMO Study

- US 1 from Nova Rd (North) to I-95 – Widen to six lanes
- LPGA from US 92 to Williamson Boulevard – PD&E Study – The PD&E was included given that a single set of volumes was used for No-Build and Build
- SR 600 (US 92) from I-4 Eastbound Ramp to Tomoka Farms Road – Widen to six lanes
- SR 40 from Breakaway Trail to Williamson Boulevard – Widen to six lanes
- SR 600 (US 92) at Williamson Boulevard – Intersection improvement
- SR 40 from Interchange Boulevard to I-95 Southbound Ramps – Turn lane improvement
- SR 483 (Clyde Morris Boulevard) from SR 400 (Beville Road) To US 92 – Corridor improvement (Add lanes)
- US 92 from I-4 Eastbound Ramp to CR 415 (Tomoka Farms Road) – Widen to six lanes
- Tomoka River Bridge (LPGA) West of Champions Drive to East of Tomoka Farms Road – Bridge to match interchange configuration

After review, the additional lanes along I-95 from north of US 92 to SR 44, and the additional lanes for SR 483 from SR 400 to US 92 were found to be excluded from the 2045 Cost Feasible Plan model. The 2045 Cost Feasible Plan model was updated to reflect these changes. Along with the changes mentioned above, the same validation revisions that were completed in the base year 2015 model were also incorporated into the year 2045 model.

5.3 Subarea Model Validation

Before utilizing the travel demand model to develop the project traffic forecasts, the base year (2015) model outputs were verified for reasonableness at the regional and project levels. When the model results are not reasonable compared to the observed traffic conditions at the regional level, the model will be determined to be unacceptable and other means of traffic forecasting should be investigated. For this reason, base year model performance was compared at the regional level prior to the project level following the criteria provided in the 2019 *FDOT Project Traffic Forecasting Handbook*.

The validation measures included the volume-to-count (V/C) ratio by facility types and by screen lines/cut lines. In this regard, the area type, facility type, and lane capacities were reviewed for any abnormalities. Furthermore, through an iterative process, the accuracy of the project area traffic forecast was improved by adjusting centroid locations and adding additional turn penalties.

All the model-estimated traffic volumes expressed in peak seasonal week average daily traffic (PSWADT) and the count data were found to be within the preferable range of FDOT standards as illustrated in the PTFM (**Appendix A**). Based on the analysis of the base year 2015 outputs, most of the validation performance measures met the regional standards identified in the FDOT Project Traffic Forecasting Handbook. Therefore, it was determined that using CFRPM 7 was acceptable at a regional level for use in the traffic analysis.

Upon comparing the PSWADT V/C ratios within the subarea level, it was determined that the CFRPM 7 predicted volumes were within the acceptable error levels and met the validation performance measure standards provided by the FDOT Project Traffic Forecasting Handbook.

At the project area level, the model volumes on both the I-95 mainline, I-95 ramps as well as the LPGA Boulevard segments were compared individually to the observed counts using the V/C ratio. Most of the links had the V/C ratios within the acceptable error levels.

5.4 Future Year Volumes and Growth Rate

Future year AADT volumes were developed for the following scenarios:

- Opening Year: 2030
- Design Year: 2050

Future year forecasted volumes were developed to represent the expected travel demand, and a single set of volumes was used for No-Build and Build. Growth rates, shown in **Table 5-1**, were used as a basis to estimate future year AADT volumes in the study area. Growth rates were used instead of direct model output given that base year model validation is done for specific control points and not all locations. Using growth rates also provided the ability to blend other sources. The CRFPM 7 outputs from 2015 model and 2045 model were used in combination with the estimated historical traffic growth rates and the Bureau of Economic and Business Research (BEBR) population growth rates, as summarized here and documented in detail in the PTFM (**Appendix A**).

- As the study area has already seen significant growth since 2015 when CRFPM 7 was developed, the growth between 2015 and 2021 was estimated and compared with the 2045 volumes. Other data sources such as Volusia County counts or data collection from previous studies within the study area were used in locations where the CRFPM 7 did not have 2015 traffic count data.
- In cases where the 2045 model volumes were less than 2021, the growth rate was adjusted based on the growth observed on adjacent links on the same roadway, or trend analysis which had R-square values greater than 75%.
- The established growth rate was then applied to the existing 2021 counts to develop 2045 volumes.
- BEBR growth rates were used to grow the volumes from 2045 to 2050.
- Additionally, the Traffic Impact Analyses (TIA) were consulted to establish future daily volumes for Tournament Drive, International Tennis Drive, International Golf Drive, Tymber Creek Road, Technology Drive, Williamson Boulevard. and Clyde Morris Boulevard.
- 2030 daily traffic volumes were interpolated between 2021 and 2050 volumes.

Table 5-1 | Growth Rates and 2050 Volumes

Roadway	Count Location	2015 Volumes		2045 Volumes	2021 Traffic Counts	Adjusted Growth to project 2015 to 2021	Projected 2021 Model Volume	2021 to 2045 Recommended Growth Rate	2045 to 2050 Growth Rate	Balanced 2050 AADT
		Model	Counts	Model						
I-95	North of LPGA Blvd.	83,900	81,161	139,185	85,500	1.34%	88,385	2.23%	0.41%	138,000
	South of LPGA Blvd.	71,364	74,825	119,741	75,830	0.22%	72,322	2.99%	0.41%	133,000
LPGA Blvd.	US 92 to International Tennis Dr.	7,913	8,019	29,714	9,390	2.85%	9,265	9.20%	0.84%	32,000
	Tournament Dr. to International Tennis Dr.	8,916	-	32,676	8,192	2.85%	10,440	8.87%	0.84%	27,000
	Tournament Dr. to Tymber Creek Rd.	9,101	9,540	32,676	11,777	3.91%	11,235	7.95%	0.84%	36,000
	Tymber Creek Rd. to Champions Dr.	9,101	9,300	46,385	14,930	10.09%	14,611	9.06%	0.84%	50,000
	Champions Dr. to Tomoka Farm Rd.	10,966	9,300	57,978	18,809	17.04%	22,178	6.73%	0.84%	52,000
	West of I-95	14,838	17,469 ¹	50,189	26,929	13.54%	26,891	3.61%	3.61%	56,000
	East of I-95	21,984	38,400 ¹	60,954	43,990	3.64%	24,384	2.89% ²	0.84%	78,000
	Technology Blvd./Outlet Blvd. to N Williamson Blvd.	20,892	26,964	41,868	31,904	3.05%	24,719	3.35%	0.84%	60,000
	N Williamson Blvd. to Clyde Morris Blvd.	26,472	22,617	42,841	34,314	8.62%	40,163	1.89%	0.84%	52,000
	East of Clyde Morris Blvd.	12,317	17,110	25,817	24,210	6.92%	17,428	2.01%	0.84%	38,000
I-95 Ramps	Southbound Off Ramp	7,273	8,380	15,765	11,687	6.58%	10,143	3.26%	0.84%	22,000
	Southbound On Ramp from WB LPGA Blvd.	1,026	4,520	2,495	8,025	12.93%	1,822	3.64%	0.84%	16,000
	Southbound On Ramp from EB LPGA Blvd.	133	640	3,153	1,243	15.71%	258	3.64%	0.84%	3,000
	Northbound Off Ramp	2,674	6,193	4,346	11,800	15.09%	5,095	3.61%	0.84%	23,000
	Northbound On Ramp from WB LPGA Blvd.	6,400	5,261	11,978	9,019	11.91%	10,972	4.52%	0.84%	19,000
	Northbound On Ramp from EB LPGA Blvd.	2,832	1,583	1,903	2,731	12.09%	4,886	3.72%	0.84%	6,000
Tymber Creek Rd.	North of LPGA Blvd.	0	-	45,183	6,459	-	-	24.98%	0.84%	33,000
	South of LPGA Blvd. ³	-	-	-	-	-	-	-	-	13,000
Champions Dr.	South of LPGA Blvd.	1,875	-	13,803	1,754	-	-	-	-	4,500
	North of LPGA Blvd.	-	-	12,912	1,413	-	-	5.77%	0.76%	3,500
Tomoka Farms Rd.	North of LPGA Blvd.	61	-	265	605	0.94%	64	9.85%	1.60%	3,000
	South of LPGA Blvd.	3,712	4,576	13,916	4,833	0.94%	3,921	11.21%	0.41%	15,000
Technology Blvd.	North of LPGA Blvd.	435	-	2,419	9,000	2.17%	492	-	-	25,000
Outlet Blvd.	South of LPGA Blvd.	661	-	19,710	9,288	2.17%	747	5.50%	0.41%	22,000
Williamson Blvd.	North of LPGA Blvd.	11,922	13,300	25,023	17,522	2.17%	13,477	3.66%	0.41%	34,000
	South of LPGA Blvd.	17,173	16,630	25,741	18,800	2.17%	19,414	3.87%	0.41%	37,000
Clyde Morris Blvd	North of LPGA Blvd.	14,563	13,440	18,266	16,520	2.17%	16,463	2.50%	0.41%	27,000
	South of LPGA Blvd.	16,678	12,944	23,807	15,513	2.17%	18,854	2.67%	0.41%	26,000
International Tennis Dr.	North of LPGA Blvd.	2,523	-	14,736	1,378	-	-	15.42%	1.60%	7,000
International Golf Dr.	South of LPGA Blvd.	2,971	-	11,516	1,246	-	-	14.40%	1.60%	6,000
Tournament Dr.	West of LPGA Blvd.	289	-	-	1,133	-	-	23.06%	1.60%	8,000
	East of LPGA Blvd.	-	-	-	3,242	-	-	2.97%	1.60%	6,000

¹Used 2017 volumes and growth rates estimated between 2017 and 2021
²Used growth between Technology/Outlet Boulevard and Williamson Boulevard.
³Trips derived from Tymber Creek Village TIA

The resulting Opening Year 2030 and Design Year 2050 AADT volumes were then balanced and refined, as appropriate. The resulting projected AADT volumes with adjustments are shown in **Figure 5-1** and **Figure 5-2**.

5.5 Future Design Hour Volumes

Future year DDHVs were developed by applying K and D factors (**Table 3-1**) to the projected AADTs. The resulting volumes were balanced and adjusted as necessary throughout LPGA Boulevard corridor and I-95. DDHVs for Opening Year (2030) and Design Year (2050) are shown in **Figure 5-1** and **Figure 5-2**.

5.6 Future Peak Hour Turning Movement Volumes

The peak hour intersection TMVs for the Opening Year 2030 and Design Year 2050 were estimated utilizing the Existing Year 2021 turning movement counts data and the future DDHVs. The FDOT TURNS5 spreadsheet was used to estimate future year peak hour intersection TMVs.

The existing turning movement counts provided a data-driven starting point for establishing traffic patterns, while the future DDHVs provided the magnitude of the future traffic volumes. The analysis area for LPGA Boulevard is slated to receive a substantial number of new developments which will have the effect of increasing the trips along LPGA Boulevard. A significant amount of these trips is estimated to come from the area north of Tymber Creek Road. To address the effects of these changes, the future year TMV estimates reflected a combination of existing travel patterns (based on existing counts) along with anticipated growth and changes in travel patterns within the analysis area. As such, additional refinements were made to the DDHVs and TMVs to account for land development changes in the project design traffic. The resulting TMVs were balanced along LPGA Boulevard corridor utilizing a consistent approach for the entire project area. The TMVs for the AM and PM peak hours are shown in **Figure 5-3** and **Figure 5-4** under the No Build Alternative for the Opening Year 2030 and Design Year 2050. The TMVs for the AM and PM peak hours are shown in **Figure 5-5** and **Figure 5-6** under the Build Alternative for the Opening Year 2030 and Design Year 2050.

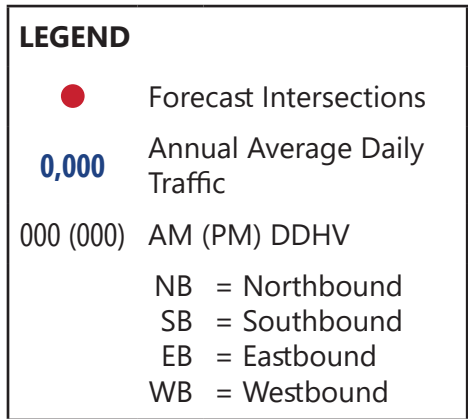


Figure 5-1 | Opening Year 2030 AADT & DDHV

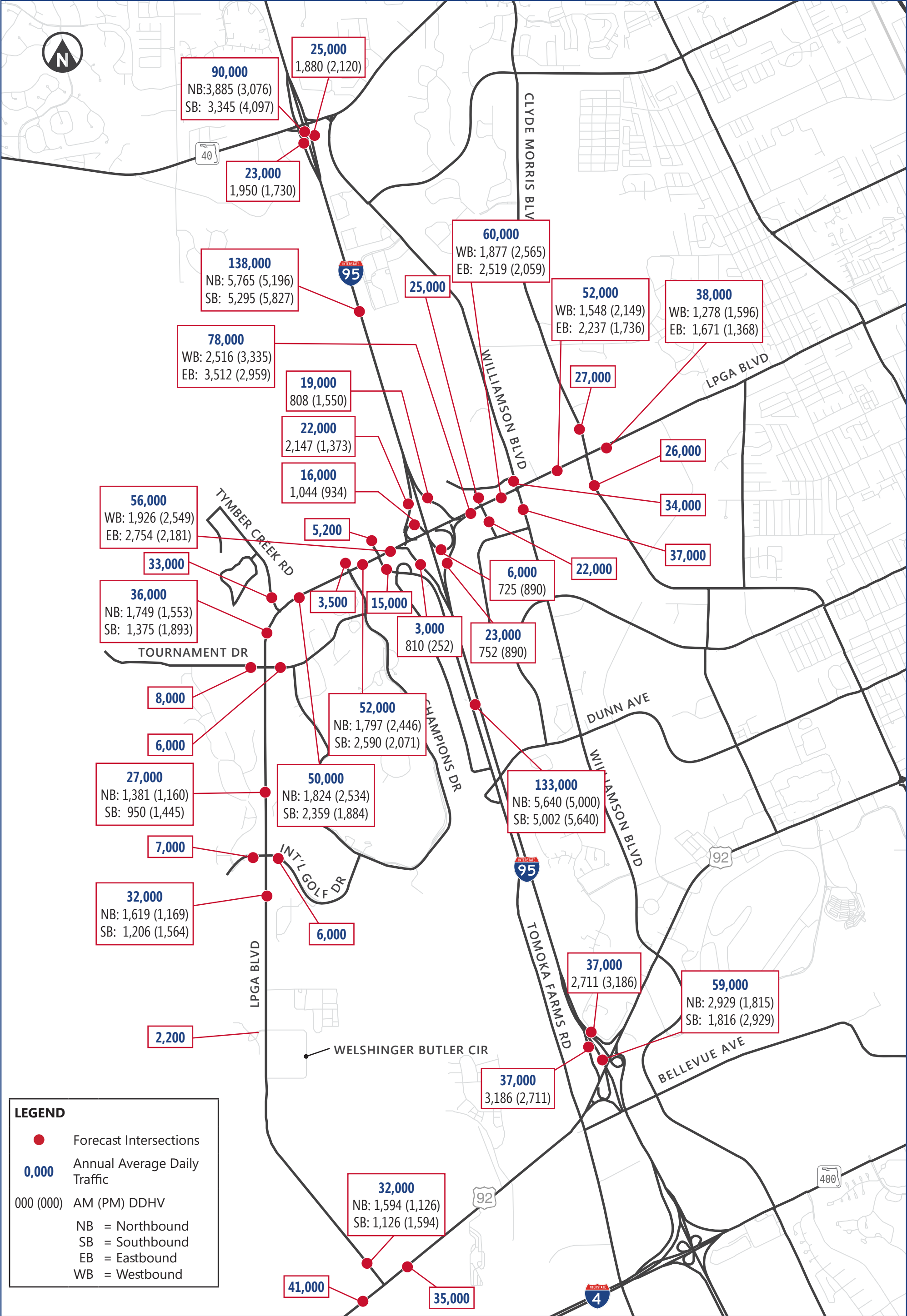


Figure 5-2 | Design Year 2050 AADT & DDHV

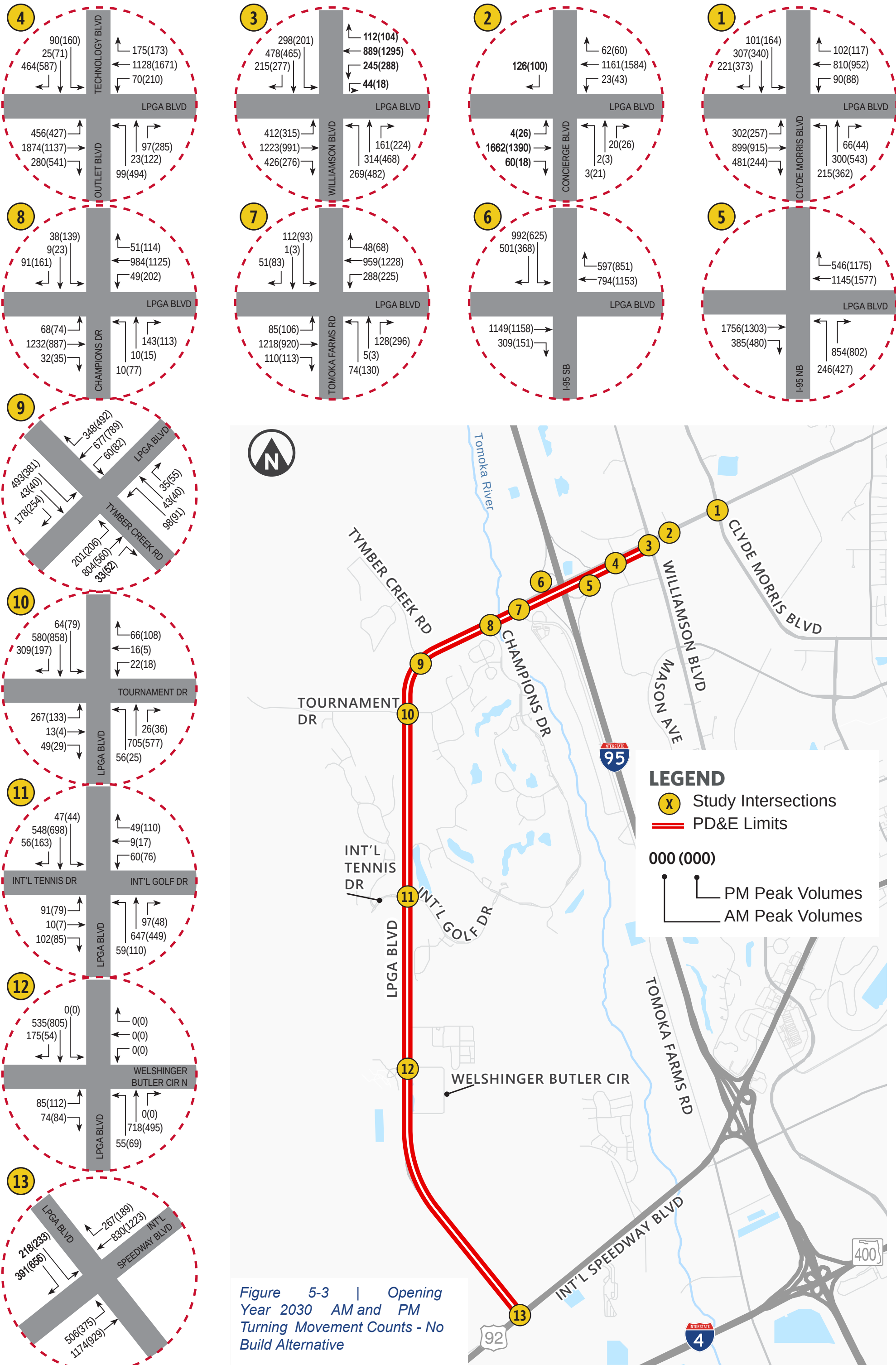


Figure 5-3 | Opening Year 2030 AM and PM Turning Movement Counts - No Build Alternative

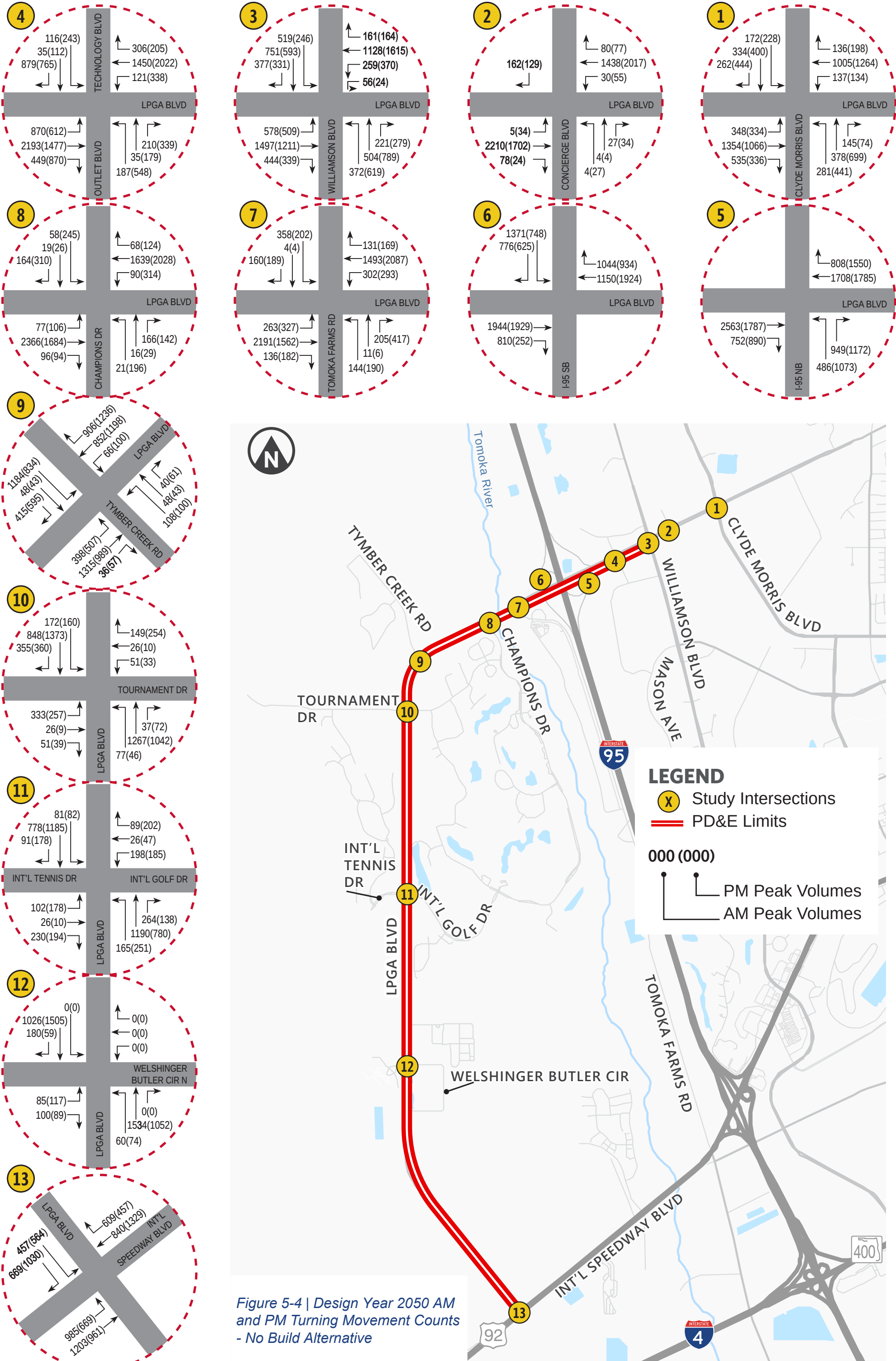
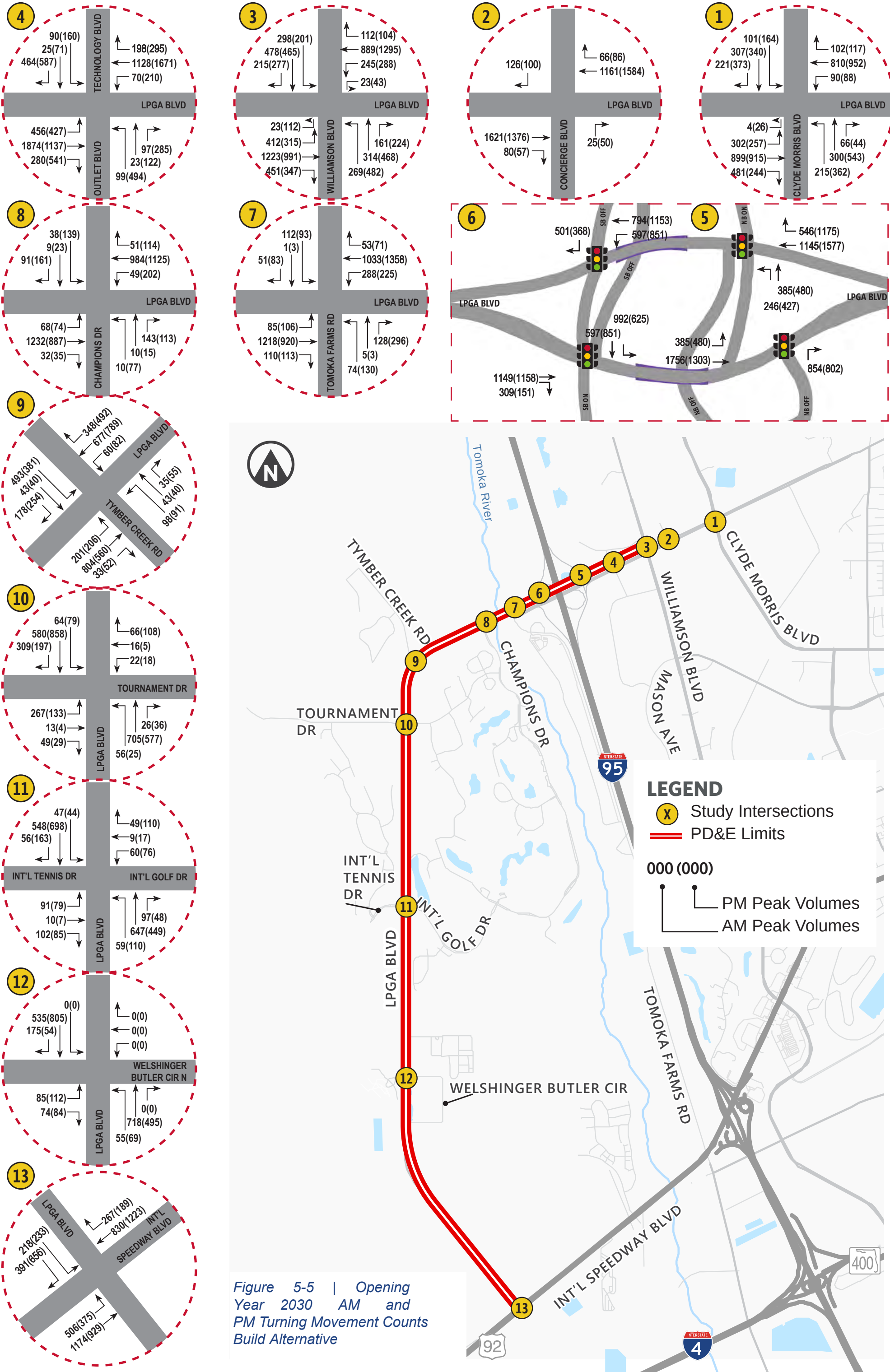
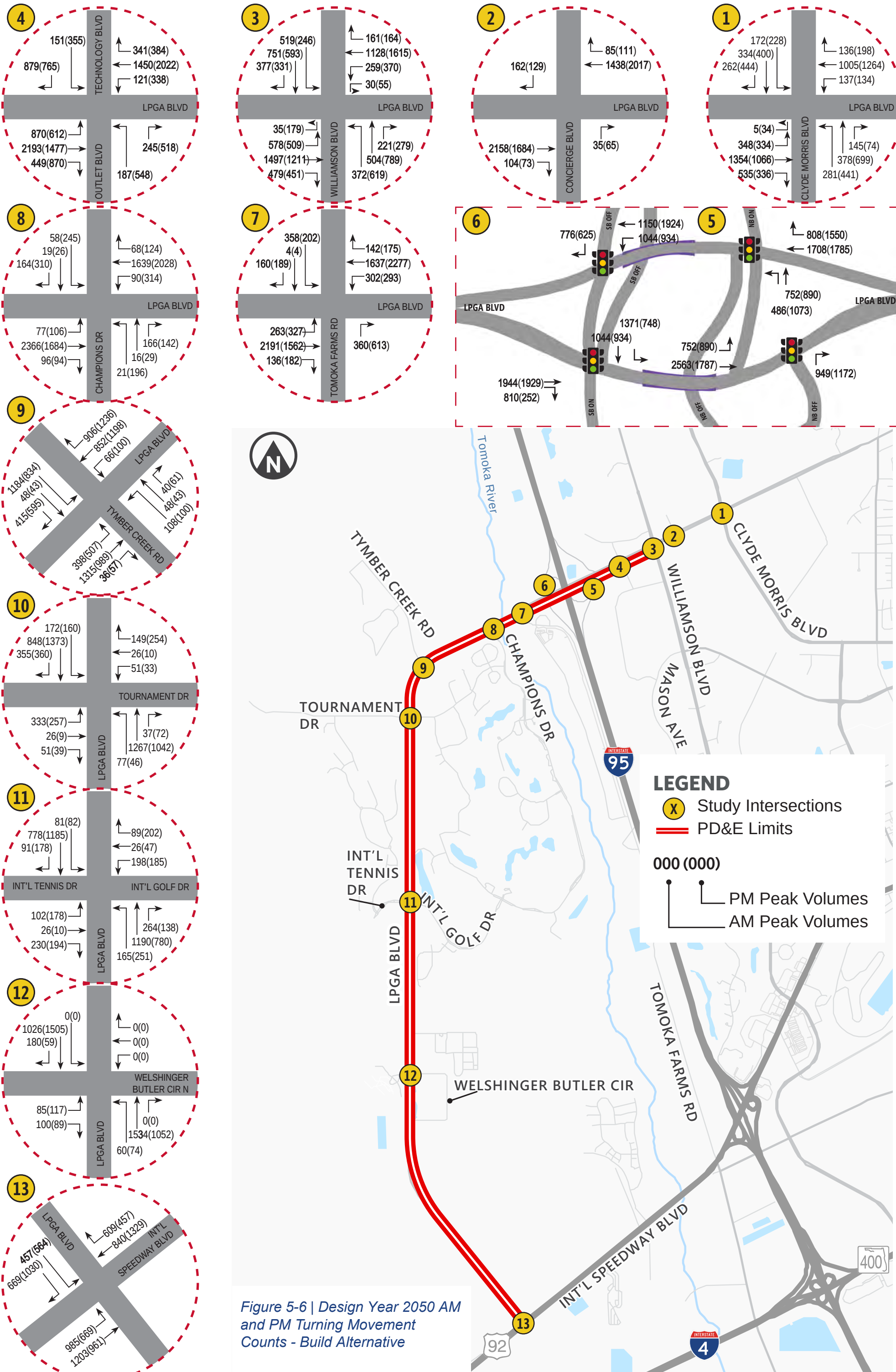


Figure 5-4 | Design Year 2050 AM and PM Turning Movement Counts - No Build Alternative





6 Future Conditions Operational Analysis

Analysis of the future year No Build and Build Alternatives was completed for the Opening Year 2030 and Design Year 2050. The methodologies specified in the HCM 6 and Synchro Version 11 were used to evaluate arterial segments and intersections on the section of LPGA Boulevard between US 92 and west of Tournament Drive intersection. The existing truck factors for each approach and an intersection peak hour factor of 0.95 were used in the future year analysis. The section of LPGA Boulevard between Tournament Drive and Williamson Boulevard was evaluated using Vissim microsimulation. Details of microsimulation analysis are documented in the IMR included in **Appendix B**.

6.1 Future Year No Build Alternative Operational Analysis

The No Build Alternative analysis used future traffic volumes presented in Section 5 of this report. The future No Build geometry and traffic control as well as signal timings are the same as the existing conditions illustrated in **Figure 3-2**.

6.1.1 No Build Alternative Intersection Analysis

Table 6-1 and **Table 6-2** show the delay and LOS results for each study intersection for the Opening Year 2030 and Design Year 2050. The results of the operational analyses show that during Design Year 2050, all study intersections for the No Build Alternative are expected to operate at LOS F. During the Opening Year 2030 the entire network gridlocks under the PM peak period, under the AM peak period the network gridlocks only west of the interchange.

6.1.2 No Build Alternative Arterial Segment Analysis

For the section of LPGA Boulevard between US 92 and Tournament Drive SimTraffic was used to assess arterial operations. **Table 6-3** summarizes the arterial speed and travel time by direction and peak period under the No Build Alternative for the Opening Year 2030 and Design Year 2050. The table also provides the average network denied entry count per peak hour.

It should be noted that the volumes are metered at the Tournament Drive and US 92 intersections due to congestion at these intersections, which is causing high arterial speed and low travel time along LPGA Boulevard. By Design Year 2050, the average network denied entry is anticipated to be 1245 and 1769 vehicles failing to enter the network due to congestion for the AM and PM peak periods, respectively.

For the section of LPGA Boulevard between Tournament Drive and Clyde Morris Boulevard the Vissim travel times and speeds were used to assess the arterial operations. **Table 6-4** shows the average travel times and speeds for the Opening Year 2030 and Design Year 2050. By the Design Year 2050 the No Build Alternative average speeds are anticipated to be very low due to a gridlocked network causing longer travel times during the peak hours.

Table 6-1 | Year 2030 No Build Peak Hour Intersection Level of Service

Intersection	Measurement Location	AM		PM	
		Delay (s/veh)	LOS	Delay (s/veh)	LOS
US 92*	Intersection	23.5	C	68.2	E
Welshinger-Butler Circle (North Intersection)**	Eastbound Left Through	120.2	F	276.8	F
International Tennis Drive / International Golf Drive**	Eastbound Left	365.0	F	576.0	F
	Westbound Left	245.8	F	510.6	F
Tournament Drive***	Intersection	223.9	F	887.5	F
Tymber Creek Road***	Intersection	297.7	F	979.4	F
Champions Drive***	Intersection	247.2	F	1312.6	F
Tomoka Farms Road***	Intersection	166.2	F	1171.3	F
I-95 Southbound Ramps***	Intersection	191.8	F	1317.4	F
I-95 Northbound Ramps***	Intersection	30.3	C	1523.6	F
Technology Boulevard***	Intersection	28.3	C	1405.6	F
Williamson Boulevard***	Intersection	66.3	E	1531.0	F
Concierge Boulevard****	Northbound Left	25.0	C	5426.9	F
	Southbound Right	69.5	F	_*****	_*****
Clyde Morris Boulevard***	Intersection	38.2	D	1271.5	F

*Signalized intersection, HCM 6 Signalized intersections results reported.
**Unsignalized intersection, HCM 6 Two-Way STOP-Controlled intersections (TWSC) results reported for minor roadway critical movements.
***Vissim intersection delay reported, LOS estimated used HCM 6 thresholds.
****Vissim TWSC, critical minor movements delay reported, LOS estimated used HCM 6 thresholds.
*****Minor street vehicles unable to complete movement due to gridlock on LPGA Boulevard, Vissim cannot calculate delay for uncompleted movements

Table 6-2 | Year 2050 No Build Peak Hour Intersection Level of Service

Intersection	Measurement Location	AM		PM	
		Delay (s/veh)	LOS	Delay (s/veh)	LOS
US 92*	Intersection	119.6	F	167.5	F
Welshinger-Butler Circle (North Intersection)**	Eastbound Left Through	3880.2	F	6516.0	F
International Tennis Drive / International Golf Drive**	Eastbound Left	_*****	_*****	_*****	_*****
	Westbound Left	_*****	_*****	_*****	_*****
Tournament Drive***	Intersection	362.5	F	1000.4	F
Tymber Creek Road***	Intersection	238.0	F	1019.2	F
Champions Drive***	Intersection	271.7	F	1559.4	F
Tomoka Farms Road***	Intersection	302.3	F	1593.1	F
I-95 Southbound Ramps***	Intersection	401.8	F	1547.8	F
I-95 Northbound Ramps***	Intersection	184.6	F	2015.3	F
Technology Boulevard***	Intersection	146.8	F	1723.2	F
Williamson Boulevard***	Intersection	166.1	F	1726.5	F
Concierge Boulevard****	Northbound Left	140.9	F	5178.7	F
	Southbound Right	598.5	F	7538.8	F
Clyde Morris Boulevard***	Intersection	131.8	F	1564.9	F

*Signalized intersection, HCM 6 Signalized intersections results reported.
**Unsignalized intersection, HCM 6 Two-Way STOP-Controlled intersections (TWSC) results reported for minor roadway critical movements.
***Vissim intersection delay reported, LOS estimated used HCM 6 thresholds.
****Vissim TWSC, critical minor movements delay reported, LOS estimated used HCM 6 thresholds.
*****Synchro, HCM 6 methodology did not produce results due to excessive delay.

Table 6-3 | No Build Arterial Segment Travel Time and Speed

Segment	Distance (mi)	Opening Year 2030						Design Year 2050					
		AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
		Travel Time (s/veh)	Arterial Speed (mph)	Network Denied Entry (veh)	Travel Time (s/veh)	Arterial Speed (mph)	Network Denied Entry (veh)	Travel Time (s/veh)	Arterial Speed (mph)	Network Denied Entry (veh)	Travel Time (s/veh)	Arterial Speed (mph)	Network Denied Entry (veh)
Northbound													
From US 92 to Welshinger-Butler Circle (North Intersection)	1.9 mi	134.4	50	0	131.9	50	0	137.4	48	1245	134.2	50	1769
From Welshinger-Butler Circle (North Intersection) to International Golf Blvd	1.1 mi	80.6	49		79.4	50		82.7	48		81.1	49	
From International Golf Blvd to Tournament Drive	1.2 mi	102.6	41		90.8	46		196.3	21		104.2	40	
Northbound from US 92 to Tournament Drive	4.1 mi	317.5	47		302.1	49		416.4	36		319.5	46	
Southbound													
From Tournament Drive to International Golf Blvd	1.2 mi	86.0	49	0	86.5	49	0	90.6	46	1245	93.4	45	1769
From International Golf Blvd to Welshinger-Butler Circle (North Intersection)	1.1 mi	79.9	50		80.7	49		81.7	48		82.2	48	
From Welshinger-Butler Circle (North Intersection) to US 92	1.9 mi	192.4	35		296.0	23		277.5	24		374.4	18	
Southbound from Tournament Drive to US 92	4.1 mi	358.3	41		463.3	32		449.9	33		550.0	27	

Table 6-4 | No Build Travel Time and Speed

Direction	LPGA Blvd Segment	Distance	Opening Year 2030				Design Year 2050			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
			Travel Time	Avg Speed	Travel Time	Avg Speed	Travel Time	Avg Speed	Travel Time	Avg Speed
Eastbound	From Tournament Dr to Clyde Morris Blvd	2.5 mi	13.8 min	10.8 mph	49.4 min	3.0 mph	14.4 min	10.4 mph	60.1 min	2.5 mph
Westbound	From Clyde Morris Blvd to Tournament Dr	2.5 mi	16.7 min	9.0 mph	104.4 min	1.4 mph	22.1 min	6.8 mph	107.3 min	1.4 mph

6.2 Future Year Build Alternative Operational Analysis

The Build Alternative used future traffic volumes presented in Section 5 of this report. The Build Alternative consists of the following proposed improvements:

- Widening LPGA Boulevard from two lanes to four lanes between US 92 and Tymber Creek Road.
- Widening LPGA Boulevard from two lanes to six lanes between Tymber Creek Road and Champions Drive.
- Widening LPGA Boulevard from two lanes to six/eight lanes between Champions Drive and Tomoka Farms Road.
- Widening LPGA Boulevard from four lanes to eight lanes between Tomoka Farms Road and I-95 Northbound ramp terminal intersection.
- Widening LPGA Boulevard from four lanes to between six lanes to eight lanes between I-95 Northbound ramp terminal intersection to Williamson Boulevard. The eight lanes transition back to the existing four lanes between Williamson Boulevard and Clyde Morris Boulevard.
- Reconfiguring the existing I-95 at LPGA Boulevard interchange from a parclo interchange to an innovative design concept known as Signalized Turbine Interchange.
- Reconfiguring the existing intersections within the project limits by adding new turn lanes, lengthening storage lanes, and changing traffic controls.

In addition to the interchange and roadway widening, all side streets of the study intersections were modified within the available right-of-way to facilitate traffic flow to and from LPGA Boulevard.

The intersection at Clyde Morris Road was not modified since it is outside of the PD&E Study limits.

6.2.1 Intersection Control Evaluation

The ICE was conducted to analyze the intersections in the project area. The ICE analysis included completing Stage 1 screening using the Capacity Analysis for Planning of Junctions (CAP-X) and the Safety Performance of Intersection Control Evaluations (SPICE). Stage 1 screening was performed utilizing Design Year 2050 intersection TMVs and five-year period (January 1, 2015 through December 31, 2019) crash history.

The CAP-X analysis provided a ranking of the intersection treatments based on overall V/C ratios. To further evaluate treatment options with respect to safety performance, Stage 1 SPICE analysis was completed utilizing the AADT volumes developed for this project. The Stage 1 ICE analysis worksheets for the study intersections are included in **Appendix D**.

The Stage 1 evaluation recommended the following control strategies to be advanced for the PD&E study traffic analysis.

- US 92: Signalized Intersection
- Welshinger-Butler Circle North: Signalized Intersection and Roundabout

- International Tennis/Golf Drive: Roundabout
- Tournament Drive: Signalized Intersection
- Tymber Creek Road: Signalized Intersection
- Champions Drive: Signalized Intersection
- Tomoka Farms Road: Signalized Intersection
- Outlet Boulevard/Technology Boulevard: Signalized intersection
- Williamson Boulevard: Signalized Intersection

Although not evaluated, the intersection of LPGA Boulevard and Welshinger-Butler Circle South is proposed as a roundabout to facilitate speed management along LPGA Boulevard corridor. The intersection was not evaluated as the east approach of the intersection leads to a sports stadium that is utilized during off-peak hours. The west approach of the intersection would need to be realigned with a new Eagle Crest subdivision that was being constructed at the time of analysis. Volusia County Public Works Department indicated that this intersection may connect to a future Dunn Avenue Extension (which is not currently in the R2CTPO 2045 Cost Feasible Plan).

The intersection of LPGA Boulevard and Welshinger-Butler Circle North, LPGA Boulevard and Tomoka Farms Road, and LPGA Boulevard and Technology Boulevard/Outlet Boulevard will be continued to be evaluated under Stage 2 of the ICE process.

Interchange ramp terminal intersections were not included in the ICE evaluation because the proposed interchange was evaluated holistically by considering various traditional and non-traditional concepts as summarized in the following section and discussed in detail in the IMR (**Appendix B**).

6.2.2 Signalized Turbine Interchange

LPGA Boulevard segment from Tymber Creek Road to Williamson Boulevard is influenced by the proximity of the adjacent intersections. In this segment, there are five signalized intersections within one mile of the interchange area which are critical to the performance of the I-95 interchange. Major traffic flows appear to head to and from I-95; most importantly there is significant traffic volume between the I-95 ramp terminals and the Outlet Boulevard/Technology Boulevard intersection. The interchange area experiences unbalanced and heavy traffic movements from/to I-95 and Technology Boulevard, Outlet Boulevard, and Williamson Boulevard. Consequently, several interchange types and configurations (shown in **Table 6-5**) were initially considered at a planning level (sketch level evaluation) and dismissed from further considerations because of their inability to serve projected traffic volumes.

After further evaluation of the future demand volumes and considering potential future growth in the area adjacent to LPGA Boulevard, a Signalized Turbine Interchange concept was proposed. This concept is a modified turbine interchange with two levels and its ramps are curved to connect along LPGA Boulevard with two-phase signals (**Figure 6-1**). It is a variant of a configuration that is common in system interchanges (freeway to freeway interchanges), but this service interchange version is modified with lower speed movements and signalized ramp connections.

The Signalized Turbine Interchange concept spreads the traffic across westbound and eastbound LPGA Boulevard and as a result, it moves high volumes and provides enough queue storage between signalized ramp terminals. This concept would provide better safety and operational benefits than the other concepts evaluated during the design year. Additionally, the Signalized Turbine Interchange can more easily allow for future expansion if needed.

Table 6-5 | Interchange Types and Consideration Considered and Eliminated

Interchange Traffic Volume Consideration	Interchange Type Dismissed
Avoid loop ramps	Parclo
Avoid free flowing movements from ramps	Directional ramps
Excessive left turn volumes	Traditional diamond interchange
Options that are not expandable	Single Point Urban Interchange (SPUI), Inverted Diamond, and Displaced Left Diamond

The PD&E Study team discussed the concepts with FDOT District 5 in a workshop held on January 3, 2022. The consensus and recommendation from the workshop were that the Signalized Turbine Interchange would advance for further detail evaluation in Phase II. The other interchange options were eliminated for the following reasons:

- Diverging Diamond Interchange (DDI) – inability to address future traffic demand and project need
- Grade Separated Modified Diamond – numerous new structures and vertical profiles not conducive to heavy vehicles
- Echelon Corridor – cost prohibitive due to multiple bridge and elevated sections, inconsistent with land uses
- Displaced Left Interchange Concept – inability to address future traffic demand and project need

The Build Alternative geometry and traffic control assumed for 2030 and 2050 analysis years are shown in **Figure 6-2**.

LPGA Boulevard from US 92 to Williamson Boulevard PD&E Study
Interchange Modification Report

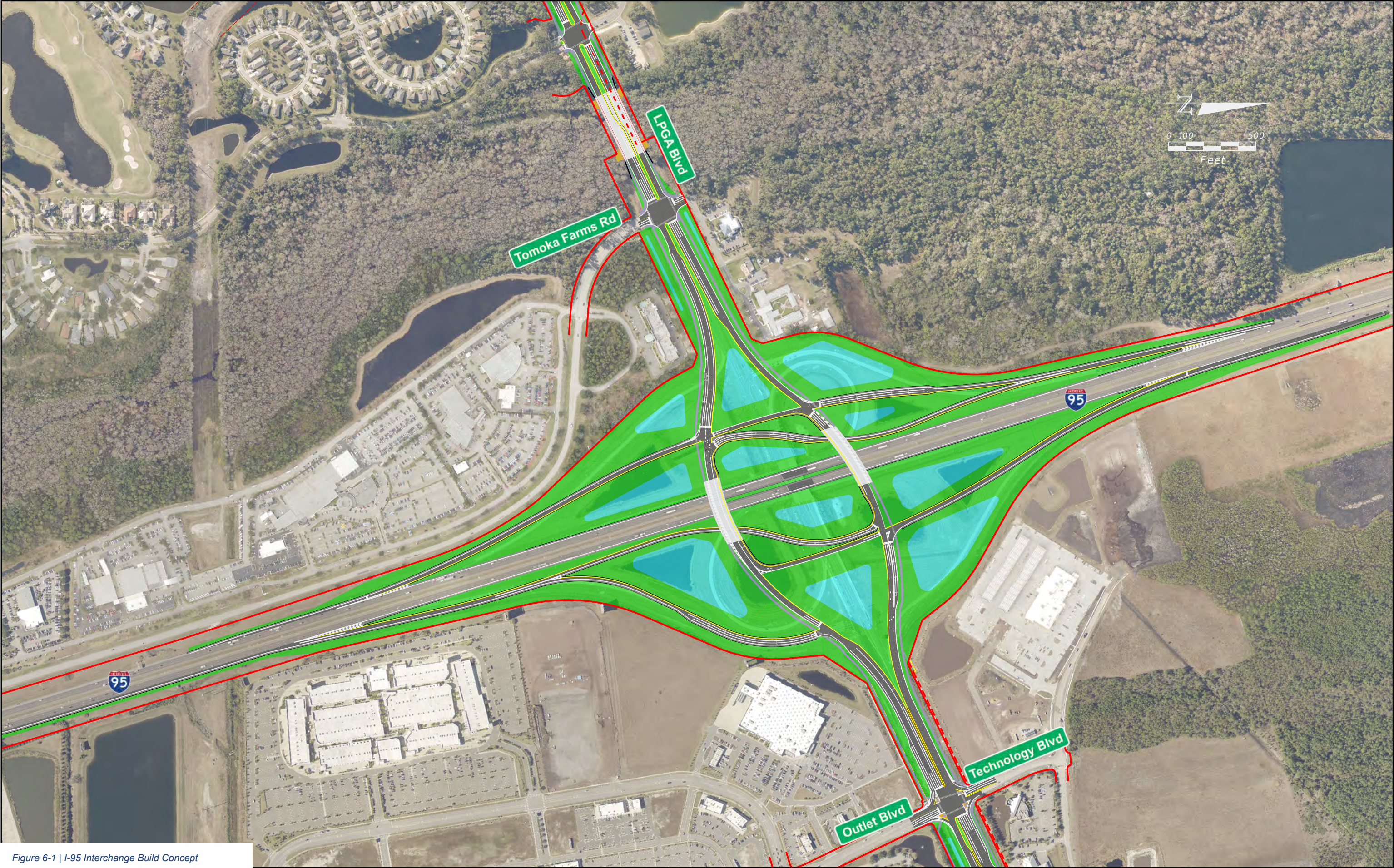
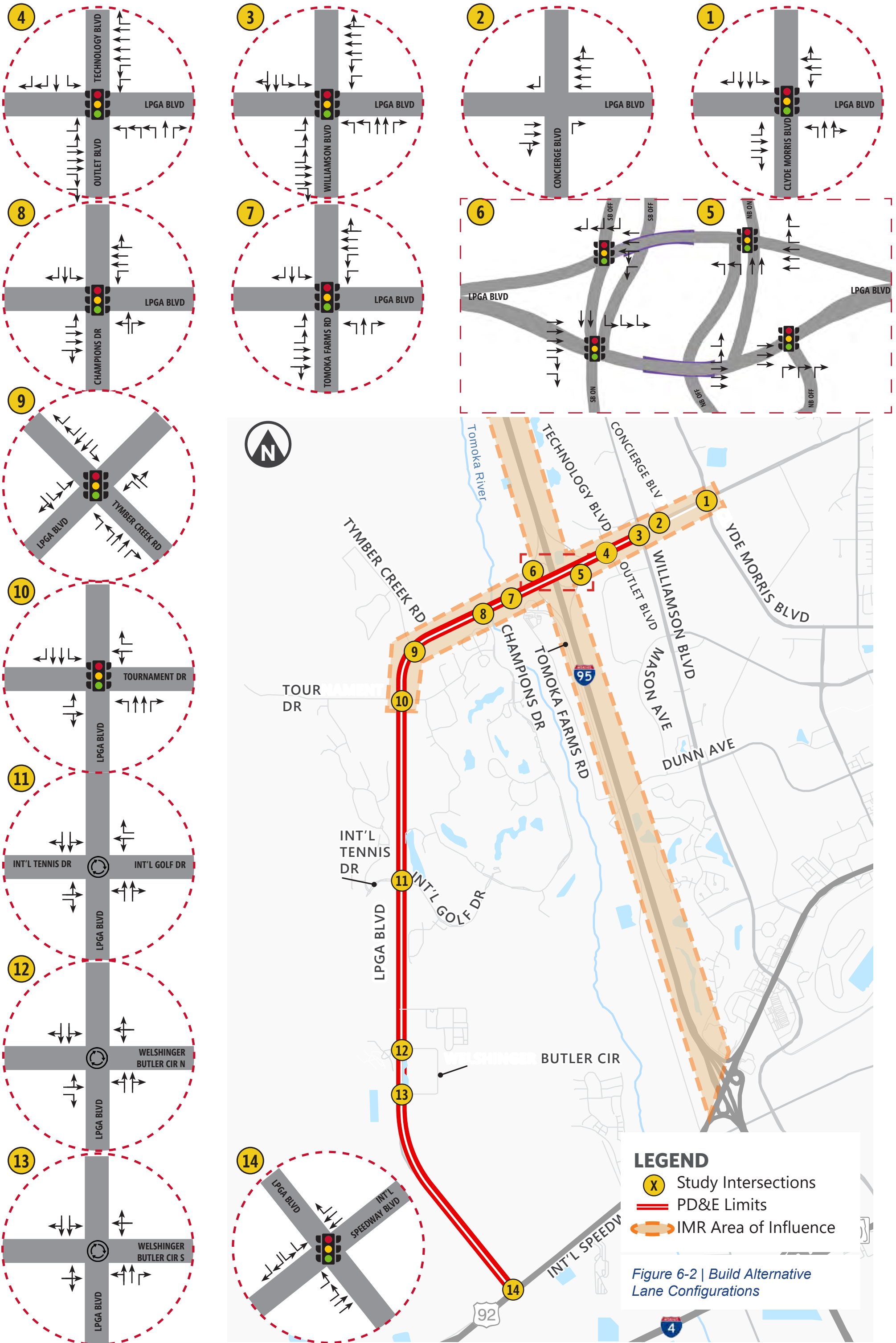


Figure 6-1 | I-95 Interchange Build Concept



6.2.3 I-95 Mainline and Ramp Junction Analysis

Volume and speed results were assessed for the I-95 Mainline and Ramp Junctions under No Build Alternative and Build Alternative. Results are documented in detail in the IMR included in **Appendix B**.

6.2.4 Build Alternative Intersection Analysis

Table 6-6 and **Table 6-7** show the delay and LOS results based on HCM 6 methodology for each study intersection for 2030 and 2050, respectively. While the Vissim results shown in the tables only reflect operational results for the second hour of analysis, the IMR (included in **Appendix B**) shows the results for all three hours of analysis. The IMR detailed analysis showed the following results.

Under the Build Alternative, the ramp terminal intersections operate at LOS C or better in all analysis hours except the third hour of the PM peak period where one terminal operates at LOS D. Several intersections operate at LOS F due to poor minor street operations affecting the overall intersection.

The intersections operating at LOS F in either peak hour are Williamson Boulevard and Clyde Morris Boulevard. The Clyde Morris Boulevard intersection is outside of the PD&E improvement limits and has no other plans for widening. Williamson Boulevard is the end of the PD&E study and proposed improvements are tying to the existing intersection which has been recently upgraded by Volusia County. It should be noted that through the ICE process innovative intersection configuration such as Displaced Left Turn (DLT) and Median U-Turn (MUT) were proposed at Williamson Boulevard intersection. However, upon coordination with the City of Daytona Beach and Volusia County, it was decided that traditional signal traffic control was the best and least impact to adjacent intersection and access driveways.

6.2.5 Build Alternative Arterial Segment Analysis

For the section of LPGA Boulevard between US 92 and Tournament Drive SimTraffic was used to assess arterial operations. **Table 6-8** summarizes the arterial speed and travel time by direction and peak period under the Build Alternative for the Opening Year 2030 and Design Year 2050. The table also provide the average network denied entry count per peak hour.

By Design Year 2050 the Build Alternative is anticipated to experience little to no average network denied entry compared to the No Build Alternative.

For LPGA Boulevard section between Tournament Drive and Clyde Morris Boulevard the Vissim travel times and speeds were used to assess the arterial operations.

Table 6-9 shows the average travel time and speed for the Opening Year 2030 and Design Year 2050. By the Design Year 2050 the Build Alternative travel times are expected to be between 7 and 11 minutes which are substantially lower than the No Build conditions. However, it is noted that the Build Alternatives travel times are impacted by poor operations at Clyde Morris Boulevard – this intersection is outside the limits of the PD&E Study and does not have planned or programmed improvements and LPGA Boulevard remains as a four-lane facility at the intersection, with single left-turn lanes. on all approaches. This configuration results in queuing on all approaches and degrades the overall operations of the study area.

Table 6-6 | Year 2030 Build Peak Hour Intersection Level of Service

Intersection	Measurement Location	AM		PM	
		Delay (s/veh)	LOS	Delay (s/veh)	LOS
US 92*	Intersection	16.3	B	27.4	C
Welshinger-Butler Circle (North Intersection)**	Intersection	5.9	A	6.3	A
International Tennis Drive / International Golf Drive**	Intersection	6.4	A	6.8	A
Tournament Drive***	Intersection	29.9	C	14.0	B
Tymber Creek Road***	Intersection	57.1	E	49.7	D
Champions Drive***	Intersection	11.6	B	23.3	C
Tomoka Farms Road***	Intersection	26.8	C	25.6	C
I-95 Southbound Ramps (NW)***	Intersection	14.2	B	10.3	B
I-95 Southbound Ramps (SW)***	Intersection	17.8	B	24.0	C
I-95 Northbound Ramps (SE)***	Intersection	21.5	C	21.0	C
I-95 Northbound Ramps (NE)***	Intersection	13.2	B	23.7	C
Technology Boulevard***	Intersection	26.2	C	48.3	D
Williamson Boulevard***	Intersection	55.0	D	61.9	E
Concierge Boulevard****	Northbound Right	5.9	A	6.3	A
	Southbound Right	9.9	A	9.6	A
Clyde Morris Boulevard***	Intersection	46.5	D	57.6	E

*Signalized intersection, HCM 6 Signalized intersections results reported.
**Roundabout, HCM 6 Roundabout results reported.
***Vissim intersection delay reported, LOS estimated used HCM 6 thresholds.
****Vissim TWSC, critical minor movements delay reported, LOS estimated used HCM 6 thresholds.

Table 6-7 | Year 2050 Build Peak Hour Intersection Level of Service

Intersection	Measurement Location	AM		PM	
		Delay (s/veh)	LOS	Delay (s/veh)	LOS
US 92*	Intersection	36.9	D	46.3	D
Welshinger-Butler Circle (North Intersection) **	Intersection	11.0	B	11.5	B
International Tennis Drive / International Golf Drive**	Intersection	17.8	C	23.7	C
Tournament Drive***	Intersection	43.4	D	33.2	C
Tymber Creek Road***	Intersection	78.3	E	78.2	E
Champions Drive***	Intersection	13.8	B	43.4	D
Tomoka Farms Road***	Intersection	64.5	E	56.3	E
I-95 Southbound Ramps (NW)***	Intersection	19.4	B	14.1	C
I-95 Southbound Ramps (SW)***	Intersection	18.5	B	29.7	C
I-95 Northbound Ramps (SE)***	Intersection	26.6	C	28.0	C
I-95 Northbound Ramps (NE)***	Intersection	16.9	B	29.3	C
Technology Boulevard***	Intersection	31.1	C	83.6	F
Williamson Boulevard***	Intersection	97.4	F	134.1	F
Concierge Boulevard****	Northbound Right	8.2	A	253.4	F
	Southbound Right	35.7	C	11.1	B
Clyde Morris Boulevard***	Intersection	63.7	E	264.0	F

*Signalized intersection, HCM 6 Signalized intersections results reported.
**Roundabout, HCM 6 Roundabout results reported.
***Vissim intersection delay reported, LOS estimated used HCM 6 thresholds.
****Vissim TWSC, critical minor movements delay reported, LOS estimated used HCM 6 thresholds.

Table 6-8 | Build Arterial Segment Travel Time and Speed

Segment	Distance (mi)	Opening Year 2030						Design Year 2050					
		AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
		Travel Time (s/veh)	Arterial Speed (mph)	Network Denied Entry (veh)	Travel Time (s/veh)	Arterial Speed (mph)	Network Denied Entry (veh)	Travel Time (s/veh)	Arterial Speed (mph)	Network Denied Entry (veh)	Travel Time (s/veh)	Arterial Speed (mph)	Network Denied Entry (veh)
Northbound													
From US 92 to Welshinger-Butler Circle (North Intersection)	1.9 mi	157.3	43	0	156.2	44	0	164.8	42	3	161.1	42	1
From Welshinger-Butler Circle (North Intersection) to International Golf Blvd	1.1 mi	103.9	38		102.8	39		112.5	35		107	37	
From International Golf Blvd to Tournament Drive	1.2 mi	118.2	37		109.2	40		137.6	31		123.4	35	
Northbound from US 92 to Tournament Drive	4.1 mi	379.3	39		368.2	40		415	36		391.5	38	
Southbound													
From Tournament Drive to International Golf Blvd	1.2 mi	102.7	42	0	105.1	41	0	108.9	40	3	128.3	34	1
From International Golf Blvd to Welshinger-Butler Circle (North Intersection)	1.1 mi	102.9	38		104.8	38		107.9	37		108.6	36	
From Welshinger-Butler Circle (North Intersection) to US 92	1.9 mi	208.1	33		218.6	31		233.5	29		251.6	27	
Southbound from Tournament Drive to US 92	4.1 mi	413.7	36		428.5	35		450.2	33		488.6	30	

Note: Design speed is 45 mph from US 92 to Tournament Dr

Table 6-9 | Build Travel Time and Speed

Direction	LPGA Blvd Segment	Distance	Opening Year 2030				Design Year 2050			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
			Travel Time	Avg Speed	Travel Time	Avg Speed	Travel Time	Avg Speed	Travel Time	Avg Speed
Eastbound	From Tournament Dr to Clyde Morris Blvd	2.5 mi	6.5 min	22.9 mph	7.5 min	20.1 mph	7.3 min	20.6 mph	11.6 min	13.0 mph
Westbound	From Clyde Morris Blvd to Tournament Dr	2.5 mi	6.1 min	24.7 mph	8.1 min	18.5 mph	7.1 min	21.2 mph	10.2 min	14.8 mph

Note: Design speed is 35 mph from Tymber Creek Rd to Williamson Blvd, and 45 mph from Tournament Dr to Tymber Creek Rd.

6.3 Future Year Queuing Analysis

Analysis of traffic operations for the Design Year 2050 future conditions included estimating the queue lengths for critical movements at the intersections in the study area. **Table 6-10** shows the queue lengths results rounded up to the nearest 25 feet for each movement at each study intersection during Design Year 2050 under the No Build and Build Alternatives.

Design Year 2050 queue lengths analysis results were used to inform the design of the turn bay queue storage lengths in order to decrease the likelihood of spillback of traffic upstream from the study intersections. Opening Year 2030 queue length results are provided in **Appendix B** and **Appendix C**.

As seen in **Table 6-10**, the Build Alternative is anticipated to provide significant overall improvements to queue lengths at the intersections within the project limits, despite a few movements that are anticipated to operate at longer queue lengths compared to the No Build Alternative. These movements are anticipated to operate at longer queue lengths due to the higher throughput processed through the Build Alternative network, and the signal timing optimization associated with the geometry proposed under the Build Alternative. Overall, all study intersections are anticipated to benefit from the proposed improvements included in the Build Alternative.

Substantial improvements are expected at the I-95 interchange where under the Build Alternative ramps are expected to experience queue lengths under 1000 feet (less than the ramp storage) and no vehicle queue back up to the I-95 mainline is anticipated.

The Clyde Morris Boulevard intersection, which is outside of the PD&E improvement limits is expected to experience longer queue lengths under the Build Alternative. This intersection does not have planned or programmed improvements and LPGA Boulevard remains as a four-lane facility at the intersection, with single left-turn lanes on all approaches.

6.4 Multimodal Accommodation

The proposed improvements will add shared use paths on both sides of the road to serve people who are walking and biking. Since the shared use paths will be separated by grass strip and curb and gutter, and at some location trees, PLTS and BLTS which measures the perceived safety issues of being in close proximity to vehicles will be at least PLTS 2 and BLTS 2, respectively.

At the intersections, crosswalks will be provided and signalization accounts for proper pedestrian crossing times. During design phase of this project, accessible pedestrian signals that communicate information about the WALK and DON'T WALK intervals at signalized intersections in non-visual to pedestrians who are blind or who have low vision will be evaluated.

VOTRAN does not currently have service within the project limits nor does not plan to extend services along LPGA Boulevard.

Table 6-10 | Design Year 2050 Queue Length Analysis

Intersection	Movement	AM Peak		PM Peak	
		No Build	Build	No Build	Build
US 92*	EBL	2350	725	1800	575
	EBT	375	425	425	325
	WBT	850	600	1600	900
	WBR	475	925	400	550
	SBL	1000	375	1225	500
	SBR	475	800	2050	1350
Welshinger-Butler Circle (North Intersection)*	EBL	-	-	-	-
	EBT	325	25	425	50
	EBR	50	25	100	25
	WBL	-	0	-	0
	WBT	-	0	-	0
	WBR	-	0	-	0
	NBL	25	-	25	-
	NBT	-	150	-	75
	NBR	-	175	-	75
	SBL	0	-	0	-
	SBT	-	75	-	125
International Tennis Drive / International Golf Drive*	SBR	-	75	-	150
	EBL	_***	-	_***	-
	EBT	700	25	525	100
	EBR	-	75	-	75
	WBL	_***	-	_***	-
	WBT	325	150	825	100
	WBR	-	25	-	50
	NBL	25	-	100	-
	NBT	-	175	-	75
	NBR	-	250	-	125
	SBL	25	-	25	-
Tournament Dr**	SBT	-	75	-	250
	SBR	-	100	-	375
	EBL	1499	1471	1494	535
	EBT	54	173	104	125
	EBR	54	173	104	125
	WBL	3928	385	404	267
	WBT	3928	385	404	267
	WBR	3935	286	3939	340
	NBL	92	127	34	63
	NBT	1668	1001	1650	613
	NBR	45	69	29	92
Tymber Creek Rd**	SBL	126	265	59	200
	SBT	344	645	424	1059
	SBR	127	465	41	453
	EBL	311	396	718	479
	EBT	1906	1385	1910	679
	EBR	1947	32	1951	40
	WBL	71	206	54	274
	WBT	1568	718	2632	1036
	WBR	360	437	302	1070
	NBL	234	357	746	336
	NBT	139	375	229	326
Champions Dr**	NBR	108	364	696	315
	SBL	_***	_***	_***	_***
	SBT	_***	_***	_***	_***
	SBR	_***	_***	_***	_***
	EBL	306	175	301	223
	EBT	2668	486	2685	534
	EBR	46	548	13	596
	WBL	546	340	633	660
	WBT	1119	524	1104	1095
	WBR	61	575	29	1146
	NBL	100	147	1444	1333
Tomoka Farms Rd**	NBT	100	147	1444	1333
	NBR	1464	182	106	260
	SBL	2096	136	2096	1670
	SBT	15	61	42	72
	SBR	981	154	2118	1446
	EBL	1123	220	1120	305
	EBT	1121	910	1107	753
	EBR	20	968	1800	575
	WBL	311	433	425	325
	WBT	1106	602	1600	900
	WBR	1106	649	400	550
I-95 SB Ramps - No-Build**	NBL	2391	371	1225	500
	NBT	48	77	2050	1350
	NBR	2169	229	-	-
	SBL	2036	2024	425	50
	SBT	2036	19	100	25
	SBR	2038	1145	-	0
	EBT	308	-	-	0
	EBR	0	-	-	0
	WBT	1487	-	25	-

Intersection	Movement	AM Peak		PM Peak	
		No Build	Build	No Build	Build
	WBR	0	-	-	75
	SBL	4168	-	-	75
	SBR	4222	-	0	-
I-95 SB Ramp – Build (NW Quadrant)**	WBL	0	424	-	125
	WBT	0	424	-	150
	SBR	0	323	***	-
I-95 SB Ramp – Build (SW Quadrant)**	EBT	0	444	525	100
	EBR	0	295	-	75
	SBL	0	434	***	-
	SBT	0	513	825	100
I-95 NB Ramps - No-Build**	EBT	362	-	-	50
	EBR	0	-	100	-
	WBT	1290	-	-	75
	WBR	0	-	-	125
	NBL	4661	-	25	-
	NBR	4665	-	-	250
I-95 NB Ramp – Build (SE Quadrant)**	EBT	0	1086	-	375
	NBR	0	477	1494	535
I-95 NB Ramp – Build (NE Quadrant)**	WBT	0	797	104	125
	WBR	0	346	104	125
	NBL	-	-	404	267
	NBT	0	278	404	267
Technology Blvd**	EBL	0	279	3939	340
	EBT	778	618	34	63
	EBR	357	671	1650	613
	WBL	0	194	29	92
	WBT	2442	149	59	200
	WBR	1273	383	424	1059
	NBL	1131	241	41	453
	NBT	532	189	718	479
	NBR	98	119	1910	679
	SBL	93	591	1951	40
	SBT	591	356	54	274
	SBR	105	137	2632	1036
Williamson Blvd**	EBL	1976	1371	302	1070
	EBT	276	365	746	336
	EBR	345	886	229	326
	WBL	291	411	696	315
	WBT	823	719	2856	3593
	WBR	837	468	1434	3604
	NBL	875	450	1434	3657
	NBT	2173	376	301	223
	NBR	1100	517	2685	534
	SBL	1100	209	13	596
	SBT	3037	3036	633	660
	SBR	3033	3034	1104	1095
Concierge Blvd**	EBL	3033	3092	29	1146
	EBT	29	0	1444	1333
	EBR	39	321	1444	1333
	WBL	39	321	106	260
	WBT	56	0	2096	1670
	WBR	1747	75	42	72
	NBL	2	75	2118	1446
	NBT	49	0	1120	305
	NBR	44	0	1107	753
	SBL	66	69	1800	575
	SBT	0	0	425	325
	SBR	0	0	1600	900
Clyde Morris Blvd**	EBL	855	267	400	550
	EBT	323	1522	1225	500
	EBR	556	1444	2050	1350
	WBL	296	1164	-	-
	WBT	177	516	425	50
	WBR	3747	1291	100	25
	NBL	3784	1317	-	0
	NBT	2208	720	-	0
	NBR	620	618	-	0
	SBL	658	657	25	-
	SBT	445	438	-	75
	SBR	334	363	-	75

* 95th percentile queue results reported from Synchro analysis, HCM 6 Signalized Intersection, HCM 6 TWSC or HCM 6 Roundabout results utilized.
** Maximum queue length results reported from Vissim analysis.
*** HCM 6 methodology did not produce results due to excessive delay.
**** Queue could not be accurately estimated because it is longer than (more than 2600 ft) the segment modeled

7 Future Conditions Safety Analysis

Future conditions safety analysis for the Opening Year 2030 and Design Year 2050 is discussed and summarized by the arterial section and the I-95 interchange area. The safety technical memorandums supporting this analysis are included in **Appendix F**.

7.1 LPGA Boulevard from US 92 to South of Tournament Drive

A safety analysis was conducted for the future conditions of LPGA Boulevard from US 92 to south of Tournament Drive utilizing the HSM Part C: Predictive Method. HSM Part C Predictive Method provides the procedure for applying Safety Performance Functions (SPFs) to predict crash frequency and severity based on roadway characteristics (geometry and intersection control) and traffic volumes.

The safety analysis for the No-Build Alternative used the HSM Part C – Predictive Method, Chapter 10 – Rural Two-Lane, Two-Way Roads spreadsheets to estimate future crash frequency. However, the Chapter 10 spreadsheet has a limitation of analyzing segments with more than 17,800 vehicles per day and major approaches for four-way unsignalized intersections with more than 14,700 vehicles per day. To overcome this limitation the HSM Chapter 10 model equations were utilized to predict future crashes anticipated on No Build Alternative.

The overall predicted crashes for LPGA Boulevard section from US 92 to Tournament Drive are summarized in **Table 7-1**. Summary tables of the No-Build predictive method crashes calculations are provided in **Appendix F**.

The safety analysis for the Build Alternative used the HSM Part C – Predictive Method, Chapter 12: Predictive Method for Urban and Suburban Arterials spreadsheets to estimate future crash frequency. The HSM Chapter 12 spreadsheets do not include an intersection type for roundabout configurations. Accordingly, the Crash Modification Factor (CMF) of 0.56 was used to convert a two-way stop-controlled intersection to a modern roundabout. Due to LPGA Boulevard being widened to a four-lane roadway in the Build alternative, calculating the expected crash frequency by the Empirical Bayes Method is not applicable.

Table 7-1 summarizes the predicted average crashes per year for the Build Alternative in the Opening Year 2030 and Design Year 2050. When compared to the No Build Alternative, crashes predicted in Build Alternative are more than No Build Alternative because of the calibration factors which tend to increase crashes of four lane divided facilities and decrease crashes on rural two-lane facilities. The calibration factors for 55 mph (two-lane facility) and 45 mph (four-lane divided urban) segments are -32% and 63%, respectively. The calibration factor for the 45 mph does not account for the fact that bicyclists are separated from the traffic lanes by using shared used paths. Additionally, horizontal deflections and terminated vistas have been applied in the proposed improvements between US 92 and Tymber Creek Road as traffic calming measures to enhance safety. It is anticipated the actual crash frequencies will be lower than what has been predicted by HSM methodologies because the proposed improvements along LPGA Boulevard would lower the posted speed and incorporate speed management measures such as horizontal deflections.

Table 7-1 | LPGA Boulevard from US 92 to Tournament Drive Predicted Crashes for Build Alternative

Crash Severity	LPGA Blvd Predicted Crashes (crashes/year)			
	Opening Year 2030		Design Year 2050	
	No-Build	Build	No-Build	Build
Total Crashes	40.9	41	69.6	80.7
Fatal and injury (FI)	13.1	17.6	22.3	34.6
Property damage only (PDO)	27.8	23.4	47.3	46.1

Note: FI includes fatality (K), incapacitating injury (A), non-incapacitating injury (B), possible injury (C). Crash severity (KABCO) is based on the FDM Chapter 122 HSM crash distribution for facility type Urban 4-lane Divided.

The No-Build scenario could be showing a lower frequency of predicted crashes due to the limitations of the SPF spreadsheet tool. Since calculations outside the HSM spreadsheet were performed for the No-Build condition due to design year segment AADT volumes being larger than the HSM Chapter 10 Rural Two-Lane spreadsheet volume maximum, results from the SPF could be less precise than what would occur in real world conditions. The Build alternative would provide additional capacity, and speed management strategies such as roundabout and horizontal deflections (chicanes) which enhance safety of LPGA Boulevard.

Future predicted crash costs were calculated for the No Build and Build predicted crash frequencies for the Design Year 2050. The average cost per crash and the crash severity distribution factors were obtained from the 2022 FDOT Design Manual (FDM) Section 122.6. A cumulative predicted crash cost comparison was completed for the 21-year analysis period from Opening Year 2030 to Design Year 2050 using present day costs provided in the FDM. **Table 7-2** shows the Build Alternative is anticipated to result in approximately \$107 million less total crash costs than the No Build Alternative.

Table 7-2 | LPGA Boulevard from US 92 to Tournament Drive Cumulative Predicted Present-Day Cost of Crashes (2030 – 2050)

Crash Severity	Cumulative Predicted Cost of Crashes (2030 - 2050)	
	No-Build	Build
Total Crashes	\$337,200,353.37	\$ 229,942,471.93
Fatal and injury (FI)	\$337,109,789.36	\$ 226,733,980.10
Property damage only (PDO)	\$3,090,564.02	\$ 3,208,491.83

7.2 LPGA Boulevard from Tournament Drive to Clyde Morris Boulevard

A safety analysis was conducted for the future conditions of LPGA Boulevard from Tournament Drive to Clyde Morris Boulevard, including the I-95 interchange and I-95 mainlines within the study area. This section summarizes the safety analysis results. The safety predictive methods utilized in this evaluation were based on the SPFs provided in the HSM Part C predictive methods for arterial section. The HSM Enhanced Interchange Safety Analysis Tool (ISATe) was used to

predict the I-95 interchange area crash frequency based on roadway characteristics (geometry and intersection control) and traffic volumes.

7.2.1 Interchange Predicted Crashes

The interchange facility segmentation (freeway and ramps) is documented in the safety technical memorandum is included in **Appendix F**. The Build Alternative Signalized Turbine Interchange ramp terminal configurations was a limitation of the ISATe tool and therefore was omitted from the analysis. Additionally, there is no CMF for a Signalized Turbine Interchange.

The overall cumulative predicted crashes for the analysis period (2030 to 2050) are summarized in **Table 7-3** by facility component and crash severity and in **Table 7-4** by overall interchange area.

Table 7-3 | I-95 Interchange Predicted Crashes by Facility (2030 – 2050)

Alternative	Facility Component	Total	Fatal and injury (FI)	PDO
No-Build	Freeway Segments	41,004.5	9950.6	31,053.9
	Ramp Segments	195.6	87.5	108.0
Build	Freeway Segments	28,918.6	7020.8	21,897.8
	Ramp Segments	195.3	80.6	114.7

Note: FI includes fatality (K), incapacitating injury (A), non-incapacitating injury (B), possible injury (C).

Table 7-4 | I-95 Interchange Overall Predicted Crashes (2030 – 2050)

Alternative	Measure	Total	Fatal and injury (FI)	PDO
No-Build	Overall	41,200.1	10,038.1	31,161.9
	Average/Year	1,961.9	478	1,483.9
Build	Overall	29,113.9	7,101.5	22,012.5
	Average/Year	1,386.4	338.1	1,048.2

Note: FI includes fatality (K), incapacitating injury (A), non-incapacitating injury (B), possible injury (C).

Safety analysis of the Build Alternative showed a decrease in the predicted crashes on freeway segments which could be attributed to the reduction of the number of conflict points as the results of elimination of two on-ramps by the Signalized Turbine Interchange concept. The interchange ramp segments are longer in the Build Alternative and the additional ramp lengths could be contributing to the additional predicted crashes in the Build Alternative due to traffic exposure. However, a slight increase is only anticipated in PDO crashes whereas fatal and injury crashes are anticipated to decrease.

7.2.2 Arterial Predicted Crashes

Table 7-5 summarizes the predicted average crashes per year for the No Build and Build Alternatives. In the Opening Year 2030, the No Build Alternative would result in 111.6 total crashes per year and the Build Alternative would result in 71.5 crashes per year, which is a 35.9% decrease in future total crashes. In the Design Year 2050, the No-Build Alternative would result in 182.7 total crashes per year and the Build Alternative would result in 113.5 crashes per year, which is a 37.8% decrease in future crashes.

Table 7-5 | Predicted Crash Comparison Along LPGA Boulevard from Tournament Drive to Clyde Morris Boulevard

Crash Severity	LPGA Blvd Predicted Crashes (crashes/year)			
	Opening Year 2030		Design Year 2050	
	No-Build	Build	No-Build	Build
Total Crashes	111.6	71.5	182.7	113.5
Fatal and injury (FI)	41.5	30.7	67.7	48.7
Property damage only (PDO)	70.1	40.8	115.0	64.8

Note: FI includes fatality (K), incapacitating injury (A), non-incapacitating injury (B), possible injury (C).

7.2.3 Crash Cost Comparison

The average cost per crash and the crash distribution factors for roadway facility types were obtained from the 2022 FDM Section 122.6. The predictive crash cost comparison completed for the No-Build and Build Alternatives is divided into two categories— the arterial LPGA Boulevard segments and intersections east and west of the I-95 interchange, and the I-95 interchange area (including mainline freeway segments). A cumulative predicted crash cost comparison is shown in **Table 7-6**. The Build Alternative is anticipated to incur a lesser predicted crash cost by approximately \$1.6 billion than the No Build Alternative over the analysis period.

Table 7-6 | Predicted Total Crash Cost Overall Comparison (2030 – 2050) Along LPGA Boulevard from Tournament Drive to Clyde Morris Boulevard

Crash Severity	Cumulative Predicted Costs (crashes/year) (2030 – 2050)	
	No-Build	Build
Interchange Area	\$4,742,276,389.22	\$3,174,391,745.33
Arterial (east and west of interchange)	\$1,473,230,541.31	\$684,495,027.18
Total	\$4,750,283,732.80	\$3,179,511,296.69

Note: Crash cost taken from the 2022 FDOT Design Manual Table 122.6.2 FDOT KABCO Crash Cost

8 Summary of Recommendations

This PTAR documents traffic and safety analyses for the LPGA Boulevard PD&E Study which proposes widening of LPGA Boulevard and modification to the I-95 interchange in Volusia County. The analysis involved evaluating safety and operations of existing conditions, travel demand forecasting to project future year traffic volumes, potential safety and operational impacts and benefits of the proposed improvements.

Existing and future planned developments within and in the vicinity of LPGA Boulevard are expected to result in substantial increases in density of both population and employment in the study area. This will result in an increase of traffic to levels that would exceed the capacities of the existing segments. Travel demand forecast in the project limits has shown that the daily traffic demand on LPGA Boulevard west of Tymber Creek Road is expected to grow from 12,000 vehicles in 2021 to 36,000 vehicles in 2050, and east of I-95 interchange from 44,000 vehicles in 2021 to 78,000 vehicles in 2050.

Under the No Build Alternative, all study intersections would operate at LOS F with prolonged congestion and queuing during the AM and PM peak hours during the Design Year 2050. Additionally, the Design Year 2050 AADTs far exceed the capacities of the existing segments. The congestion results in high vehicles denied entry to the network. It should be noted that existing field data show excessive queuing and congestion along LPGA Boulevard between Tymber Creek Road and Williamson Boulevard. Congestion on LPGA Boulevard affects throughput on I-95 by metering the demand to use the interstate facility.

Additionally, congestion related crashes like rear-end collisions are prevalent in the study area. The highest numbers of crashes correspond to the locations with deficient LOS. These include the I-95 northbound off-ramp to LPGA Boulevard with crashes during the intersection's right turn yield condition; the I-95 southbound loop on-ramp from LPGA Boulevard westbound with crash types associated with the signalized intersection, and the eastbound approach of LPGA Boulevard to Williamson Boulevard.

As the analyses indicated, the proposed improvements will address the effect of increased traffic volumes within the project area by enhancing mobility and safety needs. Vehicle delays at the study area intersections and the I-95 interchange are expected to decrease with widening of LPGA Boulevard. The modification to the I-95 interchange and improvements to study area intersections will enhance traffic progression along LPGA Boulevard and relieve the current and future congestion in the study area.

Under the Build Alternative in the Design Year 2050, all freeway segments and all the entrance and exit ramps are anticipated to operate at LOS C or better during both AM and PM peak hours in the Design Year 2050 except the I-95 southbound lanes between LPGA Boulevard and US 92 and I-4 off ramp as discussed in the IMR (**Appendix B**). Additionally, all the study intersections are projected to operate at LOS D or better except Tymber Creek Road, Tomoka Farms Road, Technology Boulevard, Williamson Boulevard, Concierge Boulevard, and Clyde Morris Boulevard intersections which are expected to operate at LOS F. The intersections with

LOS F in the Build Alternative showed substantial reductions to delays as compared to No Build conditions. Based on the findings in this report, implementation of the improvements proposed in the Build Alternative is expected to significantly improve traffic operations along LPGA Boulevard and the I-95 interchange as compared to No Build Alternative. The Signalized Turbine Interchange is projected to improve operations at the interchange area while providing additional benefits of reduced delays, emergency vehicle access, additional evacuation routes and improved connectivity for the region. Other factors such as environmental impacts, right of way and constructions costs will be evaluated in determining the preferred alternative.

Appendix A

Project Traffic Forecasting Memorandum

A separate report which consists of:

- Traffic Counts
- Travel Demand Forecasts Assumptions
- Traffic Volume Development
- TMVs Development
- U.S. 1 and LPGA Boulevard Traffic Demand Forecasting Documentation (Subarea Validation)

Appendix B

Interchange Modification Report (IMR)

A separate Report that documents safety and operational analyses to support modification of the LPGA Boulevard/I-95 interchange from Tournament Drive to Clyde Morris Boulevard. Consists of Vissim microsimulation data and analysis results and Enhanced Interchange Safety Analysis Tool (ISATe) worksheets.

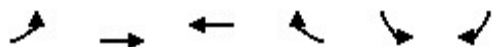
Appendix C

Synchro Analysis for Existing Conditions

Consists of Synchro HCM 6 Report

HCM 6th Signalized Intersection Summary

101: US 92 & LPGA Boulevard



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	343	1161	825	165	117	279
Future Volume (veh/h)	343	1161	825	165	117	279
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1781	1781	1826	1826	1796	1796
Adj Flow Rate, veh/h	394	1334	948	45	134	60
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	8	8	5	5	7	7
Cap, veh/h	479	2361	1553	693	207	184
Arrive On Green	0.15	0.70	0.45	0.45	0.12	0.12
Sat Flow, veh/h	1697	3474	3561	1547	1711	1522
Grp Volume(v), veh/h	394	1334	948	45	134	60
Grp Sat Flow(s),veh/h/ln	1697	1692	1735	1547	1711	1522
Q Serve(g_s), s	8.5	14.6	15.4	1.2	5.6	2.7
Cycle Q Clear(g_c), s	8.5	14.6	15.4	1.2	5.6	2.7
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	479	2361	1553	693	207	184
V/C Ratio(X)	0.82	0.57	0.61	0.06	0.65	0.33
Avail Cap(c_a), veh/h	512	3298	2471	1102	667	593
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	12.3	5.6	15.6	11.7	31.2	29.9
Incr Delay (d2), s/veh	12.3	0.6	1.1	0.1	11.7	3.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	6.4	4.8	8.7	0.7	4.9	1.9
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	24.6	6.2	16.7	11.8	42.8	33.6
LnGrp LOS	C	A	B	B	D	C
Approach Vol, veh/h		1728	993		194	
Approach Delay, s/veh		10.4	16.5		40.0	
Approach LOS		B	B		D	
Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	18.6	40.8		15.0		59.4
Change Period (Y+Rc), s	7.5	* 7.5		6.0		7.5
Max Green Setting (Gmax), s	12.5	* 53		29.0		72.5
Max Q Clear Time (g_c+l1), s	10.5	17.4		7.6		16.6
Green Ext Time (p_c), s	0.6	15.9		1.6		30.0

Intersection Summary

HCM 6th Ctrl Delay	14.4
HCM 6th LOS	B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th TWSC

103: LPGA Boulevard & Father Loper Catholic High School Driveway/Welshinger-Butler Circle N

Intersection

Int Delay, s/veh 8.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔		↔		↔	↔	↔	↔	↔	↔
Traffic Vol, veh/h	80	0	44	0	0	0	140	367	0	1	352	170
Future Vol, veh/h	80	0	44	0	0	0	140	367	0	1	352	170
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	-	350	-	195	150	-	360
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	79	79	79	79	79	79	79	79	79	79	79	79
Heavy Vehicles, %	0	0	0	0	0	0	6	6	6	6	6	6
Mvmt Flow	101	0	56	0	0	0	177	465	0	1	446	215

Major/Minor	Minor2		Minor1		Major1		Major2		Major2		Major2	
Conflicting Flow All	1267	1267	446	1403	1482	465	661	0	0	465	0	0
Stage 1	448	448	-	819	819	-	-	-	-	-	-	-
Stage 2	819	819	-	584	663	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.16	-	-	4.16	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.254	-	-	2.254	-	-
Pot Cap-1 Maneuver	147	170	617	118	126	602	909	-	-	1076	-	-
Stage 1	594	576	-	372	392	-	-	-	-	-	-	-
Stage 2	372	392	-	501	462	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	125	137	617	91	101	602	909	-	-	1076	-	-
Mov Cap-2 Maneuver	125	137	-	91	101	-	-	-	-	-	-	-
Stage 1	478	575	-	299	316	-	-	-	-	-	-	-
Stage 2	300	316	-	455	462	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	69.9	0	2.7	0
HCM LOS	F	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	909	-	-	125	617	-	1076	-	-
HCM Lane V/C Ratio	0.195	-	-	0.81	0.09	-	0.001	-	-
HCM Control Delay (s)	9.9	-	-	102.1	11.4	0	8.3	-	-
HCM Lane LOS	A	-	-	F	B	A	A	-	-
HCM 95th %tile Q(veh)	0.7	-	-	4.9	0.3	-	0	-	-

HCM 6th TWSC

104: LPGA Boulevard & International Tennis Drive/International Golf Drive

Intersection

Int Delay, s/veh 3.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	54	3	56	22	0	31	17	403	27	31	445	40
Future Vol, veh/h	54	3	56	22	0	31	17	403	27	31	445	40
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	215	-	-	0	-	-	415	-	415	410	-	400
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	4	4	4	0	0	0	6	6	6	5	5	5
Mvmt Flow	59	3	62	24	0	34	19	443	30	34	489	44

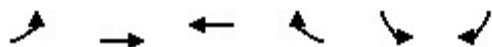
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1070	1068	489	1093	1082	443	533	0	0	473	0	0
Stage 1	557	557	-	481	481	-	-	-	-	-	-	-
Stage 2	513	511	-	612	601	-	-	-	-	-	-	-
Critical Hdwy	7.14	6.54	6.24	7.1	6.5	6.2	4.16	-	-	4.15	-	-
Critical Hdwy Stg 1	6.14	5.54	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.14	5.54	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.536	4.036	3.336	3.5	4	3.3	2.254	-	-	2.245	-	-
Pot Cap-1 Maneuver	197	220	575	193	219	619	1015	-	-	1073	-	-
Stage 1	511	509	-	570	557	-	-	-	-	-	-	-
Stage 2	540	534	-	484	493	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	179	209	575	164	208	619	1015	-	-	1073	-	-
Mov Cap-2 Maneuver	179	209	-	164	208	-	-	-	-	-	-	-
Stage 1	501	493	-	559	546	-	-	-	-	-	-	-
Stage 2	501	524	-	416	477	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	23.3		19.3		0.3		0.5	
HCM LOS	C		C					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1015	-	-	179	528	164	619	1073	-	-
HCM Lane V/C Ratio	0.018	-	-	0.332	0.123	0.147	0.055	0.032	-	-
HCM Control Delay (s)	8.6	-	-	34.8	12.8	30.7	11.2	8.5	-	-
HCM Lane LOS	A	-	-	D	B	D	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	1.4	0.4	0.5	0.2	0.1	-	-

HCM 6th Signalized Intersection Summary

101: US 92 & LPGA Boulevard



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	242	915	1175	69	84	487
Future Volume (veh/h)	242	915	1175	69	84	487
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1841	1841	1841	1841	1811	1811
Adj Flow Rate, veh/h	252	953	1224	29	88	321
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	4	4	4	4	6	6
Cap, veh/h	312	2194	1600	713	414	368
Arrive On Green	0.10	0.63	0.46	0.46	0.24	0.24
Sat Flow, veh/h	1753	3589	3589	1560	1725	1535
Grp Volume(v), veh/h	252	953	1224	29	88	321
Grp Sat Flow(s),veh/h/ln	1753	1749	1749	1560	1725	1535
Q Serve(g_s), s	7.3	14.2	29.7	1.0	4.2	20.4
Cycle Q Clear(g_c), s	7.3	14.2	29.7	1.0	4.2	20.4
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	312	2194	1600	713	414	368
V/C Ratio(X)	0.81	0.43	0.77	0.04	0.21	0.87
Avail Cap(c_a), veh/h	358	2493	1823	813	492	438
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	20.0	9.7	23.0	15.3	31.0	37.2
Incr Delay (d2), s/veh	15.7	0.4	2.6	0.1	0.9	21.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	6.8	7.8	16.7	0.6	3.1	14.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	35.7	10.1	25.7	15.3	31.9	58.7
LnGrp LOS	D	B	C	B	C	E
Approach Vol, veh/h		1205	1253		409	
Approach Delay, s/veh		15.4	25.4		52.9	
Approach LOS		B	C		D	
Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	17.3	54.0		30.4		71.3
Change Period (Y+Rc), s	7.5	* 7.5		6.0		7.5
Max Green Setting (Gmax), s	12.5	* 53		29.0		72.5
Max Q Clear Time (g_c+l1), s	9.3	31.7		22.4		16.2
Green Ext Time (p_c), s	0.5	14.8		1.9		18.3

Intersection Summary

HCM 6th Ctrl Delay	25.1
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th TWSC

103: LPGA Boulevard & Father Loper Catholic High School Driveway/Welshinger-Butler Circle N

Intersection

Int Delay, s/veh 7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔		↔		↔	↔	↔	↔	↔	↔
Traffic Vol, veh/h	107	0	79	0	0	0	45	266	0	0	492	49
Future Vol, veh/h	107	0	79	0	0	0	45	266	0	0	492	49
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	-	350	-	195	150	-	360
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	81	81	81	81	81	81	81	81	81	81	81	81
Heavy Vehicles, %	1	1	1	0	0	0	5	5	5	6	6	6
Mvmt Flow	132	0	98	0	0	0	56	328	0	0	607	60

Major/Minor	Minor2		Minor1		Major1		Major2		Major2		Major2	
Conflicting Flow All	1047	1047	607	1126	1107	328	667	0	0	328	0	0
Stage 1	607	607	-	440	440	-	-	-	-	-	-	-
Stage 2	440	440	-	686	667	-	-	-	-	-	-	-
Critical Hdwy	7.11	6.51	6.21	7.1	6.5	6.2	4.15	-	-	4.16	-	-
Critical Hdwy Stg 1	6.11	5.51	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.11	5.51	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.509	4.009	3.309	3.5	4	3.3	2.245	-	-	2.254	-	-
Pot Cap-1 Maneuver	207	229	498	184	212	718	909	-	-	1209	-	-
Stage 1	485	488	-	600	581	-	-	-	-	-	-	-
Stage 2	598	579	-	441	460	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	197	215	498	141	199	718	909	-	-	1209	-	-
Mov Cap-2 Maneuver	197	215	-	141	199	-	-	-	-	-	-	-
Stage 1	455	488	-	563	545	-	-	-	-	-	-	-
Stage 2	561	543	-	355	460	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	37.1		0		1.3		0	
HCM LOS	E		A					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	909	-	-	197	498	-	1209	-	-
HCM Lane V/C Ratio	0.061	-	-	0.671	0.196	-	-	-	-
HCM Control Delay (s)	9.2	-	-	54.1	14	0	0	-	-
HCM Lane LOS	A	-	-	F	B	A	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	4.1	0.7	-	0	-	-

HCM 6th TWSC

104: LPGA Boulevard & International Tennis Drive/International Golf Drive

Intersection												
Int Delay, s/veh	3.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	34	6	38	24	3	20	54	300	19	26	479	69
Future Vol, veh/h	34	6	38	24	3	20	54	300	19	26	479	69
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	215	-	-	0	-	-	415	-	415	410	-	400
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	1	1	1	2	2	2	4	4	4	3	3	3
Mvmt Flow	37	7	41	26	3	22	59	326	21	28	521	75
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1044	1042	521	1083	1096	326	596	0	0	347	0	0
Stage 1	577	577	-	444	444	-	-	-	-	-	-	-
Stage 2	467	465	-	639	652	-	-	-	-	-	-	-
Critical Hdwy	7.11	6.51	6.21	7.12	6.52	6.22	4.14	-	-	4.13	-	-
Critical Hdwy Stg 1	6.11	5.51	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.11	5.51	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.509	4.009	3.309	3.518	4.018	3.318	2.236	-	-	2.227	-	-
Pot Cap-1 Maneuver	208	231	557	195	213	715	971	-	-	1206	-	-
Stage 1	504	503	-	593	575	-	-	-	-	-	-	-
Stage 2	578	565	-	464	464	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	187	212	557	165	195	715	971	-	-	1206	-	-
Mov Cap-2 Maneuver	187	212	-	165	195	-	-	-	-	-	-	-
Stage 1	473	491	-	557	540	-	-	-	-	-	-	-
Stage 2	523	531	-	414	453	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	20.4			21.7			1.3			0.4		
HCM LOS	C			C								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR		
Capacity (veh/h)	971	-	-	187	456	165	530	1206	-	-		
HCM Lane V/C Ratio	0.06	-	-	0.198	0.105	0.158	0.047	0.023	-	-		
HCM Control Delay (s)	8.9	-	-	28.9	13.8	30.9	12.1	8.1	-	-		
HCM Lane LOS	A	-	-	D	B	D	B	A	-	-		
HCM 95th %tile Q(veh)	0.2	-	-	0.7	0.3	0.5	0.1	0.1	-	-		

SimTraffic Performance Report
Existing Conditions 2021 AM

Total Network Performance By Run

Run Number	1	2	3	4	5	6	7
Denied Entry After	0	0	0	0	0	0	1

Total Network Performance By Run

Run Number	8	9	10	Avg
Denied Entry After	1	1	1	0

Arterial Level of Service
Existing Conditions 2021 AM

Arterial Level of Service: NB LPGA Boulevard

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
	51	3.9	81.5	1.2	52
	102	2.2	26.7	0.4	50
Welshinger-Butler Ci	103	2.5	21.7	0.3	50
	52	1.3	18.0	0.3	51
International Golf D	104	4.8	58.7	0.8	52
Tournament Drive	105	16.0	90.3	1.2	47
Total		30.8	296.9	4.1	50

Arterial Level of Service: SB LPGA Boulevard

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
International Tennis	104	8.8	83.9	1.2	50
	52	5.3	59.6	0.8	51
Father Loper Catholi	103	2.5	18.8	0.3	49
	102	1.6	21.4	0.3	50
	51	1.7	26.2	0.4	51
US 92	101	43.1	122.6	1.2	35
Total		62.8	332.4	4.1	45

SimTraffic Performance Report
Existing Conditions 2021 PM

Total Network Performance By Run

Run Number	1	2	3	4	5	6	7
Denied Entry After	3	1	2	0	2	0	1

Total Network Performance By Run

Run Number	8	9	10	Avg
Denied Entry After	1	0	0	0

Arterial Level of Service
Existing Conditions 2021 PM

Arterial Level of Service: NB LPGA Boulevard

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
	51	2.4	76.6	1.2	55
	102	1.8	26.3	0.4	51
Welshinger-Butler Ci	103	2.1	21.4	0.3	50
	52	1.3	18.1	0.3	50
International Golf D	104	3.9	58.5	0.8	52
Tournament Drive	105	10.0	84.2	1.2	50
Total		21.5	285.1	4.1	52

Arterial Level of Service: SB LPGA Boulevard

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
International Tennis	104	8.0	83.0	1.2	51
	52	5.1	59.7	0.8	51
Father Loper Catholi	103	2.3	18.3	0.3	50
	102	2.2	21.9	0.3	49
	51	2.2	26.6	0.4	50
US 92	101	43.7	122.8	1.2	34
Total		63.4	332.4	4.1	45

Appendix D

Intersection Control Evaluation

Consists of Intersection Control Evaluation Forms

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
TECHNICAL REPORT COVERSHEET

650-050-38
ENVIRONMENTAL
MANAGEMENT
08/22

INTERSECTION CONTROL EVALUATION

Florida Department of Transportation

District 5

LPGA Boulevard PD&E Study

Limits of Project: From US 92 to Williamson Boulevard

Volusia, Florida

Financial Management Number: 448456-1

ETDM Number: 14332

Date: August 14, 2023

The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by the Florida Department of Transportation (FDOT) pursuant to 23 U.S.C. § 327 and a Memorandum of Understanding dated May 26, 2022 and executed by the Federal Highway Administration and FDOT.

Florida Department of Transportation

Intersection Control Evaluation (ICE) Form

Stage 1: Screening

Intersection Control Evaluation Form 750-010-003

To fulfill the requirements of Stage 1 (Screening) of FDOT's ICE procedures, complete the following form and append all supporting documentation. Completed forms can be submitted to the District Traffic Operations Engineer (DTOE) and District Design Engineer (DDE) for the project's approval. Selections must be made in the "Intersection Type" and "Project Funding Source" cells below for the appropriate Stage 1 and Stage 2 forms to fully populate.

Project Name	LPGA Blvd from US 92 (SR 600) to Williamson Blvd PD&E Study			FDOT Project #	448456-1-22-01		
Submitted By	L. Hess		Agency/Company	American Consulting Professionals		Date	5/31/2022
Email	Lhess@acp-fl.com		FDOT District	District 5	County	Volusia	
Project Locality (City/Town/Village)			Daytona Beach				
Intersection Type		At-Grade Intersection		FDOT Context Classification		C3R - Suburban Residential	
Project Funding Source		Federal		Project Type		Corridor Improvement Project	
Project Purpose (What is the catalyst for this project and why is it being undertaken?)		The purpose of this study is to accommodate existing and projected future travel demand and enhance safety and operations for the LPGA Blvd corridor and the I-95 interchange. The need is based on existing and future transportation demand and existing high number of crashes along LPGA Blvd and the interchange. Improvements are needed to address unacceptable LOS (LOS E or F) and enhance the safety of travel conditions along LPGA Blvd and at the interchange, various intersections, and uncontrolled access points.					
Project Setting Description (Describe the area surrounding the intersection)		All parcels surrounding the intersection are vacant. The LPGA/US 92 intersection is currently signalized. There is a potential future development that would create a fourth (south) leg.					
Multimodal Context (Describe the pedestrian, bicycle, and transit activity in the area and the potential for activity based on surrounding land uses and development patterns)		There are no existing sidewalks or bike lanes present within the intersection. There are existing bus stops for Volusia Transit (Votran) Route 60 located just west of the intersection along westbound US 92 and just east of the intersection along eastbound US 92.					

Major Street Information											
Route #:		CR 4019	Route Name(s)		LPGA Blvd			Milepost			
Existing Control Type		Signal			Existing AADT		9,400	Design Year AADT		32,000	
Design Vehicle		Florida Interstate Semitrailer (WB-62FL)			Control Vehicle		Florida Interstate Semitrailer (WB-62FL)				
Primary Functional Classification				Urban Minor Arterial			Design Speed (mph)		45		
Secondary Functional Classification (if app.)							Target Speed (mph) [if app.]		45		
Approach #1	Direction		Southbound		Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes		
	Sidewalks along		Both sides of the approach		Left-Turn		2				
	Crosswalk on Approach?		Yes		Left-Through		0	Weekday AM Peak		Weekday PM Peak	
	On-Street Bike Facilities?		No		Through		0	Left	457	Left	564
	Multi-Use Path?		Yes		Left-Through-Right		0	Through	0	Through	0
	Scheduled Bus Service?		No		Through-Right		0	Right	669	Right	1,030
	Bus Stop on Approach?		No		Right-Turn		2	Daily Truck %		6.8%	
Approach #2	Direction				Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes		
	Sidewalks along:				Left-Turn						
	Crosswalk on Approach?				Left-Through			Weekday AM Peak		Weekday PM Peak	
	On-Street Bike Facilities?				Through			Left		Left	
	Multi-Use Path?				Left-Through-Right			Through		Through	
	Scheduled Bus Service?				Through-Right			Right		Right	
	Bus Stop on Approach?				Right-Turn			Daily Truck %			

Minor Street Information									
Route #:	600	Route Name(s)	US 92				Milepost (if app.)	13.97	
Existing Control Type	Signal		Existing AADT	28,750		Design Year AADT	38,000		
Design Vehicle	Florida Interstate Semitrailer (WB-62FL)		Control Vehicle	Florida Interstate Semitrailer (WB-62FL)					
Primary Functional Classification			Urban Principal Arterial - Other			Design Speed (mph)	55		
Secondary Functional Classification (if app.)						Target Speed (mph) [if app.]	55		
Approach #1	Direction	Eastbound	Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes		
	Sidewalks along:	Neither side of the approach	Left-Turn	2					
	Crosswalk on Approach?	No	Left-Through	0	Weekday AM Peak		Weekday PM Peak		
	On-Street Bike Facilities?	No	Through	2	Left	985	Left	669	
	Multi-Use Path?	No	Left-Through-Right	0	Through	1,203	Through	961	
	Scheduled Bus Service?	No	Through-Right	0	Right	0	Right	0	
	Bus Stop on Approach?	No	Right-Turn	0	Daily Truck %		7.4%		
Approach #2	Direction	Westbound	Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes		
	Sidewalks along:	Both sides of the approach	Left-Turn	0					
	Crosswalk on Approach?	Yes	Left-Through	0	Weekday AM Peak		Weekday PM Peak		
	On-Street Bike Facilities?	No	Through	2	Left	0	Left	0	
	Multi-Use Path?	No	Left-Through-Right	0	Through	840	Through	1,329	
	Scheduled Bus Service?	No	Through-Right	0	Right	609	Right	457	
	Bus Stop on Approach?	No	Right-Turn	1	Daily Truck %		6.7%		
Approach #3	Direction		Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes		
	Sidewalks along:		Left-Turn						
	Crosswalk on Approach?		Left-Through		Weekday AM Peak		Weekday PM Peak		
	On-Street Bike Facilities?		Through		Left		Left		
	Multi-Use Path?		Left-Through-Right		Through		Through		
	Scheduled Bus Service?		Through-Right		Right		Right		
	Bus Stop on Approach?		Right-Turn		Daily Truck %				

Crash History (Existing Intersections Only)

Append the most recent five-years of crash data for the intersection from the CAR System. If the crash data evidences any issues relating to safety performance, discuss briefly here:

The most recent five-year crash data (2015-2019) for the intersection of LPGA and US 92 had a report total of 83 crashes. The most predominant crash type was rear end crashes at 48 crashes. There was one (1) reported fatal crash and 43 injury crashes at this intersection for the analysis period.

Control Strategy Evaluation							
Provide a brief justification as to why each of the following control strategies should be advanced or not. Justification should consider potential environmental impacts.							
Control Strategy	CAP-X Outputs			SPICE Outputs		Strategy to Be Advanced?	Justification
	V/C Ratio		Multimodal Score	Crash Prediction Rank	SSI Rank		
	Weekday AM Peak	Weekday PM Peak					
Two-Way Stop-Controlled	N/A	N/A	N/A	N/A	N/A	No	Current intersection is a signal.
All-Way Stop-Controlled	N/A	N/A	N/A	N/A	N/A	No	Current intersection is a signal.
Signalized Control	0.76	0.79	4.8	4	5	Yes	Existing control type
Roundabout	1.46	2.50	5.6	5	1	No	2x2 V/C exceeds 1 for both peak periods.
Median U-Turn	1.50 (1.24)	1.30 (1.00)	6.3	1	N/A	No	MUT (Partial MUT) V/C exceeds 1 for both peak period.
RCUT (Signalized)	0.99	0.92	6.3	6	2	No	V/C nearly exceeds 1 for AM peak period.
RCUT (Unsignalized)	4.33	12.46	4.4	2	3	No	V/C exceeds 1 for both peak periods.
Jughandle				N/A	N/A	No	N/A
Displaced Left-Turn	N/A	N/A	N/A	N/A	N/A	No	N/A
Continuous Green Tee	0.72	0.78	3.0	3	4	No	Due to an adjacent PD&E study to extend LPGA Blvd south of US 92, this alternative was not advanced.
Quadrant Roadway	N/A	N/A	N/A			No	N/A
Thru-Cut	N/A	N/A	N/A	N/A	N/A	No	N/A
Other 1 (Type)	N/A	N/A	N/A	N/A	N/A	No	N/A
Other 2 (Type)	N/A	N/A	N/A	N/A	N/A	No	N/A

Resolution					
To be filled out by FDOT District Traffic Operations Engineer and District Design Engineer					
Project Determination		Identified Control Strategy Approved			
Comments					
DTOE Name	James E. wood, Jr.	Signature	DocuSigned by: James E. Wood, Jr.	Date	08/14/2023 1
DDE Name	Jeffrey Cicerello	Signature	DocuSigned by: Jeffrey Cicerello	Date	08/14/2023 1

Florida Department of Transportation

Intersection Control Evaluation (ICE) Form

Stage 1: Screening

Intersection Control Evaluation Form 750-010-003

To fulfill the requirements of Stage 1 (Screening) of FDOT's ICE procedures, complete the following form and append all supporting documentation. Completed forms can be submitted to the District Traffic Operations Engineer (DTOE) and District Design Engineer (DDE) for the project's approval. Selections must be made in the "Intersection Type" and "Project Funding Source" cells below for the appropriate Stage 1 and Stage 2 forms to fully populate.

Project Name	LPGA Blvd from US 92 (SR 600) to Williamson Blvd PD&E Study	FDOT Project #	448456-1-22-01		
Submitted By	L. Hess	Agency/Company	American Consulting Professionals	Date	12/27/2022
Email	Lhess@acp-fl.com	FDOT District	District 5	County	Volusia
Project Locality (City/Town/Village)	Daytona Beach				
Intersection Type	At-Grade Intersection	FDOT Context Classification	C3R - Suburban Residential		
Project Funding Source	Federal	Project Type	Corridor Improvement Project		
Project Purpose (What is the catalyst for this project and why is it being undertaken?)	The purpose of this study is to accommodate existing and projected future travel demand and enhance safety and operations for the LPGA Blvd corridor and the I-95 interchange. The need is based on existing and future transportation demand and existing high number of crashes along LPGA Blvd and the interchange. Improvements are needed to address unacceptable LOS (LOS E or F) and enhance the safety of travel conditions along LPGA Blvd and at the interchange, various intersections, and uncontrolled access points.				
Project Setting Description (Describe the area surrounding the intersection)	The LPGA/Welshinger Butler South intersection is currently unsignalized. There is vacant land being developed into a residential community on the west side of LPGA Blvd and a football stadium on the east side. A school is located north of the intersection on the west side of LPGA Blvd. There is a water treatment plant located further to the north of the intersection on the east side of LPGA Blvd.				
Multimodal Context (Describe the pedestrian, bicycle, and transit activity in the area and the potential for activity based on surrounding land uses and development patterns)	There are no sidewalks or bike lanes present at the existing intersection. Note, Father Lopez Catholic High School is located on the northwest corner of the intersection and a stadium is located on the northeast corner. Planned future development for the area includes several residential communities.				

Major Street Information									
Route #:	CR 4019	Route Name(s)	LPGA Blvd				Milepost	N/A	
Existing Control Type	Two-way Stop-Control		Existing AADT	9,400	Design Year AADT	32,000			
Design Vehicle	Florida Interstate Semitrailer (WB-62FL)		Control Vehicle	Florida Interstate Semitrailer (WB-62FL)					
Primary Functional Classification			Urban Principal Arterial - Interstate			Design Speed (mph)	45		
Secondary Functional Classification (if app.)						Target Speed (mph) [if app.]	45		
Approach #1	Direction	Northbound	Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes		
	Sidewalks along	Neither side of the approach	Left-Turn	1					
	Crosswalk on Approach?	Yes	Left-Through	0	Weekday AM Peak		Weekday PM Peak		
	On-Street Bike Facilities?	No	Through	2	Left	31	Left	79	
	Multi-Use Path?	Yes	Left-Through-Right	0	Through	1,562	Through	1,047	
	Scheduled Bus Service?	No	Through-Right	0	Right	0	Right	0	
	Bus Stop on Approach?	No	Right-Turn	1	Daily Truck %		6.8%		
Approach #2	Direction	Southbound	Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes		
	Sidewalks along:	Neither side of the approach	Left-Turn	0					
	Crosswalk on Approach?	Yes	Left-Through	0	Weekday AM Peak		Weekday PM Peak		
	On-Street Bike Facilities?	No	Through	2	Left	0	Left	0	
	Multi-Use Path?	Yes	Left-Through-Right	0	Through	1,108	Through	1,527	
	Scheduled Bus Service?	No	Through-Right	0	Right	18	Right	67	
	Bus Stop on Approach?	No	Right-Turn	1	Daily Truck %		6.8%		

Minor Street Information									
Route #:	N/A	Route Name(s)	Welshinger Butler Circle South				Milepost (if app.)		
Existing Control Type	Two-way Stop-Control		Existing AADT	1,600		Design Year AADT	2,500		
Design Vehicle	Florida Interstate Semitrailer (WB-62FL)		Control Vehicle	Florida Interstate Semitrailer (WB-62FL)					
Primary Functional Classification			Rural Principal Arterial - Other				Design Speed (mph)	25	
Secondary Functional Classification (if app.)							Target Speed (mph) [if app.]	25	
Approach #1	Direction	Westbound	Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes		
	Sidewalks along:	Neither side of the approach	Left-Turn	0					
	Crosswalk on Approach?	Yes	Left-Through	0	Weekday AM Peak		Weekday PM Peak		
	On-Street Bike Facilities?	No	Through	0	Left	0	Left	0	
	Multi-Use Path?	No	Left-Through-Right	1	Through	0	Through	0	
	Scheduled Bus Service?	No	Through-Right	0	Right	0	Right	0	
	Bus Stop on Approach?	No	Right-Turn	0	Daily Truck %				
Approach #2	Direction	Eastbound	Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes		
	Sidewalks along:	Neither side of the approach	Left-Turn	0					
	Crosswalk on Approach?	Yes	Left-Through	1	Weekday AM Peak		Weekday PM Peak		
	On-Street Bike Facilities?	No	Through	0	Left	48	Left	34	
	Multi-Use Path?	No	Left-Through-Right	0	Through	0	Through	0	
	Scheduled Bus Service?	No	Through-Right	0	Right	76	Right	54	
	Bus Stop on Approach?	No	Right-Turn	1	Daily Truck %				
Approach #3	Direction		Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes		
	Sidewalks along:		Left-Turn						
	Crosswalk on Approach?		Left-Through		Weekday AM Peak		Weekday PM Peak		
	On-Street Bike Facilities?		Through		Left		Left		
	Multi-Use Path?		Left-Through-Right		Through		Through		
	Scheduled Bus Service?		Through-Right		Right		Right		
	Bus Stop on Approach?		Right-Turn		Daily Truck %				

Crash History (Existing Intersections Only)

Append the most recent five-years of crash data for the intersection from the CAR System. If the crash data evidences any issues relating to safety performance, discuss briefly here:

The most recent five-year crash data (2015-2019) for the intersection of LPGA Blvd and Welshinger Butler Circle South had a reported total of one crash. No fatal or injury crashes were reported at this intersection for the analysis period.

Control Strategy Evaluation							
Provide a brief justification as to why each of the following control strategies should be advanced or not. Justification should consider potential environmental impacts.							
Control Strategy	CAP-X Outputs			SPICE Outputs		Strategy to Be Advanced?	Justification
	V/C Ratio		Multimodal Score	Crash Prediction Rank	SSI Rank		
	Weekday AM Peak	Weekday PM Peak					
Two-Way Stop-Controlled	1.66	1.46	N/A	7	7	No	Existing Condition. V/C exceeds 1 for both peak periods.
All-Way Stop-Controlled	N/A	N/A	N/A	N/A	N/A	No	Currently intersection is two-way stop-controlled.
Signalized Control	0.49	0.52	4.8	5	4	No	V/C is under 1 for both peak periods. The projected volumes on the minor street are likely to not warrant a signal at this location.
Roundabout	0.65 (0.65)	0.67 (0.67)	5.6	6	1	Yes	2x2 (2x1) V/C is under 1. Major roadway exceeds 90/10 split, due to offset minor approaches and speed management roundabout is advanced.
Median U-Turn	0.53 (0.52)	0.51 (0.51)	6.3	2	2	No	MUT (Partial MUT) Due to a new development entrance on the west approach and stadium on the east, this strategy was not advanced.
RCUT (Signalized)	0.49	0.49	6.3	4	3	No	Due to a new development entrance on the west approach and stadium on the east, this strategy was not advanced.
RCUT (Unsignalized)	0.64	0.89	4.4	1	5	No	Due to a new development entrance on the west approach and stadium on the east, this strategy was not advanced.
Jughandle				N/A	N/A	No	N/A
Displaced Left-Turn	0.47 (0.49)	0.48 (0.48)	4.8	3	6	No	DLT (Partial DLT) Due to a new development entrance on the west approach and stadium on the east, this strategy was not advanced.
Continuous Green Tee	N/A	N/A	N/A	N/A	N/A	No	N/A
Quadrant Roadway	N/A	N/A	N/A			No	N/A
Thru-Cut	N/A	N/A	N/A	N/A	N/A	No	N/A
Partial Cloverleaf	N/A	N/A	N/A	N/A	N/A	No	N/A
Diverging Diamond Interchange	N/A	N/A	N/A	N/A	N/A	No	N/A

Resolution					
To be filled out by FDOT District Traffic Operations Engineer and District Design Engineer					
Project Determination		Identified Control Strategy Approved			
Comments					
DTOE Name	James E. wood, Jr.	Signature	DocuSigned by: James E. Wood, Jr.	Date	08/14/2023 1
DDE Name	Jeffrey Cicerello	Signature	DocuSigned by: Jeffrey Cicerello	Date	08/14/2023 1

Florida Department of Transportation

Intersection Control Evaluation (ICE) Form

Stage 1: Screening

Intersection Control Evaluation Form 750-010-003

To fulfill the requirements of Stage 1 (Screening) of FDOT's ICE procedures, complete the following form and append all supporting documentation. Completed forms can be submitted to the District Traffic Operations Engineer (DTOE) and District Design Engineer (DDE) for the project's approval. Selections must be made in the "Intersection Type" and "Project Funding Source" cells below for the appropriate Stage 1 and Stage 2 forms to fully populate.

Project Name	LPGA Blvd from US 92 (SR 600) to Williamson Blvd PD&E Study			FDOT Project #	448456-1-22-01		
Submitted By	L. Hess		Agency/Company	American Consulting Professionals		Date	5/31/2022
Email	Lhess@acp-fl.com		FDOT District	District 5	County	Volusia	
Project Locality (City/Town/Village)			Daytona Beach				
Intersection Type		At-Grade Intersection		FDOT Context Classification		C3R - Suburban Residential	
Project Funding Source		Federal		Project Type		Corridor Improvement Project	
Project Purpose (What is the catalyst for this project and why is it being undertaken?)		The purpose of this study is to accommodate existing and projected future travel demand and enhance safety and operations for the LPGA Blvd corridor and the I-95 interchange. The need is based on existing and future transportation demand and existing high number of crashes along LPGA Blvd and the interchange. Improvements are needed to address unacceptable LOS (LOS E or F) and enhance the safety of travel conditions along LPGA Blvd and at the interchange, various intersections, and uncontrolled access points.					
Project Setting Description (Describe the area surrounding the intersection)		The LPGA/Welshinger Butler North intersection is currently unsignalized. Surrounding land use consists of a high school on the west side of LPGA Blvd and a community football stadium on the east side of LPGA Blvd. There is a water treatment plant located to the north of the intersection on the east side of LPGA Blvd.					
Multimodal Context (Describe the pedestrian, bicycle, and transit activity in the area and the potential for activity based on surrounding land uses and development patterns)		There are no sidewalks or bike lanes present at the existing intersection. Note, there is Father Lopez Catholic High School located on the southwest corner of the intersection.					

Major Street Information									
Route #:		CR 4019	Route Name(s)		LPGA Blvd			Milepost	N/A
Existing Control Type		Two-way Stop-Control		Existing AADT		9,400	Design Year AADT		32,000
Design Vehicle		Florida Interstate Semitrailer (WB-62FL)		Control Vehicle		Florida Interstate Semitrailer (WB-62FL)			
Primary Functional Classification				Urban Minor Arterial			Design Speed (mph)		45
Secondary Functional Classification (if app.)							Target Speed (mph) [if app.]		45
Approach #1	Direction		Northbound		Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes
	Sidewalks along		Both sides of the approach		Left-Turn		1		
	Crosswalk on Approach?		Yes		Left-Through		0	Weekday AM Peak	
	On-Street Bike Facilities?		No		Through		2	Left	60
	Multi-Use Path?		Yes		Left-Through-Right		0	Through	1,534
	Scheduled Bus Service?		No		Through-Right		0	Right	0
	Bus Stop on Approach?		No		Right-Turn		1	Daily Truck %	
Approach #2	Direction		Southbound		Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes
	Sidewalks along:		Both sides of the approach		Left-Turn		1		
	Crosswalk on Approach?		Yes		Left-Through		0	Weekday AM Peak	
	On-Street Bike Facilities?		No		Through		2	Left	0
	Multi-Use Path?		Yes		Left-Through-Right		0	Through	1,026
	Scheduled Bus Service?		No		Through-Right		0	Right	180
	Bus Stop on Approach?		No		Right-Turn		1	Daily Truck %	

Minor Street Information									
Route #:		Route Name(s)		Welshinger Butler Circle North			Milepost (if app.)		
Existing Control Type		Two-way Stop-Control		Existing AADT		1,000		Design Year AADT	
Design Vehicle		Florida Interstate Semitrailer (WB-62FL)		Control Vehicle		Florida Interstate Semitrailer (WB-62FL)			
Primary Functional Classification			Rural Minor Collector				Design Speed (mph)		25
Secondary Functional Classification (if app.)							Target Speed (mph) [if app.]		25
Approach #1	Direction		Eastbound		Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes
	Sidewalks along:		Neither side of the approach		Left-Turn		0		
	Crosswalk on Approach?		Yes		Left-Through		1		Weekday AM Peak
	On-Street Bike Facilities?		No		Through		0		Left 85
	Multi-Use Path?		No		Left-Through-Right		0		Through 0
	Scheduled Bus Service?		No		Through-Right		0		Right 100
	Bus Stop on Approach?		No		Right-Turn		1		Daily Truck %
Approach #2	Direction		Westbound		Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes
	Sidewalks along:		Neither side of the approach		Left-Turn		0		
	Crosswalk on Approach?		Yes		Left-Through		0		Weekday AM Peak
	On-Street Bike Facilities?		No		Through		0		Left 0
	Multi-Use Path?		No		Left-Through-Right		1		Through 0
	Scheduled Bus Service?		No		Through-Right		0		Right 0
	Bus Stop on Approach?		No		Right-Turn		0		Daily Truck %
Approach #3	Direction				Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes
	Sidewalks along:				Left-Turn				
	Crosswalk on Approach?				Left-Through				Weekday AM Peak
	On-Street Bike Facilities?				Through				Left
	Multi-Use Path?				Left-Through-Right				Through
	Scheduled Bus Service?				Through-Right				Right
	Bus Stop on Approach?				Right-Turn				Daily Truck %

Crash History (Existing Intersections Only)

Append the most recent five-years of crash data for the intersection from the CAR System. If the crash data evidences any issues relating to safety performance, discuss briefly here:

The most recent five-year crash data (2015-2019) for the intersection of LPGA Blvd and Welshinger Butler Circle North had a reported total of eight (8) crashes. No fatal and three (3) injury crashes were reported at this intersection for the analysis period.

Control Strategy Evaluation							
Provide a brief justification as to why each of the following control strategies should be advanced or not. Justification should consider potential environmental impacts.							
Control Strategy	CAP-X Outputs			SPICE Outputs		Strategy to Be Advanced?	Justification
	V/C Ratio		Multimodal Score	Crash Prediction Rank	SSI Rank		
	Weekday AM Peak	Weekday PM Peak					
Two-Way Stop-Controlled	3.93	4.85	N/A	7	6	No	Existing Condition. V/C exceeds 1 for both peak periods.
All-Way Stop-Controlled	N/A	N/A	N/A	N/A	N/A	No	Currently intersection is two-way stop-controlled
Signalized Control	0.52	0.56	4.8	5	4	No	V/C is under 1 for both peak periods. Was not preferred by the school and local government
Roundabout	0.70 (0.70)	0.66 (0.66)	5.6	6	1	Yes	2x2 (2NSx1EW) V/C is under 1 for both peak periods, AADT split is 82/18 split. Father Lopez HS, County and City preferred roundabout.
Median U-Turn	0.60 (0.55)	0.57 (0.51)	6.3	2	2	No	MUT (Partial MUT) Due to the school entrance on the west approach and stadium on the east approach, this strategy was not advanced.
RCUT (Signalized)	0.53	0.57	6.3	4	3	No	Due to the school entrance on the west approach and stadium on the east approach, this strategy was not advanced.
RCUT (Unsignalized)	0.90	2.05	4.4	1	5	No	V/C exceeds 1 for the PM peak period.
Jughandle				N/A	N/A	No	N/A
Displaced Left-Turn	0.51 (0.52)	0.50 (0.51)	4.8	3	7	No	DLT (Partial DLT) Due to the school entrance on the west approach and stadium on the east approach, this strategy was not advanced.
Continuous Green Tee	N/A	N/A	N/A	N/A	N/A	No	N/A
Quadrant Roadway	N/A	N/A	N/A			No	N/A
Thru-Cut	N/A	N/A	N/A	N/A	N/A	No	N/A
Partial Cloverleaf	N/A	N/A	N/A	N/A	N/A	No	N/A
Diverging Diamond Interchange	N/A	N/A	N/A	N/A	N/A	No	N/A

Resolution					
To be filled out by FDOT District Traffic Operations Engineer and District Design Engineer					
Project Determination		Identified Control Strategy Approved			
Comments					
DTOE Name	James E. wood, Jr.	Signature	DocuSigned by: James E. Wood, Jr. 669E306FACE9466...	Date	08/14/2023 1
DDE Name	Jeffrey Cicerello	Signature	DocuSigned by: Jeffrey Cicerello E40D9D8820CD4A2...	Date	08/14/2023 1

Florida Department of Transportation

Intersection Control Evaluation (ICE) Form

Stage 1: Screening

Intersection Control Evaluation Form 750-010-003

To fulfill the requirements of Stage 1 (Screening) of FDOT's ICE procedures, complete the following form and append all supporting documentation. Completed forms can be submitted to the District Traffic Operations Engineer (DTOE) and District Design Engineer (DDE) for the project's approval. Selections must be made in the "Intersection Type" and "Project Funding Source" cells below for the appropriate Stage 1 and Stage 2 forms to fully populate.

Project Name	LPGA Blvd from US 92 (SR 600) to Williamson Blvd PD&E Study			FDOT Project #	448456-1-22-01		
Submitted By	L. Hess		Agency/Company	American Consulting Professionals		Date	5/31/2022
Email	Lhess@acp-fl.com		FDOT District	District 5	County	Volusia	
Project Locality (City/Town/Village)			Daytona Beach				
Intersection Type		At-Grade Intersection		FDOT Context Classification		C3R - Suburban Residential	
Project Funding Source		Federal		Project Type		Corridor Improvement Project	
Project Purpose (What is the catalyst for this project and why is it being undertaken?)		The purpose of this study is to accommodate existing and projected future travel demand and enhance safety and operations for the LPGA Blvd corridor and the I-95 interchange. The need is based on existing and future transportation demand and existing high number of crashes along LPGA Blvd and the interchange. Improvements are needed to address unacceptable LOS (LOS E or F) and enhance the safety of travel conditions along LPGA Blvd and at the interchange, various intersections, and uncontrolled access points.					
Project Setting Description (Describe the area surrounding the intersection)		The LPGA/Tennis-Golf intersection is currently unsignalized with N-S traffic free flow and E-W traffic stop controlled. The east approach gives access to a golfing center and residential and the west approach gives access to a tennis center and residential. Tennis courts are adjacent to the southwest corner of the intersection. The surrounding existing land use is predominately vacant, but developing, with vegetation and a pond on the northwest corner.					
Multimodal Context (Describe the pedestrian, bicycle, and transit activity in the area and the potential for activity based on surrounding land uses and development patterns)		On the east and west legs of the intersection, there are sidewalks on both sides going into the entrance of the golf and tennis centers. There is a crosswalk on the west leg of the intersection at the entrance of the tennis center. Currently no bike lanes are provided on the roadway. There are no existing crosswalks on LPGA Blvd.					

Major Street Information									
Route #:		CR 4019	Route Name(s)		LPGA Blvd			Milepost	N/A
Existing Control Type		Two-way Stop-Control		Existing AADT		9,500	Design Year AADT		29,500
Design Vehicle		Florida Interstate Semitrailer (WB-62FL)		Control Vehicle		Florida Interstate Semitrailer (WB-62FL)			
Primary Functional Classification				Urban Minor Arterial			Design Speed (mph)		45
Secondary Functional Classification (if app.)							Target Speed (mph) [if app.]		45
Approach #1	Direction		Northbound		Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes
	Sidewalks along		Both sides of the approach		Left-Turn		1		
	Crosswalk on Approach?		Yes		Left-Through		0	Weekday AM Peak	
	On-Street Bike Facilities?		No		Through		2	Left	165
	Multi-Use Path?		Yes		Left-Through-Right		0	Through	1,190
	Scheduled Bus Service?		No		Through-Right		0	Right	264
	Bus Stop on Approach?		No		Right-Turn		1	Daily Truck %	
Approach #2	Direction		Southbound		Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes
	Sidewalks along:		Both sides of the approach		Left-Turn		1		
	Crosswalk on Approach?		Yes		Left-Through		0	Weekday AM Peak	
	On-Street Bike Facilities?		No		Through		2	Left	81
	Multi-Use Path?		Yes		Left-Through-Right		0	Through	778
	Scheduled Bus Service?		No		Through-Right		0	Right	91
	Bus Stop on Approach?		No		Right-Turn		1	Daily Truck %	

Minor Street Information									
Route #:		Route Name(s)	International Tennis/Golf Drive				Milepost (if app.)	N/A	
Existing Control Type	Two-way Stop-Control		Existing AADT	1,350		Design Year AADT	6,500		
Design Vehicle	Florida Interstate Semitrailer (WB-62FL)		Control Vehicle	Florida Interstate Semitrailer (WB-62FL)					
Primary Functional Classification			Rural Minor Collector				Design Speed (mph)	30	
Secondary Functional Classification (if app.)							Target Speed (mph) [if app.]	30	
Approach #1	Direction	Westbound	Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes		
	Sidewalks along:	Both sides of the approach	Left-Turn	0					
	Crosswalk on Approach?	Yes	Left-Through	0	Weekday AM Peak		Weekday PM Peak		
	On-Street Bike Facilities?	No	Through	0	Left	198	Left	185	
	Multi-Use Path?	No	Left-Through-Right	1	Through	26	Through	47	
	Scheduled Bus Service?	No	Through-Right	0	Right	89	Right	202	
	Bus Stop on Approach?	No	Right-Turn	0	Daily Truck %		3.2%		
Approach #2	Direction	Eastbound	Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes		
	Sidewalks along:	Both sides of the approach	Left-Turn	1					
	Crosswalk on Approach?	Yes	Left-Through	0	Weekday AM Peak		Weekday PM Peak		
	On-Street Bike Facilities?	No	Through	0	Left	102	Left	178	
	Multi-Use Path?	No	Left-Through-Right	0	Through	26	Through	10	
	Scheduled Bus Service?	No	Through-Right	1	Right	230	Right	194	
	Bus Stop on Approach?	No	Right-Turn	0	Daily Truck %		5.8%		
Approach #3	Direction		Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes		
	Sidewalks along:		Left-Turn						
	Crosswalk on Approach?		Left-Through		Weekday AM Peak		Weekday PM Peak		
	On-Street Bike Facilities?		Through		Left		Left		
	Multi-Use Path?		Left-Through-Right		Through		Through		
	Scheduled Bus Service?		Through-Right		Right		Right		
	Bus Stop on Approach?		Right-Turn		Daily Truck %				

Crash History (Existing Intersections Only)

Append the most recent five-years of crash data for the intersection from the CAR System. If the crash data evidences any issues relating to safety performance, discuss briefly here:

The most recent five-year crash data (2015-2019) for the intersection of LPGA and International Tennis Dr/Intersection Golf Dr had a report total of six (6) crashes. No fatal and three (3) injury crashes were reported at this intersection for the analysis period.

Control Strategy Evaluation							
Provide a brief justification as to why each of the following control strategies should be advanced or not. Justification should consider potential environmental impacts.							
Control Strategy	CAP-X Outputs			SPICE Outputs		Strategy to Be Advanced?	Justification
	V/C Ratio		Multimodal Score	Crash Prediction Rank	SSI Rank		
	Weekday AM Peak	Weekday PM Peak					
Two-Way Stop-Controlled	38.98	105.35	3.7	7	6	No	Existing Conditions. V/C exceeds 1 for both peak periods
All-Way Stop-Controlled	N/A	N/A	N/A	N/A	N/A	No	Current intersection is two-way stop-controlled.
Signalized Control	0.69	0.93	4.8	5	5	No	V/C is under 1 for both peak periods. Not preferred by County and City based on surrounding land use context
Roundabout	0.81 (0.94)	0.93 (1.07)	5.6	3	3	Yes	2x2 (2NSx1EW) Due to surrounding land use, speed management, and reductions of conflict points, justified to advance. Meets 90/10 split.
Median U-Turn	0.61 (0.67)	0.74 (0.76)	6.3	2	1	No	MUT (Partial MUT) Volumes for the U-turn movement would require dual lanes, additional pavement and possibly additional right-of-way.
RCUT (Signalized)	0.60	0.66	6.3	6	2	No	Volumes for the U-turn movement would require dual lanes and additional pavement which could require additional right-of-way.
RCUT (Unsignalized)	2.66	3.28	4.4	1	4	No	V/C exceeds 1 for both peak periods
Jughandle				N/A	N/A	No	N/A
Displaced Left-Turn	0.48 (0.62)	0.56 (0.74)	4.8	4	7	No	Full (Partial) DLT would be over designed, require additional ROW, and a lot more impervious area for LT movements that are not that heavy.
Continuous Green Tee	N/A	N/A	N/A	N/A	N/A	No	N/A
Quadrant Roadway	N/A	N/A	N/A			No	N/A
Thru-Cut	N/A	N/A	N/A	N/A	N/A	No	N/A
Partial Cloverleaf	N/A	N/A	N/A	N/A	N/A	No	N/A
Diverging Diamond Interchange	N/A	N/A	N/A	N/A	N/A	No	N/A

Resolution					
To be filled out by FDOT District Traffic Operations Engineer and District Design Engineer					
Project Determination		Identified Control Strategy Approved			
Comments	Roundabout was needed here as one of the speed management strategies. Additionally, the City of Daytona Beach and Volusia County preferred roundabout at this location.				
DTOE Name	James E. wood, Jr.	Signature	DocuSigned by: James E. Wood, Jr.	Date	08/14/2023 1
DDE Name	Jeffrey Cicerello	Signature	DocuSigned by: Jeffrey Cicerello	Date	08/14/2023 1

Florida Department of Transportation

Intersection Control Evaluation (ICE) Form

Stage 1: Screening

Intersection Control Evaluation Form 750-010-003

To fulfill the requirements of Stage 1 (Screening) of FDOT's ICE procedures, complete the following form and append all supporting documentation. Completed forms can be submitted to the District Traffic Operations Engineer (DTOE) and District Design Engineer (DDE) for the project's approval. Selections must be made in the "Intersection Type" and "Project Funding Source" cells below for the appropriate Stage 1 and Stage 2 forms to fully populate.

Project Name	LPGA Blvd from US 92 (SR 600) to Williamson Blvd PD&E Study	FDOT Project #	448456-1-22-01					
Submitted By	L. Hess	Agency/Company	American Consulting Professionals	Date	5/31/2022			
Email	Lhess@acp-fl.com	FDOT District	District 5	County	Volusia			
Project Locality (City/Town/Village)	Daytona Beach							
Intersection Type	At-Grade Intersection	FDOT Context Classification	C3R - Suburban Residential					
Project Funding Source	Federal	Project Type	Corridor Improvement Project					
Project Purpose (What is the catalyst for this project and why is it being undertaken?)	The purpose of this study is to accommodate existing and projected future travel demand and enhance safety and operations for the LPGA Blvd corridor and the I-95 interchange. The need is based on existing and future transportation demand and existing high number of crashes along LPGA Blvd and the interchange. Improvements are needed to address unacceptable LOS (LOS E or F) and enhance the safety of travel conditions along LPGA Blvd and at the interchange, various intersections, and uncontrolled access points.							
Project Setting Description (Describe the area surrounding the intersection)	The LPGA/Tournament intersection is currently signalized and the surrounding adjacent land use is vacant. The east leg of the intersection is an entrance to a residential community (LPGA International) and the west leg leads towards a residential area and an elementary school.							
Multimodal Context (Describe the pedestrian, bicycle, and transit activity in the area and the potential for activity based on surrounding land uses and development patterns)	On the east leg of the intersection, there is a sidewalk on the right side of Tournament Drive. On the west leg, there are sidewalks on both sides of the street. No sidewalks are provided on LPGA Blvd. There are existing crosswalks on the south and west approaches on the intersection. No existing bike lanes are provided. There is an elementary school on the west side of the intersection so the sidewalks and crosswalks provide access to the school from the residential areas.							

Major Street Information													
Route #:	CR 4019	Route Name(s)	LPGA Blvd				Milepost	N/A					
Existing Control Type	Signal		Existing AADT	9,500	Design Year AADT	31,500							
Design Vehicle	Florida Interstate Semitrailer (WB-62FL)		Control Vehicle	Florida Interstate Semitrailer (WB-62FL)									
Primary Functional Classification			Urban Minor Arterial			Design Speed (mph)	45						
Secondary Functional Classification (if app.)						Target Speed (mph) [if app.]	45						
Approach #1	Direction	Northbound	Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes						
	Sidewalks along	Both sides of the approach	Left-Turn	1									
	Crosswalk on Approach?	Yes	Left-Through	0	Weekday AM Peak		Weekday PM Peak						
	On-Street Bike Facilities?	No	Through	2	Left	77	Left	46					
	Multi-Use Path?	Yes	Left-Through-Right	0	Through	1,267	Through	1,042					
	Scheduled Bus Service?	No	Through-Right	0	Right	37	Right	72					
	Bus Stop on Approach?	No	Right-Turn	1	Daily Truck %		7.5%						
Approach #2	Direction	Southbound	Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes						
	Sidewalks along:	Both sides of the approach	Left-Turn	1									
	Crosswalk on Approach?	Yes	Left-Through	0	Weekday AM Peak		Weekday PM Peak						
	On-Street Bike Facilities?	No	Through	2	Left	172	Left	160					
	Multi-Use Path?	Yes	Left-Through-Right	0	Through	848	Through	1,373					
	Scheduled Bus Service?	No	Through-Right	0	Right	355	Right	360					
	Bus Stop on Approach?	No	Right-Turn	1	Daily Truck %		5.7%						

Minor Street Information									
Route #:		Route Name(s)		Tournament Drive			Milepost (if app.)		
Existing Control Type		Signal		Existing AADT		2,200		Design Year AADT	
Design Vehicle		Florida Interstate Semitrailer (WB-62FL)		Control Vehicle		Florida Interstate Semitrailer (WB-62FL)			
Primary Functional Classification				Rural Minor Collector			Design Speed (mph)		35
Secondary Functional Classification (if app.)							Target Speed (mph) [if app.]		35
Approach #1	Direction		Eastbound		Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes
	Sidewalks along:		Both sides of the approach		Left-Turn		1		
	Crosswalk on Approach?		Yes		Left-Through		0		Weekday AM Peak
	On-Street Bike Facilities?		No		Through		0		Left 333
	Multi-Use Path?		No		Left-Through-Right		0		Through 26
	Scheduled Bus Service?		No		Through-Right		1		Right 51
	Bus Stop on Approach?		No		Right-Turn		0		Daily Truck % 1.9%
Approach #2	Direction		Westbound		Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes
	Sidewalks along:		One side of the approach		Left-Turn		0		
	Crosswalk on Approach?		Yes		Left-Through		1		Weekday AM Peak
	On-Street Bike Facilities?		No		Through		0		Left 51
	Multi-Use Path?		No		Left-Through-Right		0		Through 26
	Scheduled Bus Service?		No		Through-Right		0		Right 149
	Bus Stop on Approach?		No		Right-Turn		1		Daily Truck % 4.9%
Approach #3	Direction				Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes
	Sidewalks along:				Left-Turn				
	Crosswalk on Approach?				Left-Through				Weekday AM Peak
	On-Street Bike Facilities?				Through				Left
	Multi-Use Path?				Left-Through-Right				Through
	Scheduled Bus Service?				Through-Right				Right
	Bus Stop on Approach?				Right-Turn				Daily Truck %

Crash History (Existing Intersections Only)

Append the most recent five-years of crash data for the intersection from the CAR System. If the crash data evidences any issues relating to safety performance, discuss briefly here:

The most recent five-year crash data (2015-2019) for the intersection of LPA and Tournament Drive had a report total of 50 crashes. The highest crash types were rear end crashes at 22 crashes and left turn crashes at 11 crashes. No fatal and 13 injury crashes were reported at this intersection for the analysis period.

Control Strategy Evaluation							
Provide a brief justification as to why each of the following control strategies should be advanced or not. Justification should consider potential environmental impacts.							
Control Strategy	CAP-X Outputs			SPICE Outputs		Strategy to Be Advanced?	Justification
	V/C Ratio		Multimodal Score	Crash Prediction Rank	SSI Rank		
	Weekday AM Peak	Weekday PM Peak					
Two-Way Stop-Controlled	N/A	N/A	N/A	N/A	N/A	No	Current intersection is a signal.
All-Way Stop-Controlled	N/A	N/A	N/A	N/A	N/A	No	Current intersection is a signal.
Signalized Control	0.77	0.69	4.8	5	5	Yes	Existing Condition.
Roundabout	0.92 (0.92)	0.93 (0.93)	5.6	3	1	No	2x2 (2NSx1EW) West approach could be extended further west in the future and could generate more traffic, causing an imbalance of volumes.
Median U-Turn	1.18 (0.72)	1.16 (0.79)	6.3	2	2	No	MUT (Partial MUT) Volumes for the U-turn movement would require dual lanes and additional pavement which could encroach pass existing right-of-way.
RCUT (Signalized)	0.66	0.61	6.3	6	3	No	Volumes for the U-turn movement would require dual lanes and additional pavement which could encroach pass existing right-of-way.
RCUT (Unsignalized)	2.82	2.69	4.4	1	4	No	V/C exceeds 1 for both peak periods.
Jughandle				N/A	N/A	No	N/A
Displaced Left-Turn	1.05 (0.64)	0.95 (0.64)	4.8	4	6	No	DLT (Partial DLT) DLT geometry would be an over design and require a lot more impervious area for left turn movements that are not that heavy.
Continuous Green Tee	N/A	N/A	N/A	N/A	N/A	No	N/A
Quadrant Roadway	N/A	N/A	N/A			No	N/A
Thru-Cut	N/A	N/A	N/A	N/A	N/A	No	N/A
Partial Cloverleaf	N/A	N/A	N/A	N/A	N/A	No	N/A
Diverging Diamond Interchange	N/A	N/A	N/A	N/A	N/A	No	N/A

Resolution					
To be filled out by FDOT District Traffic Operations Engineer and District Design Engineer					
Project Determination		Identified Control Strategy Approved			
Comments					
DTOE Name	James E. wood, Jr.	Signature	DocuSigned by: James E. Wood, Jr.	Date	08/14/2023 1
DDE Name	Jeffrey Cicereello	Signature	DocuSigned by: Jeffrey Cicereello	Date	08/14/2023 1

Florida Department of Transportation

Intersection Control Evaluation (ICE) Form

Stage 1: Screening

Intersection Control Evaluation Form 750-010-003

To fulfill the requirements of Stage 1 (Screening) of FDOT's ICE procedures, complete the following form and append all supporting documentation. Completed forms can be submitted to the District Traffic Operations Engineer (DTOE) and District Design Engineer (DDE) for the project's approval. Selections must be made in the "Intersection Type" and "Project Funding Source" cells below for the appropriate Stage 1 and Stage 2 forms to fully populate.

Project Name	LPGA Blvd from US 92 (SR 600) to Williamson Blvd PD&E Study			FDOT Project #	448456-1-22-01		
Submitted By	L. Hess		Agency/Company	American Consulting Professionals		Date	5/31/2022
Email	Lhess@acl-fl.com		FDOT District	District 5	County	Volusia	
Project Locality (City/Town/Village)			Daytona Beach				
Intersection Type		At-Grade Intersection		FDOT Context Classification		C3R - Suburban Residential	
Project Funding Source		Federal		Project Type		Corridor Improvement Project	
Project Purpose (What is the catalyst for this project and why is it being undertaken?)		The purpose of this study is to accommodate existing and projected future travel demand and enhance safety and operations for the LPGA Blvd corridor and the I-95 interchange. The need is based on existing and future transportation demand and existing high number of crashes along LPGA Blvd and the interchange. Improvements are needed to address unacceptable LOS (LOS E or F) and enhance the safety of travel conditions along LPGA Blvd and at the interchange, various intersections, and uncontrolled access points.					
Project Setting Description (Describe the area surrounding the intersection)		There is a Publix shopping center on the northeast corner of the LPGA/Tymber Creek intersection. There is a large residential community under development north of the intersection along LPGA Blvd.					
Multimodal Context (Describe the pedestrian, bicycle, and transit activity in the area and the potential for activity based on surrounding land uses and development patterns)		Existing sidewalks are only provided on Tymber Creek Rd. There are no existing bike lanes or transit activity provided within the intersection.					

Major Street Information									
Route #:		CR 4019	Route Name(s)		LPGA Blvd			Milepost	N/A
Existing Control Type		Signal		Existing AADT		22,600	Design Year AADT		43,000
Design Vehicle		Florida Interstate Semitrailer (WB-62FL)		Control Vehicle		Florida Interstate Semitrailer (WB-62FL)			
Primary Functional Classification				Urban Minor Arterial			Design Speed (mph)		45
Secondary Functional Classification (if app.)							Target Speed (mph) [if app.]		45
Approach #1	Direction		Westbound		Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes
	Sidewalks along		Both sides of the approach		Left-Turn		1		
	Crosswalk on Approach?		Yes		Left-Through		0	Weekday AM Peak	
	On-Street Bike Facilities?		No		Through		2	Left	66
	Multi-Use Path?		Yes		Left-Through-Right		0	Through	852
	Scheduled Bus Service?		No		Through-Right		0	Right	906
	Bus Stop on Approach?		No		Right-Turn		2	Daily Truck %	
Approach #2	Direction		Eastbound		Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes
	Sidewalks along:		Both sides of the approach		Left-Turn		2		
	Crosswalk on Approach?		Yes		Left-Through		0	Weekday AM Peak	
	On-Street Bike Facilities?		No		Through		2	Left	398
	Multi-Use Path?		Yes		Left-Through-Right		0	Through	1,315
	Scheduled Bus Service?		No		Through-Right		0	Right	36
	Bus Stop on Approach?		No		Right-Turn		1	Daily Truck %	

Minor Street Information										
Route #:		Route Name(s)		Tymber Creek Rd			Milepost (if app.)			
Existing Control Type		Signal		Existing AADT		13,400		Design Year AADT		
Design Vehicle		Florida Interstate Semitrailer (WB-62FL)		Control Vehicle		Florida Interstate Semitrailer (WB-62FL)				
Primary Functional Classification			Rural Minor Collector				Design Speed (mph)			
Secondary Functional Classification (if app.)							Target Speed (mph) [if app.]			
Approach #1	Direction		Southbound		Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes	
	Sidewalks along:		Both sides of the approach		Left-Turn		2			
	Crosswalk on Approach?		Yes		Left-Through		0		Weekday AM Peak	
	On-Street Bike Facilities?		Yes		Through		0		Left 1,184	
	Multi-Use Path?		No		Left-Through-Right		0		Through 48	
	Scheduled Bus Service?		No		Through-Right		1		Right 415	
	Bus Stop on Approach?		No		Right-Turn		0		Daily Truck % 5.9%	
Approach #2	Direction		Northbound		Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes	
	Sidewalks along:		Both sides of the approach		Left-Turn		1			
	Crosswalk on Approach?		Yes		Left-Through		0		Weekday AM Peak	
	On-Street Bike Facilities?		Yes		Through		0		Left 108	
	Multi-Use Path?		No		Left-Through-Right		0		Through 48	
	Scheduled Bus Service?		No		Through-Right		1		Right 40	
	Bus Stop on Approach?		No		Right-Turn		0		Daily Truck % 2.0%	
Approach #3	Direction				Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes	
	Sidewalks along:				Left-Turn					
	Crosswalk on Approach?				Left-Through				Weekday AM Peak	
	On-Street Bike Facilities?				Through				Left	
	Multi-Use Path?				Left-Through-Right				Through	
	Scheduled Bus Service?				Through-Right				Right	
	Bus Stop on Approach?				Right-Turn				Daily Truck %	

Crash History (Existing Intersections Only)

Append the most recent five-years of crash data for the intersection from the CAR System. If the crash data evidences any issues relating to safety performance, discuss briefly here:

The most recent five-year crash data (2015-2019) for the intersection of LPGA and Tymber Creek Road had a report total of three (3) crashes. All three (3) crashes were reported as rear end crashes. No fatal and two (2) injury crashes were reported at this intersection for the analysis period.

Control Strategy Evaluation							
Provide a brief justification as to why each of the following control strategies should be advanced or not. Justification should consider potential environmental impacts.							
Control Strategy	CAP-X Outputs			SPICE Outputs		Strategy to Be Advanced?	Justification
	V/C Ratio		Multimodal Score	Crash Prediction Rank	SSI Rank		
	Weekday AM Peak	Weekday PM Peak					
Two-Way Stop-Controlled	N/A	N/A	N/A	N/A	N/A	No	Current intersection is a signal.
All-Way Stop-Controlled	N/A	N/A	N/A	N/A	N/A	No	Current intersection is a signal.
Signalized Control	0.91	0.98	4.8	4	5	Yes	Existing Condition.
Roundabout	2.60 (3.20)	2.51 (3.45)	5.6	5	1	No	2x2 (2NSx1EW) V/C exceeds 1 for both peak periods.
Median U-Turn	1.43 (0.94)	1.17 (1.10)	6.3	2	2	No	MUT (Partial MUT) V/C exceeds 1 for both peak periods. (V/C exceeds 1 for PM peak period.)
RCUT (Signalized)	1.42	1.08	6.3	6	3	No	V/C exceeds 1 for both peak periods.
RCUT (Unsignalized)	11.22	10.61	4.4	1	4	No	V/C exceeds 1 for both peak periods.
Jughandle				N/A	N/A	No	N/A
Displaced Left-Turn	0.78 (0.82)	0.71 (0.79)	4.8	3	6	No	DLT (Partial DLT) Insufficient right-of-way to provide displaced left turns for all 4 approaches of the intersection.
Continuous Green Tee	N/A	N/A	N/A	N/A	N/A	No	N/A
Quadrant Roadway	N/A	N/A	N/A			No	N/A
Thru-Cut	N/A	N/A	N/A	N/A	N/A	No	N/A
Other 1 (Type)	N/A	N/A	N/A	N/A	N/A	No	N/A
Other 2 (Type)	N/A	N/A	N/A	N/A	N/A	No	N/A

Resolution					
To be filled out by FDOT District Traffic Operations Engineer and District Design Engineer					
Project Determination		Identified Control Strategy Approved			
Comments					
DTOE Name	James E. wood, Jr.	Signature	DocuSigned by: James E. Wood, Jr.	Date	08/14/2023 1
DDE Name	Jeffrey Cicerello	Signature	DocuSigned by: Jeffrey Cicerello	Date	08/14/2023 1

Florida Department of Transportation

Intersection Control Evaluation (ICE) Form

Stage 1: Screening

Intersection Control Evaluation Form 750-010-003

To fulfill the requirements of Stage 1 (Screening) of FDOT's ICE procedures, complete the following form and append all supporting documentation. Completed forms can be submitted to the District Traffic Operations Engineer (DTOE) and District Design Engineer (DDE) for the project's approval. Selections must be made in the "Intersection Type" and "Project Funding Source" cells below for the appropriate Stage 1 and Stage 2 forms to fully populate.

Project Name	LPGA Blvd from US 92 (SR 600) to Williamson Blvd PD&E Study			FDOT Project #	448456-1-22-01		
Submitted By	Tarek Lotfy Kamal		Agency/Company	HDR		Date	6/28/2022
Email	Tarek.lotfykamal@hdrinc.com		FDOT District	District 5	County	Volusia	
Project Locality (City/Town/Village)			Daytona Beach				
Intersection Type	At-Grade Intersection		FDOT Context Classification	C3C - Suburban Commercial			
Project Funding Source		Federal	Project Type	Corridor Improvement Project			
Project Purpose (What is the catalyst for this project and why is it being undertaken?)		The purpose of this study is to accommodate existing and projected future travel demand and enhance safety and operations for the LPGA Blvd corridor and the I-95 interchange. The need is based on existing and future transportation demand and existing high number of crashes along LPGA Blvd and the interchange. Improvements are needed to address unacceptable LOS (LOS E or F) and enhance the safety of travel conditions along LPGA Blvd and at the interchange, various intersections, and uncontrolled access points.					
Project Setting Description (Describe the area surrounding the intersection)		The LPGA Blvd/Champions Dr intersection is currently a Signalized intersection. All four quadrants adjacent to the intersection are vacant, but there's a Publix Liquors along the northeast quadrant.					
Multimodal Context (Describe the pedestrian, bicycle, and transit activity in the area and the potential for activity based on surrounding land uses and development patterns)		Sidewalk exists along LPGA Blvd on the northern side of the west left and along Champions Dr on the western side of the north leg. There are no bike lanes at this intersection. Marked crosswalks available to cross all four legs of the intersection.					

Major Street Information									
Route #:		CR 4019	Route Name(s)		LPGA Blvd			Milepost	N/A
Existing Control Type		Two-way Stop-Control			Existing AADT	16,900	Design Year AADT	51,000	
Design Vehicle		Florida Interstate Semitrailer (WB-62FL)			Control Vehicle	Florida Interstate Semitrailer (WB-62FL)			
Primary Functional Classification			Urban Minor Arterial				Design Speed (mph)	35	
Secondary Functional Classification (if app.)							Target Speed (mph) [if app.]	35	
Approach #1	Direction	Eastbound		Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes	
	Sidewalks along	Neither side of the approach		Left-Turn	1	Weekday AM Peak		Weekday PM Peak	
	Crosswalk on Approach?	No		Left-Through	0	Left	77	Left	106
	On-Street Bike Facilities?	No		Through	1	Through	2,366	Through	1,684
	Multi-Use Path?	No		Left-Through-Right	0	Right	96	Right	94
	Scheduled Bus Service?	No		Through-Right	0	Daily Truck %		3.9%	
	Bus Stop on Approach?	No		Right-Turn	1				
Approach #2	Direction	Westbound		Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes	
	Sidewalks along:	Neither side of the approach		Left-Turn	1	Weekday AM Peak		Weekday PM Peak	
	Crosswalk on Approach?	No		Left-Through	0	Left	90	Left	314
	On-Street Bike Facilities?	No		Through	1	Through	1,639	Through	2,028
	Multi-Use Path?	No		Left-Through-Right	0	Right	68	Right	124
	Scheduled Bus Service?	No		Through-Right	0	Daily Truck %		4.8%	
	Bus Stop on Approach?	No		Right-Turn	1				

Minor Street Information										
Route #:		Route Name(s)		Champions Dr			Milepost (if app.)		N/A	
Existing Control Type		Two-way Stop-Control		Existing AADT		1,600	Design Year AADT		4,000	
Design Vehicle		Florida Interstate Semitrailer (WB-62FL)		Control Vehicle		Florida Interstate Semitrailer (WB-62FL)				
Primary Functional Classification			Urban Local				Design Speed (mph)		30	
Secondary Functional Classification (if app.)							Target Speed (mph) [if app.]			
Approach #1	Direction		Northbound		Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes	
	Sidewalks along:		Neither side of the approach		Left-Turn	1				
	Crosswalk on Approach?		No		Left-Through	0	Weekday AM Peak		Weekday PM Peak	
	On-Street Bike Facilities?		No		Through	0	Left	21	Left	196
	Multi-Use Path?		No		Left-Through-Right	0	Through	16	Through	29
	Scheduled Bus Service?		No		Through-Right	0	Right	166	Right	142
	Bus Stop on Approach?		No		Right-Turn	1	Daily Truck %		2.5%	
Approach #2	Direction		Southeastbound		Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes	
	Sidewalks along:		One side of the approach		Left-Turn	0				
	Crosswalk on Approach?		No		Left-Through	0	Weekday AM Peak		Weekday PM Peak	
	On-Street Bike Facilities?		No		Through	0	Left	58	Left	245
	Multi-Use Path?		No		Left-Through-Right	1	Through	19	Through	26
	Scheduled Bus Service?		No		Through-Right	0	Right	164	Right	310
	Bus Stop on Approach?		No		Right-Turn	0	Daily Truck %		2.8%	
Approach #3	Direction				Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes	
	Sidewalks along:				Left-Turn					
	Crosswalk on Approach?				Left-Through		Weekday AM Peak		Weekday PM Peak	
	On-Street Bike Facilities?				Through		Left		Left	
	Multi-Use Path?				Left-Through-Right		Through		Through	
	Scheduled Bus Service?				Through-Right		Right		Right	
	Bus Stop on Approach?				Right-Turn		Daily Truck %			

Crash History (Existing Intersections Only)	
Append the most recent five-years of crash data for the intersection from the CAR System. If the crash data evidences any issues relating to safety performance, discuss briefly here:	
The most recent five-year crash data (2015-2019) for the intersection of LPGA Boulevard at Champions Drive had ten (10) reported crashes. The most predominant crash were animal crashes at four (4) crashes. There were no fatal crashes reported but there were three (3) injury crashes at this intersection for the analysis period.	

Control Strategy Evaluation							
Provide a brief justification as to why each of the following control strategies should be advanced or not. Justification should consider potential environmental impacts.							
Control Strategy	CAP-X Outputs			SPICE Outputs		Strategy to Be Advanced?	Justification
	V/C Ratio		Multimodal Score	Crash Prediction Rank	SSI Rank		
	Weekday AM Peak	Weekday PM Peak					
Two-Way Stop-Controlled	N/A	N/A	N/A	N/A	N/A	No	Current intersection is a signal.
All-Way Stop-Controlled	N/A	N/A	N/A	N/A	N/A	No	Current intersection is a signal.
Signalized Control	0.73	0.95	4.8	4	4	Yes	Existing Conditions, projected to have a V/C ratio less than 1 by 2050
Roundabout	N/A	N/A	N/A	N/A	N/A	No	LPGA Blvd is planned to be widened to a 6-lane corridor at this intersection.
Median U-Turn	0.65	0.77	6.3	2	3	No	Partial MUT. Intersection is constraint by ROW and bridge east of the intersection, and could require additional right-of-way.
RCUT (Signalized)	0.60	0.81	6.3	5	2	No	Intersection is constraint by ROW and bridge east of the intersection, and could require additional right-of-way.
RCUT (Unsignalized)	12.11	25.80	4.4	1	5	No	V/C exceeds 1 for both peak periods
Jughandle				N/A	N/A	No	N/A
Displaced Left-Turn	0.58	0.71	4.8	3	6	No	Partial DLT. Intersection is constraint by ROW and bridge east of the intersection, and could require additional right-of-way.
Continuous Green Tee	N/A	N/A	N/A	N/A	N/A	No	N/A
Quadrant Roadway	N/A	N/A	N/A			No	N/A
Thru-Cut	0.90	1.15	5.2	N/A	1	No	V/C exceeds 1 for PM peak.
Other 1 (Type)	N/A	N/A	N/A	N/A	N/A	No	N/A
Other 2 (Type)	N/A	N/A	N/A	N/A	N/A	No	N/A

Resolution					
<i>To be filled out by FDOT District Traffic Operations Engineer and District Design Engineer</i>					
Project Determination		Identified Control Strategy Approved			
Comments					
DTOE Name	James E. wood, Jr.	Signature	DocuSigned by: <i>James E. Wood, Jr.</i>	Date	08/14/2023 1
DDE Name	Jeffrey Cicerello	Signature	DocuSigned by: <i>Jeffrey Cicerello</i>	Date	08/14/2023 1

Florida Department of Transportation

Intersection Control Evaluation (ICE) Form

Stage 1: Screening

Intersection Control Evaluation Form 750-010-003

To fulfill the requirements of Stage 1 (Screening) of FDOT's ICE procedures, complete the following form and append all supporting documentation. Completed forms can be submitted to the District Traffic Operations Engineer (DTOE) and District Design Engineer (DDE) for the project's approval. Selections must be made in the "Intersection Type" and "Project Funding Source" cells below for the appropriate Stage 1 and Stage 2 forms to fully populate.

Project Name	LPGA Blvd from US 92 (SR 600) to Williamson Blvd PD&E Study			FDOT Project #	448456-1-22-01		
Submitted By	Tarek Lotfy Kamal		Agency/Company	HDR		Date	6/28/2022
Email	Tarek.lotfykamal@hdrinc.com		FDOT District	District 5	County	Volusia	
Project Locality (City/Town/Village)			Daytona Beach				
Intersection Type	At-Grade Intersection		FDOT Context Classification	C3C - Suburban Commercial			
Project Funding Source		Federal	Project Type	Corridor Improvement Project			
Project Purpose (What is the catalyst for this project and why is it being undertaken?)		The purpose of this study is to accommodate existing and projected future travel demand and enhance safety and operations for the LPGA Blvd corridor and the I-95 interchange. The need is based on existing and future transportation demand and existing high number of crashes along LPGA Blvd and the interchange. Improvements are needed to address unacceptable LOS (LOS E or F) and enhance the safety of travel conditions along LPGA Blvd and at the interchange, various intersections, and uncontrolled access points					
Project Setting Description (Describe the area surrounding the intersection)		The LPGA Blvd/Tokoma Farms Rd intersection is currently a signalized intersection. All four quadrants adjacent to the intersection are vacant, but there's a hotel/resort along the northeast quadrant.					
Multimodal Context (Describe the pedestrian, bicycle, and transit activity in the area and the potential for activity based on surrounding land uses and development patterns)		There are no sidewalks or bike lane facility along LPGA Boulevard. No sidewalks along Tomoka Farms Road. No marked crosswalks at this intersection.					

Major Street Information										
Route #:		CR 4019	Route Name(s)		LPGA Blvd			Milepost	N/A	
Existing Control Type		Two-way Stop-Control			Existing AADT	22,900	Design Year AADT		54,000	
Design Vehicle		Florida Interstate Semitrailer (WB-62FL)			Control Vehicle	Florida Interstate Semitrailer (WB-62FL)				
Primary Functional Classification			Urban Minor Arterial				Design Speed (mph)		35	
Secondary Functional Classification (if app.)							Target Speed (mph) [if app.]		35	
Approach #1	Direction	Eastbound		Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes		
	Sidewalks along	Neither side of the approach		Left-Turn	1	Weekday AM Peak		Weekday PM Peak		
	Crosswalk on Approach?	No		Left-Through	0	Left		263	Left	327
	On-Street Bike Facilities?	No		Through	0	Through		2,191	Through	1,562
	Multi-Use Path?	No		Left-Through-Right	0	Right		136	Right	182
	Scheduled Bus Service?	No		Through-Right	1	Daily Truck %		4.8%		
	Bus Stop on Approach?	No		Right-Turn	0					
Approach #2	Direction	Westbound		Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes		
	Sidewalks along:	Neither side of the approach		Left-Turn	0	Weekday AM Peak		Weekday PM Peak		
	Crosswalk on Approach?	No		Left-Through	1	Left		302	Left	293
	On-Street Bike Facilities?	No		Through	0	Through		1,493	Through	2,087
	Multi-Use Path?	No		Left-Through-Right	0	Right		131	Right	169
	Scheduled Bus Service?	No		Through-Right	0	Daily Truck %		5.3%		
	Bus Stop on Approach?	No		Right-Turn	1					

Minor Street Information									
Route #:	CR 415	Route Name(s)	Tomoka Farms Road				Milepost (if app.)	N/A	
Existing Control Type	Two-way Stop-Control		Existing AADT	2,950		Design Year AADT	10,100		
Design Vehicle	Florida Interstate Semitrailer (WB-62FL)		Control Vehicle	Florida Interstate Semitrailer (WB-62FL)					
Primary Functional Classification			Urban Major Collector				Design Speed (mph)	35	
Secondary Functional Classification (if app.)							Target Speed (mph) [if app.]		
Approach #1	Direction	Northbound	Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes		
	Sidewalks along:	Neither side of the approach	Left-Turn	1					
	Crosswalk on Approach?	No	Left-Through	0	Weekday AM Peak		Weekday PM Peak		
	On-Street Bike Facilities?	No	Through	1	Left	144	Left	190	
	Multi-Use Path?	No	Left-Through-Right	0	Through	11	Through	6	
	Scheduled Bus Service?	No	Through-Right	0	Right	205	Right	417	
	Bus Stop on Approach?	No	Right-Turn	1	Daily Truck %		8.2%		
Approach #2	Direction	Southbound	Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes		
	Sidewalks along:	Neither side of the approach	Left-Turn	0					
	Crosswalk on Approach?	No	Left-Through	0	Weekday AM Peak		Weekday PM Peak		
	On-Street Bike Facilities?	No	Through	0	Left	358	Left	202	
	Multi-Use Path?	No	Left-Through-Right	1	Through	4	Through	4	
	Scheduled Bus Service?	No	Through-Right	0	Right	160	Right	189	
	Bus Stop on Approach?	No	Right-Turn	0	Daily Truck %		3.3%		
Approach #3	Direction		Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes		
	Sidewalks along:		Left-Turn						
	Crosswalk on Approach?		Left-Through		Weekday AM Peak		Weekday PM Peak		
	On-Street Bike Facilities?		Through		Left		Left		
	Multi-Use Path?		Left-Through-Right		Through		Through		
	Scheduled Bus Service?		Through-Right		Right		Right		
	Bus Stop on Approach?		Right-Turn		Daily Truck %				

Crash History (Existing Intersections Only)

Append the most recent five-years of crash data for the intersection from the CAR System. If the crash data evidences any issues relating to safety performance, discuss briefly here:

The most recent five-year crash data (2015-2019) for the intersection of LPGA Boulevard at Tomoka Farms Road had 49 reported crashes. The most predominant crash were rear end crashes at 16 crashes. There were no fatal crashes reported but there were 14 injury crashes at this intersection for the analysis period.

Control Strategy Evaluation							
Provide a brief justification as to why each of the following control strategies should be advanced or not. Justification should consider potential environmental impacts.							
Control Strategy	CAP-X Outputs			SPICE Outputs		Strategy to Be Advanced?	Justification
	V/C Ratio		Multimodal Score	Crash Prediction Rank	SSI Rank		
	Weekday AM Peak	Weekday PM Peak					
Two-Way Stop-Controlled	N/A	N/A	N/A	N/A	N/A	No	Current intersection is a signal.
All-Way Stop-Controlled	N/A	N/A	N/A	N/A	N/A	No	Current intersection is a signal.
Signalized Control	1.11	1.22	4.8	4	5	Yes	Existing Condition. V/C > 1. However, the public preferred to have all traditional movements served at this location, keep existing.
Roundabout	N/A	N/A	N/A	N/A	N/A	No	LPGA Blvd is planned to be widened to a 8-lane corridor at this intersection.
Median U-Turn	1.42	1.13	6.3	2	3	No	Partial MUT. V/C exceeds 1 for both peak periods
RCUT (Signalized)	0.72	0.68	6.3	5	1	No	Adjacent intersections are approx.1000ft apart. Heavy left turn movements difficult to accomedate at adjacent intersection. Additional ROW required for this Alt.
RCUT (Unsignalized)	18.97	79.18	4.4	1	4	No	V/C exceeds 1 for both peak periods
Jughandle				N/A	N/A	No	N/A
Displaced Left-Turn	0.81	0.76	4.8	3	6	No	Partial DLT. This alternative would require additional right-of-way for implementation.
Continuous Green Tee	N/A	N/A	N/A	N/A	N/A	No	N/A
Quadrant Roadway	N/A	N/A	N/A			No	N/A
Thru-Cut	0.95	1.20	5.2	N/A	2	No	Provides better V/C ratios over existing conditions. Based on comments received from the public meeting, this option was dismissed
Other 1 (Type)	N/A	N/A	N/A	N/A	N/A	No	N/A
Other 2 (Type)	N/A	N/A	N/A	N/A	N/A	No	N/A

Resolution					
To be filled out by FDOT District Traffic Operations Engineer and District Design Engineer					
Project Determination		Identified Control Strategy Approved			
Comments	The proposed control type was coordinated with the City of Daytona Beach, Volusia County. Public sentiments obtained from 02/28/23 Open house and subsequent community meetings is to provide all traditional movement and not to implement any control type that will re-route some movements to adjacent intersections.				
DTOE Name	James E. Wood, Jr.	Signature	DocuSigned by: James E. Wood, Jr.	Date	08/14/2023
DDE Name	Jeffrey Cicerello	Signature	DocuSigned by: Jeffrey Cicerello	Date	08/14/2023

Florida Department of Transportation

Intersection Control Evaluation (ICE) Form

Stage 1: Screening

Intersection Control Evaluation Form 750-010-003

To fulfill the requirements of Stage 1 (Screening) of FDOT's ICE procedures, complete the following form and append all supporting documentation. Completed forms can be submitted to the District Traffic Operations Engineer (DTOE) and District Design Engineer (DDE) for the project's approval. Selections must be made in the "Intersection Type" and "Project Funding Source" cells below for the appropriate Stage 1 and Stage 2 forms to fully populate.

Project Name	LPGA Blvd from US 92 (SR 600) to Williamson Blvd PD&E Study			FDOT Project #	448456-1-22-01		
Submitted By	Tarek Lotfy Kamal		Agency/Company	HDR		Date	6/28/2022
Email	Tarek.lotfykamal@hdrinc.com		FDOT District	District 5	County	Volusia	
Project Locality (City/Town/Village)			Daytona Beach				
Intersection Type	At-Grade Intersection		FDOT Context Classification	C3C - Suburban Commercial			
Project Funding Source		Federal	Project Type	Corridor Improvement Project			
Project Purpose (What is the catalyst for this project and why is it being undertaken?)		The purpose of this study is to accommodate existing and projected future travel demand and enhance safety and operations for the LPGA Blvd corridor and the I-95 interchange. The need is based on existing and future transportation demand and existing high number of crashes along LPGA Blvd and the interchange. Improvements are needed to address unacceptable LOS (LOS E or F) and enhance the safety of travel conditions along LPGA Blvd and at the interchange, various intersections, and uncontrolled access points					
Project Setting Description (Describe the area surrounding the intersection)		The LPGA Blvd/Technology Blvd/Outlet Blvd is currently a signalized intersection. The surrounding adjacent lane uses are commercial on the northeast and south east quadrants, while the northwest and southwest quadrants are currently vacant.					
Multimodal Context (Describe the pedestrian, bicycle, and transit activity in the area and the potential for activity based on surrounding land uses and development patterns)		No bike lane facility along LPGA Blvd. Some sidewalk available along LPGA Blvd on the east leg. Sidewalks available on both side along the north leg of Technology Boulevard and on one side along the south leg. Marked crosswalks crossing the west leg in the north-south direction and crossing the south leg in the east-west direction.					

Major Street Information										
Route #:		CR 4019	Route Name(s)		LPGA Blvd			Milepost	N/A	
Existing Control Type		Signal			Existing AADT	38,000	Design Year AADT	69,000		
Design Vehicle		Florida Interstate Semitrailer (WB-62FL)			Control Vehicle	Florida Interstate Semitrailer (WB-62FL)				
Primary Functional Classification			Urban Minor Arterial				Design Speed (mph)	35		
Secondary Functional Classification (if app.)							Target Speed (mph) [if app.]	35		
Approach #1	Direction	Eastbound		Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes		
	Sidewalks along	Neither side of the approach		Left-Turn	1	Weekday AM Peak		Weekday PM Peak		
	Crosswalk on Approach?	Yes		Left-Through	0	Left		870	Left	612
	On-Street Bike Facilities?	No		Through	2	Through		2,193	Through	1,477
	Multi-Use Path?	No		Left-Through-Right	0	Right		449	Right	870
	Scheduled Bus Service?	No		Through-Right	0	Daily Truck %		2.4%		
	Bus Stop on Approach?	No		Right-Turn	1					
Approach #2	Direction	Westbound		Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes		
	Sidewalks along:	Both sides of the approach		Left-Turn	1	Weekday AM Peak		Weekday PM Peak		
	Crosswalk on Approach?	No		Left-Through	0	Left		121	Left	338
	On-Street Bike Facilities?	No		Through	2	Through		1,450	Through	2,022
	Multi-Use Path?	No		Left-Through-Right	0	Right		306	Right	205
	Scheduled Bus Service?	No		Through-Right	0	Daily Truck %		3.3%		
	Bus Stop on Approach?	No		Right-Turn	1					

Minor Street Information										
Route #:		Route Name(s)		Technology Boulevard/Outlet Boulevard			Milepost (if app.)		N/A	
Existing Control Type		Signal		Existing AADT		9,000	Design Year AADT		23,500	
Design Vehicle		Florida Interstate Semitrailer (WB-62FL)		Control Vehicle		Florida Interstate Semitrailer (WB-62FL)				
Primary Functional Classification			Urban Local				Design Speed (mph)		35	
Secondary Functional Classification (if app.)							Target Speed (mph) [if app.]			
Approach #1	Direction		Northbound		Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes	
	Sidewalks along:		One side of the approach		Left-Turn	2				
	Crosswalk on Approach?		Yes		Left-Through	0	Weekday AM Peak		Weekday PM Peak	
	On-Street Bike Facilities?		No		Through	1	Left	187	Left	548
	Multi-Use Path?		No		Left-Through-Right	0	Through	5	Through	179
	Scheduled Bus Service?		No		Through-Right	0	Right	20	Right	339
	Bus Stop on Approach?		No		Right-Turn	1	Daily Truck %		3.7%	
Approach #2	Direction		Southbound		Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes	
	Sidewalks along:		Both sides of the approach		Left-Turn	0				
	Crosswalk on Approach?		No		Left-Through	1	Weekday AM Peak		Weekday PM Peak	
	On-Street Bike Facilities?		No		Through	0	Left	116	Left	243
	Multi-Use Path?		No		Left-Through-Right	0	Through	35	Through	112
	Scheduled Bus Service?		No		Through-Right	0	Right	879	Right	765
	Bus Stop on Approach?		No		Right-Turn	1	Daily Truck %		3.7%	
Approach #3	Direction				Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes	
	Sidewalks along:				Left-Turn					
	Crosswalk on Approach?				Left-Through		Weekday AM Peak		Weekday PM Peak	
	On-Street Bike Facilities?				Through		Left		Left	
	Multi-Use Path?				Left-Through-Right		Through		Through	
	Scheduled Bus Service?				Through-Right		Right		Right	
	Bus Stop on Approach?				Right-Turn		Daily Truck %			

Crash History (Existing Intersections Only)

Append the most recent five-years of crash data for the intersection from the CAR System. If the crash data evidences any issues relating to safety performance, discuss briefly here:

The most recent five-year crash data (2015-2019) for the intersection of LPGA Boulevard at Outlet boulevard/Technology Boulevard had a 36 reported crashes. The most predominant crash were rear end crashes at 27 crashes. There were no fatal crashes reported but there were 8 injury crashes at this intersection for the analysis period.

Control Strategy Evaluation							
Provide a brief justification as to why each of the following control strategies should be advanced or not. Justification should consider potential environmental impacts.							
Control Strategy	CAP-X Outputs			SPICE Outputs		Strategy to Be Advanced?	Justification
	V/C Ratio		Multimodal Score	Crash Prediction Rank	SSI Rank		
	Weekday AM Peak	Weekday PM Peak					
Two-Way Stop-Controlled	N/A	N/A	N/A	N/A	N/A	No	Current intersection is a signal.
All-Way Stop-Controlled	N/A	N/A	N/A	N/A	N/A	No	Current intersection is a signal.
Signalized Control	1.11	1.22	4.8	4	5	Yes	Existing Condition. V/C ratios over 1. However, the public preferred to have all traditional movements served at this location, keep existing.
Roundabout	N/A	N/A	N/A	N/A	N/A	No	LPGA Blvd is planned to be widened to a 8-lane corridor at this intersection.
Median U-Turn	1.42	1.13	6.3	2	3	No	Partial MUT. V/C exceeds 1 for both peak periods
RCUT (Signalized)	0.72	0.68	6.3	5	1	No	Adjacent intersections are approx.1000ft apart. Heavy left turn movements difficult to accomodate at adjacent intersection. Additional ROW required for this Alt.
RCUT (Unsignalized)	18.97	79.18	4.4	1	4	No	V/C exceeds 1 for both peak periods
Jughandle				N/A	N/A	No	N/A
Displaced Left-Turn	0.81	0.76	4.8	3	6	No	Partial DLT. This alternative would require additional right-of-way for implementation.
Continuous Green Tee	N/A	N/A	N/A	N/A	N/A	No	N/A
Quadrant Roadway	N/A	N/A	N/A			No	N/A
Thru-Cut	0.95	1.20	5.2	N/A	2	No	Provides better V/C ratios over existing conditions. However, it was dismissed since public, the City and the County preferred to allow all movements here.
Other 1 (Type)	N/A	N/A	N/A	N/A	N/A	No	N/A
Other 2 (Type)	N/A	N/A	N/A	N/A	N/A	No	N/A

Resolution					
To be filled out by FDOT District Traffic Operations Engineer and District Design Engineer					
Project Determination		Identified Control Strategy Approved			
Comments	The proposed control type was coordinated with the City of Daytona Beach, Volusia County. Public sentiments obtained from 02/28/23 Open House and subsequent community meetings is to provide all traditional movement and not to implement any control type that will re-route through movements to Williamson Boulevard.				
DTOE Name	James E. Wood, Jr.	Signature	DocuSigned by: <i>James E. Wood, Jr.</i> 668E296FACF0468...	Date	08/14/2023 1
DDE Name	Jeffrey Ciccerello	Signature	DocuSigned by: <i>Jeffrey Ciccerello</i> E49D9D8820CD4A2	Date	08/14/2023 1

Florida Department of Transportation

Intersection Control Evaluation (ICE) Form

Stage 1: Screening

Intersection Control Evaluation Form 750-010-003

To fulfill the requirements of Stage 1 (Screening) of FDOT's ICE procedures, complete the following form and append all supporting documentation. Completed forms can be submitted to the District Traffic Operations Engineer (DTOE) and District Design Engineer (DDE) for the project's approval. Selections must be made in the "Intersection Type" and "Project Funding Source" cells below for the appropriate Stage 1 and Stage 2 forms to fully populate.

Project Name	LPGA Blvd from US 92 (SR 600) to Williamson Blvd PD&E Study			FDOT Project #	448456-1-22-01		
Submitted By	Tarek Lotfy Kamal		Agency/Company	HDR		Date	6/28/2022
Email	Tarek.lotfykamal@hdrinc.com		FDOT District	District 5	County	Volusia	
Project Locality (City/Town/Village)			Daytona Beach				
Intersection Type	At-Grade Intersection		FDOT Context Classification	C3C - Suburban Commercial			
Project Funding Source		Federal	Project Type	Corridor Improvement Project			
Project Purpose (What is the catalyst for this project and why is it being undertaken?)		The purpose of this study is to accommodate existing and projected future travel demand and enhance safety and operations for the LPGA Blvd corridor and the I-95 interchange. The need is based on existing and future transportation demand and existing high number of crashes along LPGA Blvd and the interchange. Improvements are needed to address unacceptable LOS (LOS E or F) and enhance the safety of travel conditions along LPGA Blvd and at the interchange, various intersections, and uncontrolled access points.					
Project Setting Description (Describe the area surrounding the intersection)		The LPGA Blvd/Williamson Blvd is currently a signalized intersection. The surrounding adjacent lane uses are commercial.					
Multimodal Context (Describe the pedestrian, bicycle, and transit activity in the area and the potential for activity based on surrounding land uses and development patterns)		The west leg of the intersection has sidewalks on both sides, the east leg has a sidewalk on only one side, while the south and north legs have sidewalks on both sides of the road. There are marked crosswalks on all legs of the intersection. There are no existing Bike lanes or transit activity provided at this intersection.					

Major Street Information										
Route #:		CR 4019	Route Name(s)		LPGA Blvd			Milepost	N/A	
Existing Control Type		Signal			Existing AADT	33,000	Design Year AADT	56,000		
Design Vehicle		Florida Interstate Semitrailer (WB-62FL)			Control Vehicle	Florida Interstate Semitrailer (WB-62FL)				
Primary Functional Classification			Urban Minor Arterial				Design Speed (mph)	55		
Secondary Functional Classification (if app.)							Target Speed (mph) [if app.]	35		
Approach #1	Direction	Eastbound			Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes	
	Sidewalks along	Both sides of the approach			Left-Turn	2	Weekday AM Peak		Weekday PM Peak	
	Crosswalk on Approach?	Yes			Left-Through	0				
	On-Street Bike Facilities?	No			Through	2	Left	578	Left	509
	Multi-Use Path?	No			Left-Through-Right	0	Through	1,497	Through	1,211
	Scheduled Bus Service?	No			Through-Right	0	Right	444	Right	339
	Bus Stop on Approach?	No			Right-Turn	1	Daily Truck %		3.3%	
Approach #2	Direction	Westbound			Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes	
	Sidewalks along:	One side of the approach			Left-Turn	2	Weekday AM Peak		Weekday PM Peak	
	Crosswalk on Approach?	Yes			Left-Through	0				
	On-Street Bike Facilities?	No			Through	2	Left	259	Left	370
	Multi-Use Path?	No			Left-Through-Right	0	Through	1,128	Through	1,615
	Scheduled Bus Service?	No			Through-Right	0	Right	161	Right	164
	Bus Stop on Approach?	No			Right-Turn	1	Daily Truck %		3.0%	

Minor Street Information									
Route #:	CR 4009	Route Name(s)	Williamson Blvd				Milepost (if app.)	N/A	
Existing Control Type	Signal		Existing AADT	18,150		Design Year AADT	35,500		
Design Vehicle	Florida Interstate Semitrailer (WB-62FL)		Control Vehicle	Florida Interstate Semitrailer (WB-62FL)					
Primary Functional Classification			Urban Principal Arterial - Other				Design Speed (mph)	45	
Secondary Functional Classification (if app.)							Target Speed (mph) [if app.]		
Approach #1	Direction	Northbound	Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes		
	Sidewalks along:	Both sides of the approach	Left-Turn	2					
	Crosswalk on Approach?	Yes	Left-Through	0	Weekday AM Peak		Weekday PM Peak		
	On-Street Bike Facilities?	No	Through	1	Left	372	Left	619	
	Multi-Use Path?	No	Left-Through-Right	0	Through	504	Through	789	
	Scheduled Bus Service?	No	Through-Right	1	Right	221	Right	279	
	Bus Stop on Approach?	No	Right-Turn	0	Daily Truck %		3.6%		
Approach #2	Direction	Southbound	Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes		
	Sidewalks along:	Both sides of the approach	Left-Turn	2					
	Crosswalk on Approach?	Yes	Left-Through	0	Weekday AM Peak		Weekday PM Peak		
	On-Street Bike Facilities?	No	Through	1	Left	519	Left	246	
	Multi-Use Path?	No	Left-Through-Right	0	Through	751	Through	593	
	Scheduled Bus Service?	No	Through-Right	1	Right	377	Right	331	
	Bus Stop on Approach?	No	Right-Turn	0	Daily Truck %		3.6%		
Approach #3	Direction		Number of Lanes		Study Period #1 Traffic Volumes		Study Period #2 Traffic Volumes		
	Sidewalks along:		Left-Turn						
	Crosswalk on Approach?		Left-Through		Weekday AM Peak		Weekday PM Peak		
	On-Street Bike Facilities?		Through		Left		Left		
	Multi-Use Path?		Left-Through-Right		Through		Through		
	Scheduled Bus Service?		Through-Right		Right		Right		
	Bus Stop on Approach?		Right-Turn		Daily Truck %				

Crash History (Existing Intersections Only)

Append the most recent five-years of crash data for the intersection from the CAR System. If the crash data evidences any issues relating to safety performance, discuss briefly here:

The most recent five-year crash data (2015-2019) for the intersection of LPGA Blvd and Williamson Blvd had a report total of 139 crashes. The most predominant crash were rear end crashes at 88 crashes. There was one (1) reported fatal crash and 26 injury crashes at this intersection for the analysis period.

Control Strategy Evaluation							
Provide a brief justification as to why each of the following control strategies should be advanced or not. Justification should consider potential environmental impacts.							
Control Strategy	CAP-X Outputs			SPICE Outputs		Strategy to Be Advanced?	Justification
	V/C Ratio		Multimodal Score	Crash Prediction Rank	SSI Rank		
	Weekday AM Peak	Weekday PM Peak					
Two-Way Stop-Controlled	N/A	N/A	N/A	N/A	N/A	No	Current intersection is a signal.
All-Way Stop-Controlled	N/A	N/A	N/A	N/A	N/A	No	Current intersection is a signal.
Signalized Control	1.07	1.07	4.8	4	5	Yes	Existing Condition. Despite V/C ratios exceeding 1, other alternatives are constrained by ROW.
Roundabout	N/A	N/A	N/A	N/A	N/A	No	LPGA Blvd is planned to be widened to a 8-lane corridor at this intersection.
Median U-Turn	0.78 (0.86)	0.70 (0.80)	6.3	2	3	No	Full MUT (Partial MUT). A full MUT or partial MUT could require additional right-of-way.
RCUT (Signalized)	1.09	0.85	6.3	5	1	No	V/C exceeds 1 for PM peak period.
RCUT (Unsignalized)	31.65	95.40	4.4	1	4	No	V/C exceeds 1 for both peak periods
Jughandle				N/A	N/A	No	N/A
Displaced Left-Turn	0.61 (0.75)	0.51 (0.72)	4.8	3	6	No	Full DLT (Partial DLT). A full DLT or partial DLT could require additional right-of-way.
Continuous Green Tee	N/A	N/A	N/A	N/A	N/A	No	N/A
Quadrant Roadway	N/A	N/A	N/A			No	N/A
Thru-Cut	1.24	1.15	5.2	N/A	2	No	V/C exceeds 1 for AM peak period.
Hybrid MUT/RCUT/DLT	N/A	N/A	N/A	N/A	N/A	No	This Alt was evaluated and eliminated from further consideration, as the County and City expressed concerns with regards to access management.
Other 2 (Type)	N/A	N/A	N/A	N/A	N/A	No	N/A

Resolution					
To be filled out by FDOT District Traffic Operations Engineer and District Design Engineer					
Project Determination		Identified Control Strategy Approved			
Comments					
DTOE Name	James E. Wood, Jr.	Signature	DocuSigned by: James E. Wood, Jr. 668E206FACF0466...	Date	08/14/2023 1
DDE Name	Jeffrey Cicerello	Signature	DocuSigned by: Jeffrey Cicerello E40D0D8820CD4A2...	Date	08/14/2023 1

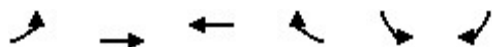
Appendix E

Synchro Analysis for Future Conditions

Consists of Synchro HCM 6 Report

HCM 6th Signalized Intersection Summary

101: US 92 & LPGA Boulevard



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	506	1174	830	267	218	391
Future Volume (veh/h)	506	1174	830	267	218	391
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1781	1781	1826	1826	1796	1796
Adj Flow Rate, veh/h	533	1236	874	73	229	53
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	8	8	5	5	7	7
Cap, veh/h	616	2376	1222	545	286	255
Arrive On Green	0.28	0.70	0.35	0.35	0.17	0.17
Sat Flow, veh/h	1697	3474	3561	1547	1711	1522
Grp Volume(v), veh/h	533	1236	874	73	229	53
Grp Sat Flow(s),veh/h/ln	1697	1692	1735	1547	1711	1522
Q Serve(g_s), s	21.3	17.7	22.6	3.3	13.3	3.1
Cycle Q Clear(g_c), s	21.3	17.7	22.6	3.3	13.3	3.1
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	616	2376	1222	545	286	255
V/C Ratio(X)	0.87	0.52	0.72	0.13	0.80	0.21
Avail Cap(c_a), veh/h	1006	3518	1610	718	480	427
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	20.9	7.2	29.0	22.8	41.4	37.1
Incr Delay (d2), s/veh	10.0	0.5	2.3	0.3	16.6	1.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	13.5	8.1	13.8	2.1	10.8	2.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	31.0	7.7	31.3	23.1	58.0	38.6
LnGrp LOS	C	A	C	C	E	D
Approach Vol, veh/h		1769	947		282	
Approach Delay, s/veh		14.7	30.7		54.4	
Approach LOS		B	C		D	
Timer - Assigned Phs	1	2	4	6		
Phs Duration (G+Y+Rc), s	36.2	43.9	23.3	80.1		
Change Period (Y+Rc), s	7.5	* 7.5	6.0	7.5		
Max Green Setting (Gmax), s	52.5	* 48	29.0	107.5		
Max Q Clear Time (g_c+l1), s	23.3	24.6	15.3	19.7		
Green Ext Time (p_c), s	5.3	11.9	2.0	31.7		

Intersection Summary

HCM 6th Ctrl Delay	23.5
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th TWSC

103: LPGA Boulevard & Father Loper Catholic High School Driveway/Welshinger-Butler Circle N

Intersection

Int Delay, s/veh 7.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱		↰		↰	↱	↱	↰	↱	↱
Traffic Vol, veh/h	85	0	74	0	0	0	55	718	0	0	535	175
Future Vol, veh/h	85	0	74	0	0	0	55	718	0	0	535	175
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	-	350	-	195	150	-	360
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	0	0	0	6	6	6	6	6	6
Mvmt Flow	89	0	78	0	0	0	58	756	0	0	563	184

Major/Minor	Minor2		Minor1		Major1		Major2		Major2		Major2	
Conflicting Flow All	1435	1435	563	1566	1619	756	747	0	0	756	0	0
Stage 1	563	563	-	872	872	-	-	-	-	-	-	-
Stage 2	872	872	-	694	747	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.16	-	-	4.16	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.254	-	-	2.254	-	-
Pot Cap-1 Maneuver	113	135	530	91	104	411	843	-	-	837	-	-
Stage 1	514	512	-	348	371	-	-	-	-	-	-	-
Stage 2	348	371	-	436	423	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	107	126	530	74	97	411	843	-	-	837	-	-
Mov Cap-2 Maneuver	107	126	-	74	97	-	-	-	-	-	-	-
Stage 1	479	512	-	324	345	-	-	-	-	-	-	-
Stage 2	324	345	-	372	423	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	70.3	0	0.7	0
HCM LOS	F	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	843	-	-	107	530	-	837	-	-
HCM Lane V/C Ratio	0.069	-	-	0.836	0.147	-	-	-	-
HCM Control Delay (s)	9.6	-	-	120.2	13	0	0	-	-
HCM Lane LOS	A	-	-	F	B	A	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	4.8	0.5	-	0	-	-

HCM 6th TWSC

104: LPGA Boulevard & International Tennis Drive/International Golf Drive

Intersection

Int Delay, s/veh 29.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	91	10	102	60	9	49	59	647	97	47	548	56
Future Vol, veh/h	91	10	102	60	9	49	59	647	97	47	548	56
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	215	-	-	0	-	-	415	-	415	410	-	400
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	4	4	4	0	0	0	6	6	6	5	5	5
Mvmt Flow	96	11	107	63	9	52	62	681	102	49	577	59

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1562	1582	577	1569	1539	681	636	0	0	783	0	0
Stage 1	675	675	-	805	805	-	-	-	-	-	-	-
Stage 2	887	907	-	764	734	-	-	-	-	-	-	-
Critical Hdwy	7.14	6.54	6.24	7.1	6.5	6.2	4.16	-	-	4.15	-	-
Critical Hdwy Stg 1	6.14	5.54	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.14	5.54	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.536	4.036	3.336	3.5	4	3.3	2.254	-	-	2.245	-	-
Pot Cap-1 Maneuver	~ 90	108	512	91	117	454	928	-	-	822	-	-
Stage 1	440	450	-	379	398	-	-	-	-	-	-	-
Stage 2	336	352	-	399	429	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	~ 67	95	512	~ 60	103	454	928	-	-	822	-	-
Mov Cap-2 Maneuver	~ 67	95	-	~ 60	103	-	-	-	-	-	-	-
Stage 1	411	423	-	354	371	-	-	-	-	-	-	-
Stage 2	271	328	-	289	403	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	174.3	134.9	0.7	0.7
HCM LOS	F	F		

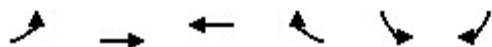
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	928	-	-	67	368	60	297	822	-	-
HCM Lane V/C Ratio	0.067	-	-	1.43	0.32	1.053	0.206	0.06	-	-
HCM Control Delay (s)	9.2	-	-	\$ 365	19.3	245.8	20.2	9.7	-	-
HCM Lane LOS	A	-	-	F	C	F	C	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	8.1	1.4	5.1	0.8	0.2	-	-

Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM 6th Signalized Intersection Summary

101: US 92 & LPGA Boulevard



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	375	929	1223	189	233	656
Future Volume (veh/h)	375	929	1223	189	233	656
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1841	1841	1841	1841	1811	1811
Adj Flow Rate, veh/h	395	978	1287	135	245	519
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	4	4	4	4	6	6
Cap, veh/h	412	2221	1355	605	500	445
Arrive On Green	0.21	0.64	0.39	0.39	0.29	0.29
Sat Flow, veh/h	1753	3589	3589	1560	1725	1535
Grp Volume(v), veh/h	395	978	1287	135	245	519
Grp Sat Flow(s),veh/h/ln	1753	1749	1749	1560	1725	1535
Q Serve(g_s), s	34.6	25.4	64.0	10.4	21.1	52.0
Cycle Q Clear(g_c), s	34.6	25.4	64.0	10.4	21.1	52.0
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	412	2221	1355	605	500	445
V/C Ratio(X)	0.96	0.44	0.95	0.22	0.49	1.17
Avail Cap(c_a), veh/h	418	2231	1364	608	500	445
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	58.8	16.6	53.3	36.8	52.8	63.7
Incr Delay (d2), s/veh	34.1	0.4	14.5	0.5	2.7	97.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	28.9	14.9	38.7	7.2	14.3	44.9
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	92.8	17.0	67.8	37.4	55.5	160.8
LnGrp LOS	F	B	E	D	E	F
Approach Vol, veh/h		1373	1422		764	
Approach Delay, s/veh		38.8	64.9		127.0	
Approach LOS		D	E		F	
Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	44.4	77.1		58.0		121.5
Change Period (Y+Rc), s	7.5	* 7.5		6.0		7.5
Max Green Setting (Gmax), s	37.5	* 70		52.0		114.5
Max Q Clear Time (g_c+I1), s	36.6	66.0		54.0		27.4
Green Ext Time (p_c), s	0.3	3.6		0.0		20.8

Intersection Summary

HCM 6th Ctrl Delay	68.2
HCM 6th LOS	E

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th TWSC

103: LPGA Boulevard & Father Loper Catholic High School Driveway/Welshinger-Butler Circle N

Intersection

Int Delay, s/veh 20.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱		↰		↰	↱	↱	↰	↱	↱
Traffic Vol, veh/h	112	0	84	0	0	0	69	495	0	0	805	54
Future Vol, veh/h	112	0	84	0	0	0	69	495	0	0	805	54
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	-	350	-	195	150	-	360
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	1	1	1	0	0	0	5	5	5	6	6	6
Mvmt Flow	118	0	88	0	0	0	73	521	0	0	847	57

Major/Minor	Minor2		Minor1		Major1		Major2		Major2		Major2	
Conflicting Flow All	1514	1514	847	1587	1571	521	904	0	0	521	0	0
Stage 1	847	847	-	667	667	-	-	-	-	-	-	-
Stage 2	667	667	-	920	904	-	-	-	-	-	-	-
Critical Hdwy	7.11	6.51	6.21	7.1	6.5	6.2	4.15	-	-	4.16	-	-
Critical Hdwy Stg 1	6.11	5.51	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.11	5.51	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.509	4.009	3.309	3.5	4	3.3	2.245	-	-	2.254	-	-
Pot Cap-1 Maneuver	~ 99	120	363	88	112	559	740	-	-	1025	-	-
Stage 1	358	379	-	451	460	-	-	-	-	-	-	-
Stage 2	450	458	-	327	358	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	~ 91	108	363	62	101	559	740	-	-	1025	-	-
Mov Cap-2 Maneuver	~ 91	108	-	62	101	-	-	-	-	-	-	-
Stage 1	323	379	-	406	414	-	-	-	-	-	-	-
Stage 2	406	413	-	247	358	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	165.9	0	1.3	0
HCM LOS	F	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	740	-	-	91	363	-	1025	-	-
HCM Lane V/C Ratio	0.098	-	-	1.296	0.244	-	-	-	-
HCM Control Delay (s)	10.4	-	-	276.8	18.1	0	0	-	-
HCM Lane LOS	B	-	-	F	C	A	A	-	-
HCM 95th %tile Q(veh)	0.3	-	-	8.5	0.9	-	0	-	-

Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM 6th TWSC

104: LPGA Boulevard & International Tennis Drive/International Golf Drive

Intersection

Int Delay, s/veh 48.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	79	7	85	76	17	110	110	449	48	44	698	163
Future Vol, veh/h	79	7	85	76	17	110	110	449	48	44	698	163
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	215	-	-	0	-	-	415	-	415	410	-	400
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	1	1	1	2	2	2	4	4	4	3	3	3
Mvmt Flow	83	7	89	80	18	116	116	473	51	46	735	172

Major/Minor	Minor2		Minor1		Major1		Major2		Major2		Major2	
Conflicting Flow All	1625	1583	735	1666	1704	473	907	0	0	524	0	0
Stage 1	827	827	-	705	705	-	-	-	-	-	-	-
Stage 2	798	756	-	961	999	-	-	-	-	-	-	-
Critical Hdwy	7.11	6.51	6.21	7.12	6.52	6.22	4.14	-	-	4.13	-	-
Critical Hdwy Stg 1	6.11	5.51	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.11	5.51	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.509	4.009	3.309	3.518	4.018	3.318	2.236	-	-	2.227	-	-
Pot Cap-1 Maneuver	~ 83	109	421	~ 77	91	591	742	-	-	1038	-	-
Stage 1	367	388	-	427	439	-	-	-	-	-	-	-
Stage 2	381	418	-	308	321	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	~ 46	88	421	~ 48	73	591	742	-	-	1038	-	-
Mov Cap-2 Maneuver	~ 46	88	-	~ 48	73	-	-	-	-	-	-	-
Stage 1	310	371	-	360	371	-	-	-	-	-	-	-
Stage 2	246	353	-	227	307	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	277.2		207.4		1.9		0.4	
HCM LOS	F		F					

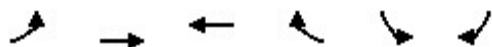
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	742	-	-	46	327	48	303	1038	-	-
HCM Lane V/C Ratio	0.156	-	-	1.808	0.296	1.667	0.441	0.045	-	-
HCM Control Delay (s)	10.7	-	-	\$ 576	20.6	\$ 510.6	25.9	8.6	-	-
HCM Lane LOS	B	-	-	F	C	F	D	A	-	-
HCM 95th %tile Q(veh)	0.6	-	-	8.4	1.2	7.8	2.1	0.1	-	-

Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM 6th Signalized Intersection Summary

101: US 92 & LPGA Boulevard



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	506	1174	830	267	218	391
Future Volume (veh/h)	506	1174	830	267	218	391
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1781	1781	1826	1826	1796	1796
Adj Flow Rate, veh/h	533	1236	874	236	229	323
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	8	8	5	5	7	7
Cap, veh/h	889	2189	1506	959	615	908
Arrive On Green	0.15	0.65	0.43	0.43	0.19	0.19
Sat Flow, veh/h	3291	3474	3561	1547	3319	2679
Grp Volume(v), veh/h	533	1236	874	236	229	323
Grp Sat Flow(s),veh/h/ln	1646	1692	1735	1547	1659	1340
Q Serve(g_s), s	7.0	18.9	17.7	6.4	5.6	8.4
Cycle Q Clear(g_c), s	7.0	18.9	17.7	6.4	5.6	8.4
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	889	2189	1506	959	615	908
V/C Ratio(X)	0.60	0.56	0.58	0.25	0.37	0.36
Avail Cap(c_a), veh/h	1676	4403	2968	1610	1553	1665
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	13.3	9.1	19.9	7.9	33.1	23.1
Incr Delay (d2), s/veh	1.8	0.6	1.0	0.4	1.4	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	3.9	8.9	10.5	5.5	4.1	0.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	15.1	9.8	20.9	8.3	34.5	24.0
LnGrp LOS	B	A	C	A	C	C
Approach Vol, veh/h		1769	1110		552	
Approach Delay, s/veh		11.4	18.2		28.3	
Approach LOS		B	B		C	
Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	19.8	48.4		24.7		68.2
Change Period (Y+Rc), s	5.5	* 8.1		7.5		* 8.1
Max Green Setting (Gmax), s	36.5	* 80		43.5		* 1.2E2
Max Q Clear Time (g_c+l1), s	9.0	19.7		10.4		20.9
Green Ext Time (p_c), s	5.2	20.6		6.8		32.8

Intersection Summary

HCM 6th Ctrl Delay	16.3
HCM 6th LOS	B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Roundabout

103: LPGA Boulevard & Father Loper Catholic High School Driveway/Welshinger-Butler Circle N

Intersection							
Intersection Delay, s/veh	5.9						
Intersection LOS	A						
Approach	EB		WB		NB		SB
Entry Lanes	2		1		2		2
Conflicting Circle Lanes	2		2		2		2
Adj Approach Flow, veh/h	167		0		814		747
Demand Flow Rate, veh/h	167		0		862		792
Vehicles Circulating, veh/h	597		951		89		61
Vehicles Exiting, veh/h	256		0		675		890
Ped Vol Crossing Leg, #/h	0		0		0		0
Ped Cap Adj	1.000		1.000		1.000		1.000
Approach Delay, s/veh	5.5		0.0		6.2		5.7
Approach LOS	A		-		A		A
Lane	Left	Right	Left	Left	Right	Left	Right
Designated Moves	LT	R	LTR	LT	TR	LT	TR
Assumed Moves	LT	R	LTR	LT	TR	LT	TR
RT Channelized							
Lane Util	0.533	0.467	1.000	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.328	4.645	4.328	4.645	4.328
Entry Flow, veh/h	89	78	0	405	457	372	420
Cap Entry Lane, veh/h	779	855	633	1244	1317	1276	1348
Entry HV Adj Factor	1.000	1.000	1.000	0.944	0.944	0.944	0.943
Flow Entry, veh/h	89	78	0	382	431	351	396
Cap Entry, veh/h	779	855	633	1174	1242	1205	1271
V/C Ratio	0.114	0.091	0.000	0.326	0.347	0.291	0.311
Control Delay, s/veh	5.8	5.1	5.7	6.2	6.2	5.7	5.7
LOS	A	A	A	A	A	A	A
95th %tile Queue, veh	0	0	0	1	2	1	1

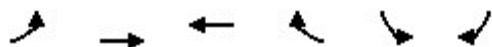
HCM 6th Roundabout

104: LPGA Boulevard & International Tennis Drive/International Golf Drive

Intersection									
Intersection Delay, s/veh	6.4								
Intersection LOS	A								
Approach	EB		WB		NB		SB		
Entry Lanes	2		2		2		2		
Conflicting Circle Lanes	2		2		1		1		
Adj Approach Flow, veh/h	214		124		845		685		
Demand Flow Rate, veh/h	222		124		896		719		
Vehicles Circulating, veh/h	720		888		162		138		
Vehicles Exiting, veh/h	137		170		780		874		
Ped Vol Crossing Leg, #/h	0		0		0		0		
Ped Cap Adj	1.000		1.000		1.000		1.000		
Approach Delay, s/veh	6.8		7.0		6.7		5.7		
Approach LOS	A		A		A		A		
Lane	Left	Right	Left	Right	Left	Right	Left	Right	
Designated Moves	LT	R	LT	R	LT	TR	LT	TR	
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR	
RT Channelized									
Lane Util	0.500	0.500	0.581	0.419	0.470	0.530	0.470	0.530	
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535	
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544	
Entry Flow, veh/h	111	111	72	52	421	475	338	381	
Cap Entry Lane, veh/h	696	770	596	668	1225	1225	1252	1252	
Entry HV Adj Factor	0.960	0.964	1.000	1.000	0.943	0.943	0.953	0.953	
Flow Entry, veh/h	107	107	72	52	397	448	322	363	
Cap Entry, veh/h	668	742	596	668	1156	1156	1193	1194	
V/C Ratio	0.159	0.144	0.121	0.078	0.344	0.388	0.270	0.304	
Control Delay, s/veh	7.2	6.4	7.5	6.2	6.5	7.0	5.5	5.8	
LOS	A	A	A	A	A	A	A	A	
95th %tile Queue, veh	1	1	0	0	2	2	1	1	

HCM 6th Signalized Intersection Summary

101: US 92 & LPGA Boulevard



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	375	929	1223	189	233	656
Future Volume (veh/h)	375	929	1223	189	233	656
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1841	1841	1841	1841	1811	1811
Adj Flow Rate, veh/h	395	978	1287	166	245	650
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	4	4	4	4	6	6
Cap, veh/h	559	2223	1776	1188	849	926
Arrive On Green	0.09	0.64	0.51	0.51	0.25	0.25
Sat Flow, veh/h	3401	3589	3589	1560	3346	2701
Grp Volume(v), veh/h	395	978	1287	166	245	650
Grp Sat Flow(s),veh/h/ln	1700	1749	1749	1560	1673	1351
Q Serve(g_s), s	7.2	20.0	40.5	4.0	8.3	29.4
Cycle Q Clear(g_c), s	7.2	20.0	40.5	4.0	8.3	29.4
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	559	2223	1776	1188	849	926
V/C Ratio(X)	0.71	0.44	0.72	0.14	0.29	0.70
Avail Cap(c_a), veh/h	967	3118	2266	1407	912	977
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	25.2	13.0	27.1	4.5	42.4	40.2
Incr Delay (d2), s/veh	4.5	0.4	1.7	0.1	0.7	3.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	6.5	11.5	22.6	5.2	6.3	0.9
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	29.7	13.4	28.8	4.6	43.1	44.0
LnGrp LOS	C	B	C	A	D	D
Approach Vol, veh/h		1373	1453		895	
Approach Delay, s/veh		18.1	26.0		43.7	
Approach LOS		B	C		D	
Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	18.1	79.8		43.4		97.9
Change Period (Y+Rc), s	5.5	* 8.1		7.5		* 8.1
Max Green Setting (Gmax), s	29.5	* 92		38.5		* 1.3E2
Max Q Clear Time (g_c+I1), s	9.2	42.5		31.4		22.0
Green Ext Time (p_c), s	3.3	29.2		4.4		21.2

Intersection Summary

HCM 6th Ctrl Delay	27.4
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Roundabout

103: LPGA Boulevard & Father Loper Catholic High School Driveway/Welshinger-Butler Circle N

Intersection							
Intersection Delay, s/veh	6.3						
Intersection LOS	A						
Approach	EB		WB		NB		SB
Entry Lanes	2		1		2		2
Conflicting Circle Lanes	2		2		2		2
Adj Approach Flow, veh/h	206		0		594		904
Demand Flow Rate, veh/h	208		0		624		958
Vehicles Circulating, veh/h	898		743		119		77
Vehicles Exiting, veh/h	137		0		987		666
Ped Vol Crossing Leg, #/h	0		0		0		0
Ped Cap Adj	1.000		1.000		1.000		1.000
Approach Delay, s/veh	8.0		0.0		5.3		6.5
Approach LOS	A		-		A		A
Lane	Left	Right	Left	Left	Right	Left	Right
Designated Moves	LT	R	LTR	LT	TR	LT	TR
Assumed Moves	LT	R	LTR	LT	TR	LT	TR
RT Channelized							
Lane Util	0.572	0.428	1.000	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.328	4.645	4.328	4.645	4.328
Entry Flow, veh/h	119	89	0	293	331	450	508
Cap Entry Lane, veh/h	591	662	755	1210	1283	1258	1330
Entry HV Adj Factor	0.992	0.989	1.000	0.953	0.951	0.944	0.943
Flow Entry, veh/h	118	88	0	279	315	425	479
Cap Entry, veh/h	586	654	755	1153	1221	1188	1255
V/C Ratio	0.201	0.134	0.000	0.242	0.258	0.358	0.382
Control Delay, s/veh	8.7	7.0	4.8	5.3	5.3	6.5	6.5
LOS	A	A	A	A	A	A	A
95th %tile Queue, veh	1	0	0	1	1	2	2

HCM 6th Roundabout

104: LPGA Boulevard & International Tennis Drive/International Golf Drive

Intersection

Intersection Delay, s/veh 6.8

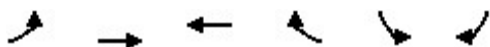
Intersection LOS A

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	179	214	640	953
Demand Flow Rate, veh/h	181	218	666	981
Vehicles Circulating, veh/h	886	697	138	221
Vehicles Exiting, veh/h	316	107	929	694
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	7.5	6.5	5.4	7.6
Approach LOS	A	A	A	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.503	0.497	0.459	0.541	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
Entry Flow, veh/h	91	90	100	118	313	353	461	520
Cap Entry Lane, veh/h	597	669	711	785	1252	1252	1161	1161
Entry HV Adj Factor	0.988	0.989	0.976	0.983	0.961	0.961	0.972	0.971
Flow Entry, veh/h	90	89	98	116	301	339	448	505
Cap Entry, veh/h	590	661	694	772	1204	1204	1128	1128
V/C Ratio	0.152	0.135	0.141	0.150	0.250	0.282	0.397	0.448
Control Delay, s/veh	8.0	7.0	6.7	6.2	5.2	5.6	7.3	8.0
LOS	A	A	A	A	A	A	A	A
95th %tile Queue, veh	1	0	0	1	1	1	2	2

HCM 6th Signalized Intersection Summary

101: US 92 & LPGA Boulevard



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖↗	↑↑	↖↗	↘	↖↗	↖↗
Traffic Volume (veh/h)	985	1203	840	609	457	669
Future Volume (veh/h)	985	1203	840	609	457	669
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1781	1781	1826	1826	1796	1796
Adj Flow Rate, veh/h	1037	1266	884	630	481	683
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	8	8	5	5	7	7
Cap, veh/h	1172	2309	1187	878	748	1427
Arrive On Green	0.31	0.68	0.34	0.34	0.23	0.23
Sat Flow, veh/h	3291	3474	3561	1547	3319	2679
Grp Volume(v), veh/h	1037	1266	884	630	481	683
Grp Sat Flow(s),veh/h/ln	1646	1692	1735	1547	1659	1340
Q Serve(g_s), s	41.7	32.0	37.9	50.1	22.1	26.9
Cycle Q Clear(g_c), s	41.7	32.0	37.9	50.1	22.1	26.9
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	1172	2309	1187	878	748	1427
V/C Ratio(X)	0.88	0.55	0.75	0.72	0.64	0.48
Avail Cap(c_a), veh/h	1303	2449	1205	886	837	1500
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.1	13.6	48.9	26.6	59.1	24.7
Incr Delay (d2), s/veh	8.5	0.6	3.4	3.9	3.5	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	28.7	16.7	23.1	36.5	14.6	31.6
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	50.6	14.2	52.3	30.5	62.6	25.6
LnGrp LOS	D	B	D	C	E	C
Approach Vol, veh/h		2303	1514		1164	
Approach Delay, s/veh		30.6	43.2		40.9	
Approach LOS		C	D		D	
Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	57.3	65.7		45.4		123.0
Change Period (Y+Rc), s	5.5	* 8.1		7.5		* 8.1
Max Green Setting (Gmax), s	58.5	* 59		42.5		* 1.2E2
Max Q Clear Time (g_c+l1), s	43.7	52.1		28.9		34.0
Green Ext Time (p_c), s	8.1	5.6		9.0		33.2

Intersection Summary

HCM 6th Ctrl Delay	36.8
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Roundabout

103: LPGA Boulevard & Father Loper Catholic High School Driveway/Welshinger-Butler Circle N

Intersection							
Intersection Delay, s/veh	11.0						
Intersection LOS	B						
Approach	EB		WB		NB		SB
Entry Lanes	2		1		2		2
Conflicting Circle Lanes	2		2		2		2
Adj Approach Flow, veh/h	194		0		1678		1269
Demand Flow Rate, veh/h	194		0		1779		1345
Vehicles Circulating, veh/h	1145		1868		89		67
Vehicles Exiting, veh/h	267		0		1250		1801
Ped Vol Crossing Leg, #/h	0		0		0		0
Ped Cap Adj	1.000		1.000		1.000		1.000
Approach Delay, s/veh	9.8		0.0		13.0		8.6
Approach LOS	A		-		B		A
Lane	Left	Right	Left	Left	Right	Left	Right
Designated Moves	LT	R	LTR	LT	TR	LT	TR
Assumed Moves	LT	R	LTR	LT	TR	LT	TR
RT Channelized							
Lane Util	0.459	0.541	1.000	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.328	4.645	4.328	4.645	4.328
Entry Flow, veh/h	89	105	0	836	943	632	713
Cap Entry Lane, veh/h	471	537	290	1244	1317	1269	1341
Entry HV Adj Factor	1.000	1.000	1.000	0.943	0.943	0.944	0.943
Flow Entry, veh/h	89	105	0	789	889	597	673
Cap Entry, veh/h	471	537	290	1173	1242	1198	1266
V/C Ratio	0.189	0.196	0.000	0.672	0.716	0.498	0.531
Control Delay, s/veh	10.4	9.3	12.4	12.5	13.4	8.4	8.7
LOS	B	A	B	B	B	A	A
95th %tile Queue, veh	1	1	0	6	7	3	3

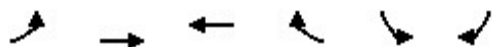
HCM 6th Roundabout

104: LPGA Boulevard & International Tennis Drive/International Golf Drive

Intersection									
Intersection Delay, s/veh	17.8								
Intersection LOS	C								
Approach	EB		WB		NB		SB		
Entry Lanes	2		2		2		2		
Conflicting Circle Lanes	2		2		1		1		
Adj Approach Flow, veh/h	376		329		1705		1000		
Demand Flow Rate, veh/h	391		329		1807		1050		
Vehicles Circulating, veh/h	1157		1623		228		419		
Vehicles Exiting, veh/h	312		412		1320		1533		
Ped Vol Crossing Leg, #/h	0		0		0		0		
Ped Cap Adj	1.000		1.000		1.000		1.000		
Approach Delay, s/veh	14.7		37.8		18.5		11.2		
Approach LOS	B		E		C		B		
Lane	Left	Right	Left	Right	Left	Right	Left	Right	
Designated Moves	LT	R	LT	R	LT	TR	LT	TR	
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR	
RT Channelized									
Lane Util	0.355	0.645	0.714	0.286	0.470	0.530	0.470	0.530	
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535	
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544	
Entry Flow, veh/h	139	252	235	94	849	958	494	556	
Cap Entry Lane, veh/h	466	531	303	357	1154	1154	970	970	
Entry HV Adj Factor	0.963	0.960	1.000	1.000	0.944	0.943	0.951	0.953	
Flow Entry, veh/h	134	242	235	94	801	904	470	530	
Cap Entry, veh/h	449	510	303	357	1089	1088	923	925	
V/C Ratio	0.299	0.475	0.775	0.263	0.736	0.830	0.509	0.573	
Control Delay, s/veh	12.9	15.6	47.0	14.9	15.6	21.2	10.4	11.9	
LOS	B	C	E	B	C	C	B	B	
95th %tile Queue, veh	1	3	6	1	7	10	3	4	

HCM 6th Signalized Intersection Summary

101: US 92 & LPGA Boulevard



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	669	961	1329	457	564	1030
Future Volume (veh/h)	669	961	1329	457	564	1030
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1841	1841	1841	1841	1811	1811
Adj Flow Rate, veh/h	704	1012	1399	474	594	1068
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	4	4	4	4	6	6
Cap, veh/h	799	2405	1606	1063	744	1132
Arrive On Green	0.20	0.69	0.46	0.46	0.22	0.22
Sat Flow, veh/h	3401	3589	3589	1560	3346	2701
Grp Volume(v), veh/h	704	1012	1399	474	594	1068
Grp Sat Flow(s),veh/h/ln	1700	1749	1749	1560	1673	1351
Q Serve(g_s), s	28.0	22.0	62.5	24.1	29.1	38.5
Cycle Q Clear(g_c), s	28.0	22.0	62.5	24.1	29.1	38.5
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	799	2405	1606	1063	744	1132
V/C Ratio(X)	0.88	0.42	0.87	0.45	0.80	0.94
Avail Cap(c_a), veh/h	904	2541	1645	1080	744	1132
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	53.5	11.9	42.2	12.6	63.7	48.3
Incr Delay (d2), s/veh	11.3	0.3	6.0	0.8	8.1	15.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	22.3	12.6	35.6	21.6	19.0	53.9
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	64.8	12.2	48.3	13.5	71.8	64.2
LnGrp LOS	E	B	D	B	E	E
Approach Vol, veh/h		1716	1873		1662	
Approach Delay, s/veh		33.8	39.5		66.9	
Approach LOS		C	D		E	
Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	39.6	87.6		46.0		127.3
Change Period (Y+Rc), s	5.5	* 8.1		7.5		* 8.1
Max Green Setting (Gmax), s	39.5	* 82		38.5		* 1.3E2
Max Q Clear Time (g_c+l1), s	30.0	64.5		40.5		24.0
Green Ext Time (p_c), s	4.1	15.1		0.0		22.5

Intersection Summary

HCM 6th Ctrl Delay	46.3
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Roundabout

103: LPGA Boulevard & Father Loper Catholic High School Driveway/Welshinger-Butler Circle N

Intersection

Intersection Delay, s/veh 11.5

Intersection LOS B

Approach	EB	WB	NB	SB
Entry Lanes	2	1	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	217	0	1185	1646
Demand Flow Rate, veh/h	219	0	1244	1745
Vehicles Circulating, veh/h	1679	1368	124	82
Vehicles Exiting, veh/h	148	0	1774	1286
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	20.6	0.0	8.6	12.4
Approach LOS	C	-	A	B

Lane	Left	Right	Left	Left	Right	Left	Right
Designated Moves	LT	R	LTR	LT	TR	LT	TR
Assumed Moves	LT	R	LTR	LT	TR	LT	TR
RT Channelized							
Lane Util	0.566	0.434	1.000	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.328	4.645	4.328	4.645	4.328
Entry Flow, veh/h	124	95	0	585	659	820	925
Cap Entry Lane, veh/h	288	341	444	1204	1278	1252	1324
Entry HV Adj Factor	0.992	0.989	1.000	0.952	0.953	0.943	0.943
Flow Entry, veh/h	123	94	0	557	628	774	872
Cap Entry, veh/h	286	337	444	1146	1218	1181	1249
V/C Ratio	0.430	0.279	0.000	0.486	0.516	0.655	0.698
Control Delay, s/veh	23.9	16.1	8.1	8.5	8.6	11.9	12.7
LOS	C	C	A	A	A	B	B
95th %tile Queue, veh	2	1	0	3	3	5	6

HCM 6th Roundabout

104: LPGA Boulevard & International Tennis Drive/International Golf Drive

Intersection

Intersection Delay, s/veh 23.7

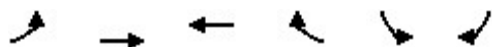
Intersection LOS C

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	1	1
Adj Approach Flow, veh/h	402	457	1230	1520
Demand Flow Rate, veh/h	406	466	1280	1566
Vehicles Circulating, veh/h	1572	1318	289	524
Vehicles Exiting, veh/h	518	251	1689	1260
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	27.9	21.9	11.2	33.3
Approach LOS	D	C	B	D

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	LT	R	LT	TR	LT	TR
Assumed Moves	LT	R	LT	R	LT	TR	LT	TR
RT Channelized								
Lane Util	0.493	0.507	0.534	0.466	0.470	0.530	0.470	0.530
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.544	4.544	4.544	4.544
Entry Flow, veh/h	200	206	249	217	602	678	736	830
Cap Entry Lane, veh/h	318	373	402	463	1092	1092	881	881
Entry HV Adj Factor	0.989	0.990	0.980	0.982	0.960	0.962	0.970	0.970
Flow Entry, veh/h	198	204	244	213	578	652	714	805
Cap Entry, veh/h	315	370	394	455	1048	1050	855	855
V/C Ratio	0.629	0.552	0.620	0.469	0.551	0.621	0.835	0.942
Control Delay, s/veh	32.2	23.9	26.1	17.1	10.3	12.0	25.7	40.0
LOS	D	C	D	C	B	B	D	E
95th %tile Queue, veh	4	3	4	2	3	5	10	15

HCM 6th Signalized Intersection Summary

101: US 92 & LPGA Boulevard



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	985	1203	840	609	457	669
Future Volume (veh/h)	985	1203	840	609	457	669
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1781	1781	1826	1826	1796	1796
Adj Flow Rate, veh/h	1037	1266	884	292	481	298
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	8	8	5	5	7	7
Cap, veh/h	741	2294	761	339	398	354
Arrive On Green	0.41	0.68	0.22	0.22	0.23	0.23
Sat Flow, veh/h	1697	3474	3561	1547	1711	1522
Grp Volume(v), veh/h	1037	1266	884	292	481	298
Grp Sat Flow(s),veh/h/ln	1697	1692	1735	1547	1711	1522
Q Serve(g_s), s	61.5	29.0	33.0	27.3	35.0	28.1
Cycle Q Clear(g_c), s	61.5	29.0	33.0	27.3	35.0	28.1
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	741	2294	761	339	398	354
V/C Ratio(X)	1.40	0.55	1.16	0.86	1.21	0.84
Avail Cap(c_a), veh/h	741	2294	761	339	398	354
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	39.0	12.5	58.8	56.5	57.8	55.1
Incr Delay (d2), s/veh	187.8	0.6	87.1	21.6	115.4	19.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	93.2	14.9	33.7	18.1	39.8	18.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	226.8	13.1	145.9	78.2	173.1	74.9
LnGrp LOS	F	B	F	E	F	E
Approach Vol, veh/h		2303	1176		779	
Approach Delay, s/veh		109.3	129.1		135.5	
Approach LOS		F	F		F	
Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	69.0	40.5		41.0		109.5
Change Period (Y+Rc), s	7.5	* 7.5		6.0		7.5
Max Green Setting (Gmax), s	61.5	* 33		35.0		101.5
Max Q Clear Time (g_c+I1), s	63.5	35.0		37.0		31.0
Green Ext Time (p_c), s	0.0	0.0		0.0		30.8

Intersection Summary

HCM 6th Ctrl Delay	119.6
HCM 6th LOS	F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th TWSC

103: LPGA Boulevard & Father Loper Catholic High School Driveway/Welshinger-Butler Circle N

Intersection

Int Delay, s/veh 111.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔		↔		↔	↔	↔	↔	↔	↔
Traffic Vol, veh/h	85	0	100	0	0	0	60	1534	0	0	1026	180
Future Vol, veh/h	85	0	100	0	0	0	60	1534	0	0	1026	180
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	-	350	-	195	150	-	360
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	0	0	0	6	6	6	6	6	6
Mvmt Flow	89	0	105	0	0	0	63	1615	0	0	1080	189

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	2821	2821	1080	2968	3010	1615	1269	0	0	1615	0	0
Stage 1	1080	1080	-	1741	1741	-	-	-	-	-	-	-
Stage 2	1741	1741	-	1227	1269	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.16	-	-	4.16	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.254	-	-	2.254	-	-
Pot Cap-1 Maneuver	~ 12	18	268	9	14	130	534	-	-	393	-	-
Stage 1	267	297	-	112	142	-	-	-	-	-	-	-
Stage 2	112	142	-	220	242	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	~ 11	16	268	5	12	130	534	-	-	393	-	-
Mov Cap-2 Maneuver	~ 11	16	-	5	12	-	-	-	-	-	-	-
Stage 1	235	297	-	99	125	-	-	-	-	-	-	-
Stage 2	99	125	-	134	242	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, \$ 1797.3		0	0.5	0
HCM LOS	F	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	534	-	-	11	268	-	393	-	-
HCM Lane V/C Ratio	0.118	-	-	8.134	0.393	-	-	-	-
HCM Control Delay (s)	12.6	-	-	\$ 3880.2	26.9	0	0	-	-
HCM Lane LOS	B	-	-	F	D	A	A	-	-
HCM 95th %tile Q(veh)	0.4	-	-	12.5	1.8	-	0	-	-

Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM 6th TWSC

104: LPGA Boulevard & International Tennis Drive/International Golf Drive

Intersection

Int Delay, s/veh 1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	102	26	230	198	26	89	165	1190	264	81	778	91
Future Vol, veh/h	102	26	230	198	26	89	165	1190	264	81	778	91
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	215	-	-	0	-	-	415	-	415	410	-	400
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	4	4	4	0	0	0	6	6	6	5	5	5
Mvmt Flow	107	27	242	208	27	94	174	1253	278	85	819	96

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	2790	2868	819	2773	2686	1253	915	0	0	1531	0	0
Stage 1	989	989	-	1601	1601	-	-	-	-	-	-	-
Stage 2	1801	1879	-	1172	1085	-	-	-	-	-	-	-
Critical Hdwy	7.14	6.54	6.24	7.1	6.5	6.2	4.16	-	-	4.15	-	-
Critical Hdwy Stg 1	6.14	5.54	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.14	5.54	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.536	4.036	3.336	3.5	4	3.3	2.254	-	-	2.245	-	-
Pot Cap-1 Maneuver	~ 12	~ 16	372	~ 13	~ 22	212	729	-	-	426	-	-
Stage 1	295	322	-	~ 135	167	-	-	-	-	-	-	-
Stage 2	~ 101	119	-	237	295	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	-	~ 10	372	-	~ 13	212	729	-	-	426	-	-
Mov Cap-2 Maneuver	-	~ 10	-	-	~ 13	-	-	-	-	-	-	-
Stage 1	224	258	-	~ 103	127	-	-	-	-	-	-	-
Stage 2	~ 34	91	-	~ 59	236	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s			1.2	1.3
HCM LOS	-	-		

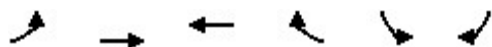
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	729	-	-	-	80	-	48	426	-	-
HCM Lane V/C Ratio	0.238	-	-	-	3.368	-	2.522	0.2	-	-
HCM Control Delay (s)	11.5	-	-	\$ 1176.3	\$ 872.3	-	-	15.6	-	-
HCM Lane LOS	B	-	-	-	F	-	F	C	-	-
HCM 95th %tile Q(veh)	0.9	-	-	-	27.4	-	12.7	0.7	-	-

Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM 6th Signalized Intersection Summary

101: US 92 & LPGA Boulevard



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	669	961	1329	457	564	1030
Future Volume (veh/h)	669	961	1329	457	564	1030
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1841	1841	1841	1841	1811	1811
Adj Flow Rate, veh/h	704	1012	1399	275	594	719
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	4	4	4	4	6	6
Cap, veh/h	501	2170	1104	493	526	468
Arrive On Green	0.26	0.62	0.32	0.32	0.30	0.30
Sat Flow, veh/h	1753	3589	3589	1560	1725	1535
Grp Volume(v), veh/h	704	1012	1399	275	594	719
Grp Sat Flow(s),veh/h/ln	1753	1749	1749	1560	1725	1535
Q Serve(g_s), s	47.5	27.9	57.0	26.4	55.0	55.0
Cycle Q Clear(g_c), s	47.5	27.9	57.0	26.4	55.0	55.0
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	501	2170	1104	493	526	468
V/C Ratio(X)	1.40	0.47	1.27	0.56	1.13	1.54
Avail Cap(c_a), veh/h	501	2170	1104	493	526	468
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	58.7	18.3	61.7	51.3	62.7	62.8
Incr Delay (d2), s/veh	193.8	0.4	127.3	2.9	80.3	252.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	71.6	16.2	63.2	15.8	48.4	81.6
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	252.5	18.7	189.1	54.2	143.0	315.1
LnGrp LOS	F	B	F	D	F	F
Approach Vol, veh/h		1716	1674		1313	
Approach Delay, s/veh		114.6	166.9		237.3	
Approach LOS		F	F		F	
Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	55.0	64.5		61.0		119.5
Change Period (Y+Rc), s	7.5	* 7.5		6.0		7.5
Max Green Setting (Gmax), s	47.5	* 57		55.0		111.5
Max Q Clear Time (g_c+I1), s	49.5	59.0		57.0		29.9
Green Ext Time (p_c), s	0.0	0.0		0.0		21.8

Intersection Summary

HCM 6th Ctrl Delay	167.5
HCM 6th LOS	F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th TWSC

103: LPGA Boulevard & Father Loper Catholic High School Driveway/Welshinger-Butler Circle N

Intersection

Int Delay, s/veh 266.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔		↔		↔	↔	↔	↔	↔	↔
Traffic Vol, veh/h	117	0	89	0	0	0	74	1052	0	0	1505	59
Future Vol, veh/h	117	0	89	0	0	0	74	1052	0	0	1505	59
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	-	350	-	195	150	-	360
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	1	1	1	0	0	0	5	5	5	6	6	6
Mvmt Flow	123	0	94	0	0	0	78	1107	0	0	1584	62

Major/Minor	Minor2		Minor1		Major1		Major2		Major2		Major2	
Conflicting Flow All	2847	2847	1584	2925	2909	1107	1646	0	0	1107	0	0
Stage 1	1584	1584	-	1263	1263	-	-	-	-	-	-	-
Stage 2	1263	1263	-	1662	1646	-	-	-	-	-	-	-
Critical Hdwy	7.11	6.51	6.21	7.1	6.5	6.2	4.15	-	-	4.16	-	-
Critical Hdwy Stg 1	6.11	5.51	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.11	5.51	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.509	4.009	3.309	3.5	4	3.3	2.245	-	-	2.254	-	-
Pot Cap-1 Maneuver	~ 11	17	134	10	16	258	385	-	-	616	-	-
Stage 1	137	169	-	210	243	-	-	-	-	-	-	-
Stage 2	209	242	-	124	159	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	~ 9	14	134	3	13	258	385	-	-	616	-	-
Mov Cap-2 Maneuver	~ 9	14	-	3	13	-	-	-	-	-	-	-
Stage 1	~ 109	169	-	167	194	-	-	-	-	-	-	-
Stage 2	167	193	-	37	159	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, \$ 3734.7		0	1.1	0
HCM LOS	F	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	385	-	-	9	134	-	616	-	-
HCM Lane V/C Ratio	0.202	-	-	13.684	0.699	-	-	-	-
HCM Control Delay (s)	16.7	-	-	\$ 6516	78.3	0	0	-	-
HCM Lane LOS	C	-	-	F	F	A	A	-	-
HCM 95th %tile Q(veh)	0.7	-	-	17	3.9	-	0	-	-

Notes

~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM 6th TWSC

104: LPGA Boulevard & International Tennis Drive/International Golf Drive

Intersection												
Int Delay, s/veh	1.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	178	10	194	185	47	202	251	780	138	82	1185	178
Future Vol, veh/h	178	10	194	185	47	202	251	780	138	82	1185	178
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	215	-	-	0	-	-	415	-	415	410	-	400
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	1	1	1	2	2	2	4	4	4	3	3	3
Mvmt Flow	187	11	204	195	49	213	264	821	145	86	1247	187
Major/Minor	Minor2		Minor1			Major1			Major2			
Conflicting Flow All	2972	2913	1247	2969	2955	821	1434	0	0	966	0	0
Stage 1	1419	1419	-	1349	1349	-	-	-	-	-	-	-
Stage 2	1553	1494	-	1620	1606	-	-	-	-	-	-	-
Critical Hdwy	7.11	6.51	6.21	7.12	6.52	6.22	4.14	-	-	4.13	-	-
Critical Hdwy Stg 1	6.11	5.51	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.11	5.51	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.509	4.009	3.309	3.518	4.018	3.318	2.236	-	-	2.227	-	-
Pot Cap-1 Maneuver	~ 9	16	213	~ 9	~ 15	374	467	-	-	709	-	-
Stage 1	~ 170	204	-	~ 186	219	-	-	-	-	-	-	-
Stage 2	~ 143	187	-	~ 130	164	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	~ 6	213	-	~ 6	374	467	-	-	709	-	-
Mov Cap-2 Maneuver	-	~ 6	-	-	~ 6	-	-	-	-	-	-	-
Stage 1	~ 74	179	-	~ 81	95	-	-	-	-	-	-	-
Stage 2	~ 13	81	-	~ 4	144	-	-	-	-	-	-	-
Approach	EB		WB			NB			SB			
HCM Control Delay, s							4.8		0.6			
HCM LOS	-		-									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR		
Capacity (veh/h)	467	-	-	-	79	-	30	709	-	-		
HCM Lane V/C Ratio	0.566	-	-	-	2.718	-	8.737	0.122	-	-		
HCM Control Delay (s)	22.3	-	-	-	\$ 890.1	-	\$ 3737.2	10.8	-	-		
HCM Lane LOS	C	-	-	-	F	-	F	B	-	-		
HCM 95th %tile Q(veh)	3.4	-	-	-	20.8	-	32.1	0.4	-	-		
Notes												
~: Volume exceeds capacity		\$: Delay exceeds 300s			+: Computation Not Defined				*: All major volume in platoon			

SimTraffic Performance Report
No Build 2030 AM

Total Network Performance By Run

Run Number	1	2	3	4	5	6	7
Denied Entry After	1	2	1	3	0	0	2

Total Network Performance By Run

Run Number	8	9	10	Avg
Denied Entry After	3	1	5	0

Arterial Level of Service
No Build 2030 AM

Arterial Level of Service: NB LPGA Boulevard

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
	51	5.4	84.7	1.2	50
	102	2.8	27.3	0.4	49
Welshinger-Butler Ci	103	3.0	22.4	0.3	48
	52	2.1	18.8	0.3	48
International Golf D	104	7.5	61.8	0.8	49
Tournament Drive	105	28.2	102.6	1.2	41
Total		49.0	317.5	4.1	47

Arterial Level of Service: SB LPGA Boulevard

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
International Tennis	104	11.9	86.0	1.2	49
	52	6.4	61.0	0.8	50
Father Loper Catholi	103	2.7	18.9	0.3	48
	102	2.0	21.7	0.3	50
	51	2.1	26.5	0.4	51
US 92	101	65.2	144.2	1.2	29
Total		90.2	358.3	4.1	41

SimTraffic Performance Report
No Build 2030 PM

Total Network Performance By Run

Run Number	1	2	3	4	5	6	7
Denied Entry After	0	1	0	0	0	3	1

Total Network Performance By Run

Run Number	8	9	10	Avg
Denied Entry After	2	3	0	0

Arterial Level of Service
No Build 2030 PM

Arterial Level of Service: NB LPGA Boulevard

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
	51	3.6	82.8	1.2	51
	102	2.5	26.9	0.4	50
Welshinger-Butler Ci	103	2.9	22.2	0.3	48
	52	1.8	18.5	0.3	49
International Golf D	104	6.5	60.9	0.8	50
Tournament Drive	105	17.6	90.8	1.2	46
Total		34.9	302.1	4.1	49

Arterial Level of Service: SB LPGA Boulevard

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
International Tennis	104	12.1	86.5	1.2	49
	52	6.8	61.6	0.8	49
Father Loper Catholi	103	3.1	19.1	0.3	48
	102	2.7	22.4	0.3	48
	51	2.7	27.1	0.4	49
US 92	101	168.8	246.5	1.2	17
Total		196.2	463.3	4.1	32

SimTraffic Performance Report
Build 2030 AM

Total Network Performance By Run

Run Number	1	2	3	4	5	6	7
Denied Entry After	0	2	2	6	2	1	2

Total Network Performance By Run

Run Number	8	9	10	Avg
Denied Entry After	1	2	0	0

Arterial Level of Service
Build 2030 AM

Arterial Level of Service: NB LPGA Boulevard

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
	51	3.9	95.1	1.2	44
	102	1.7	31.6	0.4	42
Welshinger-Butler Ci	103	7.8	30.6	0.3	35
	52	0.5	29.5	0.3	31
International Golf D	104	9.1	74.4	0.8	41
Tournament Drive	105	19.1	118.2	1.2	36
Total		42.2	379.3	4.1	39

Arterial Level of Service: SB LPGA Boulevard

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
International Tennis	104	13.3	102.7	1.2	41
	52	2.7	77.0	0.8	39
Father Loper Catholi	103	7.0	25.9	0.3	35
	102	0.5	33.3	0.3	32
	51	0.9	30.9	0.4	43
US 92	101	50.6	143.9	1.2	29
Total		75.2	413.7	4.1	36

SimTraffic Performance Report
Build 2030 PM

Total Network Performance By Run

Run Number	1	2	3	4	5	6	7
Denied Entry After	1	0	1	2	1	0	1

Total Network Performance By Run

Run Number	8	9	10	Avg
Denied Entry After	1	0	0	0

Arterial Level of Service
Build 2030 PM

Arterial Level of Service: NB LPGA Boulevard

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
	51	3.7	94.9	1.2	45
	102	1.6	31.5	0.4	43
Welshinger-Butler Ci	103	7.1	29.8	0.3	36
	52	0.4	29.3	0.3	31
International Golf D	104	8.0	73.5	0.8	41
Tournament Drive	105	12.7	109.2	1.2	39
Total		33.6	368.2	4.1	40

Arterial Level of Service: SB LPGA Boulevard

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
International Tennis	104	15.6	105.1	1.2	40
	52	3.1	78.4	0.8	39
Father Loper Catholi	103	7.7	26.4	0.3	35
	102	0.8	33.3	0.3	32
	51	1.4	31.2	0.4	43
US 92	101	60.2	154.1	1.2	27
Total		88.8	428.5	4.1	35

SimTraffic Performance Report
No Build 2050 AM

Total Network Performance By Run

Run Number	1	2	3	4	5	6	7
Denied Entry After	1443	1344	1364	1167	1233	1233	1118

Total Network Performance By Run

Run Number	8	9	10	Avg
Denied Entry After	1110	1178	1255	1245

Arterial Level of Service
No Build 2050 AM

Arterial Level of Service: NB LPGA Boulevard

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
	51	7.5	86.4	1.2	49
	102	3.3	27.8	0.4	48
Welshinger-Butler Ci	103	3.8	23.2	0.3	46
	52	2.6	19.4	0.3	47
International Golf D	104	9.0	63.3	0.8	48
Tournament Drive	105	122.4	196.3	1.2	21
Total		148.6	416.4	4.1	36

Arterial Level of Service: SB LPGA Boulevard

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
International Tennis	104	17.4	90.6	1.2	47
	52	7.2	62.2	0.8	49
Father Loper Catholi	103	3.4	19.5	0.3	47
	102	2.8	22.5	0.3	48
	51	2.6	26.9	0.4	50
US 92	101	149.9	228.1	1.2	19
Total		183.3	449.9	4.1	33

SimTraffic Performance Report
No Build 2050 PM

Total Network Performance By Run

Run Number	1	2	3	4	5	6	7
Denied Entry After	1776	1799	1724	1827	1708	1610	1872

Total Network Performance By Run

Run Number	8	9	10	Avg
Denied Entry After	1847	1845	1699	1769

Arterial Level of Service
No Build 2050 PM

Arterial Level of Service: NB LPGA Boulevard

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
	51	4.7	84.0	1.2	50
	102	2.9	27.4	0.4	49
Welshinger-Butler Ci	103	3.4	22.8	0.3	47
	52	2.3	19.0	0.3	48
International Golf D	104	8.0	62.1	0.8	49
Tournament Drive	105	30.6	104.2	1.2	40
Total		51.9	319.5	4.1	46

Arterial Level of Service: SB LPGA Boulevard

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
International Tennis	104	19.6	93.4	1.2	45
	52	7.1	62.5	0.8	49
Father Loper Catholi	103	3.7	19.7	0.3	47
	102	3.2	22.9	0.3	47
	51	3.0	27.4	0.4	49
US 92	101	247.2	324.1	1.2	13
Total		283.9	550.0	4.1	27

SimTraffic Performance Report
Build 2050 AM

Total Network Performance By Run

Run Number	1	2	3	4	5	6	7
Denied Entry After	3	5	4	9	2	2	2

Total Network Performance By Run

Run Number	8	9	10	Avg
Denied Entry After	5	1	1	3

Arterial Level of Service
Build 2050 AM

Arterial Level of Service: NB LPGA Boulevard

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
	51	5.5	97.4	1.2	43
	102	2.8	32.6	0.4	41
Welshinger-Butler Ci	103	12.1	34.8	0.3	31
	52	1.1	30.1	0.3	30
International Golf D	104	16.9	82.4	0.8	37
Tournament Drive	105	38.8	137.6	1.2	31
Total		77.2	415.0	4.1	36

Arterial Level of Service: SB LPGA Boulevard

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
International Tennis	104	20.7	108.9	1.2	39
	52	4.6	79.8	0.8	38
Father Loper Catholi	103	9.3	28.1	0.3	32
	102	1.0	33.5	0.3	32
	51	1.7	31.5	0.4	43
US 92	101	73.8	168.5	1.2	25
Total		111.1	450.2	4.1	33

SimTraffic Performance Report
Build 2050 PM

Total Network Performance By Run

Run Number	1	2	3	4	5	6	7
Denied Entry After	0	1	1	1	4	2	2

Total Network Performance By Run

Run Number	8	9	10	Avg
Denied Entry After	0	7	1	1

Arterial Level of Service
Build 2050 PM

Arterial Level of Service: NB LPGA Boulevard

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
	51	4.8	96.6	1.2	44
	102	2.2	32.2	0.4	42
Welshinger-Butler Ci	103	9.7	32.3	0.3	33
	52	0.7	29.6	0.3	31
International Golf D	104	11.9	77.4	0.8	39
Tournament Drive	105	27.9	123.4	1.2	34
Total		57.2	391.5	4.1	38

Arterial Level of Service: SB LPGA Boulevard

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
International Tennis	104	37.8	128.3	1.2	33
	52	5.4	79.3	0.8	38
Father Loper Catholi	103	10.6	29.3	0.3	31
	102	1.4	34.1	0.3	32
	51	2.2	32.0	0.4	42
US 92	101	91.0	185.5	1.2	23
Total		148.5	488.6	4.1	30

SimTraffic Performance Report
Build 2030 AM

Total Network Performance By Run

Run Number	1	2	3	4	5	6	7
Travel Time (hr)	247.6	253.3	258.9	237.5	248.2	254.0	254.1

Total Network Performance By Run

Run Number	8	9	10	Avg
Travel Time (hr)	245.3	249.2	259.7	250.8

SimTraffic Performance Report
Build 2030 PM

Total Network Performance By Run

Run Number	1	2	3	4	5	6	7
Travel Time (hr)	257.0	257.9	260.8	252.2	259.3	261.3	263.0

Total Network Performance By Run

Run Number	8	9	10	Avg
Travel Time (hr)	256.6	252.3	268.7	258.9

SimTraffic Performance Report
Build 2050 AM

Total Network Performance By Run

Run Number	1	2	3	4	5	6	7
Travel Time (hr)	487.3	490.6	471.3	456.8	453.1	508.8	468.0

Total Network Performance By Run

Run Number	8	9	10	Avg
Travel Time (hr)	490.5	479.1	494.6	480.0

SimTraffic Performance Report
Build 2050 PM

Total Network Performance By Run

Run Number	1	2	3	4	5	6	7
Travel Time (hr)	495.6	484.5	497.5	490.0	480.1	505.3	480.1

Total Network Performance By Run

Run Number	8	9	10	Avg
Travel Time (hr)	507.1	501.9	509.3	495.1

Appendix F

Safety Analysis Memorandums

A Separate Report Consisting of:

- Existing Safety Memo
- Predictive Analysis (US 92 to South of Tournament Drive)
- Predictive Analysis (Tournament Drive to Clyde Morris Boulevard)



Florida Department of Transportation District 5

Environmental Management Office

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DeLand, FL 32720