

Executive Summary

Calvin, Giordano & Associates, Inc. (CGA) was commissioned on May 8, 2012 by the Town of Surfside to complete a traffic study to assess existing and future traffic conditions throughout the Town. A Town-wide traffic analysis was performed to determine appropriate applications for traffic calming and traffic control measures. In addition to the traffic calming analysis, several signalized intersections along 96th Street, Harding Avenue, and Collins Avenue were evaluated to determine if modifications could improve the operational efficiency of the intersections. The signalized intersections analyzed for this traffic study include the following:

- 96th Street at 500 Block (Bal Harbour Shops)
- 96th Street at Byron Avenue
- 96th Street at Harding Avenue
- 96th Street at Collins Avenue
- 95th Street at Harding Avenue
- 95th Street at Collins Avenue
- 94th Street at Harding Avenue
- 94th Street at Collins Avenue

Turning movement traffic counts were collected during the AM (7:00-9:00) and PM (4:00-6:00) peak hours for seventeen intersections within the Town. Additionally, 24-hour bi-directional tube counts along with speed data were collected at ten locations throughout the Town. The traffic counts collected for this study are depicted in Figure 2.1. The traffic counts were conducted on a typical Tuesday through Thursday between August 28, 2012 and September 6, 2012 and on Tuesday, October 30, 2012. The traffic counts were utilized to analyze existing and future traffic operations of the major intersections and to develop new and upgrade existing traffic calming locations.

A computer-based traffic simulation of the Town's current roadway network was developed using the nationally recognized VISSIM micro-simulation modeling software. The VISSIM model was calibrated to match existing traffic conditions based on field reviews and traffic data collected for the study intersections. This VISSIM model will enable the Town to efficiently analyze future traffic conditions including intersection and roadway alternatives. Examples of the benefits of the VISSIM model include determining the net impact of future developments such as the expansion of Bal Harbour Shops and for future traffic flow modifications such as

street closures. Additionally, the VISSIM model has an advanced 3D interface which allows for accurate visual representation of existing and future traffic conditions.

OPERATIONAL ANALYSIS

Level of Service (LOS) is a term used to describe the conditions of a roadway in relation to vehicle delay and traffic congestion. LOS are broken down with six LOS designations (LOS A – LOS F). LOS A represents the most ideal situation with minimal if any delay at all while LOS F represents the worst conditions with high vehicular delay. The Town Comprehensive Plan identifies the LOS thresholds for state roads as LOS E+20% and LOS D for local roads. 96th Street, Harding Avenue, and Collins Avenue are each considered state roads.

Existing Conditions

The operational analysis for the aforementioned major intersections along 96th Street, Harding Avenue, and Collins Avenue demonstrated that each of the study intersections were currently operating at an acceptable LOS during the AM and PM peak hours when evaluating the overall intersection delay. However, several of the study intersection approaches had high vehicular delays resulting in a LOS E or LOS F for the intersection approach and long vehicular queues extending to the upstream traffic signal. Due to the close proximity of the signalized intersections, the operations of each signal are greatly affected by the upstream and downstream traffic signals. It was observed that vehicle queues would occasionally extend to and past the upstream traffic signals on 96th Street.

Optimized Conditions

CGA evaluated several alternatives to determine if improvements could help reduce vehicle congestion in the Town. It was determined that the most cost effective alternatives included signal timing improvements at each of the study signalized intersections. The signal timing improvements showed a substantial benefit to the side streets of Byron Avenue, 95th Street, and 94th Street.

The Town has been proactive in the past regarding improving signal timing in the Town to benefit the residents of Surfside. The northbound approach on Byron Avenue at 96th Street has historically been very congested with high delays and vehicle queues during school days and times. However, the Town was able to mitigate much of the vehicle delay by bringing it to the County's attention and requesting an adjustment in signal timing. A comparison of the existing average delay and LOS for the existing conditions and the optimized conditions is shown in Table A.

Table A – Existing and Optimized Operational Analysis

		Existing Conditions				Signal Timing Optimization			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
Intersection	Approach	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
96 th Street at Bal Harbour Shops	EB	1.9	A	2.5	A	1.9	A	2.5	A
	SB	48.5	D	43.0	D	48.5	D	43.0	D
	WB	3.4	A	3.1	A	2.4	A	1.7	A
	Total	2.9	A	5.9	A	2.5	A	5.2	A
96 th Street at Byron Avenue	NB	71.7	E	72.8	E	30.9	C	32.9	C
	EB	3.1	A	4.2	A	4.2	A	6.2	A
	WB	12.2	B	13.4	B	3.6	A	2.0	A
	Total	13.6	B	14.9	B	6.8	A	7.5	A
96 th Street at Harding Avenue	EB	33.9	C	30.0	C	30.5	C	22.5	C
	SB	32.7	C	28.1	C	32.7	C	31.1	C
	WB	142.6	F	98.8	F	115.0	F	36.9	D
	Total	48.2	D	39.7	D	43.3	D	29.2	C
96 th Street at Collins Avenue	NB	59.0	E	43.9	D	21.9	C	22.1	C
	EB	18.6	B	15.2	B	31.4	C	28.8	C
	WB	58.6	E	54.8	D	58.6	E	54.6	D
	Total	51.1	D	39.0	D	23.9	C	23.6	C
94 th Street at Harding Avenue	EB	58.0	E	57.8	E	27.0	C	24.8	C
	SB	5.8	A	6.4	A	5.3	A	9.5	A
	WB	54.6	D	64.7	E	31.0	C	24.8	C
	Total	10.0	A	14.8	B	7.3	A	11.9	B
95 th Street at Harding Avenue	EB	158.3	F	72.6	E	39.5	D	26.3	C
	SB	11.2	B	9.0	A	8.8	A	8.4	A
	WB	63.6	E	76.2	E	28.3	C	29.0	C
	Total	22.8	C	15.7	B	12.6	B	10.4	B
94 th Street at Collins Avenue	NB	4.2	A	10.5	B	5.9	A	7.2	A
	EB	70.6	E	19.8	B	23.2	C	28.2	C
	WB	58.2	E	20.8	C	15.5	B	19.2	B
	Total	6.6	A	11.0	B	6.6	A	8.1	A
95 th Street at Collins Avenue	NB	3.5	A	12.2	B	3.8	A	11.8	B
	EB	73.4	E	22.3	C	34.5	C	20.9	C
	WB	50.4	D	25.1	C	28.2	C	22.9	C
	Total	6.4	A	12.7	B	5.4	A	12.3	B

2017 Conditions

The signalized study intersections within the Town were also evaluated under future traffic conditions. A five year planning horizon (Year 2017) was chosen for the analysis and included background growth, committed trips, and other potential future development including the expansion of Bal Harbour Shops. The background growth consisted of applying a 1.0% annual growth rate to the existing peak season adjusted traffic. Additional project trips were also added to the 2017 scenario including trips from Young Israel, 92nd Street Hotel, Grand Beach Hotel, Surf Club, the Shul, and the Bal Harbour Shops expansion. The Year 2017 conditions were evaluated under two different scenarios. The first scenario included the 2017 traffic volumes utilizing the existing signal timing plans. The second scenario included the 2017 traffic volumes utilizing the proposed signal timing improvements identified in this report. Minor adjustments were made to the signal timing splits to account for the additional traffic anticipated in 2017.

The results of the 2017 conditions with existing signal timing analysis demonstrated that there could potentially be very significant delays and traffic congestion within the Town. The existing high vehicle delays and queues currently experienced will only be exacerbated under the 2017 conditions. Several of the intersections and particularly 96th Street at Harding Avenue and Collins Avenue deteriorate significantly under this scenario. A comparison of the existing and 2017 conditions utilizing the existing signal timing patterns is shown on Table B.

The results of the 2017 optimized conditions perform significantly more efficiently than the 2017 conditions without signal timing improvements. However, even with the improved timings, there is expected to be substantial vehicle delays and queues. The westbound approach of 96th Street at Harding Avenue will operate at LOS F with 50 percentile queues extending up to Collins Avenue. This will cause further increased delay and congestion beyond what is actually calculated. Additionally, the vehicular queuing on eastbound 96th Street at Harding Avenue will only get worse than the existing conditions and it potentially could be common for vehicle queuing to extend past Byron Avenue and further impact the operations of the upstream intersections beyond what is calculated.

Table B – 2017 Operational Analysis

Intersection	Approach	2012 Existing Conditions				2017 Conditions ⁽¹⁾			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
96th Street at Bal Harbour Shops	EB	1.9	A	2.5	A	2.4	A	3.4	A
	SB	48.5	D	43.0	D	56.7	E	55.4	E
	WB	3.4	A	3.1	A	4.0	A	4.5	A
	Total	2.9	A	5.9	A	4.3	A	9.8	A
96th Street at Byron Avenue	NB	71.7	E	72.8	E	72.6	E	72.7	E
	EB	3.1	A	4.2	A	4.3	A	6.9	A
	WB	12.2	B	13.4	B	12.8	B	14.2	B
	Total	13.6	B	14.9	B	14.2	B	16.1	B
96th Street at Harding Avenue	EB	33.9	C	30.0	C	38.4	D	36.5	D
	SB	32.7	C	28.1	C	38.0	D	32.7	C
	WB	142.6	F	98.8	F	261.8	F	237.1	F
	Total	48.2	D	39.7	D	70.7	E	68.6	E
96th Street at Collins Avenue	NB	59.0	E	43.9	D	104.6	F	74.6	E
	EB	18.6	B	15.2	B	19.2	B	16.0	B
	WB	58.6	E	54.8	D	58.5	E	54.9	D
	Total	51.1	D	39.0	D	89.2	F	65.2	E
Harding Avenue at 95th Street	EB	107.7	F	65.7	E	331.8	F	68.3	E
	SB	14.4	B	10.1	B	17.1	B	13.7	B
	WB	241.4	F	91.2	F	1299.9	F	367.0	F
	Total	34.2	C	18.1	B	141.0	F	48.1	D
Collins Avenue at 95th Street	NB	1.5	A	2.6	A	1.9	A	16.1	B
	EB	71.7	E	19.3	B	138.8	F	26.5	C
	WB	41.5	D	15.2	B	42.2	D	18.5	B
	Total	4.8	A	3.4	A	12.7	B	16.8	B
Harding Avenue at 94th Street	EB	67.7	E	73.6	E	69.2	E	76.7	E
	SB	5.0	A	4.0	A	5.2	A	6.7	A
	WB	77.3	E	187.9	F	84.7	F	281.5	F
	Total	10.7	B	23.7	C	11.2	B	31.2	C
Collins Avenue at 94th Street	NB	5.0	A	14.1	B	5.5	A	21.2	C
	EB	80.8	F	22.0	C	91.1	F	25.3	C
	WB	37.9	D	17.0	B	36.3	D	18.0	B
	Total	7.5	A	14.4	B	9.8	A	21.4	C

(1) 2017 Conditions include existing (2012) traffic counts plus a 1% annual growth rate, committed development trips, and additional potential developments such as the Bal Harbour Shops expansion. The existing signal timings were utilized in this scenario.

TRAFFIC CALMING

Miami Dade County has authority to approve, deny or change any proposed traffic flow modifications within the Town of Surfside. Miami-Dade County has established a procedure for approving traffic calming devices that includes minimum traffic criteria that must be met. For municipalities such as Surfside that fund their own traffic calming program, minimum traffic volume requirements can potentially be reduced by 70% and minimum 85th percentile speed requirements can potentially be reduced by 50%. In addition to minimum traffic criteria, Miami-Dade County generally requires that new traffic calming proposals are supported by two-thirds of residents in the vicinity of the proposed installation. Concurrence from affected residents is typically done through ballots delivered to the residents.

The traffic data collected for this study indicates that the majority of studied roadway segments met the reduced minimum volume criteria allowed for municipalities that fund their own traffic calming program. The results of the speed data showed that four of the ten count locations had 85th percentile speeds greater than the reduced minimum speed threshold. Additionally, three of the ten count locations were within one mph of meeting the reduced minimum speed threshold. However, Miami-Dade County also requires that a street is at least 750 feet in length without an intersecting roadway to be eligible for speed humps/tables. The majority of roadways within the Town do not meet this requirement. Only 88th Street west of Hawthorne Avenue meets this requirement within the Town.

RECOMMENDATIONS

- 1 Signal timing improvements
- 2 Continue to monitor existing and future traffic patterns
- 3 Utilize VISSIM software as a tool to analyze future traffic conditions
- 4 Implement new traffic calming devices

1. The Town should coordinate with Miami Dade County and the Florida Department of Transportation to implement the signal timing modifications identified in this report at the eight study signalized intersections. In conjunction with the signal timing improvements, vehicle and pedestrian detectors should be installed on 94th Street and 95th Street at Harding and Collins Avenue. The signal timing improvements identified in this report will provide a significant benefit to the residents who consistently utilize Byron Avenue, 95th Street, and 94th Street as the vehicular delays and queues will be substantially reduced on these roadways. Residents will notice that accessing 96th Street, Collins Avenue, and Harding Avenue from the aforementioned streets will be much easier and will not be required to wait as long for the traffic lights to turn green.

The signalized intersections on 95th Street and 94th Street at Harding Avenue and Collins Avenue are currently under pre-timed signal timing. Therefore, the maximum green time is always allotted to each phase regardless of vehicle demand. The installation of vehicle and pedestrian detectors will allow these traffic signals to operate more efficiently. Vehicle detectors are video devices installed on the traffic signal mast arms

that detect vehicles on the intersection approach. When vehicles are not present, the light will turn red and green time will be given to the other intersection approaches. The approximate cost estimate to install two vehicle detectors and four pedestrian detectors at each intersection is \$20,000. Therefore, the total estimate for the installation of the detection devices at the four proposed intersections is \$80,000.

2. The Town should closely monitor the traffic patterns on 96th Street, Harding Avenue, and Collins Avenue on an annual basis. The operational analysis documented in this report for Year 2017 is only an estimate of future traffic conditions. However, it is possible that the expected traffic patterns due to new development deviate from the existing conditions. In this event, signal timing modifications or other improvements may be necessary to continue efficient traffic operations within the Town.
3. The Town should utilize the VISSIM model developed for this traffic study for future traffic operations analysis. The VISSIM model provides highly accurate results and better replicates actual traffic operations than traditional methods. Infinite future scenarios can be analyzed including signal timing changes, new turn lanes, pedestrian crossings, route detours, and many others.

The VISSIM model was built for the entire Town and not just for the study intersections identified in the report. Therefore, future traffic studies can be completed more cost effectively than without the pre-built traffic simulation model. Additionally, the VISSIM model has a built in 3D mode which allows for realistic simulations that can be easily converted to a video format. These 3D traffic videos can be a very beneficial tool to demonstrate to the public the changes in traffic conditions or patterns.

The VISSIM files will be turned over to the Town as a deliverable for this traffic study. However, it is recommended that a professional traffic engineer be consulted for use of the VISSIM model.

Traffic Calming

4. This traffic study identified seven recommended traffic calming devices throughout the Town. The proposed locations are shown on Figure 8.8. The proposed traffic calming devices are either neighborhood roundabouts or traffic medians that share similarities to roundabouts. Generally, Miami-Dade County is very receptive of roundabouts since there are many benefits with few negatives. Some of the benefits of roundabouts include reduced speeds, increased safety, and increased aesthetics. Additionally, roundabouts do not require any actual traffic flow modification. The only negative is the potential small increase in emergency response time. The approximate cost of each of the traffic calming devices including design and construction is \$50,000. Therefore, the total cost for the seven proposed traffic calming devices is approximately \$350,000.

The Town should coordinate with Miami-Dade County to determine which traffic calming devices could be approved. Miami-Dade County may require additional data and/or resident approval. The Town should then hold public outreach meetings with residents to get feedback on the proposed traffic calming devices and proposed locations identified in this report. The Town should then determine which traffic calming devices to pursue and officially submit to Miami-Dade County.

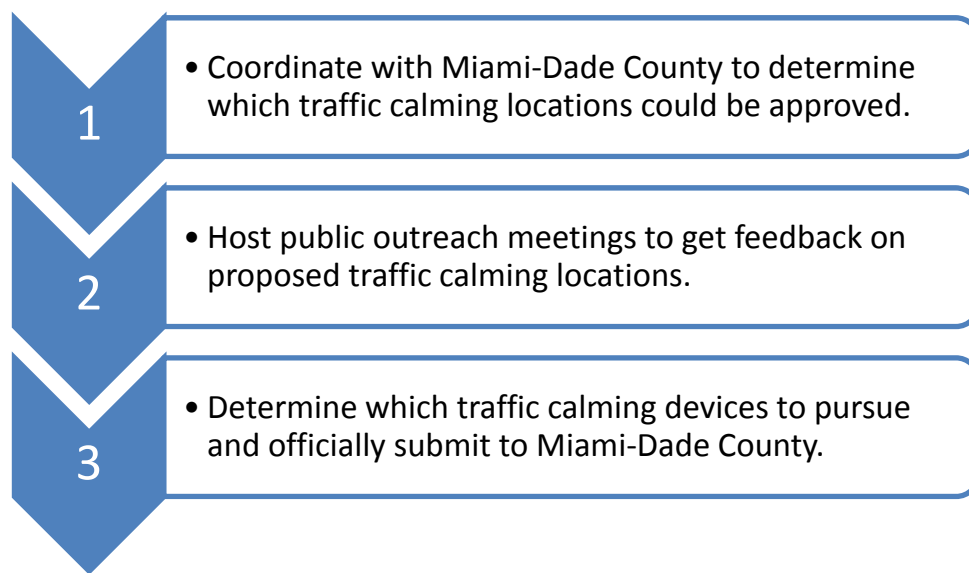


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SECTION ONE

INTRODUCTION

1.1 SUMMARY

Calvin, Giordano & Associates, Inc. (CGA) was commissioned by the Town of Surfside to complete a traffic study to assess existing and future traffic conditions throughout the Town including the potential traffic impact of the Bal Harbour Shops expansion and the reintroduction of traffic calming devices at the completion of the Water/Sewer/Storm Drainage (WSSD) project. In addition to the traffic calming analysis, several signalized intersections along 96th Street, Harding Avenue and Collins Avenue were evaluated to determine if modifications could improve the operational efficiency of the intersections. This traffic study documents the findings of the field review, traffic data collection, and the associated traffic analysis. The approximate limits of the Town wide traffic study are depicted in **Figure 1.1**.

Figure 1.1 – Location Map



1.2 HISTORY OF TRAFFIC CALMING

The Town of Surfside has been concerned about cut through traffic for many years. Residents from neighboring municipalities and from outside the area have historically utilized the Town's north-south local roads as alternatives to Harding Avenue and Collins Avenue. The Town has implemented numerous traffic calming measures to reduce cut through traffic. These traffic calming measures also potentially reduce vehicular speed and traffic volumes and enhance street beautification.

The Town currently utilizes roundabouts, road closures, traffic medians, and speed tables/humps for traffic calming. However, several speed tables/humps have been temporarily removed as part of the construction for the on-going WSSD project. The approximate locations of the existing traffic calming devices are depicted in **Figure 1.2**.



Roundabout on Dickens Avenue at Bay Drive

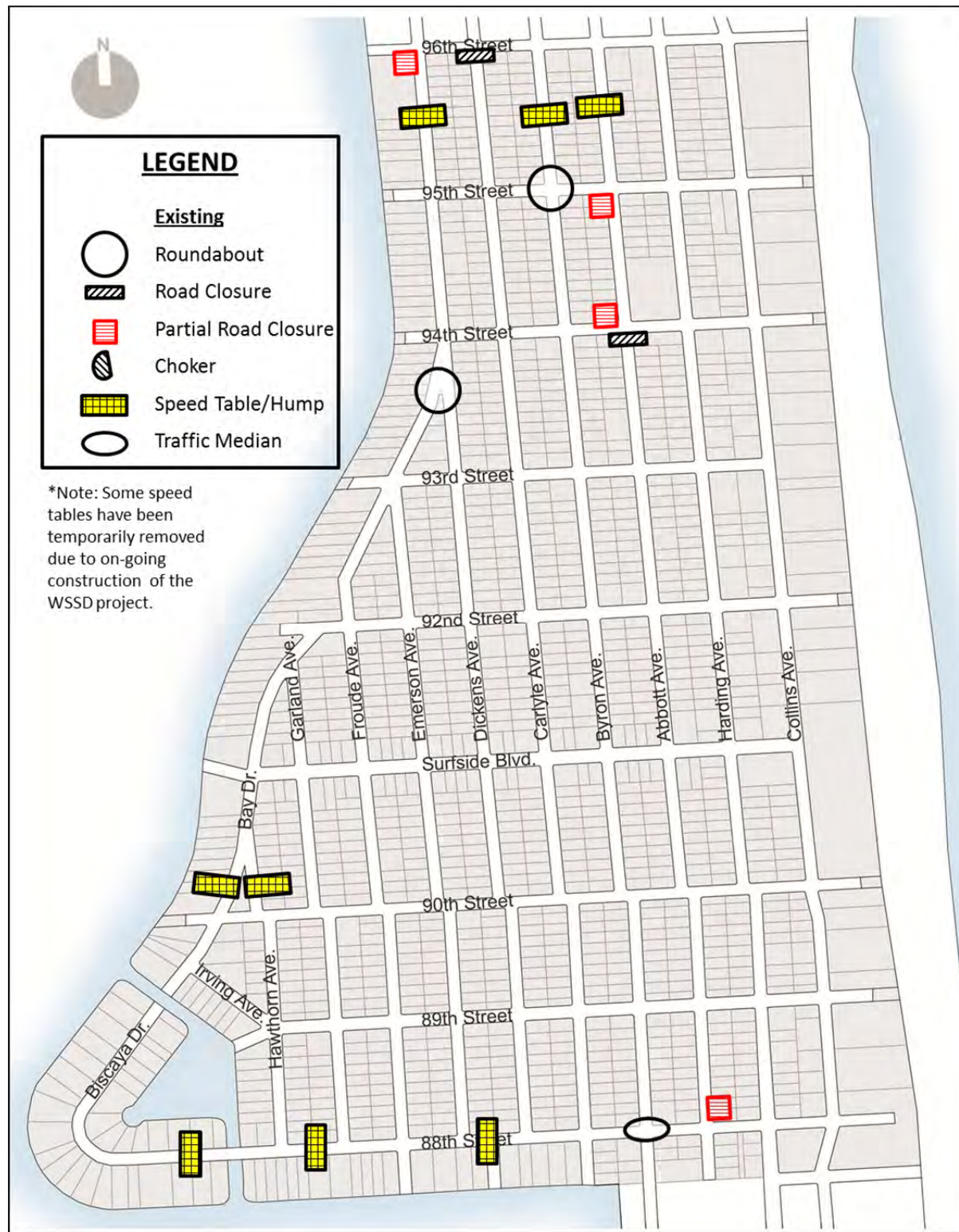


Road closure on Abbott Avenue at 94th Street



Speed table on Abbott Avenue

Figure 1.2 – Traffic Calming Locations



SECTION TWO

EXISTING CONDITIONS

2.1 GENERAL DESCRIPTION

For this study, eight signalized intersections were evaluated along 96th Street, Harding Avenue, and Collins Avenue. Within the study area, 96th Street is an east-west four lane divided state arterial road. It is a regionally significant roadway as it provides direct connection from inland Miami-Dade County to several municipalities along the eastern coastline including the Town of Surfside. 96th Street is identified in the Town Comprehensive Plan as a hurricane evacuation route and the posted speed limit is 30 mph within the study area. The one-way pair of Harding Avenue and Collins Avenue is part of SR A1A and has a posted speed limit of 30 mph within the study area. SR A1A serves the eastern coastline of the Town and the entire barrier island from the City of Dania Beach in Broward County to the City of Miami Beach in Miami-Dade County. Harding Avenue is a three lane roadway that travels south and Collins Avenue is a three lane roadway that travels north within the Town. The study intersections along these corridors include:

- 96th Street at 500 Block (Bal Harbour Shops)
- 96th Street at Byron Avenue
- 96th Street at Harding Avenue
- 96th Street at Collins Avenue
- 95th Street at Harding Avenue
- 95th Street at Collins Avenue
- 94th Street at Harding Avenue
- 94th Street at Collins Avenue

The intersection of 91st Street and Harding Avenue was unable to be collected as part of this traffic study due to the temporary closure of 91st Street between Harding Avenue and Collins Avenue. This segment on 91st Street at the time of this study was being utilized as an

equipment staging area for the WSSD project. However, the intersection of 91st Street at Harding Avenue was included in the traffic model for this study. This will enable the Town to cost effectively analyze this intersection once reliable traffic counts are able to be collected on 91st Street at Harding Avenue.

The local residential roadways within the Town of Surfside were also evaluated as part of this study. The local roadways have a posted speed limit of 20 mph. At the time of this traffic study, construction from the WSSD project was on-going throughout the Town.

2.2 TRAFFIC DATA COLLECTION

Turning movement counts were collected for each of the study intersections on 96th Street, Harding Avenue, and Collins Avenue. Additionally, turning movement counts were collected at nine intersections within the residential area of the Town as identified below:

- 95th Street at Byron Avenue
- 94th Street at Bay Drive
- 93rd Street at Emerson Avenue & Bay Drive
- 93rd Street at Byron Avenue
- 91st Street at Abbott Avenue
- Bay Drive at Hawthorne Avenue
- 90th Street at Carlyle Avenue
- 89th Street at Hawthorne Avenue
- 88th Street at Byron Avenue

As part of this traffic study, twenty-four (24) hour bi-directional counts including speed data were collected at eleven locations which are identified below:

- Bay Drive between 96th Street and 95th Street
- Byron Avenue between 95th Street and 94th Street
- Carlyle Avenue between 94th Street and 93rd Street
- Abbott Avenue between 93rd Street and 92nd Street
- Emerson Avenue between 91st Street and 90th Street
- 93rd Street between Carlyle Avenue and Byron Avenue
- 92nd Street between Dickens Avenue and Carlyle Avenue
- 91st Street between Carlyle Avenue and Byron Avenue
- 89th Street between Carlyle Avenue and Byron Avenue
- 88th Street west of Hawthorne Avenue
- Byron Avenue south of 88th Street (24 hour counts only)

24 hour counts without speed data were collected on Byron Avenue just south of 88th Street. The purpose of this count location was to obtain traffic data for the amount of traffic entering and exiting the Town from the City of Miami Beach. Since the traffic counter was required to be set up near the school on Byron Avenue, reliable speed data was unable to be obtained.

Traffic counts were conducted on a typical Tuesday through Thursday between August 28, 2012 and September 6, 2012 for the majority of the traffic counts. The turning movement counts collected on Byron Avenue at 95th Street and 88th Street and the 24 hour bi-directional counts collected on Byron Avenue south of 88th Street were collected on Tuesday, October 30, 2012. The location of the 24-hour counts and intersection counts are depicted in **Figure 2.1**. The peak hour turning movement counts were conducted from 7:00 AM to 9:00 AM and from 4:00 PM to 6:00 PM. Baseline traffic count data sheets are included in **Appendix A**.

The amount of daily traffic varies throughout the year based on seasonal conditions. This is particularly evident in South Florida due to the many residents who only inhabit South Florida for part of the year. The FDOT publishes seasonal adjustment factors each year in the annual FDOT Florida Traffic Information (FTI) DVD. These adjustment factors are commonly utilized by traffic engineers to determine peak season traffic counts. Therefore, peak season adjustment factors were applied to the existing raw traffic counts in this traffic study to replicate the peak season traffic conditions in the Town. The adjusted traffic volumes are included in **Appendix B**. Additionally, the adjusted existing turning movement counts are depicted in **Figures 2.2 and 2.3** and the bi-directional tube counts are shown in **Figure 2.4**. The 85th percentile speeds are also depicted in **Figure 2.5**.

Figure 2.1 –Traffic Count Locations

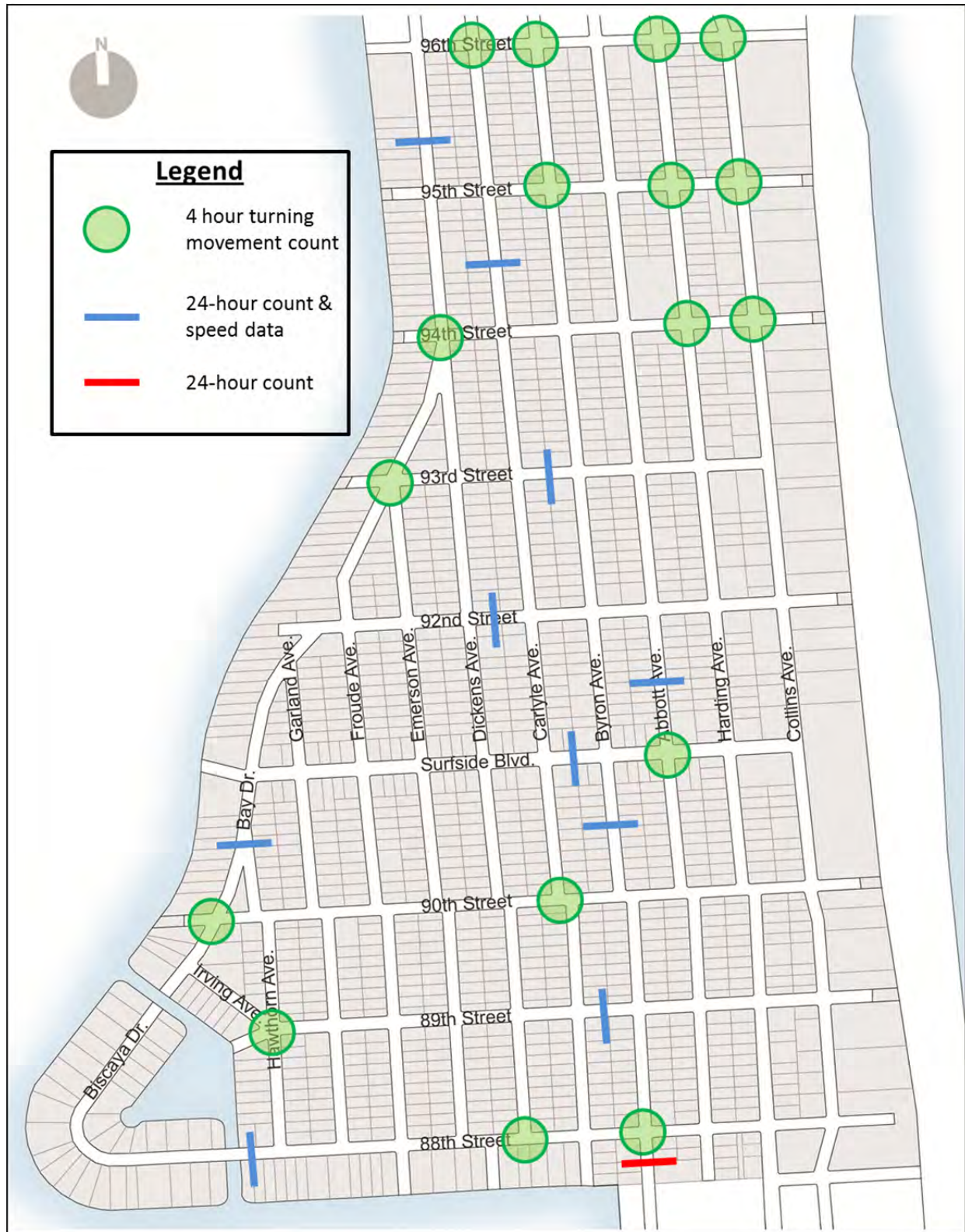


Figure 2.2 – Turning Movement Counts – Major Roadways

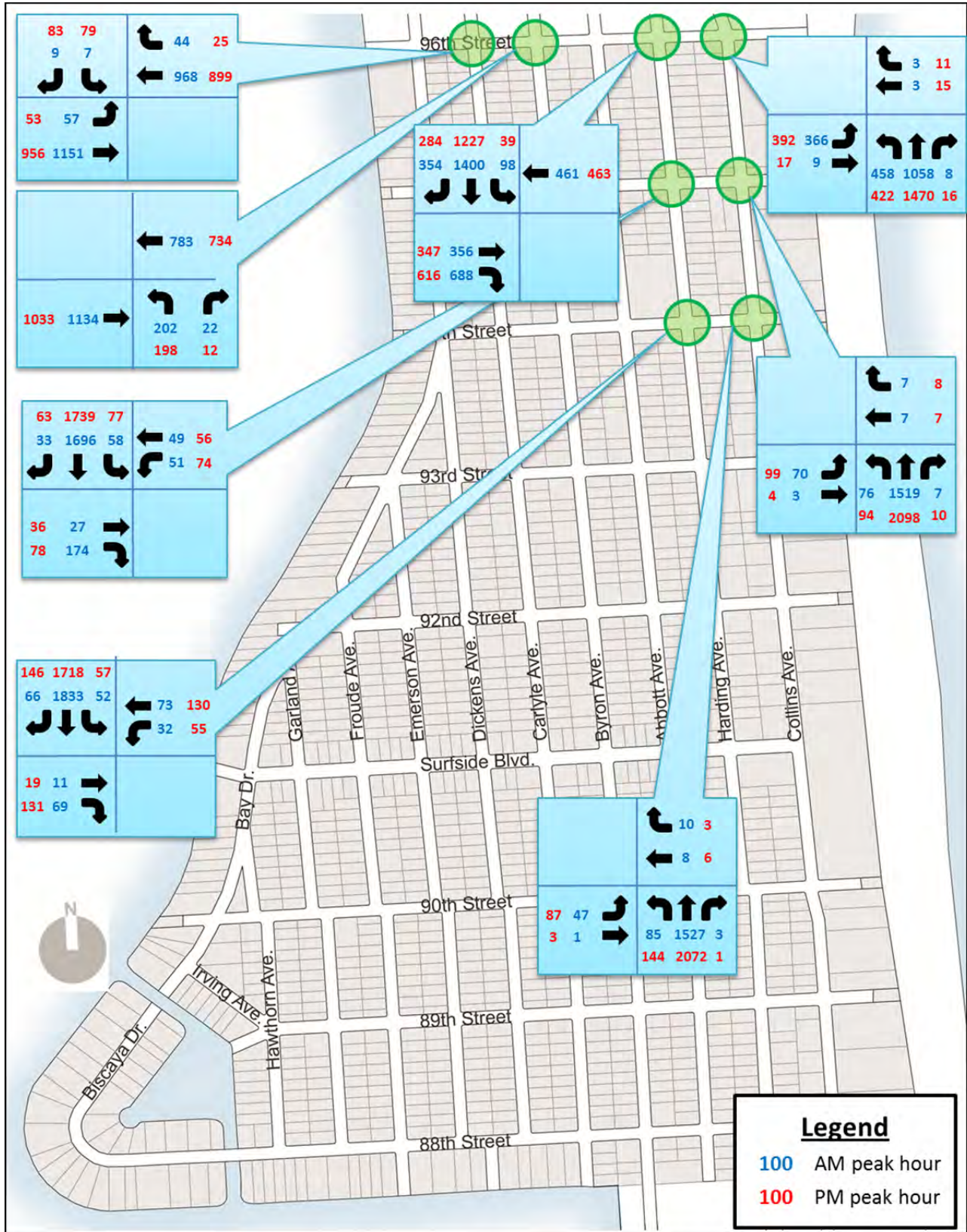


Figure 2.3 – Turning Movement Counts – Local Roadways

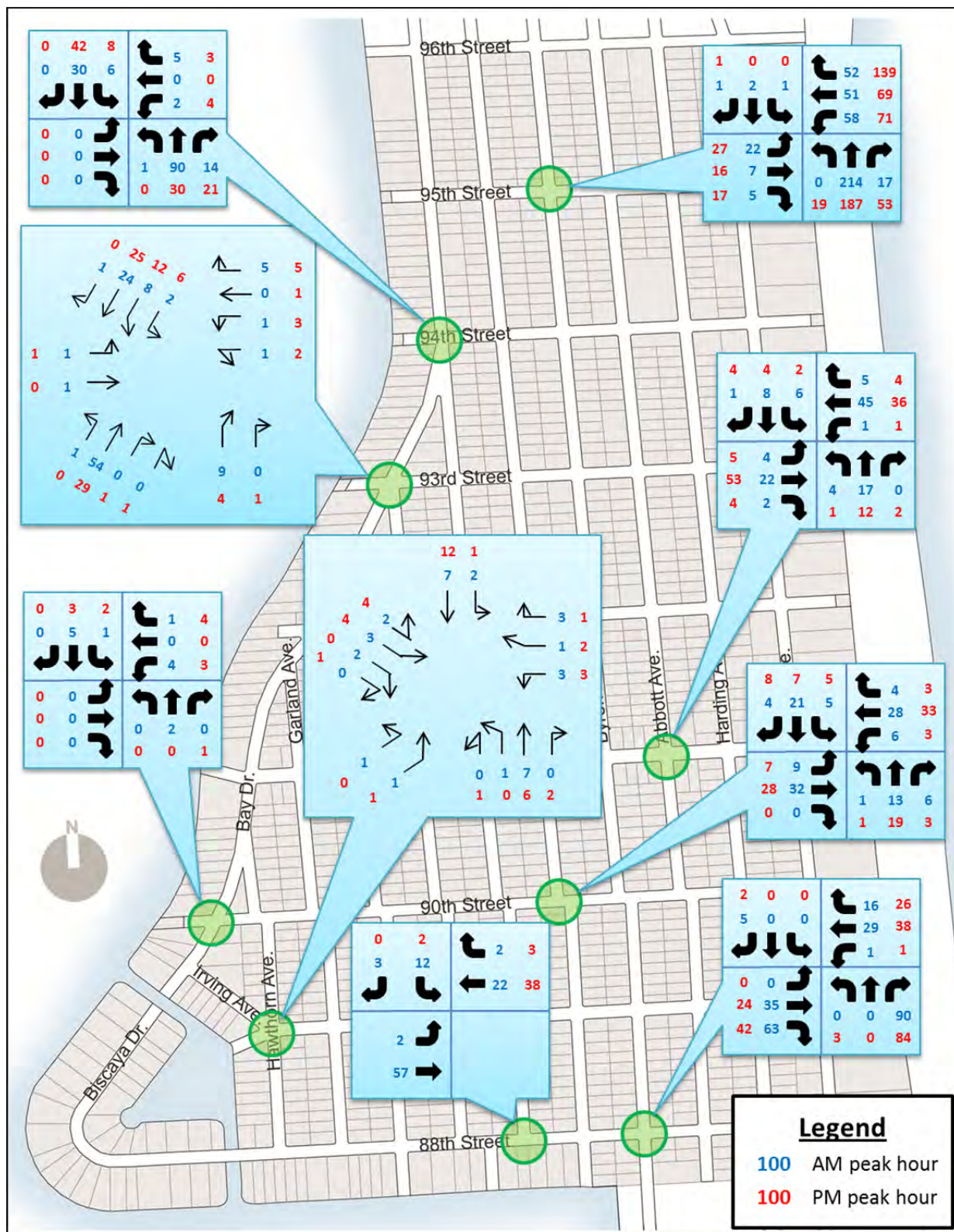
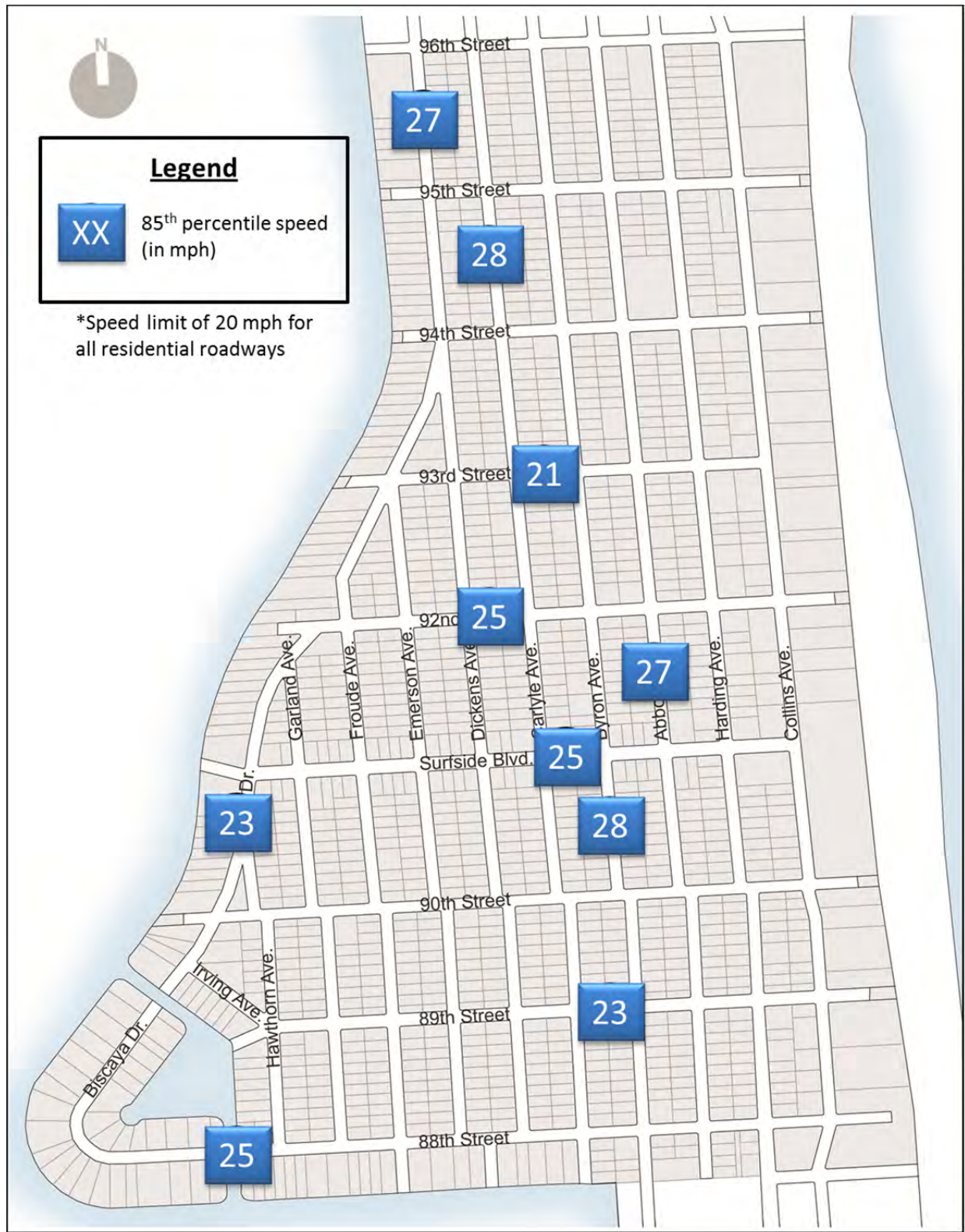


Figure 2.4 – Bi-directional Tube Counts



* Counts adjusted to peak season

Figure 2.5 – 85th Percentile Speeds



2.3 FIELD OBSERVATION

A field observation at the study locations was conducted on Wednesday, August 29, 2012 during the AM peak hour and on Thursday, August 30, 2012 during the PM peak hour. The field observation was conducted to document the existing conditions of the roadways, existing vehicular delay, and existing vehicular queuing. At the time of the field observations, Collins Avenue and Harding Avenue were being resurfaced and several of the local Town roadways were under construction for the ongoing Town-wide WSSD project. Generally speaking, minimal congestion was observed on the local residential roadways.

96th Street at Collins Avenue

The traffic operations of the northbound left turning movement on 96th Street at Collins Avenue were affected by the vehicular delay and queue of the westbound approach on 96th Street at Harding Avenue. At various times during the AM and PM peak hours, the westbound approach vehicular queue on 96th Street at Harding Avenue would extend to Collins Avenue and sometimes onto Collins Avenue. However, the queue would generally dissipate after each cycle of the traffic signal. During the PM peak hour, the northbound queue on Collins Avenue at 96th Street would occasionally extend almost to 95th Street.



Westbound queue on 96th Street at Harding Avenue extends onto Collins Avenue.

96th Street at Harding Avenue

Significant vehicular queues were observed on 96th Street at Harding Avenue. At times the eastbound vehicular queue extended past Byron Avenue and the westbound vehicular queue extended onto Collins Avenue. However the vehicular queues would generally clear after each cycle of the traffic signal.

96th Street at Byron Avenue

The eastbound vehicular queue extended past the 500 Block/Bal Harbour Shops traffic signal at times during both peak hours. Additionally, the traffic operations of 96th Street at Byron Avenue were affected by the delay and vehicular queue occurring on 96th Street at Harding Avenue. Generally, the vehicular queues would dissipate after each cycle of the traffic signal.

96th Street at 500 Block/Bal Harbour Shops

No major vehicle delays or queues were observed at this intersection. However, the traffic operations of 96th Street at the 500 Block were affected by the eastbound vehicular queue on 96th Street at Byron Avenue.

95th Street at Collins Avenue and Harding Avenue & 94th Street at Collins Avenue and Harding Avenue

The westbound vehicular queue on 94th Street and 95th Street at Harding Avenue extended almost to Collins Avenue for brief periods of time during the PM peak hour.



Eastbound queue on 96th Street at Harding Avenue extends past Byron Avenue.



Eastbound queue on 96th Street at Byron Avenue extends to Bal Harbour Shops signal.

2.4 CRASH DATA

Crash summary reports were obtained from the Town of Surfside Police Department for the three-year period from January 2009 to December 2011 for each of local residential roadways.

A summary of the crash locations for Years 2009 through 2011 are shown in **Table 2.1**

Table 2.1 – Local Roadways Vehicular Crash Locations

Roadway	Year		
	2009	2010	2011
Abbott Avenue	6	5	6
Bay Drive	1	0	1
Biscaya Drive	0	1	3
Byron Avenue	1	3	1
Carlyle Avenue	4	3	3
Dickens Avenue	0	1	0
Froude Avenue	0	2	0
Hawthorne Avenue	0	0	1
95 Street	11	10	10
94 Street	7	1	5
93 Street	1	1	0
92 Street	3	1	0
91 Street	2	0	1
90 Street	1	2	0
89 Street	2	1	1
88 Street	1	2	1
Total	40	33	33

The crash data demonstrates that over the past three years there has been a negative trend in the number of vehicle crashes that have occurred at these local roadways.

2.5 FEDERAL FUNCTIONAL CLASSIFICATIONS

The Federal Functional Classification of a roadway is required by the Federal Highway Administration (FHWA). The main purpose of roadway classification is to establish an overall hierarchy of roadways. Functional classification is often used for planning purposes, budgeting, and programming. Generally, the Florida Department of Transportation (FDOT) is responsible for classifying the roadway network based on a number of individual features of the roadway. The functional classification of roadways within the Town limits are shown in **Table 2.2** and depicted in **Figure 2.3**. All roadways not identified in **Table 2.2** are considered local roads. The existing Federal Functional Classification of the roadways within the Town is also depicted in **Figure 2.6**.

The Town is currently in the process of attempting to change the functional classifications for Bay Drive, Dickens Avenue, 88th Street from Dickens Avenue to Collins Avenue and Byron Avenue from 88th Street to the southern Town limits from collector roadways to local roadways. These roadways do not provide a preferential traffic route when compared to other local roadways within the Town. This is evidenced by the existing traffic volumes on these roadways. Additionally, these roadways provide low levels of mobility, short trip lengths and low operating speeds. The change from a collector roadway classification to a local roadway classification will make it easier for the Town to meet the traffic calming thresholds required by Miami-Dade County. Miami-Dade County allows for traffic calming on both local and collector roadways; however, the minimum thresholds are generally less stringent for local roads when compared to collector roads. Traffic Calming criteria is discussed in depth in Section seven of this traffic study.

The Town met with FDOT staff on September 13, 2012 to discuss the process of changing the roadway functional classification. A letter dated September 25, 2012 was subsequently sent to the FDOT formally requesting the change in roadway functional classification. The FDOT is currently in the review process for the request which includes involvement of adjacent municipalities. The FDOT is expected to make a final determination in early 2013. If the FDOT

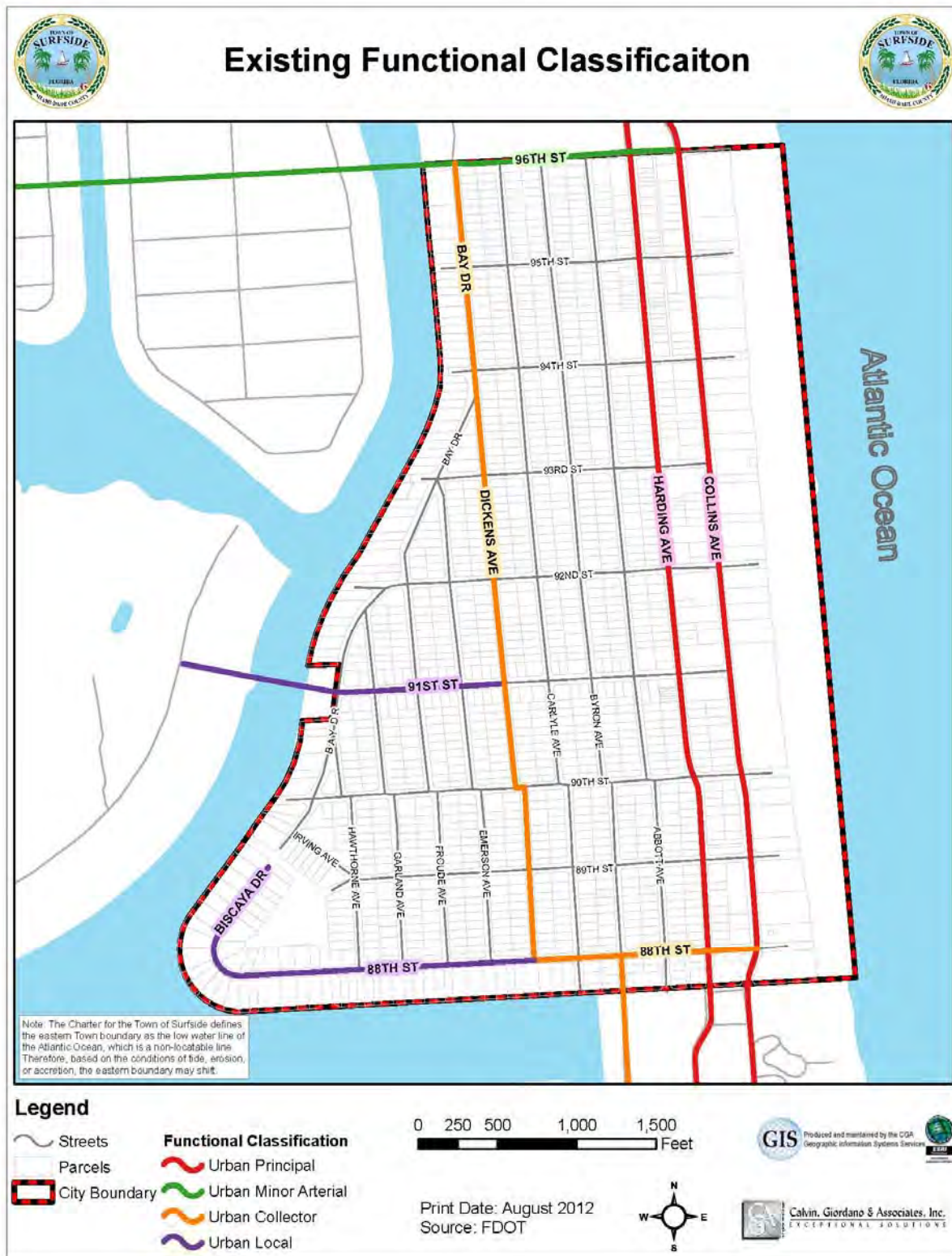
agrees with the decision to reclassify the streets, the FDOT will then submit the change to the Federal Highway Administration (FHWA).

Table 2.2 – Federal Functional Classification

Roadway	Federal Functional Classification
96 th Street	Urban Minor Arterial
Harding Avenue	Urban Principal Arterial
Collins Avenue	Urban Principal Arterial
Bay Drive (96 th Street to 94 th Street)	Urban Collector
Dickens Avenue	Urban Collector
91 st Street (Western Town Limits to Dickens Avenue)	Urban Local
88 th Street (West Street Termination to Dickens Avenue)	Urban Local
88 th Street (Dickens Avenue to Collins Avenue)	Urban Collector
Byron Avenue (88 th Street to Southern Town Limits)	Urban Collector

Source: 2011 FDOT FTI DVD

Figure 2.6 – Existing Federal Functional Classification



SECTION THREE

ROADWAY LINK EVALUATION

3.1 LINK ANALYSIS

A roadway link analysis was performed for the peak hour conditions on 96th Street, Collins Avenue, and Harding Avenue as shown in **Table 3.1**. A link analysis is generally the initial analysis performed for a roadway. A link analysis is utilized for planning purposes and provides a “ballpark” estimate for the actual capacity of the roadway. The peak hour traffic volumes were determined from the collected turning movement counts. The Town Comprehensive Plan requires 96th Street, Harding Avenue, and Collins Avenue to maintain an adopted Level of Service (LOS) E+20%. LOS for roadways are broken down with six LOS designations (LOS A – LOS F). LOS A represents the most ideal situation with minimal if any congestion at all while LOS F represents the worst conditions with high vehicular congestion. Each roadway is assigned a LOS capacity threshold volume based on a number of factors including but not limited to roadway type, number of lanes and number of traffic signals. The capacity thresholds are derived from the 2009 FDOT Quality/Level of Service Handbook.

The results of the link analysis demonstrate that there are currently no roadways operating below the LOS E+20% threshold. The results show that there is excess capacity for each of the study roadways. However, the link analysis is only an estimate of capacity and does not take into account many of the unique characteristics of the Town such as the close traffic signal proximity and high number of turn percentage on 96th Street at Collins Avenue and Harding Avenue. Therefore, it is advantageous to review more detailed traffic analysis.

Table 3.1 – Peak Hour Link Analysis

Road	Location	Adopted LOS	Existing Number of Lanes	AM Peak Hour			PM Peak Hour		
				LOS Capacity	AM Peak Hour Volume	AM Peak Hour LOS	LOS Capacity	PM Peak Hour Volume	PM Peak Hour LOS
96th St	W. of Bay Dr to Byron Ave	E+20%	4D	3,720	2,185	D	3,720	1,991	D
96th St	Byron Ave to Harding Ave	E+20%	4D	3,720	1,939	D	3,720	1,779	D
96th St	Harding Ave to Collins Ave	E+20%	4D	3,720	915	C	3,720	849	C
Harding Ave	96th St to 94th St	E+20%	3L	3,370	2,088	C	3,370	1,921	C
Harding Ave	94th St to 88th St	E+20%	3L	3,370	1,934	C	3,370	1,904	C
Collins Ave	96th St to 94th St	E+20%	3L	3,370	1,602	C	3,370	2,205	C
Collins Ave	94th St to 88th St	E+20%	3L	3,370	1,615	C	3,370	2,217	C

SECTION FOUR

EXISTING OPERATIONAL ANALYSIS

4.1 METHODOLOGY

An operational analysis was completed for each of the study intersections during the AM and PM peak hours. Synchro 7 software and VISSIM traffic simulation software were both utilized for the analysis. Synchro 7 software is a nationally accepted software that is commonly utilized for traffic impact analysis and is generally considered one of the most prominent tools to utilize for system wide signal timing improvements. Both Synchro and VISSIM offer different benefits that can be valuable to the Town. Synchro software is very common in the industry and is easier for other agencies and professionals to review and accept as valid. Since Synchro is commonly accepted in Miami-Dade County, it was determined to utilize Synchro to analyze the major signalized intersections on 96th Street, Harding Avenue, and Collins Avenue.

The Synchro calculated delay and Level of Service results for the major intersections were used for this study as opposed to the Synchro calculated Highway Capacity Manual (HCM) results. The main difference between the Synchro and HCM results is that Synchro has a more advanced calculation to incorporate the signal timing of the corridors. Since there are numerous signalized intersections within a close proximity for the study intersections and the corridors are running on a coordinated signal timing system, it was determined that the Synchro results would be the most accurate and appropriate.

VISSIM software is a nationally recognized microscopic traffic simulation tool. One of the main advantages of VISSIM is the ability to visually depict existing and future traffic scenarios. This can be particularly beneficial when presenting the findings of the study to the Town Commission and to Town residents. A VISSIM micro-simulation model encompassing the entire Town was created for this study. The VISSIM model was then calibrated to match the existing conditions based on field review and traffic data for the study intersections. The VISSIM model can be utilized for numerous scenarios including signal timing changes, new turn lanes,

pedestrian crossings, route detours, and many others. The VISSIM model was also utilized to analyze the local roadway intersections.

4.2 MAJOR ROADWAYS

The following intersections on 96th Street, Harding Avenue, and Collins Avenue were analyzed:

1. 96th Street at Carlyle Avenue
2. 96th Street at Byron Avenue
3. 96th Street at Harding Avenue
4. 96th Street at Collins Avenue
5. Harding Avenue at 95th Street
6. Harding Avenue at 94th Street
7. Collins Avenue at 95th Street
8. Collins Avenue at 94th Street

The intersection of 91st Street and Harding Avenue was unable to be included as part of this traffic study due to the temporary closure of 91st Street between Harding Avenue and Collins Avenue. This segment on 91st Street at the time of this study was being utilized as an equipment staging area for the WSSD project. However, the intersection of 91st Street at Harding Avenue was included in the traffic model for this study. This will enable the Town to cost effectively analyze this intersection once reliable traffic counts are able to be collected on 91st Street at Harding Avenue.

Existing signal timings from Miami-Dade County were utilized in the analysis. The Miami-Dade County signal timing sheets are included in **Appendix C**.

Levels of Service (LOS) for intersections are broken down with six LOS designations (LOS A – LOS F). LOS A represents the most ideal situation with minimal if any delay at all while LOS F represents the worst conditions with high vehicular delay. The LOS designations for signalized intersections are shown on **Table 4.1**.

Table 4.1 – LOS Criteria for Signalized Intersections

LOS	Control Delay per Vehicle (s/veh)
A	≤ 10
B	> 10-20
C	>20-35
D	>35-55
E	>55-80
F	>80

Source: 2000 HCM Exhibit 16-2

In addition to average vehicle delay and LOS, the 50th percentile and 95th percentile queues were also used as a performance measure for the signalized intersections. The 95th percentile queue is the calculated back of vehicle queue that has only a 5-percent probability of being exceeded during the analysis time period.

The results of the existing conditions analysis demonstrates that many of the roadway approaches are experiencing high delays and are currently operating at LOS E or LOS F. The major congestion location within the Town occurs on the intersections of 96th Street at Harding Avenue and Collins Avenue. The traffic congestion at these locations is largely due to high traffic volumes on opposing roadways and the close proximity of signalized intersections. 96th Street, Collins Avenue, and Harding Avenue all are part of a coordinated signal timing system. The limiting factor is the short available vehicle stacking space on 96th Street between Harding Avenue and Collins Avenue. Due to the high amount of eastbound left turns on 96th Street at Collins Avenue and westbound through movements on 96th Street at Harding Avenue, it is likely that one of these approaches will consistently queue with vehicles.

The existing signal timing pattern is configured so that the eastbound through vehicles on 96th Street at Harding Avenue are able to run continuously through 96th Street and make a left turn onto northbound Collins Avenue. This timing pattern is beneficial to eastbound 96th Street but causes additional delay for westbound 96th Street at Harding Avenue and subsequently the northbound left turn lane on Collins Avenue at 96th Street. The alternative would be to provide

advantageous signal timing progression for the northbound left turn on Collins Avenue onto 96th Street and then westbound through Harding Avenue. However, this pattern would have a detrimental impact on eastbound 96th Street and may cause vehicles to block the intersection of 96th and Harding Avenue which would cause substantial delays for both southbound Harding Avenue and eastbound 96th Street. Therefore, the existing signal timing pattern is considered the better of the two options since the upstream delay generally only effects the northbound left turn lane on Collins Avenue at 96th Street.

The results of the analysis demonstrate that the westbound approach on 96th Street at Harding Avenue is currently operating at LOS F during both peak hours, which is below acceptable thresholds.

In addition to the major roadways, many of the minor street approaches for the study intersections are experiencing high vehicle delays. At an intersection, the roadway that contains the higher amount of traffic volumes is usually considered the major street. Conversely, the roadway that contains the least amount of traffic volumes is considered the minor street. For example, Harding Avenue would be considered the major street while 95th Street would be considered the minor street at that intersection. Currently, 96th Street, Harding Avenue, and Collins Avenue are utilizing a coordinated traffic signal timing pattern to increase traffic progression and minimize delay on the major thoroughfares. Therefore, the minor street approaches have minimal green time and must wait the full cycle length before receiving a green light. While this approach is beneficial for the movement of traffic on the major thoroughfare, minor street traffic experiences significant delay. The average delay for many of the minor street approaches during the peak hours exceeds the Level of Service E threshold of 55 seconds.

The results of the existing conditions analysis for the AM and PM peak hours are shown on **Table 4.2.**

In addition to the high delays experienced at many of the study intersections, many of the approaches have 95th percentile queues that exceed the available stacking area. When vehicle queuing extends past the upstream intersection, this further compounds delay at both intersections and actual vehicle delay is larger than the computed delay. The 95th percentile queues for the study intersections are shown on **Table 4.3**.

Table 4.2 – Existing Conditions Analysis – Major Roadways - Delay

Intersection	Approach	AM Peak Hour		PM Peak Hour	
		Delay	LOS	Delay	LOS
96th Street at Bal Harbour Shops	EB	1.9	A	2.5	A
	SB	48.5	D	43.0	D
	WB	3.4	A	3.1	A
	Total	2.9	A	5.9	A
96th Street at Byron Avenue	NB	71.7	E	72.8	E
	EB	3.1	A	4.2	A
	WB	12.2	B	13.4	B
	Total	13.6	B	14.9	B
96th Street at Harding Avenue	EB	33.9	C	30.0	C
	SB	32.7	C	28.1	C
	WB	142.6	F	98.8	F
	Total	48.2	D	39.7	D
96th Street at Collins Avenue	NB	59.0	E	43.9	D
	EB	18.6	B	15.2	B
	WB	58.6	E	54.8	D
	Total	51.1	D	39.0	D
Harding Avenue at 95th Street	EB	107.7	F	65.7	E
	SB	14.4	B	10.1	B
	WB	241.4	F	91.2	F
	Total	34.2	C	18.1	B
Collins Avenue at 95th Street	NB	1.5	A	2.6	A
	EB	71.7	E	19.3	B
	WB	41.5	D	15.2	B
	Total	4.8	A	3.4	A
Harding Avenue at 94th Street	EB	67.7	E	73.6	E
	SB	5.0	A	4.0	A
	WB	77.3	E	187.9	F
	Total	10.7	B	23.7	C
Collins Avenue at 94th Street	NB	5.0	A	14.1	B
	EB	80.8	F	22.0	C
	WB	37.9	D	17.0	B
	Total	7.5	A	14.4	B

Table 4.3 – Existing Conditions Analysis– Major Roadways - 50th and 95th Percentile Queues

Intersection	Approach	Approx. Approach Storage Length	AM Peak Hour		PM Peak Hour		Storage Bay Exceeded?
			50 th Percentile Queue (ft)	95 th Percentile Queue (ft)	50 th Percentile Queue (ft)	95 th Percentile Queue (ft)	
96th Street at Bal Harbour Shops	EB	880	73	170	67	137	No
	SB	N/A	3	15	41	71	N/A
	WB	150	139	161	14	150	Yes
96th Street at Byron Avenue	NB	510	109	148	103	144	No
	EB	180	141	58	154	226	Yes
	WB	450	307	352	299	343	No
96th Street at Harding Avenue	EB	450	376	453	334	397	Yes
	SB	250	474	530	363	414	Yes
	WB	210	277	338	259	321	Yes
96th Street at Collins Avenue	NB	580	474	660	557	617	Yes
	EB	210	73	114	53	110	No
	WB	250	3	20	14	48	No
Harding Avenue at 95th Street	EB	190	216	#375	107	175	Yes
	SB	570	376	419	253	300	No
	WB	220	~134	#267	136	m#211	Yes
Collins Avenue at 95th Street	NB	580	33	35	23	24	No
	EB	190	69	m110	39	65	No
	WB	210	7	32	2	16	No
Harding Avenue at 94th Street	EB	190	78	136	145	227	Yes
	SB	570	195	m177	61	65	No
	WB	240	110	174	~226	m#351	Yes
Collins Avenue at 94th Street	NB	590	176	195	269	331	No
	EB	240	49	98	46	m78	No
	WB	160	8	37	2	12	No

~ Volume exceeds capacity, queue is theoretically infinite

95th percentile volume exceeds capacity, queue may be longer

m Volume for 95th percentile queue is metered by upstream signal

4.3 RESIDENTIAL ROADWAYS

The main purpose of the residential intersection counts was to obtain data for traffic patterns and volumes to determine appropriate locations for traffic calming. However, an operational analysis for the intersections within the residential district of the Town was also included. The following intersections within the residential district of the Town were analyzed:

1. 95th Street at Byron Avenue
2. 94th Street at Bay Drive
3. 93rd Street at Emerson Avenue
4. 91st Street at Abbot Avenue
5. 91st Street at Abbot Avenue
6. Bay Drive at Hawthorne Avenue
7. 90th Street at Carlyle Avenue
8. 89th Street at Hawthorne Avenue
9. 88th Street at Byron Avenue

Similarly to the signalized intersections, LOS designations from LOS A to LOS F are assigned to stop controlled intersections based on average delay. However, stop controlled intersections have a different threshold for delay and LOS because of driver perception. A driver is more willing to tolerate a higher amount of delay at a signalized intersection since they know that the light will eventually turn green and they will have an opportunity to get through the intersection. This does not occur at stop controlled intersections and thus drivers are less willing to tolerate delay. The LOS designations for stop controlled intersections are shown in **Table 4.4**.

Table 4.4 – LOS Criteria for Stop Controlled Intersections

LOS	Control Delay per Vehicle (s/veh)
A	0-10
B	> 10-15
C	>15-25
D	>25-35
E	>35-50
F	>50

Source: 2000 HCM Exhibit 17-2 and 17-22

The results of the analysis demonstrate that there is minimal peak hour delay at these intersections. Results of the VISSIM analysis for the residential stop controlled intersections are

shown in **Table 4.5**. It should be noted that a LOS designation is only given to stop controlled intersection approaches in accordance with Highway Capacity Manual methodology. The Synchro printouts for the signalized intersections are included in **Appendix D** while the VISSIM printouts for the unsignalized intersections are included in **Appendix E**.

The highest traffic volumes obtained for the residential intersections was the intersection of 95th Street at Byron Avenue. This can likely be attributed to the fact that Byron Avenue serves as the only option for Town residents to travel on westbound 96th Street without having to utilize Collins Avenue.

Table 4.5 – Existing Conditions Analysis – Residential Roadways

Intersection	Approach	AM Peak Hour		PM Peak Hour	
		Delay	LOS	Delay	LOS
94th Street at Bay Drive	NB	6.2	A	5.8	A
	SB	5.5	A	5.6	A
	WB	5.8	A	5.8	A
	Total	6	A	5.7	A
93rd Street at Bay Drive	NB	5.6	A	5.2	A
	NEB	0.1	-	0	-
	EB	3	A	-	-
	SWB	0.2	-	0	-
	WB	4.6	A	5.3	A
	Total	1.2	-	1	-
88th Street at Dickens Avenue	EB	0.1	-	0	-
	SB	5.7	A	-	-
	WB	0	-	0	-
	Total	0.9	-	0	-
91st Street at Abbott Avenue	NB	6.1	A	6.3	A
	EB	0.2	-	0.1	-
	SB	5.6	A	5.6	A
	WB	0.1	-	0.1	-
	Total	2.6	-	2.1	-
90th Street at Bay Drive	SWB	0.5	A	1.8	A
	WB	4.1	A	4.5	A
	Total	2.2	A	3.7	A
90th Street at Carlyle Avenue	NB	5.5	A	5.8	A
	EB	5.7	A	5.9	A
	SB	6.1	A	5.7	A
	WB	5.5	A	5.9	A
	Total	5.8	A	5.9	A
89th Street at Hawthorne Avenue	NB	4.8	A	4.7	A
	SEB	5	A	5.3	A
	SB	4.9	A	5.4	A
	WB	4.7	A	4.2	A
	Total	5.4	A	5.3	A

Table 4.5 Continued – Existing Conditions Analysis – Residential Roadways

Intersection	Approach	AM Peak Hour		PM Peak Hour	
		Delay	LOS	Delay	LOS
95th Street at Byron Avenue	NB	10.0	A	12.9	B
	EB	6.6	A	7.2	A
	SB	5.1	A	0.0	A
	WB	16.2	C	33.3	D
	Total	12.1	B	21.4	C
88th Street at Byron Avenue	NB	5.9	A	5.7	A
	EB	0.6	-	0.5	-
	SB	3.4	A	0.0	A
	WB	0.3	-	0.3	-
	Total	2.7	-	2.6	-

SECTION FIVE

ALTERNATIVE OPERATIONAL ANALYSIS

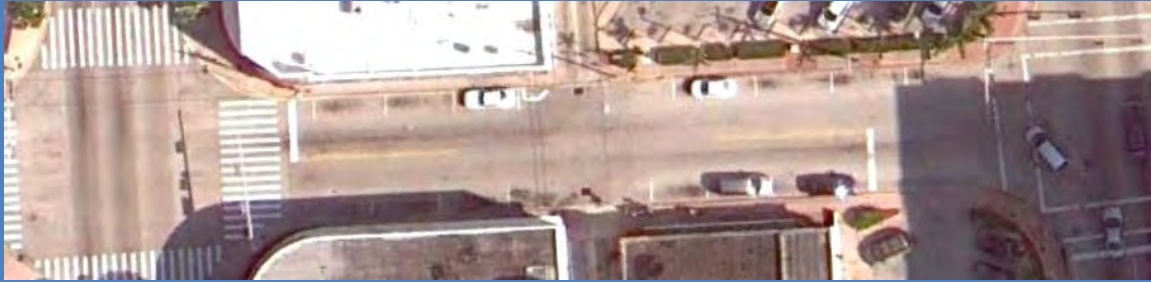
5.1 94TH STREET AND 95TH STREET EXCLUSIVE LEFT TURN LANES

As part of this traffic study, CGA evaluated the need for an exclusive left turn lane on 94th Street and 95th Street between Collins Avenue and Harding Avenue. This portion of 95th Street is approximately 40 feet wide which is sufficient width to add a turn lane. 94th Street is approximately 33 feet wide which would be just enough to accommodate an additional exclusive westbound left turn. However, several parallel parking spaces along 95th Street and 94th Street would need to be displaced to accommodate a turn lane. The 94th and 95th Street exclusive left turn lane alternative is depicted in **Figure 5.1**.

Turning movement counts were first reviewed to determine for which intersection a left turn lane would be most appropriate. The existing data collection showed that currently over 95% of vehicle trips on the eastbound approach of 95th Street and 94th Street at Collins Avenue make a left turn. Therefore, an eastbound left turn at these locations would not provide a practical benefit since the vehicle split is dominated by one movement. The existing data collection showed a much more even distribution for the westbound approach on 95th Street and 94th Street at Harding Avenue. Therefore, the roadway geometry was modified to accommodate a westbound left turn lane and a westbound through lane for both intersections in this alternative.

The results of the analysis showed an improvement for both vehicle delay and queue for the westbound approach on 94th Street and 95th Street at Harding Avenue. A comparison of the existing conditions and the proposed 95th Street and 94th Street exclusive left turn lanes are shown in **Tables 5.1 and 5.2**. The Synchro printouts for the 95th Street and 94th Street exclusive left turn lanes alternative are included in **Appendix F**.

Figure 5.1 – 94th Street and 95th Street Exclusive Left Turn Lanes



95th Street at Harding Avenue Existing Conditions



95th Street at Harding Avenue – Exclusive Left Turn Lane Alternative



94th Street at Harding Avenue Existing Conditions



94th Street at Harding Avenue – Exclusive Left Turn Lane Alternative

Table 5.1 – 94th Street and 95th Street Exclusive Left Turn Lane at Harding Avenue –Delay

95 th Street at Harding Avenue		Existing Conditions				95 th Street Left Turn Lane			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
Measure of Effectiveness	Approach	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Delay (s/veh)	EB	107.7	F	65.7	E	107.7	F	65.7	E
	SB	14.4	B	10.1	B	14.4	B	10.1	B
	WB	241.4	F	91.2	F	94.8	F	67.9	E
	Total	34.2	C	18.1	B	27.2	C	16.6	B

94 th Street at Harding Avenue		Existing Conditions				94 th Street Left Turn Lane			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
Measure of Effectiveness	Approach	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Delay (s/veh)	EB	67.7	E	73.6	E	67.7	E	73.6	E
	SB	5.0	A	4.0	A	5.1	A	4.1	A
	WB	77.3	E	187.9	F	69.2	E	68.2	E
	Total	10.7	B	23.7	C	10.5	B	14.0	B

Table 5.2 – 94th Street and 95th Street Exclusive Left Turn Lane at Harding Avenue – 50th and 95th Percentile Queues

95 th Street at Harding Avenue		Existing Conditions				95 th Street Left Turn Lane			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
Measure of Effectiveness	Approach	50 th (ft)	95 th (ft)	50 th (ft)	95 th (ft)	50 th (ft)	95 th (ft)	50 th (ft)	95 th (ft)
Delay (s/veh)	EB	216	#375	107	175	216	#375	107	175
	SB	376	419	253	300	376	419	253	300
	WB	~134	#267	136	m#211	54	#135	76	m111

94 th Street at Harding Avenue		Existing Conditions				94 th Street Left Turn Lane			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
Measure of Effectiveness	Approach	50 th (ft)	95 th (ft)	50 th (ft)	95 th (ft)	50 th (ft)	95 th (ft)	50 th (ft)	95 th (ft)
Delay (s/veh)	EB	78	136	145	227	78	136	145	227
	SB	195	m177	61	65	202	179	62	65
	WB	110	174	~226	m#351	74	130	109	m154

~ Volume exceeds capacity, queue is theoretically infinite

95th percentile volume exceeds capacity, queue may be longer

m Volume for 95th percentile queue is metered by upstream signal

The results of the alternative analysis indicate that the higher vehicular delays and queues for the westbound approach at the intersections of 95th Street and 94th Street at Harding Avenue can be reduced by the addition of a westbound left turn lane. However, the high vehicular delays are mostly due to the signal timing at these intersections. The cycle lengths for these study intersections are 160 seconds during the AM peak hour and 150 seconds during the PM peak hour, which is lengthy. Additionally, most of the green time is assigned to southbound Harding Avenue. Although westbound vehicles generally clear the intersection each cycle, the addition of a westbound left turn lane on 95th Street and 94th Street at Harding Avenue would increase the available vehicle stacking area and minimize the chance of vehicle queues extending to Collins Avenue.

5.2 SIGNAL TIMING OPTIMIZATION

Each of the eight signalized study intersections was analyzed to determine if signal timing improvements would provide a benefit to the existing operational conditions.

95th Street and 94th Street Traffic Signals

The Harding Avenue and Collins Avenue corridors are currently part of a coordinated signal timing plan. This enables favorable progression on Harding Avenue and Collins Avenue through the Town and minimizes vehicle delay on the major streets. As is often a result of coordinated timing plans, the minor streets have increased vehicular delays and queues. The current timing plans for the 95th Street and 94th Street intersections are shown in **Table 5.3**.

Table 5.3 – 94th Street and 95th Street Existing Signal Timing Plans
(Values shown are in seconds)

Intersection	AM Peak Hour			PM Peak Hour		
	Cycle	NB/SB	EB/WB	Cycle	NB/SB	EB/WB
94 th Street at Harding Avenue	160	133	27	150	123	27
95 th Street at Harding Avenue	160	133	27	150	123	27
94 th Street at Collins Avenue	160	134	26	75	49	26
95 th Street at Collins Avenue	160	135	25	75	50	25

Collins Avenue at 94th Street and 95th Street during the PM peak hour is currently operating on what is commonly referred to as a “half cycle”, meaning the signal cycle repeats every 80 seconds rather than every 160 seconds. A half cycle is generally used at intersections along a coordinated roadway where it is more beneficial to utilize a shorter cycle length than the longer cycle length used along the corridor. In this case, the half cycle allows more green time for the

minor streets and still allows for favorable progression on Collins Avenue by operating within a multiple of the 160 second cycle length established for the corridor. Each of the signalized intersections on 94th Street and 95th Street are pre-timed intersections without any vehicle or pedestrian detection.

In this signal timing optimization alternative, the signal timing was adjusted at each intersection. Vehicle and pedestrian detectors were assumed for the eastbound and westbound approaches on 94th Street and 95th Street to allow the assignment of only the amount of green time necessary to meet actual demand. The pedestrians timing was assumed to remain the same as the existing signal timings. Additionally, the cycle lengths for the Harding Avenue at 94th Street and 95th Street intersections were set to half cycles during the AM and PM peak hours. The cycle length for the Collins Avenue at 94th Street and 95th Street intersections were also set to half cycles during the AM peak hour. The modified signal timing is shown in **Table 5.4**. The results of the analysis are shown in **Table 5.5**

Table 5.4 – 94th Street and 95th Street Alternative Signal Timing Plans

Intersection	AM Peak Hour			PM Peak Hour		
	Cycle	NB/SB	EB/WB	Cycle	NB/SB	EB/WB
94 th Street at Harding Avenue	80	55	25	75	50	25
95 th Street at Harding Avenue	80	55	25	75	50	25
94 th Street at Collins Avenue	80	55	25	75	49	26
95 th Street at Collins Avenue	80	55	25	75	50	25

Note: Vehicle and pedestrian detectors included on minor street approaches.

Table 5.5 – 94th Street and 95th Street Signal Timing Optimization – Delay

		Existing Conditions				Signal Timing Optimization			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
Intersection	Approach	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
94 th Street at Harding Avenue	EB	58.0	E	57.8	E	27.0	C	24.8	C
	SB	5.8	A	6.4	A	5.3	A	9.5	A
	WB	54.6	D	64.7	E	31.0	C	24.8	C
	Total	10.0	A	14.8	B	7.3	A	11.9	B
95 th Street at Harding Avenue	EB	158.3	F	72.6	E	39.5	D	26.3	C
	SB	11.2	B	9.0	A	8.8	A	8.4	A
	WB	63.6	E	76.2	E	28.3	C	29.0	C
	Total	22.8	C	15.7	B	12.6	B	10.4	B
94 th Street at Collins Avenue	NB	4.2	A	10.5	B	5.9	A	7.2	A
	EB	70.6	E	19.8	B	23.2	C	28.2	C
	WB	58.2	E	20.8	C	15.5	B	19.2	B
	Total	6.6	A	11.0	B	6.6	A	8.1	A
95 th Street at Collins Avenue	NB	3.5	A	12.2	B	3.8	A	11.8	B
	EB	73.4	E	22.3	C	34.5	C	20.9	C
	WB	50.4	D	25.1	C	28.2	C	22.9	C
	Total	6.4	A	12.7	B	5.4	A	12.3	B

The results of the analysis demonstrate that the signal timing improvements made a significant impact on the study intersections. The minor street approaches of 94th Street and 95th Street showed a substantial decrease in delay all while Harding Avenue and Collins Avenue maintained a low average delay. Motorists who utilize the 94th Street and 95th Street intersections will notice that their average wait time for the traffic signals will decrease by about half from the existing conditions. The signal timing adjustments will also provide a significant reduction to the vehicle queue on 95th Street and 94th Street. The 50th and 95th percentile vehicle queues for the optimized conditions are shown in **Table 5.6**.

Table 5.6 – 94th Street and 95th Street Signal Timing Optimization – 50th and 95th Percentile Queues

Intersection	Approach	Approx. Approach Storage Length	AM Peak Hour		PM Peak Hour		Storage Bay Exceeded?
			50 th Percentile Queue (ft)	95 th Percentile Queue (ft)	50 th Percentile Queue (ft)	95 th Percentile Queue (ft)	
Harding Avenue at 95 th Street	EB	190	88	154	51	84	No
	SB	570	190	153	78	181	No
	WB	220	33	48	67	m109	No
Collins Avenue at 95 th Street	NB	580	2	245	17	19	No
	EB	190	41	m59	34	69	No
	WB	210	4	18	2	16	No
Harding Avenue at 94 th Street	EB	190	32	67	63	113	No
	SB	570	184	258	132	33	No
	WB	240	43	81	58	m111	No
Collins Avenue at 94 th Street	NB	590	169	207	269	331	No
	EB	240	25	m37	37	m55	No
	WB	160	3	20	2	12	No

m Volume for 95th percentile queue is metered by upstream signal

96th Street Traffic Signals

The existing signal timing during the AM and PM peak hours was also evaluated for the signalized intersections of 96th Street at Bal Harbour Shops, Byron Avenue, Harding Avenue, and Collins Avenue. Generally, the signalized intersections on 96th Street are currently operating efficiently as possible given the high vehicle demand. However, due to the proximity of the traffic signals, some vehicular queuing extends to upstream signals at peak periods during the day. However, the vehicular queue usually dissipates after each cycle. Minor signal timing adjustments were made to the intersections of 96th Street at Bal Harbour Shops, Byron Avenue, and Collins Avenue as explained below:

- 96th Street at Bal Harbour Shops – Intersection timing splits were adjusted slightly for both the AM and PM peak hours.
- 96th Street at Byron Avenue – The cycle length was adjusted to a half cycle and the splits were optimized. The half cycles significantly reduce the delay on Byron Avenue.

- 96th Street at Harding Avenue – Intersection timing splits were adjusted slightly.
- 96th Street at Collins Avenue – The intersection timing splits were adjusted to give the northbound approach more green time and eastbound approach less green time.

The Town has been proactive in the past regarding improving signal timing in the Town to benefit the residents of Surfside. The northbound approach on Byron Avenue at 96th Street has historically been very congested with high delays and vehicle queues during school days and times. However, the Town was able to mitigate much of the delay by bringing it to the County's attention and requesting an adjustment in signal timing.

Intersection offsets were adjusted as necessary to maintain efficient progression along each of the major corridors. The results of the optimized conditions analysis for the 96th Street intersections are shown in **Tables 5.7 and 5.8**. The Synchro printouts for the signal timing optimization alternative are included in **Appendix G**.

Table 5.7 – 96th Street Signal Timing Optimization - Delay

		Existing Conditions				Signal Timing Optimization			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
Intersection	Approach	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
96th Street at Bal Harbour Shops	EB	1.9	A	2.5	A	1.9	A	2.5	A
	SB	48.5	D	43.0	D	48.5	D	43.0	D
	WB	3.4	A	3.1	A	2.4	A	1.7	A
	Total	2.9	A	5.9	A	2.5	A	5.2	A
96th Street at Byron Avenue	NB	71.7	E	72.8	E	30.9	C	32.9	C
	EB	3.1	A	4.2	A	4.2	A	6.2	A
	WB	12.2	B	13.4	B	3.6	A	2.0	A
	Total	13.6	B	14.9	B	6.8	A	7.5	A
96th Street at Harding Avenue	EB	33.9	C	30.0	C	30.5	C	22.5	C
	SB	32.7	C	28.1	C	32.7	C	31.1	C
	WB	142.6	F	98.8	F	115.0	F	36.9	D
	Total	48.2	D	39.7	D	43.3	D	29.2	C
96th Street at Collins Avenue	NB	59.0	E	43.9	D	21.9	C	22.1	C
	EB	18.6	B	15.2	B	31.4	C	28.8	C
	WB	58.6	E	54.8	D	58.6	E	54.6	D
	Total	51.1	D	39.0	D	23.9	C	23.6	C

Table 5.8 – 96th Street Signal Timing Optimization – 50th and 95th Percentile Vehicle Queues

Intersection	Approach	Approx. Approach Storage Length	AM Peak Hour		PM Peak Hour		Storage Bay Exceeded?
			50 th Percentile Queue (ft)	95 th Percentile Queue (ft)	50 th Percentile Queue (ft)	95 th Percentile Queue (ft)	
96th Street at Bal Harbour Shops	EB	880	73	170	67	137	No
	SB	N/A	3	15	41	71	N/A
	WB	150	76	87	24	40	No
96th Street at Byron Avenue	NB	510	50	69	47	75	No
	EB	180	88	186	102	252	Yes
	WB	450	19	359	17	22	No
96th Street at Harding Avenue	EB	450	341	412	285	268	No
	SB	250	474	530	382	435	Yes
	WB	210	247	338	215	275	Yes
96th Street at Collins Avenue	NB	580	293	600	413	483	Yes
	EB	210	143	182	186	220	Yes
	WB	250	3	20	14	48	No

SECTION SIX

FUTURE CONDITIONS OPERATIONAL ANALYSIS

6.1 PLANNED AND PROGRAMMED ROADWAY IMPROVEMENTS

Programmed (funded and/or committed) transportation improvements within the traffic impact study area were collected using the Florida Department of Transportation (FDOT) five year work program, Miami Dade County's Metropolitan Planning Organization (MPO) Transportation Improvement Program (TIP) and the 2035 Long Range Transportation Plan (LRTP). There were no identified roadway capacity improvements planned for or funded within the study area.

6.2 BACKGROUND TRAFFIC

Background traffic was calculated to account for committed and anticipated development in the study area. Future background traffic for the study was first developed by applying an annual growth rate to the seasonally adjusted 2012 traffic counts. Year 2017 was chosen for the future year conditions since this corresponds with the end of the FDOT five year work program. Historical FDOT traffic counts were first reviewed to determine historical growth trends. The data showed inconsistent or little traffic growth within the past ten years on Harding Avenue and Collins Avenue. Therefore, in an effort to be conservative a growth rate of 1.0% was chosen for the study area.

6.3 POTENTIAL FUTURE DEVELOPMENT

At the time of this traffic study there were three developments that had been approved by the Town but had not yet been constructed that potentially could generate a significant amount of additional traffic. The committed developments are shown in **Table 6.1**.

Table 6.1 – Committed Development

Development	Location	Intensity/Size
Young Israel	9580 Abbott Avenue	23,784 SF
92 nd Street Hotel	North side of 92 nd Street between Harding Avenue and Collins Avenue	175 rooms
Grand Beach Hotel	Collins Avenue north of 94 th Street	341 rooms

Traffic studies submitted to the Town for the approved projects were utilized to forecast project trips. In the event that the submitted proposed development traffic study had a limited study area, assumptions were made to forecast traffic throughout the Town.

In addition to the committed development within the Town, two other projects, Surf Club and the Shul, were in the Town review process and had not yet received approval from the Town Commission at the time of the writing of this study. A traffic study for the Surf Club had been submitted but a traffic study for the Shul had not been submitted. The project trips for the Surf Club were broken out individually and included in the 2017 scenario based on the existing traffic study. Project trips for the Shul were estimated and distributed throughout the roadway network based on the buildout potential.

In addition to the anticipated growth within the Town, Bal Harbour Shops is anticipated to have a significant expansion in the future. Bal Harbour Shops is located just outside the Town borders north of 96th Street between Harding Avenue and Bay Drive. The proposed expansion is to consist of approximately 250,000 additional square feet of retail use and restaurants. Additionally, the parking garage could be expanded as well to accommodate the additional vehicle demand. The new Bal Harbour Shops trips were estimated and included in the 2017 scenario. The background traffic development sheets are included in **Appendix H**.

6.4 YEAR 2017 CONDITIONS OPERATIONAL ANALYSIS

The 2017 conditions were analyzed for two scenarios. The first scenario included utilizing the existing signal timing patterns while the second scenario included the optimized signal timing improvements previously identified. The results of the 2017 conditions with existing signal timing are shown in **Tables 6.2 and 6.3**. The Synchro printouts for the 2017 conditions with existing signal timing analysis are included in **Appendix I**.

The results of the 2017 conditions with existing signal timing analysis demonstrate that there could potentially be very significant delays and traffic congestion within the Town. The existing high vehicle delays and queues currently experienced will only be exacerbated under the 2017 conditions. Several of the intersections and particularly 96th Street at Harding Avenue and Collins Avenue deteriorate under this scenario.

The results of the 2017 optimized conditions are shown in **Tables 6.4 and 6.5**. The Synchro printouts for the 2017 optimized conditions are also included in **Appendix I**. The results demonstrate that the 2017 optimized conditions perform significantly more efficiently than the 2017 conditions without signal timing improvements. However, even with the improved timings, there is expected to be substantial vehicle delays and queues. The westbound approach of 96th Street at Harding Avenue will operate at LOS F with 50 percentile queues extending up to Collins Avenue. This will cause further increased delay and congestion beyond what is actually calculated. Additionally, the vehicular queuing on eastbound 96th Street at Harding Avenue will only get worse than the existing conditions and it potentially could be common for vehicle queuing to extend past Byron Avenue and further impact the operations of the upstream intersections beyond what is calculated.

The 2017 conditions analysis should be considered a general estimate of future conditions since it includes potential development that had not yet been approved and/or constructed at the time of this traffic study. Additionally, new developments within or outside of the Town could potentially cause a change in traffic patterns that deviate from the existing conditions.

Table 6.2 – 2017 Potential Future Conditions Analysis with Existing Signal Timing – Major Roadways - Delay

Intersection	Approach	2012 Existing Conditions				2017 Conditions ⁽¹⁾			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
96th Street at Bal Harbour Shops	EB	1.9	A	2.5	A	2.4	A	3.4	A
	SB	48.5	D	43.0	D	56.7	E	55.4	E
	WB	3.4	A	3.1	A	4.0	A	4.5	A
	Total	2.9	A	5.9	A	4.3	A	9.8	A
96th Street at Byron Avenue	NB	71.7	E	72.8	E	72.6	E	72.7	E
	EB	3.1	A	4.2	A	4.3	A	6.9	A
	WB	12.2	B	13.4	B	12.8	B	14.2	B
	Total	13.6	B	14.9	B	14.2	B	16.1	B
96th Street at Harding Avenue	EB	33.9	C	30.0	C	38.4	D	36.5	D
	SB	32.7	C	28.1	C	38.0	D	32.7	C
	WB	142.6	F	98.8	F	261.8	F	237.1	F
	Total	48.2	D	39.7	D	70.7	E	68.6	E
96th Street at Collins Avenue	NB	59.0	E	43.9	D	104.6	F	74.6	E
	EB	18.6	B	15.2	B	19.2	B	16.0	B
	WB	58.6	E	54.8	D	58.5	E	54.9	D
	Total	51.1	D	39.0	D	89.2	F	65.2	E
Harding Avenue at 95th Street	EB	107.7	F	65.7	E	331.8	F	68.3	E
	SB	14.4	B	10.1	B	17.1	B	13.7	B
	WB	241.4	F	91.2	F	1299.9	F	367.0	F
	Total	34.2	C	18.1	B	141.0	F	48.1	D
Collins Avenue at 95th Street	NB	1.5	A	2.6	A	1.9	A	16.1	B
	EB	71.7	E	19.3	B	138.8	F	26.5	C
	WB	41.5	D	15.2	B	42.2	D	18.5	B
	Total	4.8	A	3.4	A	12.7	B	16.8	B
Harding Avenue at 94th Street	EB	67.7	E	73.6	E	69.2	E	76.7	E
	SB	5.0	A	4.0	A	5.2	A	6.7	A
	WB	77.3	E	187.9	F	84.7	F	281.5	F
	Total	10.7	B	23.7	C	11.2	B	31.2	C
Collins Avenue at 94th Street	NB	5.0	A	14.1	B	5.5	A	21.2	C
	EB	80.8	F	22.0	C	91.1	F	25.3	C
	WB	37.9	D	17.0	B	36.3	D	18.0	B
	Total	7.5	A	14.4	B	9.8	A	21.4	C

(2) 2017 Conditions include existing (2012) traffic counts plus a 1% annual growth rate, committed development trips, and additional potential developments such as the Bal Harbour Shops expansion. The existing signal timings were utilized in this scenario.

Table 6.3 – 2017 Potential Future Conditions Analysis with Existing Signal Timing – Major Roadways – 50th and 95th Percentile - Queues

Intersection	Approach	Approx. Approach Storage Length	AM Peak Hour		PM Peak Hour		Storage Bay Exceeded?
			50 th Percentile Queue (ft)	95 th Percentile Queue (ft)	50 th Percentile Queue (ft)	95 th Percentile Queue (ft)	
96th Street at Bal Harbour Shops	EB	880	87	202	106	156	No
	SB	N/A	20	39	97	138	N/A
	WB	150	150	171	140	156	Yes
96th Street at Byron Avenue	NB	510	118	160	110	153	No
	EB	180	204	285	253	336	Yes
	WB	450	370	414	366	414	No
96th Street at Harding Avenue	EB	450	424	501	371	510	Yes
	SB	250	603	666	472	530	Yes
	WB	210	342	407	341	406	Yes
96th Street at Collins Avenue	NB	580	549	m#757	660	714	Yes
	EB	210	68	m109	56	m88	No
	WB	250	3	21	15	51	No
Harding Avenue at 95th Street	EB	190	~246	#430	124	199	Yes
	SB	570	500	554	387	447	No
	WB	220	~380	#548	~353	m#470	Yes
Collins Avenue at 95th Street	NB	580	54	58	34	33	No
	EB	190	~193	m#325	86	132	Yes
	WB	210	7	30	4	18	No
Harding Avenue at 94th Street	EB	190	91	155	159	#247	Yes
	SB	570	254	m237	515	m288	No
	WB	240	132	201	~280	m#339	Yes
Collins Avenue at 94th Street	NB	590	217	237	383	#492	No
	EB	240	107	m172	66	m99	No
	WB	160	8	37	2	12	No

~ Volume exceeds capacity, queue is theoretically infinite

95th percentile volume exceeds capacity, queue may be longer

m Volume for 95th percentile queue is metered by upstream signal

Table 6.4 – 2017 Potential Future Conditions Analysis with Signal Timing Improvements – Major Roadways - Delay

Intersection	Approach	2012 Optimized Conditions				2017 Optimized Conditions ⁽¹⁾			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
96th Street at Bal Harbour Shops	EB	1.9	A	2.5	A	2.4	A	3.4	A
	SB	48.5	D	43.0	D	56.7	E	55.4	E
	WB	2.4	A	1.7	A	2.5	A	2.3	A
	Total	2.5	A	5.2	A	3.7	A	8.9	A
96th Street at Byron Avenue	NB	30.9	C	32.9	C	31.0	C	32.9	C
	EB	4.2	A	6.2	A	5.4	A	6.0	A
	WB	3.6	A	2.0	A	5.1	A	1.3	A
	Total	6.8	A	7.5	A	7.8	A	6.8	A
96th Street at Harding Avenue	EB	30.5	C	22.5	C	34.1	C	38.0	D
	SB	32.7	C	31.1	C	39.0	D	36.2	D
	WB	115.0	F	36.9	D	131.0	F	102.0	F
	Total	43.3	D	29.2	C	50.9	D	48.0	D
96th Street at Collins Avenue	NB	21.9	C	22.1	C	15.7	B	23.6	C
	EB	31.4	C	28.8	C	45.2	D	43.2	D
	WB	58.6	E	54.6	D	58.5	E	52.7	D
	Total	23.9	C	23.6	C	21.1	C	27.0	C
Harding Avenue at 95th Street	EB	30.7	C	29.5	C	32.1	C	26.4	C
	SB	7.0	A	4.6	A	9.6	A	11.5	B
	WB	20.8	C	42.5	D	50.2	D	59.5	E
	Total	9.9	A	8.2	A	14.6	B	16.4	B
Collins Avenue at 95th Street	NB	3.8	A	1.4	A	6.1	A	4.6	A
	EB	29.5	C	27.0	C	37.9	D	32.5	C
	WB	17.9	B	15.3	B	17.7	B	19.2	B
	Total	5.0	A	2.7	A	8.6	A	6.6	A
Harding Avenue at 94th Street	EB	27.8	C	33.5	C	28.5	C	33.2	C
	SB	6.6	A	3.7	A	8.9	A	5.3	A
	WB	23.2	C	35.9	D	24.0	C	44.0	D
	Total	8.2	A	8.3	A	10.3	B	9.9	A
Collins Avenue at 94th Street	NB	7.0	A	10.0	A	7.8	A	15.2	B
	EB	30.2	C	26.5	C	33.0	C	29.5	C
	WB	16.2	B	17.1	B	15.5	B	18.0	B
	Total	7.7	A	10.6	B	9.1	A	15.9	B

(1) 2017 Conditions include existing (2012) traffic counts plus a 1% annual growth rate, committed development trips, and additional potential developments such as the Bal Harbour Shops expansion. The optimized signal timing improvements previously identified were utilized in this scenario.

Table 6.5 – 2017 Potential Future Conditions Analysis with Signal Timing Improvements – Major Roadways – 50th and 95th Percentile Queues

Intersection	Approach	Approx. Approach Storage Length	AM Peak Hour		PM Peak Hour		Storage Bay Exceeded?
			50 th Percentile Queue (ft)	95 th Percentile Queue (ft)	50 th Percentile Queue (ft)	95 th Percentile Queue (ft)	
96th Street at Bal Harbour Shops	EB	880	87	202	106	156	No
	SB	N/A	20	39	97	138	N/A
	WB	150	83	95	81	93	No
96th Street at Byron Avenue	NB	510	54	74	51	79	No
	EB	180	108	217	186	273	Yes
	WB	450	20	423	16	24	No
96th Street at Harding Avenue	EB	450	580	458	575	#680	Yes
	SB	250	610	674	495	560	Yes
	WB	210	267	407	303	401	Yes
96th Street at Collins Avenue	NB	580	196	641	429	535	Yes
	EB	210	147	m218	155	m216	Yes
	WB	250	3	21	16	52	No
Harding Avenue at 95th Street	EB	190	100	171	53	97	No
	SB	570	273	364	288	394	No
	WB	220	80	#204	122	m166	No
Collins Avenue at 95th Street	NB	580	8	310	33	31	No
	EB	190	89	m112	87	m115	No
	WB	210	3	17	5	18	No
Harding Avenue at 94th Street	EB	190	37	76	70	119	Yes
	SB	570	305	290	52	142	No
	WB	240	46	86	78	m97	No
Collins Avenue at 94th Street	NB	590	208	254	393	#515	No
	EB	240	39	m57	50	m69	No
	WB	160	3	19	2	13	No

~ Volume exceeds capacity, queue is theoretically infinite

95th percentile volume exceeds capacity, queue may be longer

m Volume for 95th percentile queue is metered by upstream signal

6.5 FUTURE PARKING GARAGE

The Town has expressed the possibility of a future garage located at one of three existing Town owned parking lots. The potential locations include the following and are depicted in **Figure 6.1**:

1. 3 story garage located just east of Abbott Avenue between 96th Street and 95th Street
2. 4 story garage located just south of 95th Street west of Collins Avenue
3. 3 story garage located just south of 94th Street east of Harding Avenue

The exact number of parking spaces for each of the potential parking garage locations has not been determined at this time. The potential parking garage locations could have a significant traffic impact at the adjacent intersections as it is reasonable to assume that each of the potential parking garages would increase vehicle demand at each location.

Roadway and signal timing improvements may be necessary to mitigate any potential increase in traffic at these locations. The signal timing improvements including half cycle lengths outlined previously in this report would likely be the most cost effective mitigation solution at the adjacent signalized intersections. However, the inclusion of an exclusive left turn lane on 94th Street or 95th Street between Harding Avenue and Collins Avenue should also be considered.

Figure 6.1 – Potential Parking Garage Locations



SECTION SEVEN

MIAMI-DADE COUNTY TRAFFIC CALMING CRITERIA

7.1 GENERAL CRITERIA

Miami Dade County has authority, subject to all applicable laws, to approve, modify, remove, continue or deny any traffic flow modification within the Town of Surfside. Miami-Dade County has established a procedure manual for residents and/or applicants seeking to implement traffic calming devices and it is included in **Appendix J**. The minimum criterion established in the manual is shown in **Table 7.1**. Minimum criterion includes thresholds for traffic volume, 85th percentile speed, number of correctable accidents per year, cut through traffic, pedestrian crossing volume, and concurrence of residents. However, the minimum traffic volume thresholds can be reduced to a total of 30% and the speed thresholds can be reduced to 50% at the request of those municipalities which provide funding for their traffic calming program, such as the Town of Surfside.

The manual states that the Miami-Dade Public Works Department will make the determination on which criteria needs to be met and which entities will be required for review. Miami Dade County establishes three levels of traffic calming ranging from the least restrictive (Level 1) to the most restrictive (Level 3). Miami Dade County may also require that temporary traffic calming devices be installed before more restrictive devices are constructed. In this scenario, a post implementation traffic study would be required to determine the effectiveness of the temporary device. The three levels of traffic calming devices are shown in **Table 7.2**. Traffic flow modifications are only to be constructed on residential local roads and residential collector roads. The time table for the process of implementing a traffic calming device can vary greatly depending on the type of device, what requirements Miami-Dade County necessitates, and whether a temporary traffic calming device followed by a post implementation study is necessary. Generally, the process can be completed in a few months if Miami-Dade County does not require extensive public outreach or temporary traffic calming devices followed by a post implementation study.

Table 7.1 – Miami-Dade County Traffic Flow Modification Criteria

Must meet the first criteria and at least one of the remaining criteria in order for the Public Works Department to consider Traffic Calming measures:		
Criterion	Residential Local Streets	Residential Collector Streets
Minimum Traffic Volume	>1,500 VPD <3,000***	>3,000 VPD <8,000***
	>150 VPH <300	>300 VPH <800
85th Percentile Speed+	10 MPH> Speed Limit	10 MPH> Speed Limit
Correctable Accidents per year	>3 per year	>6 per year
Cut Through Traffic	>25%	>50%
Pedestrian Crossing Volume	>25	>50
Concurrence of residence*	2/3 of total number of residents**	2/3 of total number of residents **
VPD = Vehicles per day; VPH = Vehicles per hour		
+ It is the speed at which 85% of motorists travel		
* Prior to community notification to submit petition, the above guidelines will first be evaluated to determine eligibility for application of calming measures.		
** For mid-block calming, total residents=All property owners between adjacent intersection		
** For intersection calming, total residents=All property owners from subject intersections to the next intersections of all legs.		
*** The traffic volume within a municipal boundary could be reduced to a total of 30%, and speed to 50% at the request of and for those municipalities, which provide funding for their traffic calming program.		

Source: Table from Miami Dade County Traffic Flow Modification/Street Closure procedure

Table 7.2 – Levels of Traffic Calming

Levels of Traffic Calming		
Level 1	Level 2	Level 3
Education	Chokers	Semi Diverter
Neighborhood Speed Watch Program	Roundabouts	Diagonal Diverter
Law Enforcement	Traffic Circle	Street Closure
Movement Restrictions	Speed Humps	Speed Humps
One Way Streets	Raised Median through Intersections (Right Turn Only)	
Multi-Way Stop Control	Mid-block Raised Islands/Medians	
Textured Pavement		
Gateway Treatments		
Border Landscaping Treatment		

7.2 SPEED HUMP/TABLE CRITERIA

In addition to the general traffic flow modification procedure, Miami Dade County also has specific policies regarding speed humps/tables. One of the criteria that is most applicable to the Town is the requirement that the street must be 750 feet long with no intersecting roadways in between. Based on this minimum requirement, the majority of the Town’s local roadways do not qualify for speed humps/tables. Only 88th Street segment west of Hawthorne Avenue meets this requirement. The full list of criterion for speed humps is included in **Appendix K**.

7.3 LOCAL ROAD ANALYSIS

Traffic counts were conducted throughout the Town to determine where it would be appropriate to install traffic calming devices. The ten locations selected for bi-directional tube counts and speed data were compared to the Miami-Dade County traffic calming thresholds. The results are shown in **Table 7.3**.

Table 7.3 – Traffic Calming Thresholds – Tube Counts

Location	Daily Traffic	Meet Daily Volume Thresholds?	Hourly Traffic	Meets Hourly Volume Thresholds?	MPH Over Speed Limit	Meets Speed Thresholds?
Bay Drive between 96th Street and 95th Street	534	No ⁽²⁾	64	No ⁽²⁾	7	Yes ⁽¹⁾
Bay Drive between 91st Street and Hawthorne Avenue	420	No	48	Yes ⁽¹⁾	3	No
Carlyle Avenue between 95th Street and 94th Street	2162	Yes	360	Yes	8	Yes ⁽¹⁾
93rd Street between Carlyle Avenue and Byron Avenue	554	Yes ⁽¹⁾	54	Yes ⁽¹⁾	1	No
92nd Street between Dickens Avenue and Carlyle Avenue	785	Yes ⁽¹⁾	64	Yes ⁽¹⁾	5	No
Abbott Avenue between 92nd Street and 91st Street	408	Yes ⁽¹⁾	38	No	7	Yes ⁽¹⁾
91st Street between Carlyle Avenue and Byron Avenue	1187	Yes ⁽¹⁾	101	Yes ⁽¹⁾	5	No
Byron Avenue between 91st Street and 90th Street	1068	Yes ⁽¹⁾	268	Yes ⁽¹⁾	8	Yes ⁽¹⁾
89th Street between Carlyle Avenue and Byron Avenue	820	Yes ⁽¹⁾	82	Yes ⁽¹⁾	3	No
88th Street west of Hawthorne Avenue	473	Yes ⁽¹⁾	39	No	5	No

(1) Meets reduced requirement allowed for municipalities that fund their own traffic calming program.

(2) Does not meet current thresholds since the roadway is classified as a collector. The Town is in the process of changing this roadway designation to a local roadway. Criteria would be met for a local roadway with the allowed reduced thresholds.

Intersection turning movement counts were also collected at nine intersections on the Town’s local roadway system. The traffic volumes obtained for these turning movement counts were also compared to the hourly thresholds for traffic calming devices. The roadway segments that exceed the minimum requirement are shown in **Table 7.4**.

Table 7.4 – Traffic Calming Thresholds – Intersection Counts

Location	Hourly Traffic	Meet hourly volume thresholds
Byron Avenue north of 95 th Street	354	Yes ⁽¹⁾
Byron Avenue south of 95 th Street	347	Yes ⁽¹⁾
Byron Avenue south of 88 th Street	154	Yes ⁽¹⁾
95 th Street west of Byron Avenue	149	Yes ⁽¹⁾
95 th Street east of Byron Avenue	348	Yes ⁽¹⁾
Bay Drive north of 94 th Street	131	Yes ⁽¹⁾
Bay Drive south of 94 th Street	137	Yes ⁽¹⁾
91 st Street west of Abbott Avenue	106	Yes ⁽¹⁾
91 st Street east of Abbott Avenue	98	Yes ⁽¹⁾
90 th Street west of Carlyle Avenue	77	Yes ⁽¹⁾
90 th Street east of Carlyle Avenue	81	Yes ⁽¹⁾
88 th Street west of Dickens Avenue	84	Yes ⁽¹⁾
88 th Street east of Dickens Avenue	93	Yes ⁽¹⁾
88 th Street west of Byron Avenue	132	Yes ⁽¹⁾
88 th Street east of Byron Avenue	173	Yes ⁽¹⁾
(1) Meets reduced requirement allowed for municipalities that fund their own traffic calming program.		

The results of the traffic counts demonstrate that the majority of the local roadway network meets the reduced minimum volume criteria allowed by Miami Dade County for municipalities that fund their own traffic calming program. Four of the ten roadway segments exceeded the reduced minimum speed criteria. Three of the ten roadway segments have an 85th percentile

speed of 5 mph over the posted speed limit and these three segments are only one mph short of meeting the minimum reduced speed requirement.

SECTION EIGHT PROPOSED TRAFFIC CALMING IMPROVEMENTS

8.1 NEIGHBORHOOD ROUNDABOUTS

Studies have shown that roundabouts can significantly reduce the frequency of vehicle collisions at an intersection when compared to other forms of traffic control devices. Furthermore, when vehicle collisions do occur they are typically at lower speeds which often results in fewer injuries. Roundabouts used in a series have also been documented to reduce vehicle speeds on the roadway corridors in between the roundabouts. Another benefit of roundabouts is the ability to add landscaping and increase the aesthetics of an intersection.

94th Street at Bay Drive

A neighborhood roundabout is proposed on 94th Street at Bay Drive. The intersection is currently under all-way stop control. An existing roundabout is present just south of this intersection at Bay Drive and Dickens Avenue. A conceptual exhibit of the proposed roundabout on 94th Street at Bay Drive is shown on **Figure 8.1**.



Roundabouts have been proven to reduce vehicle collisions and speeds



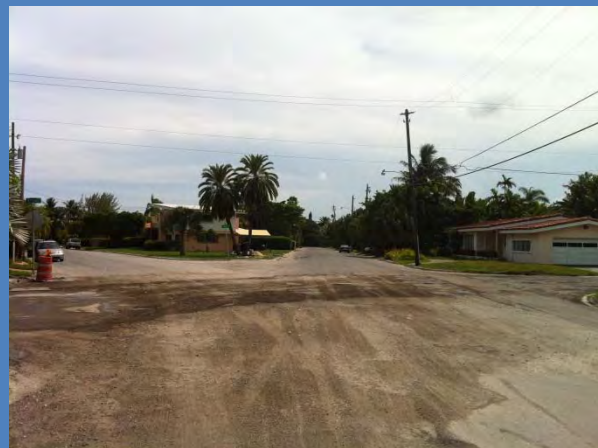
94th Street at Bay Drive
Existing Conditions

Figure 8.1 – 94th Street at Bay Drive Conceptual Roundabout



93rd Street at Bay Drive and Emerson Avenue

A neighborhood roundabout is proposed on 93rd Street at Bay Drive and Emerson Avenue. 93rd Street at Bay Drive and Emerson Avenue is a five-leg intersection with 93rd Street and Emerson Avenue under stop control. Bay Drive is currently under free flow operations. The existing roadway configuration is uncommon and could result in confusion for unfamiliar drivers. Additionally, motorists on northbound Emerson Drive approaching the intersection may have difficulty locating northbound vehicles on Bay Drive under the existing roadway configuration. A conceptual exhibit of the proposed roundabout on 93rd Street at Bay Drive and Emerson Avenue is shown on **Figure 8.2**.



93rd Street at Bay Drive and Emerson Avenue Existing Conditions



93rd Street at Bay Drive and Emerson Avenue Aerial

93rd Street at Byron Avenue

A neighborhood roundabout is proposed at 93rd Street at Byron Avenue. The intersection is currently under two-way stop control. Byron Avenue is under stop control while 93rd Street is under free flow operations. This proposed roundabout will be the second roundabout in a series for both the 93rd Street corridor and the Byron Avenue corridor. A conceptual exhibit of the proposed roundabout on 93rd Street at Byron Avenue is shown on **Figure 8.3**.



93rd Street at Byron Avenue Aerial

Figure 8.2 – 93rd Street at Bay Drive and Emerson Avenue Conceptual Roundabout

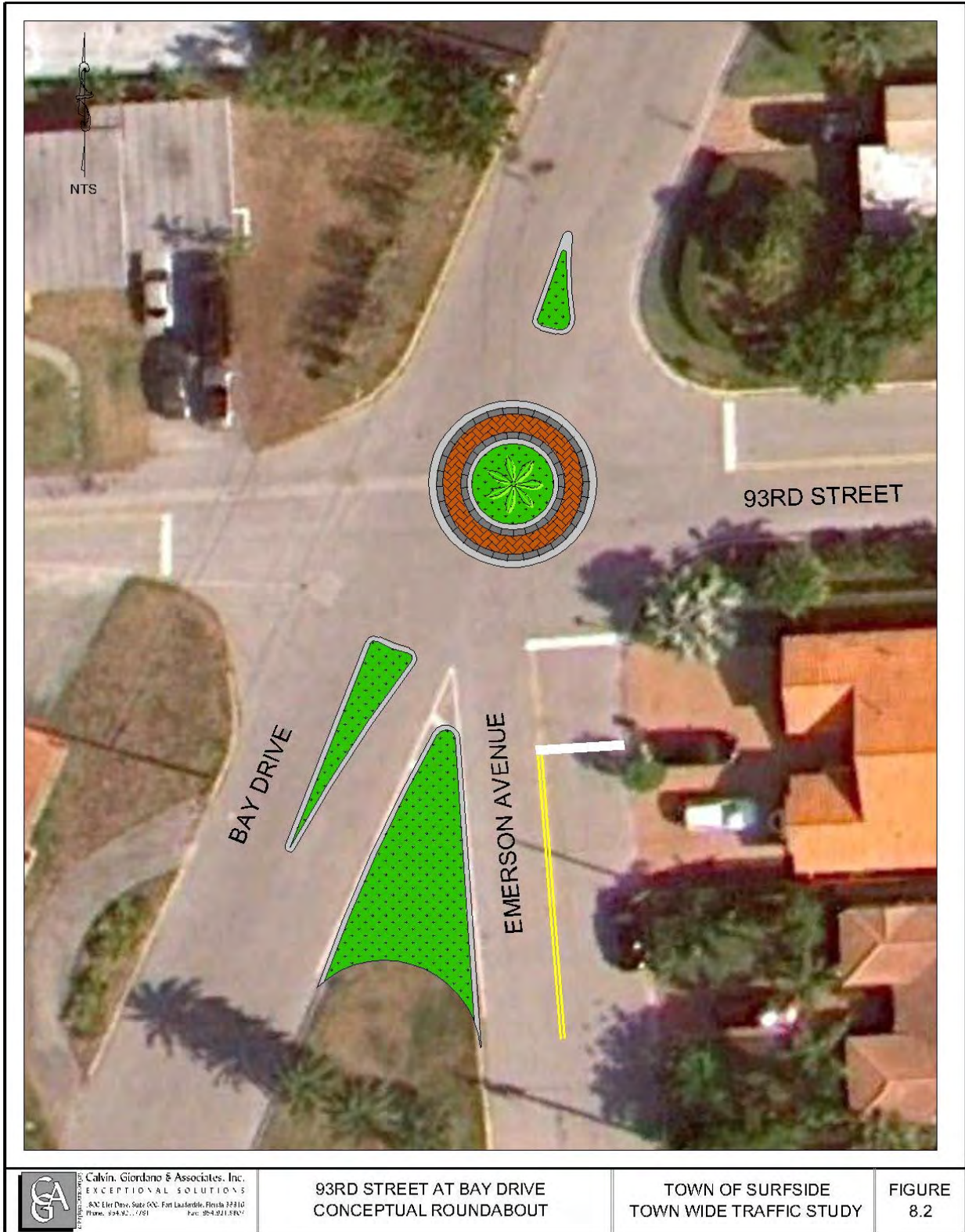


Figure 8.3 – 93rd Street at Byron Avenue Conceptual Roundabout



Bay Drive at Hawthorne Avenue

A traffic median similar to a roundabout is proposed at Bay Drive and Hawthorne Avenue. Bay Drive at Hawthorne Avenue is a three-leg intersection with stop control only on Hawthorne Avenue. This intersection also serves as the northern entrance or gateway to the Hawthorne Tot Lot which is located just to the south of the intersection. The proposed traffic median will likely result in slower speeds around the park and will also serve as an aesthetic focal point for the park entrance. The existing roadway configuration is uncommon and could result in confusion for unfamiliar drivers. Additionally, motorists on northbound Hawthorne Avenue approaching the intersection may have difficulty locating northbound vehicles on Bay Drive under the existing roadway configuration. A conceptual exhibit of the proposed traffic median on Bay Drive at Hawthorne Avenue is shown on **Figure 8.4**.



Bay Drive at Hawthorne Avenue
Existing Conditions



Bay Drive at Hawthorne Avenue
Aerial

90th Street at Bay Drive

A neighborhood roundabout is proposed at 90th Street and Bay Drive. 90th Street at Bay Drive is a four leg intersection with stop control on Bay Drive and westbound 90th Street. Eastbound 90th Street which serves only two residential properties is under free flow operations. A conceptual exhibit of the proposed neighborhood roundabout is shown on **Figure 8.5**.



90th Street at Bay Drive
Aerial

Figure 8.4 – Bay Drive at Hawthorne Avenue Conceptual Traffic Median

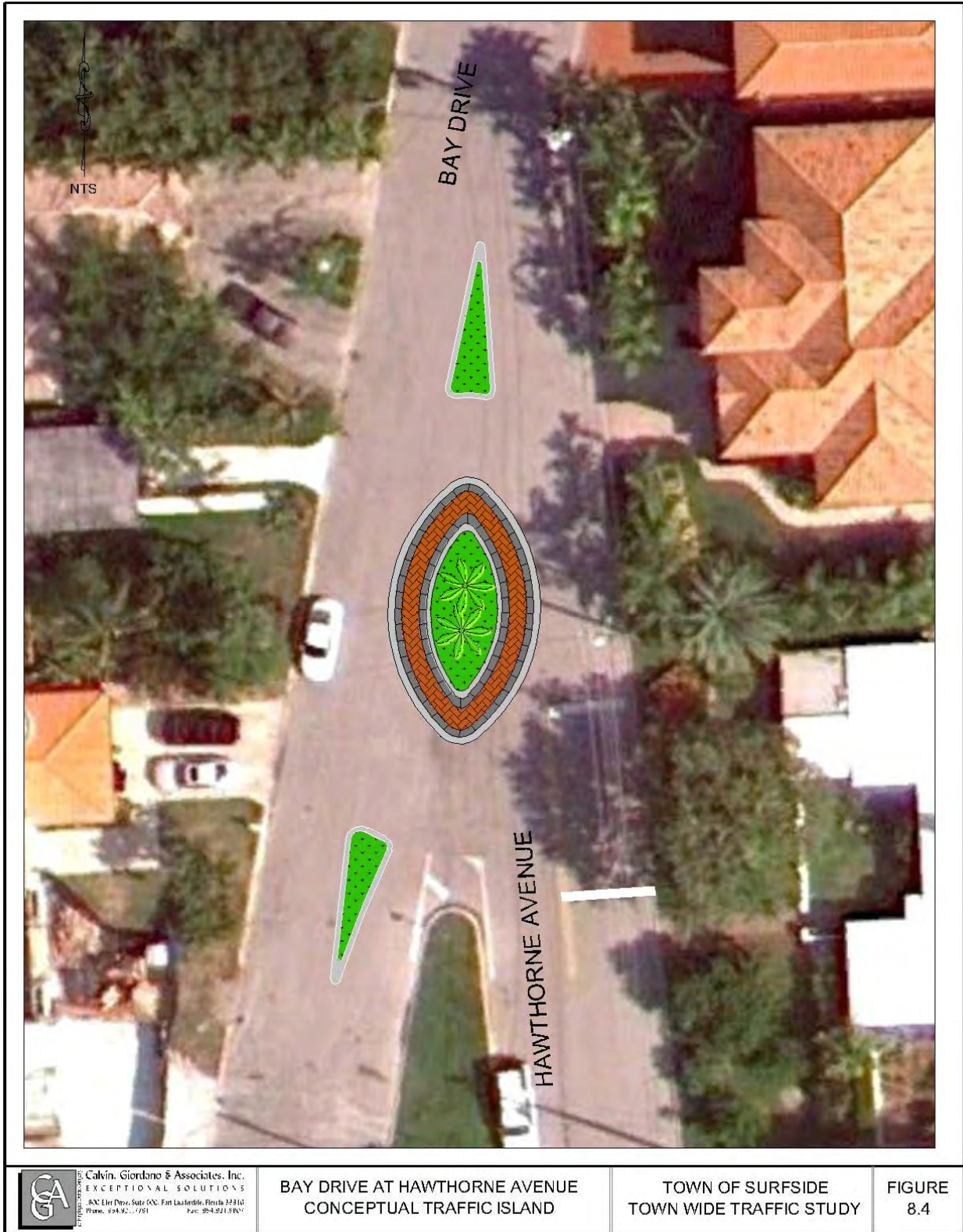
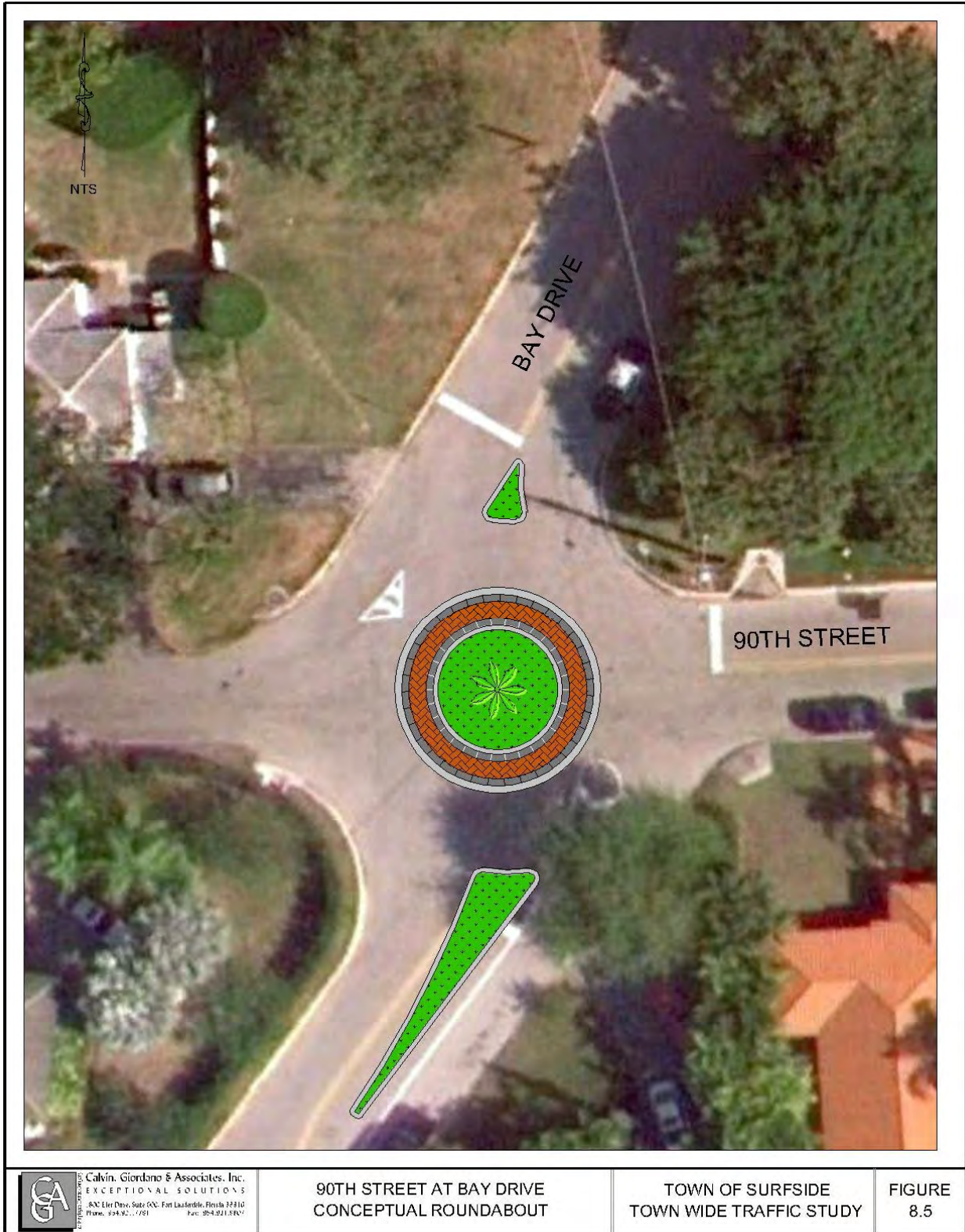
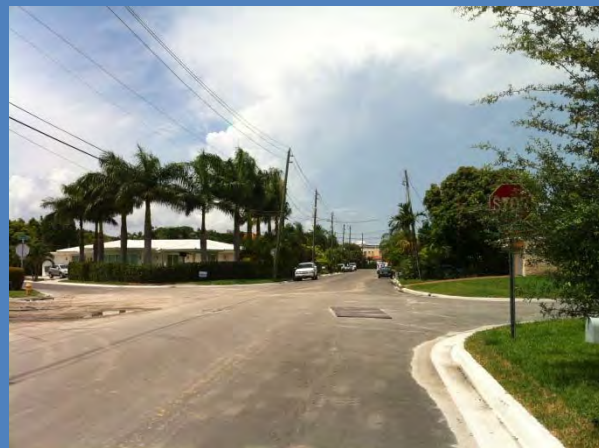


Figure 8.5 – 90th Street at Bay Drive Conceptual Roundabout



89th Street at Hawthorne Avenue and Irving Avenue

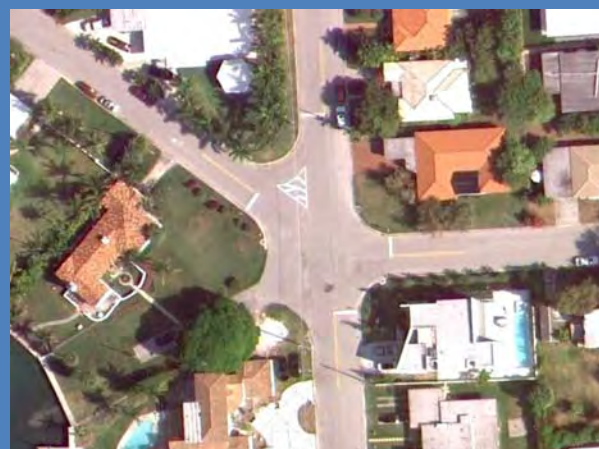
A traffic median similar to a roundabout is proposed at 89th Street at Hawthorne Avenue and Irving Avenue. 89th Street at Hawthorne Avenue and Irving Avenue is a five-leg intersection with stop control on Hawthorne Avenue, Irving Avenue, and westbound 89th Street. Eastbound 89th Street, which serves only two residential properties, is under free flow operations. A conceptual exhibit of the proposed traffic median on 89th Street at Hawthorne Avenue and Irving Street is shown on **Figure 8.6**.



89th Street at Hawthorne Avenue and Irving Avenue
Existing Conditions

91st Street at Byron Avenue

A neighborhood roundabout is proposed at 91st Street at Byron Avenue. The intersection is currently under all-way stop control. This proposed roundabout will be the third roundabout in a series for the Byron Avenue corridor. A conceptual exhibit of the proposed roundabout on 91st Street at Byron Avenue is shown on **Figure 8.7**



89th Street at Hawthorne Avenue and Irving Avenue
Aerial

The proposed traffic calming locations are shown in **Figure 8.8**.



91st Street at Byron Avenue
Aerial

Figure 8.6 – 89th Street at Hawthorne Avenue and Irving Street Conceptual Traffic Median

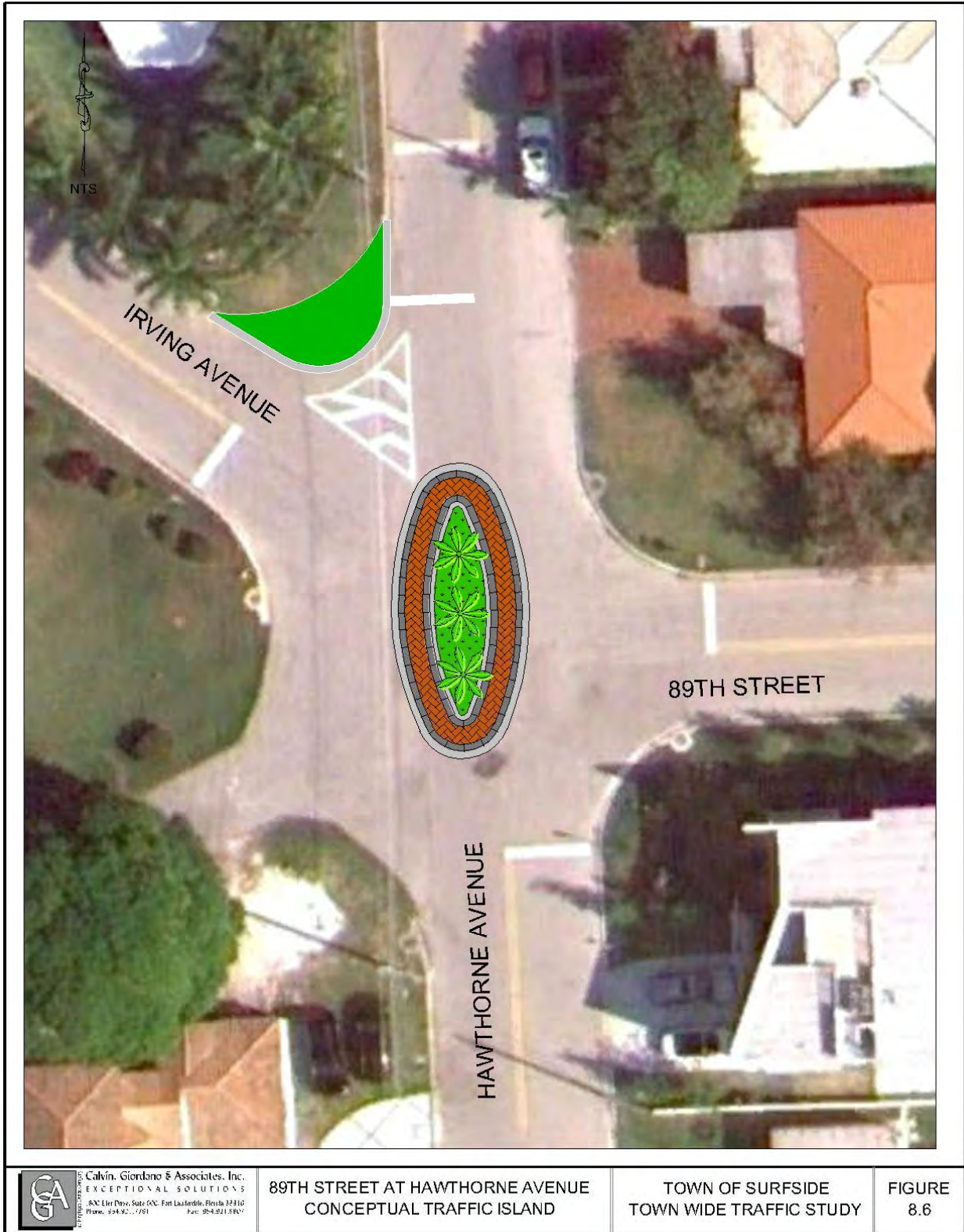
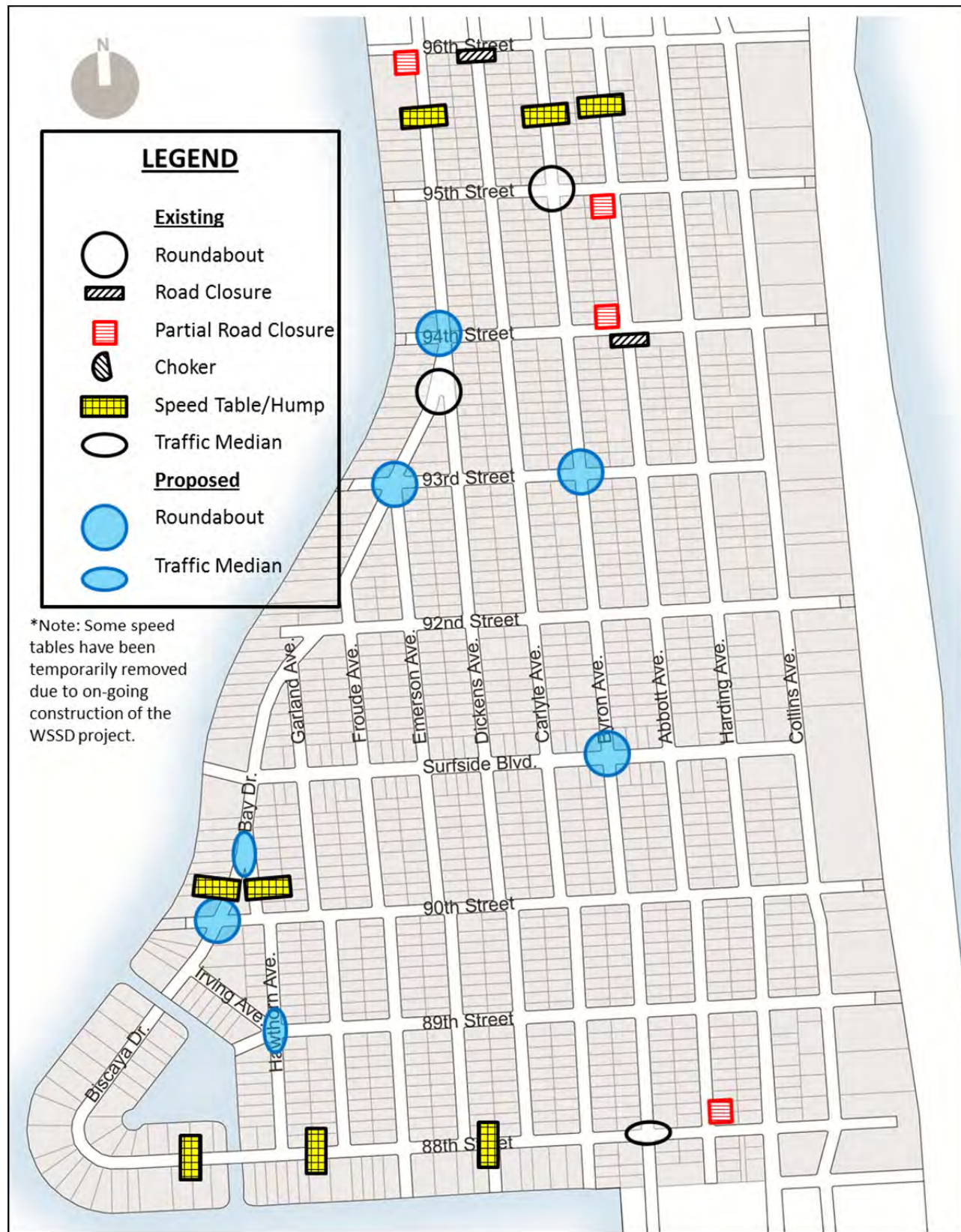


Figure 8.7 – 91st Street at Byron Avenue Conceptual Roundabout



Figure 8.8 – Proposed Traffic Calming Locations



SECTION NINE CONCLUSIONS AND RECOMMENDATIONS

9.1 CONCLUSIONS

Calvin, Giordano & Associates, Inc. (CGA) was commissioned on May 8, 2012 by the Town of Surfside to complete a traffic study to assess existing and future traffic conditions throughout the Town. A Town-wide traffic analysis was performed to determine appropriate applications for traffic calming and traffic control measures. In addition to the traffic calming analysis, several signalized intersections along 96th Street, Harding Avenue, and Collins Avenue were evaluated to determine if modifications could improve the operational efficiency of the intersections. The signalized intersections analyzed for this traffic study include the following:

- 96th Street at 500 Block (Bal Harbour Shops)
- 96th Street at Byron Avenue
- 96th Street at Harding Avenue
- 96th Street at Collins Avenue
- 95th Street at Harding Avenue
- 95th Street at Collins Avenue
- 94th Street at Harding Avenue
- 94th Street at Collins Avenue

Turning movement traffic counts were collected during the AM (7:00-9:00) and PM (4:00-6:00) peak hours for seventeen intersections within the Town. Additionally, 24-hour bi-directional tube counts along with speed data were collected at ten locations throughout the Town. The traffic counts collected for this study are depicted in Figure 2.1. The traffic counts were conducted on a typical Tuesday through Thursday between August 28, 2012 and September 6, 2012 and on Tuesday, October 30, 2012. The traffic counts were utilized to analyze existing and future traffic operations of the major intersections and to develop new and upgrade existing traffic calming locations.

A computer-based traffic simulation of the Town's current roadway network was developed using the nationally recognized VISSIM micro-simulation modeling software. The VISSIM model was calibrated to match existing traffic conditions based on field reviews and traffic data

collected for the study intersections. This VISSIM model will enable the Town to efficiently analyze future traffic conditions including intersection and roadway alternatives. Examples of the benefits of the VISSIM model include determining the net impact of future developments such as the expansion of Bal Harbour Shops and for future traffic flow modifications such as street closures. Additionally, the VISSIM model has an advanced 3D interface which allows for accurate visual representation of existing and future traffic conditions.

OPERATIONAL ANALYSIS

Level of Service (LOS) is a term used to describe the conditions of a roadway in relation to vehicle delay and traffic congestion. LOS are broken down with six LOS designations (LOS A – LOS F). LOS A represents the most ideal situation with minimal if any delay at all while LOS F represents the worst conditions with high vehicular delay. The Town Comprehensive Plan identifies the LOS thresholds for state roads as LOS E+20% and LOS D for local roads. 96th Street, Harding Avenue, and Collins Avenue are each considered state roads.

Existing Conditions

The operational analysis for the aforementioned major intersections along 96th Street, Harding Avenue, and Collins Avenue demonstrated that each of the study intersections were currently operating at an acceptable LOS during the AM and PM peak hours when evaluating the overall intersection delay. However, several of the study intersection approaches had high vehicular delays resulting in a LOS E or LOS F for the intersection approach and long vehicular queues extending to the upstream traffic signal. Due to the close proximity of the signalized intersections, the operations of each signal are greatly affected by the upstream and downstream traffic signals. It was observed that vehicle queues would occasionally extend to and past the upstream traffic signals on 96th Street.

Optimized Conditions

CGA evaluated several alternatives to determine if improvements could help reduce vehicle congestion in the Town. It was determined that the most cost effective alternatives included signal timing improvements at each of the study signalized intersections. The signal timing

improvements showed a substantial benefit to the side streets of Byron Avenue, 95th Street, and 94th Street.

The Town has been proactive in the past regarding improving signal timing in the Town to benefit the residents of Surfside. The northbound approach on Byron Avenue at 96th Street has historically been very congested with high delays and vehicle queues during school days and times. However, the Town was able to mitigate much of the vehicle delay by bringing it to the County's attention and requesting an adjustment in signal timing. A comparison of the existing average delay and LOS for the existing conditions and the optimized conditions is shown in Table A.

Table A – Existing and Optimized Operational Analysis

		Existing Conditions				Signal Timing Optimization			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
Intersection	Approach	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
96 th Street at Bal Harbour Shops	EB	1.9	A	2.5	A	1.9	A	2.5	A
	SB	48.5	D	43.0	D	48.5	D	43.0	D
	WB	3.4	A	3.1	A	2.4	A	1.7	A
	Total	2.9	A	5.9	A	2.5	A	5.2	A
96 th Street at Byron Avenue	NB	71.7	E	72.8	E	30.9	C	32.9	C
	EB	3.1	A	4.2	A	4.2	A	6.2	A
	WB	12.2	B	13.4	B	3.6	A	2.0	A
	Total	13.6	B	14.9	B	6.8	A	7.5	A
96 th Street at Harding Avenue	EB	33.9	C	30.0	C	30.5	C	22.5	C
	SB	32.7	C	28.1	C	32.7	C	31.1	C
	WB	142.6	F	98.8	F	115.0	F	36.9	D
	Total	48.2	D	39.7	D	43.3	D	29.2	C
96 th Street at Collins Avenue	NB	59.0	E	43.9	D	21.9	C	22.1	C
	EB	18.6	B	15.2	B	31.4	C	28.8	C
	WB	58.6	E	54.8	D	58.6	E	54.6	D
	Total	51.1	D	39.0	D	23.9	C	23.6	C
94 th Street at Harding Avenue	EB	58.0	E	57.8	E	27.0	C	24.8	C
	SB	5.8	A	6.4	A	5.3	A	9.5	A
	WB	54.6	D	64.7	E	31.0	C	24.8	C
	Total	10.0	A	14.8	B	7.3	A	11.9	B
95 th Street at Harding Avenue	EB	158.3	F	72.6	E	39.5	D	26.3	C
	SB	11.2	B	9.0	A	8.8	A	8.4	A
	WB	63.6	E	76.2	E	28.3	C	29.0	C
	Total	22.8	C	15.7	B	12.6	B	10.4	B
94 th Street at Collins Avenue	NB	4.2	A	10.5	B	5.9	A	7.2	A
	EB	70.6	E	19.8	B	23.2	C	28.2	C
	WB	58.2	E	20.8	C	15.5	B	19.2	B
	Total	6.6	A	11.0	B	6.6	A	8.1	A
95 th Street at Collins Avenue	NB	3.5	A	12.2	B	3.8	A	11.8	B
	EB	73.4	E	22.3	C	34.5	C	20.9	C
	WB	50.4	D	25.1	C	28.2	C	22.9	C
	Total	6.4	A	12.7	B	5.4	A	12.3	B

Table

2017 Conditions

The signalized study intersections within the Town were also evaluated under future traffic conditions. A five year planning horizon (Year 2017) was chosen for the analysis and included background growth, committed trips, and other potential future development including the expansion of Bal Harbour Shops. The background growth consisted of applying a 1.0% annual growth rate to the existing peak season adjusted traffic. Additional project trips were also added to the 2017 scenario including trips from Young Israel, 92nd Street Hotel, Grand Beach Hotel, Surf Club, the Shul, and the Bal Harbour Shops expansion. The Year 2017 conditions were evaluated under two different scenarios. The first scenario included the 2017 traffic volumes utilizing the existing signal timing plans. The second scenario included the 2017 traffic volumes utilizing the proposed signal timing improvements identified in this report. Minor adjustments were made to the signal timing splits to account for the additional traffic anticipated in 2017.

The results of the 2017 conditions with existing signal timing analysis demonstrated that there could potentially be very significant delays and traffic congestion within the Town. The existing high vehicle delays and queues currently experienced will only be exacerbated under the 2017 conditions. Several of the intersections and particularly 96th Street at Harding Avenue and Collins Avenue deteriorate significantly under this scenario. A comparison of the existing and 2017 conditions utilizing the existing signal timing patterns is shown on Table B.

The results of the 2017 optimized conditions perform significantly more efficiently than the 2017 conditions without signal timing improvements. However, even with the improved timings, there is expected to be substantial vehicle delays and queues. The westbound approach of 96th Street at Harding Avenue will operate at LOS F with 50 percentile queues extending up to Collins Avenue. This will cause further increased delay and congestion beyond what is actually calculated. Additionally, the vehicular queuing on eastbound 96th Street at Harding Avenue will only get worse than the existing conditions and it potentially could be common for vehicle queuing to extend past Byron Avenue and further impact the operations of the upstream intersections beyond what is calculated.

Table B – 2017 Operational Analysis

Intersection	Approach	2012 Existing Conditions				2017 Conditions ⁽¹⁾			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
96th Street at Bal Harbour Shops	EB	1.9	A	2.5	A	2.4	A	3.4	A
	SB	48.5	D	43.0	D	56.7	E	55.4	E
	WB	3.4	A	3.1	A	4.0	A	4.5	A
	Total	2.9	A	5.9	A	4.3	A	9.8	A
96th Street at Byron Avenue	NB	71.7	E	72.8	E	72.6	E	72.7	E
	EB	3.1	A	4.2	A	4.3	A	6.9	A
	WB	12.2	B	13.4	B	12.8	B	14.2	B
	Total	13.6	B	14.9	B	14.2	B	16.1	B
96th Street at Harding Avenue	EB	33.9	C	30.0	C	38.4	D	36.5	D
	SB	32.7	C	28.1	C	38.0	D	32.7	C
	WB	142.6	F	98.8	F	261.8	F	237.1	F
	Total	48.2	D	39.7	D	70.7	E	68.6	E
96th Street at Collins Avenue	NB	59.0	E	43.9	D	104.6	F	74.6	E
	EB	18.6	B	15.2	B	19.2	B	16.0	B
	WB	58.6	E	54.8	D	58.5	E	54.9	D
	Total	51.1	D	39.0	D	89.2	F	65.2	E
Harding Avenue at 95th Street	EB	107.7	F	65.7	E	331.8	F	68.3	E
	SB	14.4	B	10.1	B	17.1	B	13.7	B
	WB	241.4	F	91.2	F	1299.9	F	367.0	F
	Total	34.2	C	18.1	B	141.0	F	48.1	D
Collins Avenue at 95th Street	NB	1.5	A	2.6	A	1.9	A	16.1	B
	EB	71.7	E	19.3	B	138.8	F	26.5	C
	WB	41.5	D	15.2	B	42.2	D	18.5	B
	Total	4.8	A	3.4	A	12.7	B	16.8	B
Harding Avenue at 94th Street	EB	67.7	E	73.6	E	69.2	E	76.7	E
	SB	5.0	A	4.0	A	5.2	A	6.7	A
	WB	77.3	E	187.9	F	84.7	F	281.5	F
	Total	10.7	B	23.7	C	11.2	B	31.2	C
Collins Avenue at 94th Street	NB	5.0	A	14.1	B	5.5	A	21.2	C
	EB	80.8	F	22.0	C	91.1	F	25.3	C
	WB	37.9	D	17.0	B	36.3	D	18.0	B
	Total	7.5	A	14.4	B	9.8	A	21.4	C

(3) 2017 Conditions include existing (2012) traffic counts plus a 1% annual growth rate, committed development trips, and additional potential developments such as the Bal Harbour Shops expansion. The existing signal timings were utilized in this scenario.

TRAFFIC CALMING

Miami Dade County has authority to approve, deny or change any proposed traffic flow modifications within the Town of Surfside. Miami-Dade County has established a procedure for approving traffic calming devices that includes minimum traffic criteria that must be met. For municipalities such as Surfside that fund their own traffic calming program, minimum traffic volume requirements can potentially be reduced by 70% and minimum 85th percentile speed requirements can potentially be reduced by 50%. In addition to minimum traffic criteria, Miami-Dade County generally requires that new traffic calming proposals are supported by two-thirds of residents in the vicinity of the proposed installation. Concurrence from affected residents is typically done through ballots delivered to the residents.

The traffic data collected for this study indicates that the majority of studied roadway segments met the reduced minimum volume criteria allowed for municipalities that fund their own traffic calming program. The results of the speed data showed that four of the ten count locations had 85th percentile speeds greater than the reduced minimum speed threshold. Additionally, three of the ten count locations were within one mph of meeting the reduced minimum speed threshold. However, Miami-Dade County also requires that a street is at least 750 feet in length without an intersecting roadway to be eligible for speed humps/tables. The majority of roadways within the Town do not meet this requirement. Only 88th Street west of Hawthorne Avenue meets this requirement within the Town.

9.2 RECOMMENDATIONS

- 1 Signal timing improvements
- 2 Continue to monitor existing and future traffic patterns
- 3 Utilize VISSIM software as a tool to analyze future traffic conditions
- 4 Implement new traffic calming devices

1. The Town should coordinate with Miami Dade County and the Florida Department of Transportation to implement the signal timing modifications identified in this report at the eight study signalized intersections. In conjunction with the signal timing improvements, vehicle and pedestrian detectors should be installed on 94th Street and 95th Street at Harding and Collins Avenue. The signal timing improvements identified in this report will provide a significant benefit to the residents who consistently utilize Byron Avenue, 95th Street, and 94th Street as the vehicular delays and queues will be substantially reduced on these roadways. Residents will notice that accessing 96th Street, Collins Avenue, and Harding Avenue from the aforementioned streets will be much easier and will not be required to wait as long for the traffic lights to turn green.

The signalized intersections on 95th Street and 94th Street at Harding Avenue and Collins Avenue are currently under pre-timed signal timing. Therefore, the maximum green time is always allotted to each phase regardless of vehicle demand. The installation of vehicle and pedestrian detectors will allow these traffic signals to operate more

efficiently. Vehicle detectors are video devices installed on the traffic signal mast arms that detect vehicles on the intersection approach. When vehicles are not present, the light will turn red and green time will be given to the other intersection approaches. The approximate cost estimate to install two vehicle detectors and four pedestrian detectors at each intersection is \$20,000. Therefore, the total estimate for the installation of the detection devices at the four proposed intersections is \$80,000.

2. The Town should closely monitor the traffic patterns on 96th Street, Harding Avenue, and Collins Avenue on an annual basis. The operational analysis documented in this report for Year 2017 is only an estimate of future traffic conditions. However, it is possible that the expected traffic patterns due to new development deviate from the existing conditions. In this event, signal timing modifications or other improvements may be necessary to continue efficient traffic operations within the Town.
3. The Town should utilize the VISSIM model developed for this traffic study for future traffic operations analysis. The VISSIM model provides highly accurate results and better replicates actual traffic operations than traditional methods. Infinite future scenarios can be analyzed including signal timing changes, new turn lanes, pedestrian crossings, route detours, and many others.

The VISSIM model was built for the entire Town and not just for the study intersections identified in the report. Therefore, future traffic studies can be completed more cost effectively than without the pre-built traffic simulation model. Additionally, the VISSIM model has a built in 3D mode which allows for realistic simulations that can be easily converted to a video format. These 3D traffic videos can be a very beneficial tool to demonstrate to the public the changes in traffic conditions or patterns.

The VISSIM files will be turned over to the Town as a deliverable for this traffic study. However, it is recommended that a professional traffic engineer be consulted for use of the VISSIM model.

Traffic Calming

4. This traffic study identified seven recommended traffic calming devices throughout the Town. The proposed locations are shown on Figure 8.8. The proposed traffic calming devices are either neighborhood roundabouts or traffic medians that share similarities to roundabouts. Generally, Miami-Dade County is very receptive of roundabouts since there are many benefits with few negatives. Some of the benefits of roundabouts include reduced speeds, increased safety, and increased aesthetics. Additionally, roundabouts do not require any actual traffic flow modification. The only negative is the potential small increase in emergency response time. The approximate cost of each of the traffic calming devices including design and construction is \$50,000. Therefore, the total cost for the seven proposed traffic calming devices is approximately \$350,000.

The Town should coordinate with Miami-Dade County to determine which traffic calming devices could be approved. Miami-Dade County may require additional data and/or resident approval. The Town should then hold public outreach meetings with residents to get feedback on the proposed traffic calming devices and proposed locations identified in this report. The Town should then determine which traffic calming devices to pursue and officially submit to Miami-Dade County.

