



Memorandum

To: City of Clermont
Lake County
Florida Department of
Transportation District 5
Sumter-Lake MPO

Date: March 4, 2019

Project #: 63302.00

From: Joedel Zaballero, PE, PTOE

Re: South Lake Crossings (Wellness Way: Karr Commercial and Lennar
Residential Development)
Traffic Impact Study Methodology –

The purpose of this document is to outline the proposed methodology for the Traffic Impact Study to be prepared in support of South Lake Crossings PUD. Below is a summary of the procedures applicable to the project, critical issues and data sources for the Traffic Impact Study. A Tier 2 Traffic Impact Study will be conducted for the proposed project in two (2) phases. The Property is a mixed-use development comprised of single family residential, townhomes, office, and commercial retail.

The proposed project lies within the Wellness Way Sector Plan Area which envisioned a comprehensive roadway network to address the future development impacts to the surrounding roadway network.

Project Description and Purpose

The property is generally located on the east side of US 27 at Schofield Road in Lake County, Florida with a gross acreage of 743 acres as shown in **EXHIBIT 1**. The proposed development program for South Lake Crossings is provided below:

Land Use	Units	Phase 1	Phase 2	Total
Single Family	Dwelling Units	1,529	0	1,529
Townhome	Dwelling Units	225	0	225
Shopping Center/Retail	Square Feet	100,000	200,000	300,000
Office	Square Feet	--	500,000	500,000

Site access is proposed on Schofield Road (future Wellness Way) and the future Wellness Way and Hancock Road Extension as shown in the draft development plan provided as **EXHIBIT 2**.

Area of Influence/Study Area

Primary access for the proposed development will be provided on Schofield Road (future Wellness Way) at US 27 and the future Wellness Way and Hancock Road Extension.

The TIS will analyze each directly impacted collector or arterial roadway within a one-mile radius around the project site and each additional roadway where the PM peak hour project trips on the roadway is greater or equal to 5% of the adopted level of services volume of the segment during the PM peak hour. The peak-hour level of service standards is provided in the LSMPO Transportation Management System (TMS). The initial study area is anticipated to

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be three (3.0) mile from the access point[s]) in the study area. The following is a list of roadways within the three (3.0) mile radius:

<u>Roadway</u>	<u>Segment</u>
CR 455/Hartle Road	SR 50 to Hartwood Marsh Road
S. Hancock Road	SR 50 to Hook Street
S. Hancock Road	Hook Street to Johns Lake Road
S. Hancock Road	Johns Lake Road to Hartwood Marsh Road
Hartwood Marsh Road	US 27 to Hancock Road
Hartwood Marsh Road	Hancock Road to N. 90 Degree Bend
Hartwood Marsh Road	N. 90 Degree Bend to Orange County Line
Hook Street	US 27 to Citrus Tower Boulevard
US 27	SR 50 to Johns Lake Road
US 27	Johns Lake Road to Hartwood Marsh Road
US 27	Hartwood Marsh Road to Lake Louisa Road
US 27	Lake Louisa Road to Boggy Marsh Road

Trip Generation Estimate

The project traffic volumes for the proposed development were estimated using the trip generation equations contained in the Institute of Transportation Engineers (ITE) Trip Generation Manual (10th Edition). The proposed mixed-use nature of the land uses included in the development program is anticipated to allow for internal capture and passerby capture opportunities. Internal capture for each phase year was calculated based on the NCHRP 684 Internal Trip Capture Estimation Tool developed by the Texas A&M Transportation Institute (Version 2013.1) which are attached as **EXHIBITS 3 and 4**. Passerby reductions were also applied to the shopping center land uses based on the ITE Trip Generation Handbook, 3rd Edition. The proposed trip generation estimate for this project for Phase 1 and Phase 2, are summarized in **EXHIBIT 5**. In accordance with general planning guidelines, the passerby capture will be limited to 10% of the future year non-project traffic on the adjacent street.

Data Collection and Existing Conditions

Existing roadway segment counts will be compiled from the most current (2017) FDOT and Lake County (2018) count information. Annual average daily traffic (AADT) counts were converted to PM peak hour volumes by applying an appropriate planning analysis hour factor (K) and directional distribution factor (D). The K factors for all non-state roadways are based on actual peak to daily count ratios. For all state roadways and other roadways that do not have peak hour count data available, K factors are based on the appropriate FDOT standard K factor (generally, 0.09). The D

factors are taken from the FDOT Florida Traffic Information (FTI), or are based on actual peak hour directional count data provided by Volusia County. For locations without information from either source, an average D value of 0.55 was assumed.

PM peak hour turning movement counts will be collected for the intersections listed below:

- Hartwood Marsh at Hancock Road
- US 27 at Citrus Tower Boulevard
- US 27 at Hartwood Marsh Road
- US 27 at Lake Louisa Road
- US 27 at Schofield Road to the Orange County Line

Intersection capacity analysis of off-site intersections and project access points will be conducted. HCS and Synchro 10, as specified in the Methodology Guidelines will be used to evaluate intersections, turn lane and access analyses. P.M. peak hour turning movement counts will be collected on a typical weekday evening during the peak facility operational hours.

Planned, Programmed and Committed Projects

Referencing the Lake County Transportation Improvement Plan (TIP), planned, programmed committed projects within the study area are provided below:

<u>Project Name</u>	<u>Type of Work</u>	<u>Phase</u>
CR 455, Hartwood Marsh Road to Lost Lake Rd	New 2-Lane (Future 4-Lane)	PD&E 2019/CST 2022
CR 455, Lost Lake Rd to Hartle Rd	New 2-Lane (Future 4-Lane)	CST 2023
CR 455/Hartwood Marsh Rd	New 4-Lane/Realignment	DSN 2020
Hook Street Extension, Hancock Road to CR 455	New 4-Lane	DSN 2019
Shell Pond Road, US 27 to Orange County Line	New 2-Lane (Future 4-Lane)	Developers Agreement

Transportation Model

The Central Florida Regional Planning Model (CFRPM) will be used to determine project trip distribution and assignment. Socio-economic data will be reviewed to ensure that approved development is include in the model. The following roadway will be added/modified in the model network:

<u>Roadway</u>	<u>Segment</u>	<u>No. of Lanes</u>
Wellness Way	US 27 to Hancock Road Extension	New 2-L
Wellness Way	Hancock Road Extension to CR 545 in Orange County	New 2-L

Hancock Road	Hartwood Marsh Road to Wellness Way (two-lanes)	New 2-L
Shell Pond Road	Wellness Way to CR 545 CR 545 in Orange County	New 2-L

Historical Growth Rate

A comparison will be made between model volumes and historical growth trends to determine future background volumes. **Exhibit 6** provide a summary of the historical volume trends for 2027 and 2030.





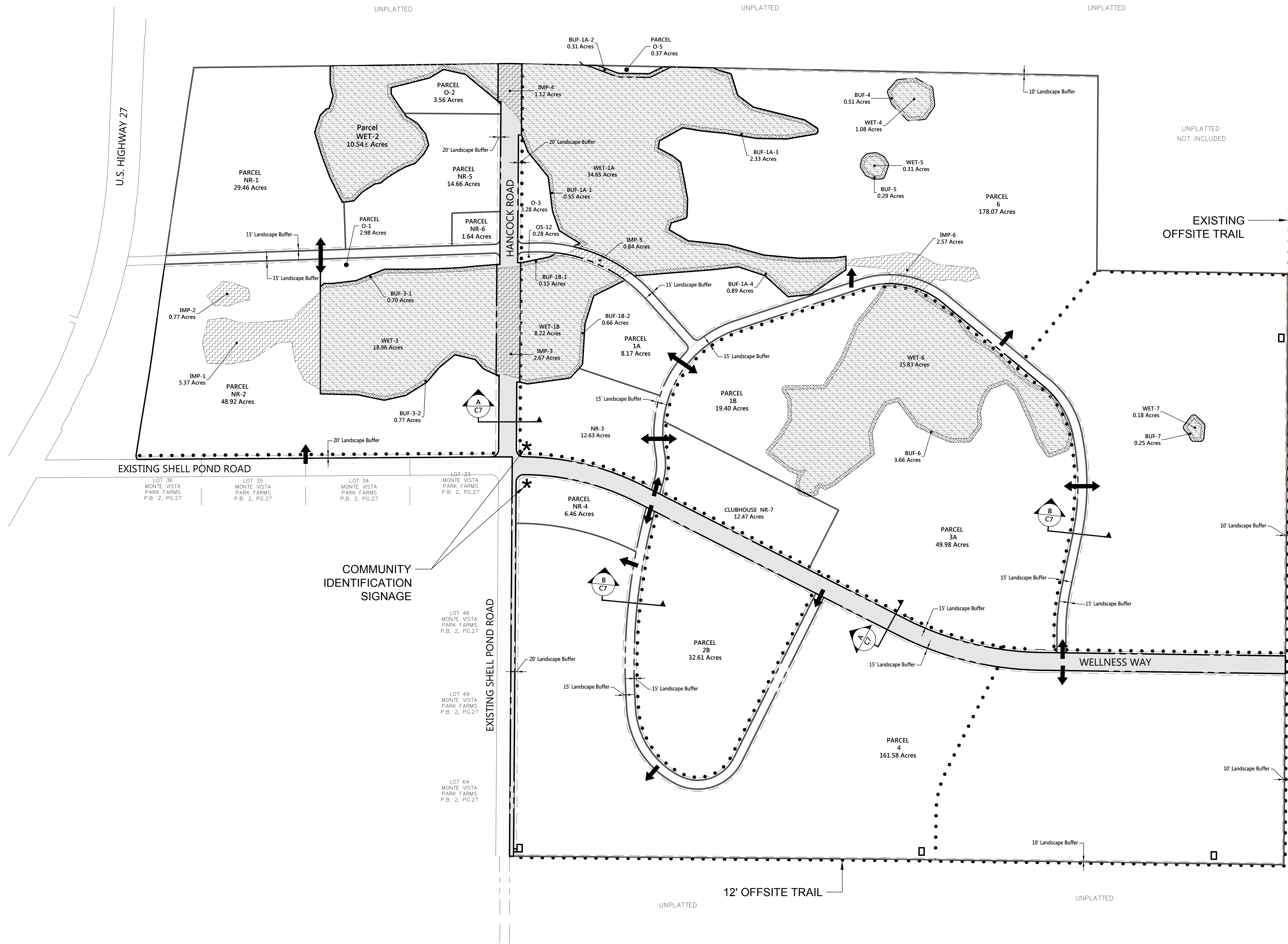
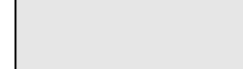

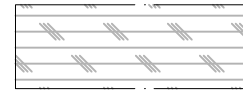

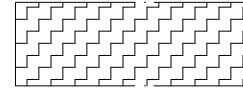
-  Site Location
-  3 Mile Study Area

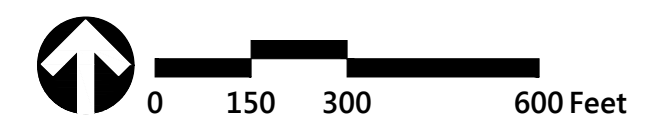


Exhibit 1
Site Location Map



LEGEND

-  FRAMEWORK ROAD
-  MULTI-USE TRAIL
-  WETLAND LIMITS
WETLAND SOURCE:
ALLEN & COMPANY SURVEYORS-
11/16/2018
-  WETLAND BUFFER (25' WIDE)
-  WETLAND IMPACT



No.	Revision	Date	Appr.



Planning + Design Studio
 Transportation
 Land Development
 Environmental Services
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 Orlando, Florida 32801
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 Certificate of Authorization Number 3932

Wellness Way PUD

City of Clermont, Florida
 Drawing Title
Development Plan

Drawing	
C-6	Sheet of
Date	Project Number
February 1, 2019	63302.00

EXHIBIT 2

2/12/2019 8:22:46 AM PBERNAT Plotted Tuesday, February 12, 2019 2:08:10 PM Blernot, Paul

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	South Lake Crossings	Organization:	VHB
Project Location:	Lake County	Performed By:	JZaballero
Scenario Description:		Date:	
Analysis Year:	2027	Checked By:	
Analysis Period:	PM Street Peak Hour	Date:	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)						
Land Use	Development Data (For Information Only)			Estimated Vehicle-Trips ³		
	ITE LUCs ¹	Quantity	Units	Total	Entering	Exiting
Office				0		
Retail	820	100,000	SF	114	18	96
Restaurant				0		
Cinema/Entertainment				0		
Residential	210/220	1,784	DU	1,529	964	565
Hotel				0		
All Other Land Uses ²				0		
				1,643	982	661

Table 2-P: Mode Split and Vehicle Occupancy Estimates						
Land Use	Entering Trips			Exiting Trips		
	Veh. Occ. ⁴	% Transit	% Non-Motorized	Veh. Occ. ⁴	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses ²						

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	25	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	2	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary			
	Total	Entering	Exiting
All Person-Trips	1,643	982	661
Internal Capture Percentage	3%	3%	4%
External Vehicle-Trips ⁵	1,589	955	634
External Transit-Trips ⁶	0	0	0
External Non-Motorized Trips ⁶	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use		
Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	11%	26%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	3%	0%
Hotel	N/A	N/A

¹Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.
²Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.
³Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).
⁴Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made.
⁵Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.
⁶Person-Trips
*Indicates computation that has been rounded to the nearest whole number.
Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	South Lake Crossings	Organization:	VHB
Project Location:	Lake County	Performed By:	JZaballero
Scenario Description:		Date:	
Analysis Year:	2030	Checked By:	
Analysis Period:	PM Street Peak Hour	Date:	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)						
Land Use	Development Data (For Information Only)			Estimated Vehicle-Trips ³		
	ITE LUCs ¹	Quantity	Units	Total	Entering	Exiting
Office	710	500,000	SF	525	84	441
Retail	820	200,000	SF	629	340	289
Restaurant				0		
Cinema/Entertainment				0		
Residential				0		
Hotel				0		
All Other Land Uses ²				0		
				1,154	424	730

Table 2-P: Mode Split and Vehicle Occupancy Estimates						
Land Use	Entering Trips			Exiting Trips		
	Veh. Occ. ⁴	% Transit	% Non-Motorized	Veh. Occ. ⁴	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses ²						

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		27	0	0	0	0
Retail	6		0	0	0	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary			
	Total	Entering	Exiting
All Person-Trips	1,154	424	730
Internal Capture Percentage	6%	8%	5%
External Vehicle-Trips ⁵	1,088	391	697
External Transit-Trips ⁶	0	0	0
External Non-Motorized Trips ⁶	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use		
Land Use	Entering Trips	Exiting Trips
Office	7%	6%
Retail	8%	2%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	N/A	N/A
Hotel	N/A	N/A

¹Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.
²Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.
³Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).
⁴Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made
⁵Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.
⁶Person-Trips
*Indicates computation that has been rounded to the nearest whole number.
Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

EXHIBIT 5: Trip Generation Estimate
South Lake Crossings

ITE Code	Land Use ¹	Size	Units	Daily Trips	PM Peak Hour Trips													
					Total PM Peak Trips			Internal Capture			Passer By Trips			New External Trips				
					Rate/Equation	Total	Enter	Exit	Total	Enter	Exit	%	Total	Enter	Exit	Total	Enter	Exit
Phase I (2027)																		
	Single Family	1,529	DU	12,782	$T=0.96*LN(X)+0.2$	1,393	878	515	57	28	29	-	-	-	-	1,336	850	486
220	Townhomes	255	DU	1,887	$T=0.89*LN(X)-0.02$	136	86	50	4	2	2	-	-	-	-	132	84	48
820	Shopping Center	100,000	SF	6,012	$T=X/1000*2.76+77.28$	353	191	162	61	31	30	34%	99	54	45	193	106	87
Subtotal				20,681		1,882	1,155	727	122	61	61		99	54	45	1,661	1,040	621
Phase II (2030)																		
710	General Office	500,000	SF	5,055	$T=0.95*LN(X/1000)+0.36$	525	84	441	32	16	16	-	-	-	-	493	68	425
820	Shopping Center	200,000	SF	9,632	$T=X/1000*2.76+77.28$	629	340	289	34	17	17	34%	202	110	92	393	213	180
Subtotal				14,687		1,154	424	730	66	33	33		202	110	92	886	281	605
TOTAL TRIPS				35,368		3,036	1,579	1,457	188	94	94		302	164	137	2,546	1,321	1,226

Source: Institute of Transportation (ITE) Trip Generation Manual, 10th Edition

Institute of Transportation (ITE) Trip Generation Handbook, 3rd Edition

NCHRP 684 Internal Trip Capture Estimation Tool developed by the Texas A&M Transportation Institute (Version 2013.1)

Note: ¹ Setting location: General Urban/Suburban

EXHIBIT 6: Historical Growth Trends
South Lake Crossings

Roadway	Segment	2013	2014	2015	2016	2017	2018	Trend		Resulting Growth Rate	Used Growth Rate	BG Volume Based on Historical Trend	
								2027	2030			2027	2030
CR 455/Hartle Rd	SR 50 to Hartwood Marsh			3,660	3,544	4,496	6,459	14,356	17,161	14.47%	14.47%	14,873	17,678
S Hancock Rd	SR 50 to Hook St	15769	17,586	19,328	18,478	19,542	20,087	24,742	23,869	2.60%	2.60%	24,781	26,346
	Hook St to Johns Lake Rd	15769	17,586	19,328	18,478	19,542	20,087	24,742	23,869	2.60%	2.60%	24,781	26,346
	Johns Lake Rd to Hartwood Marsh Rd	7843	8,359	8,513	8,483	10,600	11,175	17,917	23,332	6.91%	6.91%	18,122	20,438
Hartwood Marsh Rd	US 27 to Hancock Rd	11221	11,908	10,704	14,102	14,932	16,077	27,367	36,835	7.82%	7.82%	27,386	31,156
	Hancock Rd to N 90 Degree Bend	10300	10,400	16,478	12,479	14,798	14,963	22,014	11,674	4.98%	4.98%	21,664	23,898
	N 90 Degree Bend to Orange County Line	9402	9,589	10,759	10,247	10,862	12,123	16,404	17,352	4.27%	4.27%	16,777	18,328
Hook St	US 27 to Citrus Tower Blvd	6734	7,154	9,157	9,367	9,419	10,252	16,174	14,054	6.30%	6.30%	16,064	18,002
Johns Lake Rd	US 27 to Hancock Rd	7104	6,936	10,411	8,489	7,929	6,104	3,413	-9,966	-6.79%	1.00%	6,653	6,836
US 27	SR 50 to Johns Lake Rd	31500	32,000	34,000	36,000	35,000	--	46,900	50,200	3.14%	3.14%	46,000	48,200
	Johns Lake Rd to Hartwood Marsh Rd	29500	30,500	34,000	32,500	36,000	--	50,500	55,000	4.17%	4.17%	51,000	54,000
	Hartwood Marsh Road to Lake Louisa Rd	25500	21,000	23,500	24,500	25,500	--	40,300	44,650	1.37%	1.37%	29,000	29,700
	Lake Louisa Rd to Boggy Marsh Rd	21500	22,500	24,500	25,000	26,500	--	39,000	42,750	4.72%	4.72%	39,000	41,500

Source:
Lake County 2018 Traffic Counts
FDOT 2017 Florida Traffic Online