

TRAFFIC IMPACT STUDY

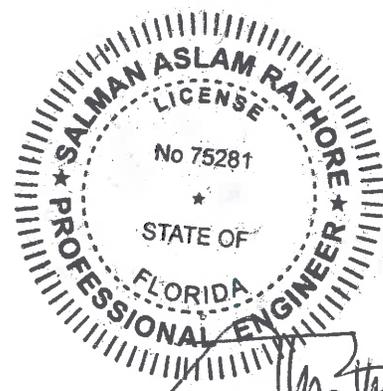
BAL HARBOUR SHOPS EXPANSION
(VILLAGE OF BAL HARBOUR, FL)



June, 2015

PREPARED FOR

VILLAGE OF BAL HARBOUR



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TABLE OF CONTENTS

EXECUTIVE SUMMARY	1
INTRODUCTION	5
INVENTORY	7
Existing Land Use and Access	7
Proposed Land Uses and Access	7
EXISTING CONDITIONS	8
Roadway System	8
Nearby Intersections	8
DATA COLLECTION	10
TRIP GENERATION	12
TRIP DISTRIBUTION AND ASSIGNMENT	14
TRAFFIC ANALYSIS	18
Future Conditions Traffic Volumes	18
Future Planned Improvements (Enhancements)	22
Level of Service Analyses & Result Comparisons with FCI Traffic Study	23
New North Driveway Queuing Analysis	25
CONCLUSIONS	27

LIST OF FIGURES

FIGURE 1 – Project Location Map	6
FIGURE 2 – Existing Lane Geometry	9
FIGURE 3 – Existing Turning Movement Counts 2015	11
FIGURE 4 – Project Trip Distribution Percentages (2020)	15
FIGURE 5 – Project Traffic Assignment (Trip Generation Scenario 1)	16
FIGURE 6 – Project Traffic Assignment (Trip Generation Scenario 2)	17
FIGURE 7 – Future Total Traffic (Trip Generation Scenario 1)	20
FIGURE 8 – Future Total Traffic (Trip Generation Scenario 2)	21

LIST OF TABLES

TABLE 1 – Trip Generation Summary (Scenario 1)	13
TABLE 2 – Trip Generation Summary (Scenario 2)	14
TABLE 3 – Level of Service Analysis (Existing)	24
TABLE 4 – Level of Service Analysis (Future)	25
TABLE 5 – Queuing Analysis	27

EXECUTIVE SUMMARY

The Corradino Group was retained by Village of Bal Harbour to provide a traffic study in connection with the proposed development and compare the results to the traffic study submitted by the developer's traffic engineer Fandrei Consulting, Inc. (FCI) dated May 30th, 2014. The study addresses trip generation and the traffic impacts created by the proposed project on the nearby transportation network. This study is divided into the following sections:

- Inventory
- Existing Conditions
- Traffic Counts
- Trip Generation
- Trip Distribution and Traffic Assignment
- Traffic Impact Analysis
- Conclusions

The proposed Bal Harbour Shops Expansion project is located in the northwest quadrant of Collins Avenue/Harding Avenue and 96th Street in the Village of Bal Harbour, Florida. This project is a proposed expansion of the existing shopping center facility and is anticipated to affect traffic conditions on the adjacent roadway network. The shops currently have 463,477 square feet of gross leasable floor area and the proposed expansion is seeking to add a total of up to 325,945 square feet of additional gross leasable area (GLA). To measure the extent of the impacts, a traffic analysis was conducted to evaluate the existing conditions of the surrounding seven intersections and how the traffic generated by the project will affect them.

The intersection turning movement counts were collected and analyzed at the following intersections located near the project site:

1. Bal Cross Drive and Collins Ave (Unsignalized)
2. 96th Street & Bal Harbour Shops south entrance (500 Block) (Signalized)
3. 96th Street & Byron Avenue (Signalized)
4. Harding Avenue & 96th Street (Signalized)
5. Collins Avenue & 96th Street (Signalized)
6. Collins Avenue & the 9700 Block (BHS and St. Regis Driveways) (Signalized)
7. 96th Street & Bal Bay Drive (Unsignalized)

The trip generation for the proposed project was based on the following two scenarios:

Scenario 1 (Average trip rate from FCI traffic study and ITE LU Code 820/Shopping Center) - The average of the shops retail (trip rates from FCI traffic study) and general retail mall from ITE LU Code 820/shopping center (which includes eating and drinking establishments) was used. This average will be reflective of a more conservative assumption that takes into account future changes in market conditions that could result in more intense uses for the purposes of traffic generation. The ITE pass-by trip reduction (34%) was applied on the expansion element of the trip generation. Pass-by trips are external to the development but are already on the transportation system (i.e., not new trips on the roadway). These trips enter the site as an intermediate stop, or are intercepted, by the proposed development. Pass-by trips are trips made as intermediate stops on the way from an origin to a primary destination. These trips are attracted from traffic passing on an adjacent street that contains direct access to the generator. These trips do not require a diversion from another roadway and are not new trips added to the system. The percentage of trips that can be classified as pass-by for a site will vary by the type of land use, time of day, type and volume of traffic carried on the adjacent street, and the size of development. Credit for pass-by trips is usually only allowed for retail and some commercial land uses such as fast-food restaurants with drive-through windows, service stations, and drive-in banks. Pass-by trips were included as part of the driveway volumes.

Scenario 2 The second scenario assumes the worst case conditions and is based on the assumption that Bal Harbour Shops would be totally redeveloped along the lines of a typical shopping center as specified in the ITE Manual. Therefore, trip generation was determined based on the conditions in the future with the assumption that BHS will be totally converted to a standard shopping center. The ITE trip generators include trucks, deliveries, employee trips as well as patrons of the shopping center. The ITE pass-by trip reduction (34%) was applied on the trip. Pass-by trips were included as part of the driveway volumes.

Church by the Sea (CBTS) is a religious institution located within Bal Harbour Village with services occurring during nonpeak hours and when BHS is closed. Church by the Sea, currently on 96th Street in the immediate vicinity of BHS, will move from its existing location to a location within the boundaries of BHS. It will be utilizing the same primary access and parking facility. For this reason, trips generated by CBTS continue to be subsumed into the trip generation of BHS.

The number of vehicles, projected by the Shops is a reasonable number, however the surrounding roadway network was analyzed by adding two additional scenarios that assume a more intense retail center for the purposes of trip generation. We do not expect the expansion to

actually generate two and three times the number of trips.

Intersection capacity/level of service analyses for the two trip generation scenarios were conducted for all the study intersections and were compared with the results provided in the FCI traffic study. In order to compare the results of the traffic studies between FCI and The Corradino Group, the future planned improvements proposed by FCI were used as part of the future level of service analysis.

All study intersections currently operate adequately at an acceptable level of service in the year 2015 when compared to the adopted level of service as per the Village Comprehensive Plan. The comparison between the two traffic studies indicate that the existing level of service results from The Corradino Group traffic study are very close to FCI traffic study.

All study intersections will continue to operate adequately at an acceptable level of service in the year 2020 with proposed project and enhancements (recommended by FCI traffic study) in place for both trip generation scenarios (Scenario 1 and 2). The comparison between the two traffic studies indicate that although the delays increase under The Corradino Group traffic analysis scenarios, the LOS results from The Corradino Group are very close to FCI traffic study and are acceptable when compared to the adopted level of service as per the Village Comprehensive Plan. As far as a regulatory requirement, the LOS is established in the Comp Plan adopted by the Council several years ago. This standard is used by a number of cities as a base and then creates concurrency areas where this LOS can be higher. The State also sets LOS standard for their roads which is usually higher than D. Cities set the LOS as a tool to evaluate impact of proposed developments and to determine how a project must mitigate their fair share of the impact. In this case BHS determined that several improvements were needed in order to satisfy the requirement in the adopted Comp Plan. The following intersections were optimized along with the future proposed enhancements (See section **Future Planned Improvements (Enhancements)** of the report):

- Collins Avenue and North New Drive
- Collins Avenue and 9700 Blk
- Collins Avenue and 96th Street
- Harding Avenue and 96th Street
- Byron Avenue/Loading & 96th Street
- 96th Street & BHS South Driveway

Since mitigation is recommended in the form of signal optimization and modification, the

developers needs to coordinate with Miami-Dade County Traffic Engineering Department and Village of Bal Harbour to develop strategy in order to provide modified and acceptable signal timing plans for the proposed expansion.

The Queuing Analysis for the New North Driveway was based on the trips generated on a *Saturday Peak Hour of Generator* for LUC 820 (Retail) and the methodology outlined in the Institute of Transportation Engineers (ITE) Transportation and Land Development. The analysis was performed to determine the number of entering lanes needed at the New North Driveway and their corresponding stacking lengths that are required during the peak period of the weekday so that the queue does not extend past the entrance onto Collins Avenue (at 95% confidence level analysis).

As per the FCI traffic study, the New North Driveway at Collins Avenue is proposed to have three entering lanes that can accommodate up to 18 vehicles where shoppers will enter the mall from south and north of Collins Avenue. Upon entering they will stop to collect ticket and will then park in the parking lot. Based on the Institute of Transportation Engineers (ITE) and *Saturday Peak Hour of Generator* for LUC 820 (Retail), 1,132 vehicles (most conservative trip generation for Saturday Peak) will enter the New North Driveway of the mall from north and south of Collins Avenue.

Different service times (30, 15, 8.0 and 9.44 seconds) were used to calculate the anticipated queues at the New North Driveway. Using equation 8-9b and Table 8-11 of ITE's Transportation and Land Development, it was determined that for 30, 15 and 9.44 seconds ticketing service time the model fails and queuing is an issue, whereas it works if the service time is 8.0 seconds or less. The 9.44 second average ticket service time was used based on the information provided by the developer's traffic engineer. The Village will work with the developer to increase the length of the stacking lanes or implement a different system of entry that does not require vehicles to stop and collect tickets thus reducing any possibility of cars queueing onto Collins Avenue.

INTRODUCTION

The proposed Bal Harbour Shops Expansion project is located in the northwest quadrant of Collins Avenue/Harding Avenue and 96th Street in the Village of Bal Harbour, Florida. This project is a proposed expansion of the existing shopping center facility and is anticipated to affect traffic conditions on the adjacent roadway network. To measure the extent of the impacts, a traffic analysis was conducted to evaluate the existing conditions of the surrounding seven intersections and how the traffic generated by the project will affect them. The project location along with study intersections are shown in **Figure 1**.

The Corradino Group was retained by Village of Bal Harbour to provide a traffic study in connection with the proposed development and compare the results to the traffic study submitted by the developer's traffic engineer Fandrei Consulting, Inc. (FCI) dated May 30th, 2014. The study addresses trip generation and the traffic impacts created by the proposed project on the nearby transportation network. This study is divided into the following sections:

- Inventory
- Existing Conditions
- Traffic Counts
- Trip Generation
- Trip Distribution and Traffic Assignment
- Traffic Impact Analysis
- Conclusions

Figure - 1 Project Location Map



INVENTORY

Existing Land Use and Access

The shops currently have 463,477 square feet of gross leasable floor area.

Proposed Land Uses and Access

The proposed expansion is seeking to add a total of up to 325,945 square feet of additional gross leasable area (GLA) for a total of 789,422 square feet. The entrance and exit to the site will be provided through the following intersections:

- 96th Street & the Bal Harbour Shops south entrance (500 Block)
- Harding Avenue & 96th Street
- Collins Avenue & 96th Street
- Collins Avenue & the 9700 Block (BHS and St. Regis Driveways)
- Collins Avenue & Northern New Driveway

The proposed project is anticipated to be built and occupied in the year 2020. **Appendix A** contains the existing and proposed site plans for the project.

EXISTING CONDITIONS

Roadway System

The roadway system located near the project site includes Collins Avenue, Harding Avenue and 96th Street. 96th Street is a four lane divided roadway south of Bal Harbour Village and is adjacent to the southern portion of Bal Harbour Shops. Collins Avenue (A1A) is a 6 lane divided roadway with posted speed limit of 30 mph extends from the Bridge over Bakers Haulover Cut at the north end of Bal Harbour to the south at the traffic signal at the 9700 Block. This signal serves Bal Harbour Shops and the new St. Regis Hotel. Further south, A1A divides into separate 3-lane, one-way roads with Harding Avenue carrying southbound traffic and Collins carrying northbound traffic.

The study intersections include the entry/exit driveways to Bal Harbour Shops on Collins Avenue at the 9700 Block and the Bal Harbour Shops driveway on 96th Street at the 500 Block. Existing traffic signals are 96th Street at the Bal Harbour Shops entrance (500 Block); at Byron Avenue; at Harding Avenue and at Collins Avenue. There is a pedestrian crossing signal on Collins and Harding Avenue between 96th Street and the Bal Harbour Shops/St. Regis Signal.

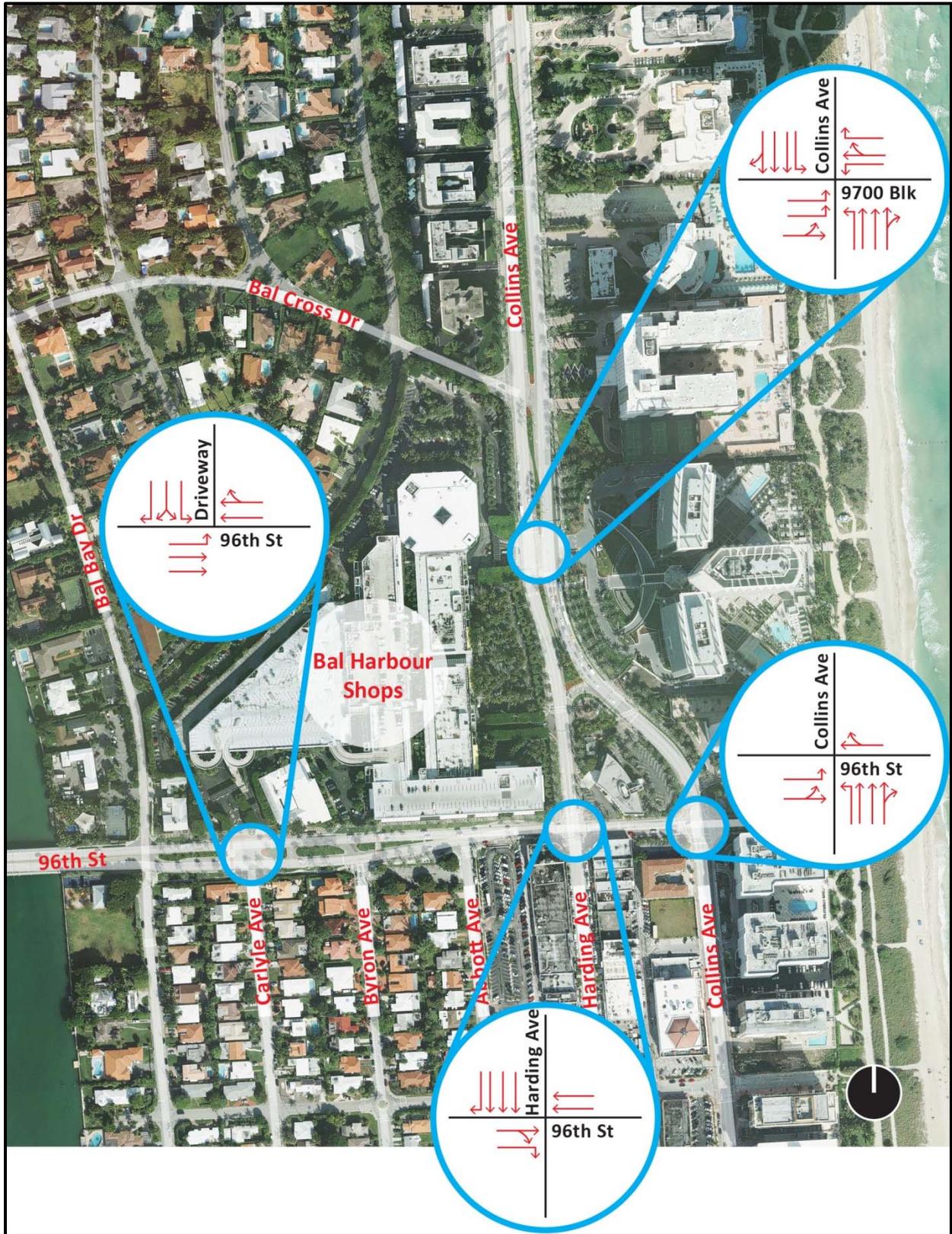
Nearby Intersections

With the assistance of Village of Bal Harbour staff, seven (7) intersections were identified that will likely to get impacted the most by the proposed project. The traffic study evaluated the following seven (7) intersections in the immediate vicinity of the project:

1. Bal Cross Drive and Collins Avenue (Unsignalized)
2. 96th Street & Bal Harbour Shops south entrance (500 Block) (Signalized)
3. 96th Street & Byron Avenue (Signalized)
4. Harding Avenue & 96th Street (Signalized)
5. Collins Avenue & 96th Street (Signalized)
6. Collins Avenue & the 9700 Block (BHS and St. Regis Driveways) (Signalized)
7. 96th Street & Bal Bay Drive (Unsignalized)

Figure 2 shows the existing lane geometry of the study intersections selected for analysis. The number of lanes on the street system surrounding the project site is also depicted in the figure.

Figure - 2 Existing Lane Geometry



DATA COLLECTION

In consultation with the Village, The Corradino Group collected traffic data on Saturday, December 13, 2014 between 4:00 PM and 6:00 PM. It was also the time period that the Village believed represented the appropriate conditions for analyzing traffic impacts at BHS.

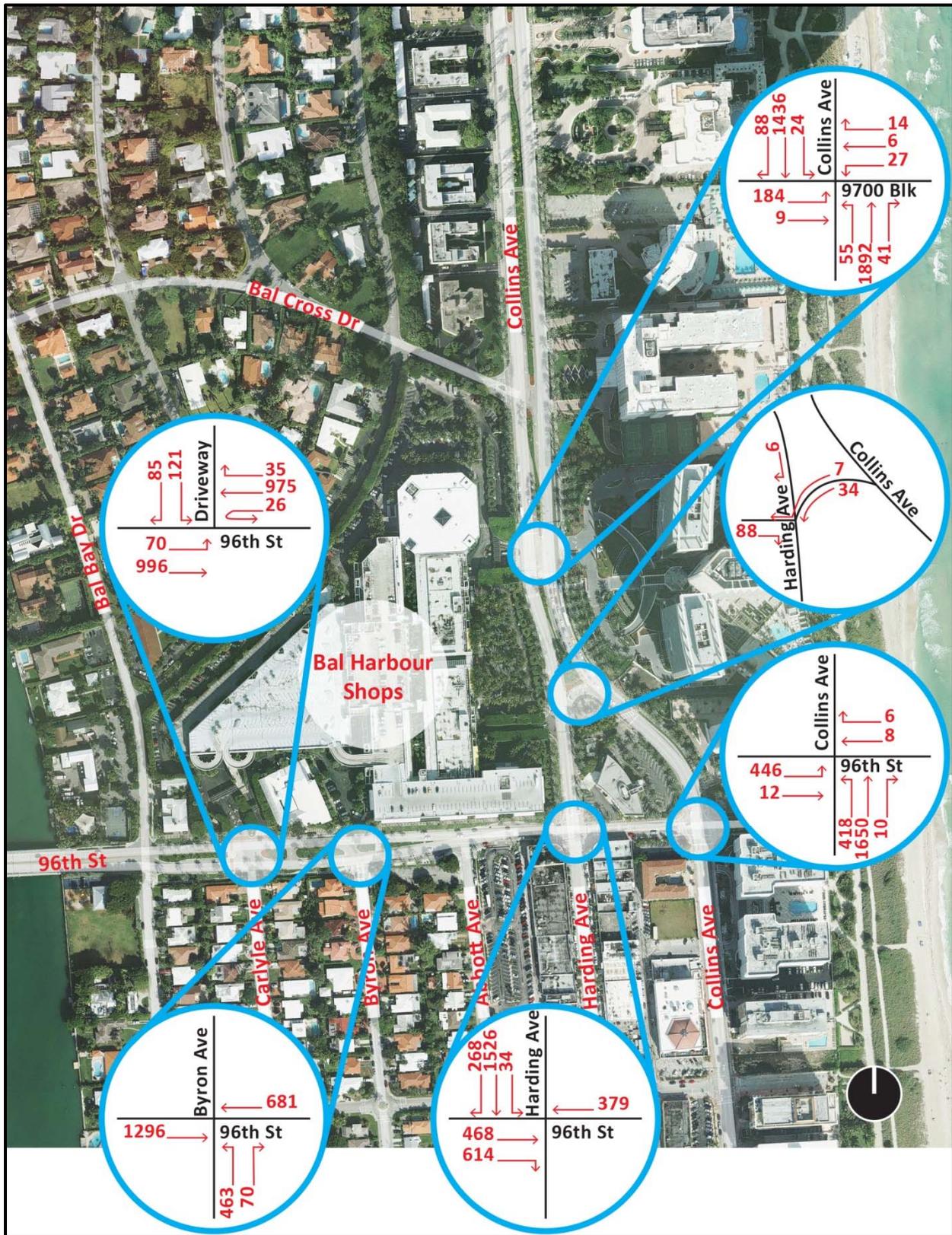
In reviewing the December counts, it was noted that the counts were actually lower than the counts collected by FCI in February 2014. Therefore, The Corradino Group felt it was appropriate to collect new counts on Thursday, February 19th, 2015 between 4:00 PM and 6:00 PM in order to compare the data collection in a similar time frame as the data collected by FCI.

The intersection turning movement counts were collected at the following intersections located near the project site:

1. Bal Cross Drive and Collins Avenue (Unsignalized)
2. 96th Street & Bal Harbour Shops south entrance (500 Block) (Signalized)
3. 96th Street & Byron Avenue (Signalized)
4. Harding Avenue & 96th Street (Signalized)
5. Collins Avenue & 96th Street (Signalized)
6. Collins Avenue & the 9700 Block (BHS and St. Regis Driveways) (Signalized)
7. 96th Street & Bal Bay Drive (Unsignalized)

Peak Season Conversion Factor (PSCF) obtained from FDOT peak season factor category report was applied on the raw counts to determine the existing 2015 turning movement counts. **Figure - 3** summarizes the results of the adjusted intersection turning movement counts undertaken during the Thursday PM peak hour. **Appendix B** contains the intersection turning movement counts collected in the field.

Figure - 3 Existing Turning Movement Counts 2015



TRIP GENERATION

The trip generation for the proposed project was based on the following two scenarios:

1. **Scenario 1** (Average trip rate from FCI traffic study and ITE LU Code 820/Shopping Center) - The average of the shops retail (trip rates from FCI traffic study) and general retail mall from ITE LU Code 820/shopping center (which includes eating and drinking establishments) was used. This average will be reflective of a more conservative assumption that takes into account future changes in market conditions that could result in more intense uses for the purposes of traffic generation. The ITE pass-by trip reduction (34%) was applied on the expansion element of the trip generation as indicated in **Table 1**. Pass-by trips are external to the development but are already on the transportation system (i.e., not new trips on the roadway). These trips enter the site as an intermediate stop, or are intercepted, by the proposed development. Pass-by trips are trips made as intermediate stops on the way from an origin to a primary destination. These trips are attracted from traffic passing on an adjacent street that contains direct access to the generator. These trips do not require a diversion from another roadway and are not new trips added to the system. The percentage of trips that can be classified as pass-by for a site will vary by the type of land use, time of day, type and volume of traffic carried on the adjacent street, and the size of development. Credit for pass-by trips is usually only allowed for retail and some commercial land uses such as fast-food restaurants with drive-through windows, service stations, and drive-in banks. Pass-by trips were included as part of the driveway volumes.

Land Use	Size	Weekday PM Peak Hour Trips		
		Inbound	Outbound	Total
Retail (Existing) [1]	463.477 ksf	291	381	672
821 Shopping Center (Additional retail) [2]	325.945 ksf	385	511	896
Total (Existing + Additional)	789.422 ksf	676	892	1568
Pass-by trip reduction (ITE - 34%) [3]		230	303	533
Net Trip Generation (Existing + Additional)	789.422 ksf	446	589	1035

Source: ITE Trip Generation Manual (9th Edition)

[1]: Trip rate (1.45) used from developer's traffic study

[2]: Average trip rate (additional GLA) from developers traffic study and ITE LU Code 820 equation (1.45+4.05/2 = 2.75)

[3] According to ITE Trip Generation Handbook (Second Edition), the passer-by traffic associated with shopping center use consists of approximately 34%.

As indicated above the net trips anticipated to be generated by the proposed expansion project consists of approximately 1,035 trips during the Weekday PM Peak hour (446 inbound and 589

outbound).

2. **Scenario 2** The second scenario assumes the worst case conditions and is based on the assumption that Bal Harbour Shops would be totally redeveloped along the lines of a typical shopping center as specified in the ITE Manual. Therefore, trip generation was determined based on the conditions in the future with the assumption that BHS will be totally converted to a standard shopping center. The ITE trip generators include trucks, deliveries, employee trips as well as patrons of the shopping center. The ITE pass-by trip reduction (34%) was applied on the trip generation as indicated in **Table 2**. *Pass-by trips were included as part of the driveway volumes.*

TABLE 2 (Scenario 2)				
Trip Generation Summary				
Bal Harbour Shops Expansion Study				
Land Use	Size	Weekday PM Peak Hour Trips		
		Inbound	Outbound	Total
820 Shopping Center (Existing + Additional retail) [1]	789.422 ksf	1148	1243	2391
Pass-by trip reduction (ITE - 34%) [2]		390	423	813
Net Trip Generation (Existing + Additional)	789.422 ksf	758	820	1578
Source: ITE Trip Generation Manual (9th Edition)				
[1]: ITE LU Code 820 equation				
[2] According to ITE Trip Generation Handbook (Second Edition), the passer-by traffic associated with shopping center use consists of approximately 34%.				

As indicated above the net trips anticipated to be generated by the proposed mall consists of approximately 1,578 trips during the Weekday PM Peak hour (758 inbound and 820 outbound). The following PM Peak hour trip comparison (*without pass-by credit*) highlights the trips generated by the developer’s traffic study and The Corradino Group’s more conservative scenarios 1 & 2:

- Developer’s Traffic Study (Total PM Peak Hour Trips) = 845
- Corradino Traffic Study Scenario 1 (Total PM Peak Hour Trips) = 1,568
- Corradino Traffic Study Scenario 2 (Total PM Peak Hour Trips) = 2,391

As can be seen from the trips above that The Corradino Group’s traffic study used more conservative approach by adding the ITE trip standards to test the impact on the project roadway network. The number of vehicles, projected by the Shops is a reasonable number, however the surrounding roadway network was analyzed by adding two additional scenarios that assume a more intense retail center for the purposes of trip generation. We do not expect the expansion to actually generate two and three times the number of trips.

Church by the Sea (CBTS)

Church by the Sea (CBTS) is a religious institution located within Bal Harbour Village with services occurring during nonpeak hours and when BHS is closed. Church by the Sea, currently on 96th Street in the immediate vicinity of BHS, will move from its existing location to a location within the boundaries of BHS. It will be utilizing the same primary access and parking facility. For this reason, trips generated by CBTS continue to be subsumed into the trip generation of BHS.

TRIP DISTRIBUTION AND ASSIGNMENT

The trip distribution and traffic assignment for the BHS project were based on the trip distribution information provided in the traffic study by FCI which was based on Miami-Dade County's Cardinal Distribution information (TAZ# 598) for the study area, examination of the surrounding roadway network characteristics, existing and future land use patterns. The trip distribution information is provided in **Appendix C**.

The new peak hour traffic generated by the project was assigned to the nearby transportation network using the traffic assignment documented above. The project trip distribution and assignments for trip generation scenarios 1 and 2 are summarized in **Figures 4, 5 & 6**.

Figure – 4 Project Trip Distribution Percentages (2020)

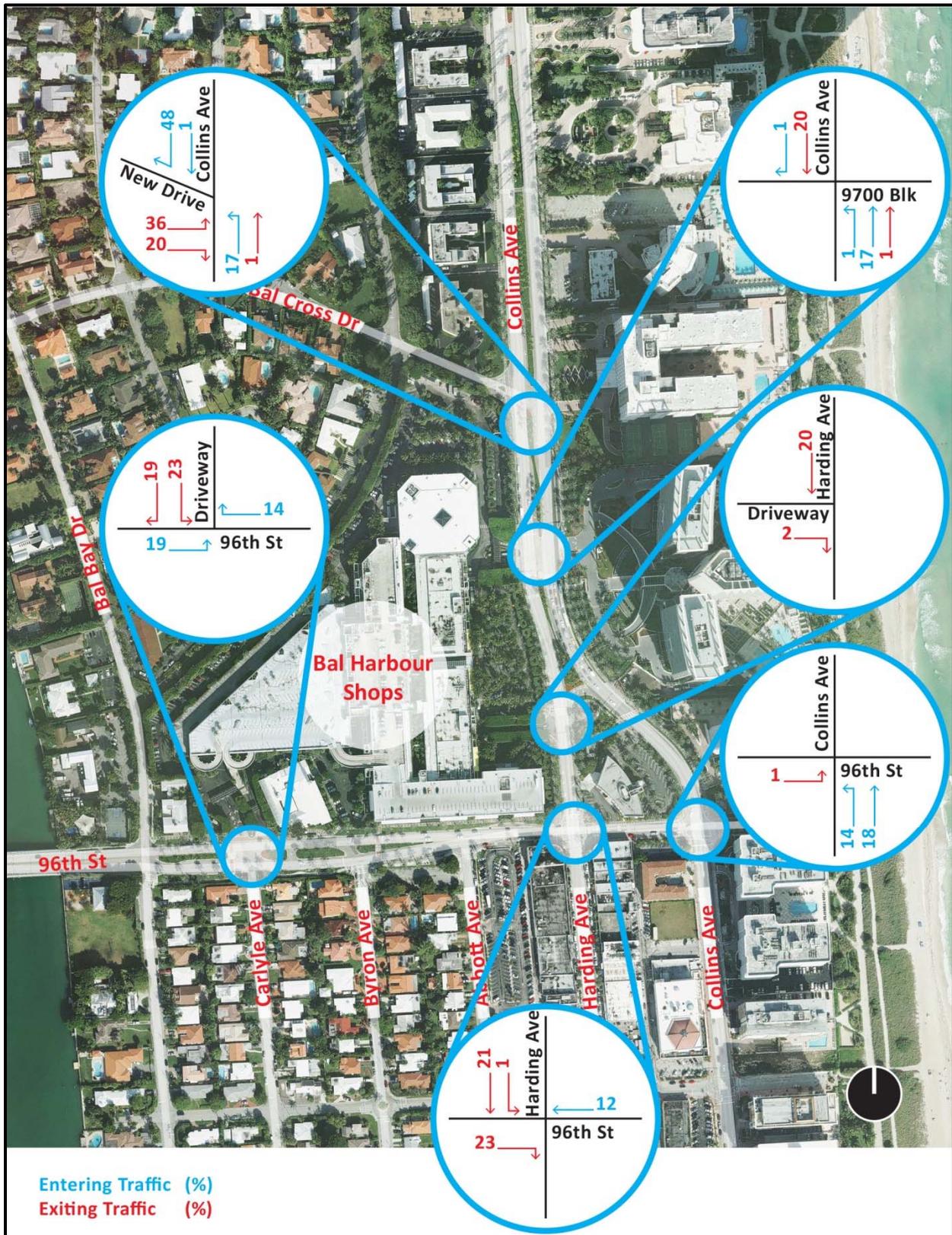


Figure – 5 Project Traffic Assignment (Trip Generation Scenario 1)

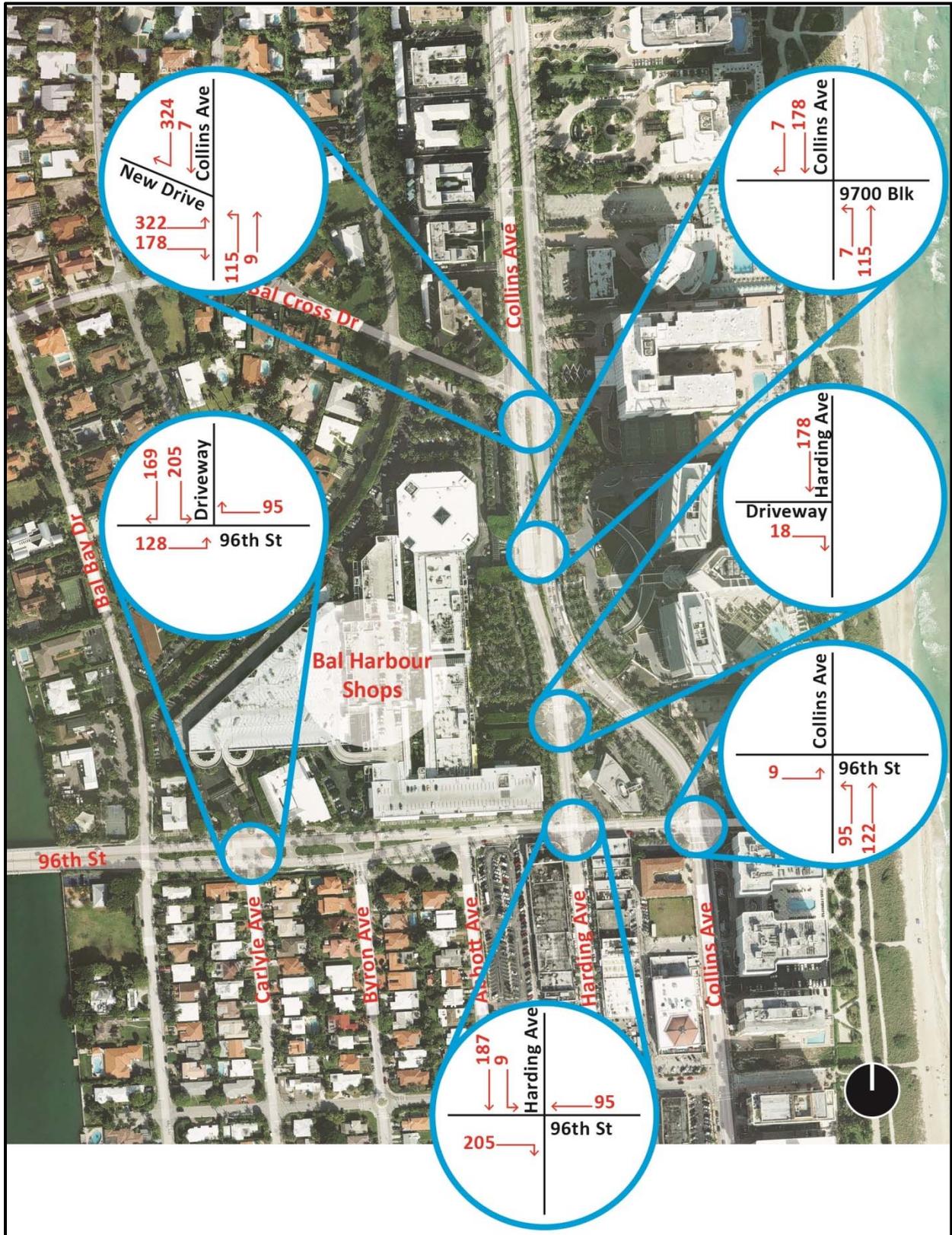
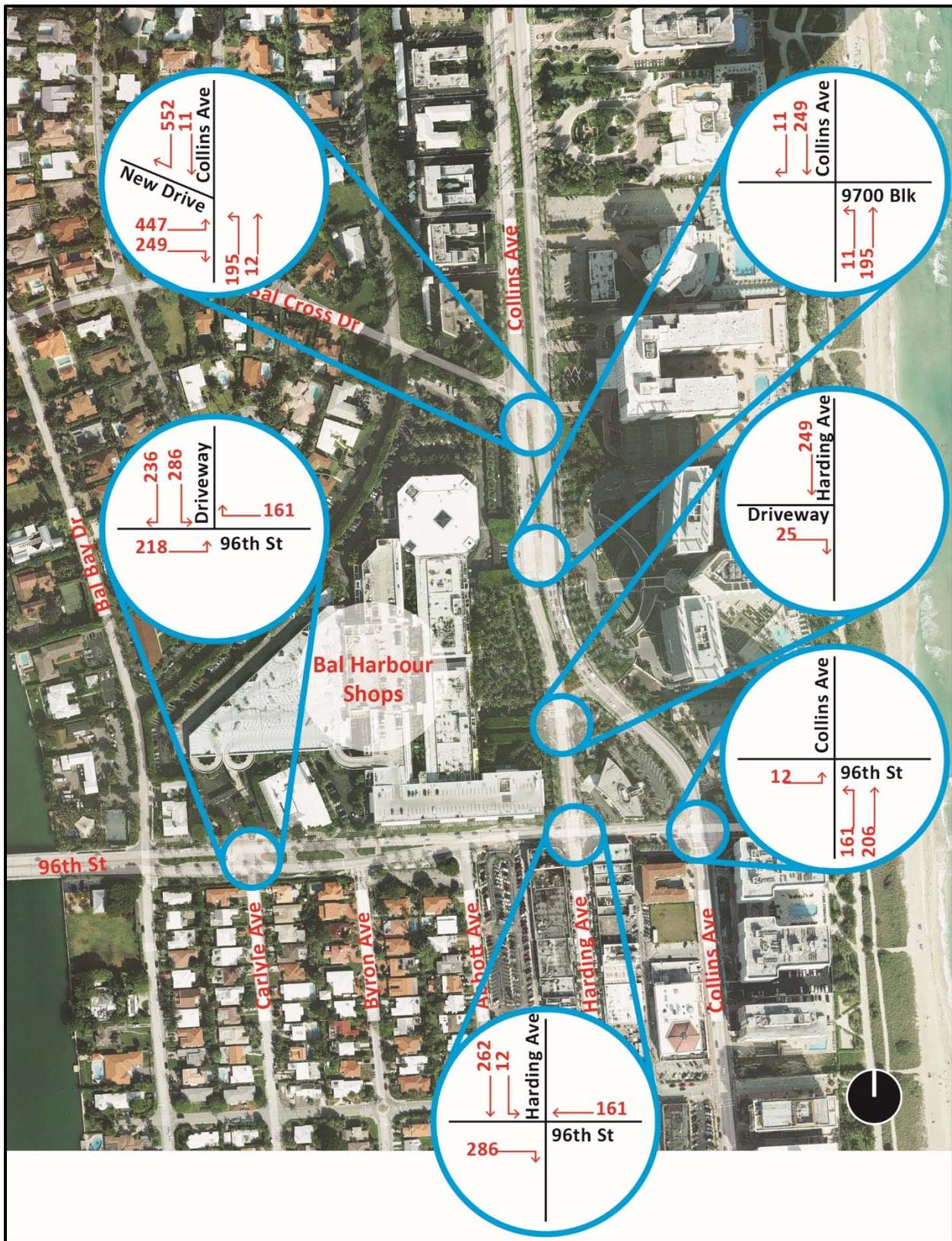


Figure – 6 Project Traffic Assignment (Trip Generation Scenario 2)



TRAFFIC ANALYSIS

This section of the study is divided into two parts. The first part consists of developing the future conditions traffic volumes for the study area. The second part includes level-of-service analyses for existing and future conditions.

Future Conditions Traffic Volumes

Two sets of future traffic volumes were developed. The first set includes project build out conditions without the proposed project and the second set adds the new trips anticipated to be generated by the project.

The project is anticipated to be built in the year 2020. In order to develop year 2020 traffic volumes, without the proposed project, two separate analyses were undertaken. The first analysis converts the existing peak hour traffic counts collected in the field to average peak season conditions based on FDOT's Peak Season Factor Category report (**Appendix D**). Factor of 0.99 was used to convert traffic counts collected in the field to convert into existing counts. The second analysis includes a growth factor to project 2015 peak season traffic volumes to the year 2020. Committed development information was obtained from the Village of Bal Harbour and Town of Surfside and was added as part of the background growth and is included in **Appendix E**. The following committed developments were added as part of the background traffic:

- Consultatio
- Surfside Pre-School
- The Shul
- Marriot
- Surf Club
- Chateau Ocean

Based on traffic growth data published by the FDOT for nearby traffic count stations (Stations 870132, 870540) located near the project site, minimal traffic growth has occurred in the past (Appendix D). However, in order to assess impacts with a conservative approach, a one percent (1%) growth rate was used for the purposes of this study. This growth rate of 1% per year is also consistent with a number of traffic studies performed (reviewed by The Corradino Group) in the area. The new trips generated by the project scenarios 1 & 2 (**Figures 5 & 6**) were added to the 2020 background traffic in order to develop total traffic conditions. The future traffic projections for the study intersections (peak season adjustments, growth rates and project

traffic) are presented in tabular format in **Appendix F. Figures 7 and 8** present the year 2020 total future traffic volumes for scenarios 1 and 2 for the study area which includes the additional traffic anticipated to be generated by the project.

Figure – 7 Future Total Traffic (Trip Generation Scenario 1)

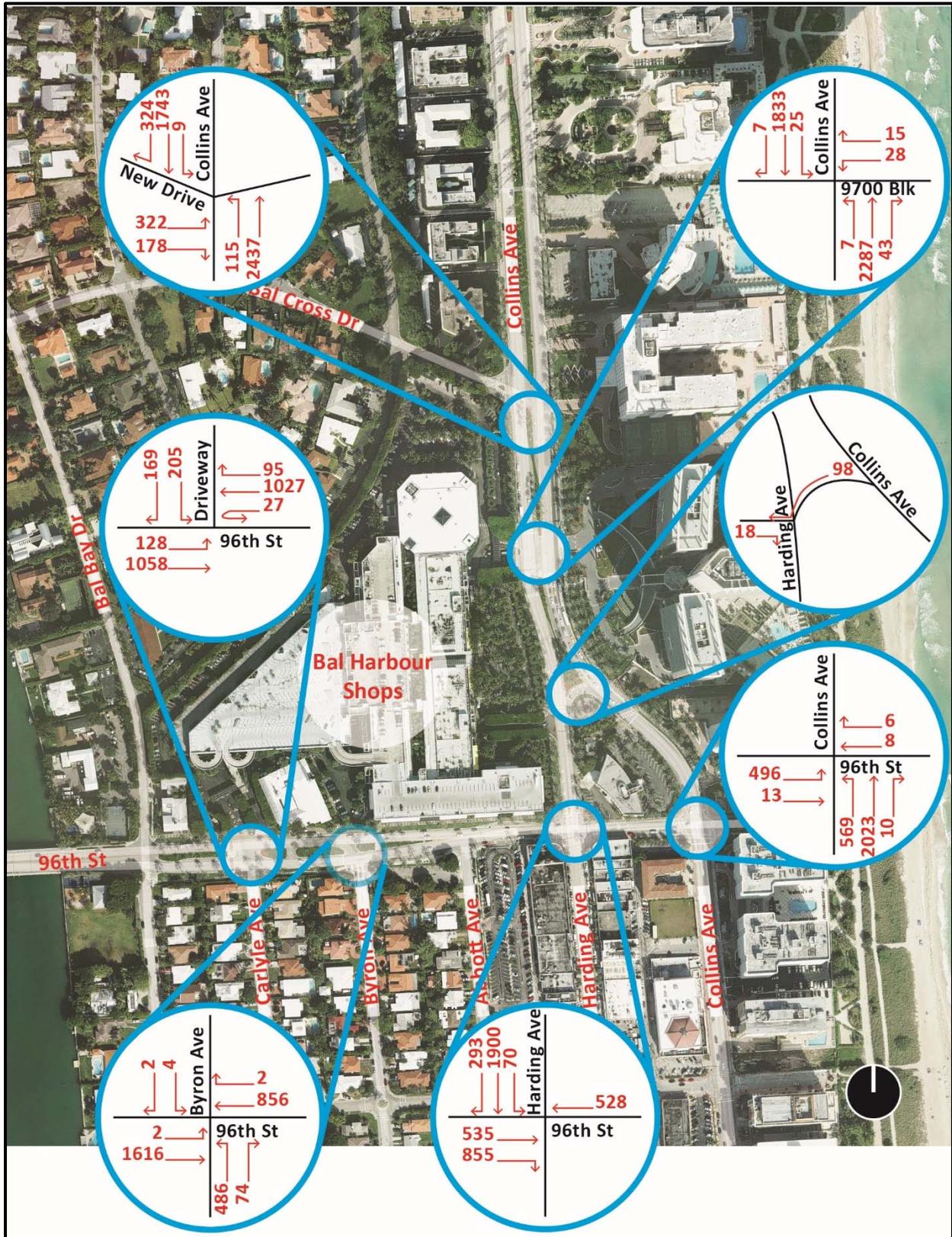
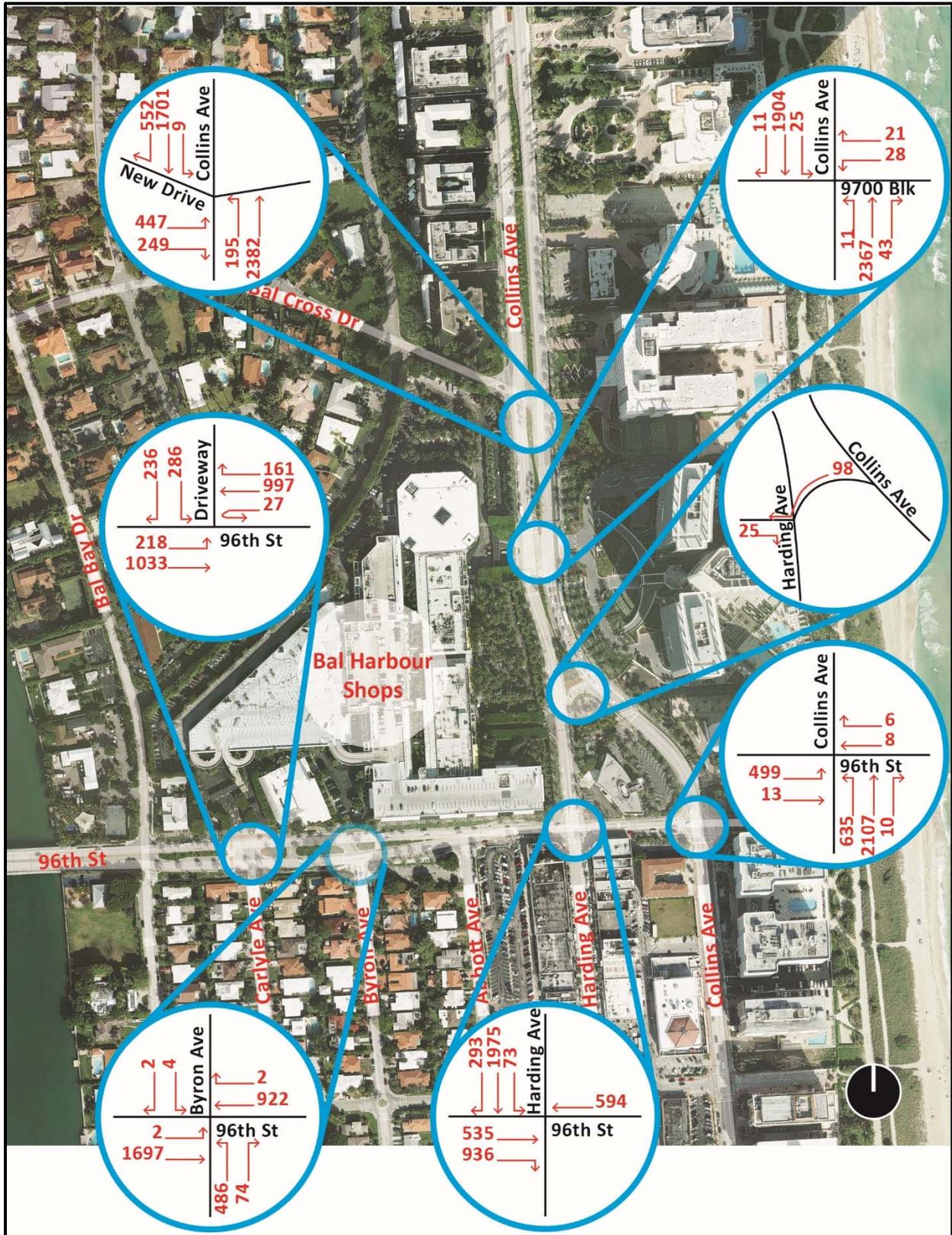


Figure – 8 Future Total Traffic (Trip Generation Scenario 2)



Future Planned Improvements (Enhancements)

In order to compare the results of the traffic studies between FCI and The Corradino Group, the future planned improvements proposed by FCI were used as part of the future level of service analysis. These improvements as highlighted in the FCI Traffic Study are mentioned below:

- Construct a new signalized driveway at the North end of BHS to handle the traffic currently using the drives on Collins and Harding.
- Reconstruct the BHS driveway on 96th Street to provide access to the enhanced Shops.
- Convert the existing drive opposite the St. Regis into an Entry Only drive for Premium Valet Parking.
- Convert the secondary driveway adjacent to the pedestrian crossing signal just north of 96th Street to an Exit Only drive for the Premium Valet parking.
- Replace the existing crosswalks on A1A at the 9700 Block and at the mid-block signal just north of 96th Street with enhanced (2 stage) crosswalks at the 9700 Block and at the new driveway at the northern end of BHS.
- Remove the mid-block pedestrian signal on Collins/Harding just north of 96th Street.
- Build a new loading area and driveway on 96th Street at Byron to handle truck traffic.
- Develop new traffic signal coordination plans (retiming) to address the improved signal spacing and other changes to the street network and optimize signal operations.

Level of Service Analyses & Result Comparisons with FCI Traffic Study

Intersection capacity/level of service analyses for the two trip generation scenarios were conducted for all the study intersections and were compared with the results provided in the FCI traffic study. The analyses were undertaken by using Synchro 8 software which follows the capacity/level of service procedures outlined in the Highway Capacity Manual 2010 (HCS). Typically, analyses are done for three daily peaks i.e. AM, Mid-day and PM Peaks. For the purpose of this study results were measured for the PM peak hour (4:00 – 6:00 PM) which represents the busiest level of combined project and roadway traffic during the day. The comparison results of the capacity analyses are summarized in **Tables 3 and 4** below:

TABLE 3 - Level of Service Analysis						
Intersections			FCI* - 2014 Existing Conditions		TCG** - 2015 Existing Conditions	
Location	Type	Move	PM Peak		PM Peak	
			Delay (sec)	LOS	Delay (sec)	LOS
Collins Avenue & New North Drive	Signalized	All	-	-	-	-
Collins Avenue & 9700 Block	Signalized	All	12.7	B	18.8	B
Collins Avenue & 96th Street	Signalized	All	34.7	C	32.3	C
Harding Avenue & 96th Street	Signalized	All	46.5	D	45.3	D
96th Street & Byron Avenue	Signalized	All	6.5	A	7.1	A
96th Street & S. Mall Entrance	Signalized	All	6.7	A	8.3	A
(*) Results from FCI Traffic Study Dated May 30, 2015.						
(**) Results from The Corradino Group Traffic Study.						

Source: Highway Capacity Manual 2010

As indicated in **Table 3**, all study intersections currently operate adequately at an acceptable level of service in the year 2015 when compared to the adopted level of service as per the Village Comprehensive Plan. The comparison between the two traffic studies indicate that the existing level of service results from The Corradino Group traffic study are very close to FCI traffic study.

TABLE 4 - Level of Service Analysis								
Intersections			FCI* - 2020 With Enhancements		TCG** - 2020 With Enhancements (Scenario 1)		TCG** - 2020 With Enhancements (Scenario 2)	
Location	Type	Move	PM Peak		PM Peak		PM Peak	
			Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
Collins Avenue & New North Drive	Signalized	All	9.1	A	14.1	B	28.9	C
Collins Avenue & 9700 Block	Signalized	All	3.7	A	3.9	A	4.0	A
Collins Avenue & 96th Street	Signalized	All	22.2	C	23.0	C	23.4	C
Harding Avenue & 96th Street	Signalized	All	36.3	D	43.4	D	52.2	D
96th Street & Byron Avenue	Signalized	All	12.4	B	16.0	B	17.1	B
96th Street & S. Mall Entrance	Signalized	All	6.5	A	13.6	B	23.3	C

(*) Results from FCI Traffic Study Dated May 30, 2015.

(**) Results from The Corradino Group Traffic Study for two Trip Generation Scenarios.

As indicated in **Table 4**, all study intersections will continue to operate adequately at an acceptable level of service in the year 2020 with proposed project and enhancements in place (recommended by FCI traffic study) for both trip generation scenarios (Scenario 1 and 2). The comparison between the two traffic studies indicate that although the delays increase under The Corradino Group traffic analysis scenarios, the LOS results from The Corradino Group are very close to FCI traffic study and are acceptable when compared to the adopted level of service as per the Village Comprehensive Plan. As far as a regulatory requirement, the LOS is established in the Comp Plan adopted by the Council several years ago. This standard is used by a number of cities as a base and then creates concurrency areas where this LOS can be higher. The State also sets LOS standard for their roads which is usually higher than D. Cities set the LOS as a tool to evaluate impact of proposed developments and to determine how a project must mitigate their fair share of the impact. In this case BHS determined that several improvements were needed in order to satisfy the requirement in the adopted Comp Plan. The following intersections were optimized along with the future proposed enhancements (See section **Future Planned Improvements (Enhancements)** of the report):

- Collins Avenue and North New Drive
- Collins Avenue and 9700 Blk
- Collins Avenue and 96th Street
- Harding Avenue and 96th Street
- Byron Avenue/Loading & 96th Street
- 96th Street & BHS South Driveway

Since mitigation is recommended in the form of signal optimization and modification, the developers needs to coordinate with Miami-Dade County Traffic Engineering Department and

Village of Bal Harbour to develop strategy in order to provide modified and acceptable signal timing plans for the proposed expansion. The synchro level of service results and outputs are included in **Appendix G**.

New North Driveway Queuing Analysis

The Queuing Analysis for the New North Driveway was based on the trips generated on a *Saturday Peak Hour of Generator* for LUC 820 (Retail) and the methodology outlined in the Institute of Transportation Engineers (ITE) *Transportation and Land Development*. The analysis was performed to determine the number of entering lanes needed at the New North Driveway and their corresponding stacking lengths that are required during the peak period of the weekday so that the queue does not extend past the entrance onto Collins Avenue (at 95% confidence level analysis).

As per the FCI traffic study, the New North Driveway at Collins Avenue is proposed to have three entering lanes that can accommodate up to 18 vehicles where shoppers will enter the mall from south and north of Collins Avenue. Upon entering they will stop to collect ticket and will then park in the parking lot. Based on the Institute of Transportation Engineers (ITE) and *Saturday Peak Hour of Generator* for LUC 820 (Retail), 1,132 vehicles (most conservative trip generation for Saturday Peak) will enter the New North Driveway of the mall from north and south of Collins Avenue.

The length of queue anticipated at the entrance was determined using information contained in ITE's *Transportation and Land Development*, Chapter 8 – Drive-In Facilities (By Vergil G. Stover and Frank J. Koepke). For this analysis, the following input variables were used:

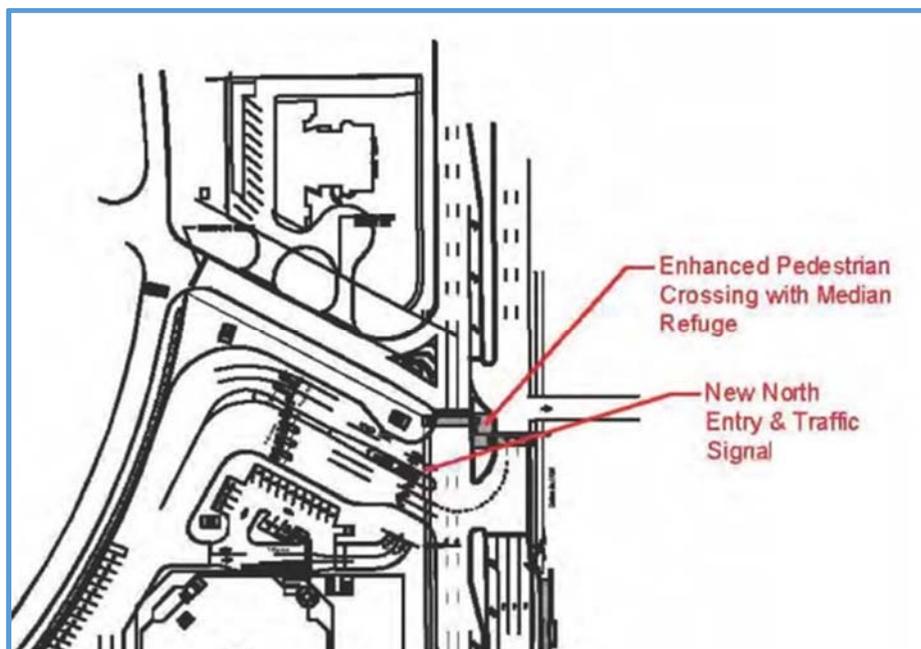
- **Demand Rate**: As indicated above, a maximum of 1,132 vehicles are expected to arrive during the highest hour (most conservative trip generation for Saturday Peak).
- **Service Rate**: The following servicing times were assumed for calculating the anticipated queue length at the New North Driveway:
 - 30 seconds (Corradino assumption)
 - 15 seconds (Corradino assumption)
 - 9.44 (As per the average service time data provided by the Developer's traffic engineer)
 - 8.0 seconds (Corradino assumption)

Using equation 8-9b and Table 8-11 of ITE's *Transportation and Land Development*, the maximum length of queue anticipated at the ticket entering lanes, at 95% confidence level, for

different service rates scenarios are mentioned in **Table 5** below:

Table 5 – Queuing Analysis			
Entering Lanes (N)	Average Ticket Service Time (Seconds)	Available Stacking (Vehicles)	Anticipated Queue (Vehicles)
3	30 (Corradino Assumption)	18 (As per the plan)	Model FAILS /Queuing is an issue
3	15 (Corradino Assumption)	18 (As per the plan)	Model FAILS /Queuing is an issue
3	8.0 (Corradino Assumption)	18 (As per the plan)	15 /Queuing is NOT an issue
3	9.44 (Developer’s traffic engineer)	18 (As per the plan)	297 /Queuing is an issue

As shown above, for 30, 15 and 9.44 seconds ticketing service time the model fails and queuing is an issue, whereas it works if the service time is 8.0 seconds or less. The 9.44 second average ticket service time was used based on the information provided by the developer’s traffic engineer. The Village will work with the developer to increase the length of the stacking lanes or implement a different system of entry that does not require vehicles to stop and collect tickets thus reducing any possibility of cars queuing onto Collins Avenue. The results of the ITE queuing procedure and service time data provided by the developer are contained in **Appendix H**.



New North Driveway

CONCLUSIONS

The proposed BHS Expansion project is located in the northwest quadrant of Collins Avenue/Harding Avenue and 96th Street in the Village of Bal Harbour, Florida. This project is a proposed expansion of the existing shopping center facility and is anticipated to affect traffic conditions on the adjacent roadway network. The shops currently have 463,477 square feet of gross leasable floor area and the proposed expansion is seeking to add a total of up to 325,945 square feet of additional gross leasable area (GLA). To measure the extent of the impacts, a traffic analysis was conducted to evaluate the existing conditions of the surrounding seven intersections and how the traffic generated by the project will affect them.

The intersection turning movement counts were collected and analyzed at the following intersections located near the project site:

1. Bal Cross Drive and Collins Ave (Unsignalized)
2. 96th Street & Bal Harbour Shops south entrance (500 Block) (Signalized)
3. 96th Street & Byron Avenue (Signalized)
4. Harding Avenue & 96th Street (Signalized)
5. Collins Avenue & 96th Street (Signalized)
6. Collins Avenue & the 9700 Block (BHS and St. Regis Driveways) (Signalized)
7. 96th Street & Bal Bay Drive (Unsignalized)

The trip generation for the proposed project was based on the following two scenarios:

Scenario 1 (Average trip rate from FCI traffic study and ITE LU Code 820/Shopping Center) - The average of the shops retail (trip rates from FCI traffic study) and general retail mall from ITE LU Code 820/shopping center (which includes eating and drinking establishments) was used. This average will be reflective of a more conservative assumption that takes into account future changes in market conditions that could result in more intense uses for the purposes of traffic generation. The ITE pass-by trip reduction (34%) was applied on the expansion element of the trip generation. Pass-by trips were included as part of the driveway volumes.

Scenario 2 The second scenario assumes the worst case conditions and is based on the assumption that Bal Harbour Shops would be totally redeveloped along the lines of a typical shopping center as specified in the ITE Manual. Therefore, trip generation was determined based on the conditions in the future with the assumption that BHS will be totally converted to a standard shopping center. The ITE trip generators include trucks, deliveries, employee trips as well as patrons of the shopping center. The ITE pass-by trip reduction (34%) was applied on the

trip generation. Pass-by trips were included as part of the driveway volumes.

Intersection capacity/level of service analyses for the two trip generation scenarios were conducted for all the study intersections and were compared with the results provided in the FCI traffic study. In order to compare the results of the traffic studies between FCI and The Corradino Group, the future planned improvements proposed by FCI were used as part of the future level of service analysis.

All study intersections currently operate adequately at an acceptable level of service in the year 2015 when compared to the adopted level of service as per the Village Comprehensive Plan. The comparison between the two traffic studies indicate that the existing level of service results from The Corradino Group traffic study are very close to FCI traffic study.

All study intersections will continue to operate adequately at an acceptable level of service in the year 2020 with proposed project and enhancements (recommended by FCI traffic study) in place for both trip generation scenarios (Scenario 1 and 2). The comparison between the two traffic studies indicate that although the delays increase under The Corradino Group traffic analysis scenarios, the LOS results from The Corradino Group are very close to FCI traffic study and are acceptable when compared to the adopted level of service as per the Village Comprehensive Plan. As far as a regulatory requirement, the LOS is established in the Comp Plan adopted by the Council several years ago. This standard is used by a number of cities as a base and then creates concurrency areas where this LOS can be higher. The State also sets LOS standard for their roads which is usually higher than D. Cities set the LOS as a tool to evaluate impact of proposed developments and to determine how a project must mitigate their fair share of the impact. In this case BHS determined that several improvements were needed in order to satisfy the requirement in the adopted Comp Plan. The following intersections were optimized along with the future proposed enhancements (See section **Future Planned Improvements (Enhancements)** of the report):

- Collins Avenue and North New Drive
- Collins Avenue and 9700 Blk
- Collins Avenue and 96th Street
- Harding Avenue and 96th Street
- Byron Avenue/Loading & 96th Street
- 96th Street & BHS South Driveway

Since mitigation is recommended in the form of signal optimization and modification, the developers needs to coordinate with Miami-Dade County Traffic Engineering Department and Village of Bal Harbour to develop strategy in order to provide modified and acceptable signal timing plans for the proposed expansion.

The Queuing Analysis for the New North Driveway was based on the trips generated on a *Saturday Peak Hour of Generator* for LUC 820 (Retail) and the methodology outlined in the Institute of Transportation Engineers (ITE) *Transportation and Land Development*. The analysis was performed to determine the number of entering lanes needed at the New North Driveway and their corresponding stacking lengths that are required during the peak period of the weekday so that the queue does not extend past the entrance onto Collins Avenue (at 95% confidence level analysis).

As per the FCI traffic study, the New North Driveway at Collins Avenue is proposed to have three entering lanes that can accommodate up to 18 vehicles where shoppers will enter the mall from south and north of Collins Avenue. Upon entering they will stop to collect ticket and will then park in the parking lot. Based on the Institute of Transportation Engineers (ITE) and *Saturday Peak Hour of Generator* for LUC 820 (Retail), 1,132 vehicles (most conservative trip generation for Saturday Peak) will enter the New North Driveway of the mall from north and south of Collins Avenue.

Different service times (30, 15, 8.0 and 9.44 seconds) were used to calculate the anticipated queues at the New North Driveway. Using equation 8-9b and Table 8-11 of ITE's *Transportation and Land Development*, it was determined that for 30, 15 and 9.44 seconds ticketing service time the model fails and queuing is an issue, whereas it works if the service time is 8.0 seconds or less. The 9.44 second average ticket service time was used based on the information provided by the developer's traffic engineer. The Village will work with the developer to increase the length of the stacking lanes or implement a different system of entry that does not require vehicles to stop and collect tickets thus reducing any possibility of cars queueing onto Collins Avenue.