

**Hobe Sound – Dollar General
Martin County, Florida**

Traffic Impact Analysis

**Prepared for: AVID Group, LLC
By: LTG, Inc.
*Revised June 2018***



CA License Number: 9227

1450 W. Granada Blvd., Suite 2 | Ormond Beach, FL 32174 | Phone 386.257.2571
Fax 386.257.6996 | www.ltg-inc.us

PROFESSIONAL ENGINEERING CERTIFICATION

I hereby certify that I am a Professional Engineer properly registered in the State of Florida practicing with LTG, Inc., a corporation authorized to operate as an engineering business, EB 0009227, by the State of Florida Department of Professional Regulation, Board of Professional Engineers, and that I have prepared or approved the evaluations, findings, opinions, conclusions, or technical advice attached hereto for:

PROJECT: Hobe Sound – Dollar General
LOCATION: Martin County, Florida
CLIENT: AVID Group, LLC
JOB #: 4349.03

I hereby acknowledge that the procedures and references used to develop the results contained in these computations are standard to the professional practice of Transportation Engineering as applied through professional judgment and experience.

Prepared by:

LTG, Inc.

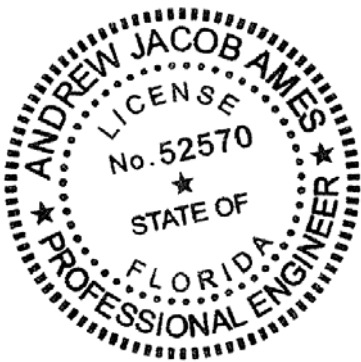
1450 W. Granada Blvd, Suite 2

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INTRODUCTION

LTG, Inc. has been retained by AVID Group, LLC to prepare a Traffic Impact Analysis (TIA) for the proposed Dollar General PD. The proposed development will be located on the southeast quadrant of the intersection of US 1 (S.E. Federal Highway) at S.E. Constitution Boulevard in unincorporated Hobe Sound in Martin County, Florida.

Access to the development is proposed via a full access driveway on S.E. Constitution Boulevard. Build-out is anticipated by 2020. Figure 1 shows the location of the project relative to the surrounding road network and a preliminary site plan is attached as Appendix A.

Study Procedures

The Martin County Traffic Impact Analysis (TIA) guidelines along with standard engineering and planning procedures were used to determine the impacts of the Dollar General project.

Reference data was obtained from the Florida Department of Transportation (FDOT), Martin County Engineering and Growth Management Departments, Institute of Transportation Engineers (ITE), National Cooperative Highway Research Program (NCHRP), and the Martin Metropolitan Planning Organization (MPO).

Study Area

The study area consists of the following roadway segments and intersections that would be impacted by the proposed project (see Appendix B for the TIA Methodology Letter):

Roadway Segments

- SR 5 (US 1) – From Osprey Street to Seabbranch Boulevard
- Constitution Boulevard – From SR-5 (US-1) to Heritage Boulevard

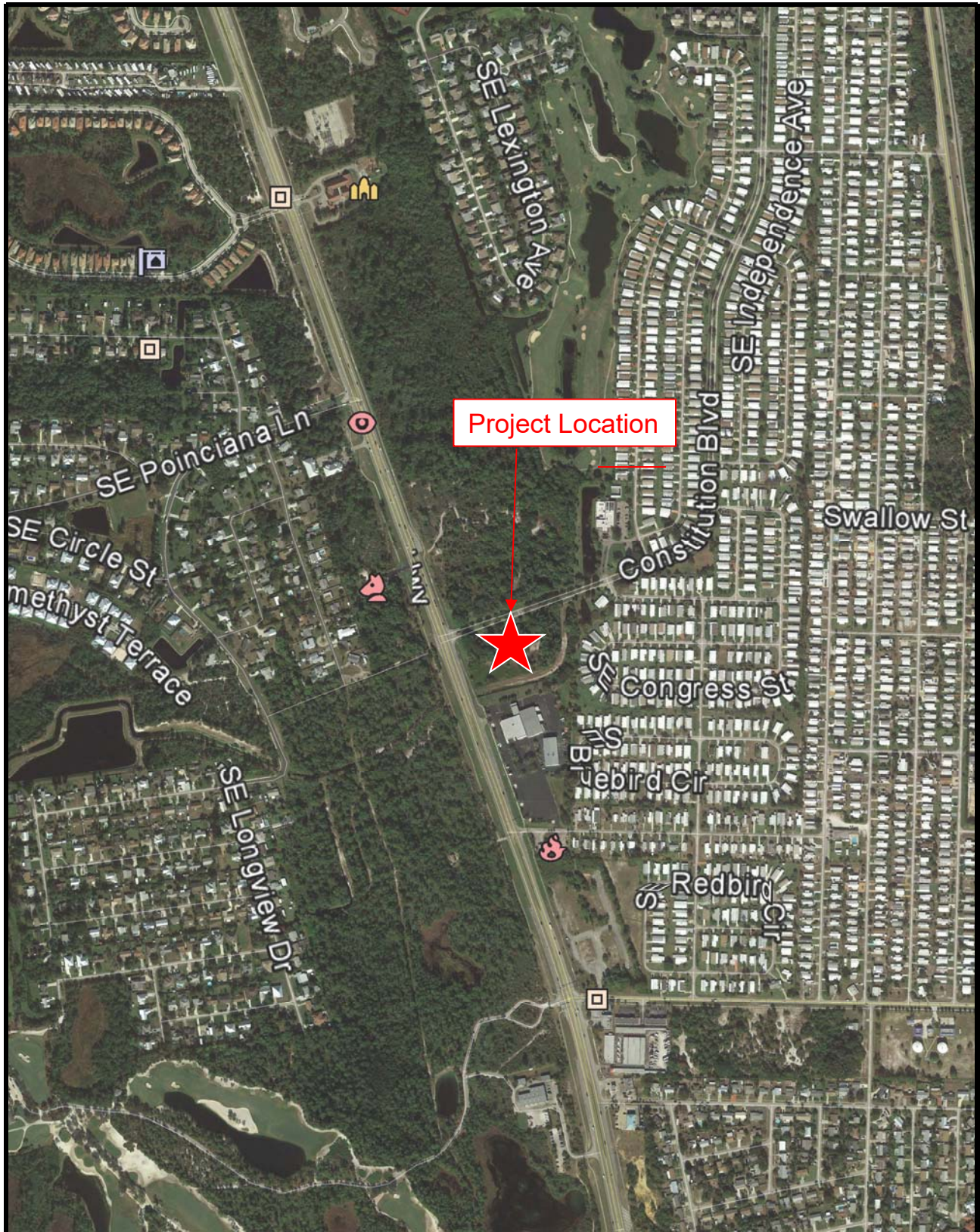
Intersections

1. SR 5 (US 1) at Osprey Street
2. SR 5 (US 1) at Constitution Boulevard
3. SR 5 (US 1) at Seabbranch Boulevard
4. Constitution Boulevard at Project Driveway (Build-out)

Planned and Programmed Roadway Improvements

The FDOT Five Year Work Program, Martin MPO Long Range Transportation Planning Organization, Martin County FY 17 Capital Improvement Plan (CIP), and previously approved projects were consulted to ascertain if there were any programmed or planned roadway improvements in the area of interest. Based on information obtained, the following improvements are planned for the roadways in the study area:

- Roadway Resurfacing on US 1/SR 5 from SE Heritage Blvd to North of Salerno Rd
- Roadway Resurfacing on SE Seabbranch Blvd from SE Retreat Dr to SR 5/US 1



**Hobe Sound
Dollar General**



NTS

Location Map

Project No.: 4349.03

Figure: 1



LTG

**Engineering
& Planning**

1450 W. Granada Blvd., Suite 2, Ormond Beach, Florida 32174
Telephone: 386.257.2571 Fax: 386.257.6996 EB# 0009227

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EXISTING ROADWAY ANALYSIS

The existing roadway analysis was conducted under 2017 existing conditions. Intersections were analyzed during the PM peak-hour. Roadway segments were analyzed based on the PM peak-hour directional traffic.

Turning movement counts (TMCs) were conducted during the PM peak-hour on a typical work day (Tuesday, Wednesday or Thursday) at the study area intersections. The TMCs were collected between 4:00 PM to 6:00 PM on July 18, 2017. The raw count data is located in Appendix C. A seasonal factor along with the peak-hour factor were applied to the counts to determine the adjusted factored volumes for analysis. The existing PM peak-hour traffic volumes from the adjusted counts are depicted in Figure 2.

Signalized Intersection Analysis

The level of service (LOS) at a signalized intersection is based on the average stop delay per vehicle for the various movements within the intersection. The operating conditions at the signalized intersections were analyzed using the Highway Capacity Software 7, version 7.2.1 (HCS). HCS utilizes the procedures outlined in Chapter 18 of the Highway Capacity Manual 6th Edition, titled "Signalized Intersections". Signal timings were obtained from Martin County and are provided in Appendix D. Table 1 shows the existing LOS at the subject signalized intersections during the PM peak-hour. HCS printout sheets are included in Appendix E.

As seen in Table 1, the intersections are expected to operate within their adopted level of service and require no improvements.

Table 1
Existing PM Peak-Hour Level of Service – Signalized Intersections
Hobe Sound Dollar General

Intersection	Adopted LOS	Existing		
		PM Peak-Hour		
		Delay (sec.)	LOS	V/C greater than 1.0?
1. SR 5 (US 1) at Osprey St	D	23.1	C	No
2. SR 5 (US 1) at Seabbranch Blvd	D	11.9	B	No

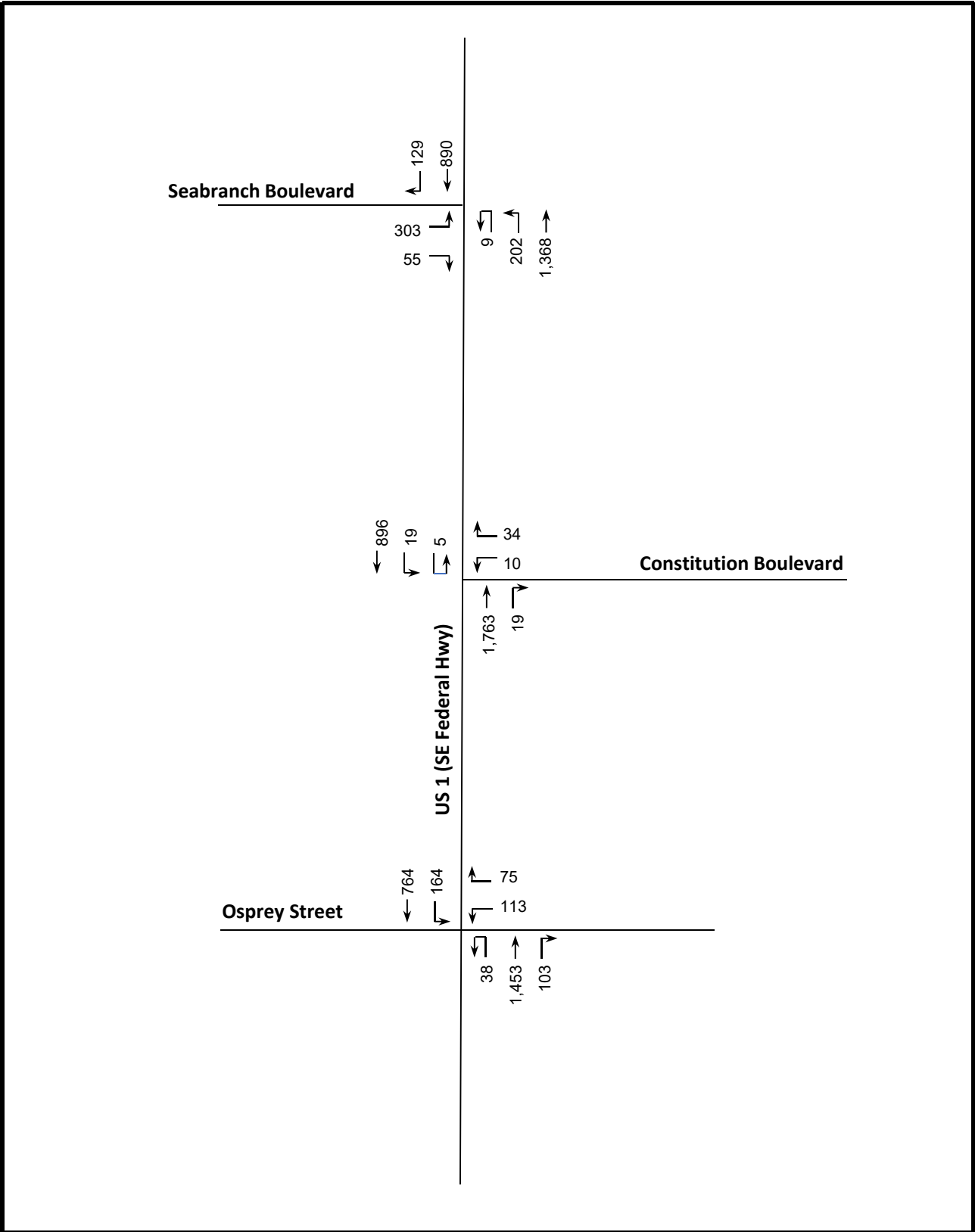
Unsignalized Intersection Analysis

The level of service (LOS) at an unsignalized intersection is based on the average stop delay per vehicle for the various movements within the intersection. The operating conditions at the unsignalized intersections were analyzed using the Highway Capacity Software 7, version 7.2.1 (HCS). HCS utilizes the procedures outlined in Chapter 18 of the Highway Capacity Manual 6th Edition, titled "Unsignalized Intersections". Table 2 shows the existing LOS at the subject unsignalized intersections during the PM peak-hour. HCS printout sheets are included in Appendix F.

As seen in Table 2, the intersections are expected to operate within their adopted level of service and require no improvements.

Table 2
Existing PM Peak-Hour Level of Service – Unsignalized Intersections
Hobe Sound Dollar General

Intersection	Adopted LOS	Existing Conditions		
		PM Peak-Hour		
		Critical Approach	Delay (sec.)	LOS
3 SR 5 (US 1) at Constitution Blvd	D	WB	25.3	D



Hobe Sound Dollar General	N NTS	Existing P.M. Peak Hour	
		Project No.: 4349.03	Figure: 2
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Roadway Segment Analysis

Roadway level of service describes the operating conditions determined from the number of vehicles passing over a given section of roadway during a specified time period. It is a qualitative measurement of several factors, which include speed, travel time, traffic interruptions, freedom to maneuver, driver comfort, convenience, safety and vehicle operating costs. Six service levels have been established as standards by which to gauge roadway performance, designated by the letters A through F. The LOS categories are defined as follows:

Level of Service A:	Free flow, individual users virtually unaffected by the presence of others
Level of Service B:	Stable flow with a high degree of freedom to select operating conditions
Level of Service C:	Flow remains stable, but with significant interactions with others
Level of Service D:	High-density stable flow in which the freedom to maneuver is severely restricted
Level of Service E:	This condition represents the capacity level of the road
Level of Service F:	Forced flow in which the traffic exceeds the amount that can be served

The Average Annual Daily Traffic (AADT) for the study roadway segments was obtained from the Martin County 2016 Roadway Level of Service Inventory Report spreadsheet. The existing levels of service analysis results for the study area road segments during the PM peak-hour are shown in Table 3.

As indicated in Table 3, the roadway segment in the study area currently operates within an acceptable level of service.

Table 3
Roadway Segment Analysis – 2016 PM Peak-Hour
Hobe Sound Dollar General

Existing LOS Segments - PM								
Roadway	Segment		No. of Lanes	Generalized LOS	Peak-Hour Directional Capacity at Adopted LOS	2016 AADT	Existing PM Peak-Hour Directional Volume	Existing PM Volume Exceed Adopted LOS?
SR 5 (US 1)	Osprey St	Constitution Blvd	4	C	2,000	23,330	1,283	No
	Constitution Blvd	Seabbranch Blvd	4	C	2,000	23,330	1,283	No
Constitution Blvd	SR-5	Heritage Blvd	2	C	790	911*	82*	No

Source: Martin County 2016 Roadway Level of Service Inventory Report

*Existing PM Peak-Hour Directional Volume was determined using the turning movement counts and the 2016 AADT was determined by taking the Existing PM Peak-Hour Directional Volume and dividing it by .09.

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2020 TRAFFIC CONDITIONS

Traffic in the area is expected to grow due to local development approvals. The following section documents the methods used to project traffic conditions in 2020, the anticipated Build-Out year for the Hobe Sound – Dollar General.

Background Traffic Growth Rate

Historical growth rates were used to determine the background traffic in the study area in 2020. Martin County 2016 Roadway Level of Service Inventory Report was used to determine historical growth rates from the Average Annual Growth Rate for each segment analyzed.

Table 4 shows the historical and applied growth rates used in the analysis. For any segments that demonstrated less than 1% growth, a 1% growth rate was applied to the existing traffic volumes, per the Martin County TIA Guidelines.

Table 4
Historical Growth Rates
Hobe Sound Dollar General

Roadway	Segment		Average Annual Growth Rate	Applied Growth Rate
SR 5 (US 1)	Osprey St	Constitution Blvd	2.30%	2.30%
	Constitution Blvd	Seabbranch Blvd	2.30%	2.30%

Project Trip Generation

The trip generation for the development was determined using the trip generation rates contained in the Institute of Transportation Engineers' (ITE) 9th edition of the Trip Generation Manual. The trip generation and pass-by percentages for the proposed development was based on the ITE Land Use for Variety Store (LU-814). The resultant PM peak-hour trip generation is shown in Table 5.

A portion of trips, known as pass-by, will be attracted to the development from the existing traffic on the adjacent roadways. Table 13 of the Martin County Impact Fee Study shows 52% new trips will be generated by the Retail Under 50,00 ft² land use, indicating a 48% pass-by capture rate. The pass-by rates were applied to the trip generation and the resultant calculations were verified to ensure they did not exceed the pass-by threshold of 14% of background traffic. The net new p.m. peak-hour trip generation is shown in Table 5.

Project Trip Distribution

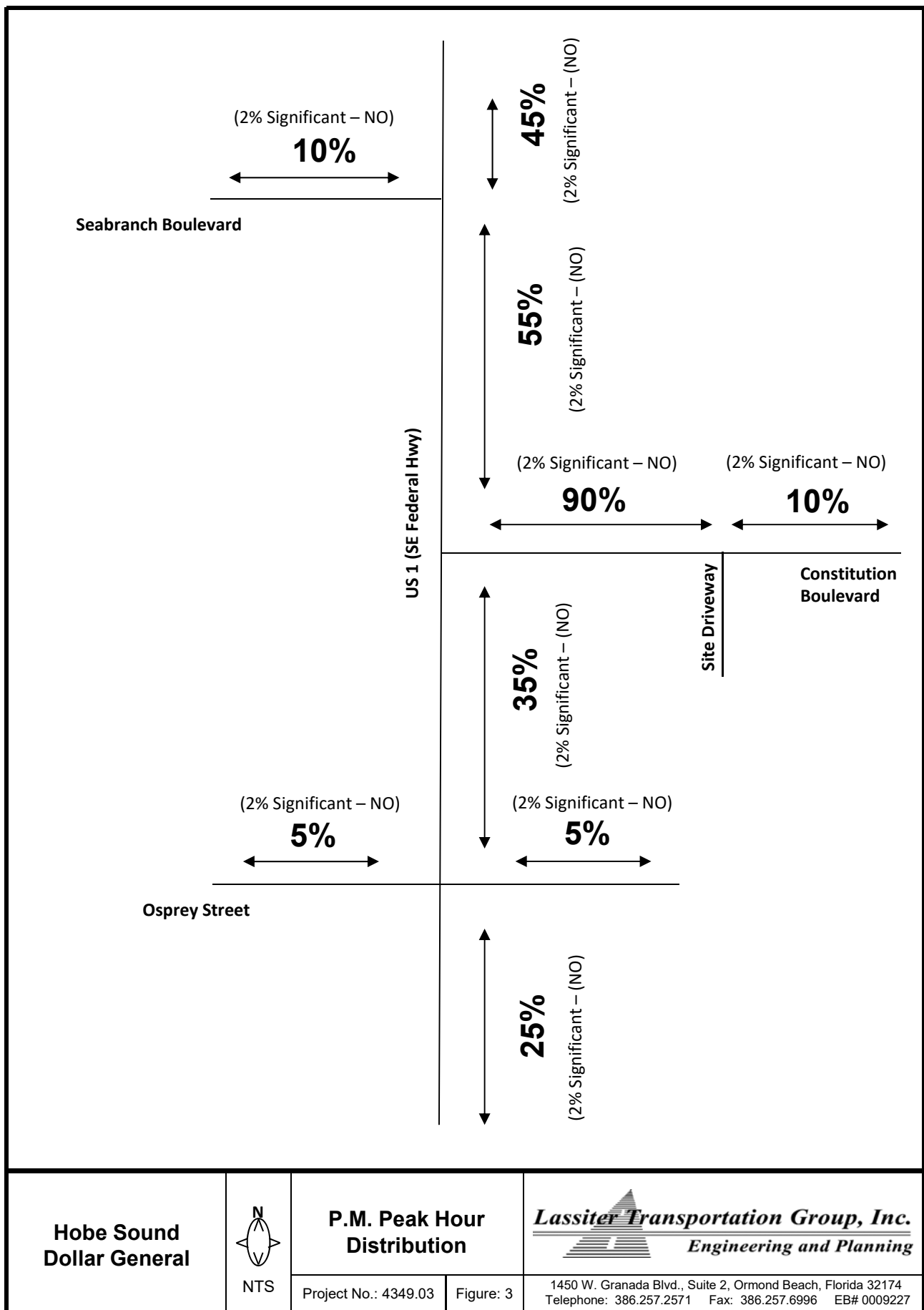
Project trips were manually distributed based on the roof tops in the area and the resulting project trip distribution is shown in Figure 3. It should be noted that the distribution of pass-by project trips will be determined based on the directional distribution of existing traffic adjacent to the site, as derived from turning movement counts.

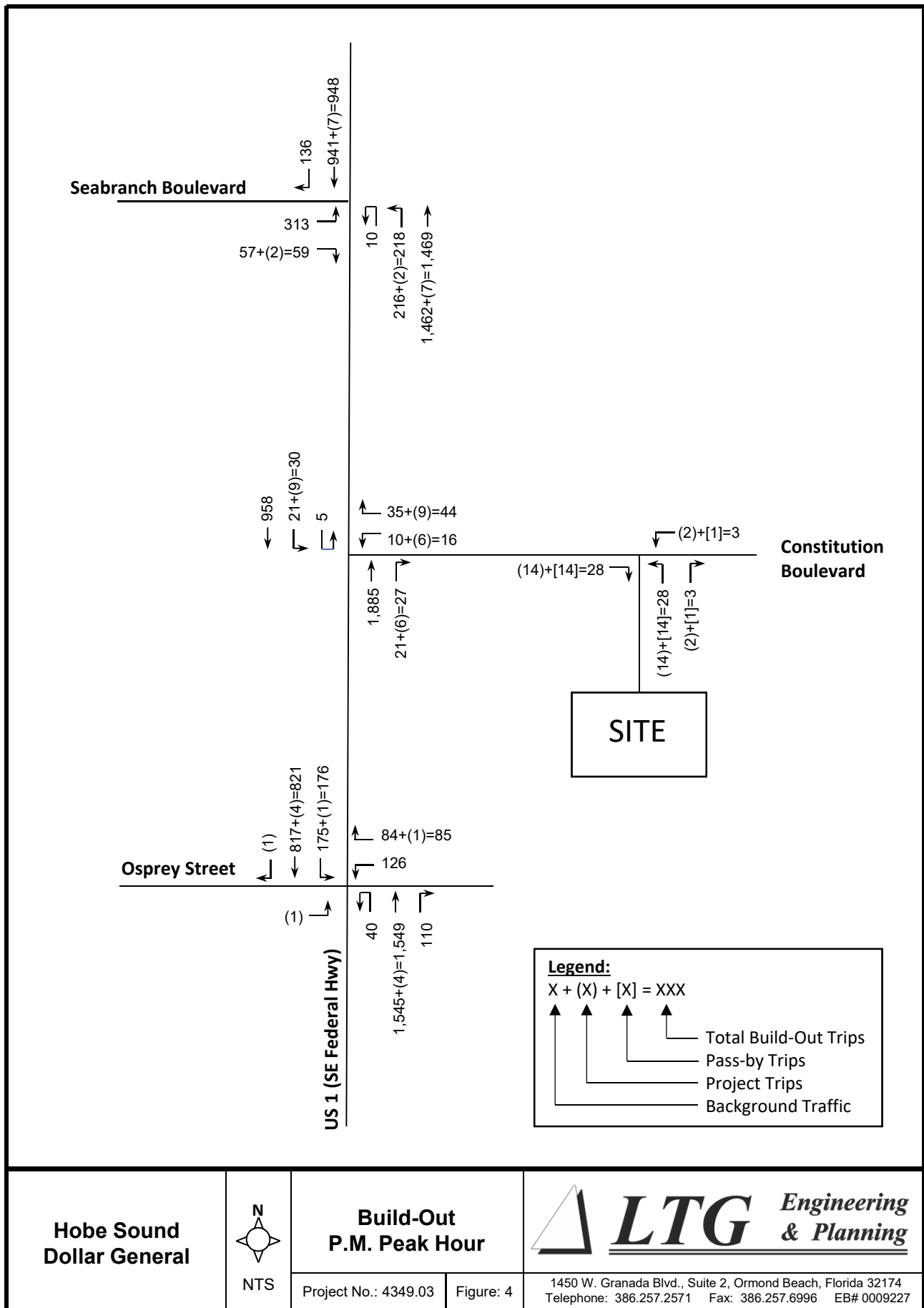
Trip Assignment

The 2020 background traffic, vested trips, and Build-Out project traffic were assigned to the project's surrounding road network. The trips assigned for the PM peak-hour are graphically depicted in Figure 4.

Table 5
Trip Generation
Hobe Sound Dollar General

Time Period	ITE LUC	Land Use	Trip Rate Equation	Size	Units	Percent Entering	Percent Exiting	Total Trips			Pass By trips			New External Trips		
								Enter	Exit	Total	Enter	Exit	Total	Enter	Exit	Total
Daily	814	Variety Store	T=64.03(X)	9.1	KSF	50%	50%	292	292	584	50	50	100	242	242	484
P.M. Peak-Hour	814	Variety Store	T=6.82(X)	9.1	KSF	50%	50%	31	31	62	15	15	30	16	16	32





Hobe Sound
Dollar General



**Build-Out
P.M. Peak Hour**



Project No.: 4349.03

Figure: 4

1450 W. Granada Blvd., Suite 2, Ormond Beach, Florida 32174
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2020 BACKGROUND ROADWAY ANALYSIS

The study area intersections were analyzed based on 2020 background roadway conditions to determine potential impacts and investigate mitigation requirements. The background analysis utilizes current traffic volumes projected to the background year (growth) along with vested trips.

Signalized Intersection Analysis

The signalized intersections were analyzed to determine the operational LOS under 2020 background conditions during the PM peak-hour. Table 6 shows the projected LOS in the PM peak-hour at the signalized intersections included in the study area. The HCS printouts are included in Appendix G.

As seen in Table 6, all signalized intersections are projected to operate within their adopted LOS under 2020 background conditions.

Table 6
2020 Background PM Peak-Hour Level of Service – Signalized Intersections
Hobe Sound Dollar General

Intersection	Adopted LOS	Background		
		PM Peak-Hour		
		Delay (sec.)	LOS	V/C greater than 1.0?
1 SR 5 (US 1) at Osprey St	D	25.0	C	No
2 SR 5 (US 1) at Seabranh Blvd	D	12.2	B	No

Unsignalized Intersection Analysis

The level of service at the unsignalized intersection was analyzed under 2020 background conditions, and the results of the analysis are presented in Table 7. The HCS printouts are contained in Appendix H.

Table 7
2020 Background PM Peak-Hour Level of Service – Unsignalized Intersections
Hobe Sound Dollar General

Intersection	Adopted LOS	Background Conditions		
		PM Peak-Hour		
		Critical Approach	Delay (sec.)	LOS
3 SR 5 (US 1) at Constitution Blvd	D	WB	27.1	D

2020 Background Roadway Segment Analysis

The study area segments were analyzed under 2020 background conditions (2016 AADT × growth rate + vested trips) to determine the expected LOS without including Hobe Sound Dollar General project traffic. No vested trips were identified in the study area. The results of the analysis, presented in Table 8, indicate that all roadway segments will operate within their generalized LOS during the PM peak-hour.

Table 8
2020 Background Roadway Segment Analysis
Hobe Sound Dollar General

Roadway	Segment		No. of Lanes	Generalized LOS	Peak-Hour Two-Way Capacity at Adopted LOS	Existing PM Peak-Hour Directional Volume	2020 Growth Factor	Vested Trips	2020 Background Traffic	2020 Background Traffic Exceed Adopted LOS?
SR-5 (US 1)	Osprey St	Constitution Blvd	4	C	2,000	1,283	1.09	0	1,401	No
	Constitution Blvd	Seabbranch Blvd	4	C	2,000	1,283	1.09	0	1,401	No
Constitution Blvd	SR-5	Heritage Blvd	2	C	790	82	1.04	0	85	No

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2020 BUILD-OUT GROWTH WITH PROJECT TRAFFIC

The study area intersections were analyzed based on the roadway conditions at the time of development Build-Out in 2020 to determine potential impacts of project-generated trips and investigate mitigation requirements.

Signalized Intersection Analysis

The signalized intersections were analyzed to determine the operational LOS under Build-Out conditions during the PM peak-hour. Table 9 shows the results of the analysis, and the HCS printouts are included in Appendix I.

Table 9
2020 Build-Out PM Peak-Hour Level of Service – Signalized Intersections
Hobe Sound Dollar General

Intersection	Adopted LOS	Build-Out Conditions		
		PM Peak-Hour		
		Delay (sec.)	LOS	V/C greater than 1.0?
1 SR 5 (US 1) at Osprey St	D	31.6	C	No
2 SR 5 (US 1) at Seabranh Blvd	D	12.5	B	No

As indicated in Table 9, the signalized intersections are expected to operate within the adopted level of service of Martin County at the time of project Build-Out. No improvements are required.

Unsignalized Intersection Analysis (Project Driveways)

The unsignalized intersections were analyzed to determine the operational LOS under Build-Out conditions during the PM peak-hour, and the results are presented in Table 10. The HCS printouts are contained in Appendix J.

Table 10
2020 Build-Out PM Peak-Hour Level of Service – Unsignalized Intersections
Hobe Sound Dollar General

Intersection	Adopted LOS	Build-Out Conditions		
		PM Peak-Hour		
		Critical Approach	Delay (sec.)	LOS
3 SR 5 (US 1) at Constitution Blvd	D	WB	31.4	D
4 Constitution Blvd at Project Driveway	D	NB	8.7	A

As indicated in Table 10, all unsignalized intersections are expected to operate within their adopted level of service at the time of project Build-Out. No improvements are required.

2020 Build-Out Roadway Segment Analysis

The study area segments were also analyzed under 2020 Build-Out conditions (2016 AADT × growth rate + vested trips + Build-Out project trips) to determine the expected LOS. No vested trips were identified in the study area. The results, shown in Table 11, indicate that all roadway segments are expected to provide sufficient roadway capacity and operate within their generalized levels of service.

Table 11
2020 Build-Out Roadway Segment Analysis
Hobe Sound Dollar General

Roadway	Segment		No. of Lanes	Generalized LOS	Peak-Hour Two-Way Capacity at Adopted LOS	Existing PM Peak-Hour Directional Volume	2020 Growth Factor	Vested Trips	2020 Background Traffic	Project Distribution	Project Trips	2020 Build-Out Traffic	2020 Build-Out Traffic Exceed Adopted LOS?
SR-5 (US-1)	Osprey St	Constitution Blvd	4	C	2,000	1,283	1.09	0	1,401	35%	6	1,407	No
	Constitution Blvd	Seabbranch Blvd	4	C	2,000	1,283	1.09	0	1,401	55%	9	1,410	No
Constitution Blvd	SR-5	Heritage Blvd	2	C	790	82	1.04	0	85	100%	16	101	No

Alternative Mode Analysis

An alternative mode analysis has been conducted to determine the existing and proposed alternate modes of transportation within the immediate project study area.

Crosswalks are present across the west and south approaches at the intersection of SR 5/US 1 and Seabranh Boulevard and across all approaches of the intersection of SR 5/US 1 and Osprey Street. There is only one crosswalk across the east approach of the intersection of SR 5/US 1 and Constitution Boulevard.

Martin County Public Transit operates Monday through Friday with the exception of six holidays:

- New Year's Day
- Memorial Day
- Independence Day
- Labor Day
- Thanksgiving Day
- Christmas Day

On those occasions when a holiday falls on a Saturday, there is no service on the Friday before the holiday. If the holiday falls on a Sunday, there is no service on the Monday following the holiday.

Martin County's Transit Service provides fixed route service to the US 1 Corridor, Indiantown, and Stuart. According to the MARTY schedule, Route 1 services the US 1 corridor, but only extends to the south as far as US 1 and Cove Road. Thus, the proposed Dollar General will not have public transit access.

Along both sides of the segment of SR 5/US 1 from Seabranh Boulevard to Osprey Street, there is a 4-foot paved shoulder and a sidewalk.

Site Access Analysis

The Dollar General development has a proposed site access on Constitution Boulevard.

Per the National Cooperative Highway Research Program (NCHRP) turn lane warrant forms (Appendix K), an eastbound right-turn bay into the development is not required and westbound left-turn lane into the development is not warranted.

Queue Length Analysis

The existing turn lane lengths for all turn lanes at the study area intersections were analyzed to determine if there is sufficient queue storage length under existing conditions and 2020 development Build-Out conditions to meet the requirements of the FDOT Design Standards Index No. 301. The results of the analysis are presented in Table 12.

Table 12
Queue Length Analysis
Hobe Sound Dollar General

Intersection	Turn Lane	# of Lanes	Existing Lane Length (ft.)	Design Speed (mph)	Required Deceleration (ft.)*	Existing				Build-Out				Exceed Standard Due to Build-Out Alone?
						95th Percentile Queue (veh/ln)	95th Percentile Queue Length (ft.)	Total Required Turn Lane Length	Lane Exceed Standard at Existing (Y/N)?	95th Percentile Queue (veh/ln)	95th Percentile Queue Length (ft.)	Total Required Turn Lane Length	Lane Exceed Standard at Build-Out (Y/N)?	
PM														
1 SR 5 (US 1) at Osprey St	NB LT	1	430	55	350	2	46	396	No	3	75	425	No	No
	NB RT	1	500	55	350	2	53	403	No	3	69	419	No	No
	WB RT	1	160	35	145	0	0	145	No	0	0	145	No	No
	WB LT	1	160	35	145	0	0	145	No	0	0	145	No	No
	SB LT	1	495	55	350	8	207	557	Yes	10	241	591	Yes	No
	SB RT	1	482	55	350	0	0	350	No	0	1	351	No	No
2 SR 5 (US 1) at Seabranh Blvd	EB LT	2	340	25	145	7	164	309	No	7	169	314	No	No
	EB RT	1	300	25	145	2	59	204	No	3	75	220	No	No
	NB LT	1	500	55	350	3	67	417	No	3	73	423	No	No
	SB LT	1	510	55	350	0	0	350	No	0	0	350	No	No
	SB RT	1	383	55	350	1	20	370	No	0	0	350	No	No
3 SR 5 (US 1) at Constitution Blvd	WB RT	1	160	25	145	0	0	145	No	1	25	170	Yes	Yes
	NB LT	1	435	55	350	0	0	350	No	0	0	350	No	No
	NB RT	1	310	55	350	0	0	350	Yes	0	0	350	Yes	No
	SB LT	1	440	55	350	0	0	350	No	0	1	351	No	No

*Based upon FDOT Design Standards Index No. 301

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CONCLUSIONS AND RECOMMENDATIONS

This analysis was conducted to evaluate the traffic impact of the proposed Dollar General variety store on its surrounding roadway network in unincorporated Hobe Sound, Florida. The analysis summary is below:

Existing 2017 Traffic Conditions Analysis

Signalized Intersections. The intersections will operate within their adopted LOS with no additional improvements needed.

Unsignalized Intersections. The intersection will operate within its adopted LOS with no additional improvements needed.

Roadway Segments. The roadway segments operate within their generalized LOS with no additional improvements needed.

2020 Background Traffic Conditions Analysis (without Project Trips)

Signalized Intersections. All intersections will operate within their adopted LOS. No additional improvements are required.

Unsignalized Intersections. The intersection will operate within its adopted LOS. No additional improvements are required.

Roadway Segments. All roadway segments will operate within their adopted LOS. No additional improvements are required.

2020 Build-Out Traffic Conditions Analysis (with Project Trips)

Signalized Intersections. All intersections will operate within its adopted LOS under 2020 Build-Out conditions with no additional improvements required.

Unsignalized Intersections. The unsignalized intersections, including the project driveway, will operate within their adopted LOS. No improvements are required.

Roadway Segments. All roadway segments will operate within their adopted LOS. No additional improvements are required.

Site Access Analysis. Per the NCHRP turn lane warrant forms, no additional turn lanes are required at the project entrance on Constitution Boulevard. The full median opening will provide sufficient capacity to accommodate inbound and outbound traffic volume.

Based on the results of this Traffic Impact Analysis, the proposed Dollar General development is recommended for approval.