LeJeune Road at SW 8th Street Intersection

Improvement Study

Final Technical Report

MIAMI-DADE METROPOLITAN PLANNING ORGANIZATION

Final Report

October 2015

Prepared by:
JACOBS

The Miami-Dade MPO complies with the provisions of Title VI of the Civil Rights Act of 1964, which states: No person in the United States shall, on grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance. It is also the policy of the Miami-Dade MPO to comply with all of the requirements of the Americans with Disabilities Act. For materials in accessible format please call (305) 375-4507.

The preparation of this report has been financed in part from the U.S. Department of Transportation (USDOT) through the Federal Highway Administration (FHWA) and/or the Federal Transit Administration (FTA), the State Planning and Research Program (Section 505 of Title 23, U.S. Code) and Miami-Dade County, Florida. The contents of this report do not necessarily reflect the official views or policy of the U.S. Department of Transportation.

Table of Contents

List of Figures

List of Tables

Appendices

Chapter 1 Introduction

This study is being conducted by the Miami-Dade Metropolitan Planning Organization (MPO) to evaluate safety, operational and multimodal improvements at the intersection of SR 953/LeJeune Road with SR 90/SW 8th Street/Tamiami Trail. The roads intersecting in this juncture are major north-south and east-west corridors within Miami-Dade County, providing access to the Miami International Airport (MIA) to the north, Coral Gables to the south, adjacent local businesses and residences east and west; as well as other major thoroughfares such as SR 836, SR 112, SR 826, and/or I-95.

1.1 Study Objective

The objective of the study is to assess operational and/or safety need(s) at the intersection and its influence area, and to determine, evaluate and document potential safety, operational and multimodal improvements to address said needs. The study consists of six tasks:

1. Study Coordination
2. Existing Data Collection
3. Project Traffic Development and Analysis
4. Alternative Development and Analysis
5. Development of Recommendations and Action Plan
6. Final Report

1.2 Area Description

The study area for the intersection study extends to SW 7th Street in the north, SW 43rd Avenue in the west, SW 40th Avenue in the east, and SW 9th Terrace in the south. Both, study area and intersection location are shown in **Figure 1-1.**

From Mendoza Avenue to SW 8th Street (US 41/Tamiami Trail), LeJeune Road runs within unincorporated Miami-Dade County. Then, from SW 8th Street to the north, LeJeune Road enters the jurisdiction of City of Miami.

Figure 1-2 shows the predominant existing land uses in the surrounding area as derived from the Miami-Dade County Property Appraiser data. In general, commercial land use fronts LeJeune Road and SW 8th Street with residential uses behind, along the surrounding local roadway facilities.

The study intersection is a signalized intersection in which LeJeune Road (North and South) crosses SW 8th Street (East and West) at an approximate 90º angle creating a four-legged intersection. The westbound approach consists of three lanes with a dedicated lane for the protected/permissive westbound left, one lane for the westbound thru, and a shared lane for the westbound thru/ right. During the AM peak period, the protected phase of the westbound left is omitted. A more detailed description of the phasing is provided in the Field Review - Traffic Conditions - section of this document.

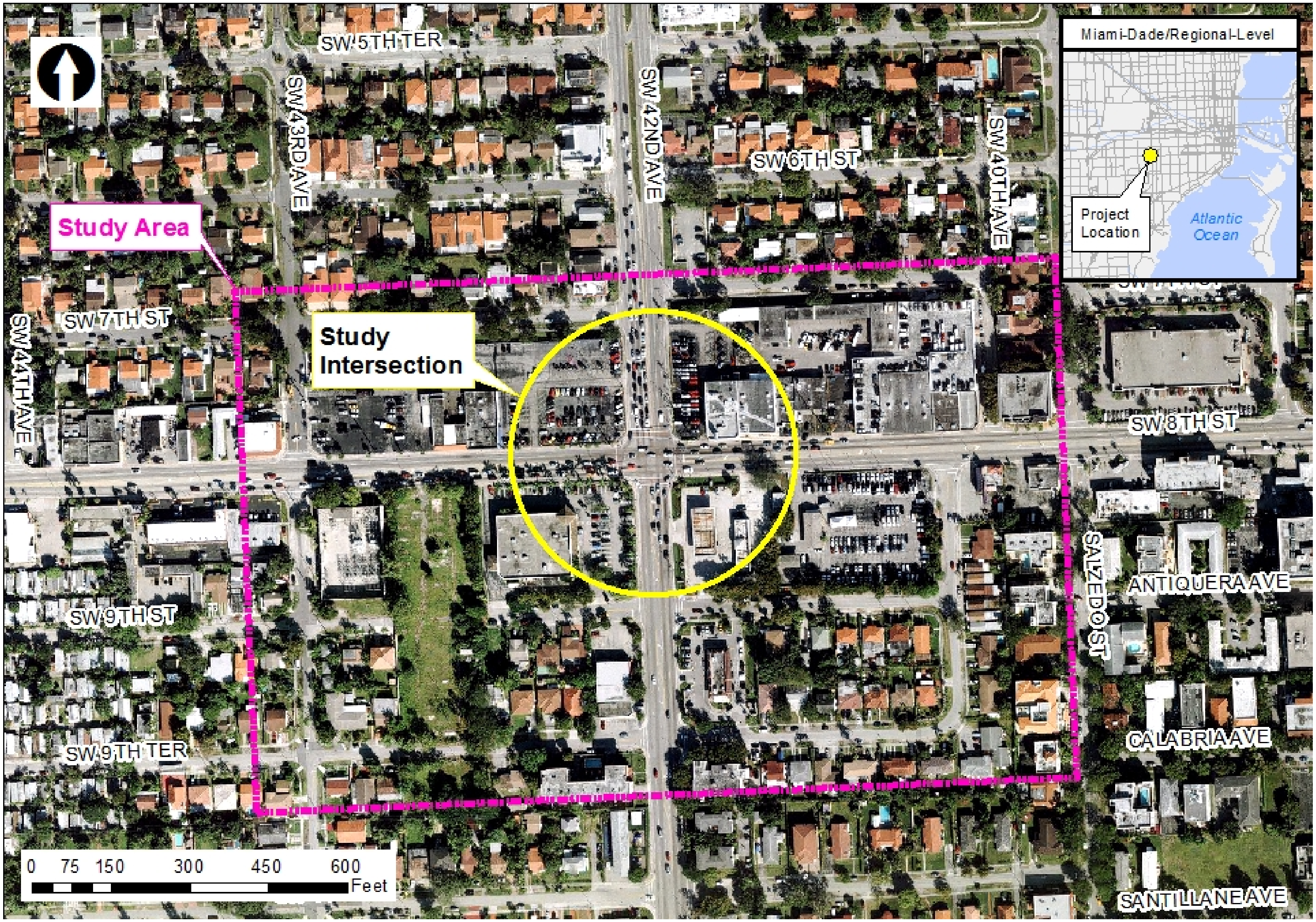

Figure 1-1: Project Location

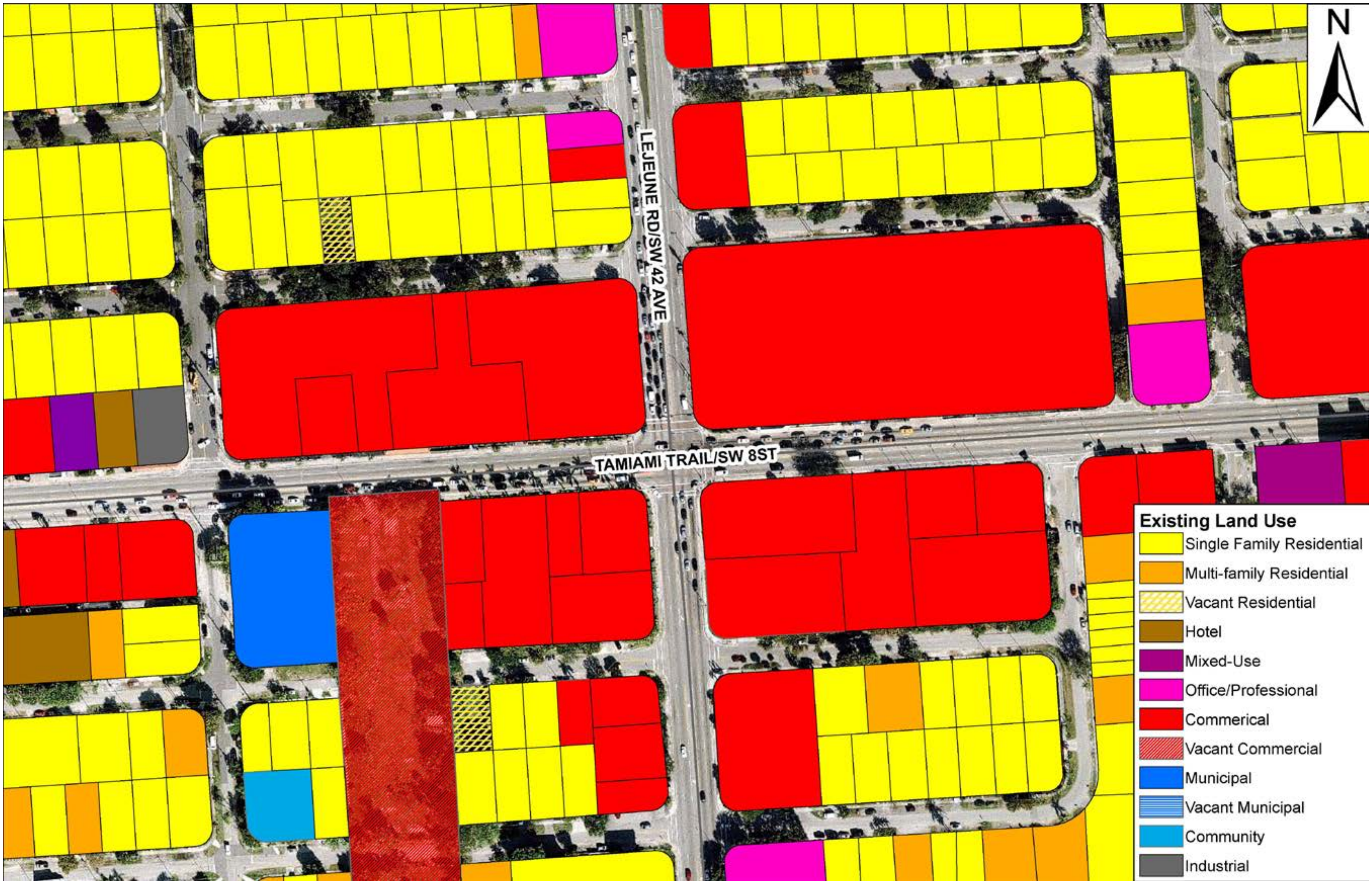

Figure 1-2: Existing Land Use

Similarly, the eastbound approach consists of three lanes with one lane dedicated to a protected/permissive eastbound left, another lane for the eastbound thru, and a shared lane for the eastbound thru/ right. Like the westbound, the protected phase of the eastbound left is omitted, but this time during the PM peak period. In the same way, the northbound approach is composed of three lanes with a lane assigned to the protected/permissive northbound left, another lane dedicated to the northbound thru, and a shared lane for the northbound thru/ right. Similar to the eastbound left-turn movement, the protected phase is omitted during the PM peak period. The southbound approach is composed of four lanes with one lane assigned to the protected/permissive southbound left (active throughout the day), two lanes for the southbound thru, and an exclusive lane for the southbound right.

1.3 Relevant Planning Documents

The following relevant planning and background documents were reviewed: Florida Department of Transportation (FDOT) Adopted Work Program – Fiscal Year (FY) 2015 – 2019, Miami-Dade Long Range Transportation Plan (LRTP) Update to the Year 2040, and Miami-Dade County's Transit Development Plan – FY 2014 – 2023.

Included within the Work Program is a Safety Improvement for the intersection in 2016. This improvement will be included as a part of the No Build alternative. The LRTP contains projects that may affect the intersection indirectly; however, no improvements are funded at the intersection specifically. The SW 8th Street corridor from SR-826 to I-95, in which limits include the intersection at LeJeune Road, is recommended for Congestion Management Project (CMP) funding (ranked 12th) with a signal timing strategy. The Transit Development Plan includes the extension of Route 8 to the future terminal at SW 147th Avenue and SW 8th Street programmed for FY 2017 – 2023, and Route 42 will provide a connection to the Miami Intermodal Center (MIC) to the north. Plan excerpts for relevant projects indicated above are included in Appendix 1-I.

Additionally, previous studies for the intersection were also reviewed, including the 2005 MPO Grade Separation Study for SW 8th Street, and the 2011 FDOT Safety Study. The data, results, and recommendations from these previous studies were considered throughout the subject study, as applicable.

Chapter 2 Existing Conditions

This chapter summarizes the existing year (2014) traffic conditions of the LeJeune Road at SW 8th Street intersection. It includes the compilation of traffic data (as required by Task 2 in the Scope of Services), field review, safety analysis, and summary of findings during the existing conditions analysis.

2.1 Traffic Data

In order to document the existing traffic conditions at the intersection, traffic counts were collected by CH Perez and Associates Consulting Engineers Inc. in October 2014. In addition, historical daily and peak period traffic volume as well as signal timing data were obtained from FDOT and Miami-Dade County, respectively. Figure 2-1 shows the type of data collected in the field, as well as the location of monitoring sites maintained by FDOT from which the additional traffic information was retrieved.

2.1.1 Historical AADT Volumes

Historical Annual Average Daily Traffic (AADT) volumes were obtained from FDOT's Florida Traffic Online (FTO) from 1998-2013. The information from the four count locations located closest to the intersection is shown in **Figures 2-2 thru 2-5**, and the historical AADT reports from the FTO are included in Appendix 2-I.

Along LeJeune Road, the historical data shows a decrease in volumes around 2006-2007 (somehow in line with the Great Recession), however before and after recovery, the volumes remained relatively steady between the years. Along SW 8th Street, the lower volumes correspond to an earlier period (1999-2002), with the remaining years showing higher and relatively steady daily volumes.

Synopsis reports were also obtained from the FTO at the count stations along LeJuene Road (as these two are immediately adjacent to the intersection). The synopsis reports document the 15-minute volumes over three consecutive weekdays in year 2013. Twenty-four-hour vehicular volume profiles were developed based upon the data contained in the synopsis reports, and were used to determine the two-hour peak periods in which turning movement counts were collected for the study, specifically: 7:45 – 9:45 AM and 4:45 – 6:45 PM. The daily volume profiles are shown in **Figures 2-6 and 2-7**, and the synopsis reports from the 2013 FTO are also included in Appendix 2-I.

Figure 2-1: Traffic Count Locations

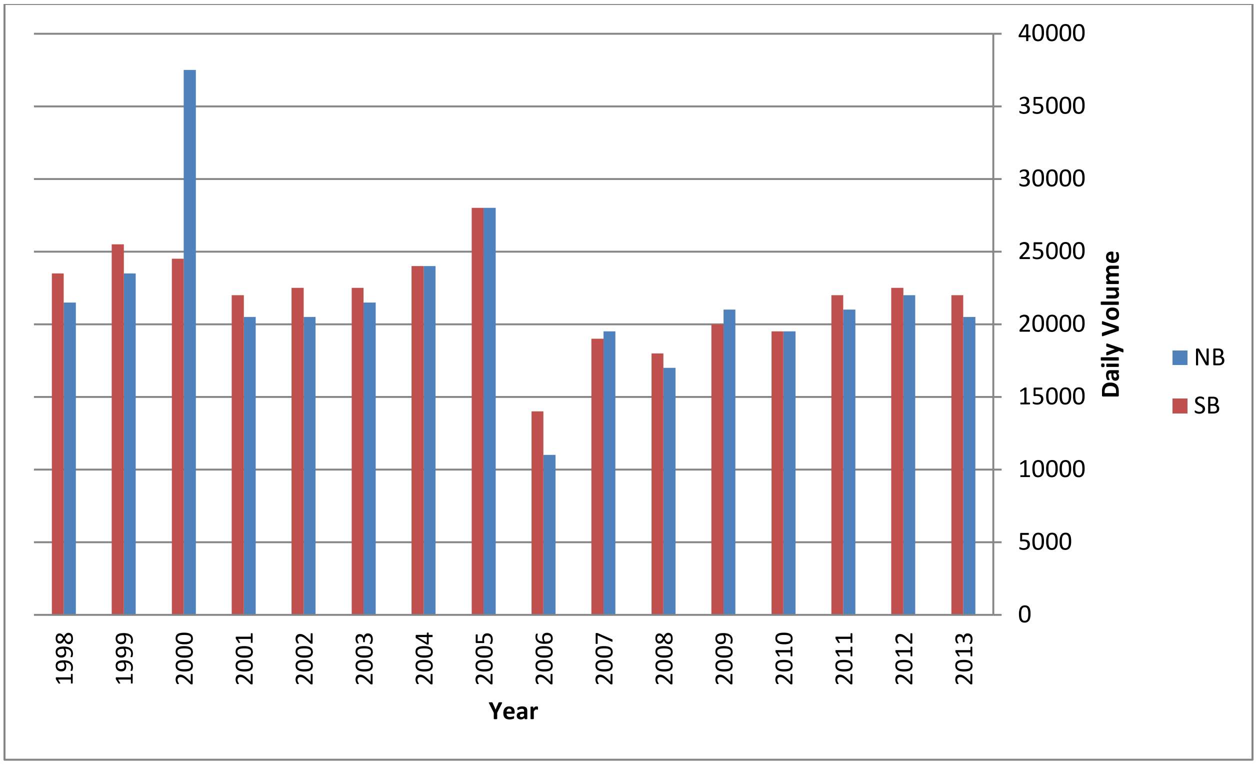

Figure 2-2: Historical AADTs – Site 870025 – SR 953/LeJeune Road, 200' South of SR 90/SW 8th Street

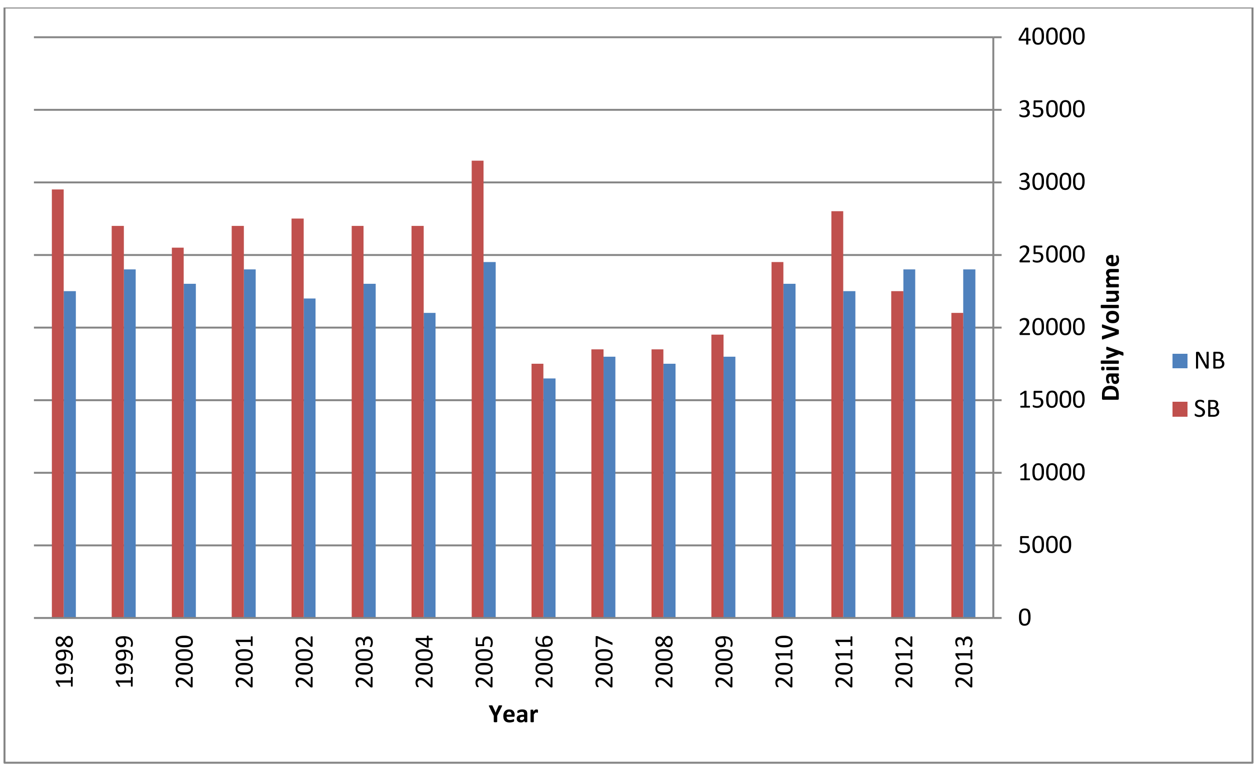

Figure 2-3: Historical AADTs – Site 870026 – SR 953/LeJeune Road, 200' North of SR 90/SW 8th Street

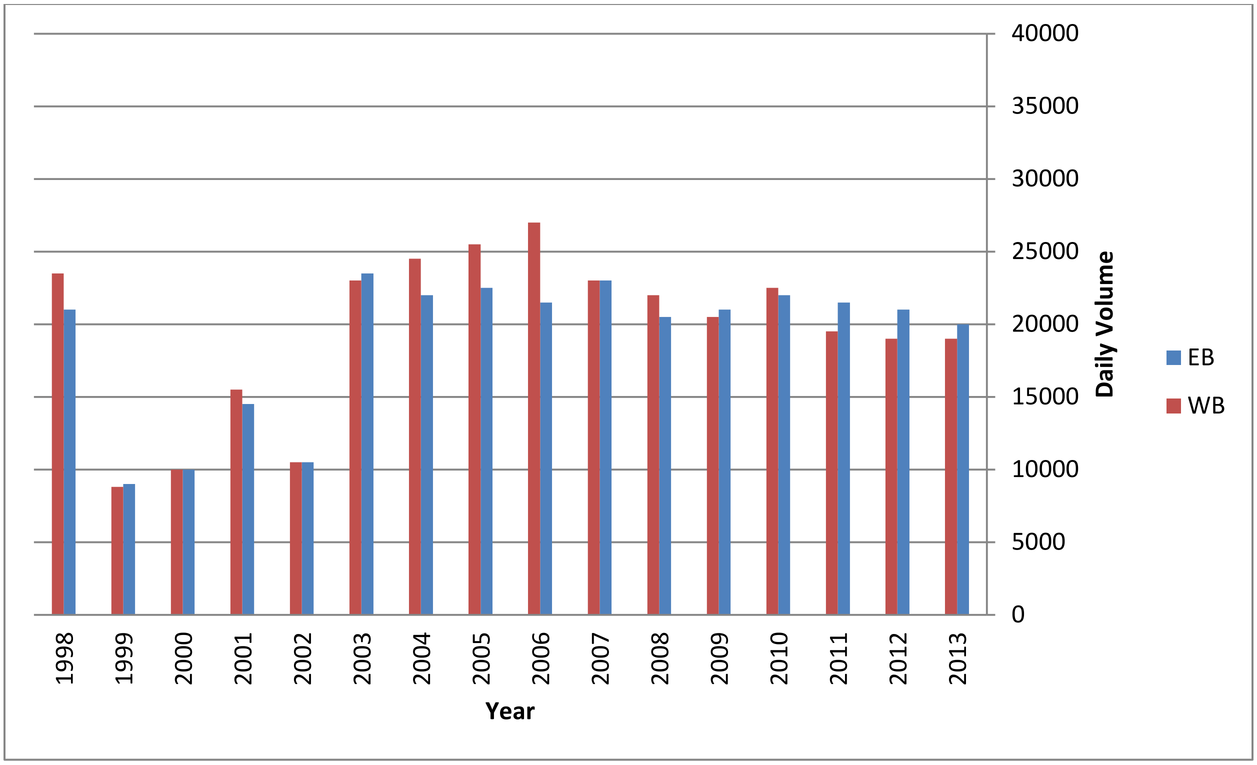

Figure 2-4: Historical AADTs – Site 870118 – SR 90/SW 8th Street, 200’ East of Red Road/SW 57th Avenue

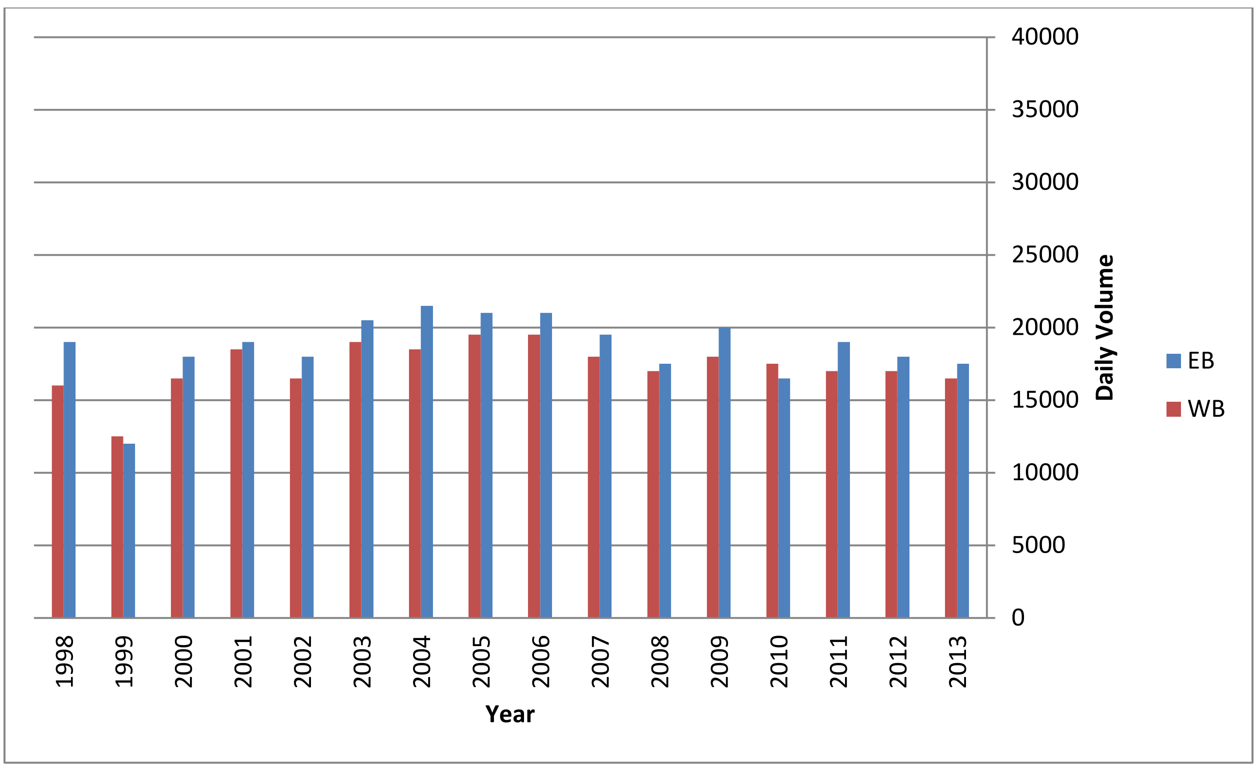

Figure 2-5: Historical AADTs – Site 875117 – SR 90/SW 8th Street, 200’ East of SW 37th Avenue

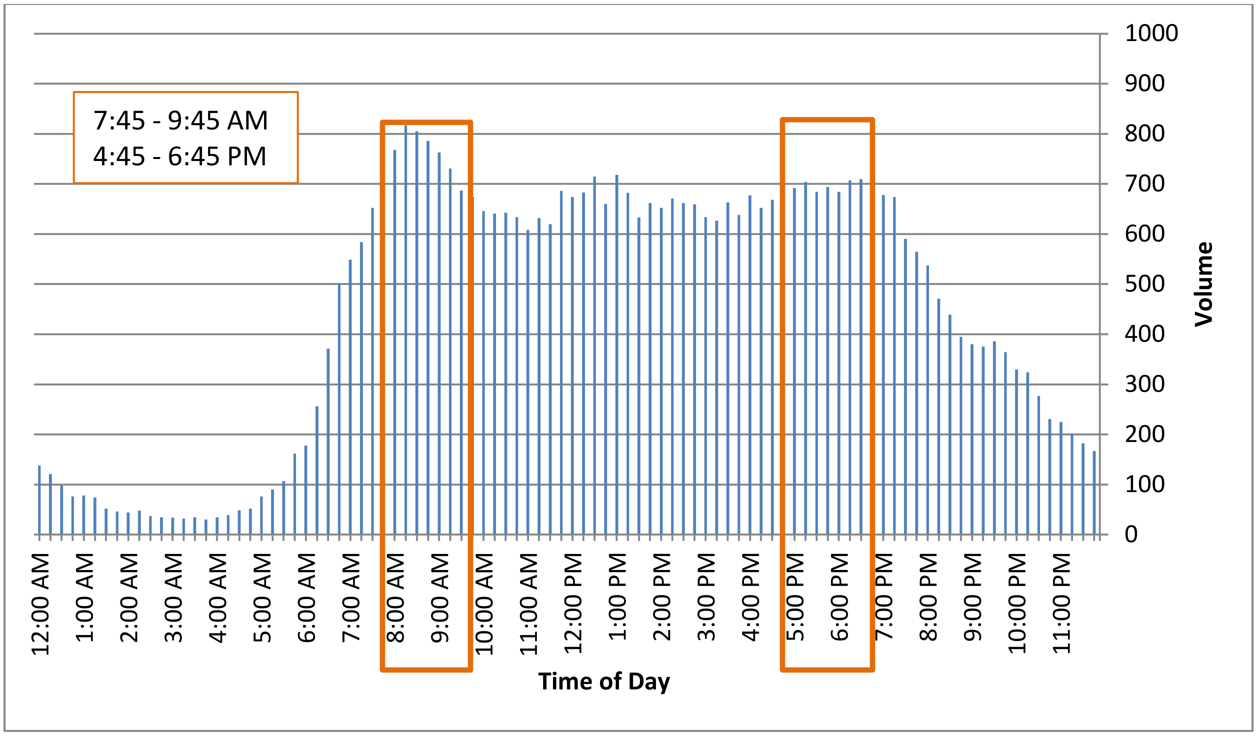

Figure 2-6: Year 2013 Daily Profile Volumes – Site 870025 – SR 953/LeJeune Road, 200' South of SR 90/SW 8th Street

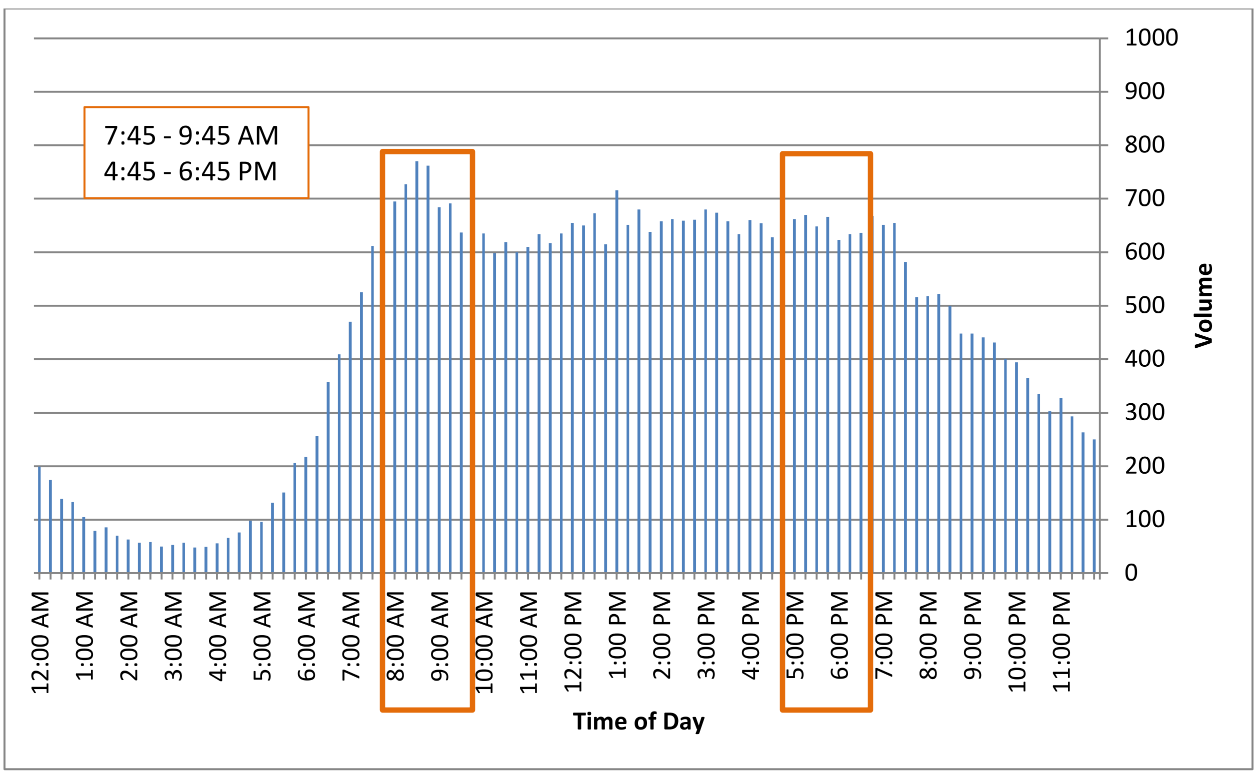

Figure 2-7: Year 2013 Daily Profile Volumes – Site 870026 – SR 953/LeJeune Road, 200' North of SR 90/SW 8th Street

The daily profiles from the synopsis reports along LeJeune Road show peaking characteristics typical of urban conditions; that is, a plateau-like spread of volume throughout most of the day, from the AM peak hours to the PM.

2.1.2 Existing Year AADT Volumes

Existing year 2013 AADT volumes were extracted from the FDOT FTO from the four stations located closest to the intersection. Because the count stations located on SW 8th Street are not adjacent to the intersection, tube counts were conducted on the west and east legs of the intersection to obtain existing AADTs on each intersection leg. CH Perez and Associates Consulting Engineers Inc. collected the 72-hour machine counts on the west and east legs during typical weekdays: Tuesday, October 7, 2014 thru Thursday, October 9, 2014. Existing year 2014 AADTs were developed from the machine counts, adjusted by factors extracted from the FTO.

Table 2-1 summarizes the results of the existing year 2013/2014 AADTs extracted from the FTO and calculated from the tube counts, and the supporting information is included in Appendix 2-II.

Table 2-1 Existing Year Annual Average Daily Traffic (AADT) Volumes

Station	Location	AADT
LeJeune Rd		
870025	200' South of SR 90/SW 8 St	**42,500**
870026	200' North of SR 90/SW 8 St	**45,000**
SW 8th St		
870118	200' East of Red Rd/SW 57 Ave	**39,000**
875117	200' East of SW 37 Ave	**34,000**
Source: FDOT Florida Traffic Online (2013).		
SW 8th St		
-	East of LeJeune Rd	**36,000**
-	West of LeJeune Rd	**36,000**

Source: CH Perez and Associates Consulting Engineers Inc. (2014).

2.1.3 Turning Movement Counts

Turning movement volumes were obtained at the study intersection, as well as for other key turning movements at surrounding intersections as shown in Figure 2-1. Based upon the 24-hour vehicle profiles shown in **Figures 2-6 and 2-7**, turning movements were collected from 7:45 – 9:45 AM and 4:45 – 6:45 PM on a typical Tuesday, Wednesday, and/or Thursday in October 2014. Different travel modes were collected including auto, trucks, bicycles, and pedestrians.

According to the field collected data, the morning and afternoon peak hours generally occurred from 8:00 – 9:00 AM and 5:00 – 6:00 PM, respectively. Thru volumes along LeJeune Road and along SW 8th Street at adjacent intersections were determined through balancing AM and PM peak hour movements, and turning movement counts were compared to tube counts for reasonableness. The resultant existing AM and PM peak hour turning movement volumes in the general study area are shown in **Figures 2-8 and 2-9**, and the turning movement count data and supporting analyses have been included in Appendix 2-III.

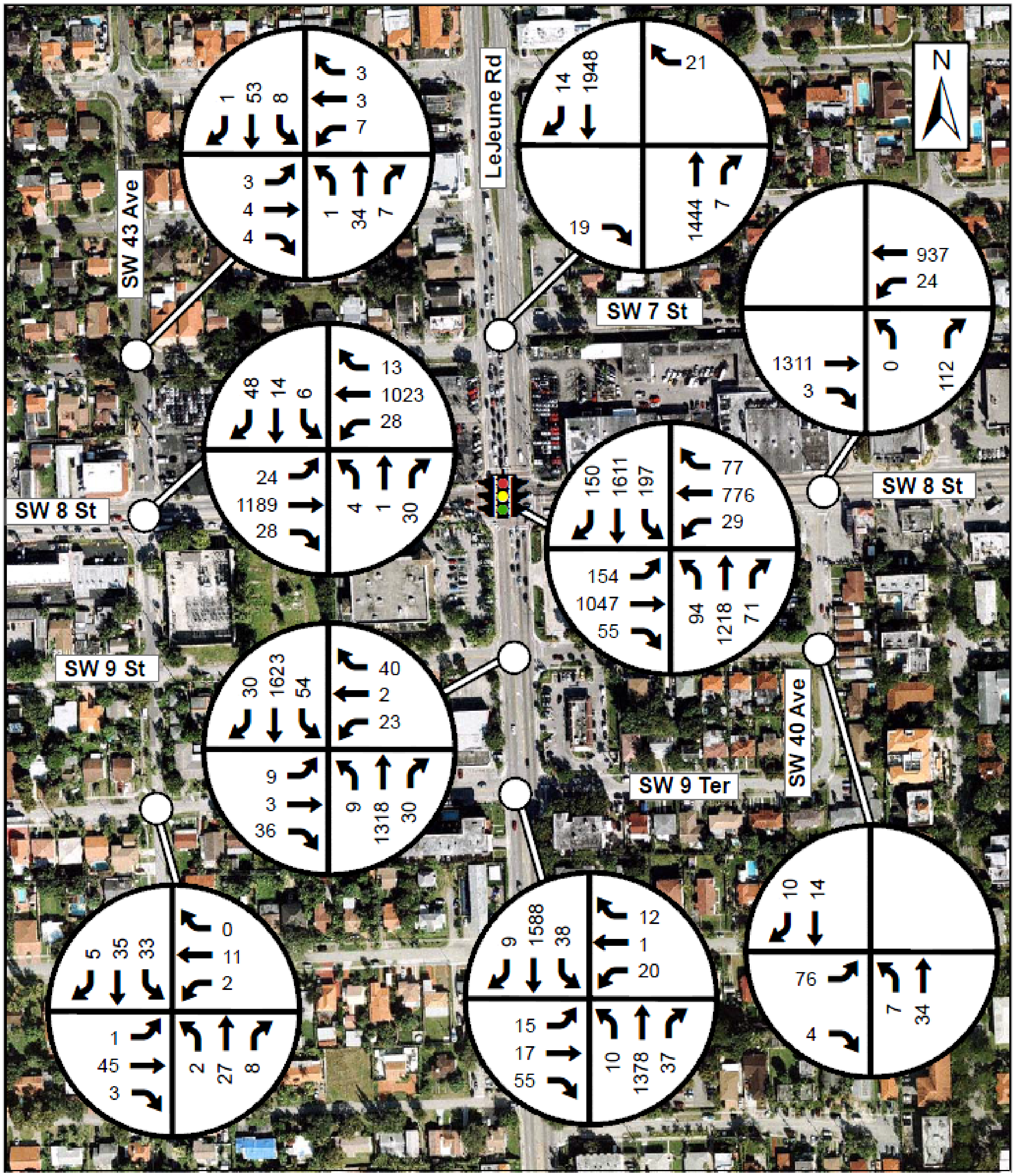

Figure 2-8 Existing Year 2014 Turning Movement Volumes (AM Peak Hour)

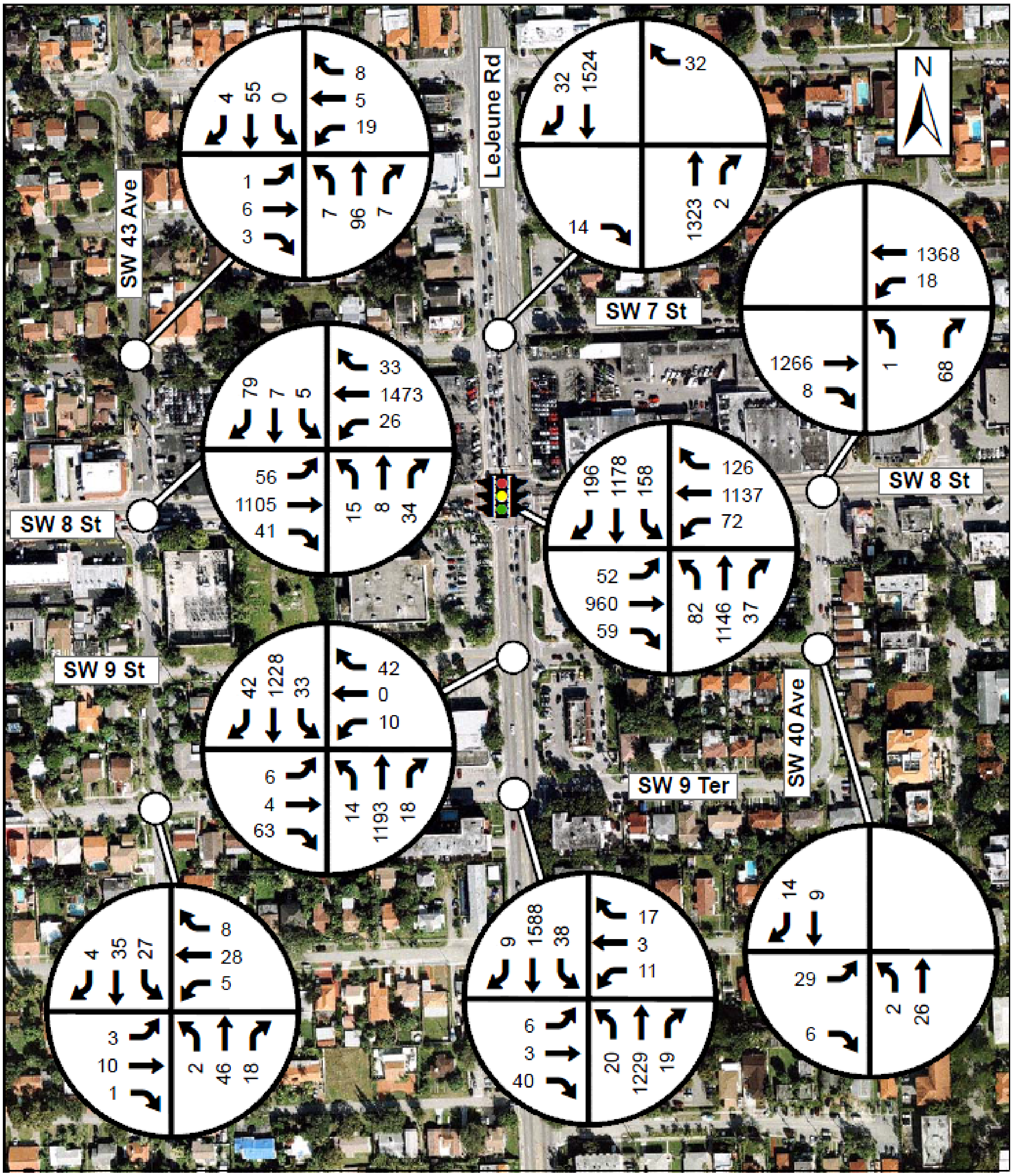

Figure 2-9: Existing Year 2014 Turning Movement Volumes (PM Peak Hour)

To further summarize the turning movement counts, the percentage of each movement in relation to the approach was calculated and the results are graphically displayed in **Figure 2-10** for LeJeune Road and SW 8th Street during the AM and PM peak hours.

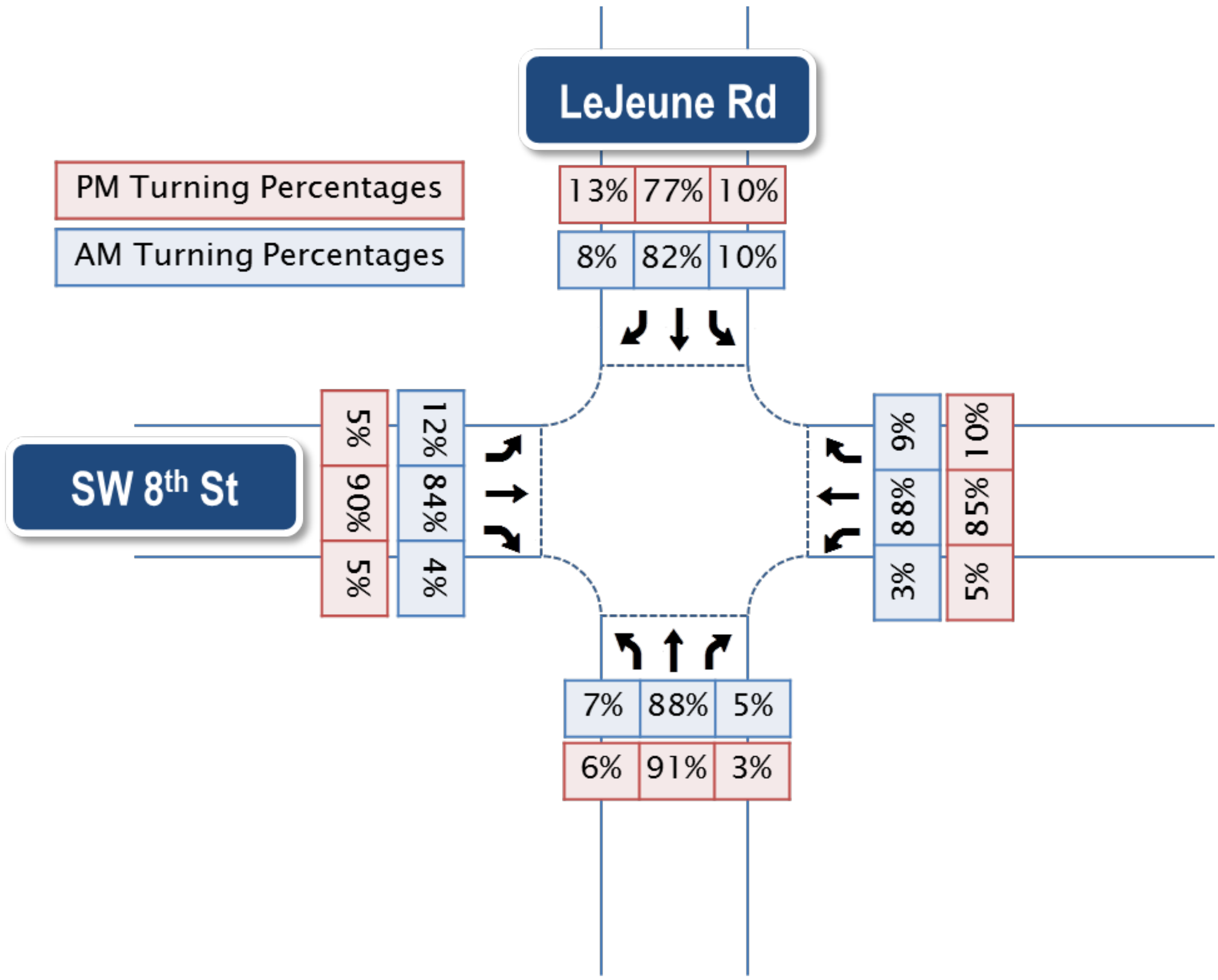

Figure 2-10: Existing Year 2014 Turning Movement Volume Percentages (AM and PM Peak Hour)

As shown in **Figure 2-10**, the majority of vehicles that enter the intersection execute a thru movement in each approach. Based upon the turning movement volumes at surrounding un-signalized intersections (see **Figures 2-8 and 2-9**), it is suspected that there is some traffic diversion present in the area, where vehicles that would make a left or right-turn at the intersection may look for other routes taking advantage of the surrounding grid-like network. Therefore, it is assumed that the true demand of the intersection is not captured with the mere turning movement counts (TMCs) summarized herein.

Additional traffic data using video cameras was collected with assistance from FDOT District 6 in January 2015 at the LeJeune Road at SW 8th Street intersection to observe traffic demands and length of queue at this intersection, as well as two nearby intersections currently being considered to potentially re-route traffic away from the study intersection. These other locations are: SW 8th Street and SW 43rd Avenue and SW 8th Street and SW 40th Avenue. The additional turning movement counts (TMCs) were collected from Tuesday January 13, 2015 to Thursday January 15, 2015 from 7:00 to 9:00 am and 4:00 to 6:00 pm. **Figure 2-11** shows the turning percentages (three-day average) for the AM and PM peak hour for the LeJeune Road at SW 8th Street intersection.

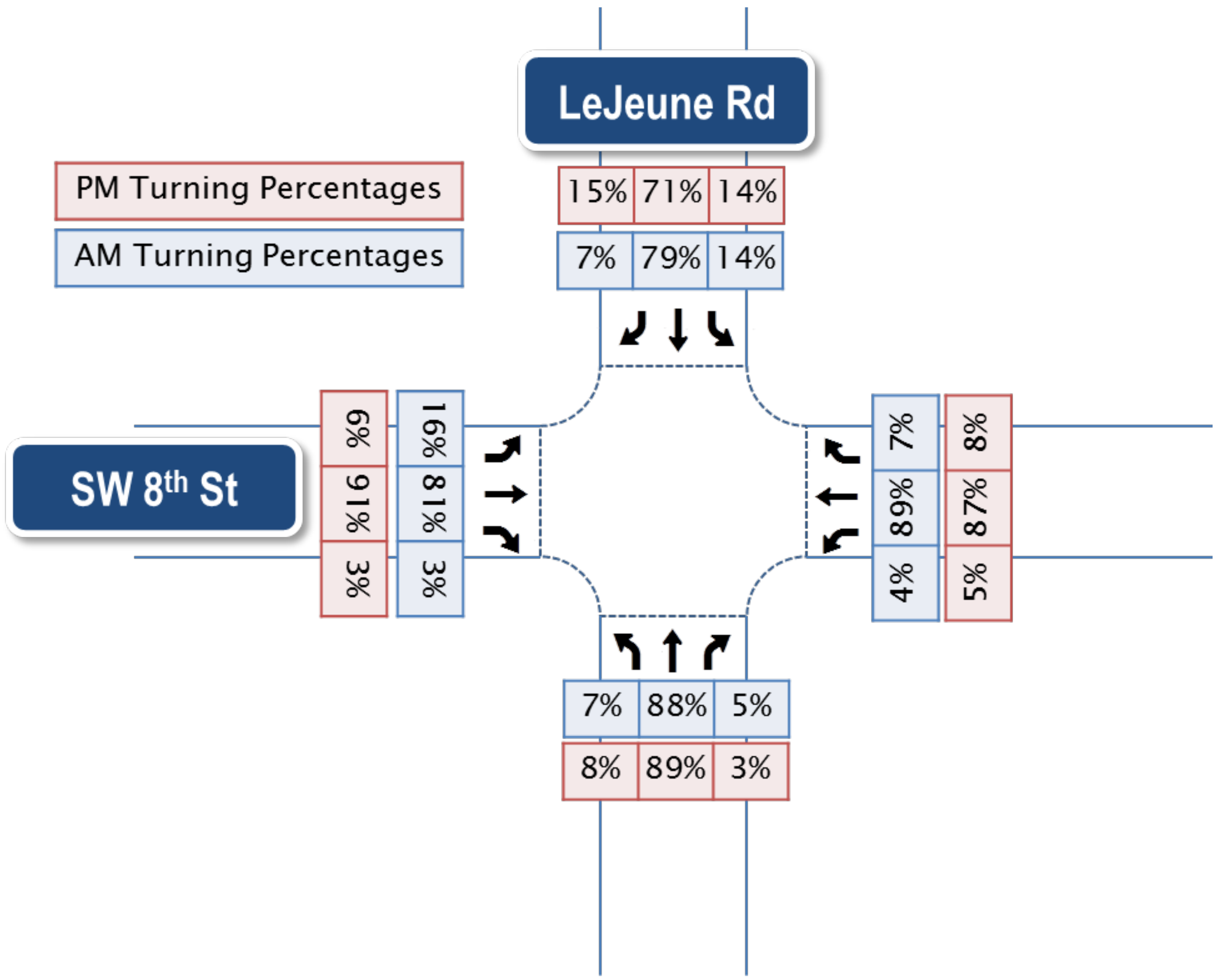

Figure 2-11: Existing Year (January 2015) Turning Movement Volume Percentages (AM and PM Peak Hour)

When comparing **Figures 2-10 and 2-11**, it can be observed that the turning movement volume percentages for the AM and PM peak are very similar. The biggest difference is in the southbound left-turn movement, 10% in October and 14% in January 2015.

Queue data was also collected from Tuesday January 13, 2015 to Thursday January 15, 2015 from 7:00 to 9:00 AM and 4:00 to 6:00 PM at the signalized intersection of LeJeune Road at SW 8th Street and at the unsignalized intersections of SW 8th Street at SW 43rd Avenue and SW 8th Street and SW 40th Avenue. The January TMCs and queue data are included in Appendix 2-IV.

In addition to documenting the number of automobiles and trucks at each intersection, the number of pedestrians and bicyclists were also recorded in the TMCs. **Figures 2-12 and 2-13** show the proportion of bicyclists/pedestrians, as well as motorized vehicles per approach with respect to the intersection total.

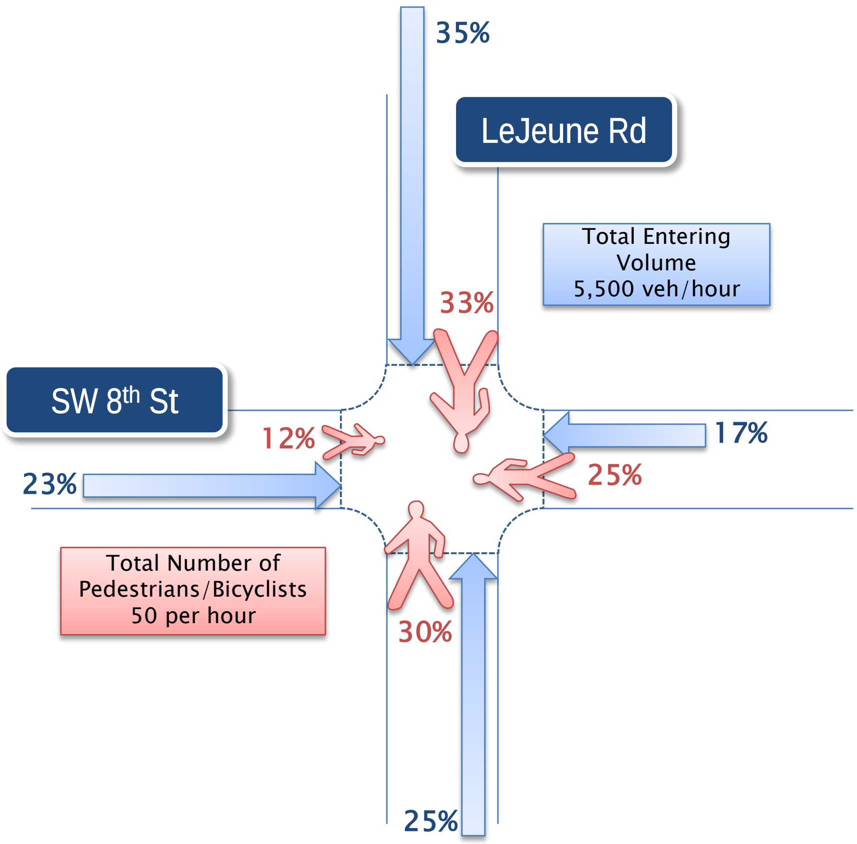

Figure 2-12: Existing Year 2014 Traffic Volume and Pedestrian/Bicyclist Percentages by Approach (AM Peak Hour)

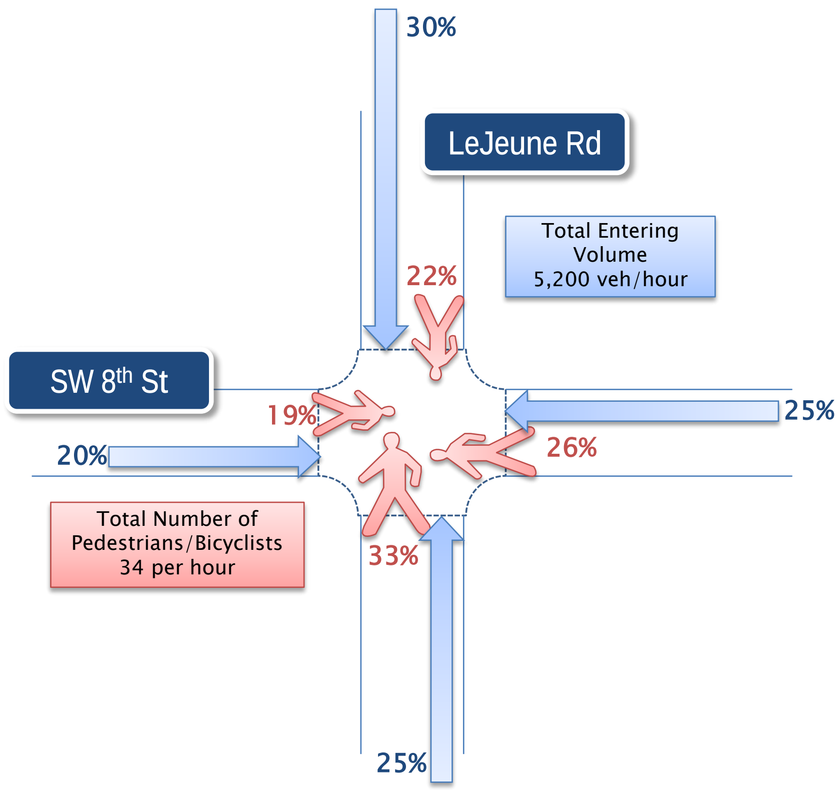

Figure 2-13: Existing Year 2014 Traffic Volume and Pedestrian/Bicyclist Percentages by Approach (PM Peak Hour)

Figures 2-12 and 2-13 show LeJeune Road not only carries more vehicular traffic than SW 8th Street, but pedestrian crossing activity during the AM and PM peak hours is also marginally higher on LeJeune Road compared to SW 8th Street.

2.1.4 Vehicle Classification Data

As no vehicle classification data is available in the immediate study area from the FTO, peak hour heavy vehicle percentages were obtained from the field-collected turning movement counts. The Highway Capacity Manual (HCM) 2010 Chapter 18 Signalized Intersections methodology allows some flexibility for planning analyses with regard as to how heavy vehicle percentages are grouped. For this study, grouping heavy vehicle percentages by approach was deemed to be feasible for both the signalized and un-signalized intersections. The average AM and PM heavy vehicle percentages for the peak hours, by approach, are summarized in **Table 2-2**.

According to the data presented in **Table 2-2**, LeJeune Road and SW 8th Street do not carry a considerable amount of truck traffic. Some smaller side street approaches were found to have higher percentages due to the relatively low total volume these facilities experience during the peak hours.

Table 2-2: Existing Year Heavy Vehicle Percentages (AM and PM Peak Hours)

Intersection	Approach	AM Peak Hour			PM Peak Hour		
		Day 1	Day 2	Average	Day 1	Day 2	Average
LeJeune Rd & SW 8th St	Southbound	2.4%	3.1%	2.7%	1.0%	0.6%	0.8%
	Westbound	2.0%	2.0%	2.0%	1.0%	1.6%	1.3%
	Northbound	1.1%	1.2%	1.2%	0.4%	0.9%	0.6%
	Eastbound	1.2%	1.0%	1.1%	0.0%	0.8%	0.4%
LeJeune Rd & SW 7th St	Southbound	2.5%		2.5%	0.9%		0.9%
	Westbound	0.0%		0.0%	0.0%		0.0%
	Northbound	1.2%		1.2%	0.4%		0.4%
	Eastbound	0.0%		0.0%	0.0%		0.0%
LeJeune Rd & SW 9th St	Southbound	1.7%		1.7%	0.8%		0.8%
	Westbound	1.5%		1.5%	0.0%		0.0%
	Northbound	2.4%		2.4%	1.8%		1.8%
	Eastbound	2.1%		2.1%	0.0%		0.0%
LeJeune Rd & SW 9th Ter	Southbound	1.7%		1.7%	0.9%		0.9%
	Westbound	6.1%		6.1%	0.0%		0.0%
	Northbound	2.7%		2.7%	2.4%		2.4%
	Eastbound	5.7%		5.7%	2.0%		2.0%
SW 7th St & SW 43rd Ave	Southbound	1.6%		1.6%	1.7%		1.7%
	Westbound	0.0%		0.0%	3.1%		3.1%
	Northbound	4.8%		4.8%	0.9%		0.9%
	Eastbound	0.0%		0.0%	0.0%		0.0%
SW 8th St & SW 43rd Ave	Southbound	0.0%		0.0%	1.1%		1.1%
	Westbound	1.3%		1.3%	0.7%		0.7%
	Northbound	2.9%		2.9%	7.0%		7.0%
	Eastbound	5.2%		5.2%	4.7%		4.7%
SW 9th Ter & SW 43rd Ave	Southbound	4.1%		4.1%	3.0%		3.0%
	Westbound	7.7%		7.7%	0.0%		0.0%
	Northbound	2.7%		2.7%	1.5%		1.5%
	Eastbound	2.0%		2.0%	0.0%		0.0%
SW 8th St & SW 40th Ave	Southbound	-		-	-		-
	Westbound	0.6%		0.6%	1.4%		1.4%
	Northbound	0.0%		0.0%	1.4%		1.4%
	Eastbound	1.4%		1.4%	1.0%		1.0%
SW 9th St & SW 40th Ave	Southbound	4.2%		4.2%	0.0%		0.0%
	Westbound	-		-	-		-
	Northbound	0.0%		0.0%	0.0%		0.0%
	Eastbound	1.3%		1.3%	0.0%		0.0%
Average				**2.2%**			**1.3%**

Source: Field data collected by CH Perez and Associates Consulting Engineers Inc. (October 2014).

2.1.5 Peak Hour Factors

In accordance with the HCM 2010, peak hour factors were summarized by intersection for both the AM and PM peak hours. **Table 2-3** summarizes the existing peak hour factors for each study intersection.

Table 2-3: Existing Peak Hour Factors by Intersection (AM and PM Peak Hours)

Intersection	AM Peak Hour			PM Peak Hour		
	Day 1	Day 2	Average	Day 1	Day 2	Average
LeJeune Rd & SW 8th St	0.992	0.972	0.98	0.978	0.981	0.98
LeJeune Rd & SW 7th St	0.941*		0.94	0.869*		0.87
LeJeune Rd & SW 9th St	0.963		0.96	0.959		0.96
LeJeune Rd & SW 9th Ter	0.967		0.97	0.954		0.95
SW 7th St & SW 43rd Ave	0.941		0.94	0.869		0.87
SW 8th St & SW 43rd Ave	0.956		0.96	0.929		0.93
SW 9th Ter & SW 43rd Ave	0.901		0.90	0.810		0.81
SW 8th St & SW 40th Ave	0.964		0.96	0.975		0.98
SW 9th St & SW 40th Ave	0.760		0.76	0.730		0.73
Average			**0.93**			**0.92**

Source: Field data collected by CH Perez and Associates Consulting Engineers Inc. (October 2014).
**No peak hour factor available, used peak hour factor for SW 7th St & SW 43rd Ave.*

2.1.6 Signal Timing Data

Signal timing data for the study intersection, as well as for adjacent signalized intersections along LeJeune Road and SW 8th Street, were obtained from Miami-Dade County Public Works and Waste Management Department. Signal timing data were also obtained for the following adjacent signalized intersections to determine existing coordination with the study intersection: LeJeune Road and Minorca Avenue, LeJeune Road and Flagler Street, SW 8th Street and SW 47th Avenue, and SW 8th Street and Ponce De Leon Boulevard. In order to assess if any signal timing changes were implemented at the LeJeune Road and SW 8th Street intersection as recommended in the 2011 FDOT Safety Study, the signal timing obtained at the time of that study was also reviewed.

The intersection is controlled with standard compound (protected plus permitted) phasing. During the AM peak hour, the pedestrian and protected westbound left-turn phases are omitted, while during the PM peak hour, both the northbound left-turn and eastbound left-turn protected phases are omitted. A comparison of the previous 2011 signal timing with the current timings revealed similar phasing and phasing sequence during the AM and PM peak hours; however, between the years, the cycle length has increased from 140/150 seconds during the AM and PM peak hours, respectively, to 180 seconds.

The aforementioned signal timing plans are included in Appendix 2-V.

2.1.7 Level of Service Operational Analysis

A level of service (LOS) analysis for existing conditions in the general study area was performed for each of the key intersections.

The Synchro Software, Version 8 was used to conduct the traffic operations analysis, which required the input of the following parameters: lane geometry, turning movement volumes, peak hour factors (PHF), lane widths, truck factors, and signal phasing/timing. The PHFs and truck percentages were obtained from the traffic data collected in October 2014, as previously documented. The signal timing plans utilized in the existing conditions analysis were obtained from Miami-Dade County.

The methodology outlined in Chapter 18 of the HCM 2010 was applied in Synchro to determine the current LOS at the LeJeune Road and SW 8th Street intersection. For the remaining stop-controlled intersections, the methodologies from HCM 2010 Chapters 19 and 20, Two-Way Stop-Controlled Intersections and All-Way Stop-Controlled Intersections, were referenced accordingly. Analyses were performed for both the AM peak hour, 8:00 – 9:00 AM, and PM peak hour, 5:00 – 6:00 PM. The 2010 HCM reports from Synchro are included in Appendix 2-VI.

Figures 2-14 and 2-15 show the AM and PM peak hour levels of service, respectively, by movement, approach and overall for the LeJeune Road and SW 8th Street intersection.

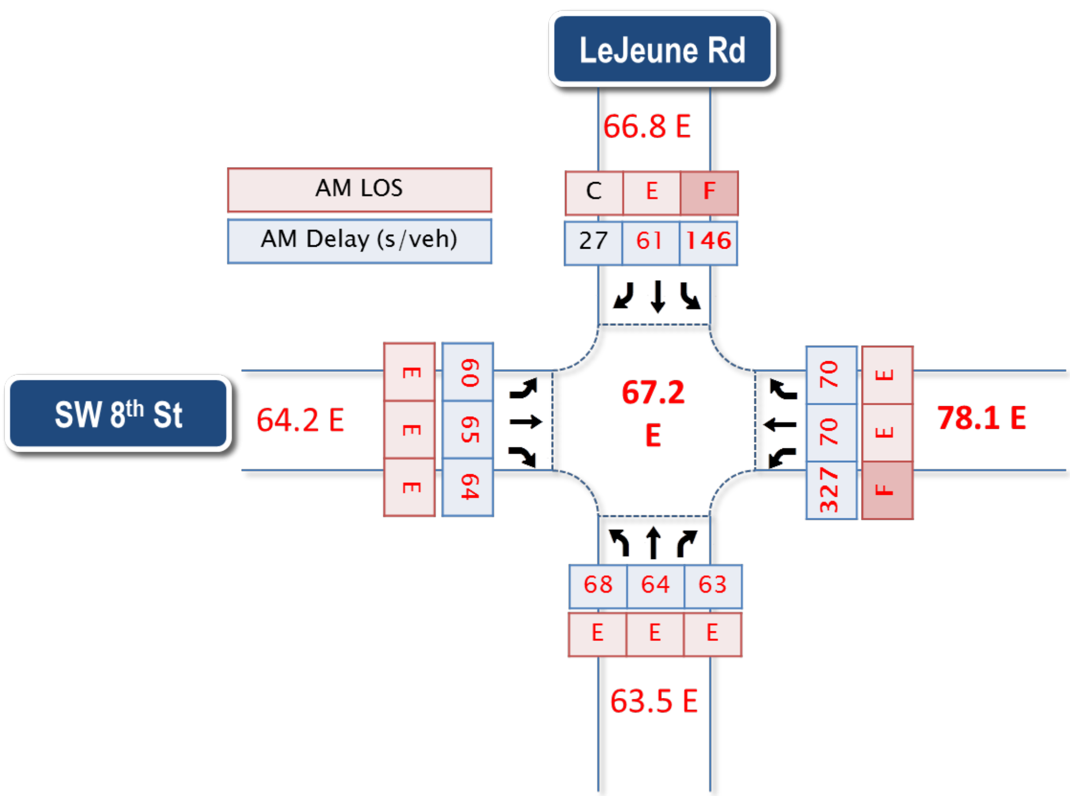

Figure 2-14: Existing Signalized Intersection Levels of Service (AM Peak Hour)

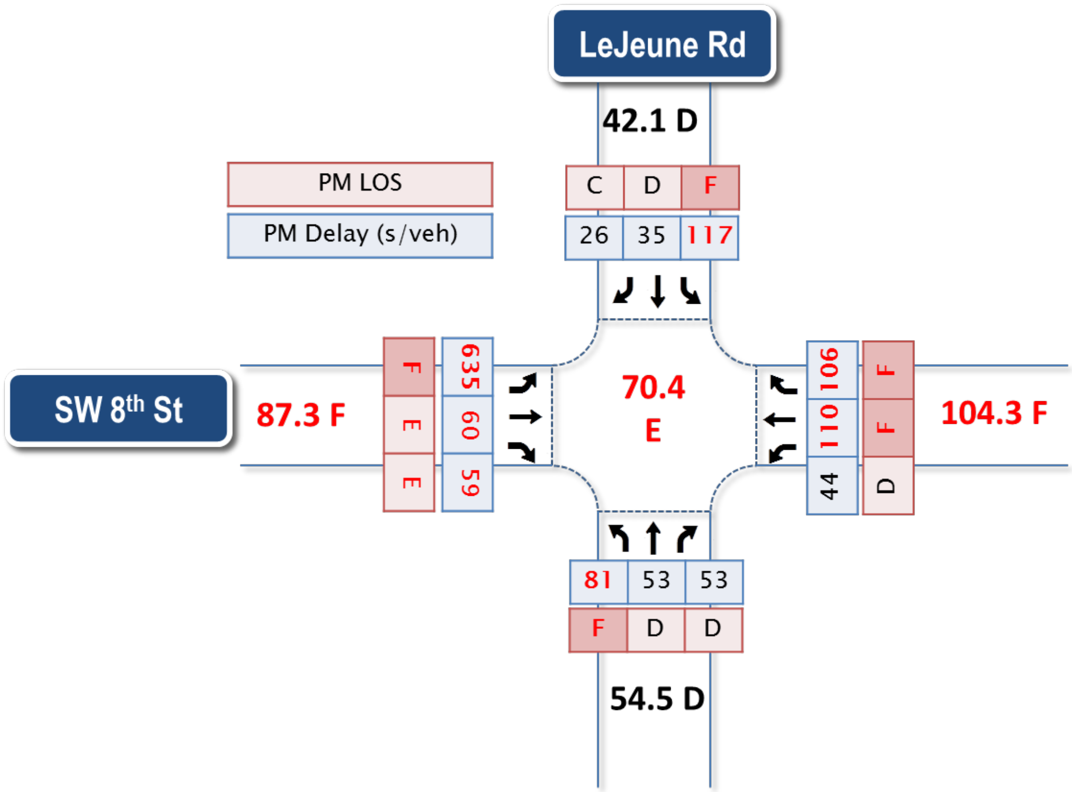

Figure 2-15: Existing Signalized Intersection Levels of Service (PM Peak Hour)

The LOS results for the study intersection show the intersection currently operates under LOS 'E' conditions overall for both the AM and PM peak hours. Because the subject intersection is on the State Highway System (SHS) and within an urbanized area, the intersection level of service standard is 'D' during peak travel hours; therefore, the intersection operates below the LOS standard during both peak hours analyzed. Additionally, many movements operate under LOS 'F' conditions, such as the southbound left-turn during both the AM and PM peak hour, which operates with high delay (146 and 117 seconds of delay, respectively).

In accordance with Chapter 19 of the HCM 2010, the LOS for two-way stop-controlled intersections are determined by control delay and volume-to-capacity (v/c) ratios. A v/c ratio greater than 1.0 results in a LOS of 'F' regardless of control delay. LOS criteria for stop-controlled intersections apply to each lane on a given approach and to each approach on the minor street; LOS is not calculated for major-street approaches or for the intersection as a whole.

Chapter 20 of the HCM 2010 was referenced to determine the LOS for the all-way stop-controlled intersection of SW 9th Terrace and SW 43rd Avenue. Similar to the criteria for signalized intersections, the LOS is based solely on control delay at approach and intersection levels for analysis of all-way stop-controlled intersections.

With the October counts only, it was noted that the unsignalized intersections were showing excessive delays during the peak hours. The queue data collected in January 2015 was helpful in calibrating the

Synchro parameters to better reflect existing conditions in the field, thereby ensuring a proper estimation of queues in the future. The 95th percentile queue was calculated from the data collected in the field and compared to the HCM results. Significant difference between the 95th percentile queues was observed on SW 43rd Avenue, especially during the PM peak hour. In order to calibrate Synchro, a change to the critical headway was made to better reflect the conditions in the field. Per the HCM 2010, the critical headway is defined as the minimum time interval in the major street traffic stream that allows intersection entry for one minor street vehicle. **Table 2-4** shows the AM and PM peak hour results for the stop-controlled intersections in the study area with the adjusted critical headway.

Table 2-4: Existing Stop-Controlled Intersections Levels of Service (AM and PM Peak Hours)

Existing Stop Controlled Intersection Level of Service									
Intersection	Approach/ Movement	AM Peak Hour				PM Peak Hour			
		Control Delay (sec/veh)	V/C Ratio	LOS		Control Delay (sec/veh)	V/C Ratio	LOS	
LeJeune Rd & SW 7th St (1)	Eastbound	25.4	0.10	D	-	20.6	0.07	C	-
	Westbound	18.1	0.08	C		18.6	0.12	C	
	-	-	-	-		-	-	-	
	-	-	-	-		-	-	-	
LeJeune Rd & SW 9th St (1)	Eastbound	32.9	0.28	D	-	17.6	0.58	C	-
	Westbound	40.2	0.40	F		16.8	0.52	C	
	Northbound Left	15.2	0.03	C		12.2	0.03	B	
	Southbound Left	13.5	0.12	B		11.9	0.06	B	
LeJeune Rd & SW 9th Ter (1)	Eastbound	84.3	0.71	F	-	18.6	0.53	C	-
	Westbound	69.7	0.39	F		26.4	0.67	D	
	Northbound Left	14.6	0.03	B		12.4	0.04	B	
	Southbound Left	13.6	0.09	B		12.1	0.03	B	
SW 7th St & SW 43 Ave (1)	Eastbound	9.2	0.01	A	-	9.7	0.02	A	-
	Westbound	9.2	0.02	A		9.9	0.05	A	
	Northbound Left	7.4	0.00	A		7.4	0.01	A	
	Southbound Left	7.3	0.01	A		0.0	0.00	A	
SW 8th St & SW 43 Ave (1)	Eastbound Left	11.0	0.04	B	-	15.7	0.15	C	-
	Westbound Left	11.9	0.05	B		11.8	0.05	B	
	Northbound	38.6	0.26	E		49.4	0.44	E	
	Southbound	37.7	0.40	E		29.1	0.40	D	
SW 9th Ter & SW 43 Ave (2)	Eastbound	7.5	-	A	A	7.4	-	A	A
	Westbound	7.5	-	A		7.4	-	A	
	Northbound	7.3	-	A		7.4	-	A	
	Southbound	7.6	-	A		7.7	-	A	
SW 8th St & SW 40 Ave (1)	-	-	-	-	-	-	-	-	-
	Westbound Left	12.5	0.05	B		12.0	0.03	B	
	Northbound	17.8	0.30	C		16.9	0.19	C	
	-	-	-	-		-	-	-	
SW 9th St & SW 40 Ave (1)	Eastbound	9.4	0.12	A	-	8.9	0.05	A	-
	-	-	-	-		-	-	-	
	Northbound Left	7.3	0.01	A		7.3	0.00	A	
	-	-	-	-		-	-	-	

Source: Synchro 8 HCM 2010 Reports
(1) HCM 2010 TWSC (Two-Way Stop-Controlled) Intersection Results
(2) HCM 2010 AWSC (All-Way Stop-Controlled) Intersection Results

2.2 Field Review

A field review was conducted to confirm existing lane configurations, speed limits, bus stop locations and amenities, pedestrian and bicyclist activity, and signal timings, as well as to observe peak period traffic conditions at the intersection. The field reviews for both the AM and PM peak periods were performed on Tuesday, October 7, 2014. The following traffic conditions were observed during the AM and PM peak periods.

2.2.1 Traffic Conditions -AM Peak Period

According to the current signal timing plan and the observations performed, the intersection operates under a 180-second cycle length with standard compound (protected plus permitted) phasing, with the exception of the westbound left-turn movement. The time-of-day schedule does not include an exclusive protected phase for the westbound left-turn movement during the AM peak period. All vehicles making a westbound left-turn movement at the intersection must perform the maneuver during the permissive phase by finding sufficient gaps in opposing eastbound thru traffic.

Due to the heavy demand for the eastbound thru movement, vehicles were unable to make this maneuver during the permissive phase, and approximately two vehicles per cycle were observed executing the movement during the yellow and red clearance intervals. On average, approximately six (6) vehicles were observed in queue in the westbound left-turn lane during the AM peak period. At 9:30 AM, protected phasing for the westbound left-turn movement is provided.

Approximately 10-20 vehicles were observed in queue for the southbound left-turn movement during the AM peak period. At the end of the protected phase, approximately 2-8 vehicles were observed in queue unable to execute the movement during the permissive phase, with the exception of 'sneakers' performing the maneuver during the clearance intervals due to the heavy demand for the northbound thru movement.

The demand for the eastbound left-turn movement varied from approximately 5-15 vehicles per cycle. As many as seven (7) vehicles were observed to process during the protected phase. The westbound thru demand is lighter than the other 4 approaches, and therefore, outside of the peak hour, vehicles were able to make the turn maneuver during the permissive phase.

The lighter northbound left-turn demand was able to be processed during the protected phase for the most part. Any vehicles left in queue at the end of the protected phase were able to make the maneuver during the clearance intervals.

During the AM peak period (7:45 AM – 9:45 AM), long queues were observed, in general, in the northbound, southbound, and eastbound approaches. The northbound thru queue extended back as far as three blocks, while the southbound thru queue was observed to extend back to SW 4th Street (4 blocks) at 10 AM (after the AM peak period). Approximately 70 vehicles were observed in the eastbound thru queue at 9:30 AM, with about 24 vehicles per lane (48 vehicles) being processed per cycle. At 9:40 AM, the westbound queue cleared in each cycle; at 10:00 AM the northbound queue cleared and in both the southbound and eastbound approaches during this time, it took vehicles approximately two cycles to clear the intersection.

2.2.2 Traffic Conditions PM Peak Period

Similarly to the AM peak period, the intersection operates under a 180-second cycle length during the PM peak period. Protected phases are not provided for both the eastbound left-turn and northbound left-turn movements. Even before the PM peak hour began, approximately 11 vehicles remained in queue for the eastbound left-turn movement (see **Figure 2-16**). With the heavy westbound thru demand, eastbound left-turning vehicles were unable to find sufficient gaps to make the maneuver during the permissive phase. As such, approximately two (2) vehicles per cycle cleared the intersection during the red and yellow clearance intervals.

The northbound left-turn queue was substantially less (approximately five vehicles) and vehicles were able to make the maneuver during the end of the permissive phase.

Figure 2-16: Eastbound Left-Turn Queue (PM Peak Period)

With the eastbound left-turn vehicles sitting through several cycles without given right-of-way via a protected phase, the impatience and frustration of drivers were noticeable through increasingly bold maneuvers made into the PM peak hour. In fact, a crash occurred when the field observations were being performed; a vehicle making an eastbound left-turn movement collided with a vehicle making a westbound left-turn movement during the permissive phase for the respective left-turn movements (see **Figure 2-17**).

Figure 2-17: Collision at Intersection (PM Peak Period)

Similarly, impatience and frustration of drivers making the southbound left-turn movement were also observed. Although a protected phase is provided for this movement, approximately fifteen vehicles were observed in queue during the permissive phase. Aggressive queue jumping was observed for one vehicle using the inside thru lane and cutting over in front of the vehicles in queue to make a southbound left-turn.

Yet another dangerous queue jumping maneuver was also observed many times (almost during every cycle) in the southbound approach with vehicles using the underutilized southbound right-turn drop lane to merge in front of the southbound thru vehicles and proceed through the intersection during the green (see **Figure 2-18**).

Figure 2-18: Queue Jumping Using Southbound Right-Turn Drop Lane (PM Peak Period)

Although more aggressive maneuvers were observed during the PM peak period, the southbound left-turn movement operates very similarly as during the AM peak period. Based upon observations, the demand is similar, as is the number of processed vehicles and vehicles left in queue after the protected and permitted phases. At the start of green time for the northbound thru movement, the queue appears to be long, but was observed to clear between 4:45 PM – 5:00 PM. In fact, the green time allotted for the phase during these times was observed to be longer than necessary, given the increased headways as vehicles towards the back of queue approached the intersection. However, these greater headways were not enough to produce sufficient gaps for vehicles to make a southbound left-turn during this phase.

Based upon observations performed at the intersection, the northbound, eastbound and westbound thru movements were observed to be the heaviest movements during the PM peak period. The northbound thru queue extended back several blocks (see **Figure 2-19**). As the signal turned green for the northbound thru movement, a platoon was observed approaching the end of queue, which extended the queue even further. This occurrence suggests the LeJeune Road corridor is coordinated in the northbound direction, specifically during the PM peak period.

Figure 2-19: Northbound Queue (PM Peak Period)

Queue lengths for the eastbound and westbound thru movements were also extensive during the PM peak period. Most notably, the westbound queue extended past the upstream signalized intersection at Ponce De Leon Boulevard (see **Figure 2-20**).

Figure 2-20: Westbound Queue (PM Peak Period)

2.2.3 Pedestrian and Bicyclist Facilities and Activity

During the AM peak period from 8 AM to 9 AM, the pedestrian crossing phase is omitted. Brick crosswalks and pedestrian signal heads are provided on each leg of the intersection. The Flashing Don't Walk indication on the southwest quadrant provided for pedestrians crossing the south leg was observed to be nonfunctional. Concrete sidewalks are provided immediately adjacent to the roadway along each side of both SW 8th Street and LeJeune Road near the intersection (see **Figure 2-21**).

The mast arm supports located on each quadrant are located on the sidewalks between the ramps accessing the crosswalks, and are therefore suspected to nullify any compliance with Americans with Disabilities Act (ADA) Standards (see **Figure 2-22**). No bicyclist facilities are provided in the vicinity of the intersection.

Figure 2-21: Sidewalk near Intersection

Figure 2-22: Mast Arm Support Location

During the AM and PM peak periods, pedestrians were observed crossing LeJeune Road and SW 8th Street in the designated crosswalks during the appropriate Walk phase. Jaywalking was also observed for a few pedestrians crossing SW 8th Street east of LeJeune Road during the PM peak period; these pedestrians were employees of AutoNation which has facilities located along both sides of SW 8th Street in the vicinity.

2.2.4 Transit Facilities

Miami-Dade Transit (MDT) provides two bus routes through the intersection. Route 8 runs eastbound and westbound along SW 8th Street with 10-minute headways during the AM and PM peak periods. Route 8 provides access to the Florida International University (FIU) Bus Terminal, FIU South Campus, SW 8th Street west of SW 82nd Avenue, Coral Way west of 82nd Avenue, Westchester Shopping Center, Little Havana, Calle Ocho, Brickell Metrorail Station, and MDC Wolfson Campus.

Route 42 runs northbound and southbound and provides 15-30 minute headways through the intersection during the AM and PM peak periods. Route 42 provides access to Miami Springs, City of Opa-Locka City Hall, Opa-Locka Tri-Rail Station, City of Hialeah, East 8th Avenue (LeJeune Road), Amtrak Passenger Terminal, Tri-Rail Metrorail Station, Miami International Airport (MIA) Metrorail station, the City of Coral Gables, and the Douglas Road Metrorail station. Route 42 does not provide service on Saturdays and Sundays. The route maps and schedules are included in Appendix 2-VII.

There are six (6) bus stops located in the vicinity of the intersection to serve MDT Routes 8 and 42. The locations are identified in **Figure 2-23** and the amenities are as follows:

Route 8

- South side of SW 8th Street west of intersection (nearside eastbound) – shelter with roof, end panel, and bench (see **Figure 2-24**)
- North side of SW 8th Street west of intersection (farside westbound) – bench
- South side of SW 8th Street east of intersection (farside eastbound) – bench
- North side of SW 8th Street east of intersection (nearside westbound) – sign only

Route 42

- East side of LeJeune Road north of intersection (farside northbound) – bench
- West side of LeJeune Road south of intersection (farside southbound) – 2 benches

Figure 2-23: Bus Stop Locations

Figure 2-24: Bus Stop on south side of SW 8th Street nearside of intersection (Eastbound)

2.2.5 Access Management

The access control classification system and access management standards for the State Highway System are set forth in Florida Administrative Code (FAC) Rule 14-97. As part of the existing conditions analysis, median openings were evaluated to determine if the spacing falls within the standards stipulated in FAC 14-97. According to FDOT's Roadway Characteristics Inventory (RCI), LeJeune Road and SW 8th Street are designated as access class 7 within the vicinity of the intersection. Based upon the observations performed during the field review and Straight Line Diagrams (SLDs) obtained from FDOT, the access spacing and median types were identified. Addtionally, CH Perez and Associates Consulting Engineers Inc. prepared an Existing Conditions Diagram for the general study area (see Appendix 2-VIII). This information was then cross-referenced with the State's access management standards. The results of this data collection effort and access management assessment are included herein.

South of SW 8th Street, LeJeune Road is a four-lane arterial with a continuous two-way left-turn lane. North of SW 8th Street, LeJeune Road is divided by a restrictive raised median. Throughout the study area, SW 8th Street is a four-lane arterial with a continuous two-way left-turn lane. Therefore, the median opening along LeJeune Road north of SW 8th Street was evaluated, as well as the signal spacing in each direction from the study intersection.

The first median opening along LeJeune Road north of SW 8th Street is a directional opening at SW 5th Terrace. SW 5th Terrace is located approximatley 790 feet from the intersection, and therefore meets the 330-feet directional median opening standard.

The signal spacing standard for both LeJeune Road and SW 8th Street in the general study area is 1,320 feet. All adjacent signal spacings meet the standard in the existing condition as follows:

- Pedestrian-actuated signal on LeJeune Road approximately 4,000 feet south of SW 8th Street
- LeJeune Road and Flagler Street – approximately 2,640 feet from intersection
- SW 8th Street and SW 47th Avenue – approximately 2,700 feet from intersection
- SW 8th Street and Ponce De Leon Boulevard – approximately 1,380 feet from intersection.

2.3 Safety

A safety analysis was conducted for the LeJeune Road and SW 8th Street intersection. The purpose of this analysis was to assess the current safety condtions of the intersection by evaluating the frequency of crashes and crash statistics over a five-year study period. A high crash location analysis was also performed for each analysis year. In addition, historical crashes at the intersection, as well as findings from the previous 2011 FDOT Safety Study are summarized herein.

2.3.1 Methodology

A spot crash analysis was conducted to identify abnormally high number of crashes, as well as recurring crash characteristics at the intersection. These analyses were performed using data from a five-year period, thus ensuring sufficient reliability, and the Highway Safety Improvement Program (HSIP) methodology from FDOT was followed.

In addition to reviewing the All Roads Crash Analysis (ARCA) Reports (i.e. 5% of the highway locations exhibiting the most severe safety needs) available on FDOT's Florida Traffic Safety Portal for years 2009, 2010, and 2011, the rate quality control method was employed to identify the potential of a high crash location. The rate-quality control method uses crash rates as criteria for identifying high crash locations, and applies a statistical test to determine whether the crash rate is significantly higher than a predetermined average crash rate for intersections with similar characteristics.

Since both LeJeune Road and SW 8th Street are on the State Highway System, actual crash rates can be compared with critical crash rates using information from the statewide crash database, Crash Analysis Reporting System (CAR), to determine if the intersection is indeed a high crash location. Actual crash rates exceeding the critical crash rate—given a confidence interval of 99.95%—indicate a crash rate that is abnormally high, so much that the intersection's crash rate cannot be reasonably attributed to random occurrences.

The safety ratio (S) is defined as the ratio of the actual crash rate to the critical crash rate (or R_a/R_c). An intersection with a safety ratio greater than or equal to 1.0 is designated as a high crash location, and said intersection may require further study to determine contributing causes to the unsafe conditions.

The FDOT crash analysis spreadsheet used to perform the crash analyses for this study requires a significant amount of input data. The crash data used in the analysis was obtained from the CAR database for the years 2008 thru 2012. The CAR output data has been included in Appendix 2-IX. Additionally, the intersection statewide, districtwide, and countywide average crash rates provided by FDOT are included in Appendix 2-X.

The historical AADTs utilized to develop the entering traffic volume at each intersection, were obtained from the 2013 edition of FDOT Florida Traffic Online (FTO). In addition, data collected during field reviews and the Straight Line Diagrams of Road Inventory (SLDs) prepared by the FDOT were referenced to verify roadway geometry, laneage, and functional classification.

2.3.2 Safety History

The intersection was included on FDOT's High Crash List in 2008. A Preliminary Safety Review was conducted in 2010, which concentrated on the crash study period of 2006 thru 2008. In 2011, FDOT conducted a more thorough safety study for the study period from 2005 to 2009. Prior to both of these studies, the Miami-Dade MPO conducted a Grade Separation Study in 2005 for the intersection, which in turn analyzed crash data from 2001-2003. The crash data from these previous studies, as well as the most current information available as obtained from FDOT from 2010-2012 is collectively summarized in **Figure 2-25.**

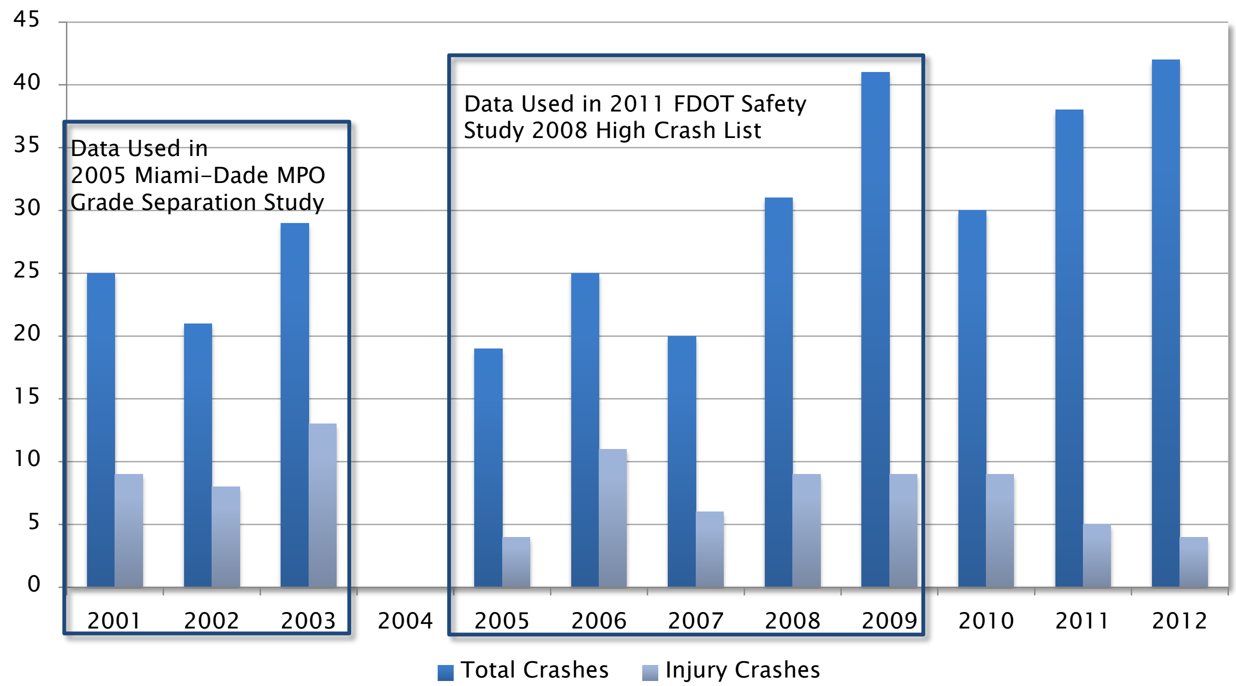

Figure 2-25: Total Crashes per Year (2001-2012)

Additionally, due to its applicability to the current study, the figure summarizing the recommendations from the FDOT 2011 Safety Study is included in Appendix 2-XI.

2.3.3 All Roads Crash Analysis

FDOT's All Roads Crash Analysis (ARCA) online database was referenced to determine if the intersection or surrounding segments were identified as high crash locations in 2009, 2010, and 2011. The high crash intersection/segment lists in ARCA represent the largest five percent of the combined high crash intersection/segment list per District over a three-year analysis period. The locations included in the list are sorted by the highest number of crashes and then sorted by fatalities plus injuries.

According to the ARCA five-percent high crash location lists, the following segments were identified as high crash locations for the respective years:

- LeJeune Road south and north of SW 8th Street intersection, MP 1.386-1.986 and MP 3.017-4.317 (2009, 2010, and 2011)

- SW 8th Street segment including LeJeune Road intersection, MP 13.375-14.432 (2009, 2010, and 2011)

It should be noted that intersections falling on reported high crash segments are not included in the ARCA high crash intersection list. Therefore, the study intersection may not be explicitly included on the high crash intersection list because it is already included within the SW 8th Street high crash segment (intersection is located at MP 13.607).

2.3.4 Crash Summary

The frequency and characteristics of crashes occurring within the intersection area of influence (250–ft radius) between years 2008 and 2012 are summarized in the following figures. Over the five-year period, a total of 176 crashes were reported within the intersection influence area. **Figure 2-26** shows the total number of crashes that occurred at the intersection during each year within the 250-ft intersection influence area.

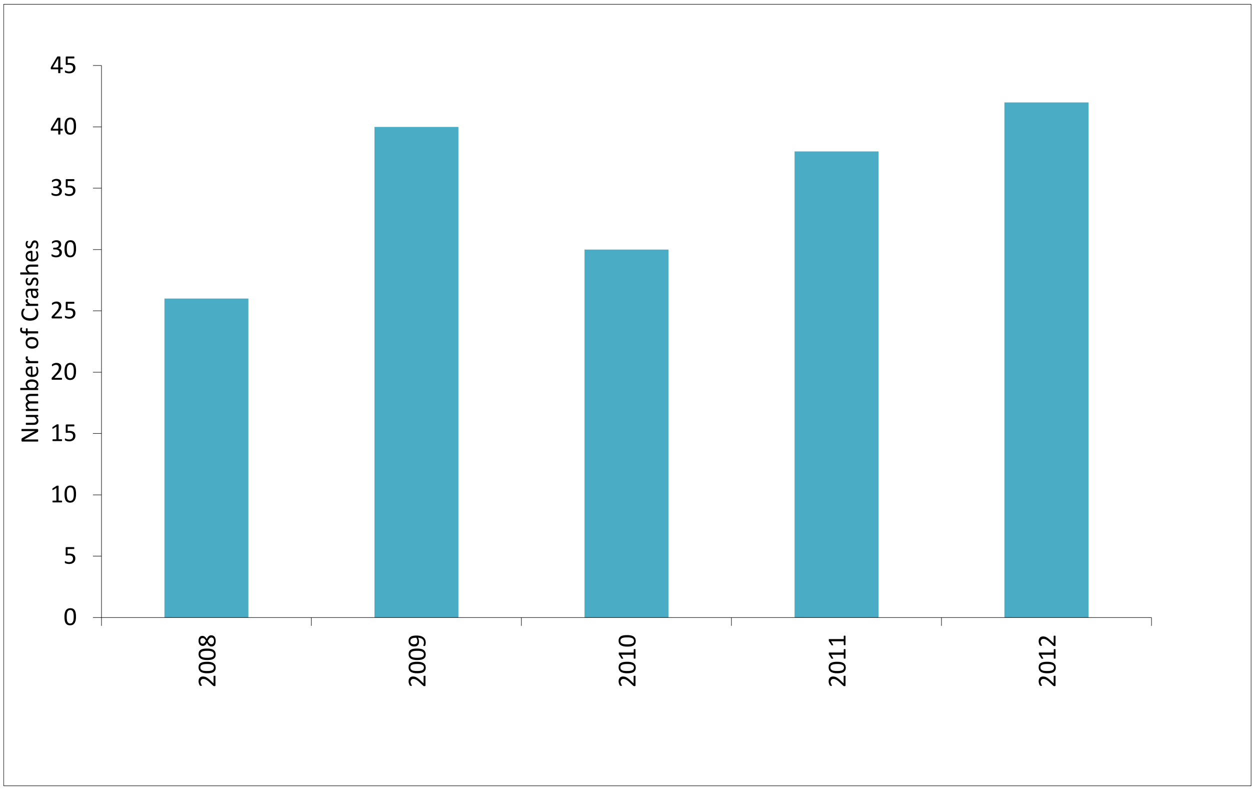

Figure 2-26: Total Crashes per Year within 250-Ft Radius (2008-2012)

In addition, the characteristics (i.e., type, severity, time of day, and weather condition) of crashes reported within the influence area are graphically summarized in **Figures 2-27 thru 2-30**. During the five-year-period, rear-end crashes were the leading type of crash at 37%, followed by angle crashes at 19% of the total number of crashes; left-turn and sideswipe crashes follow closely behind. “All other” crashes account for 27% of the total crashes, which the FDOT methodology classifies as crashes that do not fall into one of the standardized eight crash type categories.

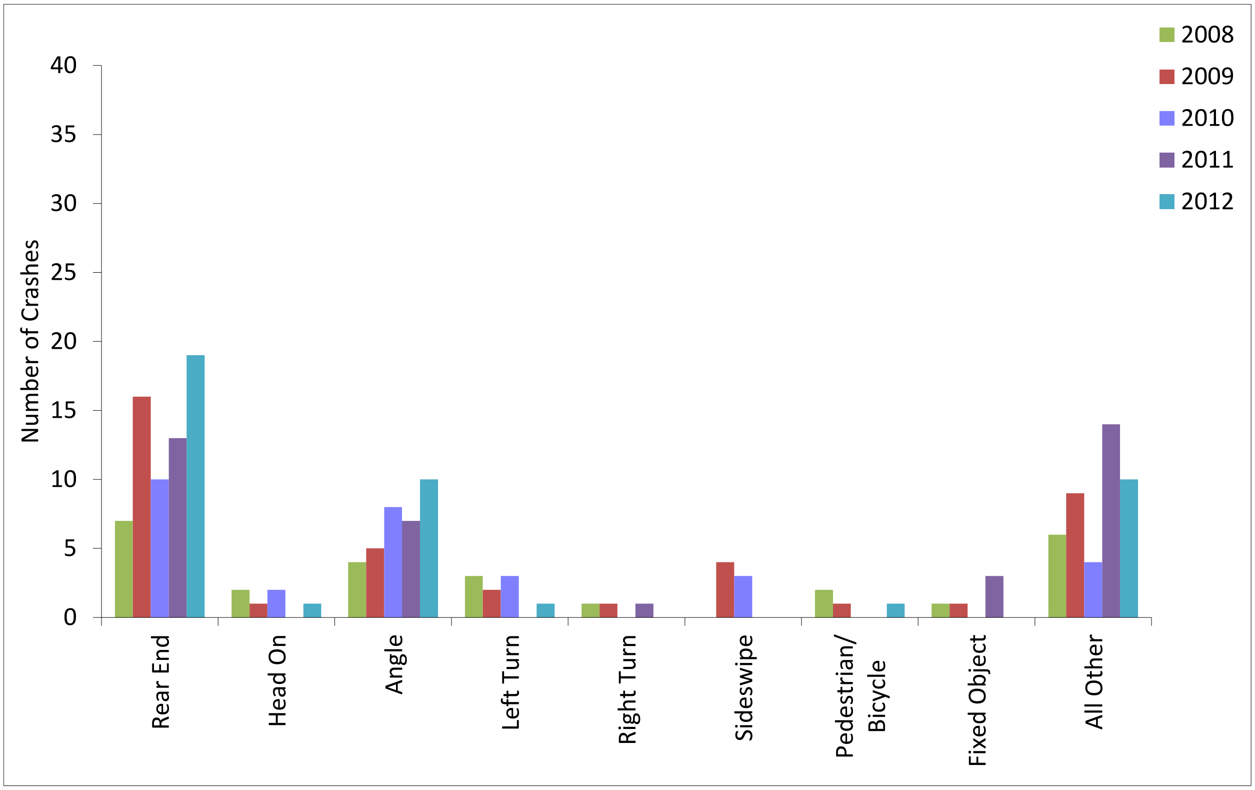

Figure 2-27: Crashes by Type per Year (2008-2012)

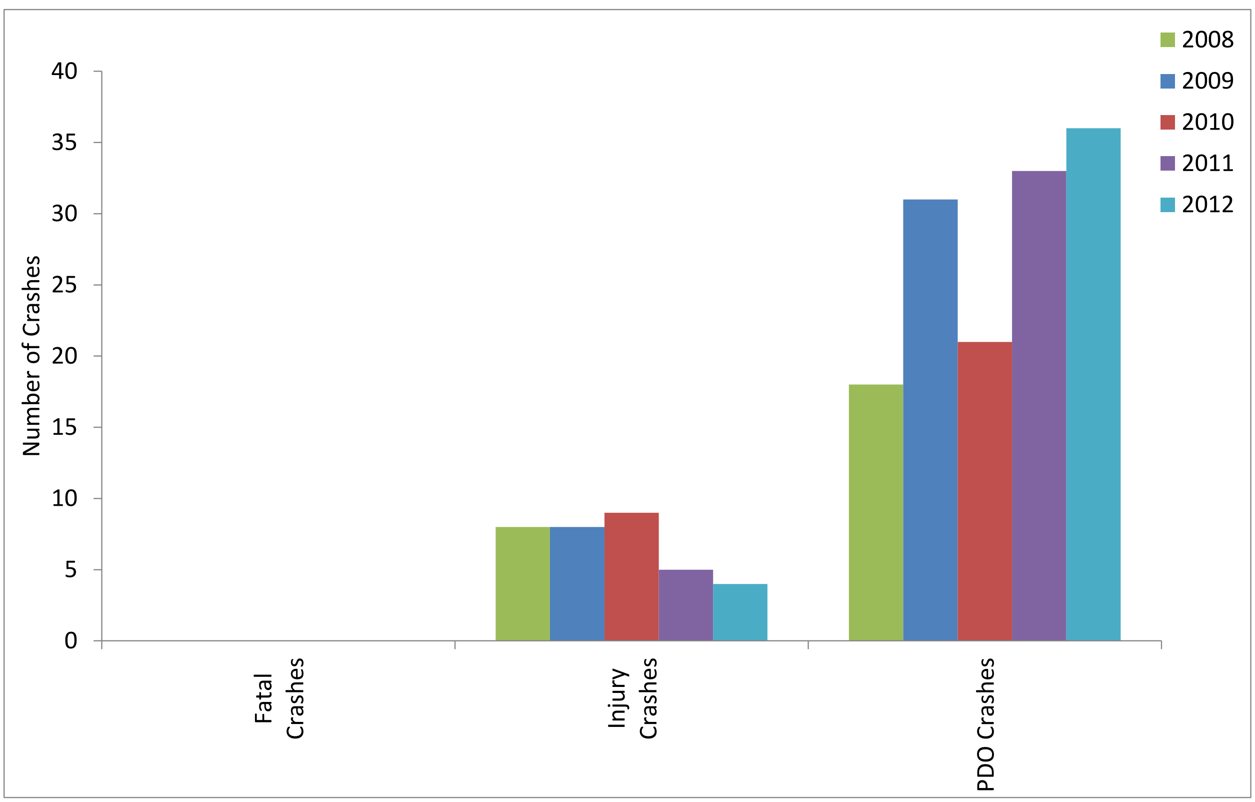

Figure 2-28: Crashes by Severity per Year (2008-2012)

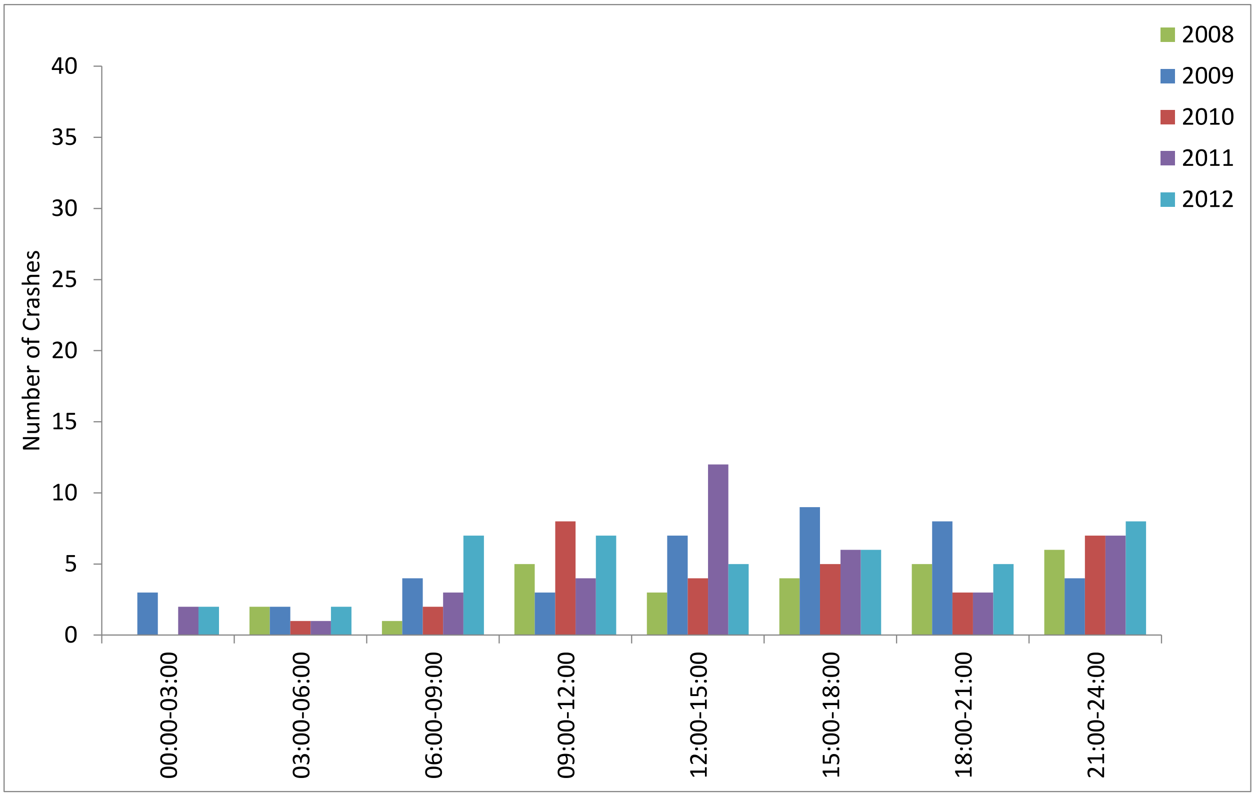

Figure 2-29: Crashes by Time of Day per Year (2008-2012)

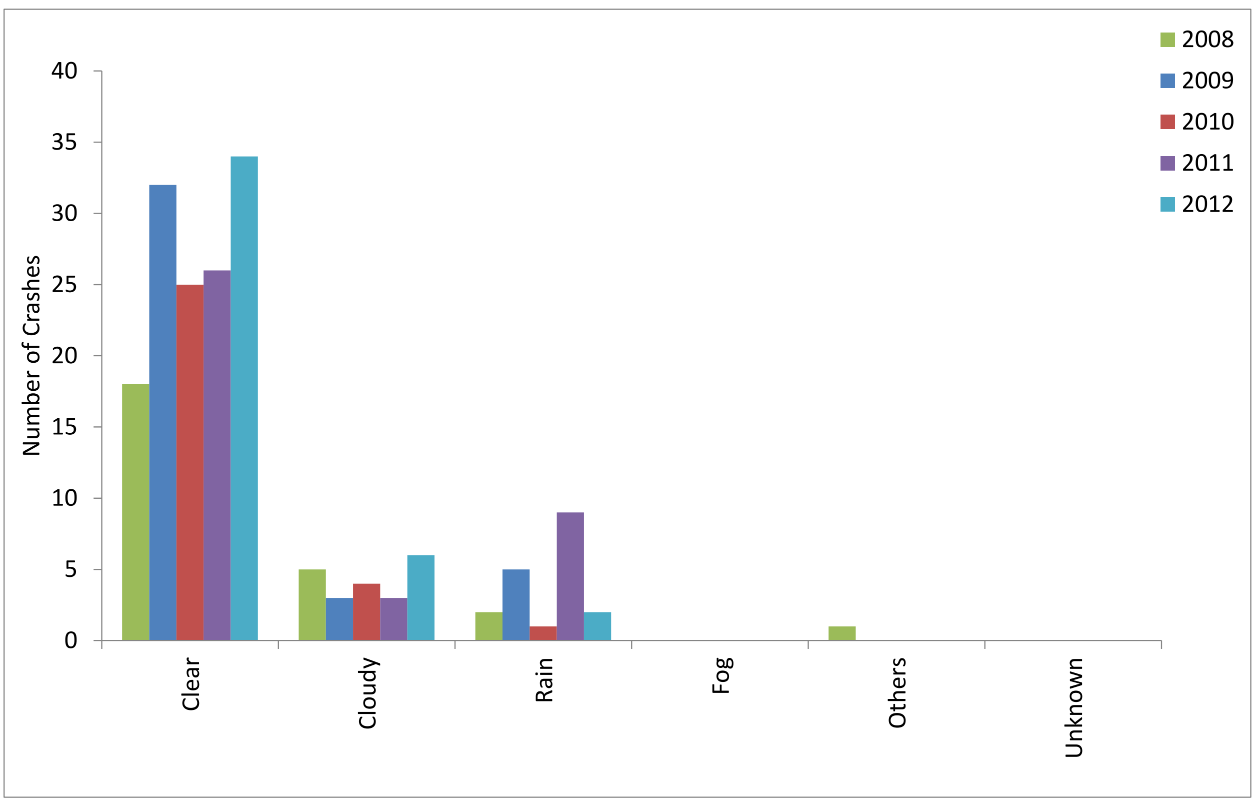

Figure 2-30: Crashes by Weather Condition per Year (2008-2012)

During the five-year-period, approximately 20% of the crashes resulted in injuries and no fatalities were reported. When reviewing the crash patterns by time of day, the frequency of crashes is similar to the daily volume profile of vehicles entering the intersection throughout a typical day. In addition, the majority of crashes occurred under clear weather conditions.

2.3.5 Rate Quality Control Method

A spot crash rate analysis was performed for the study intersection from 2008 to 2012. The crash rates and types of crashes for each intersection have been summarized in **Tables 2-5 thru 2-7,** and the detailed crash summary and crash statistics tables have been included in Appendix 2-XII for further reference.

Table 2-5: Intersection Crash Severity Summary (2008-2012)

Year	Length	Number of Lanes (1)	Divided (1)	AADT (2)	Crashes	Injury Crashes	Fatal Crashes	Fatalities	PDO
2008	0.094	6	Y	73,000	26	8	0	0	18
2009	0.094	6	Y	79,500	40	8	0	0	32
2010	0.094	6	Y	83,500	30	9	0	0	21
2011	0.094	6	Y	87,500	38	5	0	0	33
2012	0.094	6	Y	82,500	42	4	0	0	38
Total	-	-	-	-	176	34	0	0	142
Percent	-	-	-	-	-	19.32%	0.00%	-	80.68%

(1) Characteristics are based upon the intersection leg with the greatest number of lanes (i.e. north leg) in accordance with FDOT methodology.
(2) Based on FDOT 2013 FTO, Historical AADT Report.

Table 2-6: Intersection Crash Rate Summary (2008-2012)

Year	Intersection Actual Crash Rate	Countywide			Districtwide			Statewide		
		Average Crash Rate (2)	Critical Crash Rate (1)	Safety Ratio (S)	Average Crash Rate (2)	Critical Crash Rate (1)	Safety Ratio (S)	Average Crash Rate (2)	Critical Crash Rate (1)	Safety Ratio (S)
2008	0.976	0.792	1.378	0.708	0.783	1.366	0.714	0.566	1.064	0.917
2009	1.378	0.855	1.437	0.959	0.855	1.437	0.959	0.582	1.065	1.294
2010	0.984	0.896	1.477	0.667	0.896	1.477	0.667	0.614	1.098	0.897
2011	1.190	0.992	1.588	0.749	0.991	1.586	0.750	0.585	1.046	1.137
2012	1.395	1.022	1.645	0.848	1.021	1.644	0.849	0.667	1.173	1.189

(1) Critical Crash Rate based upon a k-value of 3.291 equating to a Confidence Level of 99.95%.
(2) Obtained from FDOT Crash Analysis Reporting System (CAR).

Table 2-7: Intersection Crash Type Summary (2008-2012)

Crash Type	Year					Average	Percent	Total
	2008	2009	2010	2011	2012			
Rear-End	7	16	10	13	19	13	36.93%	65
Head On	2	1	2	0	1	1	3.41%	6
Angle	4	5	8	7	10	7	19.32%	34
Left Turn	3	2	3	0	1	2	5.11%	9
Right Turn	1	1	0	1	0	1	1.70%	3
Sideswipe	0	4	3	0	0	1	3.98%	7
Pedestrian/Bicycle	2	1	0	0	1	1	2.27%	4
Fixed Object	1	1	0	3	0	1	2.84%	5
All other	6	9	4	14	10	9	24.43%	43
Total	26	40	30	38	42	35	100.00%	176

In order to determine if the actual crash rates were abnormally high, spot safety ratios were calculated for each year using countywide, districtwide, and statewide average crash rates. In general, the average crash rates on countywide and districtwide bases were found to be similar, and therefore, the corresponding safety ratios for the subject intersection were also alike. The 2009, 2011, and 2012 safety ratios computed using the statewide average crash rates were greater than 1.0, which indicates this intersection was a high crash location in those years when compared with similar intersections throughout the State.

2.4 Summary / Conclusions

Chapter 2 presents an assessment of the existing operating conditions at the intersection of SR 953/LeJeune Road with SR 90/SW 8th Street/Tamiami Trail and the influence area of the intersection. The assessment of the existing conditions included a description of existing roadway geometry, traffic volumes, pedestrian volumes, field review, signal timing, analysis of operational conditions, access management, and safety history.

The intersection of SR 953/LeJeune Road with SR 90/SW 8th Street/Tamiami Trail currently operates at LOS E during both AM and PM periods with several movements operating at LOS E or F.

During the AM peak hour field review, it was observed that vehicles making a westbound left-turn movement at the intersection do not have a protected phase and must perform the maneuver during the permissive phase. Due to the heavy demand for the eastbound thru movement, vehicles were unable to make this maneuver during the permissive phase, and approximately two vehicles per cycle were observed executing the movement during the yellow and red clearance intervals. These maneuvers are inherently dangerous, thus increasing the likelihood of crashes at the intersection.

During the PM peak hour field review, it was observed that protected phases are not provided for both the eastbound left-turn and northbound left-turn movements. With the heavy westbound thru demand, eastbound left-turning vehicles were unable to find sufficient gaps to make the maneuver during the permissive phase. As such, approximately two vehicles per cycle cleared the intersection during the red and yellow clearance intervals. Once again, this type of aggressive maneuvers is unsafe and can be conducive to near-misses and even crashes.

During both peak hours, the impatience and frustration of drivers trying to complete the left-turn movements was observed, and more so during the PM peak hour. A crash occurred while the field observations were being performed; a vehicle making an eastbound left-turn movement collided with a vehicle making a westbound left-turn movement during the permissive phase for the respective left-turn movements.

This evaluation of the existing conditions provides the baseline condition to evaluate the need for improvements at the intersection.

Chapter 3 Future Conditions

This chapter documents the estimation of future traffic volumes for the concepts analysis based upon historical growth rate trends, the Florida Department of Transportation (FDOT) Generalized Service/Volume tables, and several elements from the Southeast Florida Regional Planning Model (SERPM 6.5.4), including socio-economic growth, assignment growth, and select-link analyses. Forecasts were developed for Opening Year (2020), Interim Year (2030), and Design Year (2040).

3.1 Methodology

Future traffic volumes were projected for Years 2020, 2030, and 2040 in accordance with the methodologies described in *FDOT's Project Traffic Forecasting Handbook (version 2014)*. Annual Average Daily Traffic (AADT) volumes were developed based upon review of the historical trends analyses performed for the corridor, as well as output volumes and socio-economic data contained in SERPM. As part of the travel demand modeling effort, a cursory validation was performed to assess the reasonableness of outputs within the subarea. The assumptions and results of the traffic volume projections are contained herein.

3.2 Travel Demand Modeling Selection

SERPM encompasses the three-county area of Miami-Dade, Broward, and Palm Beach, and was therefore used for the project traffic forecasting. The SERPM 6.5.4 platform was used for the travel demand modeling effort for this project. At the time of the analysis, the 2010 and 2040 socio-economic data was available, and therefore was used for the project.

3.2.1 Subarea Validation

A small scale validation analysis was performed to assess the reasonableness of the SERPM Model within the study area, as shown in Figure 1. A review of the *Miami-Dade Long Range Transportation Plan (LRTP) Update to the Year 2040* and the future network yielded no additional improvements to the network within the study area.

As part of the reasonableness check of the SERPM Model for the purposes of this study, select-link analyses were performed in both the 2010 and 2040 models. Select-link analyses were run for the left-turn and thru movements for each intersection approach (eight select-links per model year). The results showed there was no demand for either the eastbound or westbound left-turn movements. A further review of the model inputs revealed that turn prohibitions were included for both movements. Because all left-turn movements are currently permissible through the intersection, the respective turn prohibitions were consequentially removed.

After removing the turn prohibitions for the intersection movements, the base year (2010) outputs were compared with available (2010) count data in the study area. There were no available traffic counts for SW 8th Street immediately east and west of LeJeune Road. The closest counts stations along SW 8th Street are located east of Red Road/SW 57th Avenue and east of SW 37th Avenue. The comparison results are summarized in **Table 3-1**.

Table 3-1: SERPM Model (Year 2010) Assignment Validation for LeJeune Road and SW 8th Street

	Year 2010		Difference	
	AADT	Model Assignment	Value	Percent
LeJeune Rd				
South of SW 8th St	39,000	40,700	1,700	4%
North of SW 8th St	47,500	55,200	7,700	16%
SW 8th St				
East of Red Rd/SW 57th Ave	44,500	24,200	(20,300)	-46%
East of SW 37th Ave	34,000	33,700	(300)	-1%

As shown in **Table 3-1**, the model assignment comparison results within the general study area were found to vary. While on half (two) of the links analyzed, the assignment results were very good, the other (two) links were found to differ, particularly on SW 8th Street east of Red Road (west of the study intersection). It should be noted that excellent validation results for an intersection is typically not expected from a regional model, as validation efforts generally aim more towards freeway and other higher volume facilities. However, the comparison was made to assess the model assignment performance within the subarea, so that in turn, the model could be used as deemed appropriate for the study particularly. Notwithstanding, other model elements, apart from volume outputs, were used to develop the traffic volume projections as well, as detailed herein.

3.3 SERPM Model Traffic Assignment Growth – 2010 to 2040

The highway assignment results of the SERPM model were compared between 2010 (Base Year) and 2040 (Horizon Year) in what pertains to the daily volumes along LeJeune Road and SW 8th Street. **Table 3-2** summarizes the calculated growth rates (in linear fashion) for LeJeune Road and SW 8th Street based on the 2010 and 2040 traffic assignment yielded by the SERPM model.

Table 3-2: SERPM Model Traffic Assignment Growth 2010-2040 for LeJeune Road and SW 8th Street

	Model Assignment		Growth	
	2010	2040	Absolute	Annual
LeJeune Rd				
South of SW 8th St	44,200	42,900	-3%	0%
North of SW 8th St	58,600	56,400	-4%	0%
SW 8th St				
West of LeJeune Rd	30,300	39,100	29%	1%
East of LeJeune Rd	40,700	47,800	17%	1%

3.4 Historical Growth and Trends Analyses

In addition to the examination of SERPM forecasts and travel patterns, a thorough analysis of different growth rates was conducted to determine the most likely trend of the corridor and study area in the future years. To this end, historical traffic trends and socio-economic forecasts were examined in detail.

3.4.1 Historical Traffic Growth

The historical data gathered from FDOT's portable traffic monitoring sites (PTMS) were used to analyze the growth trends along the corridor. All of the sites present a very poor fitting to the linear regression method.

Table 3-3 shows the results of the regression analyses, including each *coefficient of determination* or R^2, which measures what percentage of the data is actually explained by the selected function (linear, in this case) with the growth rate as the parameter. The closer R^2 is to 1 (or 100%), the better the fit and, consequently, the more reliable the forecast that can be generated using the given function and resulting growth rate.

However, in this case, the largest R^2 obtained was 15.8%, which is quite low. Therefore, although it is obvious that the traffic growth has been very low in the corridor, the irregularity of the regression results suggests that some other sources should be consulted to determine a solid growth rate for the corridor.

Table 3-3: SERPM Traffic Assignment Growth 2010-2040

Station	Location	R^2	Historical Growth Rate
LeJeune Rd			
870025	200' South of SR 90/SW 8 St	1.6%	-0.2%
870026	200' North of SR 90/SW 8 St	9.8%	-0.1%
SW 8 St			
870118	200' East of Red Rd/SW 57 Ave	15.8%	2.0%
875117	200' East of SW 37 Ave	2.7%	0.2%

3.4.2 Socio-economic Data

Population and employment data for approximately 60 Traffic Analysis Zones (TAZs) in the general study area were analyzed. Growth rates were calculated from 2010 to 2040 for each zone. The results depicting the population growth are shown in **Figures 3-1 and 3-2**, and the employment growth is shown in **Figures 3-3 and 3-4**.

The data shows an average annual linear growth of two percent is anticipated for both population and employment in the area.

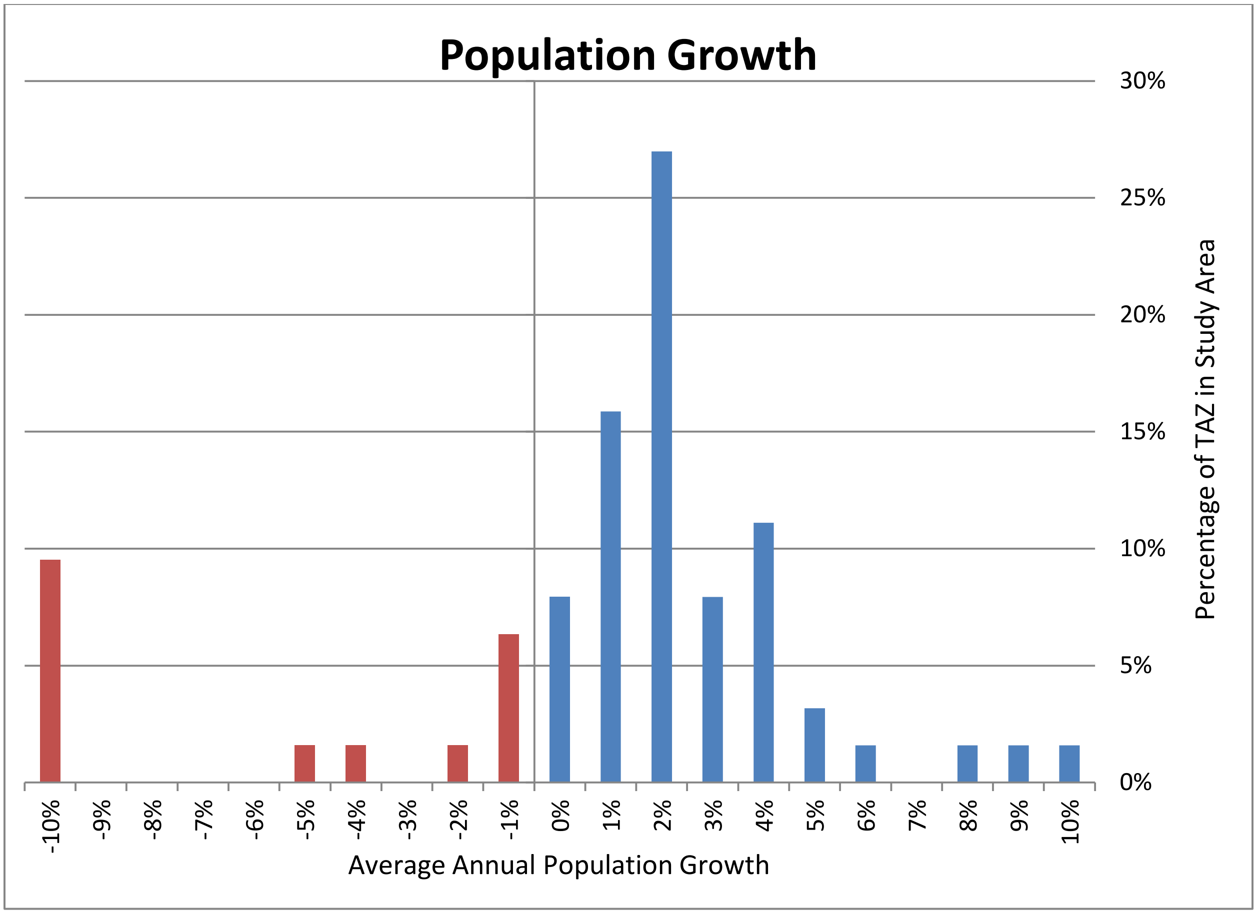

Figure 3-1: Average Annual Population Growth in Study Area TAZs – Chart

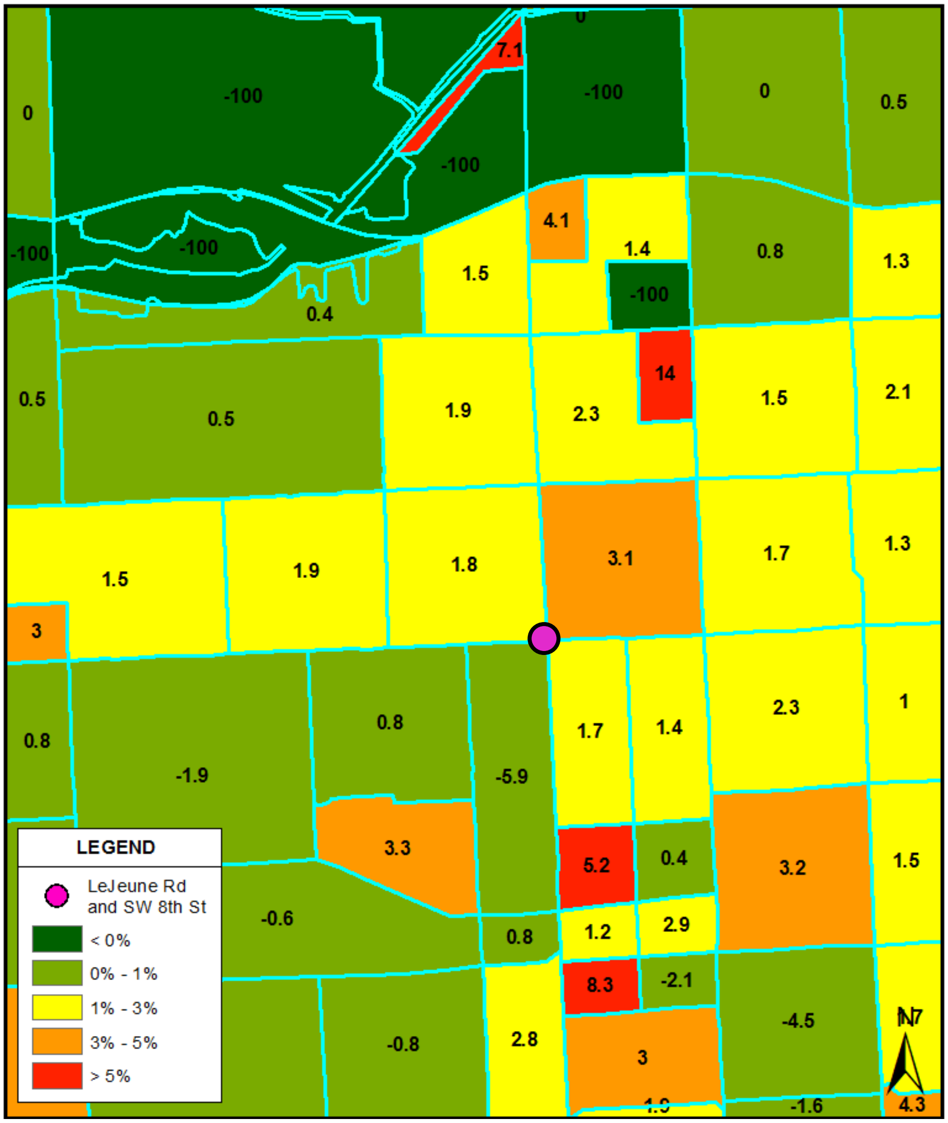

Figure 3-2: Average Annual Population Growth in Study Area TAZs

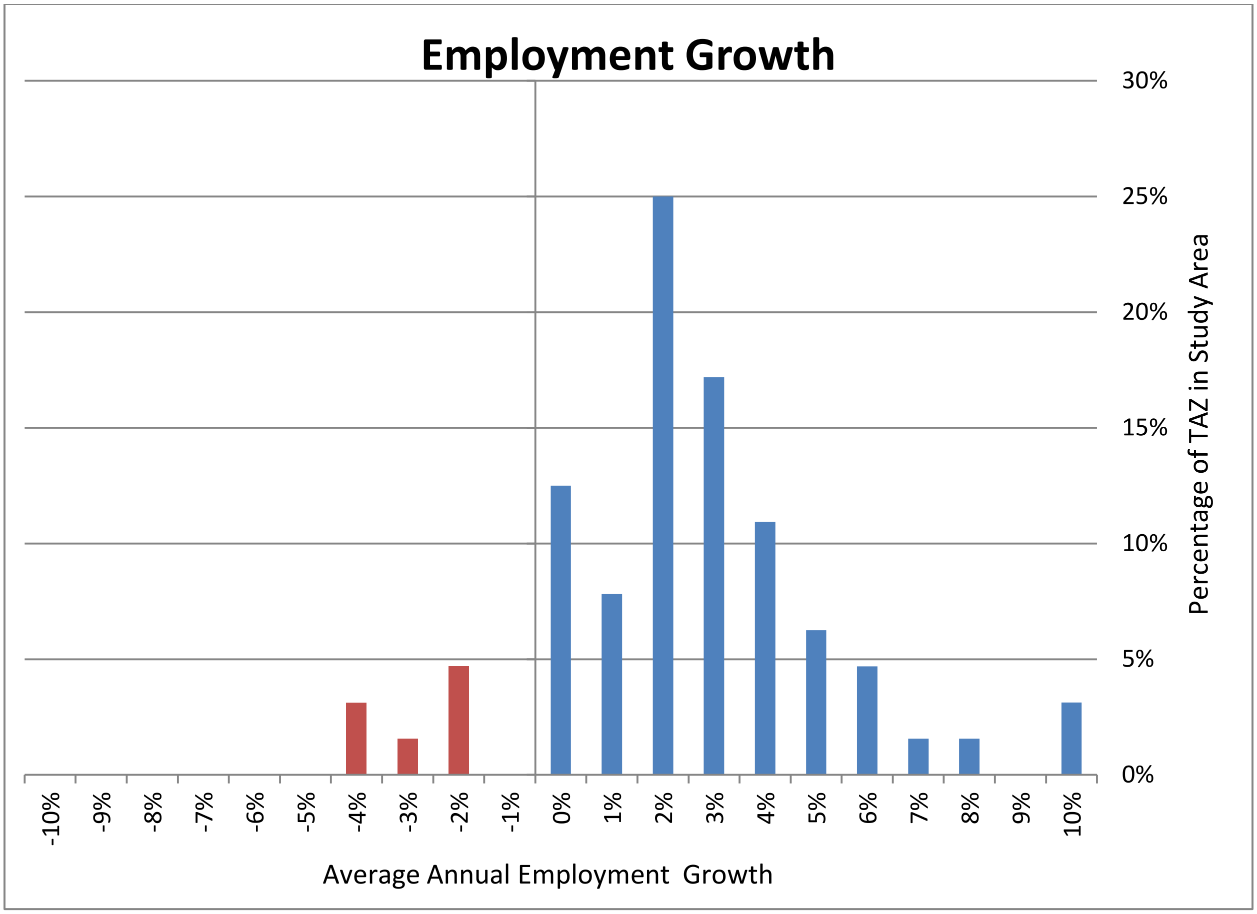

Figure 3-3: Average Annual Employment Growth in Study Area TAZs - Chart

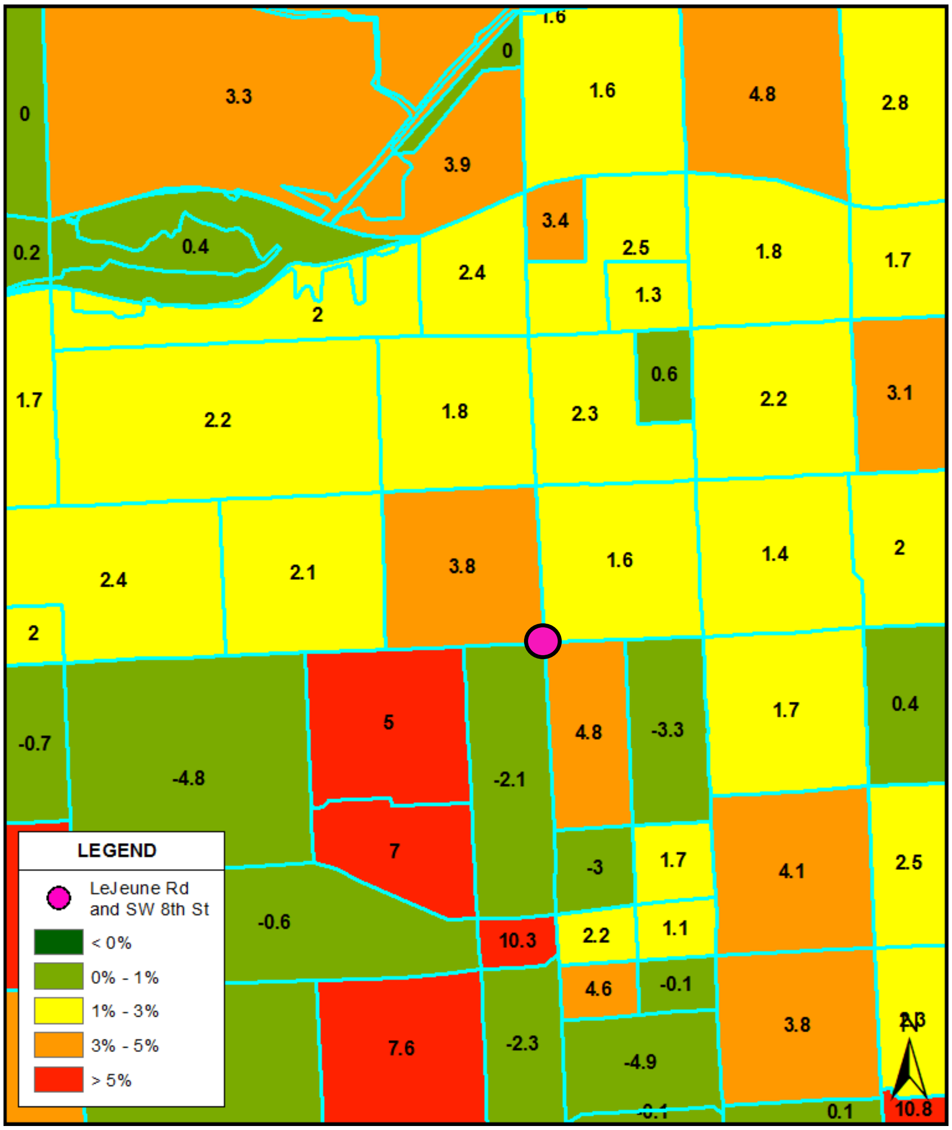

Figure 3-4: Average Annual Employment Growth in Study Area TAZs

3.5 FDOT Generalized Service Volume Tables

In addition to the highway assignment results of the SERPM model and the analysis of historical traffic trends and socio-economic forecasts, a comparison of the existing peak hourly volumes along LeJeune Road and SW 8th Street with the FDOT Generalized Service Volume tables was performed.

The existing peak hourly volumes along LeJeune Road and SW 8th Street were compared to FDOT Generalized Peak Hour Directional Volumes for Florida's Urbanized Area (Table 7) to estimate the available capacity on the segments leading to the intersection. **Table 3-4** shows the calculation of the linear growth per year until 2040 for the segments along LeJeune Road and SW 8th Street.

An average linear growth per year of 0.64% was estimated using the process shown in **Table 3-4**.

Table 3-4: Comparison between Existing Peak Hour Directional Volume and FDOT Generalized Service Volume Table

	2014 Peak Hour Directional Volume	Type of Facility	Speed (mph)	LOS D Hourly Volumes for Class I or LOS E for Class II State Signalized Arterials based on Table 7	LOS D Daily Volumes adjusted for no right-turn based on Table 7	Adjusted Peak Hour Volumes LOS D or E	How much peak direction can grow?	Grow per year until 2040
LeJeune Rd								
South of SW 8th St	1,735 (SB AM)	4LD	40	2,000	-5%	1,900	165 or 9.5%	0.38%
SW 8th St								
West of LeJeune Rd	1,309 (EB AM)	4LD	35	1,700	-5%	1,615	306 or 23.4%	0.90%
East of LeJeune Rd	1,386 (WB PM)	4LD	35	1,700	-5%	1,615	229 or 16.5%	0.63%
							Average	**0.64%, use 0.7%**

3.6 Project Traffic Volumes

Based on the previous information, an annual growth rate of 0.7% (linear) was deemed appropriate considering the model inputs and outputs, the historical data available, and the available capacity of the links, as appropriate.

3.6.1 Future AADT Volumes

Future AADT volumes were developed by linearly growing the existing AADT by 0.7% annually. The resulting daily volumes (AADTs) for Years 2020, 2030, and 2040 are included in **Table 3-5**.

Table 3-5: Future No Build AADT Volumes

	Existing	2020	2030	2040
LeJeune Rd				
South of SW 8th St	42,500 (1)	44,300	47,300	50,200
North of SW 8th St	45,000 (1)	46,900	50,000	53,200
SW 8th St				
West of LeJeune Rd	36,000 (2)	37,500	40,000	42,600
East of LeJeune Rd	36,000 (2)	37,500	40,000	42,600

Source: (1) 2013 FTO Data

(2) Field data collected by CH Perez and Associates Consulting Engineers Inc. (October 2014).

3.6.2 Project Traffic Factors

The traffic factors were determined using FDOT's 2013 Florida Traffic Online (FTO) data at Portable Traffic Monitoring Sites (PTMS) and 72-hour counts. FDOT's 2013 FTO application includes the following two PTMS sites along LeJeune Road within the study limits.

- 870025 – SR 953/LeJeune Road, 200' south of SW 8th St/SR 90
- 870026 – SR 953/LeJeune Road, 200' north of SW 8th St/SR 90

There are no PTMS sites along SW 8th Street within the study area. Information for SW 8th Street was obtained from 72-hour counts collected in October 2014.

The FTO Historical AADT Reports for PTMS sites along LeJeune Road can be found in Appendix 2-I.

3.6.2.1 K Factor

The future year K factor (proportion of the AADT occurring in the design hour) for this project was selected based upon field collected traffic data, historical K factors, and FDOT's policy regarding standardized K factors (i.e., Standard K). As discussed in FDOT's *Project Traffic Forecasting Handbook (2014)*, Standard K factors are now being used in lieu of K_{30} (the proportion of AADT occurring during the 30th highest hour) for the development of project traffic forecasts on State facilities. Standard K factors have been developed for arterials and freeways in urban and rural areas based upon research performed on these specific functional roadway types.

Peak-to-daily ratios obtained from the 72-hour approach counts and average historical K factors reported for FDOT PTMS sites were reviewed. The observed peak-to-daily ratios along LeJeune Road and SW 8th Street range between 5.7% and 7.3% during the AM peak hour and between 5.9% and 6.5% during the PM peak hour.

Furthermore, since LeJeune Road and SW 8th Street are classified as state urban principal arterials, the Standard K of 9.0% was utilized to forecast design hour traffic.

3.6.2.2 D Factor

Similarly, in addition to traffic count data collected in the field, the historical D_{30} factors reported at PTMS sites located on LeJeune Road and the 72-hour counts along SW 8th Street were also reviewed to determine the appropriate peak hour directional factor (D).

The directional distribution in the field ranged from 51.5% to 60.6% in the AM peak hour and 50.6% to 58.7% in the PM peak hour.

A D factor of 54% was used for the LeJeune Road at SW 8th Intersection Improvement Study.

3.6.2.3 T Factor

Truck traffic can significantly affect traffic operations along a facility depending on the amount of heavy vehicles traveling on the corridor. Therefore, the percentage of heavy vehicles anticipated in future years must be considered when assessing the future traffic conditions of a corridor.

Historical Design Year Daily Truck Percentages (T Factors) obtained from PTMS sites along with 72-hour vehicle classification counts collected in the study area were reviewed to determine an appropriate T Factor for the corridor.

A T factor of 4.5% was assumed for the future conditions analysis. As referenced in the FDOT's *Project Traffic Forecasting Handbook (2014)* (Section 2.6.4), the value for the design hour truck percentage (DHT) is typically estimated to be equal to half of the daily truck percentage (T). Therefore, a design hour truck percentage of 2% was used for the LeJeune Road at SW 8th Street Intersection Improvement Study.

3.6.2.4 Recommended Traffic Factors

The recommended factors presented in **Table 3-6** are representative of the traffic characteristics used in the study.

Table 3-6: Recommended Project Traffic Factors

Location	Traffic Count Data				2013 Florida Traffic Online (FTO) Historical Traffic Factors			FDOT Recommended Traffic Factors (3)		LeJeune Rd/SW 8th St Recommended Traffic Factors			
	Peak-to-Daily Ratio (%)		Directional Distribution (%)										
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	5-Year Average K	5-Year Average D (2)	5-Year Average T	Standard K	D	K	D	T	DHT
LeJeune Rd								9.0	50.8 - 67.1	**9.0**	**54.0**	**4.5**	**2.0**
South of SW 8th St	7.3	7.3	54.6	50.6	8.6	59.0	4.5						
North of SW 8th St	6.8	6.8	51.5	53.7	8.6	59.0	4.5						
SW 8th St													
West of LeJeune Rd	5.7	5.7	54.7	58.7	-	-	-						
East of LeJeune Rd	5.8	5.8	60.6	52.0	-	-	-						
Average	**6.4**	**6.4**	**55.4**	**53.8**	**8.6**	**59.0**	**4.5**						

(1) 2013 FTO Data
(2) Field data collected by CH Perez and Associates Consulting Engineers Inc. in October 2014
(3) Recommended values and ranges obtained from the FDOT Project Traffic Forecasting Handbook (2014)

3.6.3 Directional Design Hourly Volumes

The Directional Design Hourly Volumes (DDHVs) are calculated by applying the K and D factors to the AADT. The DDHVs were calculated using **Equation 1** for the peak direction and **Equation 2** for the non-peak direction.

Equation 1

$$\textit{DDHV Peak direction} = K * D * AADT$$

Equation 2

$$\textit{DDHV Non-Peak direction} = K * (1-D) * AADT$$

3.6.4 Intersection Turning Movement Volumes – No Build Conditions

Using the select-link analysis results of SERPM, the percentages of each turning movement for the intersection were generated for the year 2040 AM and PM peak periods. Once the output was checked for reasonableness, the percentages were used to compute the turning movement volumes. These percentages were applied to the DDHVs estimated with Equations 1 and 2. The resulting values were then rounded to account for the uncertainty of future traffic volumes.

The turning percentages estimated by SERPM through the select-link analysis were deemed to be a better estimation of the real turning demand, since the collected counts at the intersection actually represent the constrained capacity of the left-turn movements under the existing conditions.

Table 3-7 shows the select-link analysis percentages and the resultant 2040 turning movement volumes at the LeJeune Road at SW 8th Street intersection.

Once the 2040 turning movement volumes were estimated applying the SERPM select-link analysis percentages to the DDHVs, the 2020 and 2030 turning movement volumes were estimated by interpolating between the existing year and 2040 turning movement volumes. The turning movement volumes were rounded in accordance with the *Project Traffic Forecasting Handbook* to account for the uncertainty of the forecast.

For the rest of the intersections along the study area, the approach and departure volumes were balanced resembling the existing conditions gains and losses of vehicles at the intersections. Noticing that the turning movement volumes increased at all the nodes in the network, careful observation of the land use was conducted to account for reasonableness of the values estimated. When appropriate, minor adjustments were made.

Table 3-7: Year 2040 No Build Turning Movement Volumes

Direction	Movement	AM Select-link (%)	AM Turning Movement Volumes	AM Rounded Volumes	PM Select-link (%)	PM Turning Movement Volumes	PM Rounded Volumes
LeJeune Rd							
Southbound	Left	24%	621	620	25%	646	650
	Thru	69%	1,784	1,800	66%	1,706	1,700
	Right	7%	181	180	9%	233	230
Northbound	Left	7%	145	150	7%	145	150
	Thru	87%	1,808	1,800	89%	1,850	1,900
	Right	6%	125	130	4%	83	80
SW 8th St							
Westbound	Left	5%	88	90	5%	104	100
	Thru	79%	1,393	1,400	65%	1,344	1,300
	Right	16%	282	280	30%	623	620
Eastbound	Left	15%	311	310	17%	300	300
	Thru	78%	1,615	1,600	78%	1,376	1,400
	Right	7%	145	150	5%	88	90

Figures 3-5 thru 3-10 illustrate the rounded 2020, 2030, and 2040 AM and PM peak hour volumes used for the No Build Conditions for this study, and the turning movement volume balancing spreadsheets are included in Appendix 3-I.

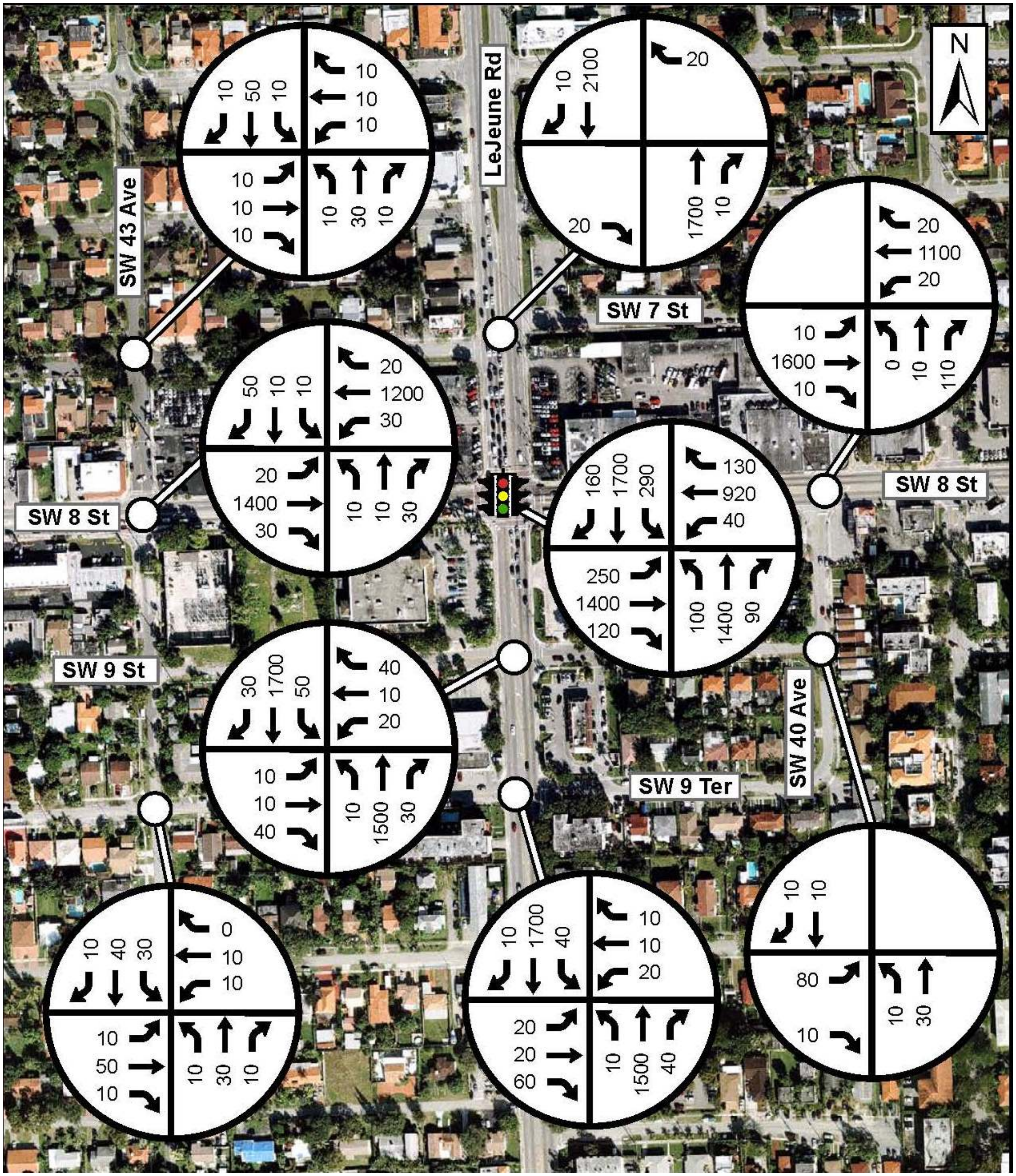

Figure 3-5: Year 2020 No Build Turning Movement Volumes (AM Peak Hour)

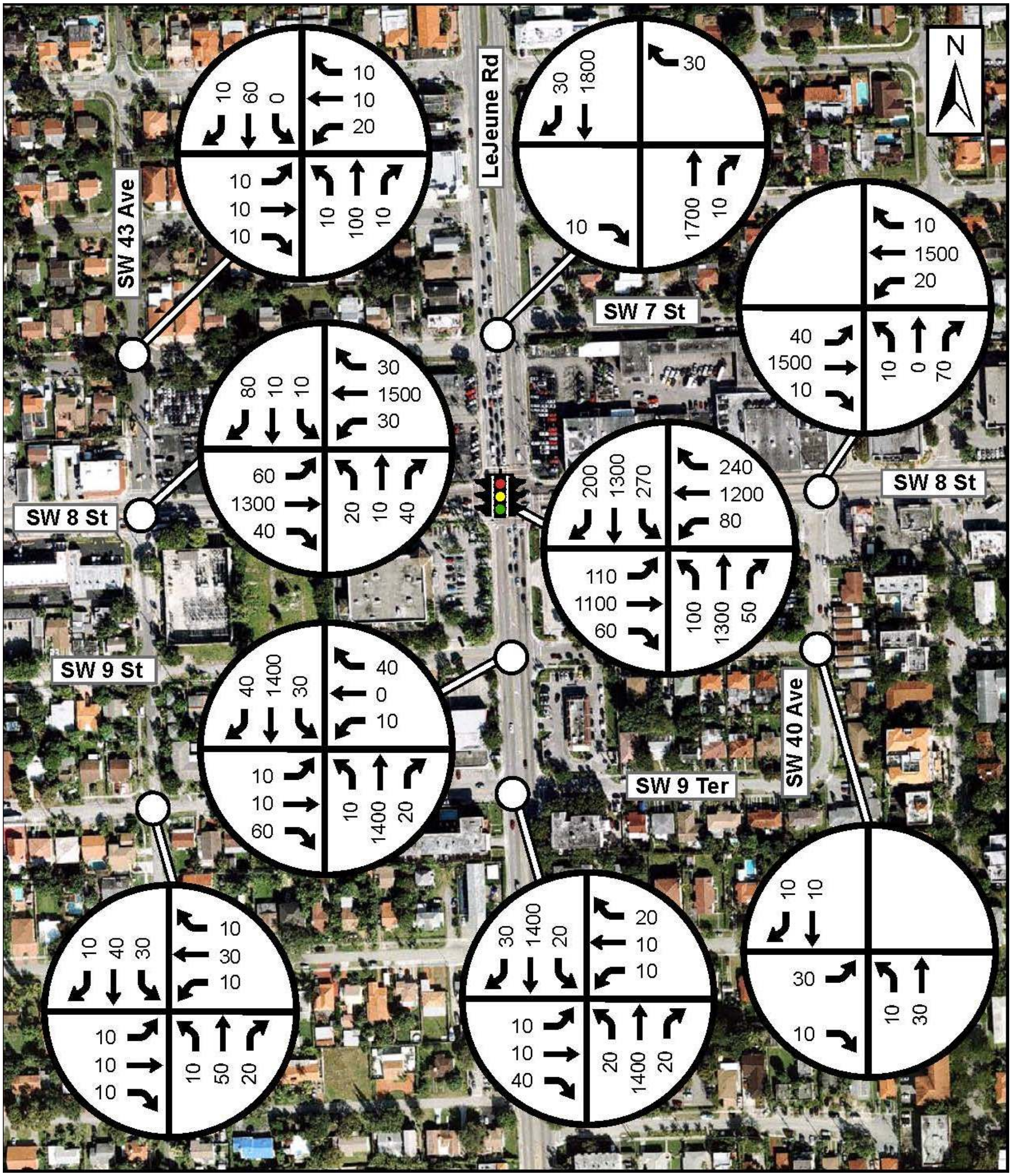

Figure 3-6: Year 2020 No Build Turning Movement Volumes (PM Peak Hour)

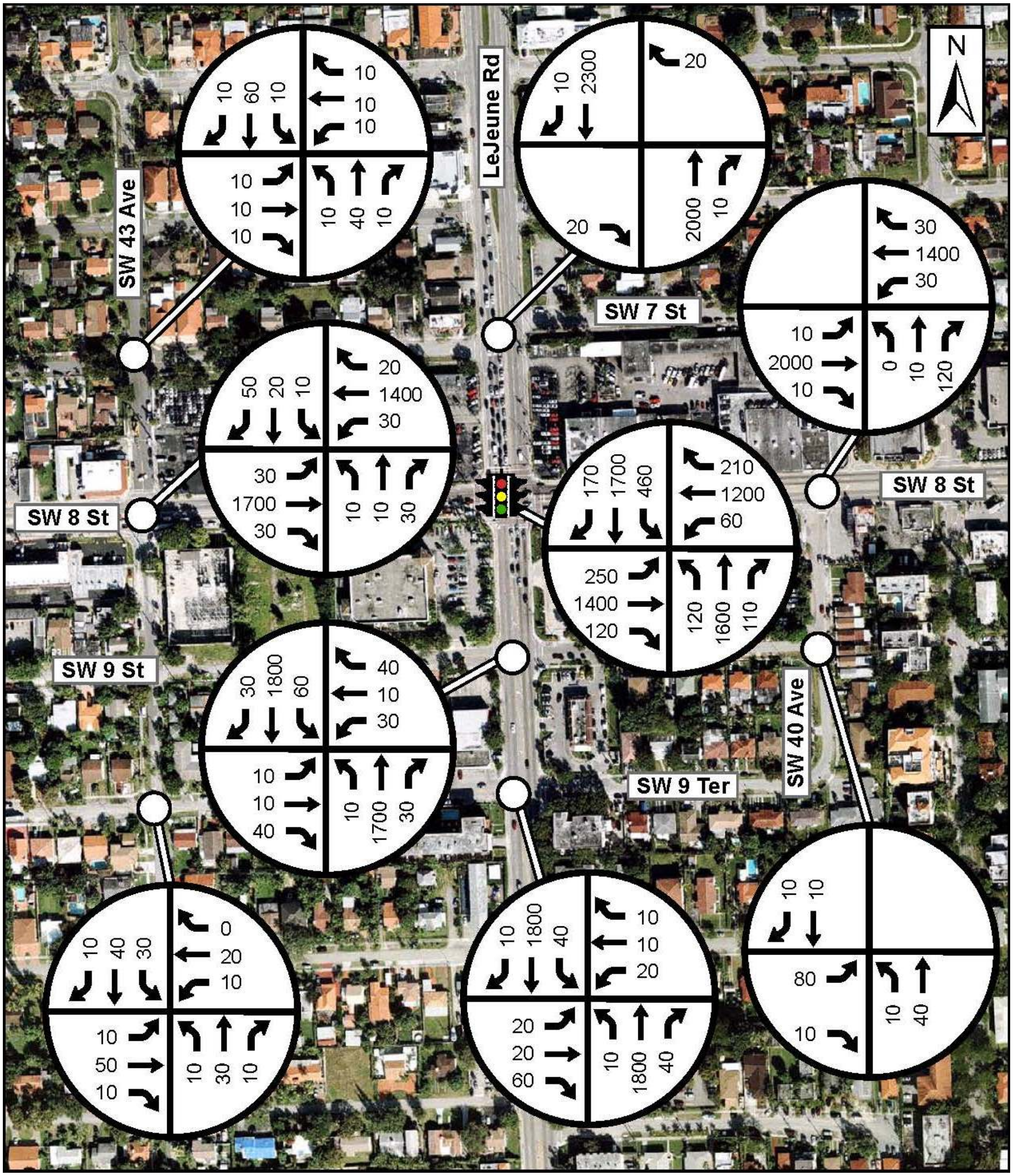

Figure 3-7: Year 2030 No Build Turning Movement Volumes (AM Peak Hour)

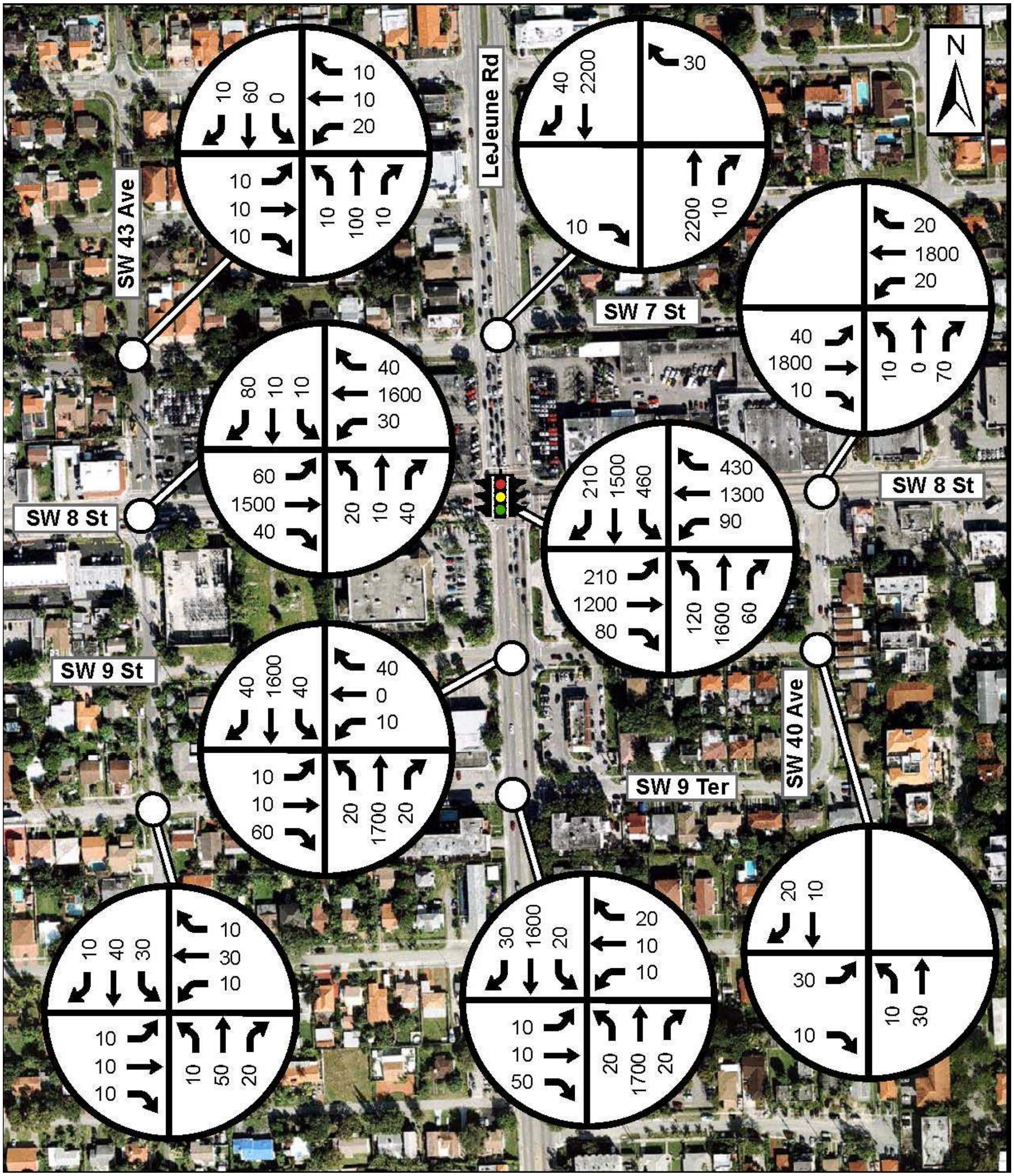

Figure 3-8: Year 2030 No Build Turning Movement Volumes (PM Peak Hour)

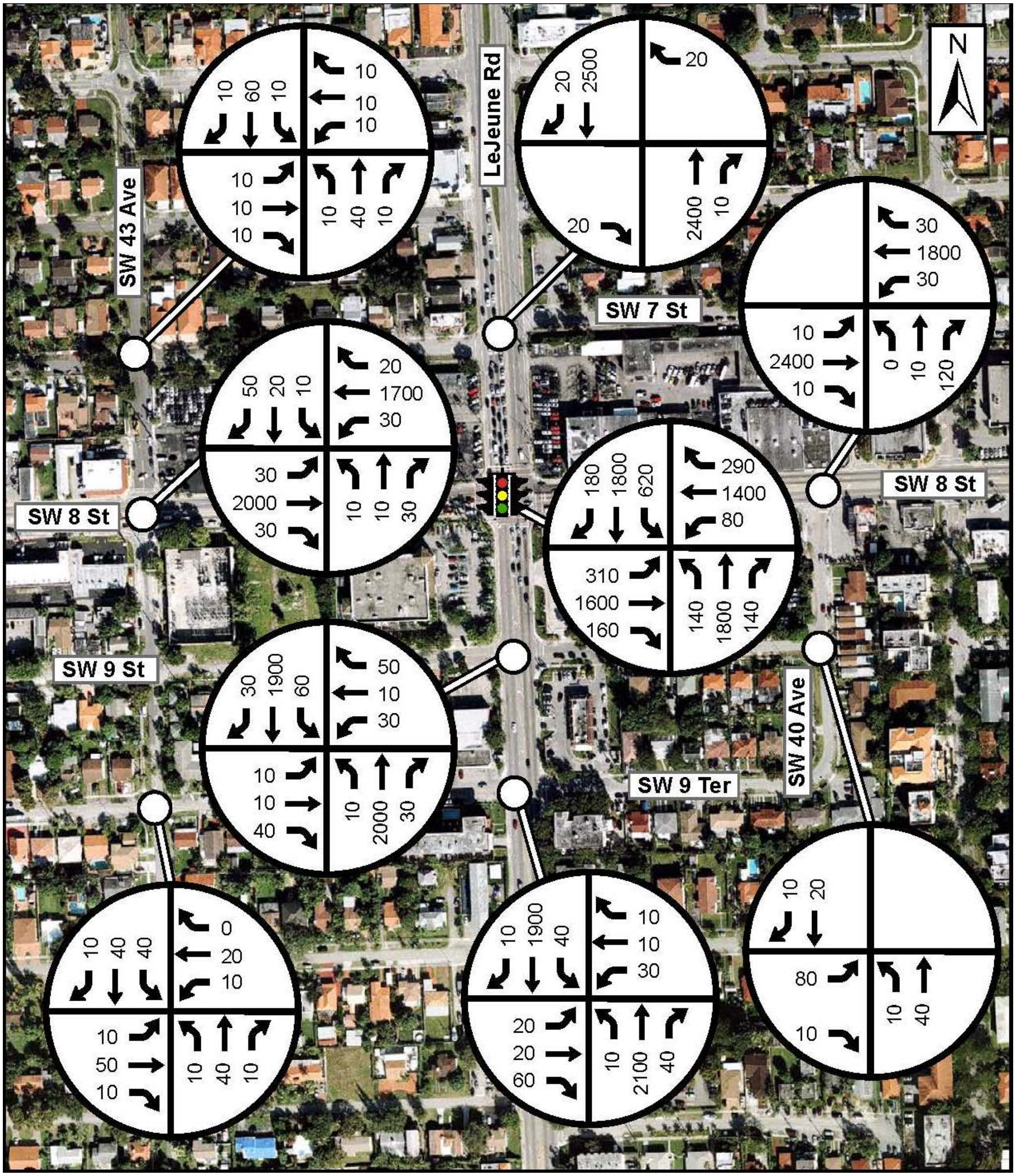

Figure 3-9: Year 2040 No Build Turning Movement Volumes (AM Peak Hour)

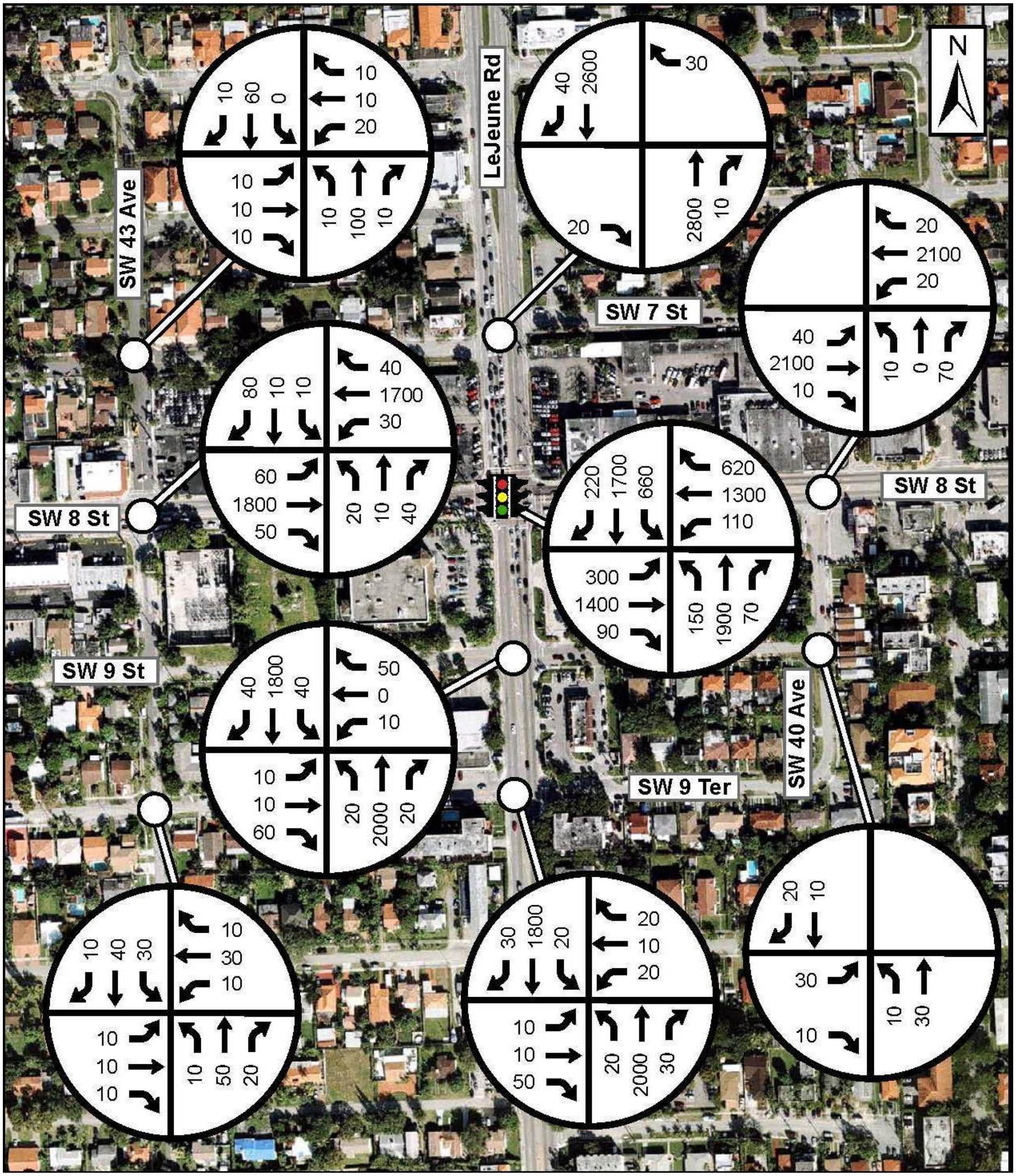

Figure 3-10: Year 2040 No Build Turning Movement Volumes (PM Peak Hour)

Chapter 4 Alternatives Development

This chapter documents the alternatives evaluated for the LeJeune Road at SW 8th Street intersection improvement study. These alternatives were evaluated with regards to safety, traffic level of service (LOS), right-of-way impacts, access considerations, potential parking impacts, and constructability, among others.

4.1 No-Build Alternative

As required in the project scope, the No Build Alternative was analyzed to serve as a baseline to compare the results against the proposed alternatives. The years analyzed were 2020 and 2040, in the AM and PM peak hour. It should be noted that Florida Department of Transportation (FDOT) Financial Project Number (FPN) 433266-1-52-01 is currently programmed as part of a safety study conducted at the intersection. The roadway plans of this project are included in Appendix 4-I. However, since the safety project does not change the geometry of the intersection and final signal timing plans have not been developed either as part of said project, no improvement were included in the No Build alternative and all existing operational conditions were maintained.

4.2 Transportation System Management and Operations (TSM&O) #1 Alternative

The following TSM&O Alternative includes improvements that can be done at the intersection without re-routing traffic or right-of-way (ROW) acquisition. Specifically, TSM&O #1 Alternative contemplates the following changes at the signalized intersection of LeJeune Road and SW 8th Street:

- Adding an additional left-turn lane in the southbound direction thereby creating dual left turns in this approach. Therefore, the lane geometry of the southbound approach is changed to a shared thru/right-turn lane, a thru lane, and dual left-turn lanes.
- Changing the northbound left from protected/permissive to protected-only. This had to be done because the dual southbound left-turn lanes would most likely block the line of sight of the left turning vehicles in the northbound approach for them to complete the movement in a safe manner during the permissive phase.
- For the AM peak hour, the westbound left turn was changed from permissive-only to protected/permissive. For the PM peak hour, the eastbound left turn was changed from permissive-only to protected/permissive.
- Existing cycle length was maintained for the intersection, but the phase split times were optimized to accommodate the new configuration.

4.3 Transportation System Management and Operations (TSM&O) #2 Alternative

TSM&O #2 Alternative includes the following changes at the signalized intersection of LeJeune Road and SW 8th Street:

- Adding an additional left-turn lane in the southbound direction thereby creating dual left turns in this approach. Therefore, the lane geometry of the southbound approach is changed to a shared thru/right-turn lane, a thru lane, and dual left-turn lanes.

- Changing the northbound left from protected/permissive to protected-only. This had to be done because the dual southbound left-turn lanes would most likely block the line of sight of the left turning vehicles in the northbound approach for them to complete the movement in a safe manner during the permissive phase.
- The operation of the eastbound and westbound approaches was changed to split phasing (one approach at a time).
- Existing cycle length was maintained for the intersection, but the phase split times were optimized to accommodate the new configuration.

4.4 Alternative I

Alternative I consists in redirecting eastbound drivers seeking to go northbound on LeJeune Road from SW 8th Street. These drivers would go through the current intersection and make a right turn onto SW 40th Avenue, a right turn on SW 9th Street and then turn right onto LeJeune Road to head north. Additionally, westbound drivers seeking to go southbound on LeJeune Road from SW 8th Street would go through the intersection and make a right turn onto SW 43rd Avenue, a right turn on SW 7th Street and then a right turn on LeJeune Road to head south. Alternative I is illustrated in **Figure 4-1**. The elimination of the eastbound and westbound left-turn lanes allows the addition of a right-turn lane in the westbound approach. **Figure 4-1** also illustrates how each diverted vehicle passes the intersection of LeJeune Road and SW 8th Street twice. Alternative I also includes adding an additional left-turn lane in the southbound direction creating dual left turns in this approach. Therefore, the lane geometry of the southbound approach changes to a shared thru/right-turn lane, a thru lane, and dual left-turn lanes. Additionally, in order to modify the existing lane assignment in the westbound approach to two thru lanes and a right-turn lane, the two-way left-turn lane east of the intersection would be eliminated to allow the necessary transition, thereby restricting the side street access to right-turn only, namely SW 40th Avenue and Salzedo Street/SW 39th Court (see Appendix 5-IV).

The following benefits and disadvantages have been identified with the implementation of Alternative I:

Benefits:

- Elimination of eastbound and westbound left-turn movements at intersection through provision of right-turn movements
- Elimination of eastbound/westbound left-turn signal timing phase, which increases the green time allocation for thru movements/pedestrian crossings

Disadvantages:

- Increase in travel distance for eastbound and westbound left-turn movements
- Passing through intersection twice

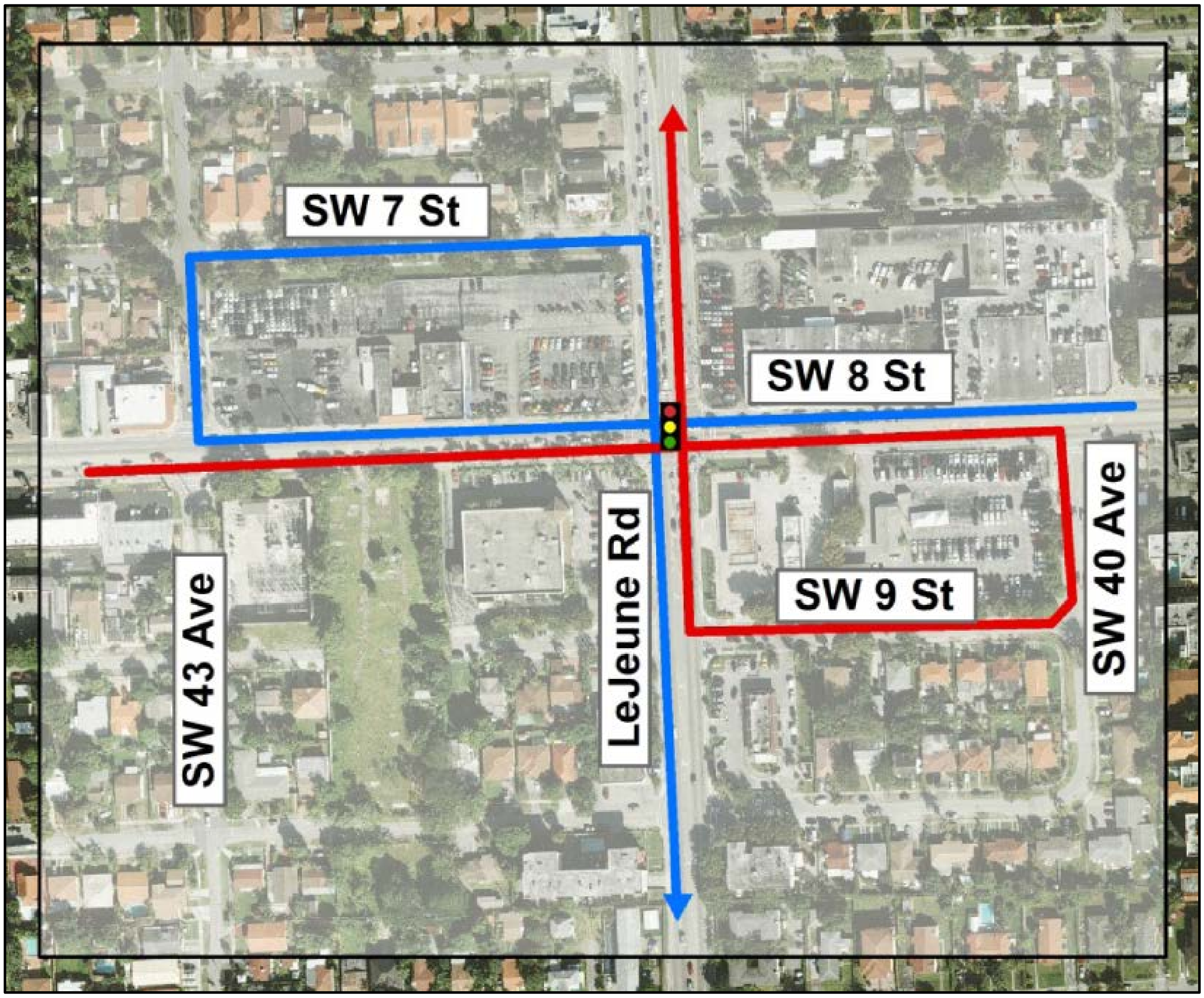

Figure 4-1: Alternative I

4.5 Alternative II

Alternative II consists in redirecting southbound drivers seeking to go eastbound on SW 8th Street from LeJeune Road. These drivers would have to make a right turn at SW 7th Street, a left turn on SW 43rd Avenue and then a left turn on SW 8th Street. Additionally, northbound drivers seeking to go westbound on SW 8th Street from LeJeune Road would have to make a right turn at SW 9th Street and, a left turn onto SW 40th Avenue and a left turn on SW 8th Street. New traffic signals would need to be installed at the intersections of SW 8th Street and SW 43rd Avenue, and SW 8th Street and SW 40th Avenue. Alternative II is illustrated in **Figure 4-2**.

To accomplish these changes in the most effective and safe manner, and considering the volumes that would be rerouted to roadways with lower capacity, it is recommended to change the segment of SW 43rd Avenue between SW 7th Street and SW 8th Street to a one-way road in the southbound direction. Moreover, due to the level of service (LOS) results obtained during the operational analysis, the intersection of SW 7th Street and SW 43rd Avenue should be changed from a two-way stop-controlled (TWSC) to an all-way stop-controlled (AWSC) intersection.

The following benefit and disadvantages have been identified with the implementation of Alternative II:

<u>Benefit:</u> Elimination of northbound/southbound left-turn signal timing phase, which increases the green time allocation for thru movements/pedestrian crossings

<u>Disadvantages:</u>

- Increase in travel distance for northbound and southbound left-turn movements
- Two additional traffic signals adjacent to the study intersection along SW 8th Street

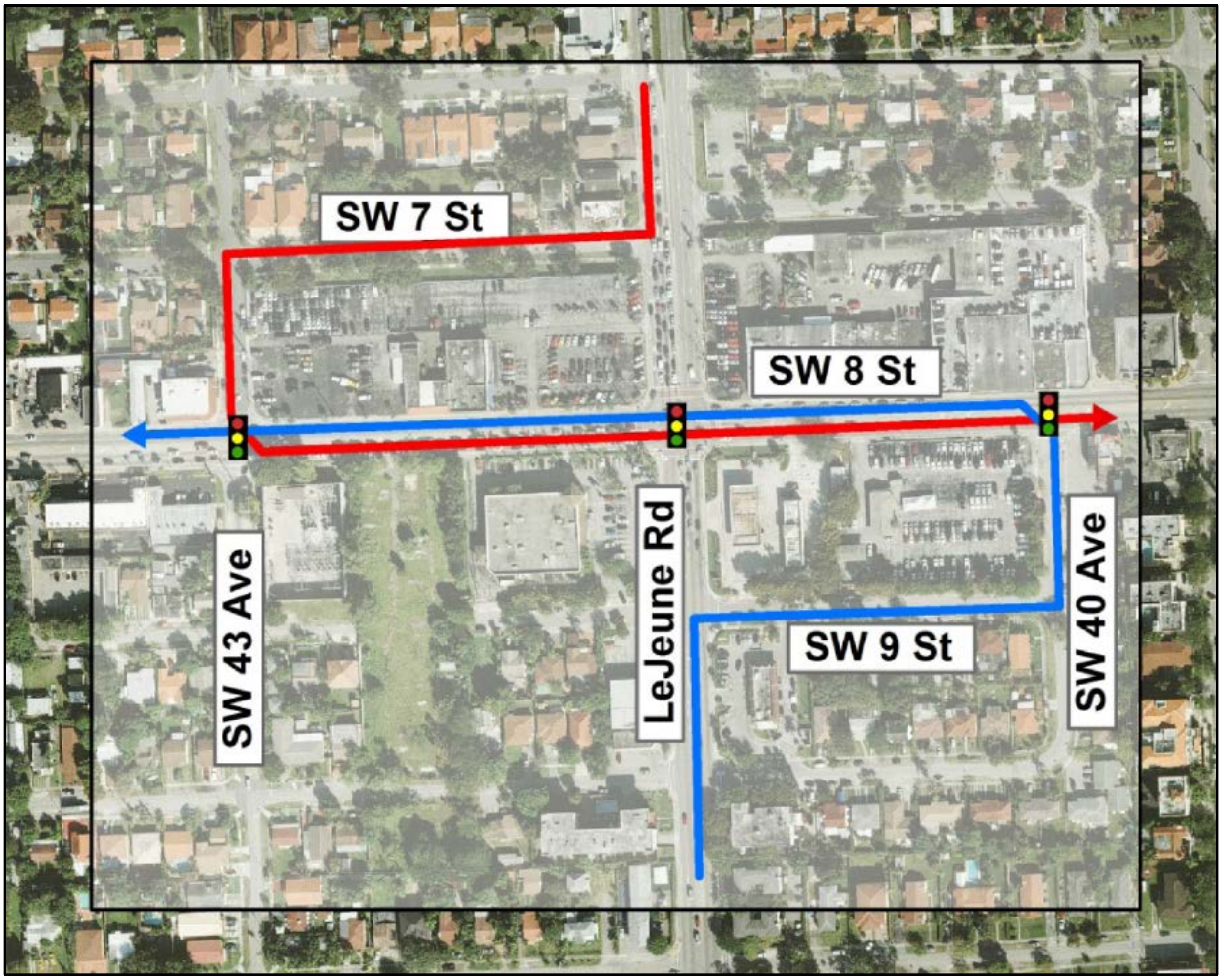

Figure 4-2: Alternative II

4.6 Alternative III (Grade Separation)

This alternative consists of elevating SW 8th Street over LeJeune Road. The criterion used to develop this concept was to use the minimum acceptable design standards in order to reduce the footprint of the concept and, therefore, reduce the ROW that will be required. The overpass lane configuration consists of two lanes for both the westbound and eastbound directions.

One of the restrictions with this alternative is the close proximity of adjacent signals along SW 8th Street, namely at Ponce De Leon Boulevard approximately 1,380 feet to the east of LeJeune Road. In using a minimum acceptable slope of the overpass, the ultimate allowable height of the overpass does not allow for a bridge structure with at-grade lanes underneath. Therefore, Mechanically Stabilized Earth (MSE) Walls are to be constructed to support the overpass with the at-grade lanes adjacent to the walls.

The additional ROW needed to implement this concept is approximately 260,500 square feet (SF). The Grade Separation concept is shown in **Figures 4-3 thru 4-5**.

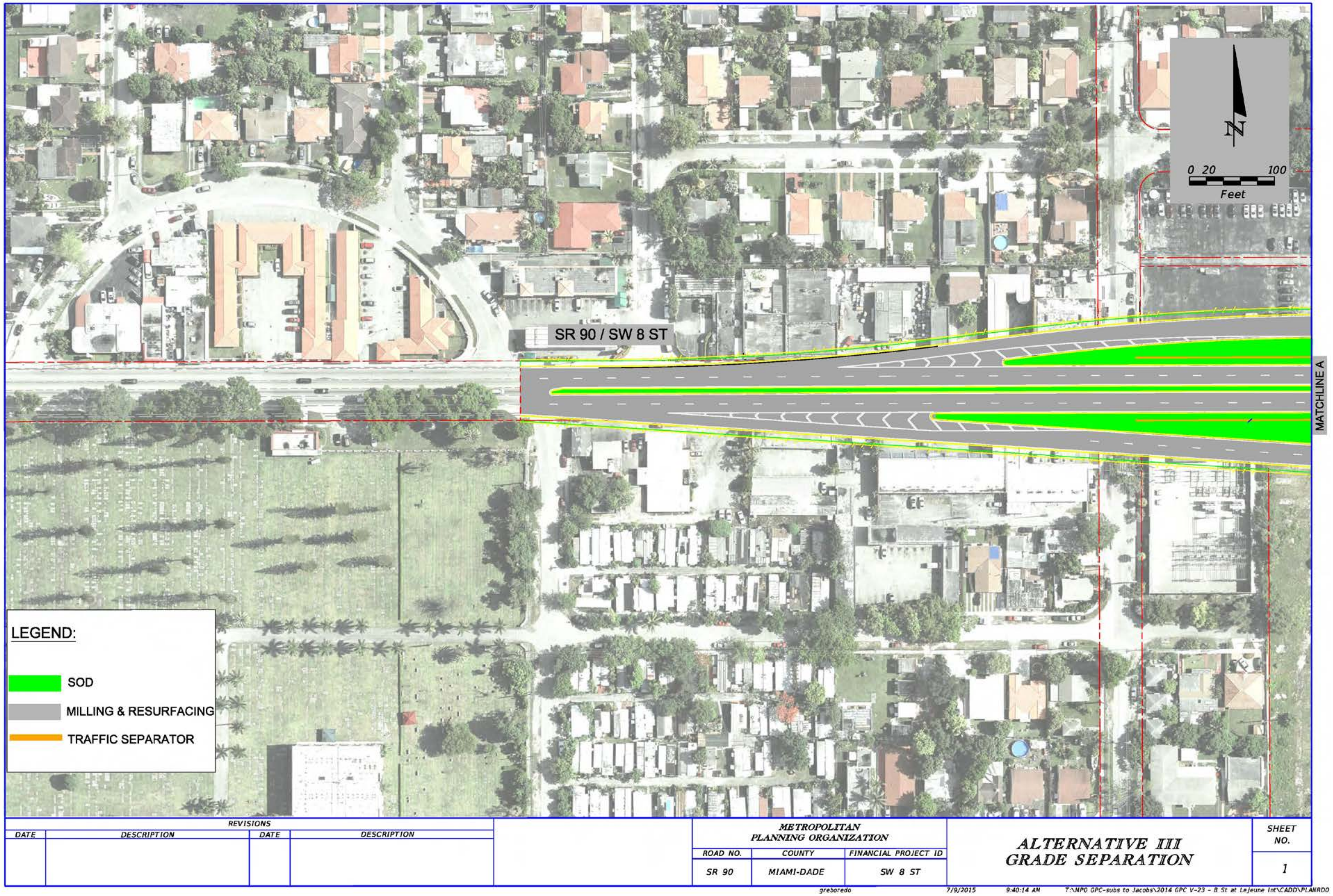

Figure 4-3: Alternative III - Sheet 1 of 3

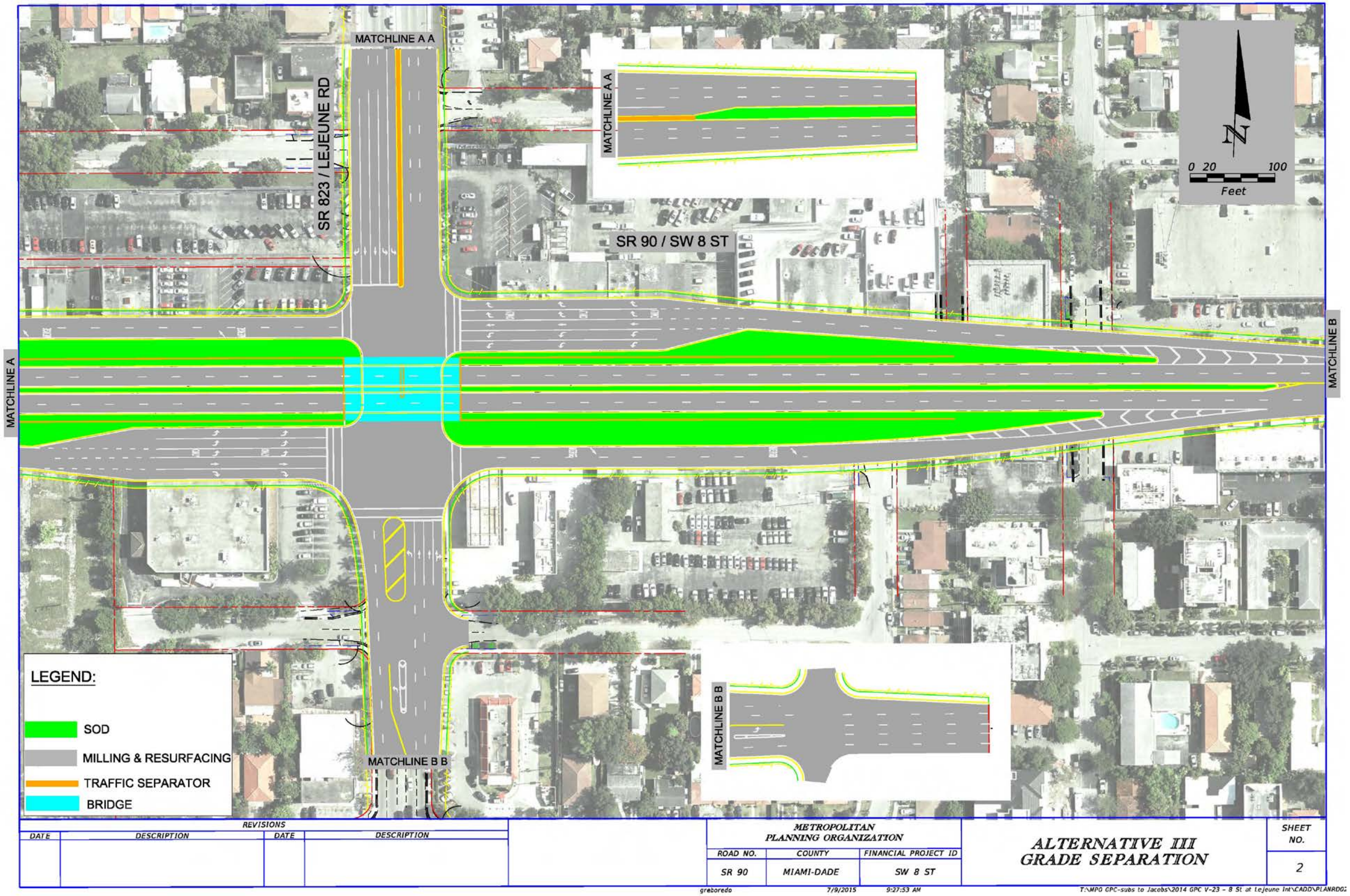

Figure 4-4: Alternative III - Sheet 2 of 3

Figure 4-5: Alternative III - Sheet 3 of 3

Chapter 5 Future Year Operational Analysis

This chapter presents the operational results of the previously described alternatives. Opening Year (2020) and Design Year (2040) horizons were analyzed for each alternative.

5.1 No Build Alternative

This alternative represents the baseline used to compare the results of the proposed alternatives. The operational analysis consisted of the calculation of the LOS of the intersection under study and the other key intersections within the study area. To this end, the forecasted volumes for each horizon (2020 and 2040) were used. For the signalized intersection, the same signal timings as the existing conditions were kept. The rest of the intersections are unsignalized (stop-controlled). Since the LOS score range criteria from HCM 2010 differs for the two types of control (signalized and unsignalized), the results are shown separately.

Tables 5-1 and 5-2 summarize the LOS results for the LeJeune Road and SW 8th Street signalized intersection, for years 2020 and 2040, respectively.

Table 5-1: Year 2020 - No Build Alternative – Signalized Intersection LOS

No Build Alternative - Year 2020 Signalized Intersection Level of Service									
Intersection	Approach	AM Peak Hour				PM Peak Hour			
		Control Delay (sec/veh)		Level of Service		Control Delay (sec/veh)		Level of Service	
LeJeune Rd & SW 8th St	Eastbound	101.5	104.3	F	F	154.0	118.8	F	F
	Westbound	114.8		F		144.8		F	
	Northbound	107.3		F		84.3		F	
	Southbound	98.7		F		99.4		F	

Source: Synchro 8 HCM 2010 Reports.

Table 5-2: Year 2040 - No Build Alternative – Signalized Intersection LOS

No Build Alternative - Year 2040 Signalized Intersection Level of Service									
Intersection	Approach	AM Peak Hour				PM Peak Hour			
		Control Delay (sec/veh)		Level of Service		Control Delay (sec/veh)		Level of Service	
LeJeune Rd & SW 8th St	Eastbound	262.7	277.9	F	F	650.8	400.1	F	F
	Westbound	365.5		F		251.4		F	
	Northbound	213.1		F		330.3		F	
	Southbound	282.3		F		400.4		F	

Source: Synchro 8 HCM 2010 Reports.

As expected, the operation of the signalized intersection of LeJeune Road and SW 8th Street is expected to significantly deteriorate in the future with the projected traffic volume growth in the area and maintaining the existing operational conditions. It should also be noted that the failing threshold for LOS F in the case of signal-controlled intersections is 80 sec/vehicle of delay, which means that by 2020 the delay is expected to be 49% larger than the failing delay, and by 2040, this excess will be 400%.

Tables 5-3 and 5-4 show the control delay, V/C (Volume-over-Capacity) ratio and LOS at the unsignalized (stop-controlled) intersections, for the No Build Alternative for years 2020 and 2040, respectively.

The results included in **Tables 5-3 and 5-4** indicate that the operations of the stop-controlled intersections are expected to worsen in the future with the projected traffic, especially for vehicles from the side streets south of LeJeune Road and SW 8th Street wanting to cross LeJeune Road, and for vehicles wanting to cross SW 8th Street east and west of the LeJeune Road and SW 8th Street intersection. As traffic along LeJeune Road and SW 8th Street grows, the number of available gaps in the traffic stream diminishes considerably, and vehicles on the side streets must wait longer to cross it and/or merge onto it, thereby experiencing higher delays.

The results for the No Build Alternative are included in Appendix 5-I.

Table 5-3: Year 2020 - No Build Alternative – Stop-Controlled Intersections LOS

No Build Alternative - Year 2020 Stop-Controlled Intersection Level of Service									
Intersection	Approach/ Movement	AM Peak Hour				PM Peak Hour			
		Control Delay (sec/veh)	V/C Ratio	LOS		Control Delay (sec/veh)	V/C Ratio	LOS	
LeJeune Rd & SW 7th St (1)*	Eastbound	13.0	0.04	B	-	12.0	0.02	B	-
	Westbound	10.8	0.03	B		10.6	0.05	B	
	-	-	-	-		-	-	-	
	-	-	-	-		-	-	-	
LeJeune Rd & SW 9th St (1)	Eastbound	**103.0**	0.68	**F**	-	35.8	0.42	E	-
	Westbound	**147.2**	0.86	**F**		22.1	0.20	C	
	Northbound Left	16.0	0.03	C		13.3	0.02	B	
	Southbound Left	15.1	0.13	C		13.6	0.07	B	
LeJeune Rd & SW 9th Ter (1)	Eastbound	**230.6**	**1.16**	**F**	-	44.6	0.42	**E**	-
	Westbound	**269.8**	0.96	**F**		**56.7**	0.38	**F**	
	Northbound Left	15.6	0.03	C		13.6	0.05	B	
	Southbound Left	14.8	0.10	B		13.5	0.05	B	
SW 7th St & SW 43 Ave (1)	Eastbound	9.5	0.04	A	-	9.8	0.04	A	-
	Westbound	9.5	0.04	A		10.0	0.06	B	
	Northbound Left	7.4	0.01	A		7.4	0.01	A	
	Southbound Left	7.3	0.01	A		0.0	0.00	A	
SW 8th St & SW 43 Ave (1)	Eastbound Left	11.8	0.04	B	-	15.6	0.16	C	-
	Westbound Left	13.7	0.07	B		13.0	0.07	B	
	Northbound	**502.2**	**1.49**	**F**		**96.0**	0.70	**F**	
	Southbound	**93.0**	0.69	**F**		**56.9**	0.63	**F**	
SW 9th Ter & SW 43 Ave (2)	Eastbound	7.6	0.09	A	-	7.4	0.04	A	-
	Westbound	7.5	0.03	A		7.5	0.06	A	
	Northbound	7.4	0.06	A		7.5	0.10	A	
	Southbound	7.7	0.10	A		7.7	0.10	A	
SW 8th St & SW 40 Ave (1)	-	-	-	-	-	-	-	-	-
	Westbound Left	15.1	0.06	C		13.9	0.05	B	
	Northbound	23.4	0.37	C		**57.1**	0.56	**F**	
	-	-	-	-		-	-	-	
SW 9th St & SW 40 Ave (1)	Eastbound	9.2	0.10	A	-	8.9	0.04	A	-
	-	-	-	-		-	-	-	
	Northbound Left	7.3	0.01	A		7.3	0.01	A	
	-	-	-	-		-	-	-	

Source: Synchro 8 HCM 2010 Reports
(1) HCM 2000 TWSC (Two-Way Stop-Controlled) Intersection Results*
(1) HCM 2010 TWSC (Two-Way Stop-Controlled) Intersection Results
(2) HCM 2010 AWSC (All-Way Stop-Controlled) Intersection Results

Table 5-4: Year 2040 - No Build Alternative – Stop-Controlled Intersections LOS

No Build Alternative - Year 2040 Stop-Controlled Intersection Level of Service									
Intersection	Approach/ Movement	AM Peak Hour				PM Peak Hour			
		Control Delay (sec/veh)	V/C Ratio	LOS		Control Delay (sec/veh)	V/C Ratio	LOS	
LeJeune Rd & SW 7th St (1)*	Eastbound	14.5	0.05	B	-	15.1	0.06	C	-
	Westbound	10.8	0.03	B		10.6	0.05	B	
	-	-	-	-		-	-	-	
	-	-	-	-		-	-	-	
LeJeune Rd & SW 9th St (1)	Eastbound	**1357.2**	**3.13**	**F**	-	**278.7**	**1.21**	**F**	-
	Westbound	**3368.3**	**7.21**	**F**		**220.1**	0.99	**F**	
	Northbound Left	18.4	0.04	C		17.7	0.07	C	
	Southbound Left	23.6	0.25	C		21.6	0.16	C	
LeJeune Rd & SW 9th Ter (1)	Eastbound	**1566.9**	**3.82**	**F**	-	**412.1**	**1.45**	**F**	-
	Westbound	*	*	*		**892.5**	**2.19**	**F**	
	Northbound Left	17.8	0.04	C		17.8	0.07	C	
	Southbound Left	23.6	0.18	C		20.7	0.08	C	
SW 7th St & SW 43 Ave (1)	Eastbound	9.6	0.04	A	-	9.8	0.04	A	-
	Westbound	9.6	0.04	A		10.0	0.06	B	
	Northbound Left	7.4	0.01	A		7.4	0.01	A	
	Southbound Left	7.3	0.01	A		0.0	0.00	A	
SW 8th St & SW 43 Ave (1)	Eastbound Left	16.6	0.09	C	-	18.5	0.19	C	-
	Westbound Left	21.1	0.12	C		18.6	0.11	C	
	Northbound	*	*	*		**755.7**	**2.11**	**F**	
	Southbound	*	*	*		**358.4**	**1.44**	**F**	
SW 9th Ter & SW 43 Ave (2)	Eastbound	7.7	0.09	A	-	7.4	0.04	A	-
	Westbound	7.6	0.04	A		7.5	0.06	A	
	Northbound	7.5	0.07	A		7.5	0.10	A	
	Southbound	7.8	0.11	A		7.7	0.10	A	
SW 8th St & SW 40 Ave (1)	-	-	-	-	-	-	-	-	-
	Westbound Left	29.5	0.18	D		21.0	0.08	C	
	Northbound	**76.5**	0.77	**F**		**700.0**	**2.04**	**F**	
	-	-	-	-		-	-	-	
SW 9th St & SW 40 Ave (1)	Eastbound	9.4	0.10	A	-	9.0	0.04	A	-
	-	-	-	-		-	-	-	
	Northbound Left	7.3	0.01	A		7.3	0.01	A	
	-	-	-	-		-	-	-	

Source: Synchro 8 HCM 2010 Reports
(1) HCM 2000 TWSC (Two-Way Stop-Controlled) Intersection Results*
(1) HCM 2010 TWSC (Two-Way Stop-Controlled) Intersection Results
(2) HCM 2010 AWSC (All-Way Stop-Controlled) Intersection Results

5.2 TSM&O Alternative #1

As previously described, this alternative maximizes the improvements that can be done at the study intersection without re-routing of traffic or ROW acquisition. The left-turn movements operating as permitted-only during the peak hours were changed to protected/permitted operation to create safer operations for those movements, based on the number of reported crashes and the near-misses and risky maneuvers observed during field visits to the site. Due to the long cycle lengths (180 seconds) anticipated to remain during the AM and PM peak hours, the pedestrian crossing times were able to be maintained.

Table 5-5 includes the LOS results for year 2020 for the LeJeune Road and SW 8th Street signalized intersection, and **Table 5-6** shows the results for year 2040.

Table 5-5: Year 2020 – TSM&O #1 Signalized Intersection LOS

TSM&O #1 Alternative - Year 2020 Signalized Intersection Level of Service									
Intersection	Approach	AM Peak Hour				PM Peak Hour			
		Control Delay (sec/veh)		Level of Service		Control Delay (sec/veh)		Level of Service	
LeJeune Rd & SW 8th St	Eastbound	167.2	117.5	F	F	90.3	136.4	F	F
	Westbound	117.0		F		229.5		F	
	Northbound	84.1		F		88.6		F	
	Southbound	108.4		F		128.6		F	

Source: Synchro 8 HCM 2010 Reports.

Table 5-6: Year 2040 – TSM&O #1 Signalized Intersection LOS

TSM&O #1 Alternative - Year 2040 Signalized Intersection Level of Service									
Intersection	Approach	AM Peak Hour				PM Peak Hour			
		Control Delay (sec/veh)		Level of Service		Control Delay (sec/veh)		Level of Service	
LeJeune Rd & SW 8th St	Eastbound	249.4	271.2	F	F	188.1	299.5	F	F
	Westbound	332.2		F		421.6		F	
	Northbound	303.7		F		313.1		F	
	Southbound	220.8		F		269.5		F	

Source: Synchro 8 HCM 2010 Reports.

Comparing TSM&O #1 Alternative to the No Build Alternative, though with slightly less overall delay, TSM&O #1 still shows about the same level of operational failure for 2020 and 2040 as the No Build. Moreover, for some approaches the delay is actually higher. This is the result of adding green time to the left-turn movements previously operating as permitted-only to operate with a protected phase; which means that less green time is available for the opposing thru movement. Although operationally counterintuitive, this change is expected to have a much needed positive impact on the safety of the intersection.

Furthermore, considering that phases were added, the intersection still operates at the same level of overall delay as the No Build conditions, but is expected to improve safety.

The results for the stop-controlled intersections under the TSM&O #1 Alternative remain the same as the results shown in Tables 17 and 18 for the No-Build Alternative therefore, they are omitted in this section. The detailed results of the analysis of the TSM&O #1 Alternative are included in Appendix 5-II.

5.3 TSM&O Alternative #2

The TSM&O #2 Alternative includes geometric improvements to the signalized intersection in addition to the split of the eastbound and westbound phases, so these approaches go one at the time. For consistency with the rest of the signal grid, the cycle length was kept at 180 seconds as in the existing conditions, and pedestrian crossing times were maintained.

Tables 5-7 and 5-8 include the LOS results for the LeJeune Road and SW 8th Street signalized intersection for years 2020 and 2040, respectively.

Table 5-7: Year 2020 – TSM&O #2 Signalized Intersection LOS

TSM&O #2 Alternative - Year 2020 Signalized Intersection Level of Service									
Intersection	Approach	AM Peak Hour				PM Peak Hour			
		Control Delay (sec/veh)		Level of Service		Control Delay (sec/veh)		Level of Service	
LeJeune Rd & SW 8th St	Eastbound	276.1	246.4	F	F	238.0	275.4	F	F
	Westbound	277.0		F		366.5		F	
	Northbound	186.6		F		220.4		F	
	Southbound	254.9		F		269.1		F	

Source: Synchro 8 HCM 2010 Reports.

Table 5-8: Year 2040 – TSM&O #2 Signalized Intersection LOS

TSM&O #2 Alternative - Year 2040 Signalized Intersection Level of Service									
Intersection	Approach	AM Peak Hour				PM Peak Hour			
		Control Delay (sec/veh)		Level of Service		Control Delay (sec/veh)		Level of Service	
LeJeune Rd & SW 8th St	Eastbound	475.6	452.1	F	F	389.1	480.1	F	F
	Westbound	513.7		F		575.4		F	
	Northbound	466.0		F		476.1		F	
	Southbound	380.2		F		471.4		F	

Source: Synchro 8 HCM 2010 Reports.

The splitting of the eastbound and westbound phases, while inherently safer, is expected to significantly degrade the intersection overall delay, when compared with the No Build Alternative, as shown in the previous tables. Even though the results from the operational analysis for both TSM&O alternatives resulted in a LOS of F for both of the future years, TSM&O #1 has less delay than TSM&O #2.

The results for the stop-controlled intersections under the TSMO #2 Alternative remain the same as shown in Tables 17 and 18 for the No-Build Alternative, and therefore are omitted in this section. The detailed results for the analysis of the TSM&O #2 Alternative are included in Appendix 5-III.

5.4 Alternative I

Alternative I includes primarily the re-routing of the eastbound and westbound left-turn movements at LeJeune Road and SW 8th Street along with other geometric improvements at the signalized intersection (see Appendix 5-IV). The re-routing of these left-turn movements create differences in the thru and turning movement volumes at neighboring intersections. The signal timing on LeJeune and SW 8th Street was optimized to account for the diverted volumes taking in to consideration the coordination with other intersections as well as maintaining pedestrian crossing times. Appendix 5-IV includes the balanced and rounded turning volumes for this alternative, for both AM and PM peak hours in the years 2020 and 2040.

Tables 5-9 and 5-10 summarize the HCM 2010 delays and LOS reported by Synchro 8 for the signalized intersection for years 2020 and 2040, respectively. **Table 5-11** shows the control delay, V/C ratio and LOS for the affected stop-controlled intersections in year 2020, and similarly, **Table 5-12** includes these results for year 2040.

Table 5-9: Year 2020 - Alternative I - Signalized Intersection LOS

Alternative I: Year 2020 Signalized Intersection Level of Service									
Intersection	Approach	AM Peak Hour				PM Peak Hour			
		Control Delay (sec/veh)		Level of Service		Control Delay (sec/veh)		Level of Service	
LeJeune Rd & SW 8th St	Eastbound	137.0	113.6	F	F	82.9	105.6	F	F
	Westbound	91.6		F		188.0		F	
	Northbound	85.8		F		62.6		E	
	Southbound	130.7		F		88.4		F	

Source: Synchro 8 HCM 2010 Reports.

Table 5-10: Year 2040 - Alternative I - Signalized Intersection LOS

Alternative I: Year 2040 Signalized Intersection Level of Service									
Intersection	Approach	AM Peak Hour				PM Peak Hour			
		Control Delay (sec/veh)		Level of Service		Control Delay (sec/veh)		Level of Service	
LeJeune Rd & SW 8th St	Eastbound	328.2	262.6	F	F	300.5	238.1	F	F
	Westbound	220.3		F		231.7		F	
	Northbound	300.9		F		271.6		F	
	Southbound	206.9		F		171.3		F	

Source: Synchro 8 HCM 2010 Reports.

The signalized intersection of LeJeune Road and SW 8th Street is expected to still operate at LOS F in both future horizons (2020 and 2040); however—and similarly to TSM&O #1—Alternative I offers important benefits over the No Build Alternative in the safety aspect of the intersection's performance, which translate into subtle but still noticeable operational improvements. Specifically, by re-routing the eastbound and westbound left-turns, the protected left-turn phasing for these movements becomes unnecessary thereby enabling the allocation of more green time for the thru movement. Moreover, one approach is even expected to operate at LOS E in year 2020.

Table 5-11: Year 2020 – Alternative I – Stop-Controlled Intersection LOS

Alternative I: Year 2020 Stop-Controlled Intersection Level of Service										
Intersection	Approach/ Movement	AM Peak Hour				PM Peak Hour				
		Control Delay (sec/veh)	V/C Ratio	LOS		Control Delay (sec/veh)	V/C Ratio	LOS		
LeJeune Rd & SW 7th St (1)*	Eastbound	13.9	0.14	B	-	13.4	0.18	B	-	
	Westbound	10.9	0.03	B		10.8	0.05	B		
	-	-	-	-		-	-	-		
	-	-	-	-		-	-	-		
LeJeune Rd & SW 9th St (1)	Eastbound	**154.8**	0.83	**F**	-	39.5	0.45	E	-	
	Westbound	**181.8**	**1.23**	**F**		19.5	0.40	C		
	Northbound Left	16.0	0.03	C		13.3	0.02	B		
	Southbound Left	15.1	0.13	C		13.6	0.07	B		
LeJeune Rd & SW 9th Ter (1)	Eastbound	**230.6**	**1.16**	**F**	-	44.6	0.42	E	-	
	Westbound	**269.8**	0.96	**F**		**56.7**	0.38	**F**		
	Northbound Left	15.6	0.03	C		13.6	0.05	B		
	Southbound Left	14.8	0.10	B		13.5	0.05	B		
SW 7th St & SW 43 Ave (1)	Eastbound	9.6	0.04	A	-	10.1	0.43	B	-	
	Westbound	9.6	0.04	A		10.4	0.06	B		
	Northbound Left	7.4	0.01	A		7.4	0.01	A		
	Southbound Left	7.4	0.01	A		0.0	0.00	A		
SW 8th St & SW 43 Ave (1)	Eastbound Left	12.2	0.04	B	-	16.8	0.17	C	-	
	Westbound Left	13.7	0.07	B		13.0	0.07	B		
	Northbound	**526.0**	**1.53**	**F**		**110.6**	0.75	**F**		
	Southbound	**106.8**	0.74	**F**		**64.4**	0.67	**F**		
SW 9th Ter & SW 43 Ave (2)	Eastbound	7.6	0.09	A	-	7.4	0.04	A	-	
	Westbound	7.5	0.03	A		7.5	0.06	A		
	Northbound	7.4	0.06	A		7.5	0.10	A		
	Southbound	7.7	0.10	A		7.7	0.10	A		
SW 8th St & SW 40 Ave (1)	-	-	-	-	-	-	-	-	-	
	Westbound Left	17.0	0.07	C		14.8	0.05	B		
	Northbound	28.1	0.43	D		**65.9**	0.61	**F**		
	-	-	-	-		-	-	-		
SW 9th St & SW 40 Ave (1)	Eastbound	9.9	0.12	A	-	9.2	0.05	A	-	
	-	-	-	-		-	-	-		
	Northbound Left	7.7	0.01	A		7.5	0.01	A		
	-	-	-	-		-	-	-		

Source: Synchro 8 HCM Reports.
(1) HCM 2000 TWSC (Two-Way Stop-Controlled) Intersection Results*
(1) HCM 2010 TWSC (Two-Way Stop-Controlled) Intersection Results
(2) HCM 2010 AWSC (All-Way Stop-Controlled) Intersection Results

** Due to limitations with the reporting of results with the Synchro software, the results were unable to be reported for the approach due to the extremely high delay associated with the opposing approach. These approaches are expected to be LOS F.*

Table 5-12: Year 2040 - Alternative I – Stop-Controlled Intersection LOS

Alternative I: Year 2040 Stop-Controlled Intersection Level of Service									
Intersection	Approach/ Movement	AM Peak Hour				PM Peak Hour			
		Control Delay (sec/veh)	V/C Ratio	LOS		Control Delay (sec/veh)	V/C Ratio	LOS	
LeJeune Rd & SW 7th St (1)*	Eastbound	17.6	0.29	C	-	19.8	0.36	C	-
	Westbound	11.4	0.04	B		15.8	0.09	C	
	-	-	-	-		-	-	-	
	-	-	-	-		-	-	-	
LeJeune Rd & SW 9th St (1)	Eastbound	6590.5	12.50	F	-	1034.6	2.69	F	-
	Westbound	3380.6	8.17	F		392.1	1.74	F	
	Northbound Left	18.4	0.04	C		17.7	0.07	C	
	Southbound Left	23.6	0.25	C		21.6	0.16	C	
LeJeune Rd & SW 9th Ter (1)	Eastbound	1566.9	3.82	F	-	412.1	1.45	F	-
	Westbound	*	*	*		892.5	2.19	F	
	Northbound Left	17.8	0.04	C		17.8	0.07	C	
	Southbound Left	23.6	0.18	C		20.7	0.08	C	
SW 7th St & SW 43 Ave (1)	Eastbound	9.9	0.04	A	-	10.3	0.04	B	-
	Westbound	9.9	0.04	A		10.5	0.06	B	
	Northbound Left	7.4	0.01	A		7.4	0.01	A	
	Southbound Left	7.5	0.01	A		0.0	0.00	A	
SW 8th St & SW 43 Ave (1)	Eastbound Left	17.6	0.10	C	-	20.4	0.21	C	-
	Westbound Left	21.1	0.12	C		18.6	0.11	C	
	Northbound	*	*	*		1036.4	2.63	F	
	Southbound	*	*	*		510.7	1.75	F	
SW 9th Ter & SW 43 Ave (2)	Eastbound	7.7	0.09	A	-	7.4	0.04	A	-
	Westbound	7.6	0.04	A		7.5	0.06	A	
	Northbound	7.5	0.07	A		7.5	0.10	A	
	Southbound	7.8	0.11	A		7.7	0.10	A	
SW 8th St & SW 40 Ave (1)	-	-	-	-	-	-	-	-	-
	Westbound Left	40.2	0.24	E		26.7	0.11	D	
	Northbound	139.2	0.98	F		1217.0	3.02	F	
	-	-	-	-		-	-	-	
SW 9th St & SW 40 Ave (1)	Eastbound	10.6	0.13	B	-	9.9	0.05	A	-
	-	-	-	-		-	-	-	
	Northbound Left	8.0	0.01	A		8.0	0.01	A	
	-	-	-	-		-	-	-	

Source: Synchro 8 HCM Reports.
(1) HCM 2000 TWSC (Two-Way Stop-Controlled) Intersection Results*
(1) HCM 2010 TWSC (Two-Way Stop-Controlled) Intersection Results
(2) HCM 2010 AWSC (All-Way Stop-Controlled) Intersection Results

** Due to limitations with the reporting of results with the Synchro software, the results were unable to be reported for the approach due to the extremely high delay associated with the opposing approach. These approaches are expected to be LOS F.*

The control delay for the stop-controlled intersections, on the other hand, shows some increase by year 2020, and significant increase by 2040 when compared to the No Build Alternative. This is expected because with this alternative, additional vehicles re-routed to the side streets would be waiting for gaps to cross either LeJeune Road or SW 8th Street in a higher flow of traffic, thereby creating additional delay for these minor movements.

The detailed results of the operational analysis of Alternative I are included in Appendix 5-IV.

5.5 Alternative II

Alternative II includes primarily the re-routing of the northbound and southbound left-turn movements at LeJeune Road and SW 8th Street. The re-routing of these left-turn movements adds traffic in the thru and turning movements of some neighboring intersections. Appendix 5-V includes the balanced and rounded turning volumes for this alternative, for AM and PM peak hours in the years 2020 and 2040.

As a result of the traffic re-routed with Alternative II, new traffic signals will be required at the intersections of SW 8th Street and SW 43rd Avenue, and SW 8th Street and SW 40th Avenue. Also, the segment of SW 43rd Avenue between SW 7th Street and SW 8th Street is proposed to be changed to a one-way road in the southbound direction. The signal timings for these intersections were developed with consideration of pedestrian crossing times to the extent possible. Crosswalks could be implemented on the west leg of the intersection of SW 8th Street and SW 43rd Avenue and on the east leg of the SW 8th Street and SW 40th Avenue intersection.

Due to limitations of the methodology and the configuration of these new signalized intersections, the HCM 2010 methodology could not be applied to report the LOS. Therefore, the HCM 2000 report from Synchro was used instead for the new signalized intersections.

Table 5-13 shows the HCM 2010 delays and LOS produced by Synchro 8 for SW 8th Street and LeJeune Road, and the respective HCM 2000 results for the two proposed signalized intersections for year 2020. Likewise, **Table 5-14** includes the same results for the year 2040.

Tables 5-15 and 5-16 summarize the control delay, V/C ratio and LOS for the stop-controlled intersections for Alternative II for years 2020 and 2040, respectively.

It should be noted that in the first iteration of the analysis, the intersection of SW 7th Street and SW 43rd Avenue was maintained as a two-way stop-controlled intersection, as it currently operates (TWSC). However, it was found that with this configuration there were significant delays both in 2020 and 2040. Therefore, it was determined that an all-way-stop-control (AWSC) was required at this location to reduce the delays, and improve the intersection operations as well as safety.

Table 5-13: Year 2020 - Alternative II - Signalized Intersection LOS

Alternative II: Year 2020 Signalized Intersection Level of Service									
Intersection	Approach	AM Peak Hour				PM Peak Hour			
		Control Delay (sec/veh)		Level of Service		Control Delay (sec/veh)		Level of Service	
LeJeune Rd & SW 8th St	Eastbound	**107.0**	73.9	**F**	E	31.6	**80.6**	C	**F**
	Westbound	52.1		D		**169.6**		**F**	
	Northbound	59.5		E		60.6		E	
	Southbound	67.7		E		50.6		D	
SW 8th St & SW 43 Ave (1)	Eastbound	10.7	12.4	B	B	10.8	15.2	B	B
	Westbound	5.3		A		12.0		B	
	Northbound	41.3		D		40.5		D	
	Southbound	40.0		D		40.7		D	
SW 8th St & SW 40 Ave (1)	Eastbound	9.0	9.8	A	A	3.9	6.4	A	A
	Westbound	5.1		A		5.0		A	
	Northbound	40.8		D		40.1		D	
	-	-		-		-		-	

(1) Calculations based on HCM 2000 reports due to limitations of the HCM 2010 methodology

Source: Synchro 8 HCM 2010 Reports

Table 5-14: Year 2040 - Alternative II -Signalized Intersection LOS

Alternative II: Year 2040 Signalized Intersection Level of Service									
Intersection	Approach	AM Peak Hour				PM Peak Hour			
		Control Delay (sec/veh)		Level of Service		Control Delay (sec/veh)		Level of Service	
LeJeune Rd & SW 8th St	Eastbound	**318.4**	**213.3**	**F**	**F**	**230.0**	**212.9**	**F**	**F**
	Westbound	**265.1**		**F**		**294.0**		**F**	
	Northbound	**149.6**		**F**		**196.1**		**F**	
	Southbound	**84.9**		**F**		**114.6**		**F**	
SW 8th St & SW 43 Ave (1)	Eastbound	36.9	36.9	D	D	21.9	40.0	C	D
	Westbound	21.9		C		15.9		B	
	Northbound	41.3		D		41.4		D	
	Southbound	73.6		E		**140.0**		**F**	
SW 8th St & SW 40 Ave (1)	Eastbound	44.1	30.5	D	C	20.6	17.0	C	B
	Westbound	11.2		B		10.7		B	
	Northbound	40.5		D		43.2		D	
	-	-		-		-		-	

(1) Calculations based on HCM 2000 reports due to limitations of the HCM 2010 methodology

Source: Synchro 8 HCM 2010 Reports

Alternative II results in significant delay reduction when compared to the No Build Alternative for the intersection of LeJeune Road and SW 8th Street, with some of its approaches expected to operate at LOS C or D in year 2020.

Furthermore, the proposed new traffic signals are expected to operate at an acceptable LOS D or better by year 2040. These intersections were changed from stop-controlled operation under which they were projected to experience significant delays by 2020 and 2040.

Table 5-15: Year 2020 - Alternative II – Stop-Controlled Intersection LOS

Alternative II: Year 2020 Stop-Controlled Intersection Level of Service									
Intersection	Approach/ Movement	AM Peak Hour				PM Peak Hour			
		Control Delay (sec/veh)	V/C Ratio	LOS		Control Delay (sec/veh)	V/C Ratio	LOS	
LeJeune Rd & SW 7th St (1)	Eastbound	28.4	0.12	D	-	21.9	0.05	C	-
	Westbound	21.3	0.09	C		22.1	0.13	C	
	-	-	-	-		-	-	-	
	-	-	-	-		-	-	-	
LeJeune Rd & SW 9th St (1)	Eastbound	**98.8**	0.67	**F**	-	35.3	0.42	E	-
	Westbound	**130.4**	0.81	**F**		21.3	0.19	C	
	Northbound Left	16.0	0.03	C		13.3	0.02	B	
	Southbound Left	15.2	0.13	C		13.6	0.07	B	
LeJeune Rd & SW 9th Ter (1)	Eastbound	**230.6**	**1.16**	**F**	-	44.6	0.42	E	-
	Westbound	**269.8**	0.96	**F**		**56.7**	0.38	**F**	
	Northbound Left	15.6	0.03	C		13.6	0.05	B	
	Southbound Left	14.8	0.10	B		13.5	0.05	B	
SW 7th St & SW 43 Ave (2)	Eastbound	7.9	0.08	A	-	8.5	0.16	A	-
	Westbound	10.20	0.41	B		10.3	0.40	B	
	-	-	-	-		-	-	-	
	Southbound	8.30	0.10	A		8.4	0.10	A	
SW 8th St & SW 43 Ave (3)	-	-	-	-	-	-	-	-	-
	-	-	-	-		-	-	-	
	-	-	-	-		-	-	-	
	-	-	-	-		-	-	-	
SW 9th Ter & SW 43 Ave (2)	Eastbound	7.6	0.09	A	-	7.4	0.04	A	-
	Westbound	7.5	0.03	A		7.5	0.06	A	
	Northbound	7.4	0.06	A		7.5	0.10	A	
	Southbound	7.7	0.10	A		7.7	0.10	A	
SW 8th St & SW 40 Ave (3)	-	-	-	-	-	-	-	-	-
	-	-	-	-		-	-	-	
	-	-	-	-		-	-	-	
	-	-	-	-		-	-	-	
SW 9th St & SW 40 Ave (1)	Eastbound	9.9	0.21	A	-	9.6	0.16	A	-
	-	-	-	-		-	-	-	
	Northbound Left	7.3	0.01	A		7.3	0.01	A	
	-	-	-	-		-	-	-	

Source: Synchro 8 HCM 2010 Reports
(1) HCM 2010 TWSC (Two-Way Stop-Controlled) Intersection Results
(2) HCM 2010 AWSC (All-Way Stop-Controlled) Intersection Results
(3) Converted to signalized intersection on Alternative II

** Due to limitations with the reporting of results with the Synchro software, the results were unable to be reported for the approach due to the extremely high delay associated with the opposing approach. These approaches are expected to be LOS F.*

Table 5-16: Year 2040 - Alternative II – Stop-Controlled Intersection LOS

Alternative II: Year 2040 Stop-Controlled Intersection Level of Service									
Intersection	Approach/ Movement	AM Peak Hour				PM Peak Hour			
		Control Delay (sec/veh)	V/C Ratio	LOS		Control Delay (sec/veh)	V/C Ratio	LOS	
LeJeune Rd & SW 7th St (1)	Eastbound	40.2	0.17	E	-	42.0	0.18	E	-
	Westbound	36.0	0.15	E		**58.3**	0.32	**F**	
	-	-	-	-		-	-	-	
	-	-	-	-		-	-	-	
LeJeune Rd & SW 9th St (1)	Eastbound	**622.1**	**1.79**	**F**	-	**234.9**	**1.11**	**F**	-
	Westbound	**1728.9**	**4.08**	**F**		**132.5**	0.77	**F**	
	Northbound Left	18.4	0.04	C		17.7	0.07	C	
	Southbound Left	22.3	0.23	C		20.8	0.15	C	
LeJeune Rd & SW 9th Ter (1)	Eastbound	**1566.9**	**3.82**	**F**	-	**412.1**	**1.45**	**F**	-
	Westbound	*	*	*		**892.5**	**2.19**	**F**	
	Northbound Left	17.8	0.04	C		17.8	0.07	C	
	Southbound Left	23.6	0.18	C		20.7	0.08	C	
SW 7th St & SW 43 Ave (2)	Eastbound	8.5	0.10	A	-	9.3	0.19	A	-
	Westbound	26.5	0.84	D		36.4	0.92	E	
	-	-	-	-		-	-	-	
	Southbound	9.5	0.13	A		9.7	0.12	A	
SW 8th St & SW 43 Ave (3)	-	-	-	-	-	-	-	-	-
	-	-	-	-		-	-	-	
	-	-	-	-		-	-	-	
	-	-	-	-		-	-	-	
SW 9th Ter & SW 43 Ave (2)	Eastbound	7.7	0.09	A	-	7.4	0.04	A	-
	Westbound	7.6	0.04	A		7.5	0.06	A	
	Northbound	7.5	0.07	A		7.5	0.10	A	
	Southbound	7.8	0.11	A		7.7	0.10	A	
SW 8th St & SW 40 Ave (3)	-	-	-	-	-	-	-	-	-
	-	-	-	-		-	-	-	
	-	-	-	-		-	-	-	
	-	-	-	-		-	-	-	
SW 9th St & SW 40 Ave (1)	Eastbound	10.4	0.27	B	-	9.9	0.22	A	-
	-	-	-	-		-	-	-	
	Northbound Left	7.3	0.01	A		7.3	0.01	A	
	-	-	-	-		-	-	-	

Source: Synchro 8 HCM 2010 Reports
(1) HCM 2010 TWSC (Two-Way Stop-Controlled) Intersection Results
(2) HCM 2010 AWSC (All-Way Stop-Controlled) Intersection Results
(3) Converted to signalized intersection on Alternative II

** Due to limitations with the reporting of results with the Synchro software, the results were unable to be reported for the approach due to the extremely high delay associated with the opposing approach. These approaches are expected to be LOS F.*

With regard to the stop-controlled intersections under Alternative II, these intersections are projected to have some reduction in delay when compared to the No Build Alternative.

5.6 Alternative III (Grade Separation)

Given the expected impact of the grade separation alternative, it is foreseeable that its selection would trigger a National Environmental Policy Act (NEPA) process, possibly a Categorical Exclusion or Project Development and Environmental Study (PD&E). In such case, the alternative will be required to perform according to the set LOS standards for urban areas; in this case, this would mean for all approaches and the overall intersection to operate at LOS D or better.

Therefore, to operationally analyze this concept a different approach was followed. Namely, a lane-call exercise was used to determine the optimum configuration of lanes that would indeed yield the required performance of the intersection through the design year (2040). **Figure 5-1** graphically depicts the at-grade lane requirements for the grade separation to perform at LOS D, per approach and overall, in 2020 and 2040.

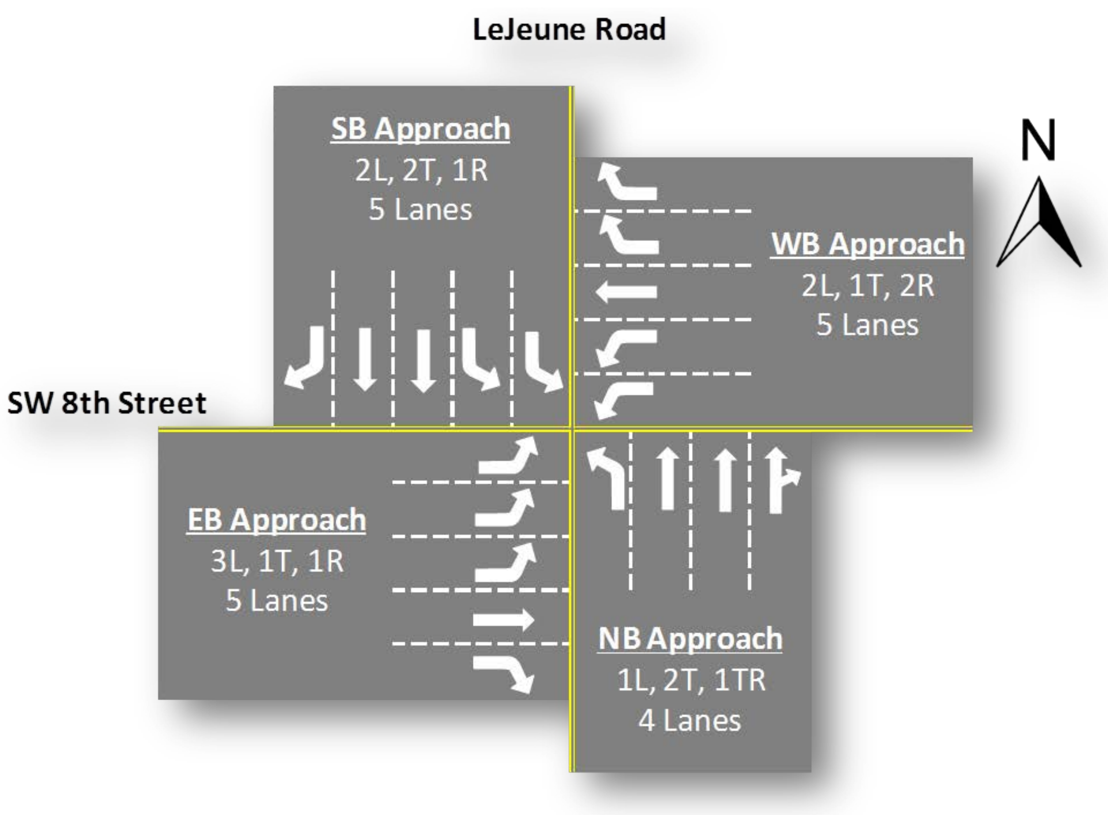

Figure 5-1: At-Grade Lane Requirements for Grade Separation Alternative

Table 5-17 summarizes HCM 2010 delays and LOS reported by Synchro 8 for the signalized intersection and for year 2040. The detailed results of the operational analysis of Alternative III are included in Appendix 5-VI.

Table 5-17: Year 2040 - Alternative III – Grade Separation Intersection LOS

Alternative III: Year 2040 Signalized Intersection Level of Service									
Intersection	Approach	AM Peak Hour				PM Peak Hour			
		Control Delay (sec/veh)		Level of Service		Control Delay (sec/veh)		Level of Service	
LeJeune Rd & SW 8th St	Eastbound	43.3	26.5	D	C	54.4	30.7	D	C
	Westbound	50.3		D		47.5		D	
	Northbound	29.6		C		27.2		C	
	Southbound	21.3		C		30.0		C	

Source: Synchro 8 HCM 2010 Reports

5.7 Summary of Alternatives Development and Operational Analysis

Chapter 5 includes the operational evaluation of all alternatives considered for the intersection of SR 953/LeJeune Road with SR 90/SW 8th Street/Tamiami Trail and its area of influence area, based on the projected volumes for 2020 and 2040 documented in **Chapter 3**. Five alternatives were considered as follows:

- No-Build Alternative
- Transportation System Management and Operation (TSM&O) alternatives (two variations)
- Alternative I: Re-routing eastbound and westbound lefts plus TSM&O improvements
- Alternative II: Re-routing northbound and southbound lefts
- Alternative III: Grade Separation

The analysis results for all alternatives considered for the LeJeune Road at SW 8th Street intersection are summarized in **Table 5-18**.

Table 5-18: Alternative Results Summary – Signalized Intersection Delay and LOS

Alternative		Year 2020		Year 2040	
		AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
No Build		104.3 (F)	118.8 (F)	277.9 (F)	400.1 (F)
TSM&O	#1	117.5 (F)	136.4 (F)	271.2 (F)	299.5 (F)
	#2	246.4 (F)	275.4 (F)	452.1 (F)	480.1 (F)
Alternative I		113.6 (F)	105.6 (F)	262.6 (F)	238.1 (F)
Alternative II		73.9 (E)	80.5 (F)	213.3 (F)	212.9 (F)
Alternative III		--	--	26.5 (C)	30.7 (C)

The results of the **No Build Alternative** indicate that, as expected, the operation is projected to significantly deteriorate in the future if the exiting operational conditions are maintained. It should be noted that these operational results do not account for the potential further decline in the safety conditions of the intersection. Furthermore, considering that many of the reported crashes seemed to be caused by dangerous maneuvers provoked by drivers' frustration, it is highly likely that the exacerbated congestion expected in the future would have a serious negative impact on the already compromised safety of the intersection.

TSM&O Alternative #1 and TSM&O Alternative #2 include geometric improvements that can be implemented without right-of-way acquisition, as well as safety-driven changes to the signal timing through the implementation of protected left-turn phasing for all approaches. The results show that under the TSM&O #1 Alternative, the signalized intersection would still operate at similar levels of overall delay as the No Build Alternative in the future; while under TSM&O #2 Alternative, the signalized intersection is anticipated to operate worse than the No Build Alternative. However, in both TSM&O Alternatives, the introduction of much needed protective phases for turning vehicles is expected to enhance the safety of the intersection.

Alternatives I and II consist in the elimination of left-turns on two opposing approaches at the subject intersection. Alternative I eliminates the westbound and eastbound left-turn movements through provision of right-turns, while Alternative II relocates the northbound and southbound left-turn movements to adjacent intersections along SW 8th Street. Consequently, the respective left-turn phases are eliminated from the traffic signal timing, which allows an increase in green time allocation for thru movements/pedestrian crossings. The results from the operational analysis show that although the signalized intersection is expected to operate at LOS F in years 2020 and 2040, in Alternative II the overall delay of the intersection is reduced when compared to the No Build Alternative, in addition to safety improvements. On the other hand—and similarly to TSM&O #1—Alternative I is anticipated to provide comparable levels of operation and overall delay as the No Build Alternative, but it does provide a safer design concept. It should be noted that a disadvantage these two alternatives share is the increase in travel distance for the re-routed traffic compared to the No-Build conditions. Furthermore, Alternative I requires the re-routed traffic to pass through the subject intersection twice.

Lastly, **Alternative III** is the Grade Separation Alternative. As previously explained, this alternative was specifically designed to maintain acceptable levels of service (D or better) through the design year (2040). However, the alternative is expected to have significant ROW and community impacts. In addition, the close proximity to the signalized intersection at SW 8th Street and Ponce De Leon Boulevard effectively eliminates the benefits of grade separation, thus restricting the height and slope of the structure as well as the allowance for a bridge structure with at-grade lanes underneath. Furthermore, due to the cost and intersection location (grid network), the alternative offers a limited return on investment unless such improvements are proposed on a corridor-wide basis. Finally, although the safety of the intersection may be improved through the reduction of intersection conflict points brought by the overpass, the alternative may also potentially create other safety issues in relation to queues being formed at the end of the vertical alignment of the overpass on the eastbound approach at the intersection of SW 8th Street and Ponce De Leon.

A summary of benefits and disadvantages have been included in **Table 7-1** for each Build alternative.

Chapter 6 Cost Estimates

Preliminary cost estimates for the proposed TSM&O Alternatives, Alternative I, and Alternative II were calculated based on the latest FDOT Item Average Unit Cost table for Area 13 (Miami-Dade). The latest table includes the period from March 1, 2014 to February 28, 2015. Signal retiming costs were estimated from data obtained from Washington State DOT and National Traffic Signal Report Card. Traffic signal installation costs were estimated using data from Washington State DOT.

The grade separation alternative preliminary cost estimate was based on the cost per mile models from FDOT and does not include right-of-way costs.

The cost estimates and assumptions for each proposed alternative and the data obtained from Washington DOT and National Traffic Signal Report Card are included in Appendix 6-I. A summary of the construction cost estimates for each alternative is provided in **Table 7-2.**

Chapter 7 Alternative Comparison

Table 7-1 summarizes the benefits and disadvantages that have been identified for each Build alternative.

Table 7-1: Summary of Benefits and Disadvantages of Build Alternatives

Build Alternatives	TSM&O #1	TSM&O #2	Alternative I	Alternative II	Alternative III
Benefits	• No traffic re-routing nor neighborhood intrusion • Geometric improvements without right-of-way acquisition • Safety improvement due to the implementation of protected phasing for all left-turn movements • Less delay than No Build in both peak periods in2040	• No traffic re-routing nor neighborhood intrusion • Geometric improvements without right-of-way acquisition. • Safety improvement due to the implementation of protected phasing for all left-turn movements	• Elimination of eastbound/westbound left-turn movements through provision of right-turn movements (safer movement) • Elimination of eastbound/westbound left-turn signal phase, which increases green time allocation for thru movements/pedestrian crossings • Less delay than No Build in both peak periods in 2040	• Elimination of northbound/southbound left phase from traffic signal • More green time available for thru movements • Less delays than No Build in both peak periods in2040 • Safer design concept	• Signalized intersection LOS D or better
Disadvantages	• LOS F for both peak periods in 2020 and 2040	• LOS F for both peak periods in 2020 and 2040 • Increase in delay from No Build conditions	• Longer travel distance for drivers making eastbound/westbound left-turns • Signalized intersection LOS F for both peak periods in 2020 and 2040 • Vehicles making eastbound/westbound left-turn pass twice through intersection	• Longer travel distance for drivers making northbound/southbound left-turns • Installation of two traffic signals along SW 8th Street adjacent to the study intersection	• Significant right-of-way acquisition • Height and slope restricted by proximity of signalized intersection at Ponce De Leon and SW 8th Street • Safety concerns from queues formed at negative slope at the eastbound approach at Ponce De Leon and SW 8th Street intersection • Possible NEPA process and further studies

Tables 7-2 and 7-3 show evaluation parameters taken into consideration for all the alternatives. Evaluation parameters include safety, intersection operations (LOS), construction costs (excluding right-of-way and maintenance), right-of-way impacts, access considerations, and constructability, among others.

Table 7-2: Comparison Matrix

Evaluation Parameter/Alternative	No Build	TSM&O #1	TSM&O #2	Alternative I	Alternative II	Alternative III
Traffic Operations/LOS	Bad	Bad	Worst	Bad	Better	Best
Safety	Worst	Better	Better	Better	Better	Best
Construction Cost (does not include right-of-way or yearly maintenance)	None	$379,000	$379,000	$527,000	$732,000	$17,618,000
Right-of-way Impacts	None	None	None	None	None	260,500 SF
Qualitative Return on Investment	Worst	Best	Worst	Bad	Better	Worst
Access Considerations	None	None	None	None	None	Yes
Parking Impacts	None	None	None	None	Yes	Yes
Interface with existing/proposed transit stops	None	None	None	None	None	Yes
Community Impacts	None	None	None	Yes (re-routing traffic)	Yes (re-routing traffic)	Yes (properties impacts)
Constructability	None	Best	Best	Better	Better	Worst

Table 7-3: Comparison Matrix (Symbols)

Evaluation Parameter/Alternative	No Build	TSM&O #1	TSM&O #2	Alternative I	Alternative II	Alternative III
Traffic Operations/LOS	●	●	◖	●	●●	●●●
Safety	◖	●●	●●	●●	●●	●●●
Construction Cost	⦸	●●●	●●●	●●	●	◖
Right-of-way Impacts	⦸	⦸	⦸	⦸	⦸	◖
Qualitative Return on Investment	◖	●●●	◖	●	●●	◖
Access Considerations	⦸	⦸	⦸	⦸	⦸	●
Parking Impacts	⦸	⦸	⦸	⦸	●	●
Potential Impact to Transit	⦸	⦸	⦸	⦸	⦸	●
Community Impacts	⦸	⦸	⦸	●	●	◖
Constructability	⦸	●●●	●●●	●●	●●	◖

<u>Legend:</u>

Worst	◖
Bad	●
Better	●●
Best	●●●
None	⦸

Alternatives I, II, III reduce conflict points at the subject intersection, which thereby offer safety benefits over the No Build and TSM&O alternatives. However, the elimination of such conflict points comes at cost, whether it be the re-routing of traffic and neighborhood intrusion (Alternatives I and II), or monetary cost due to right-of-way acquisition, construction and infrastructure (Alternative III). On the other hand, the TSM&O Alternatives maintain all movements at the intersection, but offer a safety improvement through the implementation of protected left-turn phasing for all approaches. Therefore, there is no traffic diversion or neighborhood intrusion, and relatively minimal monetary cost through the restriping and reassignment of an underutilized lane - all within the available right-of-way.

Chapter 8 Recommendations and Action Plan

Based upon the analyses presented herein and the feedback from the Project Advisory Team (PAT) members, the Transportation System Management and Operations (TSM&O) #1 Alternative was selected as the recommended alternative. The TSM&O #1 Alternative offers the following:

- Safety benefits through the provision of protected left-turn movements at all approaches
- Improved operations while maintaining pedestrian crossing times
- Easily implementable in the short term with no additional ROW required and minimal construction cost
- Compliments the programmed FDOT safety study (FPID 433266-1-52-01), which involves many improvements at the intersection such as milling and resurfacing, restriping, signing and pavement markings including illuminated signs, new signal mast arms and poles with pedestrian countdown heads, loop assemblies, among others. These improvements are funded for construction in FY 2016.

The data and analyses contained herein serve as a preliminary assessment of existing and future conditions of the intersection and surrounding area. The recommended alternative will be provided to the Florida Department of Transportation (FDOT) for further evaluation and potential programming of improvements. The currently programmed safety study can be enhanced with any and/or all components of the recommended alternative as applicable, with additional programming in the short or mid-term as necessary.