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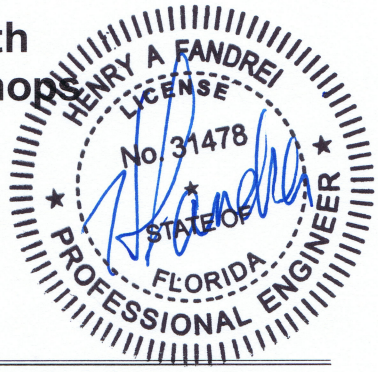
TECHNICAL MEMORANDUM

Traffic Impacts Associated With The Expansion at Bal Harbour Shops



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Florida P.E. # 31478

Date: June 24, 2015 (Revised October 27, 2015)

This memorandum summarizes the updated analyses of the traffic impacts associated with expanding Bal Harbour Shops. The memo of June 24, 2015 has been revised to reflect the Enhanced Plan for Bal Harbour Shops submitted to Bal Harbour Village in late October of 2015. The analyses described here follow the procedures described in the report *Traffic Impact Analyses-Bal Harbour Shops and Church by the Sea Proposed Enhancement and Relocation* submitted to Bal Harbour Village in May of 2014.

These updated analyses address review comments made in their March 19, 2015 memo by The Corradino Group (TCG). TCG functions as the Village's traffic engineer.

The Corradino Group also did an independent study of traffic impacts associated with the expansion at Bal Harbour Shops. In their study, TCG analyzed impacts using the trip generation developed by Fandrei Consulting, Inc. (FCI) for the May, 2014 study.

TCG also analyzed impacts using 2 theoretical versions of the trip generation for BHS which, in their report, are referenced as Scenario 1 and Scenario 2. The Village Manager has requested that, in addition to the analyses described in this memorandum, FCI provide analyses using Scenario 1 and Scenario 2 for the Enhanced Option for improvements to BHS described below. The supplemental analyses for these theoretical scenarios are described in a separate memo.

Expansion of Bal Harbour Shops

The Enhanced Plan for the improvements to Bal Harbour Shops has a Gross Leasable Area of 849,709 square feet.

To be conservative and to allow for some minor adjustments to the plan, the analyses described in this memorandum assume a GLA of 855,000 square feet for the expansion of Bal Harbour Shops. In other words, these updated analyses address the traffic impacts of the Enhanced Plan or any similar plan for Bal Harbour Shops with a GLA of 855,000 square feet or less.

Differences from the May 2014 Report

These analyses differ slightly when compared to the May 2014 report.

1. The earlier analyses assumed a value for the existing Gross Leasable Area (GLA) which was about 2% higher than the true size. These analyses use the correct GLA of 463,477 square feet for the existing Bal Harbour Shops. This adjustment creates an impact, albeit minor, to the trip generation rate for BHS. The corrected trip generation rate for Bal Harbour Shops is shown in Table 1 in the attachments to this memo.

2. These analyses use updated and expanded data for committed development obtained through coordination with The Corradino Group.

3. The Peak Hour Factors (PHF) used in the intersection capacity analyses were adjusted where necessary to match the existing measured PHF, subject to a limiting value of 0.95.

4. The percentage of heavy vehicles in the through movements on Collins, Harding and 96th Street was adjusted for the intersection capacity analyses, where necessary, to equal 2%. Measured percentages varied slightly from intersection to intersection but averaged about 1.5%.

5. TCG felt that the assignment of project trips to the surrounding roadway network may have been too high. We have reviewed our assignment of project traffic to the various roadway links within the study network and found it to be correct. This assignment can be found in the attached Table 3 and also in Table 5 from the May 2014 report.

6. Intersection settings for Collins @ 9700 Block were adjusted to account for the steady pedestrian flow across Collins at this intersection. Intersection settings for 96th Street at Harding and at Collins were adjusted to show no active sensors on the EB and WB approaches at Harding and for the EB approach at Collins.

Project Trip Generation and Assignment

Bal Harbour Shops was created as a unique collection of high end retail merchants. Bal Harbour Shops remains this way today and will continue to retain this unique character. It's 463,477 square feet of gross leasable area generates 593 trips during the p.m. peak hour. This represents 1.28 trips for each 1,000 square feet of leasable area (Table 1). This level of trip generation remains consistent with studies made at BHS in previous years. The rate of traffic generated by traditional shopping centers is 3.71 trips per 1,000 square feet of gross leasable area; almost 3 times as high as Bal Harbour Shops.

Traffic to be generated by Bal Harbour Shops after the proposed improvements are completed is shown in Table 2 in the attachments to this memo.

This traffic was then distributed to the roadway network using the assumptions from the original report. Peak Season, Peak Hour traffic volumes in 2020 after the enhancements to Bal Harbour Shops are in place are shown in Table 3 and in Figure 1.

Committed development traffic from the following projects was added to future background traffic:

Consulatio Condominiums in Bal Harbour
The Shul expansion in Surfside
Marriot
Surf Club
Chateau Ocean

The assignment of traffic from these developments to A1A and to 96th Street is also shown in Table 3.

Signalized Intersection Levels of Service

Intersection Levels of Service were recalculated for existing Peak Season conditions and for Peak Season conditions in 2020 after the physical and operational improvements associated with the enhancements to Bal Harbour Shops are completed. The results of these analyses are shown in Table 4.

After the proposed physical and operational improvements associated with the enhancements at Bal Harbour Shops are completed, levels of service and average delays will generally improve. This includes the important intersections of Harding and 96th Street and Collins and 96th Street.

Roadway Network Impacts

Computer simulation of traffic operations on the roadway network was also undertaken to provide for a comparison of existing and future traffic flow conditions on roadways in the general area of Bal Harbour Shops. The results, in Table 5, show that traffic operations in Bal Harbour will be better after the improvements proposed as part of the Bal Harbour Shops enhancements are in place even with the growth in the volume of background traffic plus the new traffic into Bal Harbour Shops referenced above.

Queuing at North Driveway

Studies of the time it takes to take a ticket at the gate and enter BHS at the existing main driveway (Service Time) were undertaken in 2011 and in 2015.

The average service time, including a blend of customers and employees, from the May 2011 study was found to be 8.3 seconds and the average service time from the April 2015 study was 9.4 seconds. These values are both consistent with industry standards.

An analysis of queuing in the North Driveway was undertaken to determine average and peak queues for three entry conditions. These conditions were 1) the PM Peak Hour, 2) the highest hourly volume of entering traffic on a Saturday and 3) the highest hourly volume of entering traffic over the Christmas Holiday Season. This peak Holiday volume is based upon a continuous count of driveway traffic at BHS extending from December 13th through 29th, 2014.

The results of the queuing analysis are shown in Table 6. The North entry drive can accommodate vehicles at each of the 3 gates plus up to 15 vehicles in the lanes behind them. This capacity means 18 vehicles can be in line without blocking Collins Avenue. As shown in Table 6, even the heaviest flow of traffic entering the Shops during the busy Christmas season can be accommodated without creating queuing that exceeds the 18 car capacity of the North entry drive.

Coordination with Miami-Dade County

FCI has consulted several times with William Paz, the signal timing engineer for the Miami-Dade Traffic Control Center with responsibility for traffic signals in the area including Bal Harbour, Surfside and Bay Harbour Islands. His input has helped us in formulating the improvements associated with the BHS expansion and with the listing of ancillary improvements which can be implemented by the Village and Surfside as funding becomes available.

FCI will continue to work with Mr. Paz and the Traffic Control Center over the course of this project to manage traffic flow during construction and to implement appropriate and efficient traffic operations as the improvements in our plan come on line.

Summary

The overall effect of the expansion of the proposed Bal Harbour Shops expansion and the accompanying transportation enhancements integral to the subject project will be improved, or at a minimum, consistent with current levels of service at signalized intersections within the community. Based upon the traffic analyses, the planned transportation-related improvements will allow for more efficient management of traffic flow within the community. They will also provide safer and more convenient pedestrian crossings at certain locations. The resulting traffic condition will not be increased congestion. Instead, motorists within Bal Harbour Village are expected to experience a slight, but noticeable, reduction in overall delay and number of stops.

attachments

TABLES & FIGURE

Table 1 - TRIP GENERATION FOR BAL HARBOUR SHOPS

Driveway Volumes (P.M. Peak Hour between 4-6 p.m.)				
	Data Counted Feb. 2014	Yearly Average (f=0.90)	Adjust to Peak Sea. (f=1.02)	Direc-tional Dist'n
Enter	*285*	256	291	43%
Exit	*374*	337	381	57%
Total	*659*	**593**	**672**	

Size of BHS = 463.477 ksf (gross leasable area)

Trip Generation Rate for **BHS** (Average Conditions) =

1.28 trips per 1000 sq. ft. of Gross Leasable Area

FCI June 2015

Table 2 - PM PEAK HOUR TRIPS FOR BAL HARBOUR SHOPS WITH 855,000 SF GLA

Average Conditions	Size	Units	Enter	Exit	Total
Retail (Trips to/from Existing)	463.477	ksf	256	337	593
Exist. + Enhancements[1] (Trips from Exist x 1.5072)[2]	855.000	ksf	387	507	894
Net Increase in PM Pk Hr Trips (Enhancements)			**131**	**170**	**301**
Peak Season Volumes					
Retail (Existing)	463.477	ksf	291	381	672
Exist. + Enhancements[1] (Trips from Exist x 1.5072)[2]	855.000	ksf	438	575	1013
Net Increase in PM Pk Hr Trips (Enhancements)			**147**	**194**	**341**

[1] Actual Size is 849.709 ksf. The 855.0 is assumed to allow for minor changes in the floor plan

[2] % Change in Trips Generated when comparing 855 ksf to 463.477 ksf is 150.72%

based upon ITE Equations for mixed retail (Shopping Centers, LUC 820) - see Appendix H in May 2014 Rpt

Source: BHS Driveway Counts Feb 2014 & ITE Trip Generation, 9th Ed.

Table 3 - TMC DATA FOR P.M. PK HR for BHS w/ UP TO 855,000 sq ft of GLA

Intersection	Mvmt	Count	Feb 2014 BHS Traf	a-b Feb B'gnd Traffic	PSCF B'gnd Traffic	c*d Pk Sea B'gnd Traffic	PSCF BHS Traffic	b*f Pk Sea BHS Traffic	e+g **2014 Pk Sea Traffic**	B'gnd Growth 2020	e*i B'gnd Traffic 2020	Con-su-latio	Surf-Side Shul Expn	Mar-riot Surf-Side	Cha-teau Ocean	Surf Club	Proj Traf 835 ksf	j+k+l+m+n+o+p **Pk Sea 2020 W/Expn**
		a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q
Collins Ave & New N. Drive (2/14 count is at Bal Cross)	NBUT	12	0	12	0.99	12	1.02	0	**12**	1.06	13	0	0	0	0	0	0	**13**
	NBL	4	0	4	0.99	4	1.02	0	**4**	0.00	0	0	0	0	0	0	75	**75**
	NBT	2,087	147	1,940	0.99	1,921	1.02	150	**2,071**	1.06	2,036	62	34	23	5	21	6	**2,187**
	NBR	4	0	4	0.99	4	1.02	0	**4**	1.00	4	0	0	0	0	0	0	**4**
	SBUT	16	0	16	0.99	16	1.02	0	**16**	1.06	17	0	0	0	0	0	0	**17**
	SBL	9	0	9	0.99	9	1.02	0	**9**	1.00	9	0	0	0	0	0	0	**9**
	SBT	1,675	143	1,532	0.99	1,517	1.02	146	**1,663**	1.06	1,608	34	30	22	7	24	4	**1,729**
	SBR	3	0	3	0.99	3	1.02	0	**3**	0.00	0	0	0	0	0	0	211	**211**
2/18/2014	EBL	0	0	0	0.99	0	1.02	0	**0**	0.00	0	0	0	0	0	0	207	**207**
	EBR	1	0	1	0.99	1	1.02	0	**1**	0.00	0	0	0	0	0	0	115	**115**
Collins Ave & 9700 Block	NBUT	6	0	6	0.99	6	1.02	0	**6**	1.06	6	0	0	0	0	0	0	**6**
	NBL	39	39	0	0.99	0	1.02	40	**40**	1.00	0	0	0	0	0	0	4	**4**
	NBT	2,091	10	2,081	0.99	2,060	1.02	10	**2,070**	1.06	2,184	62	34	23	5	21	81	**2,410**
	NBR	52	0	52	0.99	51	1.02	0	**51**	1.00	51	0	0	0	0	0	0	**51**
	SBUT	0	0	0	0.99	0	1.02	0	**0**	1.06	0	0	0	0	0	0	0	**0**
	SBL	19	0	19	0.99	19	1.02	0	**19**	1.00	19	0	0	0	0	0	0	**19**
	SBT	1,602	4	1,598	0.99	1,582	1.02	4	**1,586**	1.06	1,677	34	30	22	7	24	115	**1,909**
	SBR	139	139	0	0.99	0	1.02	142	**142**	1.00	0	0	0	0	0	0	4	**4**
	EBL	137	137	0	0.99	0	1.02	140	**140**	1.00	0	0	0	0	0	0	0	**0**
2/20/2014	EBT	8	8	0	0.99	0	1.02	8	**8**	1.00	0	0	0	0	0	0	0	**0**
	EBR*	0	0	0	0.99	0	1.02	0	**0**	1.00	0	0	0	0	0	0	0	**0**
	WBL	39	0	39	0.99	39	1.02	0	**39**	1.00	39	0	0	0	0	0	0	**39**
	WBT	1	1	0	0.99	0	1.02	1	**1**	1.00	0	0	0	0	0	0	0	**0**
	WBR	5	0	5	0.99	5	1.02	0	**5**	1.00	5	0	0	0	0	0	0	**5**
Harding Ave & S BHS Dr	SBR	4	4	0	0.99	0	1.02	4	**4**	1.00	0	0	0	0	0	0	0	**0**
	EBR*	79	79	0	0.99	0	1.02	81	**81**	1.00	0	0	0	0	0	0	12	**12**
	WBL	93	0	93	0.99	92	1.02	0	**92**	1.06	98	0	0	0	0	0	0	**98**
2/20/2014	WBT	7	7	0	0.99	0	1.02	7	**7**	0.00	0	0	0	0	0	0	0	**0**
Collins Ave & 96 Street	NBL	430	26	404	0.99	400	1.02	27	**427**	1.06	424	0	29	12	2	11	61	**539**
	NBT	1,817	71	1,746	0.99	1,729	1.02	72	**1,801**	1.06	1,833	45	34	23	5	21	79	**2,040**
	NBR	10	0	10	0.99	10	1.02	0	**10**	1.06	11	0	0	0	0	0	0	**11**
	EBL	377	16	361	0.99	357	1.02	16	**373**	1.06	378	17	0	0	0	0	6	**401**
2/20/2014	EBT	5	0	5	0.99	5	1.02	0	**5**	1.06	5	0	0	0	0	0	0	**5**
	WBT	9	0	9	0.99	9	1.02	0	**9**	1.06	10	0	0	0	0	0	0	**10**
	WBR	8	0	8	0.99	8	1.02	0	**8**	1.06	8	0	0	0	0	0	0	**8**
Harding Ave & 96 Street	SBL	22	4	18	0.99	18	1.02	4	**22**	1.06	19	0	26	0	0	0	6	**51**
	SBT	1,429	76	1,353	0.99	1,339	1.02	78	**1,417**	1.06	1,419	24	4	22	7	24	121	**1,621**
	SBR	292	0	292	0.99	289	1.02	0	**289**	1.06	306	10	0	0	0	0	0	**316**
	EBT	389	12	377	0.99	373	1.02	12	**385**	1.06	395	17	25	0	0	0	0	**437**
2/20/2014	EBR	468	92	376	0.99	372	1.02	94	**466**	1.06	394	0	0	11	4	12	132	**553**
	WBT	443	26	417	0.99	413	1.02	27	**440**	1.06	438	0	29	0	0	11	61	**539**
96th Street & Byron	NBL	370	0	370	0.99	366	1.02	0	**366**	1.06	388	0	0	0	0	0	0	**388**
	NBR	52	0	52	0.99	51	1.02	0	**51**	1.06	54	0	0	0	0	0	0	**54**
	SBL**	--	0	0	0.99	0	1.02	0	**0**	1.00	0	0	0	0	0	0	1	**1**
	SBR**	--	0	0	0.99	0	1.02	0	**0**	1.00	0	0	0	0	0	0	0	**0**
2/20/2014	EBL**	0	0	0	0.99	0	1.02	0	**0**	1.00	0	0	0	0	0	0	0	**0**
	EBT	1,044	98	946	0.99	937	1.02	100	**1,037**	1.06	993	17	25	11	4	12	132	**1,194**
	WBT	735	40	695	0.99	688	1.02	41	**729**	1.06	729	10	29	12	2	11	61	**854**
	WBR**	0	0	0	0.99	0	1.02	0	**0**	1.00	0	0	0	0	0	0	1	**1**
96th Street & BHS Drive	SBL	98	98	0	0.99	0	1.02	100	**100**	1.00	0	0	0	0	0	0	132	**132**
	SBR	65	65	0	0.99	0	1.02	66	**66**	1.00	0	0	0	0	0	0	109	**109**
	EBUT	6	0	6	0.99	6	1.02	0	**6**	1.06	6	0	0	0	0	0	0	**6**
	EBL	57	57	0	0.99	0	1.02	58	**58**	1.00	0	0	0	0	0	0	83	**83**
2/20/2014	EBT	866	0	866	0.99	857	1.02	0	**857**	1.06	908	17	25	11	4	12	0	**977**
	WBUT	26	0	26	0.99	26	1.02	0	**26**	1.06	28	0	0	0	0	0	0	**28**
	WBT	1,037	0	1,037	0.99	1,027	1.02	0	**1,027**	1.06	1,089	10	29	12	2	11	0	**1,153**
	WBR	40	40	0	0.99	0	1.02	41	**41**	1.00	0	0	0	0	0	0	61	**61**

* EB right turns at 9700 are illegal; existing R turns are transferred to drive on Harding where they are permitted

** Truck vol's into and out of the loading area bet. 5 & 6 pm are between 0 & 1; vol's are higher during midday

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Table 4 - INTERSECTION LOS w/ UP TO 855,000 SF OF GLA

Location	PM Peak Hour	
	Existing Peak Season	2020 Peak Season
Collins Ave & New North Dr	--	A/8.1
Collins Ave & 9700 Block	C/28.5	A/6.0
Collins Avenue & 96th Street	D/35.0	B/17.1
Harding Avenue & 96th Street	D/37.4	C/27.5
96th Street & Byron Avenue	A/6.5	B/12.0
96th Street & S. Entrance of BHS	A/6.7	A/8.1

* LOS/Ave. delay in sec.

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Table 5 - ROAD NETWORK MEASURES OF EFFECTIVENESS

Measure of Effectiveness	- - PM Peak Hour - -		
	2014 Peak Season	2020 Peak Season w/ BHS Enhancements up to 855 ksf of GLA	Percent Improvement
Delay/Vehicle in sec.	69.0	55.1	20%
Stops/vehicle	1.29	1.17	9%
Average Speed (mph)	16	17	6%

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Table 6 - QUEUING ANALYSES AT NORTH DR FOR UP TO 855,000 SF of GLA

	Wkday (TWTh), Peak Season Peak Entering Vol	Saturday Peak Hour for Entering Traffic	Highest Single Hour for Entering Traffic During Christmas Season
Hourly Volume (veh/hr)	488	522	800 [1]
Number of Lanes	3	3	3
Average Service Time (sec)	9.4	9.4	9.4
Average Queue per Lane [2]	negligible	negligible	negligible
Design Queue/lane (90% prob.) [2]	negligible	negligible	1.5
Total Cars in System inc cars at gate	- -	- -	8.0

[1] Actual Projection is 702 vph [2] Queue is measured behind car in Service position (at gate)

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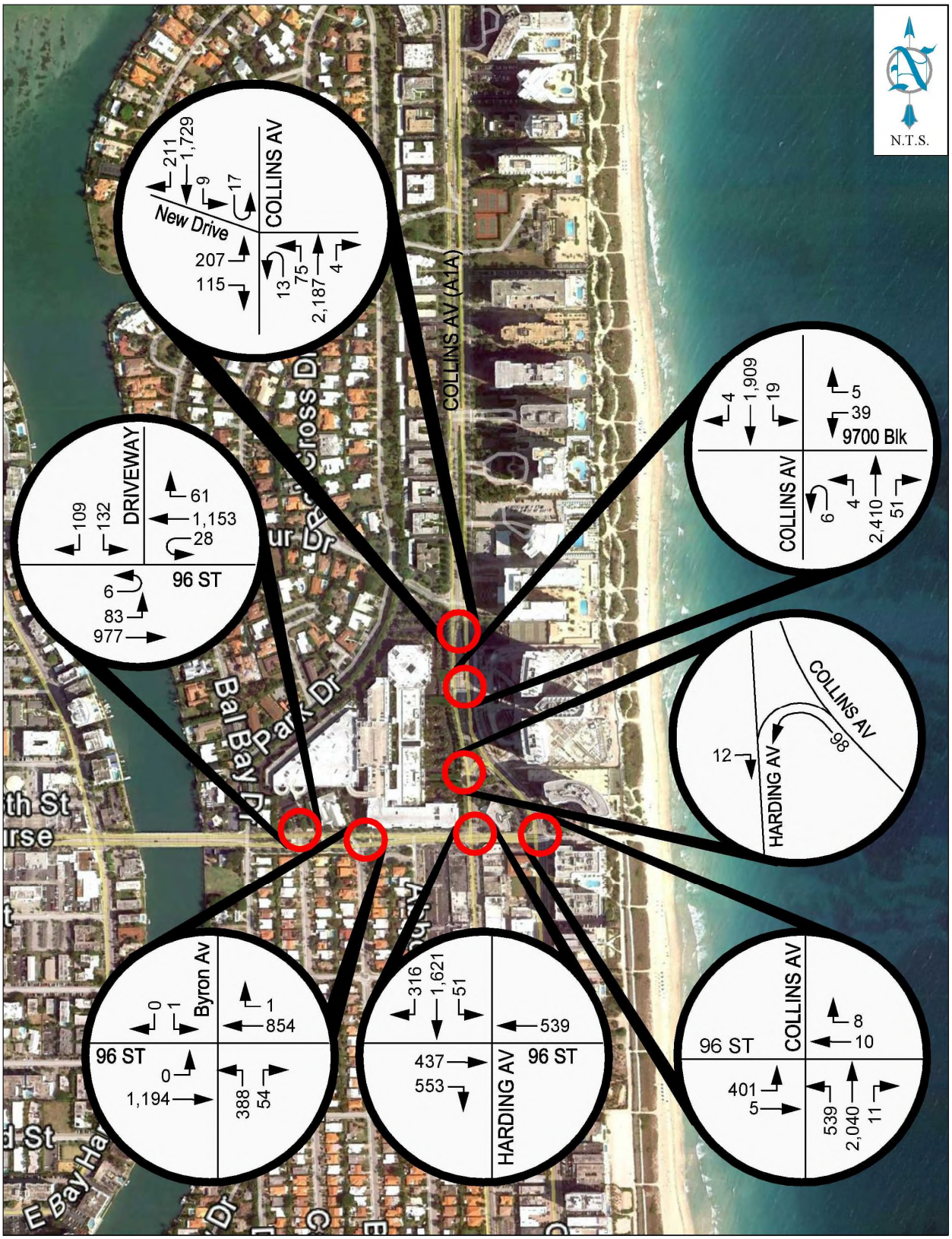
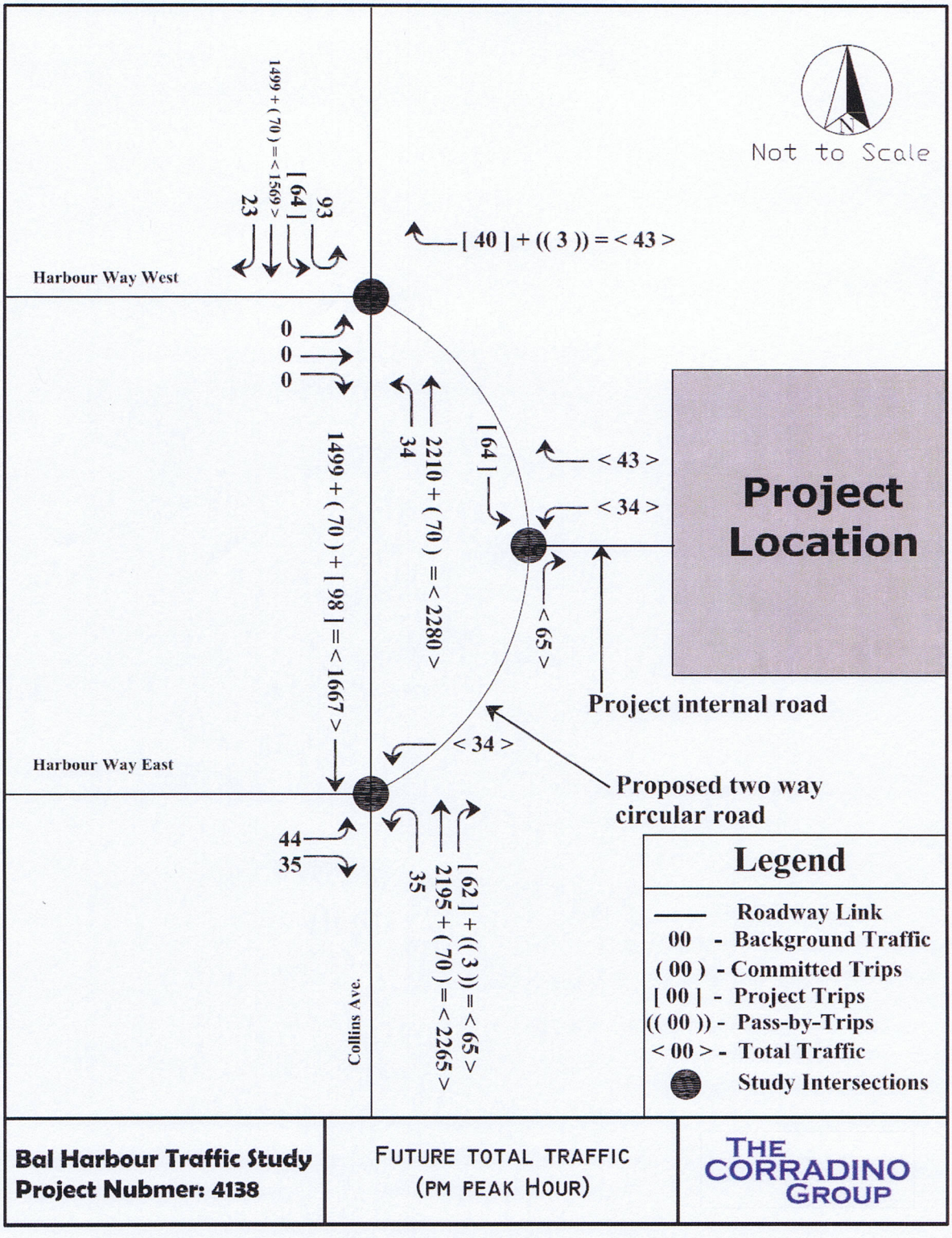


Figure 1 - 2020 PEAK SEASON TRAFFIC (5-6 PM) w/ UP TO 835,000 sq ft OF GLA

COMMITTED DEVELOPMENT

Figure 5 - Future Traffic Volumes (PM Peak Hour)



30
HARDING AVE
COLLINS AVE
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29
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96TH STREET
96TH STREET
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29 34
ALLEY
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ASSIGNMENT
WEEKDAY PM PEAK HOUR
IN-86
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35 63
ALLEY
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95TH STREET
95TH STREET
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63
4
31
COLLINS AVE
HARDING AVE
35

TRIP GENERATION

The trip generation analysis for the 175-room hotel was performed using the trip generation rates published in the Institute of Transportation Engineer's (ITE) *Trip Generation* manual (8th Edition). The trip generation analysis was undertaken for daily, AM peak hour, and PM peak hour conditions. According to ITE's *Trip Generation* manual (8th Edition), the trip generation rates used for the subject lodging facility are:

HOTEL (ITE Land Use 310)

Daily Trip Generation
T = 8.92 (X)
Where T = number of daily trips
X = number of occupied hotel rooms

AM Peak Hour
T = 0.67 (X) (58% inbound and 42% outbound)
Where T = number of AM peak hour trips
X = number of occupied hotel rooms

PM Peak Hour
T = 0.70 (X) (49% inbound and 51% outbound)
Where T = number of PM peak hour trips
X = number of occupied hotel rooms

Using the above-listed trip generation rates from the ITE document, a trip generation analysis was undertaken for the proposed hotel. The results of this effort are documented in Table 1.

TABLE 1
Trip Generation Analysis
Hotel

		Number of Trips		
Land Use	**Size**	**Daily**	**AM Peak**	**PM Peak**
Hotel	175 rooms	1,561	117	123

Source: ITE Trip Generation Manual (8th Edition)

As indicated in Table 1, the proposed 175-room hotel is projected to generate approximately 1,561 daily trips, approximately 117 AM peak hour trips (68 inbound and 49 outbound), and approximately 123 trips during the typical afternoon peak hour (60 inbound and 63 outbound).

Marriot

TRIP DISTRIBUTION AND TRAFFIC ASSIGNMENT

The trip distribution for the project was based on Miami-Dade County's Cardinal Distribution information for the study area. Table 2 below summarizes the county's cardinal distribution data for traffic zone 602, which is applicable to the location of the subject project.

TABLE 2
Project Trip Distribution
Hotel

Direction		% of Total Trips
North:	Northwest	31.77%
	Northeast	0.81%
South:	Southwest	27.30%
	Southeast	1.60%
East:	Northeast	0.0%
	Southeast	0.0%
West:	Northwest	21.59%
	Southwest	16.93%
	Total	100.00%

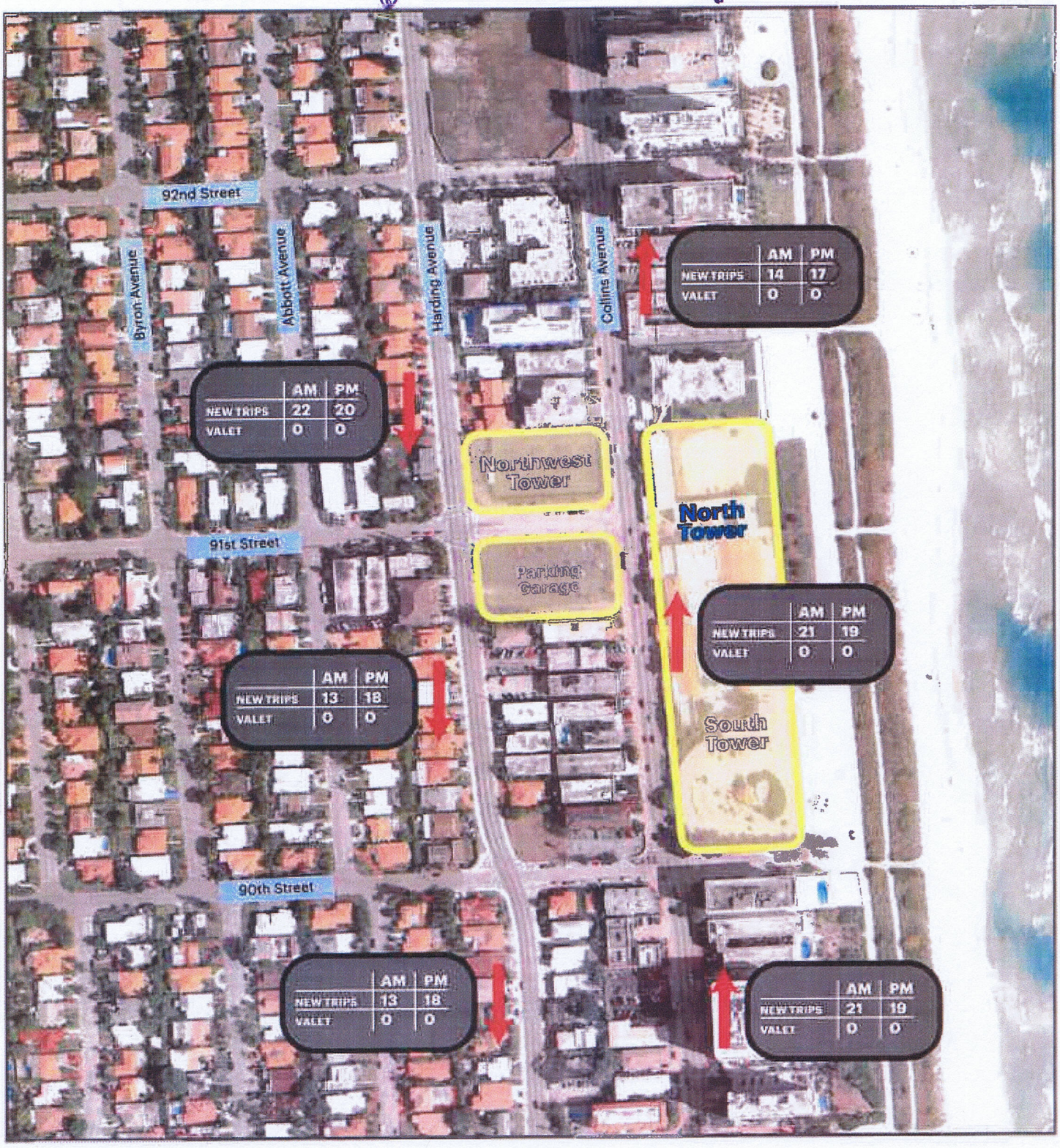
Source: Miami-Dade County

Using the trip distribution documented in Table 2, the traffic assignment assumed for the proposed hotel development is as follows:

- 55% to and from the north via Collins Avenue/Harding Avenue
- 45% to and from the south via Collins Avenue/Harding Avenue

Based on the above, the maximum hourly volume heading eastbound on 92nd Street occurs in the PM peak hour with 35 vehicles (63 outbound x 55% towards the north on Collins Avenue). Similarly, the maximum hourly volume heading west on 92nd Street occurs in the PM peak hour with 28 vehicles (63 outbound x 45% towards the south on Harding Avenue).

Marriot



North Tower - Project Trips
Exhibit 9

David Plummer & Associates

Surf Club
Traffic Study

N.T.S.

TABLE 1 Trip Generation Summary Chateau Ocean - Surfside, Florida				
		Number of Trips		
Land Use	**Size**	**Daily**	**AM Peak**	**PM Peak**
EXISTING USE				
Hotel	92 rooms	752	52	54
PROPOSED USE				
Residential	85 units	356	29	33
Difference		**-396**	**-23**	**-21**

Source: ITE Trip Generation Manual (8th Edition)

As indicated it Table 1, the proposed Chateau Ocean residential development is anticipated to generate approximately 356 daily trips, approximately 29 AM peak hour trips (6 inbound and 23 outbound) and approximately 33 new trips (20 inbound and 13 outbound) during the typical afternoon peak hour. When compared to the existing use on the site, the proposed 85-unit high-rise residential complex is projected to generate approximately 396 less daily trips, approximately 23 less AM peak hour trips, and approximately 21 less PM peak hour trips when compared to the existing hotel use on the site. Therefore, it is concluded that the proposed Chateau Ocean project will benefit the transportation network located within the Town of Surfside.

TRIP DISTRIBUTION AND TRAFFIC ASSIGNMENT

The trip distribution and traffic assignment for the Chateau Ocean project were based on Miami-Dade County's Cardinal Distribution information for the study area, examination of the surrounding roadway network characteristics, and existing land use patterns. Table 2 summarizes the county's cardinal distribution data for the project area (TAZ 602) based on the latest SERPM data published by Miami-Dade County.

TABLE 2
Project Trip Distribution
Chateau Ocean – Surfside, Florida

Direction		% of Total Trips
North:	Northwest	31.77%
	Northeast	0.81%
South:	Southwest	27.30%
	Southeast	1.60%
East:	Northeast	0.00%
	Southeast	0.00%
West:	Northwest	21.59%
	Southwest	16.93%
	Total	100.00%

Source: Miami-Dade County (2035 SERPM)

Using the trip distribution documented in Table 2, the following traffic assignment was assumed for the proposed redevelopment project:

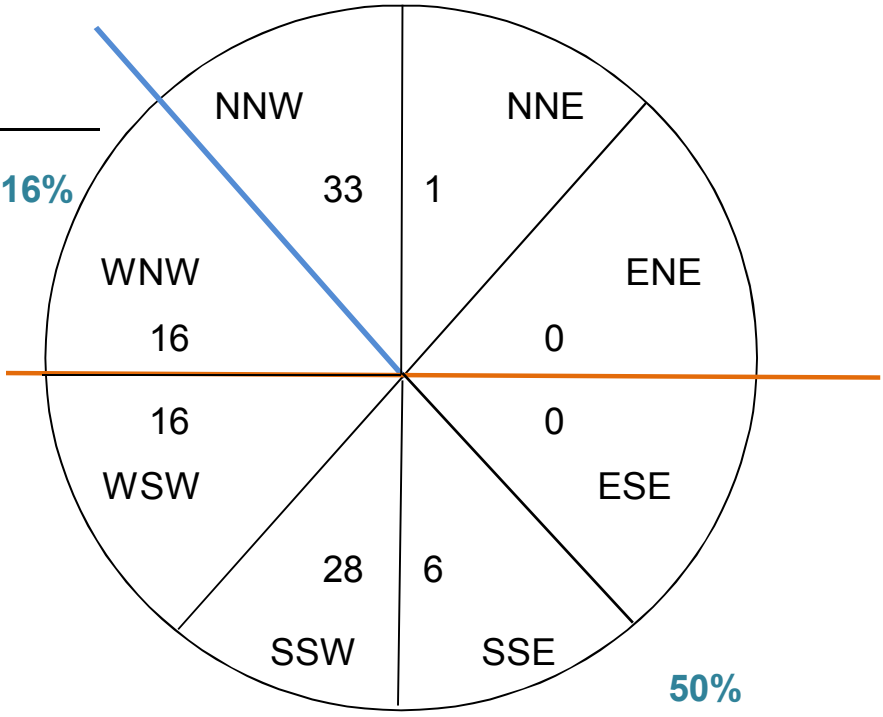
- 55% to and from the north via Collins Avenue/Harding Avenue
- 45% to and from the south via Collins Avenue/Harding Avenue

The AM and PM peak hour traffic generated by the project was assigned to the project driveways using the traffic assignment documented above. The project traffic assignment is summarized in Figure 2. As indicated in Figure 2, the projected northbound right-turning volume at the proposed SR A1A right-turn-in only driveway does not warrant the installation of a separate right-turn lane (maximum hourly volume expected is 9, or approximately one vehicle every six minutes 40 seconds).

TAZ #	602	2-Way Trips	34%
TRIPS	100		

NNE	1.54%
ENE	0.00%
ESE	0.00%
SSE	5.83%
SSW	28.03%
WSW	15.50%
WNW	16.35%
NNW	32.75%

16%



50%

Source: Miami-Dade MPO's Cardinal Distribution of Trips for 2020

CARDINAL DISTRIBUTION OF SURFSIDE TRIPS IN 2020

SERVICE TIME STUDIES

Data collected at BHS on: May 25, 2011 *Technician* *D. Boyd*

Arriving Vehicles	Lane A			Lane B		
	Duration(sec)	# *in Line*	#	Duration(sec)	# *in Line*	#
3:00-3:15 PM	9	*1*	*1*	4	*1*	*1*
	11		*2*	11	*1*	*2*
	1		*3*	6		*3*
	8		*4*	15		*4*
	8		*5*	9		*5*
	5		*6*	5		*6*
	6	*1*	*7*	7		*7*
	6		*8*	9		*8*
	3		*9*	4		*9*
	3		*10*			
	20	*1*	*11*			
3:15-3:30	6	*1*	*12*			
	6		*13*			
	5		*14*			
	8		*15*	6		*10*
	5		*16*	5		*11*
	7		*17*	5	*1*	*12*
	7		*18*	6		*13*
	5		*19*			
	11		*20*			
3:30-3:45	32		*21*	15		*14*
	8		*22*	9		*15*
	7		*23*	6		*16*
	9	*1*	*24*	5		*17*
	3		*25*	6	*1*	*18*
	15		*26*	7	*1*	*19*
	11	*1*	*27*	5		*20*
	6		*28*	10		*21*
	11		*29*	8		*22*
	10		*30*	6		*23*
	10		*31*	8	*1*	*24*
	9	*1*	*32*	12		*25*
	6		*33*			
	9		*34*			
	9	*1*	*35*			
	6		*36*			
	14	*1*	*37*			
	5		*38*			
	7	*1*	*39*			
3:45-4:00	14	*1*	*40*	8		*26*
	10		*41*	10		*27*
	12		*42*	13		*28*
	6	*1*	*43*	6	*1*	*29*
	6		*44*	7		*30*
	8		*45*	6		*31*
	8		*46*	10		*32*
	6		*47*	6		*33*
	9		*48*	11		*34*
	16		*49*	8		*35*
	6	*1*	*50*	9		*36*
	7	*1*	*51*	7		*37*
	11		*52*			
	8		*53*			
	10	*1*	*54*			
	7	*1*	*55*			
	6	*1*	*56*			
	9		*57*			
Totals	486	*17*		290	*7*	
Observations (vehicles)			*57*			*37*

Total Seconds	776
Total Ob'ns	94
Ave Service Time (sec)	**8.3**
Total Veh. In Line	24
Ave line behind the Ticket Spitter	0.26

Data collected at BHS on: April 30, 2015 *Technician: R Aleman*

Arriving Vehicles

12:30-12:45 PM

Lane 1		Lane 2	
Duration(sec)	#	Duration(sec)	#
1	*1*	6	*1*
5	*2*	2	*2*
14	*3*	2	*3*
1	*4*	2	*4*
7	*5*	5	*5*
9	*6*	8	*6*
2	*7*	4	*7*
7	*8*	6	*8*
12	*9*	6	*9*
3	*10*	2	*10*
8	*11*	2	*11*
10	*12*	8	*12*
8	*13*	10	*13*
7	*14*	5	*14*
3	*15*	8	*15*
2	*16*	8	*16*
17	*17*	3	*17*
15	*18*	6	*18*
8	*19*	6	*19*
4	*20*	7	*20*
4	*21*	7	*21*
3	*22*	8	*22*
2	*23*	4	*23*
9	*24*	12	*24*
2	*25*	9	*25*
8	*26*	4	*26*
3	*27*	17	*27*
6	*28*	7	*28*
6	*29*	3	*29*
3	*30*		
5	*31*		
7	*32*		
7	*33*		
7	*34*		
8	*35*		
8	*36*		
8	*37*		
11	*38*		
8	*39*		

Data collected at BHS on: April 30, 2015 *Technician: R Aleman*

Arriving Vehicles

12:45-1:00 PM

Lane 1		Lane 2	
Duration(sec)	#	Duration(sec)	#
5	*40*	14	*30*
8	*41*	2	*31*
9	*42*	6	*32*
3	*43*	6	*33*
8	*44*	8	*34*
4	*45*	5	*35*
6	*46*	3	*36*
4	*47*	6	*37*
8	*48*	7	*38*
4	*49*	4	*39*
7	*50*	6	*40*
7	*51*	4	*41*
2	*52*	4	*42*
7	*53*	8	*43*
9	*54*	6	*44*
10	*55*	5	*45*
5	*56*	150	*46*
4	*57*	19	*47*
12	*58*	3	*48*
7	*59*	1	*49*
8	*60*	8	*50*
4	*61*	18	*51*
5	*62*	11	*52*
4	*63*	7	*53*
12	*64*	8	*54*
9	*65*		
2	*66*		
3	*67*		
3	*68*		
4	*69*		
7	*70*		
8	*71*		
5	*72*		
1	*73*		
31	*74*		
2	*75*		
2	*76*		
6	*77*		
13	*78*		
13	*79*		
1	*80*		
8	*81*		

Data collected at BHS on: April 30, 2015 *Technician: R Aleman*

Arriving Vehicles

1:00-1:15 PM

Lane 1		Lane 2	
Duration(sec)	#	Duration(sec)	#
4	*82*	4	*55*
7	*83*	7	*56*
8	*84*	4	*57*
2	*85*	10	*58*
1	*86*	39	*59*
5	*87*	9	*60*
9	*88*	2	*61*
8	*89*	7	*62*
4	*90*	3	*63*
3	*91*	8	*64*
6	*92*	6	*65*
8	*93*	7	*66*
7	*94*	5	*67*
9	*95*	8	*68*
8	*96*	10	*69*
6	*97*	11	*70*
8	*98*	9	*71*
4	*99*	2	*72*
6	*100*	6	*73*
4	*101*	9	*74*
6	*102*	14	*75*
12	*103*	17	*76*
4	*104*	12	*77*
6	*105*	17	*78*
8	*106*	8	*79*
20	*107*	9	*80*
6	*108*	6	*81*
8	*109*		
5	*110*		
9	*111*		
6	*112*		
7	*113*		
20	*114*		
6	*115*		
3	*116*		
7	*117*		
6	*118*		
12	*119*		
11	*120*		
5	*121*		
10	*122*		
13	*123*		
7	*124*		

Data collected at BHS on: April 30, 2015 *Technician: R Aleman*

Arriving Vehicles

1:15-1:30 PM

Lane 1		Lane 2	
Duration(sec)	#	Duration(sec)	#
26	*125*	5	*82*
8	*126*	7	*83*
5	*127*	19	*84*
3	*128*	4	*85*
11	*129*	20	*86*
16	*130*	7	*87*
10	*131*	7	*88*
12	*132*	20	*89*
4	*133*	16	*90*
13	*134*	11	*91*
11	*135*	10	*92*
8	*136*	11	*93*
9	*137*	8	*94*
11	*138*	6	*95*
8	*139*	12	*96*
10	*140*	5	*97*
11	*141*	9	*98*
8	*142*	8	*99*
8	*143*	11	*100*
8	*144*	6	*101*
12	*145*	11	*102*
4	*146*	8	*103*
21	*147*	4	*104*
16	*148*	13	*105*
8	*149*		
15	*150*		
9	*151*		
23	*152*		
6	*153*		
4	*154*		
8	*155*		

Data collected at BHS on: April 30, 2015 *Technician: R Aleman*

Arriving Vehicles

1:30-1:45 PM

Lane 1		Lane 2	
Duration(sec)	#	Duration(sec)	#
15	*156*	8	*106*
14	*157*	2	*107*
4	*158*	10	*108*
8	*159*	5	*109*
14	*160*	9	*110*
2	*161*	7	*111*
10	*162*	10	*112*
8	*163*	6	*113*
9	*164*	7	*114*
6	*165*	17	*115*
9	*166*	7	*116*
4	*167*	2	*117*
9	*168*	3	*118*
15	*169*	3	*119*
17	*170*	10	*120*
11	*171*	9	*121*
7	*172*	8	*122*
7	*173*	8	*123*
0	*174*	18	*124*
10	*175*	13	*125*
15	*176*	2	*126*
4	*177*	8	*127*
10	*178*	11	*128*
6	*179*	10	*129*
10	*180*	11	*130*
7	*181*		
4	*182*		
10	*183*		
10	*184*		
5	*185*		
7	*186*		
7	*187*		
5	*188*		
11	*189*		
12	*190*		
6	*191*		
7	*192*		
9	*193*		
10	*194*		
36	*195*		
12	*196*		

Data collected at BHS on: April 30, 2015 *Technician: R Aleman*

Arriving Vehicles

	Lane 1		Lane 2	
	Duration(sec)	#	Duration(sec)	#
1:45-2:00 PM	9	*197*	9	*131*
	8	*198*	8	*132*
	7	*199*	7	*133*
	11	*200*	7	*134*
	26	*201*	18	*135*
	6	*202*	5	*136*
	10	*203*	11	*137*
	64	*204*	7	*138*
	13	*205*	7	*139*
	16	*206*	6	*140*
	12	*207*	10	*141*
	15	*208*	11	*142*
	23	*209*	10	*143*
	4	*210*	12	*144*
	13	*211*	7	*145*
	16	*212*	8	*146*
	2	*213*	12	*147*
	6	*214*	9	*148*
	8	*215*	3	*149*
	7	*216*	8	*150*
	8	*217*	4	*151*
	7	*218*	56	*152*
	14	*219*	2	*153*
	21	*220*	7	*154*
	9	*221*	10	*155*
	2	*222*	7	*156*
	6	*223*	8	*157*
	10	*224*	4	*158*
	8	*225*	8	*159*
			5	*160*

Data collected at BHS on: April 30, 2015 *Technician: R Aleman*

Arriving Vehicles

2:00-2:15 PM

Lane 1		Lane 2	
Duration(sec)	#	Duration(sec)	#
14	*226*	87	*161*
4	*227*	14	*162*
6	*228*	7	*163*
10	*229*	18	*164*
14	*230*	11	*165*
22	*231*	13	*166*
10	*232*	15	*167*
6	*233*	9	*168*
12	*234*	8	*169*
16	*235*	8	*170*
30	*236*	11	*171*
5	*237*	13	*172*
8	*238*	3	*173*
15	*239*	25	*174*
31	*240*	5	*175*
29	*241*	11	*176*
9	*242*	5	*177*
10	*243*	9	*178*
20	*244*	9	*179*
13	*245*	4	*180*
		4	*181*
		4	*182*
		9	*183*

2:15-2:30 PM

6	*246*	10	*184*
16	*247*	15	*185*
12	*248*	8	*186*
5	*249*	19	*187*
11	*250*	6	*188*
6	*251*	5	*189*
10	*252*	11	*190*
17	*253*	10	*191*
8	*254*	13	*192*
6	*255*	7	*193*
9	*256*	12	*194*
7	*257*	4	*195*
8	*258*	6	*196*
15	*259*	9	*197*
15	*260*	7	*198*
10	*261*		
6	*262*		
21	*263*		
12	*264*		

Data collected at BHS on: April 30, 2015 *Technician: R Aleman*

Arriving Vehicles

	Lane 1		Lane 2	
	Duration(sec)	#	Duration(sec)	#
2:30-2:45 PM	11	*265*	5	*199*
	3	*266*	4	*200*
	9	*267*	17	*201*
	21	*268*	10	*202*
	8	*269*	6	*203*
	27	*270*	10	*204*
	11	*271*	6	*205*
	8	*272*	6	*206*
	5	*273*	16	*207*
	8	*274*	6	*208*
	18	*275*	12	*209*
	15	*276*	12	*210*
	11	*277*	9	*211*
	4	*278*	10	*212*
	2	*279*	10	*213*
	3	*280*	15	*214*
2:45-3:00 PM	13	*281*	21	*215*
	6	*282*	8	*216*
	14	*283*	10	*217*
	7	*284*	1	*218*
	12	*285*	12	*219*
	4	*286*	17	*220*
	11	*287*	4	*221*
	9	*288*	8	*222*
	5	*289*	15	*223*
	16	*290*	14	*224*
	11	*291*	5	*225*
	14	*292*	10	*226*
	7	*293*	11	*227*
	7	*294*	8	*228*
	9	*295*	16	*229*
	6	*296*	13	*230*
	6	*297*	4	*231*
	35	*298*	8	*232*
	7	*299*	13	*233*
	3	*300*	2	*234*
	6	*301*	22	*235*
	9	*302*	8	*236*
	7	*303*	9	*237*
			6	*238*
	2793	303	2316	238
	5109			
	541			
	9.44		**sec/veh**	

CAPACITY ANALYSES

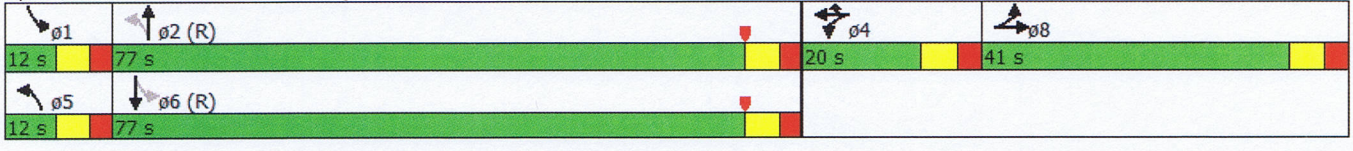
EXISTING

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	140	8	0	38	1	5	40	2070	51	19	1586	142
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		0	140		0
Storage Lanes	2		0	1		1	1		0	1		0
Taper Length (ft)	25			25			25			50		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		423			324			378			391	
Travel Time (s)		9.6			7.4			8.6			8.9	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	2%	0%
Shared Lane Traffic (%)	30%			49%								
Turn Type	Split	NA		Split	NA	Prot	pm+pt	NA		pm+pt	NA	
Protected Phases	8	8		4	4	4	5	2		1	6	
Permitted Phases							2			6	6	
Detector Phase	8	8		4	4	4	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		4.0	4.0	4.0	4.0	4.0		4.8	4.0	
Minimum Split (s)	13.8	13.8		15.0	15.0	15.0	10.2	20.0		11.0	21.0	
Total Split (s)	41.0	41.0		20.0	20.0	20.0	12.0	77.0		12.0	77.0	
Total Split (%)	27.3%	27.3%		13.3%	13.3%	13.3%	8.0%	51.3%		8.0%	51.3%	
Maximum Green (s)	34.2	34.2		13.2	13.2	13.2	5.8	70.5		5.8	70.5	
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	3.7	4.0		3.7	4.0	
All-Red Time (s)	2.8	2.8		2.8	2.8	2.8	2.5	2.5		2.5	2.5	
Lost Time Adjust (s)	-1.0	-1.0		-1.0	-1.0	-1.0	0.0	0.0		1.0	-1.0	
Total Lost Time (s)	5.8	5.8		5.8	5.8	5.8	6.2	6.5		7.2	5.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	2.5	2.5		2.5	2.5	2.5	2.0	2.0		2.0	2.0	
Recall Mode	Max	Max		None	None	None	None	C-Max		None	C-Max	
Walk Time (s)	4.0	4.0										
Flash Dont Walk (s)	29.0	29.0										
Pedestrian Calls (#/hr)	24	24										

Intersection Summary

Area Type: Other
Cycle Length: 150
Actuated Cycle Length: 150
Offset: 75 (50%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow
Natural Cycle: 80
Control Type: Actuated-Coordinated

Splits and Phases: 3548: Harding Ave/Collins Ave & 9700 Blk/9701 Blk



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	140	8	0	38	1	5	40	2070	51	19	1586	142
Number	3	8	18	7	4	14	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	0	1900	1900	1900	1900	1864	1900	1900	1866	1900
Adj Flow Rate, veh/h	153	0	0	41	0	5	42	2179	54	20	1669	149
Adj No. of Lanes	3	1	0	2	0	1	1	3	0	1	3	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	0	0	0	0	2	2	0	2	2
Cap, veh/h	1274	446	0	106	0	47	170	2839	70	106	2660	237
Arrive On Green	0.23	0.00	0.00	0.03	0.00	0.03	0.02	0.56	0.56	0.01	0.56	0.55
Sat Flow, veh/h	5429	1900	0	3619	0	1615	1810	5107	126	1810	4762	424
Grp Volume(v), veh/h	153	0	0	41	0	5	42	1446	787	20	1189	629
Grp Sat Flow(s),veh/h/ln	1810	1900	0	1810	0	1615	1810	1696	1841	1810	1698	1791
Q Serve(g_s), s	3.3	0.0	0.0	1.7	0.0	0.5	1.5	49.5	49.8	0.7	35.7	35.9
Cycle Q Clear(g_c), s	3.3	0.0	0.0	1.7	0.0	0.5	1.5	49.5	49.8	0.7	35.7	35.9
Prop In Lane	1.00		0.00	1.00		1.00	1.00		0.07	1.00		0.24
Lane Grp Cap(c), veh/h	1274	446	0	106	0	47	170	1885	1023	106	1897	1000
V/C Ratio(X)	0.12	0.00	0.00	0.39	0.00	0.11	0.25	0.77	0.77	0.19	0.63	0.63
Avail Cap(c_a), veh/h	1274	446	0	343	0	153	200	1885	1023	144	1897	1000
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	45.2	0.0	0.0	71.5	0.0	70.9	19.1	25.8	25.9	24.0	22.5	22.6
Incr Delay (d2), s/veh	0.2	0.0	0.0	1.7	0.0	0.7	0.3	3.1	5.6	0.3	1.6	3.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	1.7	0.0	0.0	0.9	0.0	0.2	0.8	23.9	26.7	0.4	17.1	18.5
LnGrp Delay(d),s/veh	45.4	0.0	0.0	73.2	0.0	71.6	19.3	28.8	31.4	24.3	24.1	25.6
LnGrp LOS	D			E		E	B	C	C	C	C	C
Approach Vol, veh/h		153			46			2275			1838	
Approach Delay, s/veh		45.4			73.0			29.6			24.6	
Approach LOS		D			E			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	8.9	89.9		10.2	9.5	89.3		41.0
Change Period (Y+Rc), s	* 6.2	6.5		* 6.8	* 6.2	6.5		6.8
Max Green Setting (Gmax), s	* 5.8	70.5		* 13	* 5.8	70.5		34.2
Max Q Clear Time (g_c+I1), s	2.7	51.8		3.7	3.5	37.9		5.3
Green Ext Time (p_c), s	0.0	13.9		0.0	0.0	20.4		0.5

Intersection Summary	
HCM 2010 Ctrl Delay	28.5
HCM 2010 LOS	C

Notes

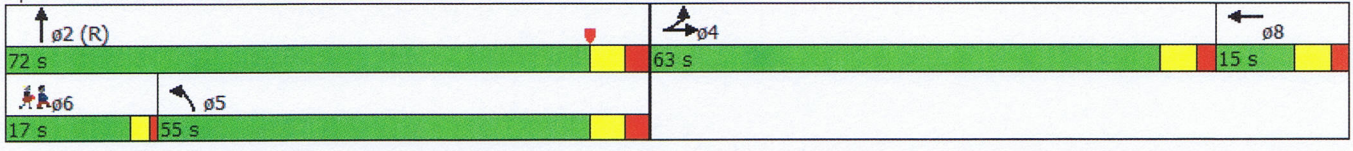
User approved pedestrian interval to be less than phase max green.
User approved volume balancing among the lanes for turning movement.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	373	5	0	0	9	8	427	1801	10	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	300		0	0		0
Storage Lanes	1		0	0		0	1		0	0		0
Taper Length (ft)	25			25			50			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		297			368			670			418	
Travel Time (s)		6.8			8.4			15.2			9.5	
Peak Hour Factor	0.96	0.96	0.96	0.95	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	0%	1%	1%	0%	0%	2%	2%	0%	2%	2%	2%
Shared Lane Traffic (%)	49%											
Turn Type	Split	NA			NA		Prot	NA				
Protected Phases	4	4			8		5	2				
Permitted Phases												
Detector Phase	4	4			8		5	2				
Switch Phase												
Minimum Initial (s)	4.0	4.0			7.0		4.0	4.0				
Minimum Split (s)	25.0	25.0			13.2		24.0	31.0				
Total Split (s)	63.0	63.0			15.0		55.0	72.0				
Total Split (%)	42.0%	42.0%			10.0%		36.7%	48.0%				
Maximum Green (s)	56.8	56.8			8.8		48.1	65.1				
Yellow Time (s)	4.0	4.0			4.0		4.0	4.0				
All-Red Time (s)	2.2	2.2			2.2		2.9	2.9				
Lost Time Adjust (s)	-1.0	-1.0			-1.0		-1.0	-1.0				
Total Lost Time (s)	5.2	5.2			5.2		5.9	5.9				
Lead/Lag							Lag					
Lead-Lag Optimize?												
Vehicle Extension (s)	2.5	2.5			2.5		2.0	2.0				
Recall Mode	Max	Max			None		Max	C-Max				
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												

Intersection Summary

Area Type: Other
Cycle Length: 150
Actuated Cycle Length: 150
Offset: 113 (75%), Referenced to phase 2:NBT, Start of Yellow
Natural Cycle: 80
Control Type: Actuated-Coordinated

Splits and Phases: 3005: Collins Ave & 96th St



Lane Group	ø6
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Right Turn on Red	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Turn Type	
Protected Phases	6
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	3.0
Minimum Split (s)	16.0
Total Split (s)	17.0
Total Split (%)	11%
Maximum Green (s)	14.0
Yellow Time (s)	2.0
All-Red Time (s)	1.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lead
Lead-Lag Optimize?	
Vehicle Extension (s)	2.0
Recall Mode	Ped
Walk Time (s)	4.0
Flash Dont Walk (s)	11.0
Pedestrian Calls (#/hr)	8

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	373	5	0	0	9	8	427	1801	10	0	0	0
Number	7	4	14	3	8	18	5	2	12			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1863	1864	0	0	1900	1900	1863	1863	1900			
Adj Flow Rate, veh/h	393	0	0	0	9	8	445	1876	10			
Adj No. of Lanes	2	1	0	0	1	0	1	3	0			
Peak Hour Factor	0.96	0.96	0.96	0.95	0.96	0.96	0.96	0.96	0.96			
Percent Heavy Veh, %	2	0	0	0	0	0	2	2	2			
Cap, veh/h	1367	718	0	0	28	25	844	2483	13			
Arrive On Green	0.39	0.00	0.00	0.00	0.03	0.02	0.48	0.48	0.47			
Sat Flow, veh/h	3548	1864	0	0	929	826	1774	5221	28			
Grp Volume(v), veh/h	393	0	0	0	0	17	445	1218	668			
Grp Sat Flow(s),veh/h/ln	1774	1864	0	0	0	1754	1774	1695	1858			
Q Serve(g_s), s	11.5	0.0	0.0	0.0	0.0	1.4	26.3	44.1	44.1			
Cycle Q Clear(g_c), s	11.5	0.0	0.0	0.0	0.0	1.4	26.3	44.1	44.1			
Prop In Lane	1.00		0.00	0.00		0.47	1.00		0.01			
Lane Grp Cap(c), veh/h	1367	718	0	0	0	53	844	1613	884			
V/C Ratio(X)	0.29	0.00	0.00	0.00	0.00	0.32	0.53	0.76	0.76			
Avail Cap(c_a), veh/h	1367	718	0	0	0	115	844	1613	884			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.67	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00			
Uniform Delay (d), s/veh	31.9	0.0	0.0	0.0	0.0	71.4	27.5	32.2	32.2			
Incr Delay (d2), s/veh	0.4	0.0	0.0	0.0	0.0	2.5	2.4	3.3	6.0			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(-26165%),veh/ln	5.7	0.0	0.0	0.0	0.0	0.7	13.4	21.4	24.1			
LnGrp Delay(d),s/veh	32.2	0.0	0.0	0.0	0.0	74.0	29.9	35.5	38.2			
LnGrp LOS	C					E	C	D	D			
Approach Vol, veh/h		393			17			2331				
Approach Delay, s/veh		32.2			74.0			35.2				
Approach LOS		C			E			D				

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		77.2		63.0				9.8
Change Period (Y+Rc), s		6.9		* 6.2				6.2
Max Green Setting (Gmax), s		48.1		* 57				8.8
Max Q Clear Time (g_c+I1), s		46.1		13.5				3.4
Green Ext Time (p_c), s		1.5		1.5				0.0

Intersection Summary	
HCM 2010 Ctrl Delay	35.0
HCM 2010 LOS	D

Notes

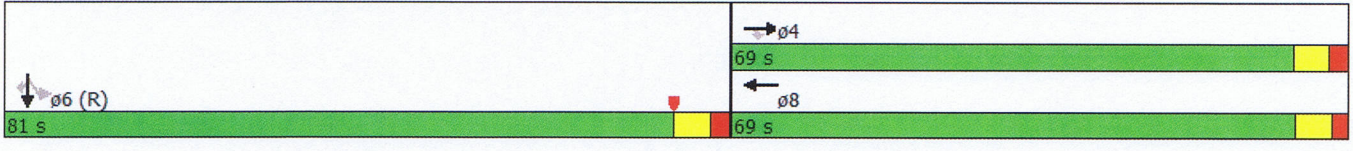
User approved volume balancing among the lanes for turning movement.
* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	385	466	0	440	0	0	0	0	22	1417	289
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Right Turn on Red			No			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		278			297			669			261	
Travel Time (s)		6.3			6.8			15.2			5.9	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	1%	2%	2%	1%	2%	1%	1%	1%	1%	1%	2%	1%
Shared Lane Traffic (%)			15%									
Turn Type		NA	Perm		NA					Perm	NA	Perm
Protected Phases		4			8						6	
Permitted Phases			4							6		6
Detector Phase		4	4		8					6	6	6
Switch Phase												
Minimum Initial (s)		4.0	4.0		4.0					4.0	4.0	4.0
Minimum Split (s)		24.0	24.0		25.0					72.3	72.3	72.3
Total Split (s)		69.0	69.0		69.0					81.0	81.0	81.0
Total Split (%)		46.0%	46.0%		46.0%					54.0%	54.0%	54.0%
Maximum Green (s)		62.7	62.7		63.0					74.7	74.7	74.7
Yellow Time (s)		4.0	4.0		4.0					4.0	4.0	4.0
All-Red Time (s)		2.3	2.3		2.0					2.3	2.3	2.3
Lost Time Adjust (s)		-1.0	-1.0		-1.0						-1.0	-1.0
Total Lost Time (s)		5.3	5.3		5.0						5.3	5.3
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)		1.0	1.0		1.0					1.0	1.0	1.0
Recall Mode		Max	Max		Max					C-Max	C-Max	C-Max
Walk Time (s)					7.0					49.0	49.0	49.0
Flash Dont Walk (s)					12.0					17.0	17.0	17.0
Pedestrian Calls (#/hr)					0					0	0	0

Intersection Summary

Area Type: Other
Cycle Length: 150
Actuated Cycle Length: 150
Offset: 98 (65%), Referenced to phase 6:SBTL, Start of Yellow
Natural Cycle: 100
Control Type: Actuated-Coordinated

Splits and Phases: 2919: Harding Ave & 96th St



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	385	466	0	440	0	0	0	0	22	1417	289
Number	7	4	14	3	8	18				1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1863	1863	0	1863	0				1900	1863	1881
Adj Flow Rate, veh/h	0	474	453	0	468	0				23	1507	307
Adj No. of Lanes	0	1	1	0	2	0				0	3	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94				0.94	0.94	0.94
Percent Heavy Veh, %	0	2	2	0	2	0				1	2	1
Cap, veh/h	0	795	676	0	1510	0				38	2612	807
Arrive On Green	0.00	0.71	0.71	0.00	0.43	0.00				0.17	0.17	0.17
Sat Flow, veh/h	0	1863	1583	0	3725	0				74	5176	1599
Grp Volume(v), veh/h	0	474	453	0	468	0				575	955	307
Grp Sat Flow(s),veh/h/ln	0	1863	1583	0	1770	0				1859	1695	1599
Q Serve(g_s), s	0.0	19.1	23.6	0.0	13.1	0.0				43.1	38.8	25.6
Cycle Q Clear(g_c), s	0.0	19.1	23.6	0.0	13.1	0.0				43.1	38.8	25.6
Prop In Lane	0.00		1.00	0.00		0.00				0.04		1.00
Lane Grp Cap(c), veh/h	0	795	676	0	1510	0				938	1711	807
V/C Ratio(X)	0.00	0.60	0.67	0.00	0.31	0.00				0.61	0.56	0.38
Avail Cap(c_a), veh/h	0	795	676	0	1510	0				938	1711	807
HCM Platoon Ratio	1.00	1.67	1.67	1.00	1.00	1.00				0.33	0.33	0.33
Upstream Filter(I)	0.00	1.00	1.00	0.00	0.86	0.00				0.94	0.94	0.94
Uniform Delay (d), s/veh	0.0	15.1	15.8	0.0	28.4	0.0				48.9	47.1	41.6
Incr Delay (d2), s/veh	0.0	3.3	5.2	0.0	0.5	0.0				2.8	1.2	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	0.0	10.4	11.0	0.0	6.5	0.0				23.0	18.6	11.6
LnGrp Delay(d),s/veh	0.0	18.4	21.0	0.0	28.9	0.0				51.7	48.4	42.9
LnGrp LOS		B	C		C					D	D	D
Approach Vol, veh/h		927			468						1837	
Approach Delay, s/veh		19.7			28.9						48.5	
Approach LOS		B			C						D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				69.3		81.0		69.3
Change Period (Y+Rc), s				* 6.3		6.3		* 6.3
Max Green Setting (Gmax), s				* 63		74.7		* 63
Max Q Clear Time (g_c+I1), s				25.6		45.1		15.1
Green Ext Time (p_c), s				1.6		2.3		1.6

Intersection Summary	
HCM 2010 Ctrl Delay	37.4
HCM 2010 LOS	D

Notes

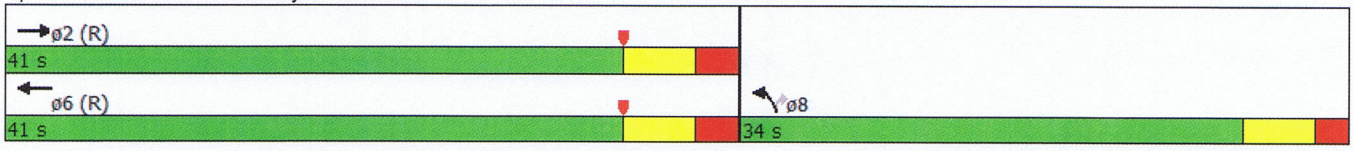
User approved volume balancing among the lanes for turning movement.
* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1037	0	0	729	366	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Right Turn on Red		Yes				Yes
Link Speed (mph)	30			30	30	
Link Distance (ft)	282			279	570	
Travel Time (s)	6.4			6.3	13.0	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	0%	0%	2%	1%	0%
Shared Lane Traffic (%)						
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Detector Phase	2			6	8	8
Switch Phase						
Minimum Initial (s)	4.0			4.0	4.0	4.0
Minimum Split (s)	22.5			22.5	12.0	12.0
Total Split (s)	41.0			41.0	34.0	34.0
Total Split (%)	54.7%			54.7%	45.3%	45.3%
Maximum Green (s)	34.5			34.5	28.0	28.0
Yellow Time (s)	4.0			4.0	4.0	4.0
All-Red Time (s)	2.5			2.5	2.0	2.0
Lost Time Adjust (s)	0.0			0.0	0.0	0.0
Total Lost Time (s)	6.5			6.5	6.0	6.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	1.0			1.0	2.5	2.5
Recall Mode	C-Max			C-Max	None	None
Walk Time (s)	5.0			5.0		
Flash Dont Walk (s)	11.0			11.0		
Pedestrian Calls (#/hr)	0			0		

Intersection Summary

Area Type: Other
Cycle Length: 75
Actuated Cycle Length: 75
Offset: 6 (8%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
Natural Cycle: 40
Control Type: Actuated-Coordinated

Splits and Phases: 3648: Byron & 96th St



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↰↰	↱
Volume (veh/h)	1037	0	0	729	366	51
Number	2	12	1	6	3	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	0	0	1863	1881	1900
Adj Flow Rate, veh/h	1080	0	0	759	381	53
Adj No. of Lanes	2	0	0	2	2	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	0	0	2	1	0
Cap, veh/h	2432	0	0	2432	508	236
Arrive On Green	1.00	0.00	0.00	1.00	0.15	0.15
Sat Flow, veh/h	3725	0	0	3725	3476	1615
Grp Volume(v), veh/h	1080	0	0	759	381	53
Grp Sat Flow(s),veh/h/ln	1770	0	0	1770	1738	1615
Q Serve(g_s), s	0.0	0.0	0.0	0.0	7.9	2.2
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.0	7.9	2.2
Prop In Lane		0.00	0.00		1.00	1.00
Lane Grp Cap(c), veh/h	2432	0	0	2432	508	236
V/C Ratio(X)	0.44	0.00	0.00	0.31	0.75	0.22
Avail Cap(c_a), veh/h	2432	0	0	2432	1298	603
HCM Platoon Ratio	2.00	1.00	1.00	2.00	1.00	1.00
Upstream Filter(I)	0.95	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	0.0	30.7	28.3
Incr Delay (d2), s/veh	0.6	0.0	0.0	0.3	1.7	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	0.2	0.0	0.0	0.1	3.9	1.0
LnGrp Delay(d),s/veh	0.6	0.0	0.0	0.3	32.4	28.6
LnGrp LOS	A			A	C	C
Approach Vol, veh/h	1080			759	434	
Approach Delay, s/veh	0.6			0.3	31.9	
Approach LOS	A			A	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		58.0				58.0		17.0
Change Period (Y+Rc), s		6.5				6.5		6.0
Max Green Setting (Gmax), s		34.5				34.5		28.0
Max Q Clear Time (g_c+I1), s		2.0				2.0		9.9
Green Ext Time (p_c), s		1.7				1.7		1.1

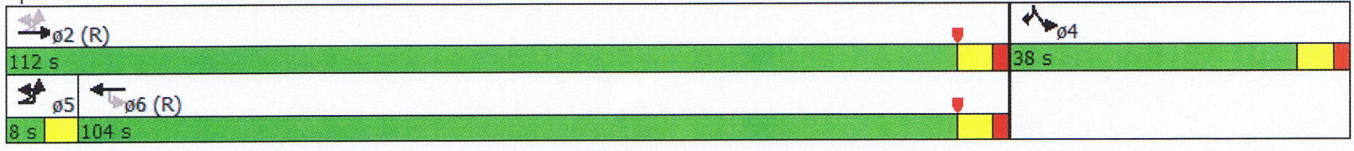
Intersection Summary	
HCM 2010 Ctrl Delay	6.5
HCM 2010 LOS	A

Lane Group	EBU	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Lane Configurations								
Volume (vph)	6	58	857	26	1027	41	100	66
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)		85		25		0	0	0
Storage Lanes		1		1		0	2	1
Taper Length (ft)		50		25			25	
Right Turn on Red						Yes		Yes
Link Speed (mph)			30		30		30	
Link Distance (ft)			244		282		588	
Travel Time (s)			5.5		6.4		13.4	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	1%	0%	2%	1%	2%	0%	0%	0%
Shared Lane Traffic (%)								22%
Turn Type	pm+pt	pm+pt	NA	Perm	NA		Prot	Prot
Protected Phases	5	5	2		6		4	4
Permitted Phases	2	2		6				
Detector Phase	5	5	2	6	6		4	4
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0
Minimum Split (s)	9.0	9.0	22.0	22.0	22.0		21.0	21.0
Total Split (s)	8.0	8.0	112.0	104.0	104.0		38.0	38.0
Total Split (%)	5.3%	5.3%	74.7%	69.3%	69.3%		25.3%	25.3%
Maximum Green (s)	4.3	4.3	106.0	98.0	98.0		32.0	32.0
Yellow Time (s)	3.7	3.7	4.0	4.0	4.0		4.0	4.0
All-Red Time (s)	0.0	0.0	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)		3.7	6.0	6.0	6.0		6.0	6.0
Lead/Lag	Lead	Lead		Lag	Lag			
Lead-Lag Optimize?								
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0
Recall Mode	None	None	C-Max	C-Max	C-Max		None	None
Walk Time (s)			5.0	5.0	5.0			
Flash Dont Walk (s)			11.0	11.0	11.0			
Pedestrian Calls (#/hr)			0	0	0			

Intersection Summary

Area Type: Other
Cycle Length: 150
Actuated Cycle Length: 150
Offset: 149 (99%), Referenced to phase 2:EBTL and 6:WBTU, Start of Yellow
Natural Cycle: 60
Control Type: Actuated-Coordinated

Splits and Phases: 4344: 96th St & BHS South



Movement	EBU	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Lane Configurations								
Volume (veh/h)	6	58	857	26	1027	41	100	66
Number		5	2		6	16	7	14
Initial Q (Qb), veh		0	0		0	0	0	0
Ped-Bike Adj(A_pbT)		1.00				1.00	1.00	1.00
Parking Bus, Adj		1.00	1.00		1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln		1898	1863		1864	1900	1900	1900
Adj Flow Rate, veh/h		62	912		1093	44	117	59
Adj No. of Lanes		1	2		2	0	2	1
Peak Hour Factor		0.94	0.94		0.94	0.94	0.94	0.94
Percent Heavy Veh, %		0	2		2	2	0	0
Cap, veh/h		504	3075		2844	114	185	83
Arrive On Green		0.02	0.87		1.00	1.00	0.05	0.05
Sat Flow, veh/h		1808	3632		3564	140	3619	1615
Grp Volume(v), veh/h		62	912		558	579	117	59
Grp Sat Flow(s),veh/h/ln		1808	1770		1771	1840	1810	1615
Q Serve(g_s), s		0.8	6.8		0.0	0.0	4.8	5.4
Cycle Q Clear(g_c), s		0.8	6.8		0.0	0.0	4.8	5.4
Prop In Lane		1.00				0.08	1.00	1.00
Lane Grp Cap(c), veh/h		504	3075		1451	1507	185	83
V/C Ratio(X)		0.12	0.30		0.38	0.38	0.63	0.71
Avail Cap(c_a), veh/h		511	3075		1451	1507	772	345
HCM Platoon Ratio		1.00	1.00		2.00	2.00	1.00	1.00
Upstream Filter(I)		1.00	1.00		0.90	0.90	1.00	1.00
Uniform Delay (d), s/veh		1.6	1.7		0.0	0.0	69.8	70.1
Incr Delay (d2), s/veh		0.0	0.2		0.7	0.7	1.3	4.2
Initial Q Delay(d3),s/veh		0.0	0.0		0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln		0.4	3.4		0.3	0.3	2.4	4.9
LnGrp Delay(d),s/veh		1.6	2.0		0.7	0.7	71.1	74.3
LnGrp LOS		A	A		A	A	E	E
Approach Vol, veh/h			974		1137		176	
Approach Delay, s/veh			2.0		0.7		72.2	
Approach LOS			A		A		E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		136.3		13.7	7.4	128.9		
Change Period (Y+Rc), s		6.0		6.0	3.7	6.0		
Max Green Setting (Gmax), s		106.0		32.0	4.3	98.0		
Max Q Clear Time (g_c+I1), s		8.8		7.4	2.8	2.0		
Green Ext Time (p_c), s		4.8		0.3	0.0	4.8		

Intersection Summary	
HCM 2010 Ctrl Delay	6.7
HCM 2010 LOS	A

Notes

User approved volume balancing among the lanes for turning movement.
User approved ignoring U-Turning movement.

ENHANCED PLAN

(up to 855,000 square feet OF GLA)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	207	0	115	0	0	0	88	2187	4	26	1729	211
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	11	11	11	11	11	11
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	200		0	100		0
Storage Lanes	2		1	0		0	1		0	1		0
Taper Length (ft)	50			50			50			50		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		122			209			297			1786	
Travel Time (s)		2.8			4.8			6.8			40.6	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Turn Type	Prot		pm+ov				pm+pt	NA		pm+pt	NA	
Protected Phases	7		5				5	2		1	6	
Permitted Phases			7				2			6		
Detector Phase	7		5				5	2		1	6	
Switch Phase												
Minimum Initial (s)	15.0		4.0				4.0	4.0		4.0	4.0	
Minimum Split (s)	20.0		9.0				9.0	20.0		18.0	20.0	
Total Split (s)	24.0		19.0				19.0	108.0		18.0	107.0	
Total Split (%)	16.0%		12.7%				12.7%	72.0%		12.0%	71.3%	
Yellow Time (s)	4.0		4.0				4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0		1.0				1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0		0.0				0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0		5.0				5.0	5.0		5.0	5.0	
Lead/Lag			Lead				Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None		None				None	C-Max		Max	C-Max	

Intersection Summary

Area Type: Other
Cycle Length: 150
Actuated Cycle Length: 150
Offset: 3 (2%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow
Natural Cycle: 80
Control Type: Actuated-Coordinated

Splits and Phases: 5: Collins Ave & N Drive/Condo Dr

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	207	0	115	0	0	0	88	2187	4	26	1729	211
Number	7	4	14				5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	0	1900				1900	1863	1900	1900	1867	1900
Adj Flow Rate, veh/h	223	0	124				95	2352	4	28	1859	227
Adj No. of Lanes	2	0	1				1	3	0	1	3	0
Peak Hour Factor	0.93	0.93	0.93				0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	0	0	0				0	2	2	0	2	2
Cap, veh/h	351	0	207				223	3740	6	315	3556	431
Arrive On Green	0.10	0.00	0.10				0.06	1.00	1.00	0.09	0.77	0.77
Sat Flow, veh/h	3510	0	1615				1810	5243	9	1810	4607	559
Grp Volume(v), veh/h	223	0	124				95	1521	835	28	1367	719
Grp Sat Flow(s),veh/h/ln	1755	0	1615				1810	1695	1861	1810	1699	1768
Q Serve(g_s), s	9.2	0.0	10.9				2.2	0.0	0.0	0.4	23.0	23.4
Cycle Q Clear(g_c), s	9.2	0.0	10.9				2.2	0.0	0.0	0.4	23.0	23.4
Prop In Lane	1.00		1.00				1.00		0.00	1.00		0.32
Lane Grp Cap(c), veh/h	351	0	207				223	2418	1328	315	2623	1365
V/C Ratio(X)	0.64	0.00	0.60				0.43	0.63	0.63	0.09	0.52	0.53
Avail Cap(c_a), veh/h	445	0	250				341	2418	1328	315	2623	1365
HCM Platoon Ratio	1.00	1.00	1.00				2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.21	0.21	0.21	1.00	1.00	1.00
Uniform Delay (d), s/veh	64.9	0.0	61.8				6.4	0.0	0.0	2.7	6.5	6.6
Incr Delay (d2), s/veh	0.7	0.0	1.0				0.1	0.3	0.5	0.6	0.7	1.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	4.5	0.0	9.7				1.0	0.1	0.2	0.3	10.9	11.9
LnGrp Delay(d),s/veh	65.6	0.0	62.8				6.5	0.3	0.5	3.2	7.3	8.0
LnGrp LOS	E		E				A	A	A	A	A	A
Approach Vol, veh/h		347						2451			2114	
Approach Delay, s/veh		64.6						0.6			7.5	
Approach LOS		E						A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		
Phs Duration (G+Y+Rc), s	18.0	112.0		20.0	9.2	120.8		
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		
Max Green Setting (Gmax), s	13.0	103.0		19.0	14.0	102.0		
Max Q Clear Time (g_c+I1), s	2.4	2.0		12.9	4.2	25.4		
Green Ext Time (p_c), s	0.0	77.8		0.4	0.1	62.6		

Intersection Summary	
HCM 2010 Ctrl Delay	8.1
HCM 2010 LOS	A

Notes

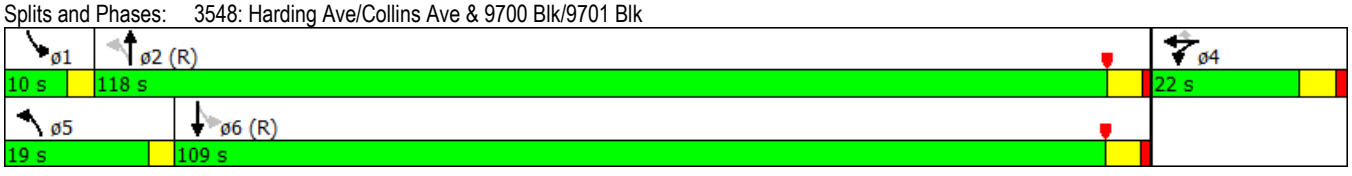
User approved ignoring U-Turning movement.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	39	0	5	10	2410	51	19	1909	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	11	11	11	11	11	11
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	100		0	125		0
Storage Lanes	0		0	1		1	1		0	1		0
Taper Length (ft)	25			25			25			50		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		149			204			380			297	
Travel Time (s)		3.4			4.6			8.6			6.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)				50%								
Turn Type				Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases				4	4		5	2		1	6	
Permitted Phases						4	2			6	6	
Detector Phase				4	4	4	5	2		1	6	
Switch Phase												
Minimum Initial (s)				15.0	15.0	15.0	4.0	4.0		5.0	4.0	
Minimum Split (s)				21.5	21.5	21.5	9.0	20.0		10.0	21.0	
Total Split (s)				22.0	22.0	22.0	19.0	118.0		10.0	109.0	
Total Split (%)				14.7%	14.7%	14.7%	12.7%	78.7%		6.7%	72.7%	
Yellow Time (s)				4.0	4.0	4.0	3.0	4.0		3.0	4.0	
All-Red Time (s)				1.5	1.5	1.5	0.0	1.0		0.0	1.2	
Lost Time Adjust (s)				-1.0	-1.0	-1.0	0.0	0.0		1.0	-1.0	
Total Lost Time (s)				4.5	4.5	4.5	3.0	5.0		4.0	4.2	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode				Max	Max	Max	Max	C-Max		None	C-Max	

Intersection Summary

Area Type: Other
Cycle Length: 150
Actuated Cycle Length: 150
Offset: 149 (99%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow
Natural Cycle: 80
Control Type: Actuated-Coordinated

Splits and Phases: 3548: Harding Ave/Collins Ave & 9700 Blk/9701 Blk



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	39	0	5	10	2410	51	19	1909	4
Number				7	4	14	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1900	1900	1900	1900	1864	1900	1900	1863	1900
Adj Flow Rate, veh/h				42	0	5	11	2591	55	20	2053	4
Adj No. of Lanes				2	0	1	1	3	0	1	3	0
Peak Hour Factor				0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %				0	0	0	0	2	2	0	2	2
Cap, veh/h				422	0	188	384	3999	84	133	3662	7
Arrive On Green				0.12	0.00	0.12	0.11	0.78	0.78	0.02	1.00	1.00
Sat Flow, veh/h				3619	0	1615	1810	5128	108	1810	5241	10
Grp Volume(v), veh/h				42	0	5	11	1710	936	20	1328	729
Grp Sat Flow(s),veh/h/ln				1810	0	1615	1810	1696	1844	1810	1695	1861
Q Serve(g_s), s				1.6	0.0	0.4	0.2	33.6	34.0	0.5	0.0	0.0
Cycle Q Clear(g_c), s				1.6	0.0	0.4	0.2	33.6	34.0	0.5	0.0	0.0
Prop In Lane				1.00		1.00	1.00		0.06	1.00		0.01
Lane Grp Cap(c), veh/h				422	0	188	384	2645	1438	133	2369	1300
V/C Ratio(X)				0.10	0.00	0.03	0.03	0.65	0.65	0.15	0.56	0.56
Avail Cap(c_a), veh/h				422	0	188	384	2645	1438	183	2369	1300
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)				1.00	0.00	1.00	1.00	1.00	1.00	0.80	0.80	0.80
Uniform Delay (d), s/veh				59.2	0.0	58.7	2.7	7.3	7.4	8.6	0.0	0.0
Incr Delay (d2), s/veh				0.5	0.0	0.3	0.1	1.2	2.3	0.2	0.8	1.4
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln				0.8	0.0	0.4	0.1	15.9	18.1	0.3	0.3	0.5
LnGrp Delay(d),s/veh				59.7	0.0	59.0	2.8	8.6	9.7	8.7	0.8	1.4
LnGrp LOS				E		E	A	A	A	A	A	A
Approach Vol, veh/h					47			2657			2077	
Approach Delay, s/veh					59.6			8.9			1.1	
Approach LOS					E			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		
Phs Duration (G+Y+Rc), s	5.8	122.2		22.0	19.0	109.0		
Change Period (Y+Rc), s	3.0	* 5.2		5.5	3.0	* 5.2		
Max Green Setting (Gmax), s	7.0	* 1.1E2		16.5	16.0	* 1E2		
Max Q Clear Time (g_c+I1), s	2.5	36.0		3.6	2.2	2.0		
Green Ext Time (p_c), s	0.0	42.4		0.1	0.0	47.8		

Intersection Summary	
HCM 2010 Ctrl Delay	6.0
HCM 2010 LOS	A

Notes

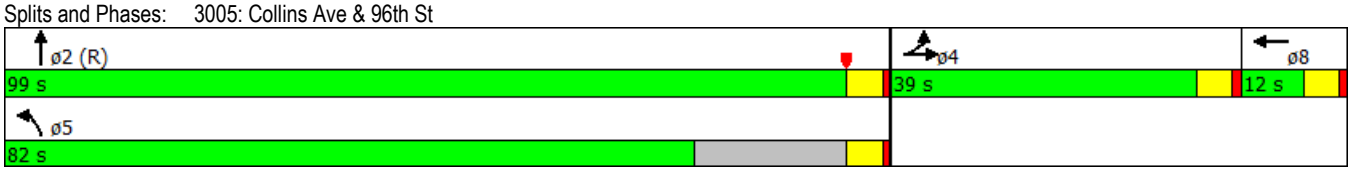
User approved volume balancing among the lanes for turning movement.
User approved ignoring U-Turning movement.
* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	401	5	0	0	10	8	539	2040	11	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	11	11	11	11	11	11
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	300		0	0		0
Storage Lanes	1		0	0		0	1		0	0		0
Taper Length (ft)	25			25			50			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		292			368			663			419	
Travel Time (s)		6.6			8.4			15.1			9.5	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)	49%											
Turn Type	Split	NA			NA		Prot	NA				
Protected Phases	4	4			8		5	2				
Permitted Phases												
Detector Phase	4	4			8		5	2				
Switch Phase												
Minimum Initial (s)	4.0	4.0			7.0		4.0	4.0				
Minimum Split (s)	25.0	25.0			12.0		24.0	31.0				
Total Split (s)	39.0	39.0			12.0		82.0	99.0				
Total Split (%)	26.0%	26.0%			8.0%		54.7%	66.0%				
Yellow Time (s)	4.0	4.0			4.0		4.0	4.0				
All-Red Time (s)	1.0	1.0			1.0		1.0	1.0				
Lost Time Adjust (s)	-1.0	-1.0			-1.0		-1.0	-1.0				
Total Lost Time (s)	4.0	4.0			4.0		4.0	4.0				
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Ped	Ped			None		Max	C-Max				

Intersection Summary

Area Type: Other
Cycle Length: 150
Actuated Cycle Length: 150
Offset: 103 (69%), Referenced to phase 2:NBT, Start of Yellow
Natural Cycle: 75
Control Type: Actuated-Coordinated

Splits and Phases: 3005: Collins Ave & 96th St



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	401	5	0	0	10	8	539	2040	11	0	0	0
Number	7	4	14	3	8	18	5	2	12			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1863	1864	0	0	1900	1900	1900	1863	1900			
Adj Flow Rate, veh/h	426	0	0	0	11	8	567	2147	12			
Adj No. of Lanes	2	1	0	0	1	0	1	3	0			
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95			
Percent Heavy Veh, %	2	0	0	0	0	0	0	2	0			
Cap, veh/h	517	272	0	0	33	24	1343	3872	22			
Arrive On Green	0.15	0.00	0.00	0.00	0.03	0.03	0.74	0.74	0.74			
Sat Flow, veh/h	3548	1864	0	0	1024	745	1810	5219	29			
Grp Volume(v), veh/h	426	0	0	0	0	19	567	1394	765			
Grp Sat Flow(s),veh/h/ln	1774	1864	0	0	0	1769	1810	1695	1858			
Q Serve(g_s), s	17.5	0.0	0.0	0.0	0.0	1.6	17.7	27.0	27.1			
Cycle Q Clear(g_c), s	17.5	0.0	0.0	0.0	0.0	1.6	17.7	27.0	27.1			
Prop In Lane	1.00		0.00	0.00		0.42	1.00		0.02			
Lane Grp Cap(c), veh/h	517	272	0	0	0	57	1343	2516	1378			
V/C Ratio(X)	0.82	0.00	0.00	0.00	0.00	0.33	0.42	0.55	0.55			
Avail Cap(c_a), veh/h	828	435	0	0	0	94	1343	2516	1378			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.65	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00			
Uniform Delay (d), s/veh	62.2	0.0	0.0	0.0	0.0	71.2	7.3	8.5	8.5			
Incr Delay (d2), s/veh	1.9	0.0	0.0	0.0	0.0	2.5	1.0	0.9	1.6			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(-26165%),veh/ln	8.7	0.0	0.0	0.0	0.0	0.8	9.2	12.9	14.4			
LnGrp Delay(d),s/veh	64.1	0.0	0.0	0.0	0.0	73.7	8.2	9.4	10.1			
LnGrp LOS	E					E	A	A	B			
Approach Vol, veh/h		426			19			2726				
Approach Delay, s/veh		64.1			73.7			9.3				
Approach LOS		E			E			A				

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		115.3		25.9				8.8
Change Period (Y+Rc), s		5.0		5.0				5.0
Max Green Setting (Gmax), s		77.0		34.0				7.0
Max Q Clear Time (g_c+I1), s		29.1		19.5				3.6
Green Ext Time (p_c), s		12.2		1.4				0.0

Intersection Summary	
HCM 2010 Ctrl Delay	17.1
HCM 2010 LOS	B

Notes

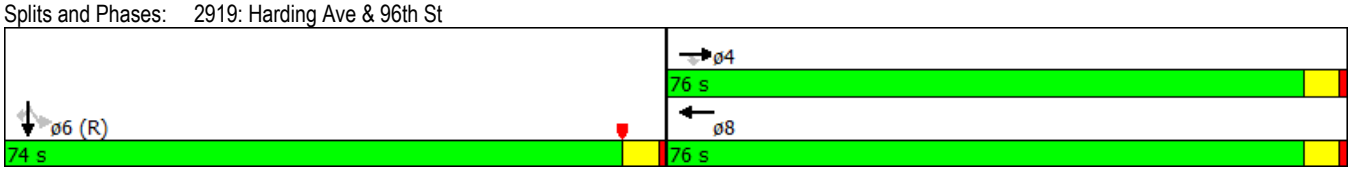
User approved volume balancing among the lanes for turning movement.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	437	553	0	539	0	0	0	0	51	1621	316
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	11	11	11	11	11	11
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		1	0		0	0		0	0		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			No			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		283			292			669			260	
Travel Time (s)		6.4			6.6			15.2			5.9	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	2%	2%	0%	2%	0%	0%	0%	0%	0%	2%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)			16%									
Turn Type		NA	Perm		NA					Perm	NA	Perm
Protected Phases		4			8						6	
Permitted Phases			4							6		6
Detector Phase		4	4		8					6	6	6
Switch Phase												
Minimum Initial (s)		4.0	4.0		4.0					4.0	4.0	4.0
Minimum Split (s)		24.0	24.0		24.0					71.0	71.0	71.0
Total Split (s)		76.0	76.0		76.0					74.0	74.0	74.0
Total Split (%)		50.7%	50.7%		50.7%					49.3%	49.3%	49.3%
Yellow Time (s)		4.0	4.0		4.0					4.0	4.0	4.0
All-Red Time (s)		1.0	1.0		1.0					1.0	1.0	1.0
Lost Time Adjust (s)		-1.0	-1.0		-1.0						-1.0	-1.0
Total Lost Time (s)		4.0	4.0		4.0						4.0	4.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode		Max	Max		Max					C-Max	C-Max	C-Max

Intersection Summary

Area Type: Other
Cycle Length: 150
Actuated Cycle Length: 150
Offset: 14 (9%), Referenced to phase 6:SBTL, Start of Yellow
Natural Cycle: 105
Control Type: Actuated-Coordinated

Splits and Phases: 2919: Harding Ave & 96th St



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	437	553	0	539	0	0	0	0	51	1621	316
Number	7	4	14	3	8	18				1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1863	1863	0	1863	0				1900	1864	1881
Adj Flow Rate, veh/h	0	557	526	0	573	0				54	1724	336
Adj No. of Lanes	0	1	1	0	2	0				0	3	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94				0.94	0.94	0.94
Percent Heavy Veh, %	0	2	2	0	2	0				1	2	1
Cap, veh/h	0	894	760	0	1699	0				70	2379	746
Arrive On Green	0.00	0.80	0.80	0.00	0.48	0.00				0.47	0.47	0.47
Sat Flow, veh/h	0	1863	1583	0	3725	0				150	5099	1599
Grp Volume(v), veh/h	0	557	526	0	573	0				668	1110	336
Grp Sat Flow(s),veh/h/ln	0	1863	1583	0	1770	0				1856	1696	1599
Q Serve(g_s), s	0.0	17.8	22.2	0.0	15.1	0.0				45.0	38.9	21.3
Cycle Q Clear(g_c), s	0.0	17.8	22.2	0.0	15.1	0.0				45.0	38.9	21.3
Prop In Lane	0.00		1.00	0.00		0.00				0.08		1.00
Lane Grp Cap(c), veh/h	0	894	760	0	1699	0				866	1583	746
V/C Ratio(X)	0.00	0.62	0.69	0.00	0.34	0.00				0.77	0.70	0.45
Avail Cap(c_a), veh/h	0	894	760	0	1699	0				866	1583	746
HCM Platoon Ratio	1.00	1.67	1.67	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	0.90	0.00				1.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	9.5	9.9	0.0	24.2	0.0				33.3	31.7	27.0
Incr Delay (d2), s/veh	0.0	3.3	5.1	0.0	0.5	0.0				6.6	2.6	2.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	0.0	9.5	10.3	0.0	7.4	0.0				24.6	18.8	9.8
LnGrp Delay(d),s/veh	0.0	12.8	15.1	0.0	24.7	0.0				39.9	34.3	29.0
LnGrp LOS		B	B		C					D	C	C
Approach Vol, veh/h		1083			573						2114	
Approach Delay, s/veh		13.9			24.7						35.2	
Approach LOS		B			C						D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				76.0		74.0		76.0
Change Period (Y+Rc), s				5.0		5.0		5.0
Max Green Setting (Gmax), s				71.0		69.0		71.0
Max Q Clear Time (g_c+I1), s				24.2		47.0		17.1
Green Ext Time (p_c), s				2.0		2.8		2.0

Intersection Summary	
HCM 2010 Ctrl Delay	27.5
HCM 2010 LOS	C

Notes

User approved volume balancing among the lanes for turning movement.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	1194	0	0	854	1	388	0	54	1	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	11	11	11	11	14	11
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	75		0	0		0	0		0	0		0
Storage Lanes	1		0	0		0	2		0	0		0
Taper Length (ft)	25			25			25			50		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		296			265			570			107	
Travel Time (s)		6.7			6.0			13.0			2.4	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	2%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Turn Type	Perm	NA			NA		Split	NA		Split	NA	
Protected Phases		2			6		8	8		4	4	
Permitted Phases	2											
Detector Phase	2	2			6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	4.0	4.0			4.0		4.0	4.0		5.0	5.0	
Minimum Split (s)	21.0	21.0			21.0		20.0	20.0		10.0	10.0	
Total Split (s)	97.0	97.0			97.0		41.0	41.0		12.0	12.0	
Total Split (%)	64.7%	64.7%			64.7%		27.3%	27.3%		8.0%	8.0%	
Yellow Time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0			1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0			0.0		0.0	0.0			0.0	
Total Lost Time (s)	5.0	5.0			5.0		5.0	5.0			5.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max			C-Max		None	None		None	None	

Intersection Summary

Area Type: Other
Cycle Length: 150
Actuated Cycle Length: 150
Offset: 126 (84%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow
Natural Cycle: 60
Control Type: Actuated-Coordinated

Splits and Phases: 3648: Byron/Loading & 96th St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	39	0	5	10	2410	51	19	1909	4
Number				7	4	14	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1900	1900	1900	1900	1864	1900	1900	1863	1900
Adj Flow Rate, veh/h				42	0	5	11	2591	55	20	2053	4
Adj No. of Lanes				2	0	1	1	3	0	1	3	0
Peak Hour Factor				0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %				0	0	0	0	2	2	0	2	2
Cap, veh/h				422	0	188	384	3999	84	133	3662	7
Arrive On Green				0.12	0.00	0.12	0.11	0.78	0.78	0.02	1.00	1.00
Sat Flow, veh/h				3619	0	1615	1810	5128	108	1810	5241	10
Grp Volume(v), veh/h				42	0	5	11	1710	936	20	1328	729
Grp Sat Flow(s),veh/h/ln				1810	0	1615	1810	1696	1844	1810	1695	1861
Q Serve(g_s), s				1.6	0.0	0.4	0.2	33.6	34.0	0.5	0.0	0.0
Cycle Q Clear(g_c), s				1.6	0.0	0.4	0.2	33.6	34.0	0.5	0.0	0.0
Prop In Lane				1.00		1.00	1.00		0.06	1.00		0.01
Lane Grp Cap(c), veh/h				422	0	188	384	2645	1438	133	2369	1300
V/C Ratio(X)				0.10	0.00	0.03	0.03	0.65	0.65	0.15	0.56	0.56
Avail Cap(c_a), veh/h				422	0	188	384	2645	1438	183	2369	1300
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)				1.00	0.00	1.00	1.00	1.00	1.00	0.80	0.80	0.80
Uniform Delay (d), s/veh				59.2	0.0	58.7	2.7	7.3	7.4	8.6	0.0	0.0
Incr Delay (d2), s/veh				0.5	0.0	0.3	0.1	1.2	2.3	0.2	0.8	1.4
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln				0.8	0.0	0.4	0.1	15.9	18.1	0.3	0.3	0.5
LnGrp Delay(d),s/veh				59.7	0.0	59.0	2.8	8.6	9.7	8.7	0.8	1.4
LnGrp LOS				E		E	A	A	A	A	A	A
Approach Vol, veh/h					47			2657			2077	
Approach Delay, s/veh					59.6			8.9			1.1	
Approach LOS					E			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		
Phs Duration (G+Y+Rc), s	5.8	122.2		22.0	19.0	109.0		
Change Period (Y+Rc), s	3.0	* 5.2		5.5	3.0	* 5.2		
Max Green Setting (Gmax), s	7.0	* 1.1E2		16.5	16.0	* 1E2		
Max Q Clear Time (g_c+I1), s	2.5	36.0		3.6	2.2	2.0		
Green Ext Time (p_c), s	0.0	42.4		0.1	0.0	47.8		

Intersection Summary	
HCM 2010 Ctrl Delay	6.0
HCM 2010 LOS	A

Notes

User approved volume balancing among the lanes for turning movement.
User approved ignoring U-Turning movement.
* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBU	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Lane Configurations								
Volume (vph)	6	83	977	28	1153	61	132	109
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	11	11
Grade (%)			0%		0%		0%	
Storage Length (ft)		125		25		0	0	0
Storage Lanes		1		1		0	2	1
Taper Length (ft)		50		25			25	
Right Turn on Red						Yes		Yes
Link Speed (mph)			30		30		30	
Link Distance (ft)			244		296		285	
Travel Time (s)			5.5		6.7		6.5	
Confl. Peds. (#/hr)								
Confl. Bikes (#/hr)								
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	2%	0%	2%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0
Parking (#/hr)								
Mid-Block Traffic (%)			0%		0%		0%	
Shared Lane Traffic (%)								31%
Turn Type	pm+pt	pm+pt	NA	Perm	NA		Prot	Prot
Protected Phases	5	5	2		6		4	4
Permitted Phases	2	2		6				
Detector Phase	5	5	2	6	6		4	4
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0
Minimum Split (s)	9.0	9.0	21.0	21.0	21.0		21.0	21.0
Total Split (s)	16.0	16.0	123.0	107.0	107.0		27.0	27.0
Total Split (%)	10.7%	10.7%	82.0%	71.3%	71.3%		18.0%	18.0%
Yellow Time (s)	3.0	3.0	4.0	4.0	4.0		4.0	4.0
All-Red Time (s)	0.0	0.0	1.0	1.0	1.0		1.0	1.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)		3.0	5.0	5.0	5.0		5.0	5.0
Lead/Lag	Lead	Lead		Lag	Lag			
Lead-Lag Optimize?								
Recall Mode	None	None	C-Max	C-Max	C-Max		None	None

Intersection Summary

Area Type: Other
Cycle Length: 150
Actuated Cycle Length: 150
Offset: 20 (13%), Referenced to phase 2:EBTL and 6:WBTU, Start of Yellow
Natural Cycle: 60
Control Type: Actuated-Coordinated

Splits and Phases: 4344: 96th St & BHS South

Movement	EBU	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Lane Configurations								
Volume (veh/h)	6	83	977	28	1153	61	132	109
Number		5	2		6	16	7	14
Initial Q (Qb), veh		0	0		0	0	0	0
Ped-Bike Adj(A_pbT)		1.00				1.00	1.00	1.00
Parking Bus, Adj		1.00	1.00		1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln		1900	1863		1865	1900	1900	1900
Adj Flow Rate, veh/h		88	1039		1227	65	169	85
Adj No. of Lanes		1	2		2	0	2	1
Peak Hour Factor		0.94	0.94		0.94	0.94	0.94	0.94
Percent Heavy Veh, %		0	2		2	2	0	0
Cap, veh/h		451	3064		2806	149	244	109
Arrive On Green		0.03	0.87		1.00	1.00	0.07	0.07
Sat Flow, veh/h		1810	3632		3516	181	3619	1615
Grp Volume(v), veh/h		88	1039		634	658	169	85
Grp Sat Flow(s),veh/h/ln		1810	1770		1771	1833	1810	1615
Q Serve(g_s), s		1.1	8.4		0.0	0.0	6.9	7.8
Cycle Q Clear(g_c), s		1.1	8.4		0.0	0.0	6.9	7.8
Prop In Lane		1.00				0.10	1.00	1.00
Lane Grp Cap(c), veh/h		451	3064		1452	1502	244	109
V/C Ratio(X)		0.20	0.34		0.44	0.44	0.69	0.78
Avail Cap(c_a), veh/h		560	3064		1452	1502	531	237
HCM Platoon Ratio		1.00	1.00		2.00	2.00	1.00	1.00
Upstream Filter(I)		1.00	1.00		0.87	0.87	1.00	1.00
Uniform Delay (d), s/veh		1.6	1.9		0.0	0.0	68.4	68.8
Incr Delay (d2), s/veh		0.1	0.3		0.8	0.8	1.3	4.5
Initial Q Delay(d3),s/veh		0.0	0.0		0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln		0.5	4.2		0.3	0.3	3.5	7.0
LnGrp Delay(d),s/veh		1.7	2.2		0.8	0.8	69.7	73.3
LnGrp LOS		A	A		A	A	E	E
Approach Vol, veh/h			1127		1292		254	
Approach Delay, s/veh			2.2		0.8		70.9	
Approach LOS			A		A		E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		134.9		15.1	6.9	128.0		
Change Period (Y+Rc), s		5.0		5.0	3.0	5.0		
Max Green Setting (Gmax), s		118.0		22.0	13.0	102.0		
Max Q Clear Time (g_c+I1), s		10.4		9.8	3.1	2.0		
Green Ext Time (p_c), s		20.3		0.4	0.1	20.2		

Intersection Summary	
HCM 2010 Ctrl Delay	8.1
HCM 2010 LOS	A

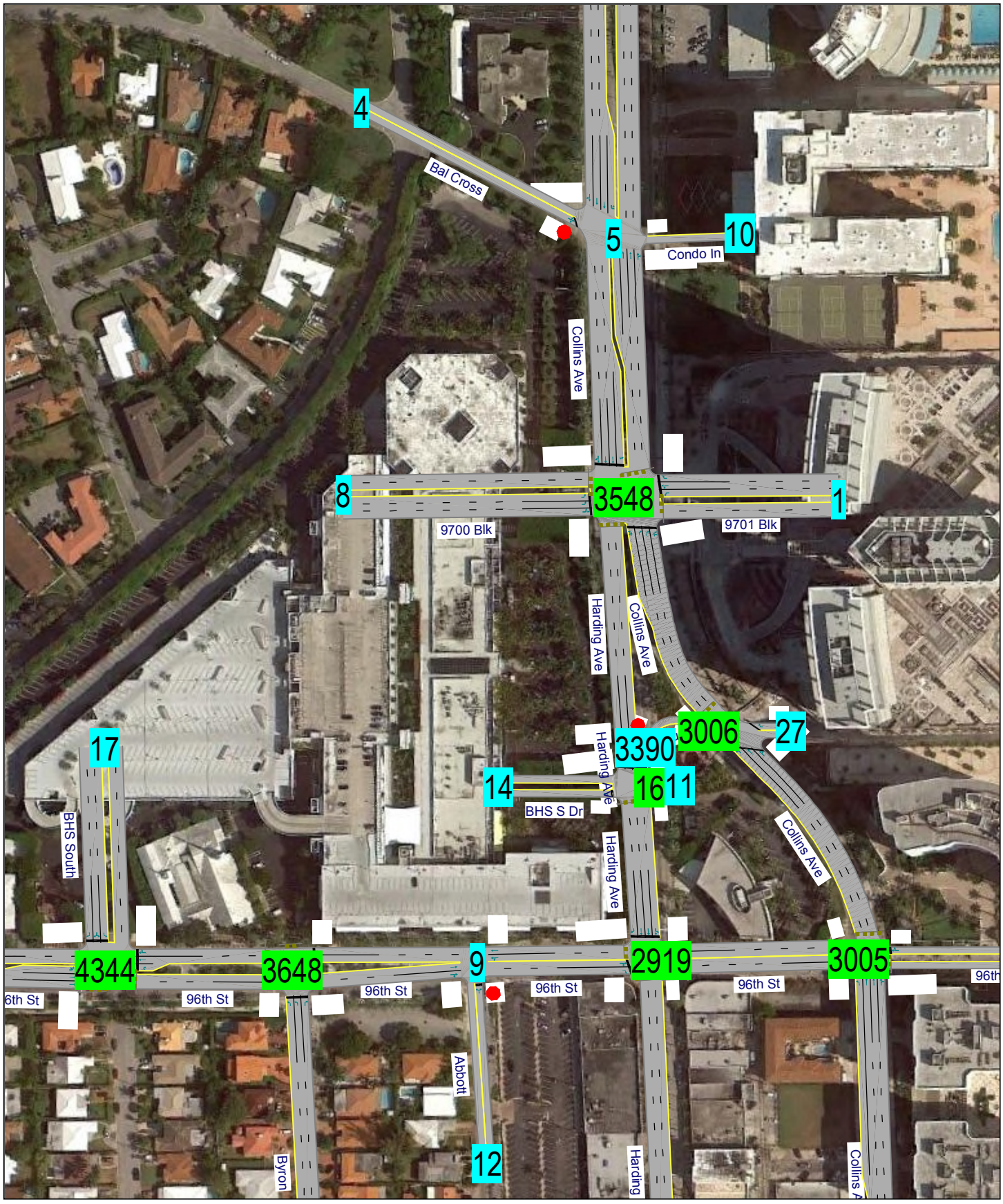
Notes

User approved volume balancing among the lanes for turning movement.
User approved ignoring U-Turning movement.

SIMULATION ANALYSES

2014 Exist B.syn

Existing Network



5: Collins Ave & Bal Cross/Condo In Performance by run number

Run Number	11	12	13	14	15	Avg
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	4.4	4.8	4.9	5.5	5.1	4.9

9: Abbott & 96th St Performance by run number

Run Number	11	12	13	14	15	Avg
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	4.8	4.7	5.1	6.3	5.6	5.3

13: 96th St Performance by run number

Run Number	11	12	13	14	15	Avg
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	1.5	1.3	1.5	1.3	1.5	1.4

16: Harding Ave & BHS S Dr Performance by run number

Run Number	11	12	13	14	15	Avg
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	1.1	1.1	1.1	1.2	1.2	1.1

2919: Harding Ave & 96th St Performance by run number

Run Number	11	12	13	14	15	Avg
Denied Del/Veh (s)	0.1	0.0	0.0	0.1	0.0	0.0
Total Del/Veh (s)	14.9	14.9	15.1	15.1	15.0	15.0

3005: Collins Ave & 96th St Performance by run number

Run Number	11	12	13	14	15	Avg
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	34.2	34.5	41.9	37.3	36.7	36.9

3006: Collins Ave & U-turn Performance by run number

Run Number	11	12	13	14	15	Avg
Denied Del/Veh (s)	0.1	0.1	0.1	0.1	0.1	0.1
Total Del/Veh (s)	19.7	21.2	21.4	21.0	21.2	20.9

3390: Harding Ave & U-turn Performance by run number

Run Number	11	12	13	14	15	Avg
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	4.0	4.1	4.2	3.6	4.3	4.0

3548: Harding Ave & Collins Ave & 9700 Blk/9701 Blk Performance by run number

Run Number	11	12	13	14	15	Avg
Denied Del/Veh (s)	0.5	0.8	0.8	0.8	0.6	0.7
Total Del/Veh (s)	28.8	29.6	29.5	30.7	28.7	29.5

3648: Byron & 96th St Performance by run number

Run Number	11	12	13	14	15	Avg
Denied Del/Veh (s)	0.1	0.1	0.0	0.1	0.1	0.1
Total Del/Veh (s)	11.1	9.8	10.0	11.2	10.2	10.5

4344: 96th St & BHS South Performance by run number

Run Number	11	12	13	14	15	Avg
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	9.6	8.6	9.9	8.7	8.3	9.0

Total Network Performance By Run

Run Number	11	12	13	14	15	Avg
Denied Del/Veh (s)	1.0	1.0	2.3	1.1	1.7	1.4
Total Del/Veh (s)	67.0	67.5	71.9	69.8	68.7	69.0

5: Collins Ave & Bal Cross/Condo In Performance by run number

Run Number	11	12	13	14	15	Avg
Stop/Veh	0.04	0.06	0.05	0.06	0.05	0.05

9: Abbott & 96th St Performance by run number

Run Number	11	12	13	14	15	Avg
Stop/Veh	0.09	0.10	0.10	0.11	0.12	0.10

13: 96th St Performance by run number

Run Number	11	12	13	14	15	Avg
Stop/Veh	0.03	0.03	0.03	0.03	0.03	0.03

16: Harding Ave & BHS S Dr Performance by run number

Run Number	11	12	13	14	15	Avg
Stop/Veh	0.03	0.02	0.03	0.04	0.03	0.03

2919: Harding Ave & 96th St Performance by run number

Run Number	11	12	13	14	15	Avg
Stop/Veh	0.38	0.37	0.38	0.35	0.37	0.37

3005: Collins Ave & 96th St Performance by run number

Run Number	11	12	13	14	15	Avg
Stop/Veh	0.64	0.67	0.74	0.68	0.68	0.68

3006: Collins Ave & U-turn Performance by run number

Run Number	11	12	13	14	15	Avg
Stop/Veh	0.38	0.42	0.43	0.38	0.44	0.41

3390: Harding Ave & U-turn Performance by run number

Run Number	11	12	13	14	15	Avg
Stop/Veh	0.07	0.06	0.07	0.05	0.07	0.06

3548: Harding Ave & Collins Ave & 9700 Blk/9701 Blk Performance by run number

Run Number	11	12	13	14	15	Avg
Stop/Veh	0.49	0.49	0.49	0.51	0.47	0.49

3648: Byron & 96th St Performance by run number

Run Number	11	12	13	14	15	Avg
Stop/Veh	0.39	0.35	0.37	0.40	0.39	0.38

4344: 96th St & BHS South Performance by run number

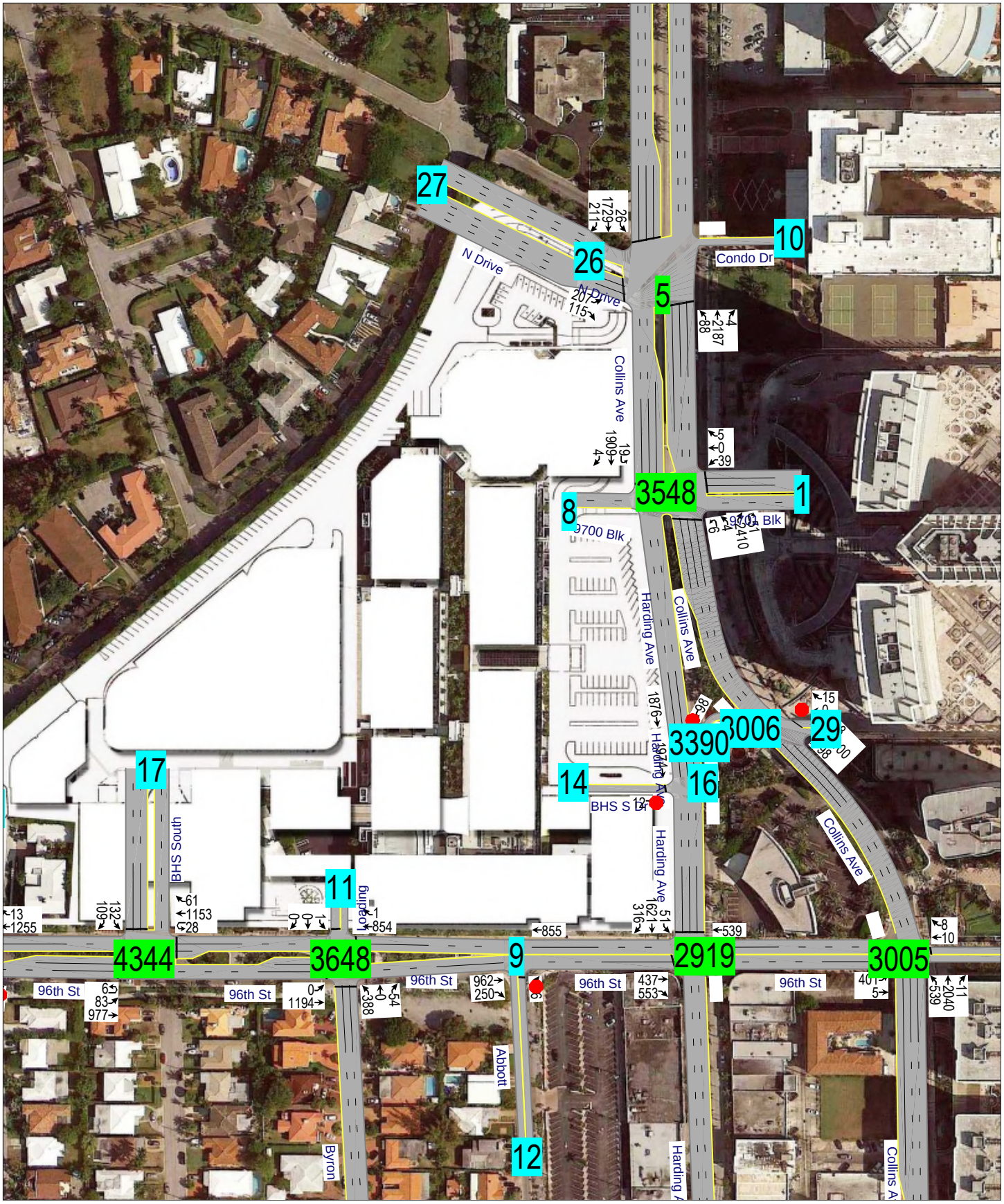
Run Number	11	12	13	14	15	Avg
Stop/Veh	0.26	0.24	0.28	0.24	0.23	0.25

Total Network Performance By Run

Run Number	11	12	13	14	15	Avg
Stop/Veh	1.27	1.27	1.34	1.26	1.28	1.29

Total Network Performance By Run

Run Number	11	12	13	14	15	Avg
Avg Speed (mph)	16	16	15	15	16	16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9700 Blk
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14
16
17
11
4344
3648
9
2919
3005
12
N Drive
Condo Dr
Collins Ave
Harding Ave
BHS South
BHS S St
Loading
96th St
Abbott
Byron

5: Collins Ave & N Drive/Condo Dr Performance by run number

Run Number	11	12	13	14	15	Avg
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	12.8	12.1	12.8	12.5	13.1	12.7

9: Abbott & 96th St Performance by run number

Run Number	11	12	13	14	15	Avg
Denied Del/Veh (s)	0.8	0.0	0.0	0.0	0.0	0.2
Total Del/Veh (s)	13.0	7.3	9.0	7.2	4.4	8.2

13: 96th St Performance by run number

Run Number	11	12	13	14	15	Avg
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	2.2	2.0	1.7	2.5	1.7	2.0

16: Harding Ave & BHS S Dr Performance by run number

Run Number	11	12	13	14	15	Avg
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	2.0	1.8	1.8	1.7	1.9	1.9

2919: Harding Ave & 96th St Performance by run number

Run Number	11	12	13	14	15	Avg
Denied Del/Veh (s)	0.5	0.4	0.1	0.2	0.1	0.3
Total Del/Veh (s)	18.7	18.0	17.4	18.2	17.4	18.0

3005: Collins Ave & 96th St Performance by run number

Run Number	11	12	13	14	15	Avg
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	24.2	22.4	21.7	21.2	20.3	22.0

3006: Collins Ave & U-turn Performance by run number

Run Number	11	12	13	14	15	Avg
Denied Del/Veh (s)	0.0	0.0	0.0	0.1	0.0	0.0
Total Del/Veh (s)	3.1	3.2	2.8	3.5	3.8	3.3

3390: Harding Ave & U-turn Performance by run number

Run Number	11	12	13	14	15	Avg
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	10.8	9.0	9.0	9.4	10.4	9.7

3548: Harding Ave & Collins Ave & 9700 Blk/9701 Blk Performance by run number

Run Number	11	12	13	14	15	Avg
Denied Del/Veh (s)	0.1	0.1	0.1	0.1	0.1	0.1
Total Del/Veh (s)	9.3	8.8	8.7	8.8	9.3	9.0

3648: Byron/Loading & 96th St Performance by run number

Run Number	11	12	13	14	15	Avg
Denied Del/Veh (s)	0.1	0.1	0.1	0.1	0.1	0.1
Total Del/Veh (s)	15.2	16.0	15.2	14.8	15.5	15.3

4344: 96th St & BHS South Performance by run number

Run Number	11	12	13	14	15	Avg
Denied Del/Veh (s)	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	15.0	12.2	12.4	10.9	11.6	12.4

Total Network Performance By Run

Run Number	11	12	13	14	15	Avg
Denied Del/Veh (s)	1.2	0.7	0.5	0.6	0.5	0.7
Total Del/Veh (s)	59.4	54.4	54.4	53.7	53.3	55.1

5: Collins Ave & N Drive/Condo Dr Performance by run number

Run Number	11	12	13	14	15	Avg
Stop/Veh	0.30	0.31	0.30	0.30	0.32	0.31

9: Abbott & 96th St Performance by run number

Run Number	11	12	13	14	15	Avg
Stop/Veh	0.18	0.12	0.12	0.13	0.09	0.13

13: 96th St Performance by run number

Run Number	11	12	13	14	15	Avg
Stop/Veh	0.04	0.03	0.04	0.04	0.03	0.04

16: Harding Ave & BHS S Dr Performance by run number

Run Number	11	12	13	14	15	Avg
Stop/Veh	0.05	0.05	0.05	0.05	0.05	0.05

2919: Harding Ave & 96th St Performance by run number

Run Number	11	12	13	14	15	Avg
Stop/Veh	0.34	0.36	0.33	0.35	0.35	0.34

3005: Collins Ave & 96th St Performance by run number

Run Number	11	12	13	14	15	Avg
Stop/Veh	0.50	0.50	0.48	0.47	0.44	0.48

3006: Collins Ave & U-turn Performance by run number

Run Number	11	12	13	14	15	Avg
Stop/Veh	0.04	0.03	0.03	0.03	0.07	0.04

3390: Harding Ave & U-turn Performance by run number

Run Number	11	12	13	14	15	Avg
Stop/Veh	0.37	0.33	0.32	0.33	0.38	0.35

3548: Harding Ave & Collins Ave & 9700 Blk/9701 Blk Performance by run number

Run Number	11	12	13	14	15	Avg
Stop/Veh	0.28	0.27	0.26	0.27	0.30	0.28

3648: Byron/Loading & 96th St Performance by run number

Run Number	11	12	13	14	15	Avg
Stop/Veh	0.34	0.37	0.35	0.34	0.34	0.35

4344: 96th St & BHS South Performance by run number

Run Number	11	12	13	14	15	Avg
Stop/Veh	0.32	0.30	0.32	0.30	0.29	0.31

Total Network Performance By Run

Run Number	11	12	13	14	15	Avg
Stop/Veh	1.20	1.17	1.15	1.14	1.17	1.17

Total Network Performance By Run

Run Number	11	12	13	14	15	Avg
Avg Speed (mph)	16	17	17	17	17	17