TRAFFIC IMPACT STUDY
FOR
PALAZZO HOTEL
#657 BAY ESPLANADE
CLEARWATER BEACH, FLORIDA

PREPARED FOR:
NORTHSIDE ENGINEERING, INC.

PREPARED BY:
GULF COAST CONSULTING, INC.
SEPTEMBER 2016
PROJECT # 13-005

Robert Pergolizzi, AICP, PTP
AICP #9023, PTP #133

I. INTRODUCTION

The .35 acre project site is located along the south side of Bay Esplanade along Clearwater Harbor in north Clearwater Beach (See Figure 1). The site is proposed to be developed as a small hotel containing 27 rooms. The development of the property is the subject of a Comprehensive Infill Redevelopment application. This application requires an assessment of the traffic impacts of development. Prior to completing this analysis a methodology was established with the City of Clearwater staff.

II. EXISTING TRAFFIC CONDITIONS

The property has frontage on Bay Esplanade which is a two-lane local road. Mandalay Avenue is a four-lane divided collector roadway between the roundabout and Bay Esplanade, and a two-lane collector north of Bay Esplanade. Royal Way is a two-lane local road that intersects with Mandalay Avenue and provides access to the area of the proposed hotel. As agreed to by Clearwater staff, traffic counts were conducted between 4 - 6 PM on in September 2016 at the following intersections:

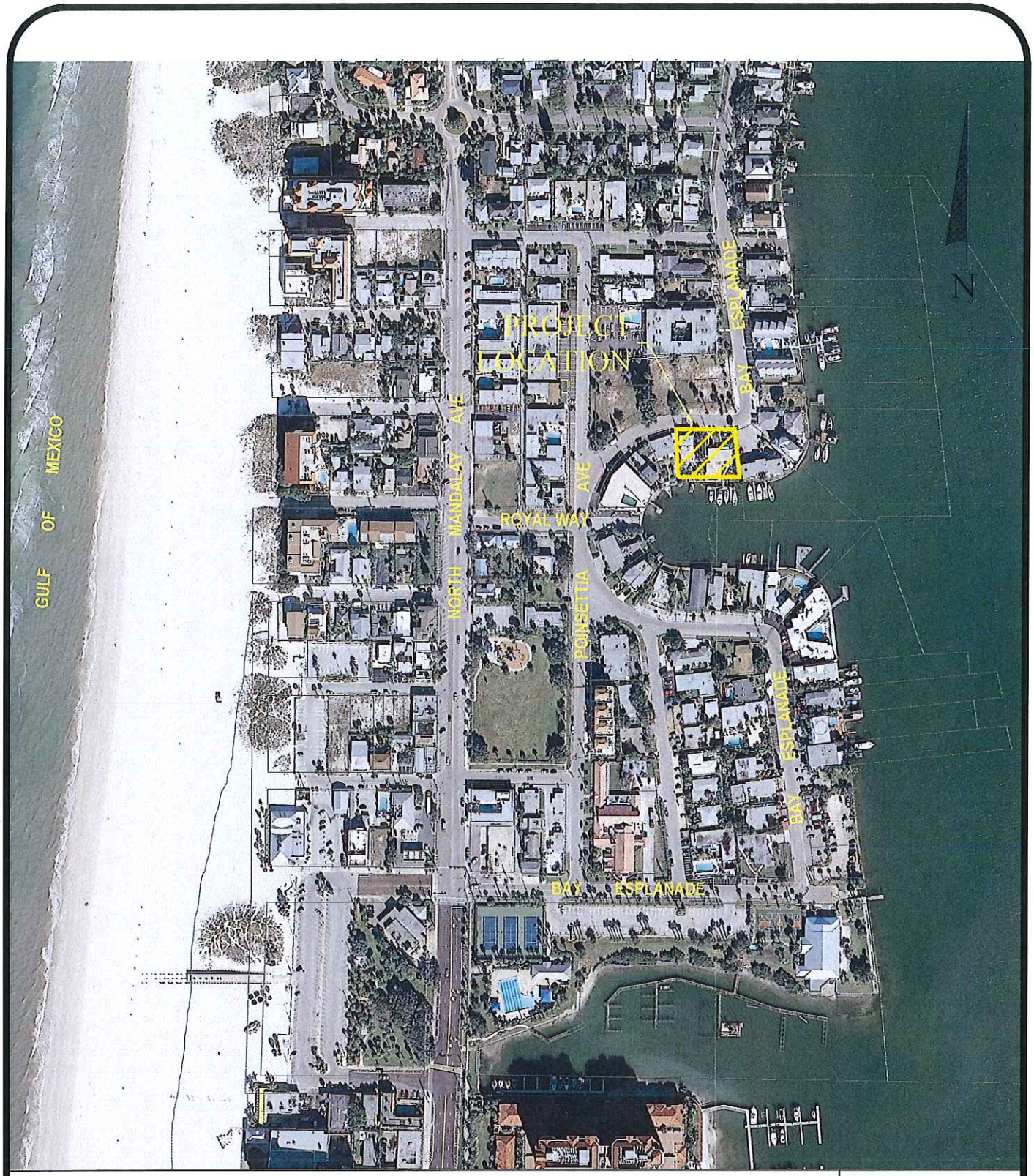
Mandalay Avenue / Bay Esplanade (signal)
Mandalay Avenue / Royal Way/Glendale St

All traffic counts were converted to annual average equivalents using FDOT seasonal adjustment factors. Existing traffic volumes are shown in Figure 2. Existing intersections were analyzed using the SYNCHRO and HCS 2010 software. The SYNCHRO & HCS 2010 printouts are included in Appendix A.

Presently the signalized intersection at Mandalay Avenue / Bay Esplanade operates at LOS A with average delay of 2.3 seconds per vehicle during the PM peak hour. Intersection capacity utilization (ICU) is 49.2%.

At the Mandalay Avenue / Royal Way Glendale Street intersection northbound left runs operate at LOS A with average delay of 7.8 seconds southbound left turns operate at LOS A with average delay of 7.7 seconds, the eastbound approach (Glendale) operates at LOS B with 10.2 seconds average delay and the westbound approach (Royal Way) operates at LOS B with 12.5 seconds average delay. Traffic volume on Royal Way is extremely low.

Mandalay Avenue south of Bay Esplanade is a four-lane divided collector roadway and according to FDOT 2012 QLOS Handbook capacity tables has a LOS D capacity of 2,630 vehicles per hour. The segment of Mandalay Avenue north of Bay Esplanade is a two-lane undivided collector roadway with a LOS D capacity of 1,200 vehicles per hour. Existing roadway conditions are shown below.



PROJECT LOCATION – PALAZZO HOTEL

PROJECT NO: 16–053

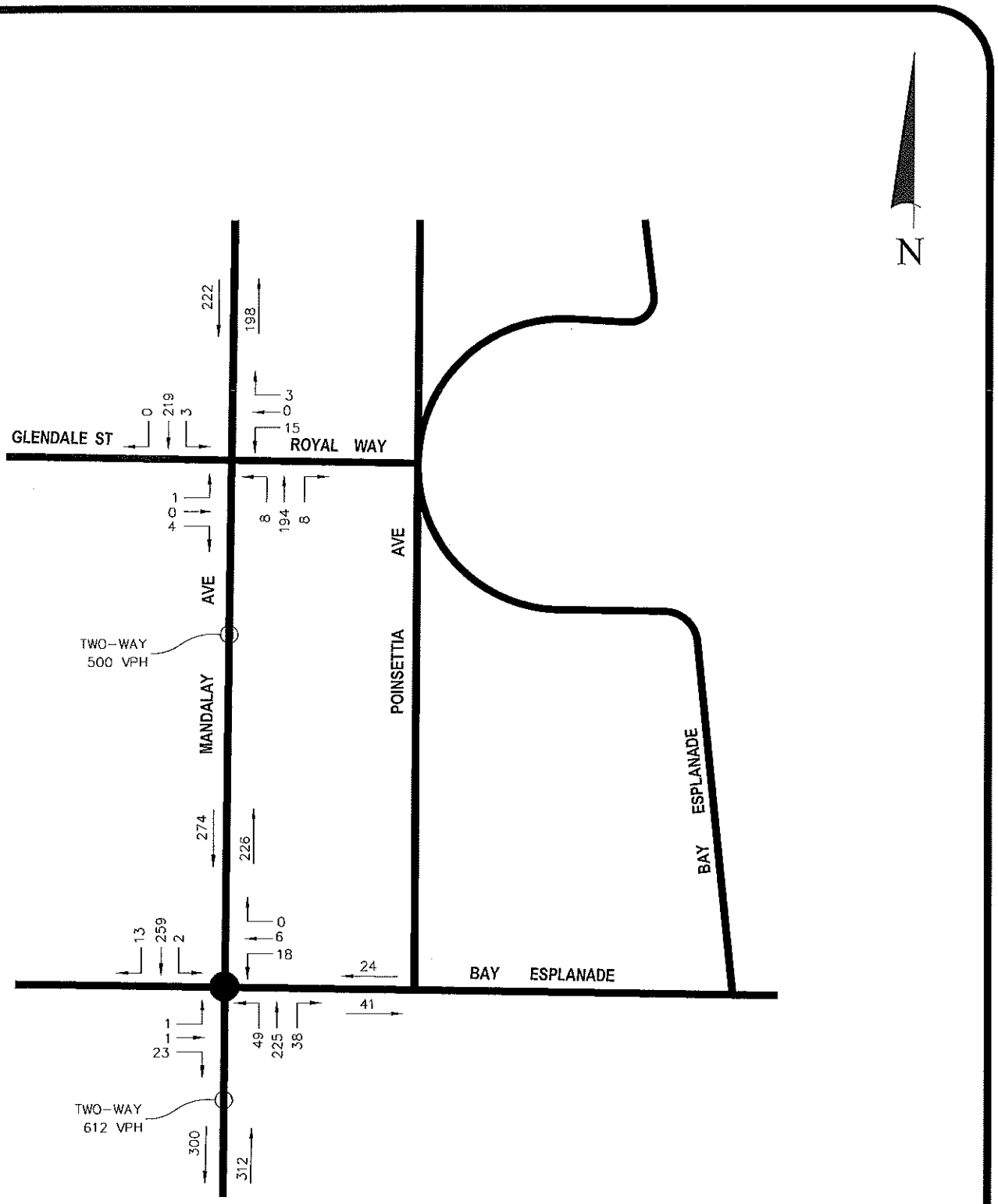
Gulf Coast Consulting, Inc.
Land Development Consulting

DATE: 9/2016

DRAWN BY: DME

FIGURE: 1

Y:\PINELLAS\Palazzo Hotel (16-053)\Drawings\16-053 TRAFFIC COUNTS.dwg, 9/27/2016 9:12:14 AM



EXISTING PM PEAK HOUR TRAFFIC (2016)

PROJECT NO: 16-053

Gulf Coast Consulting, Inc.
Land Development Consulting

DATE: 9/2016

DRAWN BY: DME

FIGURE: 2

Y:\PINELLAS\Palazzo Hotel (16-053)\Drawings\16-053 TRAFFIC COUNTS.dwg, 9/27/2016 8:37:14 AM

EXISTING ROADWAY CONDITIONS - 2016

Roadway Segment	Lanes	PM Volume	PM LOS
Mandalay Ave (S. of Bay Esplanade)	4LU	612	C
Mandalay Ave. (Bay Esplanade – Royal)	2LU	500	C
Mandalay (N of Royal)	2LU	420	C

As shown above all roadway segments and intersections operate at LOS C during PM peak hour.

III. FUTURE TRAFFIC CONDITIONS

Background Traffic Growth

Existing traffic was adjusted to include expected traffic from the approved Fairfield Inn hotel which is presently under construction on a 1.02 acre site across the street from the subject site. Fairfield Inn will contain 102 rooms. Project traffic from this hotel was previously analyzed in a report prepared by Gulf Coast Consulting in January 2013.

Project Traffic

Using Institute of Transportation Engineers (ITE) Trip Generation, 9th Edition rates, the amount of new trips was calculated and estimates are shown below:

TRIP GENERATION ESTIMATES

Land Use	ITE LUC	Amount	Daily	Mid-Day	PM Peak
Hotel	310	27 rooms	221	16 (8/8)	16 (8/8)

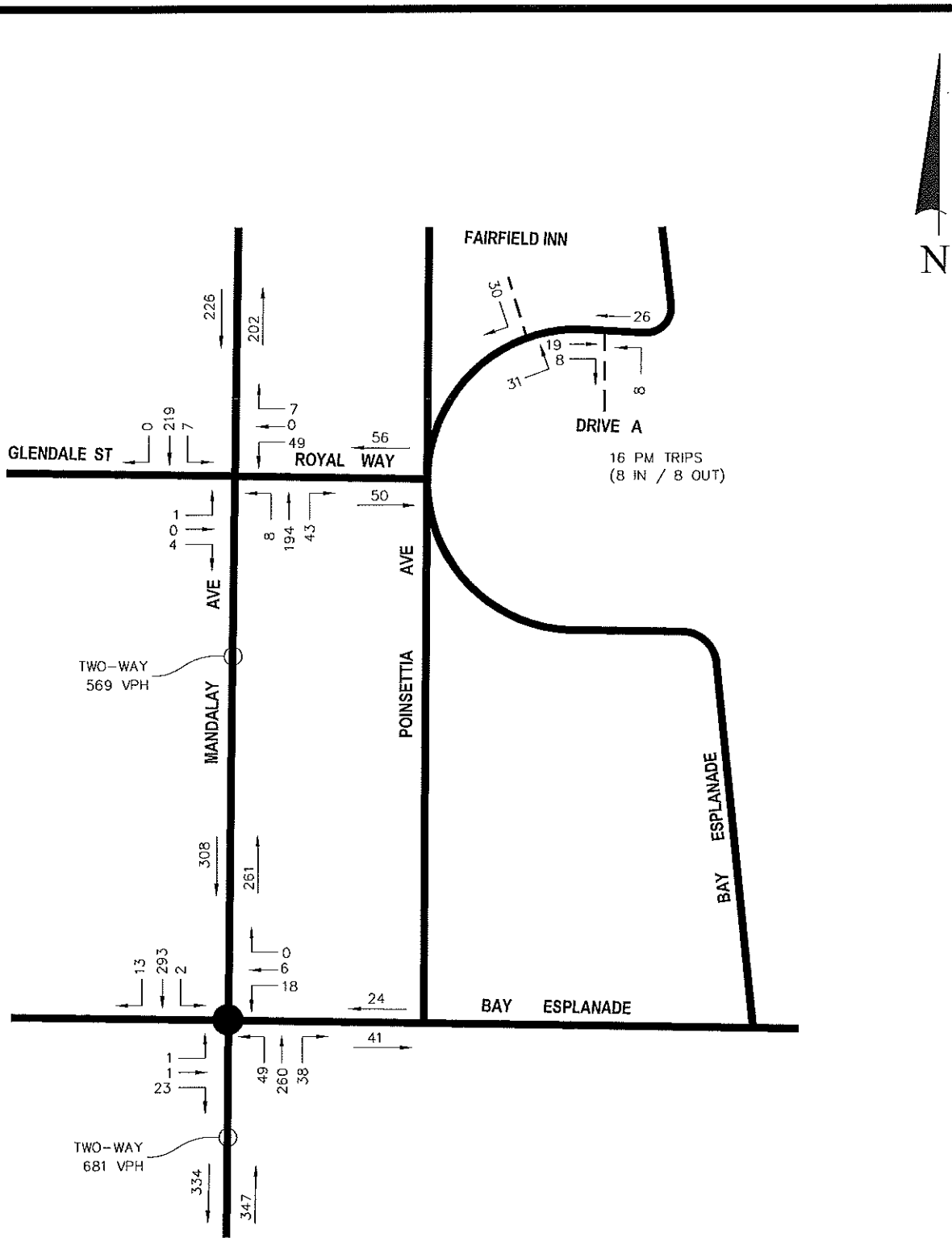
The expected distribution of vehicular trips is as follows:

10% to / from the north (2 PM trips)
90% to / from the south (14 PM trips)

PROJECT IMPACT CALCULATIONS (PM PEAK HOUR)

Road Segment	Lanes	Project Trips	Capacity	Project Percent
Mandalay Ave. (S – Bay Esplanade	4LU	14	2630	0.05%
Mandalay Ave (Bay Esplanade – Royal)	2LU	14	1200	1.17%
Mandalay Ave (N. of Royal Way)	2LU	2	1200	0.02%

Background traffic and project traffic were added to determine total traffic for 2017 and the intersections and roadway segments were reanalyzed. The future traffic volumes are shown in Figure 3, and the SYNCHRO & HCS 2010 printouts are included in Appendix B.



FUTURE PM PEAK HOUR TRAFFIC (2017)

PROJECT NO: 16-053

Gulf Coast Consulting, Inc.
Land Development Consulting

DATE: 9/2016

DRAWN BY: DME

FIGURE: 3

Y:\PINELLAS\Palazzo Hotel (16-053)\Drawings\16-053 TRAFFIC COUNTS.dwg, 9/27/2016 9:04:00 AM

Under future conditions the signalized intersection at Mandalay Avenue / Bay Esplanade would continue to operate at LOS A with average delay of 2.3 seconds per vehicle during the PM peak hour. The ICU would slightly increase to 52.8%.

At the Mandalay Avenue / Royal Way intersection northbound and southbound left turns would continue to operate at LOS A with average delay of 7.8 seconds; the eastbound approach (Glendale) would operate at LOS B with 10.3 seconds average delay and the westbound approach (Royal Way) would operate at LOS B with average delay increasing to 13.7 seconds.

At the project driveway all movements would operate at LOS A with minimal delay.

FUTURE ROADWAY CONDITIONS - 2017

Roadway Segment	Lanes	PM Volume	PM LOS
Mandalay Ave (S. of Bay Esplanade)	4LU	681	C
Mandalay Ave. (Bay Esplanade – Royal)	2LU	569	C
Mandalay (N of Royal)	2LU	428	C

As shown above all roadway segments and intersections would continue to operate at LOS C during the PM peak hour.

IV. CONCLUSION

This analysis was conducted in accordance with a specific methodology established with City of Clearwater staff. This analysis demonstrates traffic operations at nearby intersections and on adjacent roadways would continue at acceptable levels of service with the proposed hotel during the PM peak hour.

APPENDIX A

2015 Peak Season Factor Category Report - Report Type: ALL
Category: 1500 PINELLAS COUNTYWIDE

MOCF: 0.95

Week	Dates	SF	PSCF
1	01/01/2015 - 01/03/2015	1.04	1.09
2	01/04/2015 - 01/10/2015	1.04	1.09
3	01/11/2015 - 01/17/2015	1.04	1.09
4	01/18/2015 - 01/24/2015	1.02	1.07
5	01/25/2015 - 01/31/2015	1.00	1.05
6	02/01/2015 - 02/07/2015	0.98	1.03
* 7	02/08/2015 - 02/14/2015	0.96	1.01
* 8	02/15/2015 - 02/21/2015	0.95	1.00
* 9	02/22/2015 - 02/28/2015	0.94	0.99
*10	03/01/2015 - 03/07/2015	0.92	0.97
*11	03/08/2015 - 03/14/2015	0.91	0.96
*12	03/15/2015 - 03/21/2015	0.92	0.97
*13	03/22/2015 - 03/28/2015	0.93	0.98
*14	03/29/2015 - 04/04/2015	0.94	0.99
*15	04/05/2015 - 04/11/2015	0.95	1.00
*16	04/12/2015 - 04/18/2015	0.96	1.01
*17	04/19/2015 - 04/25/2015	0.96	1.01
*18	04/26/2015 - 05/02/2015	0.97	1.02
*19	05/03/2015 - 05/09/2015	0.98	1.03
20	05/10/2015 - 05/16/2015	0.99	1.04
21	05/17/2015 - 05/23/2015	0.99	1.04
22	05/24/2015 - 05/30/2015	1.00	1.05
23	05/31/2015 - 06/06/2015	1.00	1.05
24	06/07/2015 - 06/13/2015	1.00	1.05
25	06/14/2015 - 06/20/2015	1.01	1.06
26	06/21/2015 - 06/27/2015	1.02	1.07
27	06/28/2015 - 07/04/2015	1.02	1.07
28	07/05/2015 - 07/11/2015	1.03	1.08
29	07/12/2015 - 07/18/2015	1.03	1.08
30	07/19/2015 - 07/25/2015	1.03	1.08
31	07/26/2015 - 08/01/2015	1.03	1.08
32	08/02/2015 - 08/08/2015	1.03	1.08
33	08/09/2015 - 08/15/2015	1.03	1.08
34	08/16/2015 - 08/22/2015	1.04	1.09
35	08/23/2015 - 08/29/2015	1.05	1.11
36	08/30/2015 - 09/05/2015	1.06	1.12
37	09/06/2015 - 09/12/2015	1.07	1.13
38	09/13/2015 - 09/19/2015	1.06	1.12
39	09/20/2015 - 09/26/2015	1.04	1.09
40	09/27/2015 - 10/03/2015	1.03	1.08
41	10/04/2015 - 10/10/2015	1.02	1.07
42	10/11/2015 - 10/17/2015	1.01	1.06
43	10/18/2015 - 10/24/2015	1.02	1.07
44	10/25/2015 - 10/31/2015	1.03	1.08
45	11/01/2015 - 11/07/2015	1.04	1.09
46	11/08/2015 - 11/14/2015	1.04	1.09
47	11/15/2015 - 11/21/2015	1.04	1.09
48	11/22/2015 - 11/28/2015	1.04	1.09
49	11/29/2015 - 12/05/2015	1.04	1.09
50	12/06/2015 - 12/12/2015	1.04	1.09
51	12/13/2015 - 12/19/2015	1.04	1.09
52	12/20/2015 - 12/26/2015	1.04	1.09
53	12/27/2015 - 12/31/2015	1.04	1.09

TMC

* Peak Season

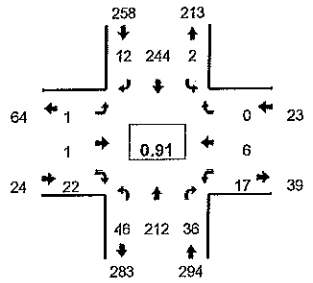
Type of peak hour being reported: Intersection Peak

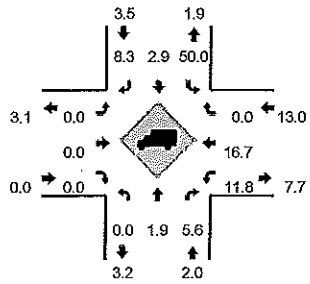
Method for determining peak hour: Total Entering Volume

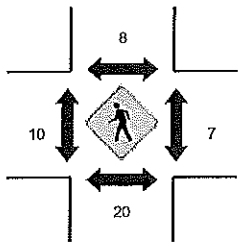
LOCATION: Mandalay Ave -- Bay Esplanade
CITY/STATE: Clearwater, FL

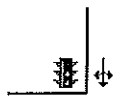
QC JOB #: 13906902
DATE: Wed, Sep 14 2016

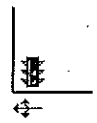
Peak-Hour: 4:15 PM -- 5:15 PM
Peak 15-Min: 5:00 PM -- 5:15 PM

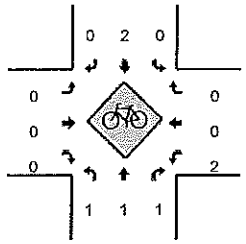


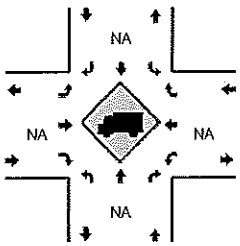


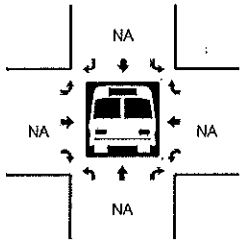






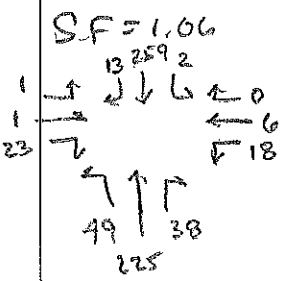






R* = RTOR

15-Min Count Period Beginning At	Mandalay Ave (Northbound)					Mandalay Ave (Southbound)					Bay Esplanade (Eastbound)					Bay Esplanade (Westbound)					Total	Hourly Totals
	Left	Thru	Right	U	R*	Left	Thru	Right	U	R*	Left	Thru	Right	U	R*	Left	Thru	Right	U	R*		
4:00 PM	9	52	8	0	0	0	63	0	0	0	0	0	4	0	4	8	0	0	0	1	149	
4:15 PM	11	59	4	0	1	0	53	2	0	0	0	1	2	0	5	7	1	0	0	0	146	
4:30 PM	9	48	14	0	1	0	67	4	0	0	0	0	1	0	3	3	3	0	0	0	153	
4:45 PM	11	48	5	0	1	1	58	2	0	0	0	0	0	0	6	3	1	0	0	0	136	584
5:00 PM	15	57	10	0	0	1	66	4	0	0	1	0	0	0	5	4	1	0	0	0	164	599
5:15 PM	21	54	7	0	3	2	39	4	0	0	0	0	1	0	6	4	0	0	0	1	142	595
5:30 PM	19	45	8	0	2	0	46	0	0	0	1	0	1	0	5	8	1	0	0	0	136	578
5:45 PM	24	61	6	0	1	3	39	3	0	0	2	0	2	0	10	3	1	0	0	1	156	598



Peak 15-Min Flowrates	Northbound					Southbound					Eastbound					Westbound					Total
	Left	Thru	Right	U	R*	Left	Thru	Right	U	R*	Left	Thru	Right	U	R*	Left	Thru	Right	U	R*	
All Vehicles	60	228	40	0	0	4	264	16	0	0	4	0	0	0	20	16	4	0	0	0	656
Heavy Trucks	0	0	4			4	4	0			0	0	0			8	0	0			20
Pedestrians		20					8					28					16				72
Bicycles	0	1	1			0	1	0			0	0	0			1	0	0			4
Railroad																					
Stopped Buses																					

Comments:

Report generated on 9/20/2016 1:28 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

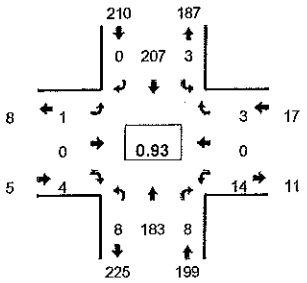
Type of peak hour being reported: Intersection Peak

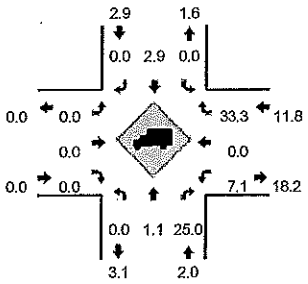
Method for determining peak hour: Total Entering Volume

LOCATION: Mandalay Ave -- Royal Way
CITY/STATE: Clearwater, FL

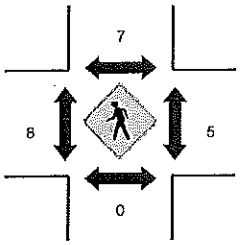
QC JOB #: 13906901
DATE: Wed, Sep 14 2016

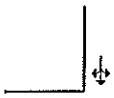
Peak-Hour: 4:15 PM -- 5:15 PM
Peak 15-Min: 4:15 PM -- 4:30 PM

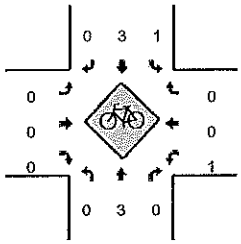


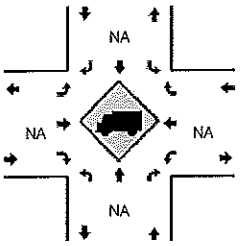


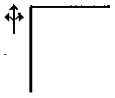
Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES

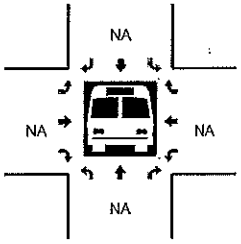








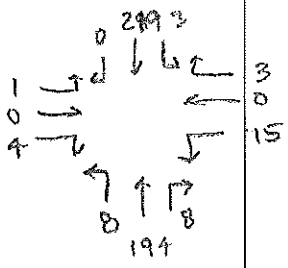




R* = RTOR

15-Min Count Period Beginning At	Mandalay Ave (Northbound)					Mandalay Ave (Southbound)					Royal Way (Eastbound)					Royal Way (Westbound)					Total	Hourly Totals
	Left	Thru	Right	U	R*	Left	Thru	Right	U	R*	Left	Thru	Right	U	R*	Left	Thru	Right	U	R*		
4:00 PM	1	49	1	0	0	1	46	0	0	0	1	0	2	0	0	5	0	0	0	0	106	
4:15 PM	3	59	1	0	0	0	46	0	0	0	1	0	0	0	0	6	0	0	0	0	116	
4:30 PM	0	39	2	0	0	0	55	0	0	0	0	0	2	0	0	2	0	1	0	0	101	
4:45 PM	4	37	3	0	0	0	53	0	0	0	0	0	1	0	0	2	0	1	0	0	101	424
5:00 PM	1	48	2	0	0	3	53	0	0	0	0	0	1	0	0	4	0	1	0	0	113	431
5:15 PM	0	45	2	0	0	0	32	0	0	0	0	0	1	0	0	6	0	0	0	0	86	401
5:30 PM	2	40	4	0	0	1	38	0	0	0	0	0	2	0	0	3	0	1	0	0	91	391
5:45 PM	1	55	3	0	0	0	41	0	0	0	0	0	0	0	0	1	0	1	0	0	102	392

SF = 1.06



Peak 15-Min Flowrates	Northbound					Southbound					Eastbound					Westbound					Total
	Left	Thru	Right	U	R*	Left	Thru	Right	U	R*	Left	Thru	Right	U	R*	Left	Thru	Right	U	R*	
All Vehicles	12	236	4	0	0	0	184	0	0	0	4	0	0	0	0	24	0	0	0	0	464
Heavy Trucks	0	0	0			0	4	0			0	0	0			4	0	0			8
Pedestrians		0					20					8					4				32
Bicycles	0	1	0			0	1	0			0	0	0			1	0	0			3
Railroad																					
Stopped Buses																					

Comments:

Report generated on 9/20/2016 1:28 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Lanes, Volumes, Timings
3: MANDALAY & BAY ESPLANADE

9/22/2016

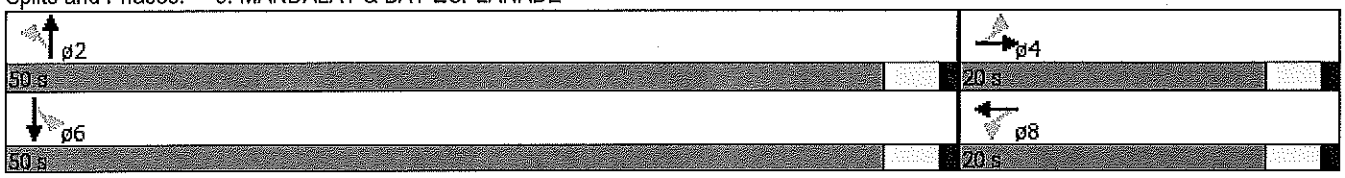
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1	1	23	18	6	0	49	225	38	2	259	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.92			0.96		0.96	0.99			1.00	
Frt		0.875						0.978			0.994	
Flt Protected		0.998			0.964		0.950					
Satd. Flow (prot)	0	1525	0	0	1621	0	1770	1801	0	0	1829	0
Flt Permitted							0.577				0.999	
Satd. Flow (perm)	0	1526	0	0	1611	0	1031	1801	0	0	1827	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		25						26			7	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		434			429			371			489	
Travel Time (s)		9.9			9.8			8.4			11.1	
Confl. Peds. (#/hr)	18		30	27		15	30		27	15		18
Confl. Bikes (#/hr)			2						3			
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	0%	0%	0%	13%	13%	13%	2%	2%	2%	3%	3%	3%
Adj. Flow (vph)	1	1	25	20	7	0	54	247	42	2	285	14
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	27	0	0	27	0	54	289	0	0	301	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	20.0	20.0		20.0	20.0		20.0	20.0		20.0	20.0	
Total Split (s)	20.0	20.0		20.0	20.0		50.0	50.0		50.0	50.0	
Total Split (%)	28.6%	28.6%		28.6%	28.6%		71.4%	71.4%		71.4%	71.4%	
Maximum Green (s)	16.0	16.0		16.0	16.0		46.0	46.0		46.0	46.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	1.0	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	
Total Lost Time (s)		4.0			4.0		4.0	4.0			4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		6.0			6.2		25.3	25.3			25.3	
Actuated g/C Ratio		0.22			0.22		0.91	0.91			0.91	
v/c Ratio		0.08			0.07		0.06	0.18			0.18	
Control Delay		6.2			10.2		2.0	1.8			1.8	
Queue Delay		0.0			0.0		0.0	0.0			0.0	
Total Delay		6.2			10.2		2.0	1.8			1.8	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		A			B		A	A			A	
Approach Delay		6.2			10.2			1.8			1.8	
Approach LOS		A			B			A			A	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 27.8
Natural Cycle: 40
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.18
Intersection Signal Delay: 2.3 Intersection LOS: A
Intersection Capacity Utilization 49.2% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 3: MANDALAY & BAY ESPLANADE



HCS 2010 Two-Way Stop Control Summary Report

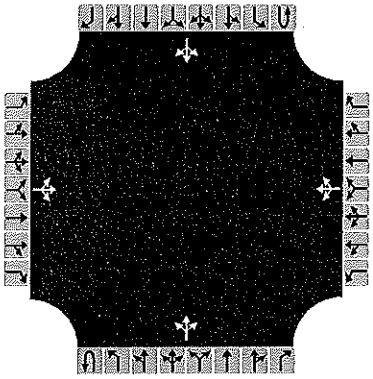
General Information

Analyst	RP
Agency/Co.	GCC
Date Performed	9/22/2016
Analysis Year	2016
Time Analyzed	PM PEAK - EXISTING 2016
Intersection Orientation	North-South
Project Description	PALAZZO HOTEL

Site Information

Intersection	MANDALAY AVE / ROYAL WAY
Jurisdiction	CLEARWATER
East/West Street	ROYAL WAY / GLENDALE ST
North/South Street	MANDALAY AVENUE
Peak Hour Factor	0.93
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		1	0	4		15	0	3		8	194	8		3	219	0
Percent Heavy Vehicles		0	0	0		12	12	12		2				3		
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Undivided															
Median Storage																

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)			5				19			9				3		
Capacity			698				502			1315				1344		
v/c Ratio			0.01				0.04			0.01				0.00		
95% Queue Length			0.0				0.1			0.0				0.0		
Control Delay (s/veh)			10.2				12.5			7.8				7.7		
Level of Service (LOS)			B				B			A				A		
Approach Delay (s/veh)	10.2				12.5				0.4				0.1			
Approach LOS	B				B											

Copyright © 2016 University of Florida. All Rights Reserved.

TABLE 4

Generalized **Peak Hour Two-Way** Volumes for Florida's **Urbanized Areas**[1]

12/18/12

INTERRUPTED FLOW FACILITIES

STATE SIGNALIZED ARTERIALS

Class I (40 mph or higher posted speed limit)

Lanes	Median	B	C	D	E
2	Undivided	*	1,510	1,600	**
4	Divided	*	3,420	3,580	**
6	Divided	*	5,250	5,390	**
8	Divided	*	7,090	7,210	**

Class II (35 mph or slower posted speed limit)

Lanes	Median	B	C	D	E
2	Undivided	*	660	1,330	1,410
4	Divided	*	1,310	2,920	3,040
6	Divided	*	2,090	4,500	4,590
8	Divided	*	2,880	6,060	6,130
90% 2LU			600	1200	
90% 4LD			1180	2630	

Non-State Signalized Roadway Adjustments

(Alter corresponding state volumes by the indicated percent.)

Non-State Signalized Roadways -10%

Median & Turn Lane Adjustments

Lanes	Median	Exclusive Left Lanes	Exclusive Right Lanes	Adjustment Factors
2	Divided	Yes	No	+5%
2	Undivided	No	No	-20%
Multi	Undivided	Yes	No	-5%
Multi	Undivided	No	No	-25%
–	–	–	Yes	+ 5%

One-Way Facility Adjustment

Multiply the corresponding two-directional volumes in this table by 0.6

UNINTERRUPTED FLOW FACILITIES

FREEWAYS

Lanes	B	C	D	E
4	4,120	5,540	6,700	7,190
6	6,130	8,370	10,060	11,100
8	8,230	11,100	13,390	15,010
10	10,330	14,040	16,840	18,930
12	14,450	18,880	22,030	22,860

Freeway Adjustments

Auxiliary Lanes Present in Both Directions	Ramp Metering
+ 1,800	+ 5%

UNINTERRUPTED FLOW HIGHWAYS

Lanes	Median	B	C	D	E
2	Undivided	770	1,530	2,170	2,990
4	Divided	3,300	4,660	5,900	6,530
6	Divided	4,950	6,990	8,840	9,790

Uninterrupted Flow Highway Adjustments

Lanes	Median	Exclusive left lanes	Adjustment factors
2	Divided	Yes	+5%
Multi	Undivided	Yes	-5%
Multi	Undivided	No	-25%

BICYCLE MODE[2]

(Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine two-way maximum service volumes.)

Paved Shoulder/Bicycle Lane Coverage	B	C	D	E
0-49%	*	260	680	1,770
50-84%	190	600	1,770	>1,770
85-100%	830	1,770	>1,770	**

PEDESTRIAN MODE[2]

(Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine two-way maximum service volumes.)

Sidewalk Coverage	B	C	D	E
0-49%	*	*	250	850
50-84%	*	150	780	1,420
85-100%	340	960	1,560	>1,770

BUS MODE (Scheduled Fixed Route)[3]

(Buses in peak hour in peak direction)

Sidewalk Coverage	B	C	D	E
0-84%	> 5	≥ 4	≥ 3	≥ 2
85-100%	> 4	≥ 3	≥ 2	≥ 1

[1] Values shown are presented as peak hour two-way volumes for levels of service and are for the automobile/truck modes unless specifically stated. This table does not constitute a standard and should be used only for general planning applications. The computer models from which this table is derived should be used for more specific planning applications. The table and deriving computer models should not be used for corridor or intersection design, where more refined techniques exist. Calculations are based on planning applications of the Highway Capacity Manual and the Transit Capacity and Quality of Service Manual.

[2] Level of service for the bicycle and pedestrian modes in this table is based on number of motorized vehicles, not number of bicyclists or pedestrians using the facility.

[3] Buses per hour shown are only for the peak hour in the single direction of the higher traffic flow.

* Cannot be achieved using table input value defaults.

** Not applicable for that level of service letter grade. For the automobile mode, volumes greater than level of service D become F because intersection capacities have been reached. For the bicycle mode, the level of service letter grade (including F) is not achievable because there is no maximum vehicle volume threshold using table input value defaults.

Source:
Florida Department of Transportation
Systems Planning Office
www.dot.state.fl.us/planning/systems/sm/los/default.shtm

APPENDIX B

Hotel
(310)

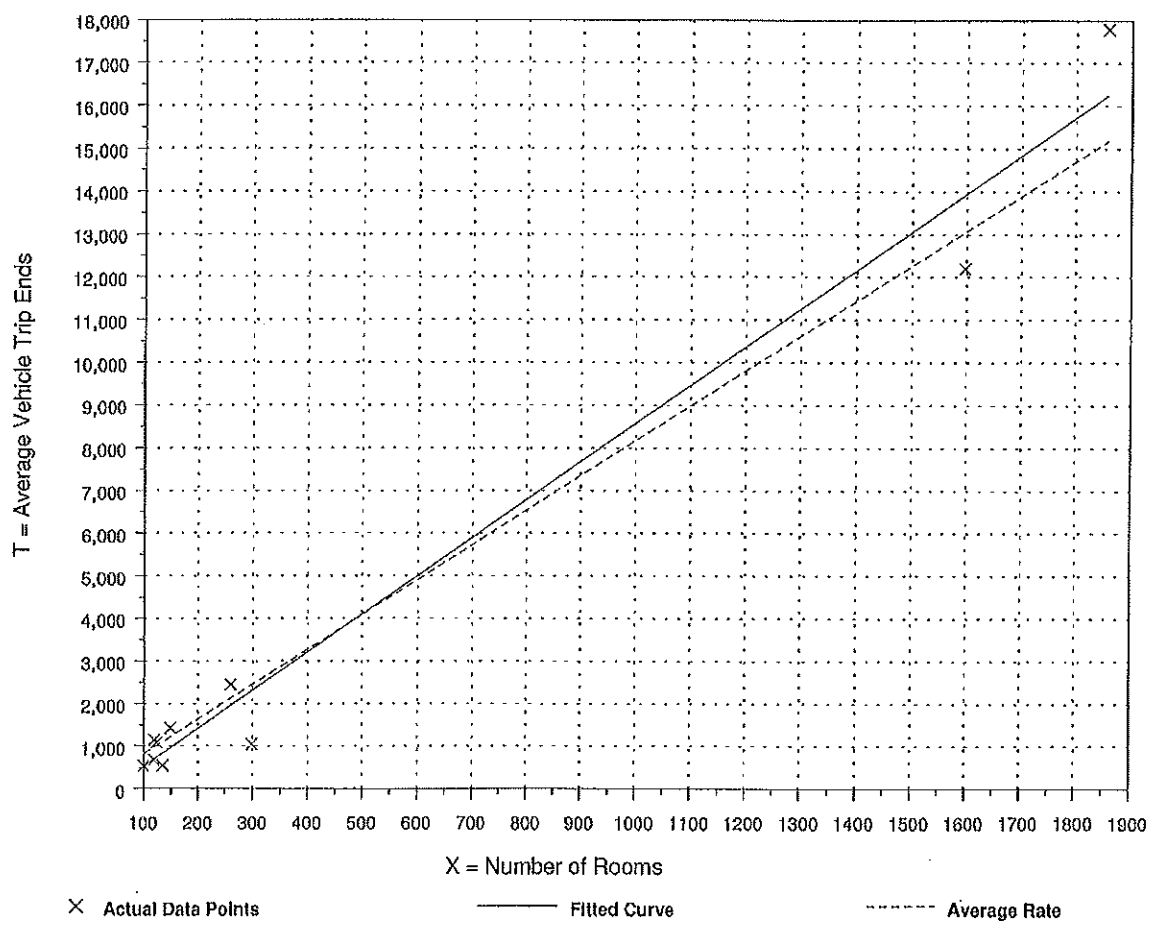
Average Vehicle Trip Ends vs: Rooms
On a: Weekday

Number of Studies: 10
Average Number of Rooms: 476
Directional Distribution: 50% entering, 50% exiting

Trip Generation per Room

Average Rate	Range of Rates	Standard Deviation
8.17	3.47 - 9.58	3.38

Data Plot and Equation



Fitted Curve Equation: T = 8.95(X) - 373.16 $R^2 = 0.98$

Hotel
(310)

MID-DAY

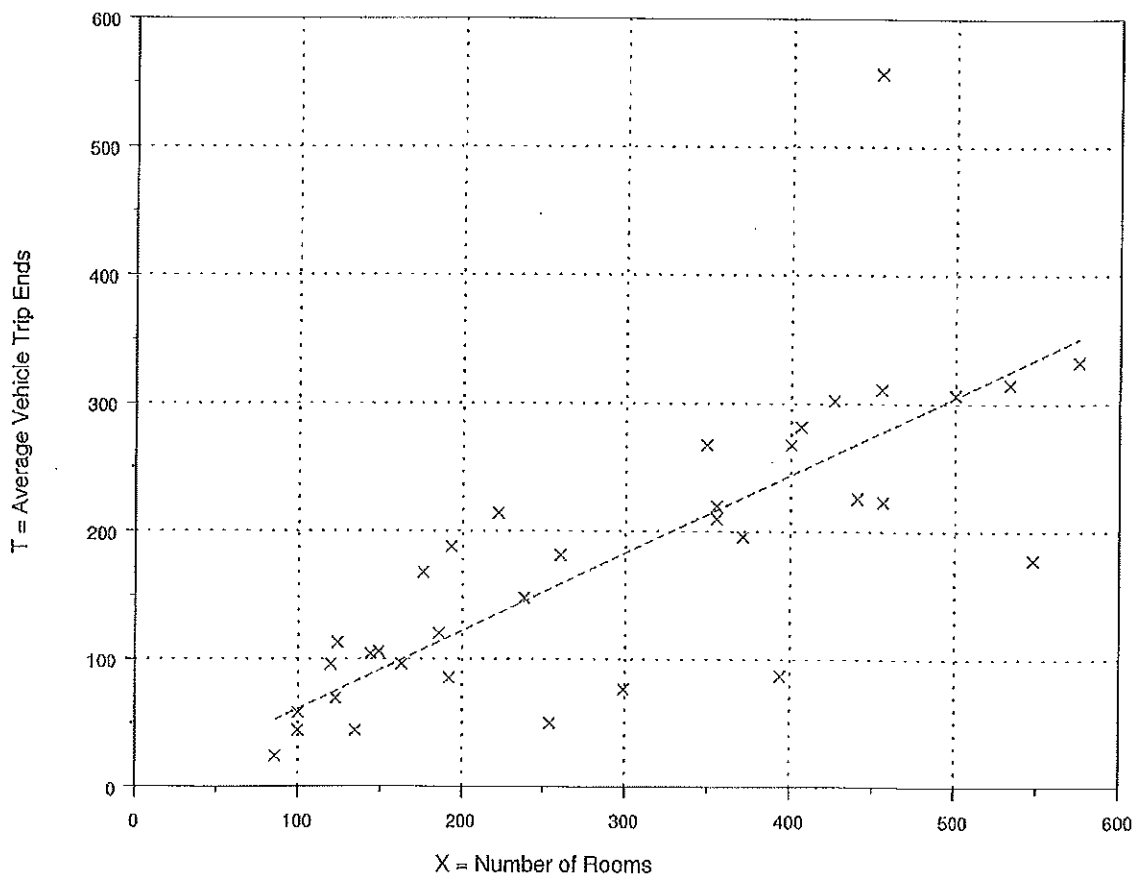
Average Vehicle Trip Ends vs: Rooms
On a: Weekday,
P.M. Peak Hour of Generator

Number of Studies: 35
Average Number of Rooms: 294
Directional Distribution: 58% entering, 42% exiting

Trip Generation per Room

Average Rate	Range of Rates	Standard Deviation
0.61	0.20 - 1.23	0.81

Data Plot and Equation



× Actual Data Points

------ Average Rate

Fitted Curve Equation: Not Given

R^2 = ****

Hotel
(310)

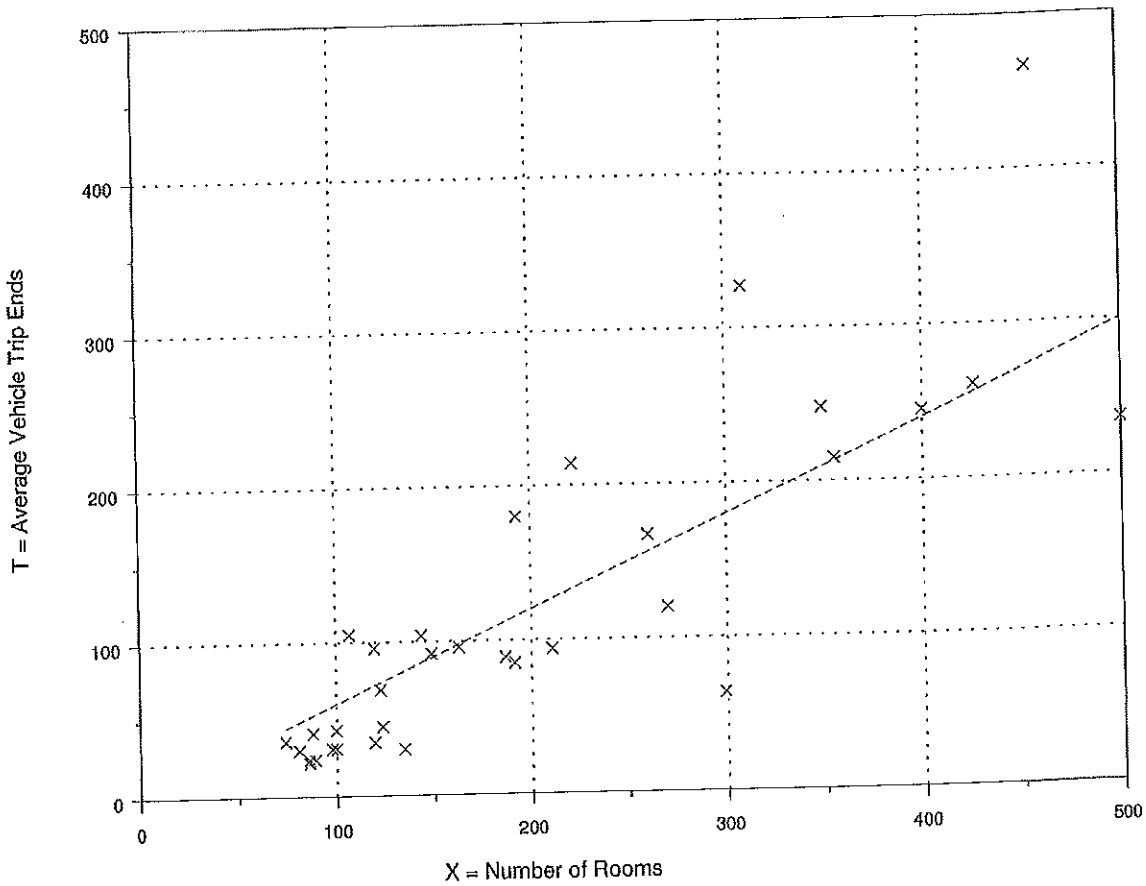
Average Vehicle Trip Ends vs: Rooms
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.

Number of Studies: 33
Average Number of Rooms: 200
Directional Distribution: 51% entering, 49% exiting

Trip Generation per Room

Average Rate	Range of Rates	Standard Deviation
0.60	0.21 - 1.06	0.81

Data Plot and Equation



× Actual Data Points

------ Average Rate

Fitted Curve Equation: Not Given

R^2 = ****

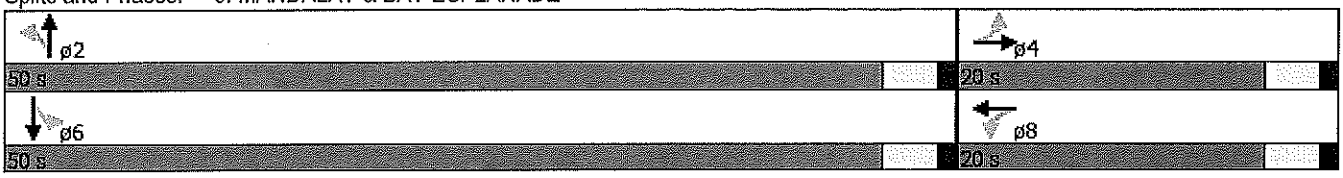
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1	1	23	18	6	0	49	260	38	2	293	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.92			0.96		0.96	0.99			1.00	
Frt		0.875						0.981			0.994	
Flt Protected		0.998			0.964		0.950					
Satd. Flow (prot)	0	1525	0	0	1621	0	1770	1809	0	0	1829	0
Flt Permitted							0.557				0.999	
Satd. Flow (perm)	0	1526	0	0	1611	0	999	1809	0	0	1827	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		25						22			6	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		434			429			371			489	
Travel Time (s)		9.9			9.8			8.4			11.1	
Confl. Peds. (#/hr)	18		30	27		15	30		27	15		18
Confl. Bikes (#/hr)			2						3			
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	0%	0%	0%	13%	13%	13%	2%	2%	2%	3%	3%	3%
Adj. Flow (vph)	1	1	25	20	7	0	54	286	42	2	322	14
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	27	0	0	27	0	54	328	0	0	338	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	20.0	20.0		20.0	20.0		20.0	20.0		20.0	20.0	
Total Split (s)	20.0	20.0		20.0	20.0		50.0	50.0		50.0	50.0	
Total Split (%)	28.6%	28.6%		28.6%	28.6%		71.4%	71.4%		71.4%	71.4%	
Maximum Green (s)	16.0	16.0		16.0	16.0		46.0	46.0		46.0	46.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	1.0	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	
Total Lost Time (s)		4.0			4.0		4.0	4.0			4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		6.0			6.3		26.0	26.0			26.0	
Actuated g/C Ratio		0.21			0.22		0.91	0.91			0.91	
v/c Ratio		0.08			0.08		0.06	0.20			0.20	
Control Delay		6.5			10.7		2.0	1.8			1.9	
Queue Delay		0.0			0.0		0.0	0.0			0.0	
Total Delay		6.5			10.7		2.0	1.8			1.9	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		A			B		A	A			A	
Approach Delay		6.5			10.7			1.8			1.9	
Approach LOS		A			B			A			A	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 28.5
Natural Cycle: 40
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.20
Intersection Signal Delay: 2.3 Intersection LOS: A
Intersection Capacity Utilization 52.8% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 3: MANDALAY & BAY ESPLANADE



HCS 2010 Two-Way Stop Control Summary Report

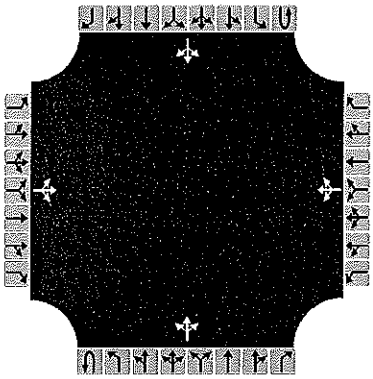
General Information

Analyst	RP
Agency/Co.	GCC
Date Performed	9/22/2016
Analysis Year	2017
Time Analyzed	PM PEAK - FUTURE W/PROJ
Intersection Orientation	North-South
Project Description	PALAZZO HOTEL

Site Information

Intersection	MANDALAY AVE / ROYAL WAY
Jurisdiction	CLEARWATER
East/West Street	ROYAL WAY / GLENDALE ST
North/South Street	MANDALAY AVENUE
Peak Hour Factor	0.93
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		1	0	4		49	0	7		8	194	43		7	219	0
Percent Heavy Vehicles		0	0	0		12	12	12		2				3		
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Undivided															
Median Storage																

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)			5				61			9				8		
Capacity			686				474			1315				1303		
v/c Ratio			0.01				0.13			0.01				0.01		
95% Queue Length			0.0				0.4			0.0				0.0		
Control Delay (s/veh)			10.3				13.7			7.8				7.8		
Level of Service (LOS)			B				B			A				A		
Approach Delay (s/veh)	10.3				13.7				0.3				0.3			
Approach LOS	B				B											

Copyright © 2016 University of Florida. All Rights Reserved.

HCS 2010 Two-Way Stop Control Summary Report

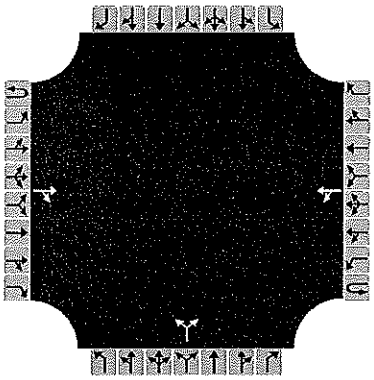
General Information

Analyst	RP
Agency/Co.	GCC
Date Performed	9/22/2016
Analysis Year	2017
Time Analyzed	FUTURE - PM PEAK
Intersection Orientation	East-West
Project Description	FUTURE WITH PROJECT

Site Information

Intersection	BAY ESPLANADE - DRIVE A
Jurisdiction	CLEARWATER
East/West Street	BAY ESPLANADE
North/South Street	DRIVE A
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	0	0
Configuration				TR		LT					LR					
Volume (veh/h)			19	8		0	26			8		0				
Percent Heavy Vehicles						3				3		3				
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Undivided															
Median Storage																

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)						0					9					
Capacity						1574					951					
v/c Ratio						0.00					0.01					
95% Queue Length						0.0					0.0					
Control Delay (s/veh)						7.3					8.8					
Level of Service (LOS)						A					A					
Approach Delay (s/veh)					0.0				8.8							
Approach LOS									A							

Copyright © 2016 University of Florida. All Rights Reserved.