City-Wide Major Traffic Study

Study Report

FINAL REPORT

Prepared for:

CITY OF CORONADO

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TABLE OF CONTENTS

List of Figures

List of Tables

1.0 INTRODUCTION

Roadways within the City of Coronado are experiencing increasing traffic congestion as a result of an overall increase in traffic volumes on the two principal arterial roadways leading into the City. In 1977 the San Diego-Coronado Bridge and Silver Strand had average daily traffic volumes of 33,000 and 20,900 vehicles respectively. By 2002, vehicular volumes at those same locations had increased to 82,500 and 28,200, respectively.

Congestion within the City of Coronado has been exacerbated by the recent bridge toll removal, the home-porting of a third aircraft carrier at Naval Air Station North Island (NASNI), increased base security in the wake of September 11, 2001 terrorist attacks and ever increasing regional cut-through traffic generated by congestion on the Interstate 5 corridor. Additionally, the implementation of semi-diverters at select locations has altered circulation patterns and resulted in different traffic usage on local streets. The changes in the traffic circulation patterns have caused the proliferation of requests for localized traffic control.

The previous piecemeal approach to implementing traffic control within the City has only managed to shift congestion problems between neighborhoods. Due to the seasonal variability of traffic volumes within the City of Coronado, there is little consensus between the City and agencies such as Caltrans and SANDAG as to the actual vehicle volume statistics used for planning purposes. It is the purpose of this study to implement and execute an accurate traffic volume monitoring program, to develop and utilize an evaluation tool for assessing the impact of system improvements on traffic flow within the City, and to devise City-Wide traffic flow solutions and mechanisms to alleviate current and short-term future traffic congestion.

The City of Coronado City-Wide Major Traffic Study provides a comprehensive review of traffic circulation and impacts within the City of Coronado thereby providing the Coronado City Council and City staff with the necessary information to make more informed transportation planning decisions. The approach for this study involves the accomplishment of the following specific study objectives:

- Inventory data that provides an expansive snapshot of existing traffic flow conditions
- Develop a comprehensive database and state-of-the-practice evaluation model to serve as the basis for ongoing monitoring and evaluation of traffic circulation within the City
- Assess the impact of anticipated short-term traffic growth within the City of Coronado
- Evaluate the effectiveness of alternative strategies to mitigate the impacts of this traffic growth
- Recommend appropriate traffic flow improvements to address short-term traffic needs City-wide
- Compliment other ongoing transportation planning activities for the City of Coronado

This study report presents the results and findings of the City-Wide Major Traffic Study. The report is divided into six chapters that deal with the various aspects of the study.

- Chapter 1 provides an introduction to the City-Wide Major Traffic Study and provides this explanation of the various chapters contained in the study report.
- Chapter 2 develops the inventory of existing traffic conditions and evaluates current traffic circulation in the City. Chapter 2 also completes a review of the City of Coronado's current written policy relating to transportation planning leading to recommendations for articulating more concise planning goals.
- Chapter 3 establishes forecasts of short-term traffic conditions within the City of Coronado and provides an evaluation of the impacts of short-term traffic growth within the City.
- Chapter 4 defines the nature of the traffic problem within the City of Coronado and explains alternate policy statements leading to the endorsement of a preferred policy to guide future City transportation investments.
- Chapter 5 evaluates alternative improvement strategies for mitigating the impacts of short-term traffic growth in the City
- Chapter 6 outlines key findings of the study and summarizes recommendations for improvements to address traffic circulation City-wide.

2.0 EXISTING CONDITIONS

This section summarizes the data collection efforts and existing traffic conditions analysis of the Coronado City-Wide Major Traffic Study. Two primary types of data were collected to support the determination of existing conditions; peak hour turning movement volume counts and roadway link volumes counts.

Intersection level of service analysis was performed using the turning movement data for both the AM and PM peak hours. In addition, roadway link volumes were reviewed to determine any apparent general traffic circulation patterns throughout the City of Coronado. The results of each of these efforts are described in this section.

2.1 Data Collection Methodology and Limitations

As a basis for evaluating existing traffic conditions within the City of Coronado, a variety of traffic count data was assembled. Due to the limited availability of existing comprehensive traffic data sources, the majority of the data used as the basis for the analysis was field collected specifically for this purpose.

Two primary types of traffic data were collected to support the City-Wide Major Traffic Study. These data types were:

- Manual peak hour turning movement counts
- Roadway link volume machine counts

In addition, manual roadway link volume counts were collected at specific locations to better assess traffic characteristics at major generators. **Figures 2.1** and **2.2** illustrate the various count locations for the City-Wide Major Traffic Study.

The majority of the traffic counts were collected in July 2003, with a limited number of follow-up counts completed in August 2003. July was selected as the appropriate month for this research, as it is typically one of the months of the year with the highest traffic volumes throughout the state. Anecdotal evidence suggests this is very much the case in the City of Coronado which attracts a considerable number of summer visitors to the numerous tourist oriented facilities, including the beach, Hotel Del Coronado and the Village retail areas. Capturing count volumes under the traditionally highest flow conditions is intended to establish the most conservative base for evaluating traffic flows and constraints within the City of Coronado as part of the City-Wide Major Traffic Study. The counts were not collected during the week of the Independence Day Holiday to minimize the potential for encountering unique or unusual traffic flows and patterns associated with the holiday observance.

The traffic count data was collected (and the subsequent analysis was performed) with semi-diverters in place on A, B and C Avenues at Third Street to prohibit westbound left turn and southbound through movements. The semi-diverters were removed in January 2005 in accordance with a ballot measure approved by City residents in November 2004. Although the removal of the semi-diverters opens previously restricted movements at the intersections, the provision of peak hour turning restrictions and high cross traffic volumes on Third and Fourth Streets effectively limits the ability for significant traffic volumes to utilize these movements. For this reason, the previously collected data and subsequent analysis are considered applicable for the purposes this study.

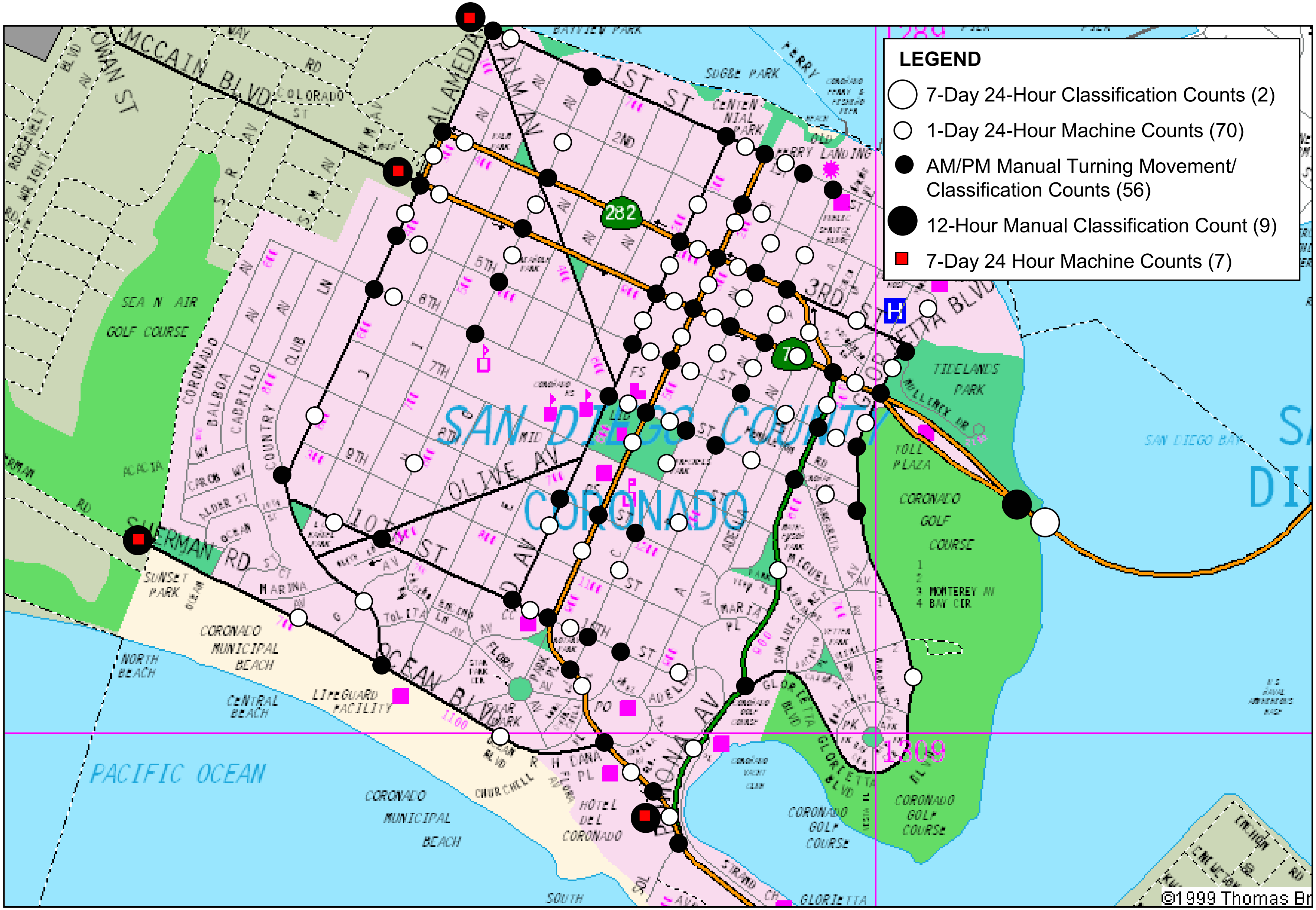


Figure 2.1 City-Wide Major Traffic Study Traffic Count Locations (Village)

Figure 2.2 City-Wide Major Traffic Study Traffic Count Locations (Strand)

2.1.1 Peak Hour Turning Movement Counts Methodology

Peak hour intersection turning movement counts were collected at 56 intersections in the city including all signalized intersections. The peak hour turning movement counts were conducted from 5:30 AM to 7:30 AM to capture the AM peak hour and for two hours between 2:30 PM and 5:00 PM for the PM peak hour. These counts were done at each location using manual observation to physically record the number of vehicles that turn left or right or drive straight through the intersection for each of the intersection approaches. The counts also classified the number of trucks using the intersection by number of axles on the truck. This made it possible to assess truck traffic patterns throughout the city, and to accurately include the percentage of heavy vehicles when performing the intersection analysis.

2.1.2 Roadway Link Volume Counts Methodology

A total of 90 roadway link volume counts were collected at various locations throughout the city. Of these 90 counts, eight were conducted using machines for seven days, 72 were conducted using machines for 24-hours, and ten were conducted manually for 12 hours.

The majority of the 24-hour counts were obtained at locations internal to the city. These counts captured hourly volume data for all vehicle types combined, based on the number of axles crossing a detection tube at each count location for each direction. These counts are intended to provide an indication of the magnitude of traffic at each location, and illustrate the various changes in traffic flow throughout the course of a typical weekday. For this reason, the 24-hour counts were conducted exclusively on Tuesday, Wednesday or Thursday to exclude any atypical influences of weekend traffic conditions.

The remaining link volume counts were generally conducted at either entrances to the city or at entrances to major traffic generators within the city, such as the various military base gates and the Hotel Del Coronado entrance. Counts at these locations generally included a combination of a 7-day hourly count and a 12-hour manual classification count. The combination of counts is intended to provide an overview of the daily and weekly traffic flow patterns at each of these various locations, along with a typical weekday sample of the types of vehicles using each facility. Due to the nature of these count locations (which are typified by slow moving vehicles under congested conditions, particularly during the peak periods) it was not possible to use automated traffic counting equipment to collect classification data for longer durations, and therefore manual observation sampling for a 12-hour period was undertaken to supplement the 7-day duration directional volume counts.

2.1.3 Supplemental Data Sources

In addition to the data collected specifically for the City-Wide Major Traffic Study, two supplemental data sources were utilized to further assess existing traffic conditions. These data sources included:

- Caltrans permanent traffic count stations

- Caltrans District 11 Traffic Census

City of Coronado and Caltrans Traffic Signal Phasing and Timing Plans and City of Coronado traffic observation logs were also utilized to evaluate existing traffic conditions and to assess the context of the various existing traffic evaluation results.

Caltrans permanent traffic count stations located at the Coronado Bridge Toll Plaza and on Silver Strand Boulevard south of Tulagi Road were utilized for this study. Total hourly count data generated at these stations was retrieved by City of Coronado staff for the month of July 2003.

The Caltrans District 11 publication titled *1989 Thru 2001 Traffic Volumes on California Highways in District 11* (referred to as the *Caltrans District 11 Traffic Census*) provides estimated annual average daily traffic (AADT) volumes for various locations on State highways within San Diego County. Data for sample stations along SR-75 in and immediately outside of the City of Coronado were reviewed to assess longer term traffic volume trends.

2.1.4 Data Limitations

The data collected as part of the City-Wide Major Traffic Study is primarily intended to provide a ‘snapshot’ look at existing traffic flow conditions and circulation patterns within the City of Coronado. The data will also be used as the basis for establishing estimates of future traffic volumes to reflect anticipated changes in development and levels of activity at major trip generation points within the City.

Due to the one time snapshot nature of the data being used to support this study, there is limited ability to assess longer term traffic flow trends within the City of Coronado. However, the data collected to support the City-Wide Major Traffic Study establishes a comprehensive data archive that can be used as the basis for the future data collection activities and comparison to determine changing traffic trends.

The utilization of snapshot traffic data to support the evaluation of existing traffic conditions is widely accepted as the state-of-the-practice. Due to the expense and difficulty of collecting and archiving comprehensive transportation data over an extended duration, transportation studies of all types and complexity are often predicated on one-time snapshot data as the basis for evaluating existing conditions and forecasting future conditions. Snapshot data is typically compared to available (and generally limited) historical data sets to validate observation data in the context of broader long term trends. This methodology has been replicated for the City-Wide Major Traffic Study with field collected data being validated against sample data from Caltrans District 11 Traffic Census.

The principal limitation of utilizing snapshot data as the basis for evaluation and forecasting is the inherent variability in traffic flows over time. Many factors can influence traffic flows at a given location from one time period to the next. While some factors may be obvious (e.g. weather, incidents, holidays, special events, etc.), many can be less obvious. These obvious factors along with more subtle, indirect and simply random influences on travel behavior ultimately result in variations in traffic flows that are impossible to predict and are often difficult to explain.

In the mid 1990's, the Federal Highway Administration sponsored a research project to determine the *Variability in Traffic Monitoring Data*. The resulting report, published in August 1997 by the Oak Ridge National Laboratory, determined that the coefficients of variation associated with total daily traffic range up to 22%. In other words, on any given day, 'normal' traffic at a particular location can vary up to 22%.

The coefficient of variation generally has a direct relationship to the overall volume of a facility with higher volume facilities having lower coefficients of variation. The same relationship between volume and coefficient of variation is also true for differing vehicle classes on the same facility with automobiles generally having a lower coefficient of variation than other vehicle classes, including trucks. Research also indicates that weekend days, winter months and holiday periods tend to be larger contributors to traffic count variability than weekdays, summer months and non-holiday periods, respectively.

To minimize variations in traffic counts, data for the City-Wide Major Traffic Study was primarily collected on Tuesdays, Wednesdays and Thursdays in mid-July to reflect the traditionally highest volumes in Coronado and to avoid the influence of weekends, winter weather and holidays (counts were commenced a full week following the Independence Day Holiday to avoid influence). Count data for adjacent count stations was subsequently compared and variations noted. Where variations over 20% were observed between count locations, data were modified to achieve better consistency. Where data adjustments were necessary for existing conditions, lower counts were increased accordingly to ensure the most conservative, worst case conditions were reflected as the basis for evaluation.

A key element of the City-Wide Major Traffic Study is the evaluation of a modified future traffic condition to reflect changes in development and trip generation within the City of Coronado. To help account for any normal variation in traffic flows within the City of Coronado, the traffic forecast for the modified future condition will incorporate a blanket increase in addition to the incremental increase for identified trip generators. The consideration of a blanket traffic increase in this modified scenario reflects the most conservative approach possible as the basis for evaluating Coronado's traffic conditions and identifying potential mitigation needs.

2.2 Existing Traffic Volume Data

Tables 2.1 and **2.2** summarize the existing intersection traffic volumes for the AM and PM peak hour periods, respectively. **Figures 2.3** and **2.4** illustrate the peak hour turning movements at the intersections observed. It should be noted that intersection counts were modified, as described previously, for a limited number of intersections to resolve imbalances in field collected data resulting from variations between data collected on alternate days or during alternate weeks. Data modifications were completed for intersections along Fourth Street east of Orange Avenue and along southbound Orange Avenue between Fourth Street and Tenth Street.

The roadway link volume counts are summarized in **Table 2.3** and **Figures 2.5**, **2.6** and **2.7**. The roadway link volume counts were collected primarily to validate intersection counts, to establish a baseline for future comparison of city-wide traffic flows, and to assess the trip generation characteristics of major traffic generators affecting the City of Coronado.

Table 2.1 AM Peak Hour Intersection Volumes

#	Intersection	Northbound			Southbound			Eastbound			Westbound			Total
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
1	Alameda Blvd & First St	1,122	0	25	0	0	0	0	30	111	9	769	0	2,066
2	Alameda Blvd & Third St	0	0	0	0	120	0	0	0	0	1,348	0	695	2,163
3	Alameda Blvd & Fourth St	460	0	40	76	19	1,377	0	232	48	0	0	0	2,252
4	Alameda Blvd & Fifth St	0	275	6	5	54	0	0	0	0	5	0	206	551
5	Alameda Blvd & Sixth St	2	259	4	4	61	4	23	6	2	3	13	23	404
6	Alameda Blvd & Country Club	3	408	0	0	79	0	0	0	4	0	0	0	494
7	Alameda Blvd & Ocean Blvd	0	0	0	57	0	3	0	47	0	0	457	152	716
8	H Ave & First St	2	0	14	0	0	0	0	38	1	3	659	0	717
9	H Ave & Third St	1	3	0	0	2	3	0	0	0	0	1,978	2	1,989
10	H Ave & Fourth St	0	17	28	13	10	0	0	495	2	0	0	0	565
11	H Ave & Fifth St	1	21	2	0	4	2	1	6	0	4	302	5	348
12	H Ave & Sixth St	4	10	3	1	2	5	9	11	1	2	86	2	136
13	H Ave & Tenth St	2	6	2	8	9	4	11	41	0	4	68	11	166
14	D Ave & First St	5	1	14	8	1	1	0	61	1	1	643	3	739
15	D Ave & Third St	2	11	0	0	33	0	0	0	0	33	1,473	4	1,556
16	D Ave & Fourth St	0	16	17	25	42	0	0	518	2	0	0	0	620
17	D Ave & Fifth St	1	14	4	1	21	0	1	10	0	2	251	1	306
18	D Ave & Sixth St	2	44	20	13	32	4	2	22	6	6	63	1	215
19	D Ave & Eighth St	6	11	25	6	19	0	2	65	1	3	32	1	171
20	D Ave & Tenth St	0	0	0	21	0	2	4	67	0	0	71	13	178
21	Orange Ave & First St	322	0	59	0	0	0	0	5	39	282	302	0	1,009
22	Orange Ave & Second St	50	390	71	3	151	202	3	14	50	97	304	25	1,360
23	Orange Ave & Third St	45	163	0	0	343	8	0	0	0	1,487	1,557	326	3,929
24	Orange Ave & Fourth St	0	200	265	337	1,726	0	20	367	46	0	0	0	2,961
25	Orange Ave & Fifth St	36	464	8	29	1,747	139	5	3	6	3	15	19	2,474
26	Orange Ave & Sixth St	27	459	7	22	1,244	51	20	10	20	4	11	17	1,892
27	Orange Ave & Eighth St	16	480	4	7	1,230	19	43	12	12	8	10	0	1,841
28	Orange Ave & Tenth St	48	427	3	31	1,240	32	26	20	42	8	10	21	1,908
29	Orange Ave & Ocean Blvd	606	466	3	16	1,118	23	16	7	76	5	10	8	2,354
30	Orange Ave & Pomona Ave	0	0	0	80	0	3	0	1,266	0	0	907	487	2,743
31	C Ave & First St	93	0	3	0	2	2	1	27	38	6	554	0	726
32	C Ave & Third St	3	0	0	0	0	7	0	0	0	0	3,364	4	3,378
33	C Ave & Fourth St	0	2	14	8	3	0	1	1,178	3	0	0	0	1,209
34	C Ave & Sixth St	10	13	10	4	10	1	6	41	6	3	20	3	127
35	C Ave & Eighth St	3	9	3	2	22	5	4	25	0	2	21	0	96
36	C Ave & Tenth St	4	15	5	7	13	8	3	54	5	4	32	2	152
37	C Ave & Orange Ave	0	0	0	9	0	9	23	1,136	0	1	472	11	1,661
38	B Ave & First St	77	1	0	1	2	1	8	17	13	14	478	4	616
39	B Ave & Third St	1	1	0	0	0	12	0	0	0	0	3,220	5	3,239
40	B Ave & Fourth St	0	3	18	9	4	0	5	1,200	3	0	0	0	1,242
41	B Ave & Fifth St	2	27	1	5	2	0	4	27	5	0	24	2	99
42	B Ave & Sixth St	4	18	3	6	8	5	8	30	3	0	25	3	113
43	B Ave & Tenth St	11	12	15	2	11	3	1	48	13	6	25	1	148
44	Pomona Ave & Fourth St	0	0	219	0	0	0	0	1,247	93	0	3,359	0	4,918
45	Pomona Ave & Fifth St	2	292	184	2	82	5	0	21	19	1	7	1	616
46	Pomona Ave & Sixth St	9	504	40	14	90	2	5	43	6	7	24	10	754
47	Pomona Ave & Glorietta Blvd	0	0	0	0	0	123	435	153	0	0	25	2	738
48	Glorietta Blvd & Third St	83	642	8	2	2	7	0	0	4	2	0	4	754
49	Glorietta Blvd & Fourth St	0	0	488	0	0	52	0	1,515	48	0	3,314	733	6,150
50	Glorietta Blvd & Fifth St	4	204	0	0	55	6	234	0	13	0	0	0	516
51	Glorietta Blvd & Sixth St	9	149	0	0	61	5	59	0	16	0	0	0	299
52	Glorietta Blvd & Orange Ave	0	0	0	1	0	9	7	1,283	0	0	894	6	2,200
53	Silver Strand & De Las Arenas Ave	25	1,526	19	46	1,138	15	55	5	7	10	1	20	2,867
54	Silver Strand & Rendova Dr.	0	1,575	1	327	1,413	0	0	0	0	2	0	10	3,328
55	Silver Strand & Tarawa Rd	202	1,533	5	485	281	330	18	28	3	24	65	156	3,130
56	Silver Strand & Tulagi Rd	0	1,880	725	0	284	0	0	0	0	20	0	3	2,912

Data collected July 2003 through August 2003

Table 2.2 PM Peak Hour Intersection Volumes

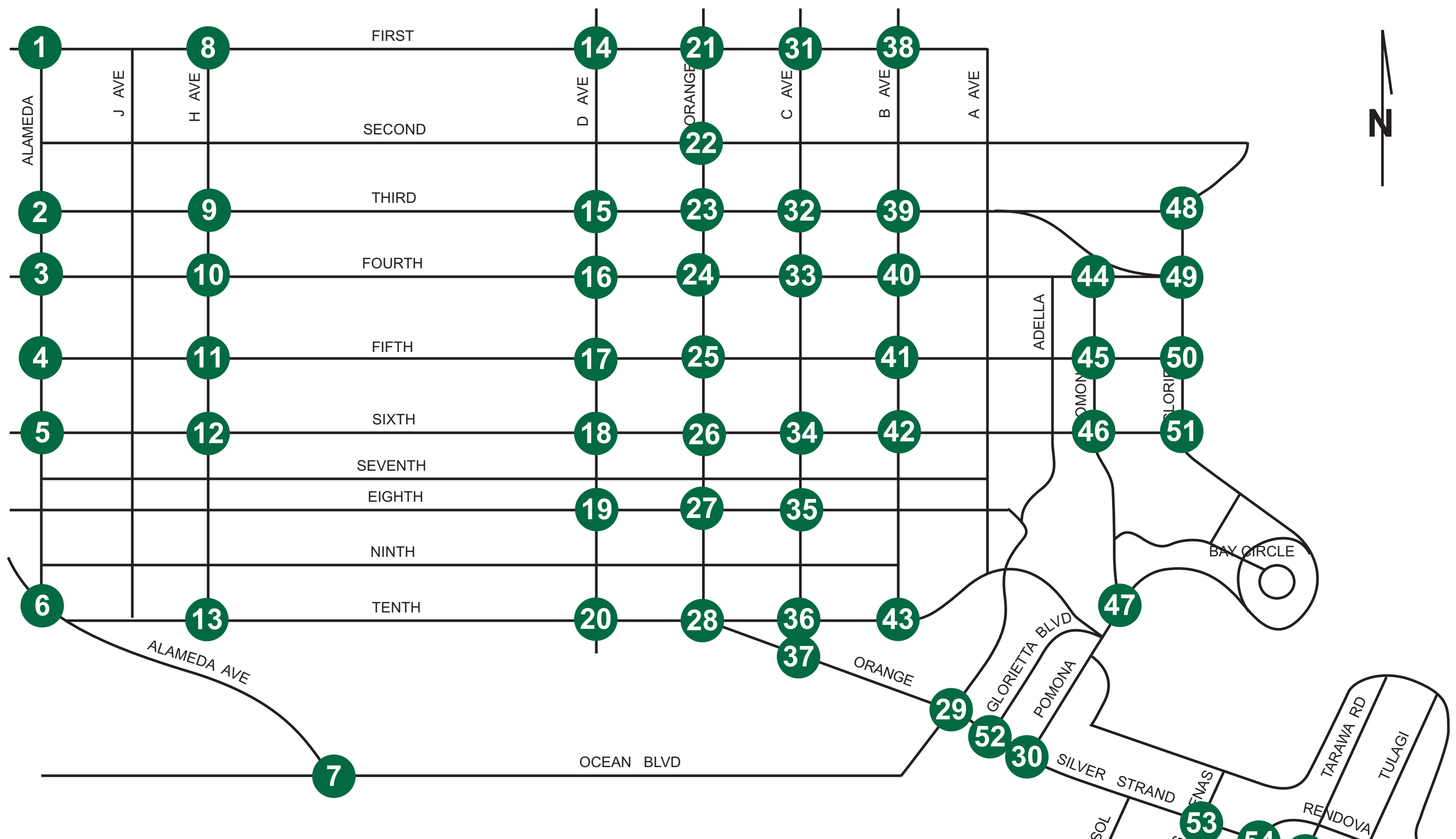
#	Intersection	Northbound			Southbound			Eastbound			Westbound			Total
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
1	Alameda Blvd & First St	100	0	9	0	0	0	0	476	531	16	136	0	1,268
2	Alameda Blvd & Third St	0	0	0	0	503	0	0	0	0	685	0	56	1,244
3	Alameda Blvd & Fourth St	161	0	75	382	225	581	0	1,237	705	0	0	0	3,366
4	Alameda Blvd & Fifth St	0	197	26	405	492	0	0	0	0	47	0	19	1,186
5	Alameda Blvd & Sixth St	8	151	16	79	435	43	16	26	1	13	17	11	816
6	Alameda Blvd & Country Club	3	127	0	0	427	0	1	0	0	0	0	0	558
7	Alameda Blvd & Ocean Blvd	0	0	0	313	0	6	4	556	0	0	144	88	1,111
8	H Ave & First St	5	0	11	0	0	0	0	504	12	8	225	0	765
9	H Ave & Third St	0	24	0	0	22	7	0	0	0	23	749	13	838
10	H Ave & Fourth St	0	15	12	12	20	0	2	1,860	11	0	0	0	1,932
11	H Ave & Fifth St	5	20	10	5	29	1	11	362	18	14	36	4	515
12	H Ave & Sixth St	6	20	13	7	43	18	7	112	3	22	42	2	295
13	H Ave & Tenth St	5	21	7	21	20	10	14	107	3	4	88	12	312
14	D Ave & First St	2	2	16	10	3	1	1	518	9	41	268	14	885
15	D Ave & Third St	10	53	0	0	142	0	0	0	0	26	921	16	1,168
16	D Ave & Fourth St	0	62	86	68	109	0	2	1,870	4	0	0	0	2,201
17	D Ave & Fifth St	3	85	6	14	96	7	71	351	31	8	45	21	738
18	D Ave & Sixth St	7	111	55	68	93	7	8	154	25	42	46	8	624
19	D Ave & Eighth St	12	66	72	36	128	12	3	135	26	9	34	6	539
20	D Ave & Tenth St	0	0	0	96	0	30	21	190	0	0	90	50	477
21	Orange Ave & First St	109	0	126	0	0	0	0	138	414	183	160	0	1,130
22	Orange Ave & Second St	35	239	150	7	556	43	11	42	42	164	98	40	1,427
23	Orange Ave & Third St	74	394	0	0	750	8	0	0	0	1,294	847	96	3,463
24	Orange Ave & Fourth St	0	449	447	813	1,270	0	19	1,965	44	0	0	0	5,007
25	Orange Ave & Fifth St	15	846	43	70	1,278	31	10	189	55	7	23	21	2,588
26	Orange Ave & Sixth St	37	783	37	51	1,334	27	58	112	81	10	20	17	2,567
27	Orange Ave & Eighth St	83	758	19	39	1,201	61	64	97	48	12	36	16	2,434
28	Orange Ave & Tenth St	58	714	21	79	1,261	38	58	106	108	23	50	45	2,561
29	Orange Ave & Ocean Blvd	197	727	24	67	1,264	43	103	102	741	40	11	24	3,343
30	Orange Ave & Pomona Ave	0	0	0	166	0	23	1	1,690	0	0	735	585	3,200
31	C Ave & First St	35	1	18	3	0	3	4	226	35	9	268	9	611
32	C Ave & Third St	2	1	0	0	0	23	0	0	0	2	2,190	21	2,239
33	C Ave & Fourth St	0	3	21	5	3	0	2	3,275	11	0	0	0	3,320
34	C Ave & Sixth St	13	45	11	5	27	1	21	187	29	6	41	4	390
35	C Ave & Eighth St	18	59	4	4	37	12	14	90	22	2	44	4	310
36	C Ave & Tenth St	17	46	26	23	32	23	25	192	33	19	93	20	549
37	C Ave & Orange Ave	0	0	0	29	0	8	77	1,216	0	0	784	49	2,163
38	B Ave & First St	38	7	12	4	4	15	19	209	36	3	240	11	598
39	B Ave & Third St	3	4	0	0	0	46	0	0	0	2	2,185	27	2,267
40	B Ave & Fourth St	0	3	21	4	3	0	6	3,281	7	0	0	0	3,325
41	B Ave & Fifth St	9	63	13	6	14	6	24	162	66	2	28	13	406
42	B Ave & Sixth St	9	72	6	1	32	9	24	179	5	2	33	3	375
43	B Ave & Tenth St	56	66	40	10	47	7	12	111	91	11	66	4	521
44	Pomona Ave & Fourth St	0	0	210	0	0	0	0	3,338	68	0	2,239	0	5,855
45	Pomona Ave & Fifth St	9	193	257	2	124	7	9	125	26	4	10	0	766
46	Pomona Ave & Sixth St	14	441	160	19	135	1	11	120	27	3	5	5	941
47	Pomona Ave & Glorietta Blvd	0	0	0	5	0	153	580	368	0	0	52	4	1,162
48	Glorietta Blvd & Third St	73	179	26	22	29	23	11	5	12	15	12	15	422
49	Glorietta Blvd & Fourth St	0	0	1,436	0	0	74	0	3,518	30	0	2,220	189	7,467
50	Glorietta Blvd & Fifth St	6	691	0	0	25	8	440	0	11	0	0	0	1181
51	Glorietta Blvd & Sixth St	13	390	0	0	33	3	318	0	8	0	0	0	765
52	Glorietta Blvd & Orange Ave	0	0	0	5	0	11	38	1,669	0	0	702	39	2,464
53	Silver Strand & De Las Arenas Ave	28	1,064	46	55	1,678	125	126	22	44	40	7	17	3,252
54	Silver Strand & Rendova Dr.	0	1,179	0	0	1,762	0	30	0	23	9	0	257	3,260
55	Silver Strand & Tarawa Rd	40	750	6	168	1,768	52	217	56	168	23	72	343	3,663
56	Silver Strand & Tulagi Rd	0	760	60	0	1,746	0	0	0	0	290	0	5	2,861

Data collected July 2003 through August 2003

CORONADO CITYWIDE TRAFFIC STUDY

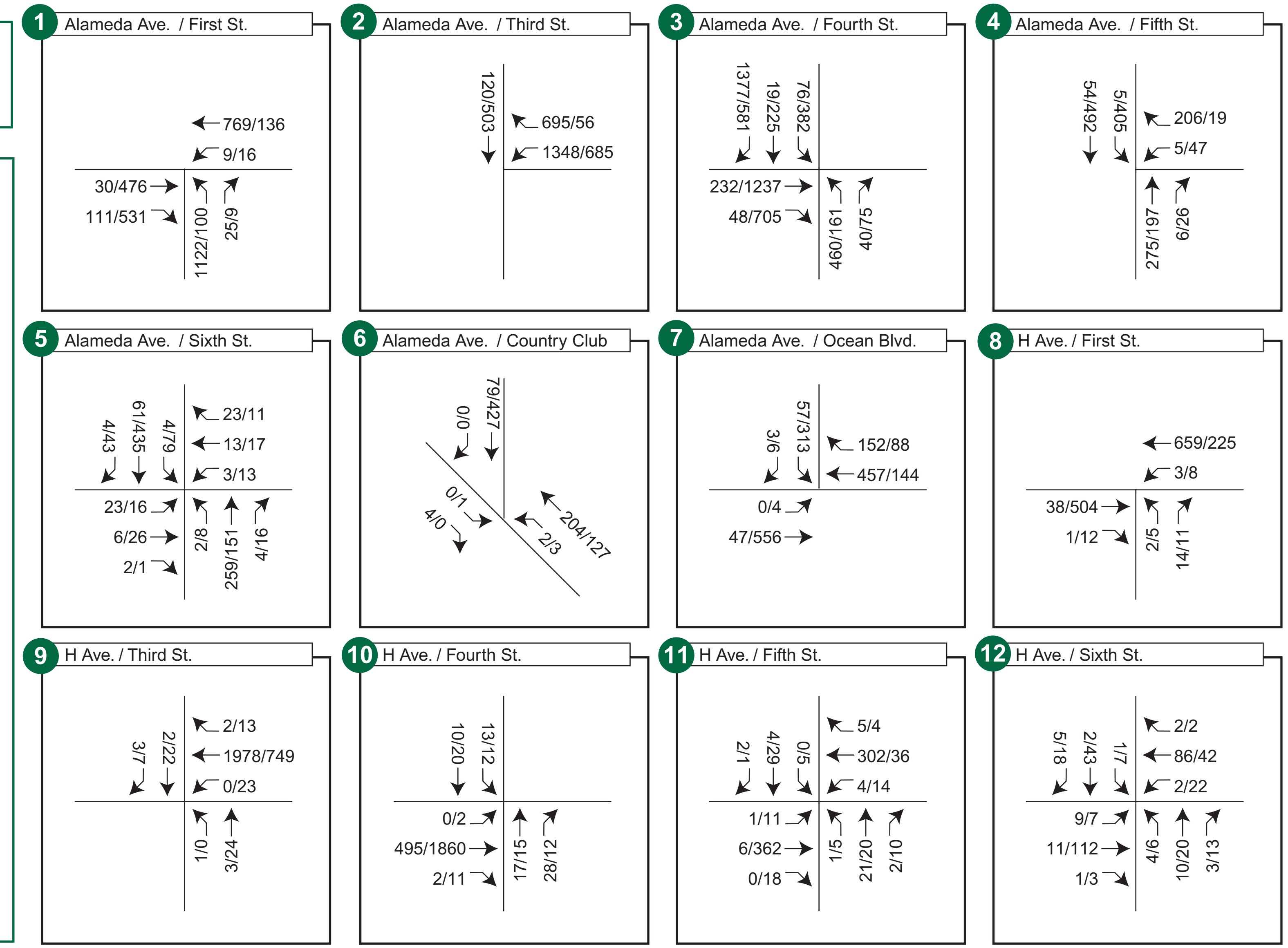
Peak Hour Turning Movement Volumes Pt. 1

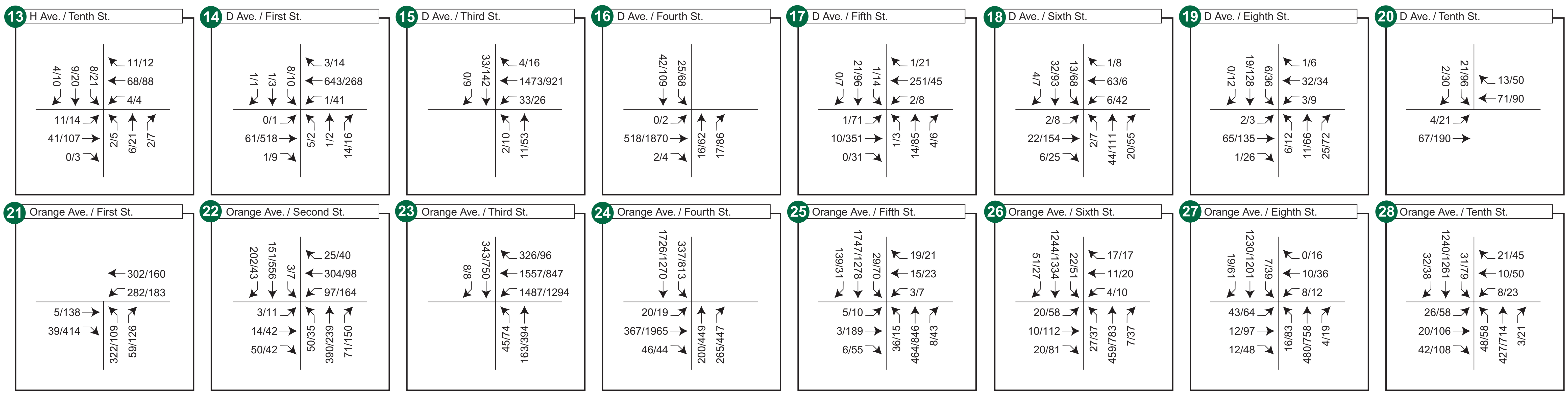
FIGURE 2.3



Note: Counts taken July 2003

 # - AM/PM





CORONADO CITYWIDE TRAFFIC STUDY

Peak Hour Turning Movement Volumes Pt. 2

FIGURE 2.4

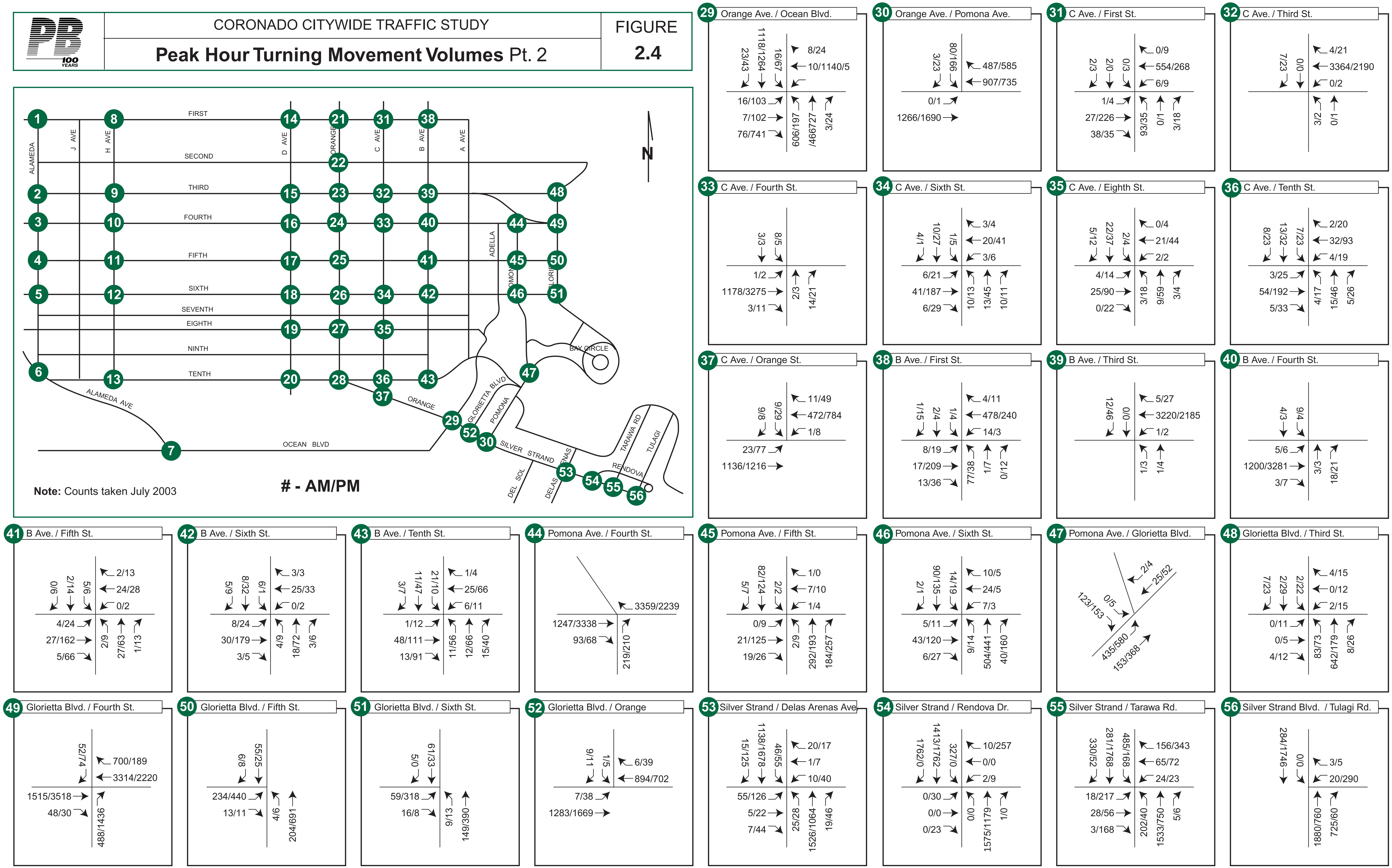


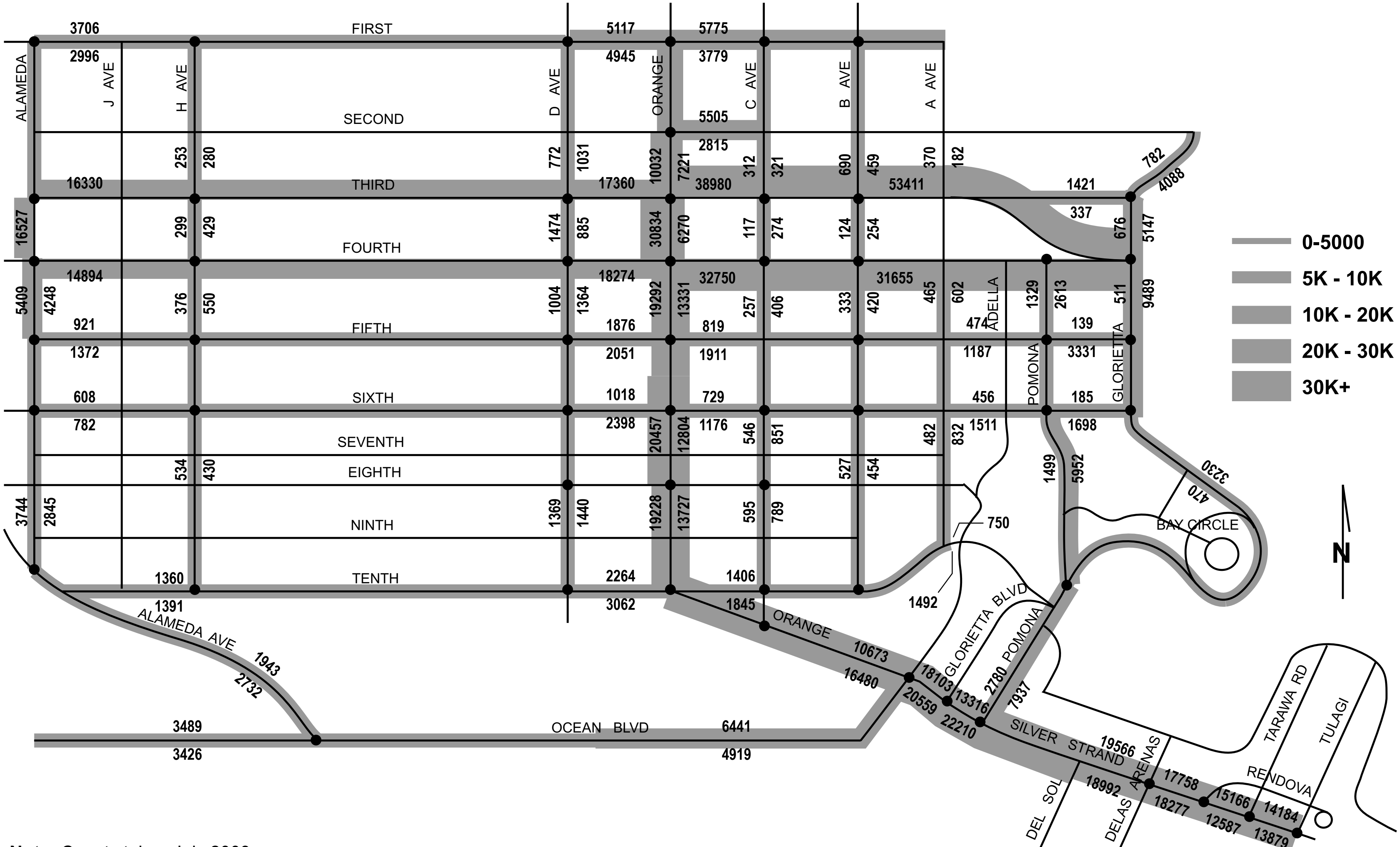
Table 2.3 Roadway Link ADT and Peak Hour Volumes

Street	Location	ADT	AM Peak			PM Peak		
			Hour	Direction	Volume	Hour	Direction	Volume
A	b/ 4th and 5th	1,067	7:00 AM	NB	39	2:00 PM	SB	107
A	b/ 6th and 7th	1,314	8:00 AM	NB	57	5:00 PM	NB	89
A	b/ Glorietta and 3rd	552	8:00 AM	SB	20	2:00 PM	SB	51
Alameda	b/ 3rd and 4th	16,527	5:00 AM	SB	1,337	2:00 PM	SB	1,105
Alameda	b/ 4th and 5th	9,657	6:00 AM	NB	505	2:00 PM	SB	851
Alameda	b/ 8th and 9th	6,589	7:00 AM	NB	221	3:00 PM	SB	460
Alameda	b/ G and Tolita	4,675	6:00 AM	WB (NB)	164	3:00 PM	EB (SB)	317
B	b/ 2nd and 3rd	1,149	11:00 AM	SB	45	4:00 PM	SB	73
B	b/ 3rd and 4th	378	10:00 AM	NB	19	1:00 PM	NB	36
B	b/ 4th and 5th	753	10:00 AM	NB	30	2:00 PM	NB	44
B	b/ 7th and 8th	981	8:00 AM	SB	51	5:00 PM	SB	63
C	b/ 2nd and 3rd	633	8:00 AM	NB	26	12:00 PM	SB	37
C	b/ 3rd and 4th	391	9:00 AM	NB	25	2:00 PM	NB	24
C	b/ 4th and 5th	663	9:00 AM	NB	52	11:00 AM	NB	74
C	b/ 6th and 7th	1,397	7:00 AM	NB	46	4:00 PM	NB	107
C	b/ 8th and 9th	1,384	9:00 AM	NB	38	5:00 PM	NB	94
D	b/ 2nd and 3rd	1,803	8:00 AM	NB	50	3:00 PM	SB	146
D	b/ 3rd and 4th	2,359	8:00 AM	NB	93	3:00 PM	SB	179
D	b/ 4th and 5th	2,368	10:00 AM	NB	92	2:00 PM	NB	156
D	b/ 8th and 9th	2,809	7:00 AM	NB	55	3:00 PM	SB	168
Fifth	b/ A and Adella	1,661	8:00 AM	EB	49	3:00 PM	EB	222
Fifth	b/ Alameda and J	2,293	6:00 AM	WB	241	2:00 PM	EB	424
Fifth	b/ D and Orange	3,927	6:00 AM	WB	232	3:00 PM	EB	397
Fifth	b/ Orange and C	2,730	9:00 AM	EB	100	3:00 PM	EB	278
Fifth	b/ Pomona and Glorietta	3,470	7:00 AM	EB	222	3:00 PM	EB	392
First	b/ Alameda and J	6,702	6:00 AM	WB	726	3:00 PM	EB	613
First	b/ D and Orange	10,062	6:00 AM	WB	646	2:00 PM	EB	620
First	b/ Orange and C	9,554	6:00 AM	WB	681	1:00 PM	W	418
Fourth	b/ Alameda and J	14,894	11:00 AM	EB	902	3:00 PM	EB	1,765
Fourth	b/ D and Orange	18,274	9:00 AM	EB	1,294	3:00 PM	EB	1,974
Fourth	b/ Orange and C	32,750	11:00 AM	EB	1,899	2:00 PM	EB	3,001
Glorietta	b/ 2nd and 3rd	4,870	5:00 AM	NB	572	4:00 PM	NB	257
Glorietta	b/ 4th and 5th	10,000	7:00 AM	NB	524	3:00 PM	NB	1,346
Glorietta	b/ Mullinix and 4th	5,823	6:00 AM	NB	630	4:00 PM	NB	300
Glorietta	b/ Visalia and Monterey	3,700	8:00 AM	NB	177	2:00 PM	NB	386
H	b/ 2nd and 3rd	533	8:00 AM	NB	21	12:00 PM	SB	37
H	b/ 4th and 5th	926	8:00 AM	NB	51	1:00 PM	NB	44
H	b/ 7th and 8th	964	7:00 AM	SB	44	4:00 PM	SB	53
H	b/ Palm and 4th	728	6:00 AM	NB	33	3:00 PM	NB	48
Ocean	b/ Flora and Loma	11,360	6:00 AM	NB (EB)	579	3:00 PM	SB (WB)	804
Ocean	b/ Marina and G	6,915	6:00 AM	WB	479	3:00 PM	EB	516
Orange	b/ 2nd and 3rd	17,253	6:00 AM	NB	641	5:00 PM	SB	817
Orange	b/ 3rd and 4th	37,104	6:00 AM	SB	2,028	5:00 PM	SB	2,197
Orange	b/ 4th and 5th	32,623	6:00 AM	SB	1,586	11:00 AM	SB	1,410
Orange	b/ 6th and 7th	33,261	6:00 AM	SB	1,273	5:00 PM	SB	1,539
Orange	b/ 8th and 9th	32,955	6:00 AM	SB	1,192	5:00 PM	SB	1,337
Orange	b/ Adella and Glorietta	38,662	5:00 AM	WB (NB)	1,317	3:00 PM	EB (SB)	1,890
Orange	b/ Glorietta and Pomona	35,526	11:00 AM	EB (SB)	1,649	4:00 PM	EB (SB)	1,794
Orange	b/ Loma and C	27,153	7:00 AM	SB	1,331	4:00 PM	SB	1,534

Table 2.3 Roadway Link ADT and Peak Hour Volumes (continued)

Street	Location	ADT	AM Peak			PM Peak		
			Hour	Direction	Volume	Hour	Direction	Volume
Pomona	b/ 4th and 5th	3,942	7:00 AM	NB	255	3:00 PM	NB	201
Pomona	b/ 7th and 8th	7,451	7:00 AM	NB	569	4:00 PM	NB	574
Pomona	b/ Glorietta and s/o Ynez	10,717	7:00 AM	NB	583	3:00 PM	NB	722
Second	b/ Orange and C	8,320	6:00 AM	WB	551	5:00 PM	WB	413
Sixth	b/ A and Adella	1,967	10:00 AM	EB	102	2:00 PM	EB	208
Sixth	b/ Alameda and J	1,390	6:00 AM	WB	51	3:00 PM	EB	112
Sixth	b/ D and Orange	3,416	6:00 AM	WB	101	3:00 PM	EB	269
Sixth	b/ Orange and C	1,905	7:00 AM	EB	61	3:00 PM	EB	194
Sixth	b/ Pomona and Glorietta	1,883	11:00 AM	EB	88	3:00 PM	EB	352
SR-75	b/ A and B	67,066	6:00 AM	WB	3,159	2:00 PM	EB	3,013
Silver Strand	b/ Delas Arenas and Lunar	36,035	7:00 AM	NB	1,491	4:00 PM	SB	1,794
Silver Strand	b/ Del Sol and Delas Arenas	38,558	7:00 AM	NB	1,414	3:00 PM	SB	1,587
Silver Strand	n/ Tarawa	27,753	6:00 AM	NB	1,590	4:00 PM	SB	1,843
Silver Strand	n/ Tulagi	28,063	6:00 AM	NB	1,616	4:00 PM	SB	1,718
Tenth	b/ A and Adella	2,242	9:00 AM	EB	99	3:00 PM	EB	140
Tenth	b/ D and Orange	5,326	9:00 AM	EB	214	4:00 PM	EB	279
Tenth	b/ J and I	2,751	7:00 AM	WB	161	2:00 PM	EB	117
Tenth	b/ Orange and C	3,251	9:00 AM	EB	124	3:00 PM	EB	218
Third	b/ Alameda and J	16,330	5:00 AM	WB	2,019	1:00 PM	WB	909
Third	b/ D and Orange	17,360	6:00 AM	WB	1,600	1:00 PM	WB	1,146
Third	b/ El Chico and Solidad	1,758	7:00 AM	WB	107	2:00 PM	WB	117
Third	b/ Orange and C	38,980	6:00 AM	WB	3,288	1:00 PM	WB	2,333

Data collected July 2003 through August 2003



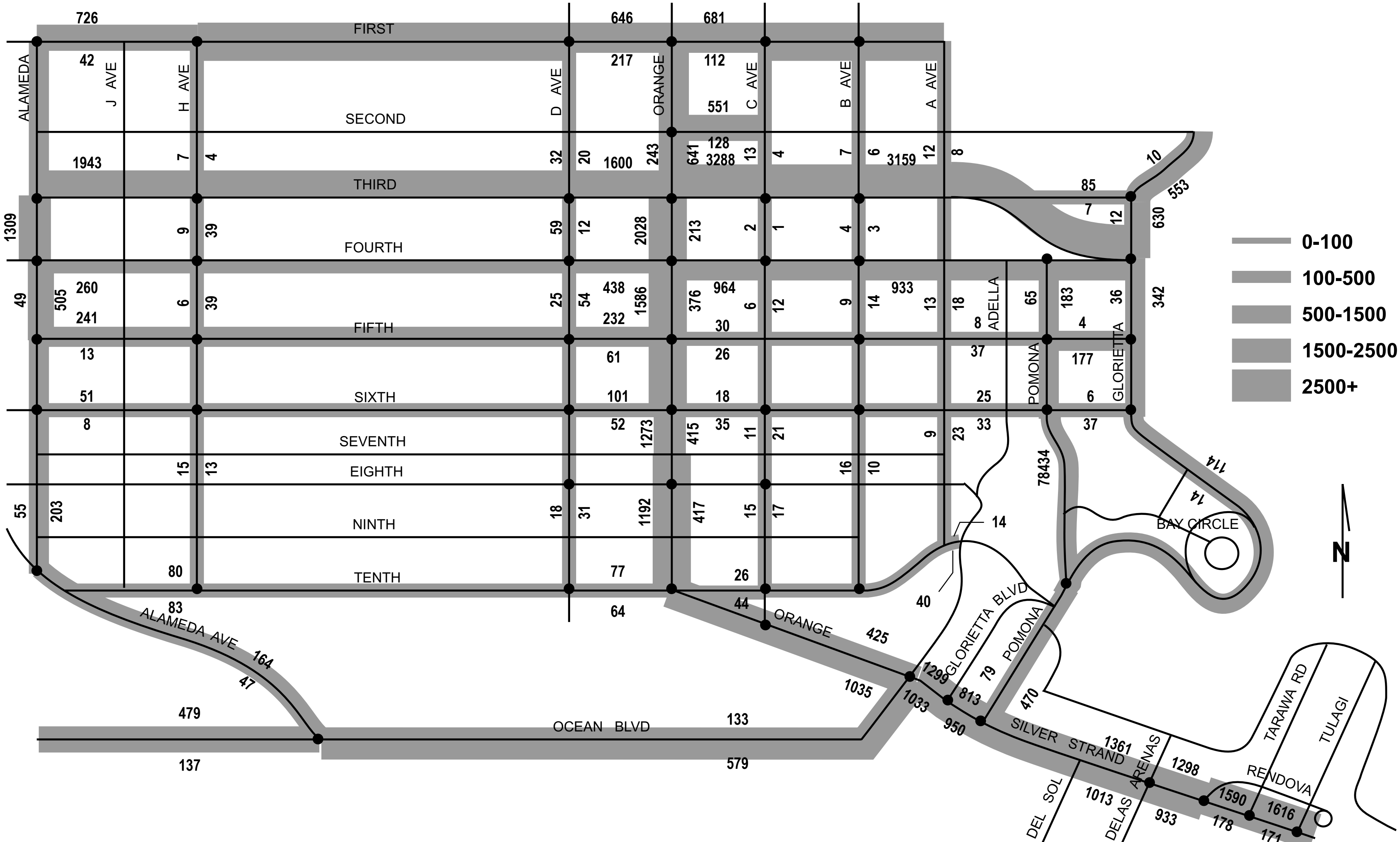
Note: Counts taken July 2003

CORONADO CITYWIDE TRAFFIC STUDY

FIGURE
2.5

Roadway Link Total Daily Traffic Volumes

PB 100 YEARS

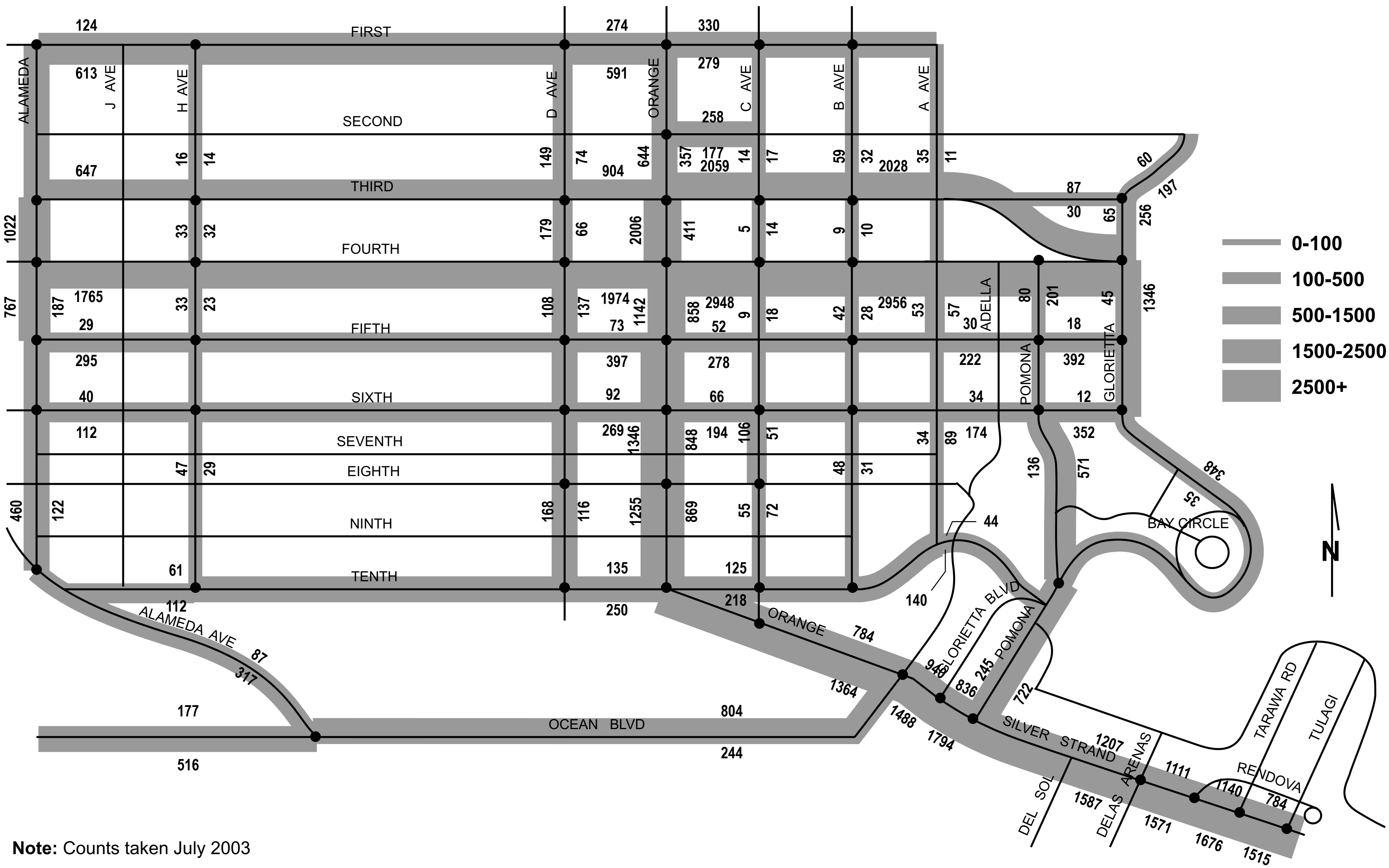


Note: Counts taken July 2003

CORONADO CITYWIDE TRAFFIC STUDY

Roadway Link AM Peak Hour Volumes (6:00AM to 7:00AM)

FIGURE
2.6



Note: Counts taken July 2003

CORONADO CITYWIDE TRAFFIC STUDY

Roadway Link PM Peak Hour Volumes (3:00PM to 4:00PM)

FIGURE
2.7

2.3 Existing Intersection Traffic Analysis

The intersection traffic analysis of the AM and PM peak hours was performed using the existing turning movement counts and Synchro© traffic analysis software developed by Trafficware. Intersections were analyzed using the *Highway Capacity Manual* (HCM) methodologies. The HCM is published by the Transportation Research Board and is widely used in traffic analysis. Intersection level of service (LOS) is a letter grade designation that represents how well an intersection or specific intersection movement operates and is determine by average vehicle delay. A summary of the level of service grade designations and the associated range of delays is shown in **Table 2.4**.

Table 2.4 Level of Service Descriptions

LOS	Signalized Delay (seconds/vehicle)	Unsignalized Delay (seconds/vehicle)	Description
A	≤10	≤10	Free-Flowing
B	>10 and ≤20	>10 and ≤15	Minimal Delays
C	>20 and ≤35	>15 and ≤25	Acceptable Delays
D	>35 and ≤55	>25 and ≤35	Tolerable Delays
E	>55 and ≤80	>35 and ≤50	Significant Delays
F	>80	>50	Excessive Delays

Source: Highway Capacity Manual, *Transportation Research Board, 2000.*

As a basis for determining LOS, average vehicle delay provides a measure of the average delay in seconds that each vehicle using a particular intersection (or approach to an intersection) experiences as a result of the traffic control provided at that location. Delay is the measure of time difference between the actual time it takes for a vehicle to move through an intersection and the time it would take if the vehicle could pass freely through the intersection. In other words, the delay for each vehicle is the aggregate of any time the vehicle must stop or slow for an amber or red traffic light, a yield or stop sign, to yield to other traffic in the intersection or simply to queue behind other traffic stopped for the same purpose. LOS is then determined based on the average of the delay experienced by all vehicles using the intersection (or on a particular approach to the intersection).

Three different types of intersection control exist among the 56 study intersections within the City of Coronado. The most common type is the two-way stop controlled intersection. These intersections have no control on one street, typically the major street, and have stop signs controlling the other street, typically the secondary side street. Due to the inherent lack of delay on the street with no control (the vehicles on the uncontrolled streets are able to move freely through the intersection and therefore experience no delay), average vehicle delay is only measured for those movements that have stop control and yield conflicts with other movements rather than for the entire intersection. In this report, the average vehicle delay and level of service reported for two-way stop controlled intersections represents the approach with the highest delay to reflect the magnitude of the primary performance limitation of the intersection. Since no delay is experienced on the uncontrolled street (with the exception yield requirements for left turning movements from the uncontrolled street), ensuring manageable delay on specific approaches represents the main consideration of two-way stop controlled intersection performance and is therefore the basis for LOS determination.

The second type of intersection control in the study sample is the all-way stop controlled intersection, of which there are seven among the 56 study intersections. These have stop signs for all approaches and therefore delay is experienced by all vehicles using the intersection. For this reason, average vehicle delay is reported for the entire intersection rather than specific movements or approaches to provide an indication of the overall performance of the intersection. For intersections with traffic control on all approaches, balancing the delay incurred on each of the various approaches to achieve the minimum average delay for the entire intersection is the fundamental premise for maximizing intersection performance and for this reason is the basis for identifying LOS.

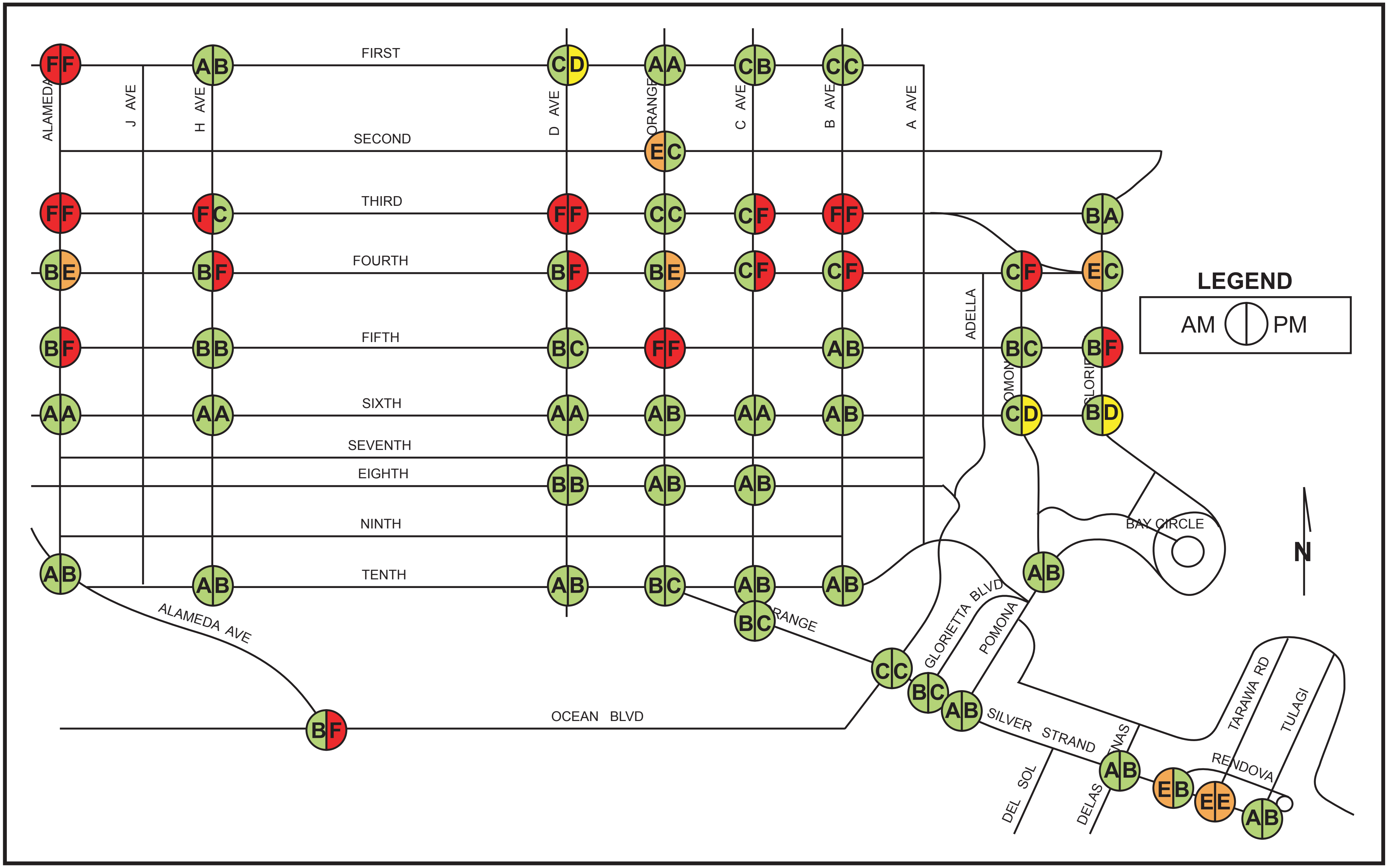
The third type of control is a traffic signal, which is present at twelve of the 56 intersections. While there are various types of phasing at the different signalized intersections, delay is experienced at some time by vehicles on each of the approaches to the signal controlled intersection. Since optimizing the performance of a signalized intersection is generally predicated on minimizing the average delay to all vehicles using the intersection, LOS is based on the average vehicle delay for the entire intersection.

The existing approach or intersection delay and corresponding level of service for each of the study intersections in the AM and PM peak hour periods are shown in **Table 2.5** and **Figure 2.8**. Detailed analysis printouts are provided in Appendix A.

Table 2.5 Peak Hour Delay and Level of Service

	Intersection	Control[1]	Existing AM Delay in Seconds[2]	Existing AM LOS	Existing PM Delay in Seconds	Existing PM LOS
1	Alameda Blvd & First St	2	>50	F	>50	F
2	Alameda Blvd & Third St	2	>50	F	>50	F
3	Alameda Blvd & Fourth St	A	11.3	B	48.1	E
4	Alameda Blvd & Fifth St	2	12.4	B	>50	F
5	Alameda Blvd & Sixth St	A	7.8	A	9.1	A
6	Alameda Blvd & Country Club	2	8.9	A	13.0	B
7	Alameda Blvd & Ocean Blvd	2	14.4	B	>50	F
8	H Ave & First St	2	9.4	A	14.4	B
9	H Ave & Third St	2	>50	F	21.0	C
10	H Ave & Fourth St	2	11.8	B	>50	F
11	H Ave & Fifth St	2	12.1	B	13.9	B
12	H Ave & Sixth St	A	7.3	A	7.5	A
13	H Ave & Tenth St	2	9.9	A	11.3	B
14	D Ave & First St	2	18.2	C	29.4	D
15	D Ave & Third St	2	>50	F	>50	F
16	D Ave & Fourth St	2	13.8	B	>50	F
17	D Ave & Fifth St	2	11.9	B	23.5	C
18	D Ave & Sixth St	A	7.3	A	8.5	A
19	D Ave & Eighth St	2	10.1	B	14.1	B
20	D Ave & Tenth St	2	9.8	A	12.3	B
21	Orange Ave & First St	S	8.8	A	9.7	A
22	Orange Ave & Second St	2	38.4	E	20.3	C
23	Orange Ave & Third St	S	23.3	C	25.7	C
24	Orange Ave & Fourth St	S	14.4	B	59.5	E
25	Orange Ave & Fifth St	2	>50	F	>50	F
26	Orange Ave & Sixth St	S	6.8	A	18.0	B
27	Orange Ave & Eighth St	S	8.1	A	16.0	B
28	Orange Ave & Tenth St	S	16.0	B	26.6	C
29	Orange Ave & Ocean St	S	29.2	C	21.9	C
30	Orange Ave & Pomona St	S	6.5	A	10.4	B
31	C Ave & First St	2	18.3	C	15.0	B
32	C Ave & Third St	2	22.4	C	50.0	F
33	C Ave & Fourth St	2	15.6	C	>50	F
34	C Ave & Sixth St	A	7.1	A	7.8	A
35	C Ave & Eighth St	2	9.5	A	11.3	B
36	C Ave & Tenth St	2	9.8	A	14.0	B
37	C Ave & Orange Ave	2	12.6	B	19.8	C
38	B Ave & First St	2	16.4	C	15.9	C
39	B Ave & Third St	2	>50	F	>50	F
40	B Ave & Fourth St	2	18.5	C	>50	F
41	B Ave & Fifth St	2	9.5	A	12.5	B
42	B Ave & Sixth St	2	9.6	A	11.9	B
43	B Ave & Tenth St	2	9.7	A	13.4	B
44	Pomona Ave & Fourth St	2	18.3	C	>50	F
45	Pomona Ave & Fifth St	2	13.7	B	19.8	C
46	Pomona Ave & Sixth St	2	21.6	C	34.2	D
47	Pomona Ave & Glorietta Blvd	A	9.1	A	14.1	B
48	Glorietta Blvd & Third St	A	11.2	B	7.8	A
49	Glorietta Blvd & Fourth St	2	50.0	E	22.8	C
50	Glorietta Blvd & Fifth St	2	14.4	B	>50	F
51	Glorietta Blvd & Sixth St	2	10.8	B	25.4	D
52	Glorietta Blvd & Orange Ave	2	13.1	B	15.5	C
53	Silver Strand & De Las Arenas Ave	S	7.6	A	12.3	B
54	Silver Strand & Rendova Dr	S	75.0	E	12.8	B
55	Silver Strand & Tarawa Rd	S	63.3	E	68.1	E
56	Silver Strand & Tulagi Rd	S	2.6	A	15.8	B

[1] 2 = Two-Way Stop, A = All-Way Stop, S = Traffic Signal
[2] Delay for two-way stop controlled intersections is for the approach with the highest delay



CORONADO CITYWIDE TRAFFIC STUDY

Existing AM/PM Peak Hour Intersection Level of Service

FIGURE 2.8

As illustrated in Figure 2.8, most of the intersections operate at a level of service of "C" or better during both the AM and PM peak hours. Those intersections that provide a marginal or unacceptable level of service have been detailed in the following sections by type of control with explanations for their performance.

2.3.1 Two-Way Stop Controlled Intersections

As shown in **Table 2.6** below, a total of 20 two-way stop controlled intersections operate at LOS "D" or worse during either the AM or PM peak hour. At many of these intersections the number of vehicles on the side street is very small, but they are opposed by such heavy volumes on the major street that there are insufficient gaps for them to turn onto or cross the street, which results in long delays for the generally small number of side street vehicles. In the overall context of intersection performance, the average vehicle delay is low due to the much greater number of vehicles able to pass freely through the intersection without delay, although the fewer vehicles using the side streets experience poor levels of service. This scenario occurs at most of the two-way stop controlled study intersections along Alameda Boulevard, Orange Avenue, Third Street, Fourth Street and Sixth Street.

Table 2.6 Two-Way Stop Controlled Intersections with Unacceptable LOS

Intersection		Existing AM		Existing PM	
		Delay in Seconds[1]	LOS	Delay in Seconds	LOS
1	Alameda Blvd & First St	>50	F	>50	F
2	Alameda Blvd & Third St	>50	F	>50	F
4	Alameda Blvd & Fifth St	12.4	B	>50	F
7	Alameda Blvd & Ocean Blvd	14.4	B	>50	F
9	H Ave & Third St	>50	F	21.0	C
10	H Ave & Fourth St	11.8	B	>50	F
14	D Ave & First St	18.2	C	29.4	D
15	D Ave & Third St	>50	F	>50	F
16	D Ave & Fourth St	13.8	B	>50	F
22	Orange Ave & Second St	38.4	E	20.3	C
25	Orange Ave & Fifth St	>50	F	>50	F
32	C Ave & Third St	22.4	C	50.0	F
33	C Ave & Fourth St	15.6	C	>50	F
39	B Ave & Third St	>50	F	>50	F
40	B Ave & Fourth St	18.5	C	>50	F
44	Pomona Ave & Fourth St	18.3	C	>50	F
46	Pomona Ave & Sixth St	21.6	C	34.2	D
49	Glorietta Blvd & Fourth St	50.0	E	22.8	C
50	Glorietta Blvd & Fifth St	14.4	B	>50	F
51	Glorietta Blvd & Sixth St	10.8	B	25.4	D

[1] Delay is the average delay in seconds for the approach with the highest delay

Although the calculated delay is very high on controlled approaches to several two-way stop controlled intersections, it should be noted that often the actual delay experienced by drivers is reduced by drivers taking more aggressive actions to complete their desired maneuver. In particular, drivers experiencing lengthy delays will take advantage of less than sufficient gaps in opposing traffic to complete their desired maneuver and to avoid further delay. Field observations have confirmed that this phenomena occurs at locations within the City of Coronado, particularly for two-way stop controlled streets intersecting Third Street, Fourth Street and Orange Avenue where uncontrolled through traffic volumes are very high.

1. Alameda & First – Both of the stop controlled approaches on First Street fail in the AM peak hour due to the very high volume of traffic turning left into the base off of Alameda Boulevard. With over 1,100 vehicles making this turn there are no available gaps for side street traffic under typical operating conditions. In the PM peak hour much of the delay occurs in the westbound direction to the 16 vehicles wishing to turn left onto southbound Alameda, which are opposed by over 1,000 vehicles exiting the base.

As a result of the poor performance of this intersection and the substantial queuing that occurs, courteous drivers have been observed to allow First Street traffic to enter into the intersection in an alternating fashion. This impromptu traffic management allows the intersection to perform better than it does with the existing stop controls alone and reduces the immediacy for considering alternate traffic control at this location. Furthermore, the pending relocation of the NASNI main gate to Third Street may also cause a shift in traffic patterns that may reduce demand at the intersection of Alameda and First.

2. Alameda & Third – The 120 southbound through vehicles in the AM peak hour cause this intersection to fail due to their difficulty in crossing the steady stream of over 1,300 vehicles turning left onto southbound Alameda Boulevard. When security processing delays cause traffic to back up to this location, courteous drivers allow side street traffic to go in front of them.

The problem is essentially the same in the PM peak hour with about 500 vehicles desiring to go south on Alameda being opposed by nearly 700 vehicles turning left from Third to Alameda.

4. Alameda & Fifth – The side street delay in the PM peak hour is caused by the about 50 vehicles that want to turn left onto southbound Alameda Boulevard, but are opposed by about 1,100 vehicles on the main street.

7. Alameda & Ocean – Vehicles on southbound Alameda Boulevard wishing to turn left onto eastbound Ocean Boulevard in the PM peak hour experience delays due to the combination of the high volume (over 300) of vehicles making the left turn and the high volume on Ocean (about 700) opposing the turn.

9. H & Third – In the AM peak hour the few vehicles that wish to cross Third Street are delayed due to the nearly 2,000 vehicles on the main street. Since there are only five vehicles crossing the street, the delay affects a very small portion of the overall intersection traffic.

10. H & Fourth – This is essentially the same situation as the previous intersection and other Third and Fourth street intersections, but in the PM peak hour when Fourth Street traffic is heaviest. The 35 vehicles crossing the main street are a small percentage of the total traffic.

14. D & First – The northbound approach operates at LOS D in the PM peak hour when the 13 vehicles wishing to turn onto or cross First Street are delayed by the over 800 opposing vehicles.

15. D & Third – In the AM peak hour there are about 30 southbound vehicles wishing to cross Third Street, opposed by over 1,500 vehicles. Adequate gaps should be created by the adjacent traffic signal on Orange Avenue.

The situation is the same in the PM peak hour when about 140 southbound vehicles wish to cross Third, but are opposed by over 900 vehicles, which make available gaps difficult to find. Again, the adjacent traffic signal should help create the necessary gaps.

16. D & Fourth – In the PM peak hour about 110 southbound vehicles wish to cross Fourth, but are opposed by nearly 1900 vehicles, which make available gaps difficult to find. In this case there is no upstream signal to create the necessary gaps.

22. Orange & Second – The westbound approach to this intersection operates at LOS E during the AM peak hour. This is due to the large volume (about 300) of through vehicles on Second Street, which are opposed by about 600 through and left turning vehicles on Orange Avenue. It is likely that this large volume on Second Street represents drivers that are seeking an alternate route to First and Third.

25. Orange & Fifth – This intersection is similar to the previous, but while the side street through and left turning volumes of about 25 vehicles on Fifth Street are lighter, the opposing through and left turning volumes on Orange Avenue of nearly 2,300 vehicles are much higher in the AM peak hour. This intersection is also aided by the close proximity to upstream signals on Orange Avenue and the wide median that allows for vehicles to cross Orange in two steps.

The situation is more severe in the PM peak hour when about 200 through and left turning vehicles are approaching on the side streets, but are opposed by about 2,200 through and left turning vehicles on the main street.

32. C & Third – The northbound approach at this intersection operates at LOS F with 50.0 seconds of delay in the PM peak hour. While there are only three vehicles using this approach, they are opposed by nearly 2,200 through vehicles on Third Street, which limits the available gaps.

33. C & Fourth – Both the southbound and northbound approaches to this intersection operate at LOS F in the PM peak hour. The northbound approach has a total of 24 vehicles crossing or turning right and the southbound approach has eight vehicles crossing or turning left. These vehicles are opposed by nearly 3,300 through vehicles on Fourth Street, which makes it very difficult to find an acceptable gap.

39. B & Third – The northbound approach to this intersection operates at LOS F in both the AM and PM peak hours with unacceptable delay, respectively. In the morning there are only two vehicles on the northbound approach, but over 3,200 through vehicles on the main street, while in the afternoon there are seven vehicles using the northbound approach with just under 2,200 through vehicles on Third Street.

40. B & Fourth – Both the southbound and northbound approaches to this intersection operate at LOS F in the PM peak hour. The northbound approach has a total of 24 vehicles crossing or turning right and the southbound approach has seven vehicles crossing or turning left. These vehicles are opposed by nearly 3,300 through vehicles on Fourth Street, which makes it very difficult to find an acceptable gap, particularly for those crossing the street.

44. Pomona & Fourth – The northbound approach, which only allows a right turn onto eastbound Fourth Street, operates at LOS F in the PM peak hour with lengthy average vehicle delay. There are over 200 vehicles desiring to make this right turn, but they are opposed by over 3,300 eastbound through vehicles on Third Street.

46. Pomona & Sixth – This intersection, which is two-way stop controlled on the eastbound and westbound approaches, experiences LOS D with 34.2 seconds of delay on the eastbound approach in the PM peak hour. This leg of the intersection has about 130 through or left vehicles, which are opposed by over 600 through or left vehicles on Pomona Avenue.

49. Glorietta & Fourth – This intersection has a free right for the northbound movement to eastbound Highway 75 across the bridge. This free right removes the right turn volumes from the level of service calculations so the only stop controlled movement is the southbound right turn. In the AM peak hour this right turn operates at LOS E with 50.0 seconds of delay. There are about 50 vehicles desiring to turn right, which are opposed by over 3,300 westbound through vehicles.

Since the northbound free right was not included in the level of service calculations, a simulation run was performed. Simulations actually model the flow of traffic and the interactions between intersections throughout the entire network. In the AM peak hour, the free right and corresponding merge into traffic on eastbound Highway 75 seems to work just fine, which is largely expected given a right turn volume of nearly 500 merging into three lanes of traffic carrying about 1,500 vehicles. However, in the PM peak hour the conditions are not quite so good. There are nearly 1,500 vehicles turning right and merging into three lanes carrying about 3,500 vehicles. The conflicts at the merge point cause traffic to back up in both the eastbound and northbound directions. The simulation calculates an average eastbound queue in the right lane of about 225 feet from the intersection, which is nearly halfway between Glorietta and Pomona.

50. Glorietta & Fifth – The eastbound approach at this intersection experiences unacceptable delay and LOS F in the PM peak hour. This is caused by 440 vehicles wishing to turn left onto northbound Glorietta Boulevard, which are opposed by over 700 through vehicles.

51. Glorietta & Sixth – The eastbound approach at this intersection operates at LOS D in the PM peak hour with 25.4 seconds of average vehicle delay. This is caused by over 300 vehicles wishing to turn left onto northbound Glorietta Boulevard, opposed by over 400 through vehicles on Glorietta Boulevard.

2.3.2 All-Way Stop Controlled Intersections

As shown in **Table 2.7** below, one all-way stop controlled intersections operate at LOS "D" or worse during either the AM or PM peak hour.

Table 2.7 All-Way Stop Controlled Intersections with Unacceptable LOS

Intersection		Existing AM		Existing PM	
		Delay in Seconds	LOS	Delay in Seconds	LOS
3	Alameda Blvd & Fourth St	11.3	B	48.1	**E**

3. Alameda & Fourth – This intersection operates at LOS E in the PM peak hour. The southbound and eastbound right turn movements were not included in the level of service calculations since the southbound is a free right and the eastbound has similar geometry to a free right, but is controlled by a yield sign. The eastbound approach operates at LOS F. It experiences the most delay with an average of 68.1 seconds per vehicle and a through volume of over 1,200 vehicles. The southbound approach operates at LOS C with 23.0 seconds of delay per vehicle and over 600 through or left vehicles.

Although the calculated delay for the intersection reflects considerable delay and LOS E, the intersection is controlled intermittently during the PM peak with manual traffic control to help reduce the eastbound delay and subsequent queuing, and to improve the overall performance of the intersection. Due to the random nature of manual traffic control, it is not possible to quantify the benefit of using a 'waiver' to direct traffic during the peak period. For this reason, the intersection of Alameda and Fourth has been analyzed to reflect the existing stop controlled configuration for the purposes of this study.

2.3.3 Signalized Intersections

As shown in **Table 2.8** below, three signalized intersections operate at LOS "D" or worse during either the AM or PM peak hour.

Table 2.8 Signalized Intersections with Unacceptable LOS

Intersection		Existing AM		Existing PM	
		Delay in Seconds	LOS	Delay in Seconds	LOS
24	Orange Ave & Fourth St	14.4	B	59.5	**E**
54	Silver Strand & Rendova Dr	75.0	**E**	12.8	B
55	Silver Strand & Tarawa Rd	63.3	**E**	68.1	**E**

24. Orange & Fourth – This intersection operates at LOS E in the PM peak hour with 59.5 seconds of average vehicle delay. This is obviously a very busy intersection with over 5,000 vehicles passing through it in the PM peak hour. It is difficult to handle that many vehicles and still operate at an acceptable level of service. The movement with the most delay is the southbound left turn onto Fourth Street, which has over 800 vehicles and experiences 86.7 seconds of delay and contends for green time with northbound through traffic on Orange Avenue, which has about 450 vehicles and 64.8 seconds of delay. The eastbound approach on Fourth Street has over 2,000 vehicles and 69.3 seconds of delay.

Although the analysis results do not reflect unacceptable delay at the intersection of Orange and Third, the performance of this ntersection is impacted by southbound queuing and blocking at the intersection of Orange and Fourth. The influence of this downstream blocking at Orange and Fourth results in additional extensive delay for southbound motorists at the intersection Orange and Third where traffic is not able to proceed during the otherwise sufficient green signal phase.

54. Silver Strand & Rendova – This intersection operates at LOS E during the AM peak hours with an average vehicle delay of 75.0 seconds. The confluence of 327 southbound left turns opposing 1,575 northbound through movements reduces the available green time for the northbound through traffic thereby increasing the average delay incurred. The situation at this intersection is exacerbated by the need to allocate green time to the cross street traffic despite the very low approach volumes on Rendova during the AM peak period.

55. Silver Strand & Tarawa – This intersection operates at LOS E in both the AM and PM peak hours with an average vehicle delay of 63.3 and 68.1 seconds, respectively. The intersection has over 3,000 vehicles in the morning and nearly 3,700 vehicles using it in the afternoon. The intersection has split timing on Tarawa Road, which means that each leg of the intersection gets their green time separately. In the AM peak hour the movement with the most delay is the southbound left turn onto Tarawa with a volume of 485. This competes for green time with the northbound through movement on Silver Strand which has over 1,500 vehicles. In the morning, there is a lack of capacity turning left off of Silver Strand.

In the PM peak hour the situation is largely the reverse of the AM. The movement with the most delay is the northbound left turn onto Tarawa with over 80 seconds of delay and a volume of 40. This competes for green time with the southbound through movement on Silver Strand which has nearly 1,800 vehicles and 75.3 seconds of delay. There are also larger side street volumes in the PM peak hour; however, by simply changing the eastbound through lane to a shared left-through lane the afternoon intersection delay can be reduced by over 10 seconds per vehicle. In the afternoon, the traffic exiting the base takes up much of the green time leaving less time for the heavier volumes on Silver Strand.

2.3.4 *Additional Intersection Performance Observations*

In addition to the intersections described previously as having level of service deficiencies, several intersections were identified as having performance constraints based on physical design and operating characteristics observed in the field. These intersections include the following locations and specific performance constraints.

26. Orange & Sixth, 27. Orange & Eighth, and 28. Orange & Tenth – These three intersections are signalized intersections along Orange Avenue in the civic and commercial core of the City of Coronado. Between locations a combination of signal phasing configurations are utilized, particularly with regard to the treatment of left turn movements from the numbered side streets onto Orange Avenue. At certain locations and times of the day, the signal phasing is operated with an opposing lead/lag left turn control paired with the corresponding through movement. In this manner all left turn and through traffic from one approach direction is able to clear the intersection under signal protection, thereby minimizing potential conflict with opposing, oncoming traffic. By contrast, at other locations and times of the day, the signal phasing utilizes a dual opposing protected left turn control and/or an opposing permitted left turn/through control from the numbered side street. Due to the exceptionally wide center median on Orange Avenue, opposing drivers are unable to safely complete simultaneous left turn movements and were observed to regularly become confused with regard to how to proceed with left turns at these locations. Typically opposing left turn traffic proceeds into the center of the Orange Avenue median where it crosses and turns behind the opposing vehicle, thereby creating potential conflicts and confusion over yielding responsibilities particularly where and when protected left turn control is provided. The most appropriate solution to this problem is to consistently utilize an opposing lead/lag left turn control at these locations where the wide median prevents simultaneous opposing left turning movements in front of the intersection center point.

29. Orange & Ocean – At this signalized intersection location, dual right turn lanes are provided on the eastbound Ocean Boulevard approach to Orange Avenue. Field observations noted that despite the relatively high right turn traffic volume, very few drivers are utilizing the left-most right turn lane, possibly due to unsure driver expectations regarding the use of this lane. The most appropriate solution for this location is to eliminate the left-most right turn lane and to possibly utilize this lane as a through lane thereby allowing the provision of a dedicated left turn lane (although intersection level of service analysis results do not indicate a compelling need to provide a dedicated left turn at this location). In addition, a protected right turn signal and appropriate phases could be incorporated into the signal design and phasing at this location to ensure sufficient capacity to adequately accommodate the right turn traffic at this location. Although a protected right turn movement would likely improve traffic performance, the high pedestrian movements conflicting with this movement would possibly minimize the effectiveness of this intersection improvement.

53. Silver Strand & De Las Arenas – At this signalized intersection location, an unusual combination left turn, left turn/through (to provide dual left turns), and right turn lane configuration is provided on the eastbound Avenida De Las Arenas approach to Silver Strand. This configuration was observed in the field to create potential conflicts between yielding left turn traffic and through traffic using the combined left turn/through lane, and between left turn traffic using this lane and opposing traffic from the westbound approach. The level of service results for this intersection indicate that the provision of dual left turn lanes may not be necessary to provide sufficient capacity at this intersection. However, the most appropriate solution to this location is to provide dual dedicated left turn lanes for the eastbound approach, and to combine the through and right turn movements on this approach.

2.4 Existing Traffic General Observations

While the specific details of the existing intersection traffic analysis represents the basis of understanding and evaluating traffic conditions within the City of Coronado as part of the Citywide Major Traffic Study, the observation of roadway link volume patterns and volume changes over time provide interesting insights into the results of the intersection analysis. This section will examine general observations regarding traffic circulation patterns and trends within the City of Coronado based on a review of roadway link data collected as part of this study.

2.4.1 Roadway Link Volume Patterns

Table 2.3 (shown previously) details ADT and peak hour traffic volumes for various streets within the City of Coronado. The table indicates that roadway ADT volumes vary considerably throughout the City, with the volumes observed ranging from nearly 70,000 vehicles per day on SR-75 in the vicinity of the Coronado Bridge (traffic volumes on the Coronado Bridge exceed 90,000 vehicles per day) down to less than 1,000 vehicles per day on several primarily local residential streets. Like ADT volumes, peak hour volumes and times also vary widely throughout Coronado.

AM peak hour volumes on individual facilities occur as early as the 5:00 AM hour and as late as the 11:00 AM hour, depending on the functional class of the facility, and the types of adjacent and down stream land uses. The AM peak hour for the most roadways in Coronado occurs between 6:00 AM and 7:00 AM, which coincides with the AM peak hour for traffic entering the NASNI Main Gate. The AM peak period for the City of Coronado extends from 6:00 AM to 9:00 PM, which is consistent with the traditional AM peak period for many cities.

PM peak hour volumes on individual facilities occur as early as the 11:00 AM hour (including Orange Avenue between Fourth and Fifth) and as late as the 5:00 PM hour. The PM peak hour for the most roadways in Coronado occurs between 3:00 PM and 4:00 PM, with the City experiencing a relatively early PM peak period between 2:00 PM and 5:00 PM. The relatively early PM peak hour and PM peak period coincides with the peak period for traffic leaving the NASNI Main Gate. Traditionally, most cities including many in Southern California experience the PM peak period between 3:00 PM and 7:00 PM highlighting the unique nature of traffic in Coronado and the influence of NASNI on local traffic patterns.

Figures 2.5, **2.6** and **2.7** provide an illustrated overview of the traffic circulation within the City of Coronado based on the observation of roadway link volume patterns. Clearly, the Third Street and Fourth Street couplet (SR-75/SR-282) represents the primary east-west artery through the City of Coronado highlighting the strategic connection it provides between the San Diego-Coronado Bridge (Coronado Bridge) and the Naval Air Station North Island (NASNI). With an ADT volume in excess of 70,000 east of Orange Avenue, the Third Street/Fourth Street couplet (SR-75) has colloquially been identified as the busiest residential street in San Diego County. West of Orange Avenue the Third Street/Fourth Street couplet (SR-282) sustains ADT volumes in excess of 30,000 reiterating its significance as a strategic connection of regional significance.

Orange Avenue and Silver Strand (SR-75) provide the major north-south traffic artery through the City of Coronado which is consistent with the historical evolution of these roadways. Prior to the completion of the Coronado Bridge, Silver Strand provided the only external road access to the City of Coronado. Consequently, substantial commercial, tourist, and civic development has historically occurred along Silver Strand and its northerly extension into the City, Orange Avenue. The local and regional significance of this connection continues to be reflected with ADT volumes exceeding 30,000 between Third Street and Rendova Drive (near the entrance to the Naval Amphibious Base). In the vicinity of the Hotel Del Coronado south of Ocean Boulevard, the ADT volume of Silver Strand exceeds 38,000.

The influence of high ADT volumes along these major east-west and north-south arteries is evident on parallel City streets that are observed to carry traffic volumes in excess of those typically expected on local and collector streets. It is apparent that First Street, Second Street, Fifth Street and Sixth Street all experience high traffic volumes as a result of ‘overflow’ traffic from the Third Street and Fourth Street couplet. Similarly Pomona Avenue and Glorietta Boulevard accommodate high traffic volumes as a result of traffic seeking to bypass Orange Avenue, particularly in the vicinity of Third Street and Fourth Street.

The location of NASNI gates on First Street and Ocean Boulevard is primarily responsible for additional traffic load on each of these residential streets as vehicles destined for NASNI seek to avoid congestion at the NASNI Main Gate located on Fourth Street. Despite the generally residential characteristics of these streets, volumes more typical of minor arterials are observed along First Street and Ocean Boulevard in particular, highlighting the convenience of these gates as an alternative to entering NASNI through the Fourth Street Main Gate. ADT volumes in excess of 10,000 along First Street are indicative of the magnitude of overflow traffic penetrating the Coronado residential street system.

As the name implies, Ocean Boulevard provides the most direct access to the beach in Coronado further increasing the traffic load along this street. Weekday, and particularly weekend traffic accessing beachfront areas contributes to Ocean Boulevard carrying the highest ADT volumes of any street in the jurisdiction of the City of Coronado (Third Street, Fourth Street and Orange Avenue are all designated State Highways that carry higher traffic volumes). Weekday ADT volumes approaching 11,500 and consistent with the minor arterial designation of the street are observed along Ocean Boulevard west of Orange Avenue.

During the AM peak period, non typical hourly volumes are observed for westbound traffic along First Street, Fifth Street (west of Orange Avenue) Tenth Street and Ocean Boulevard as traffic destined for NASNI seeks to use local streets to bypass congestion on Third Street. In particular, First Street is observed to have westbound peak hour volumes exceeding 700 vehicles, which is approaching the threshold of a minor arterial. The high westbound AM peak traffic flow along First Street reflects the traffic that exits SR-75 at Glorietta Boulevard and proceeds northerly and westerly to the NASNI First Street Gate, thereby bypassing Third Street.

Coronado resident commute traffic is also evident during the AM peak in the eastbound traffic volumes along Ocean Boulevard and the northbound traffic volumes along both Pomona Avenue and Glorietta Boulevard south of Fourth Street. AM peak hour volumes in excess of 500 vehicles are observed along each of these streets as traditional commute traffic originating in the predominately residential community of Coronado travels to employment in San Diego and other neighboring communities.

During the PM peak period, the reverse of the AM peak traffic flows is generally observed to the extent that one-way flows and turn prohibitions permit. Eastbound traffic flows on First Street, Fifth Street, Sixth Street and Tenth Street reflect the high number of vehicles avoiding eastbound congestion along Fourth Street. The eastbound overflow traffic manifests at the intersections of Third Street at Orange Avenue and Fourth Street at Orange Avenue where eastbound First Street traffic is forced to use eastbound Fourth Street due to Fourth Street turn prohibitions east of Orange Avenue. Additionally, traffic from eastbound Fifth Street and Sixth Street combine on northbound Glorietta Boulevard south of Fourth Street, where a free right turn permits direct access to the bridge. The northbound PM peak hour volume on Glorietta Boulevard at this location approaches 1,350 vehicles far exceeding the threshold for a collector street.

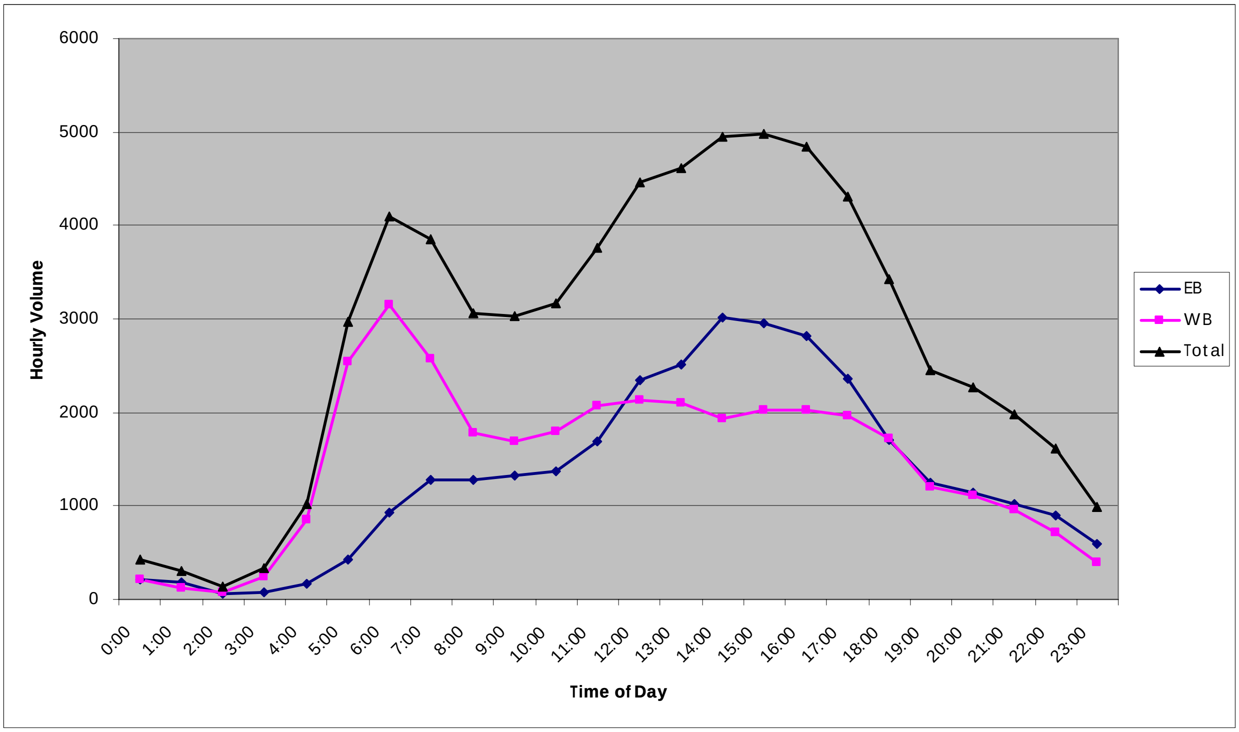
More traditional resident PM peak traffic flows are most evident on westbound First Street and Ocean Boulevard. Residents entering the City of Coronado on SR-75 from the east or the south use these peripheral streets to access the predominately residential areas bypassing traffic on Third Street and Orange Avenue.

2.4.2 Weekday Hourly Traffic Volume Trends

Weekday traffic volumes for roadways within the City of Coronado generally reflect a traditional peak trend with a directional AM peak and counter-directional PM peak illustrating the respective commute direction. Examination of weekday hourly traffic volumes for SR-75 near the Coronado Bridge and the NAB (the two roadway access points to the City of Coronado) indicates a strong peak directional flow of traffic into Coronado during the AM peak and out of Coronado during the PM peak, reflecting the significance of the Department of Navy facilities as major traffic generators. The influence of the Navy facilities is also indicated in the early occurrence of the directional peaks compared to the traditional urban area traffic peaks.

Figure 2.9 illustrates the hourly traffic volumes for SR-75 (Third Street and Fourth Street) between A Avenue and B Avenue. The figure indicates a very prominent westbound AM peak of over 3,000 vehicles between 6:00 AM and 7:00 AM and an earlier sustained eastbound PM peak with PM volumes near 3,000 vehicles per hour between 2:00 PM and 5:00 PM. During the afternoon a sustained traffic flow is also observed in the westbound direction, with hourly westbound volumes in excess of 2,000 vehicles generally observed from 11:00 AM to 6:00 PM.

Figure 2.9 **Hourly Traffic Volumes – SR-75 (Third Street/Fourth Street) between A Avenue and B Avenue**



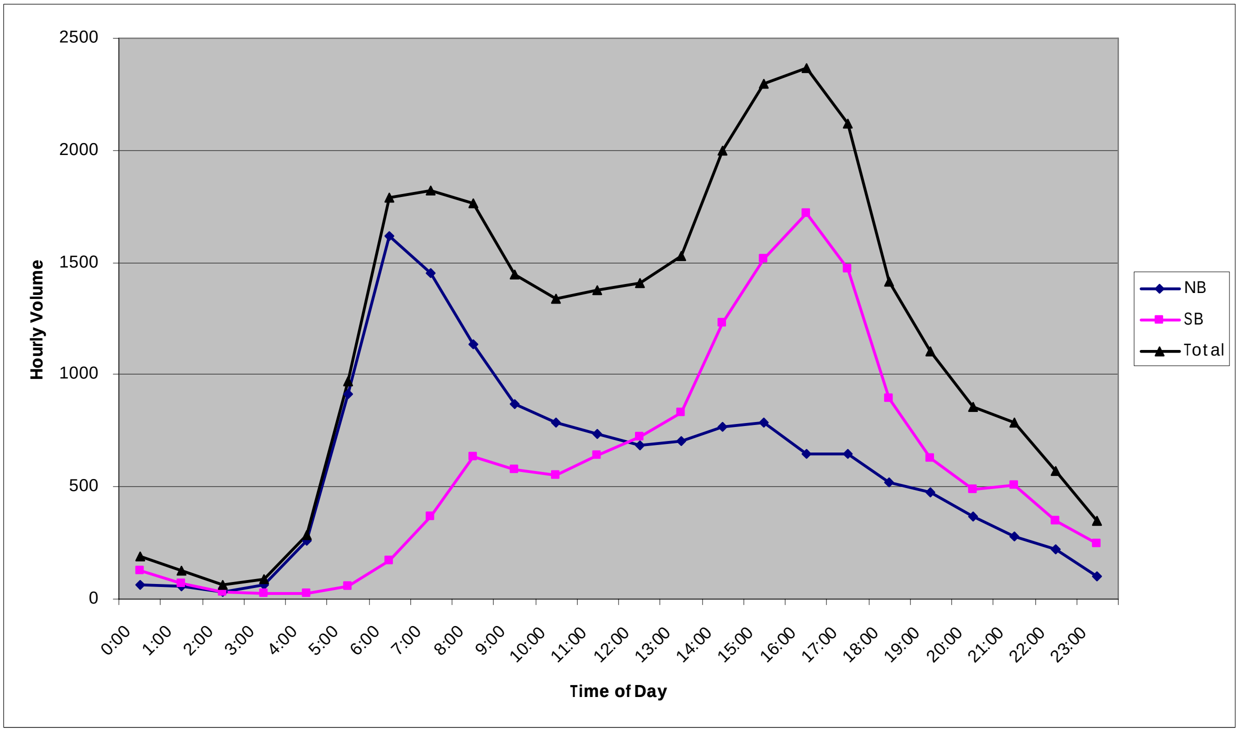
Data collected August 12, 2003

Figure 2.10 illustrates the weekday hourly traffic volumes for SR-75 (Silver Strand) north of Tulagi Road (near NAB). The figure indicates a very balanced, traditional and well defined AM and PM peak emphasizing the overall daytime traffic generation characteristic of the City of Coronado. Peak directional volumes for this location exceed 1,500 vehicles per hour during both the AM and PM peak, with peak directional volumes occurring between 6:00 AM and 7:00 AM northbound and between 4:00 PM and 5:00 PM southbound.

By contrast, **Figure 2.11** provides an example of the extreme directional peak that occurs at certain locations within the City of Coronado. This figure illustrates the hourly traffic flow on Glorietta Boulevard south of Fourth Street, where overflow and bypass traffic from Fourth Street and Orange Avenue has a very significant impact on the observed northbound traffic flow.

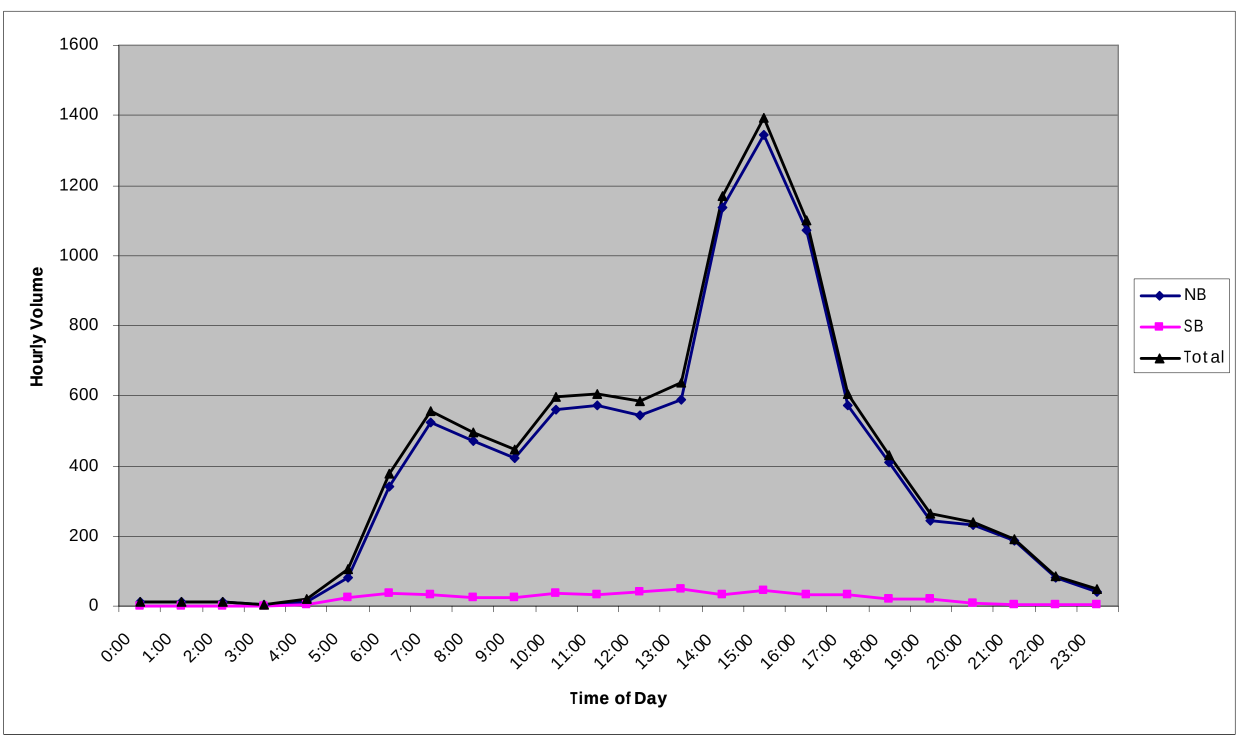
Southbound traffic flows for Glorietta Boulevard generally reflect the residential nature of the street and the impact of access prohibitions at Fourth Street with very low observed traffic volumes and undefined AM and PM peaks. By contrast, northbound traffic flows along Glorietta Boulevard reflect the impact of neighborhood traffic penetration as commute traffic attempts to bypass congestion in the vicinity of Orange Avenue and Fourth Street. Sustained northbound hourly traffic flows in excess of 500 vehicles from 7:00 AM to 6:00 PM, and peak northbound hourly traffic flows of over 1,300 vehicles from 3:00 PM to 4:00 PM are characteristic of the traffic utilizing Glorietta Boulevard to gain direct access to the Coronado Bridge.

Figure 2.10 Hourly Traffic Volumes – SR-75 (Silver Strand) North of Tulagi Road



Data collected July 23, 2003

Figure 2.11 Hourly Traffic Volumes – Glorietta Boulevard between Fourth Street and Fifth Street

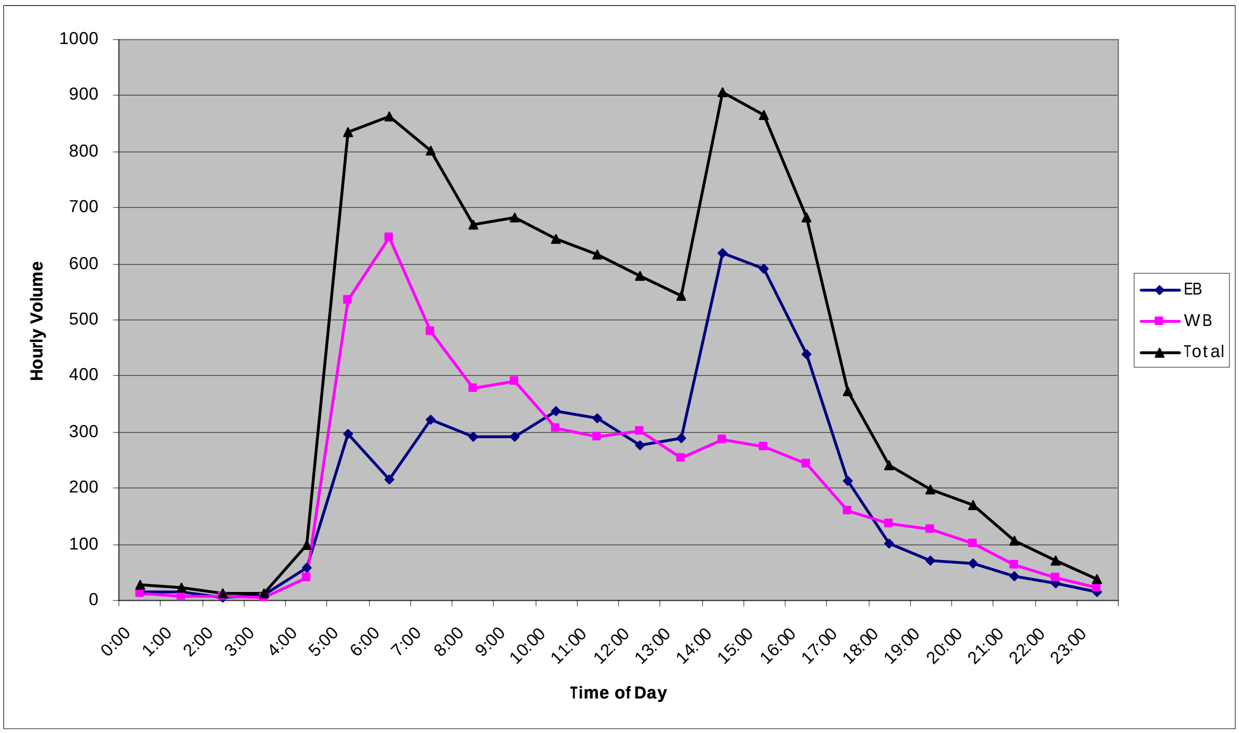


Data collected July 17, 2003

Although this example represents an extreme, similar unbalanced or erratic daily traffic patterns are observed on First Street, Fifth Street, Sixth Street, Tenth Street and Pomona Boulevard where traffic seeks alternatives to the peak congestion experienced along on SR-75.

Figure 2.12 illustrates traffic flows on First Street west of Orange Avenue. Although reflecting a somewhat more traditional hourly traffic flow pattern, erratic changes can be observed at this location, particularly during the peak periods when traffic overflows from Third Street and Fourth Street. This trend is particularly evident between 5:00 AM and 8:00 AM in the westbound direction and 2:00 PM and 4:00 PM in the eastbound direction when significant increases in directional hourly traffic flows is observed at this location.

Figure 2.12 Hourly Traffic Volumes – First Street between D Avenue and Orange Avenue



Data collected July 23, 2003

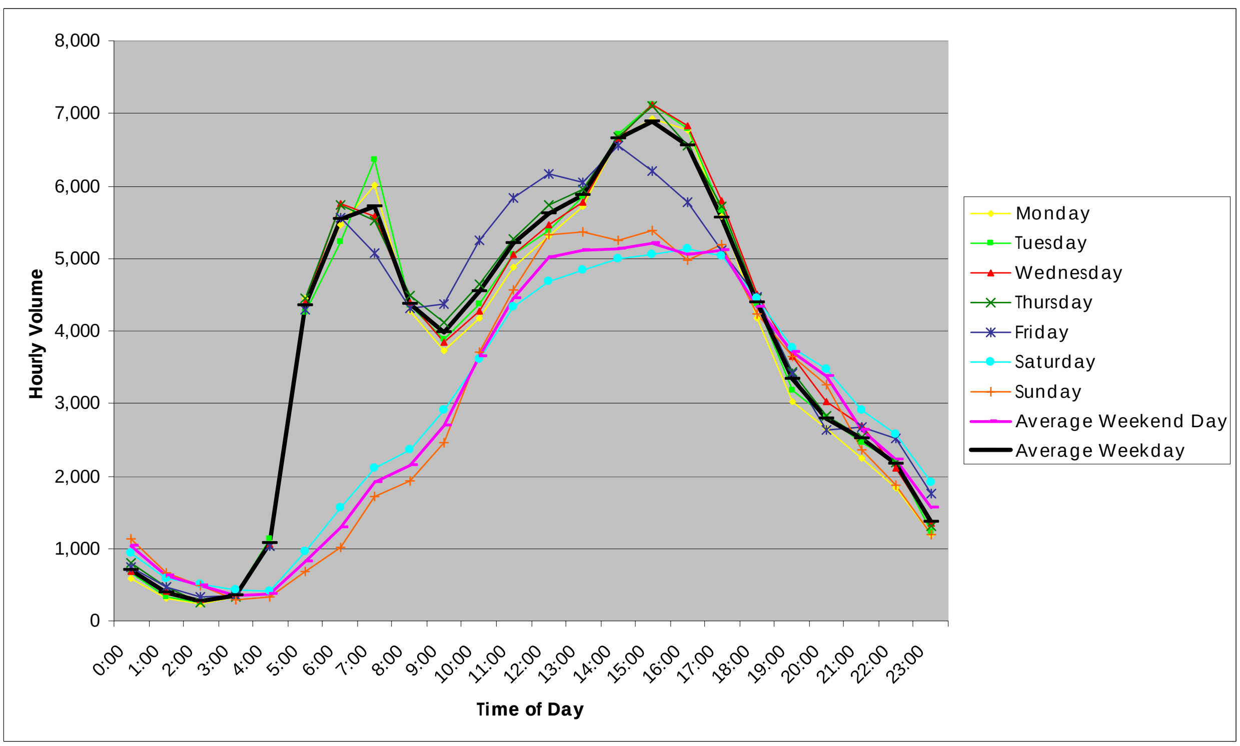
2.4.3 Weekly Daily Traffic Volume Trends

Weekly traffic volumes for roadways within the City of Coronado were observed for locations adjacent to major trip generating activities, such as the Navy facilities and the Hotel Del Coronado, and at the two primary roadway access points to the city. Traffic patterns at these locations generally reflect a sustained daily traffic flow pattern for every day of the week (including weekends), which is consistent with the seven day operation of these respective trip generators. However, the hourly traffic flows for each facility and location were observed to have varied characteristic depending on the nature of the facility and the physical location.

Figure 2.13 indicates the daily traffic patterns on SR-75 at the Coronado Bridge Toll Plaza. This location represents one of only two external roadway access points to the City of Coronado, the other being the continuation of SR-75 along the Silver Strand south of the city. The Coronado Bridge is the primary gateway to the City of Coronado and therefore traffic volumes at this location are, by far, the highest anywhere in the city. ADT at this location exceeds 91,000 vehicles per day during the middle of the week (Wednesday and Thursday) with an average weekday ADT exceeding 90,000. Average weekend day ADT at this location exceed 68,000.

The weekday traffic pattern at this location reflects a traditional AM/PM peak pattern, although the influence of unique land uses and trip generation on the island is reflected in the relatively early peaks, particularly during the PM period which extends from 2:00 PM to 5:00 PM. During weekend days, a relatively sustained traffic pattern is observed throughout the afternoon with hourly traffic volumes remaining constant between noon and 6:00 PM.

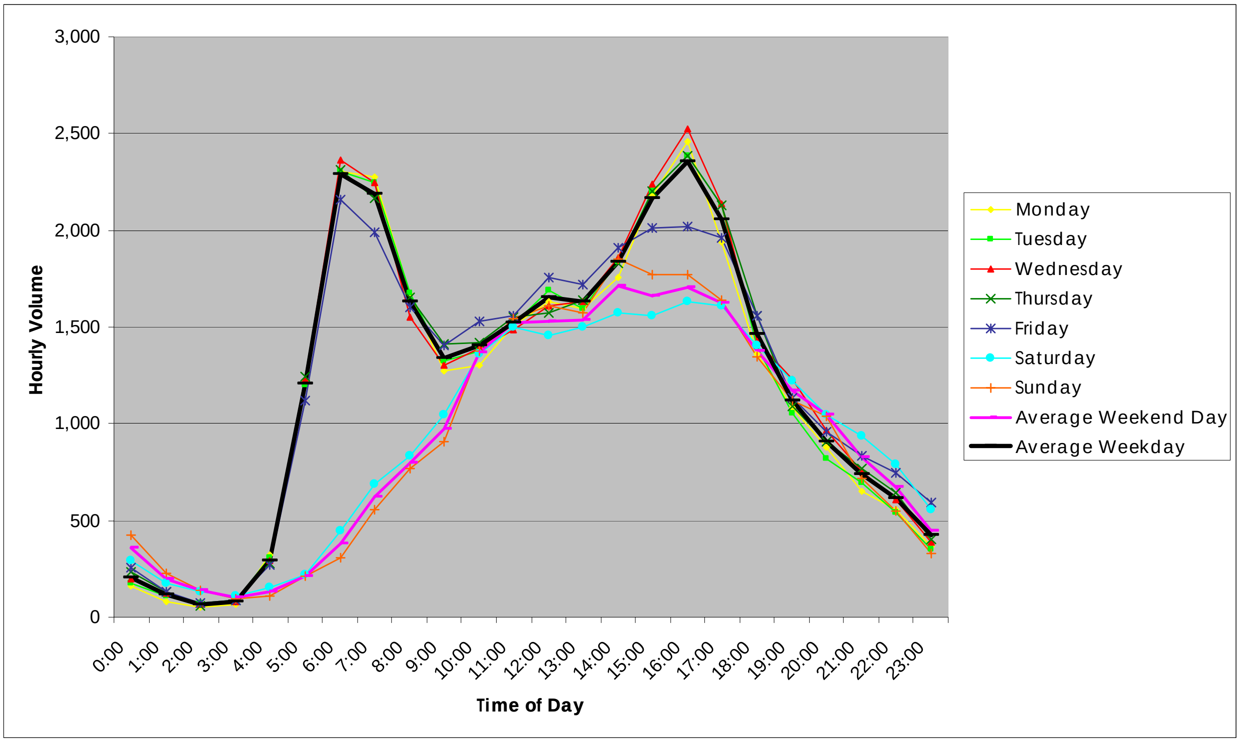
Figure 2.13 Daily Traffic Volumes – SR-75 at Coronado Bridge Toll Plaza



Source: Caltrans Permanent Count Station – data for July 14, 2003 to July 20, 2003

Figure 2.14 shows hourly traffic volumes on SR-75 (Silver Strand) south of Tulagi Road (near NAB). ADT volumes at this second of two roadway access points to the City of Coronado approach 30,000 vehicles per day during weekdays and exceed 20,000 during weekend days. Traffic patterns at this location generally reflect those at the SR-75 Toll Plaza, although it should be noted that the PM peak period at the Tulagi location is more traditional occurring between 3:00 PM and 6:00 PM, one hour later than the PM peak period occurring at the Toll Plaza. The more traditional peak period for this location is most likely the result of a lesser influence of NASNI commute traffic and more influence from Coronado and Imperial Beach resident commute traffic.

Figure 2.14 Daily Traffic Volumes – SR-75 (Silver Strand) South of Tulagi Road (near NAB)



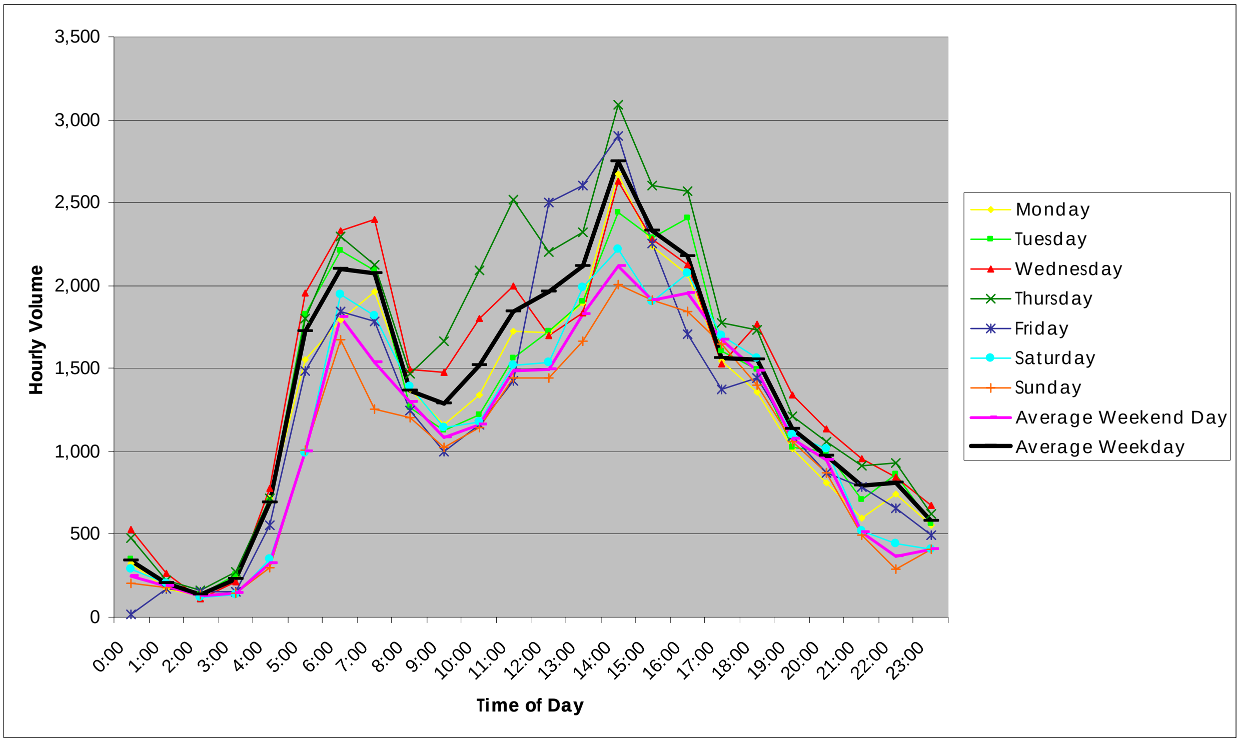
Source: Caltrans Permanent Count Station – data for July 14, 2003 to July 20, 2003

Figure 2.15 illustrates the daily traffic volumes at the NASNI Main Gate located on McCain Boulevard (Fourth Street) west of Alameda Boulevard. Daily traffic patterns at this location are generally consistent throughout the week (although slightly lower on weekend days), with volumes and traditional AM and PM peaks consistent with those described previously for SR-75 near the Coronado Bridge. This consistency in traffic patterns and volumes clearly illustrates the significance of NASNI traffic generation on the City of Coronado traffic patterns.

Figure 2.16 shows a differing traffic flow trend at the NASNI First Street Gate (west of Alameda Boulevard). At this location, gate utilization is concentrated during the morning and is reflected in an extreme AM peak of about 1,800 vehicles per hour.

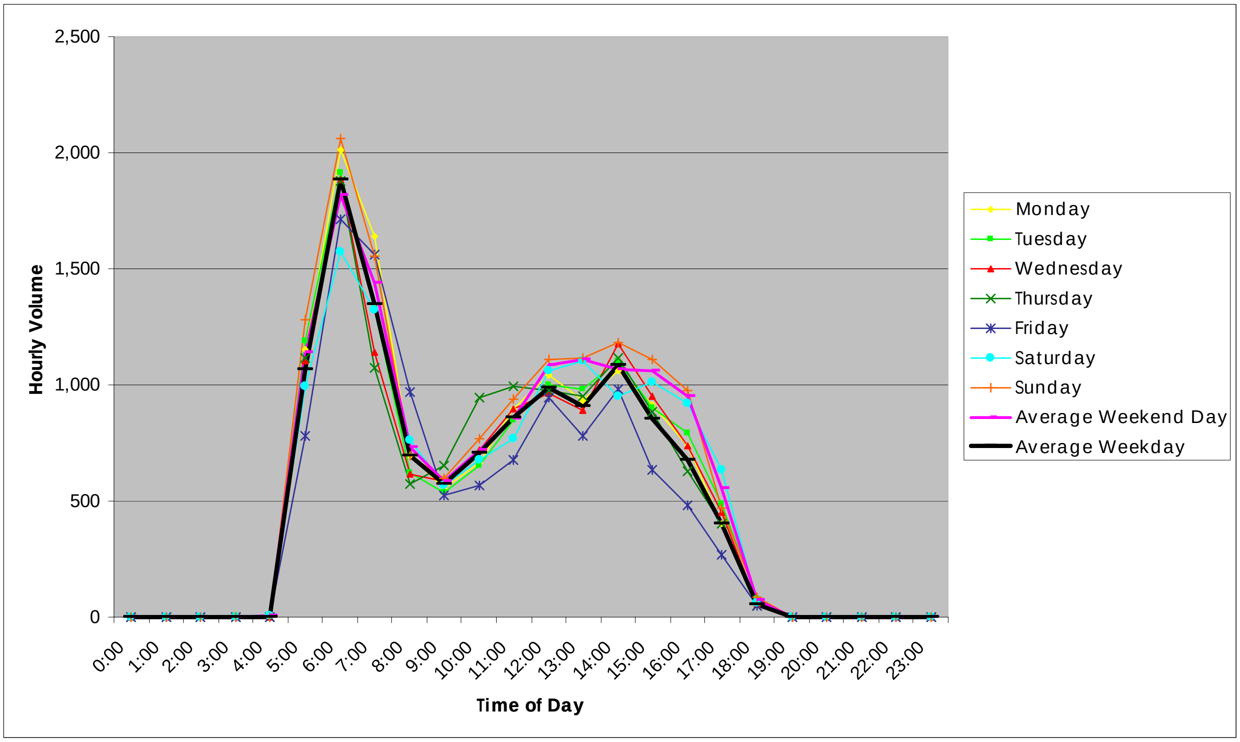
This characteristic is consistent with roadway traffic flow observed on First Street during the AM peak period when traffic leaving the Coronado Bridge will divert to northbound Glorietta Boulevard and westbound First Street to avoid congestion along Third Street. By contrast, the PM peak is less prominent and sustains an hourly volume of approximately 1,000 vehicles from noon until 3:00 PM. The extended peak and the limited ability to conveniently access Fourth Street from this gate may be factors that contribute to the disparate traffic peaks at this location.

Figure 2.15 Daily Traffic Volumes – McCain Boulevard (Fourth Street) West of Alameda Boulevard (at NASNI Main Gate)



Data collected July 14, 2003 to July 20, 2003

Figure 2.16 Daily Traffic Volumes – First Street West of Alameda (at NASNI Gate)



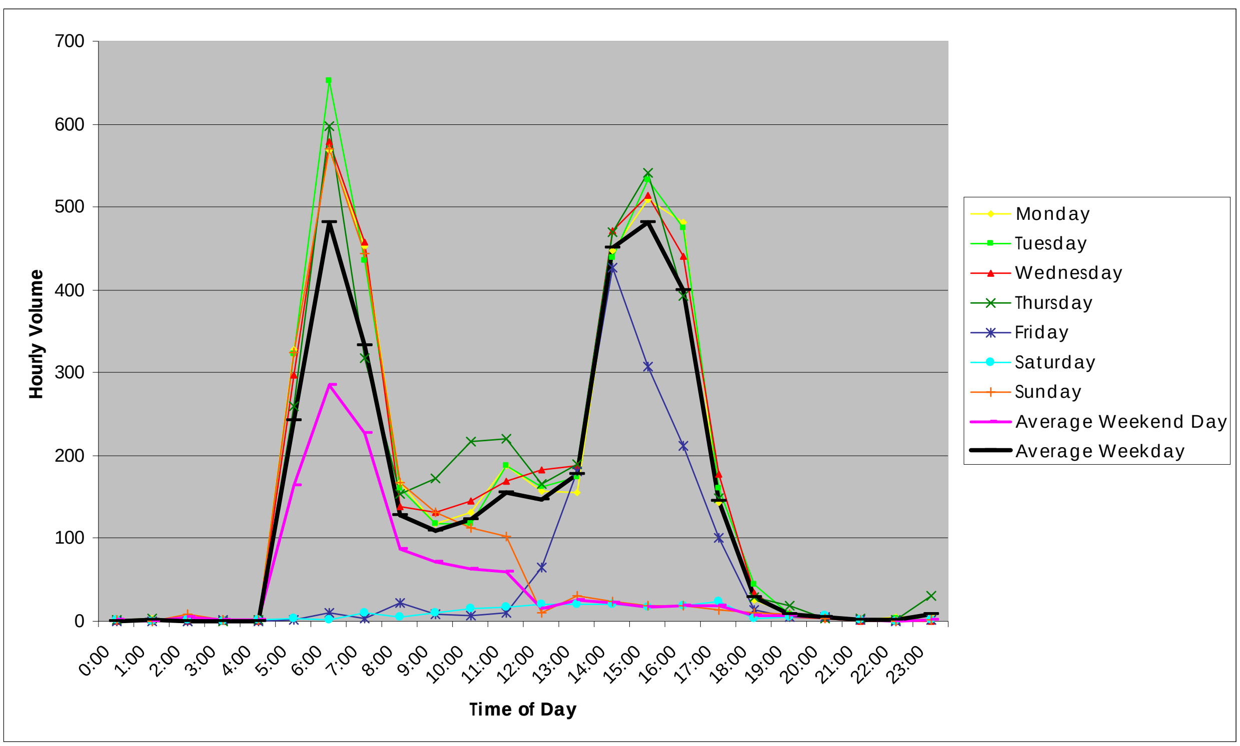
Data collected July 14, 2003 to July 20, 2003

Figure 2.16 indicates that Sunday traffic volumes at the First Street Gate are the highest for the week although volumes tend to be relatively consistent throughout the week. This occurrence is most likely indicative of activity on the base and in particularly the proximity of the First Street Gate to the commissary and carrier docks.

At the Ocean Boulevard Gate, more balanced AM and PM peaks are observed. However, unlike the other gate locations, variations in daily volumes at the Ocean Boulevard gate are noticeably different during the days of the week. As illustrated in **Figure 2.17**, this is particularly the case on Saturdays when the gate traffic remains relatively inactive. Low traffic volumes are also observed at the gate from Thursday afternoon to Friday morning, and on Sunday evening. These atypical variations in the traffic flows are most likely a reflection of irregular activity levels on this part of the base, although there is no obvious apparent explanation for the unusual traffic flow pattern.

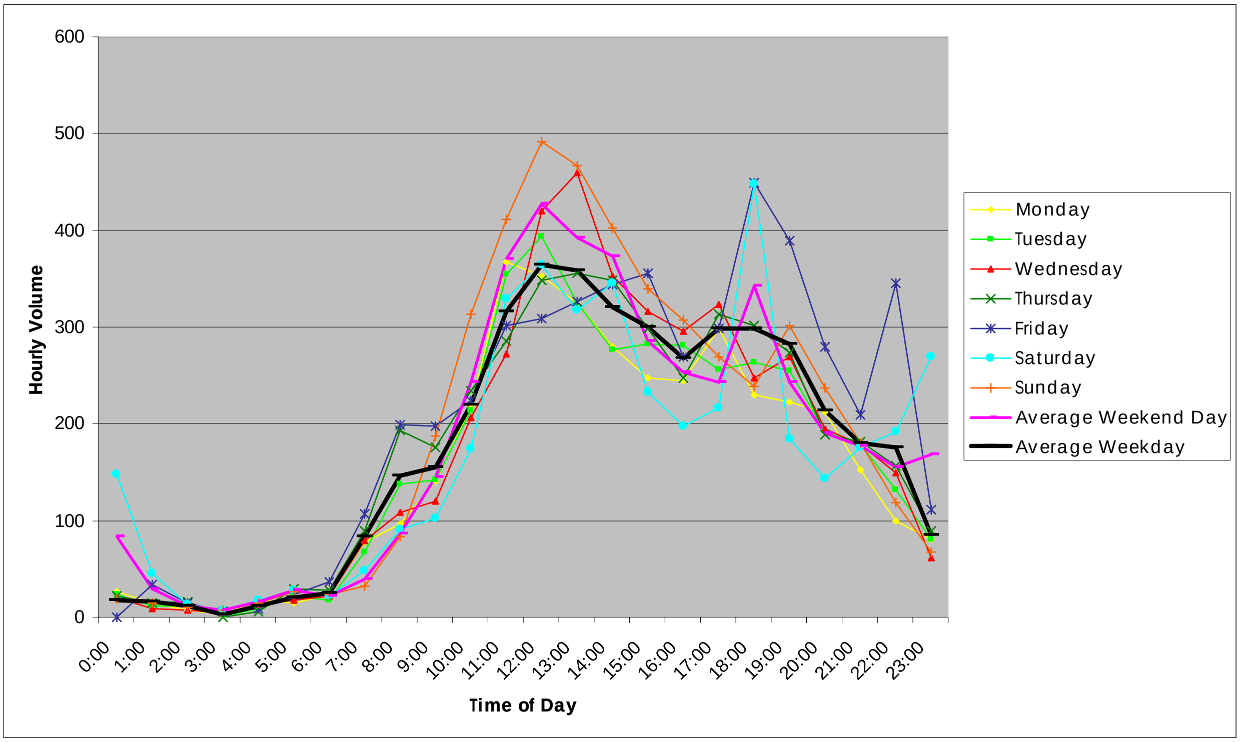
Traffic flows at the Hotel Del Coronado are extremely variable throughout the day, but generally reflect a midday peak, sustained afternoon traffic volumes and a less definitive PM peak, as illustrated in **Figure 2.18**. Noticeable peaks in traffic volumes are evident on Friday and Saturday evenings between 6:00 PM and 7:00 PM, between 10:00 PM and 11:00 PM Friday, between 11:00 PM and 1:00 AM Saturday, and between noon and 1:00 PM Sunday. These peak times are consistent with the resort hotel and in particular the banquet and dining services offered by the Hotel Del Coronado.

Figure 2.17 Daily Traffic Volumes – Ocean Boulevard at NASNI Gate



Data collected July 14, 2003 to July 20, 2003

Figure 2.18 Daily Traffic Volumes – Hotel Del Coronado Main Entrance



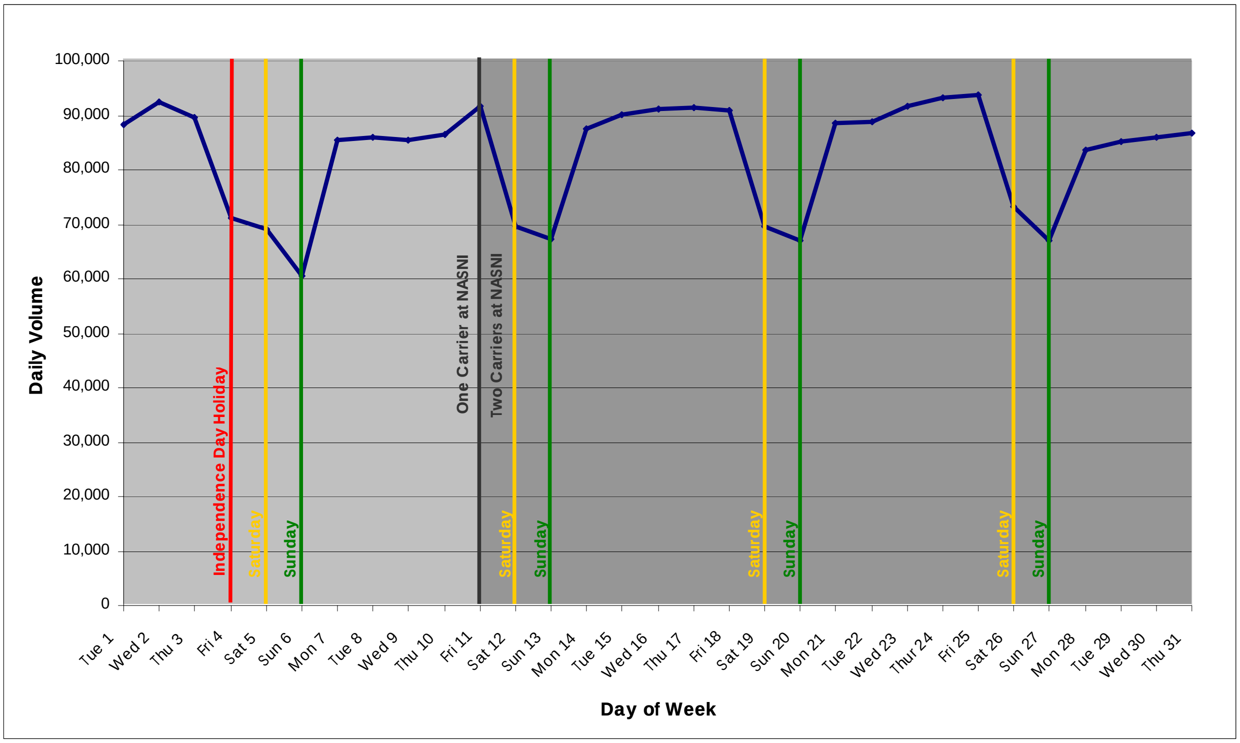
Data collected July 11, 2003 to July 17, 2003

2.4.4 Monthly Traffic Volume Trends

Short term trend changes in traffic volume for a given area are generally attributable to a notable change in trip generation at a major source(s), such as the impact of the holiday shopping season on the trip generation at a major regional mall or the impact of summer vacation on trip generation at schools. In the case of the City of Coronado, the most notable variable in short term traffic is the impact of Navy carrier fleet activity at NASNI. Traditionally, any increase in the number of carriers berthed at NASNI similarly increases trip generation at the base, and therefore increases overall traffic within the City of Coronado. In the context of the City-Wide Major Traffic Study, an opportunity to evaluate the apparent impact of increased carrier activity at NASNI was provided when a second carrier was docked at the base midway through July 2003 and during the collection of data to support the study. Traffic data on SR-75 at the bridge toll plaza and along the Silver Strand was archived throughout this period as the basis for assessing any impacts of base activity on traffic flow to and from Coronado.

Figure 2.19 illustrates overall traffic flow on SR-75 at the bridge toll plaza for the month of July 2003. The figure shows daily traffic volumes during the month and specifically highlights the impact of weekend days, the Independence Day Holiday and the number of carriers berthed at NASNI on the overall volume at this location.

Figure 2.19 Monthly Traffic Volumes – SR-75 at Coronado Bridge Toll Plaza



Source: Caltrans Permanent Count Station, July 2003
City of Coronado Traffic Condition Log

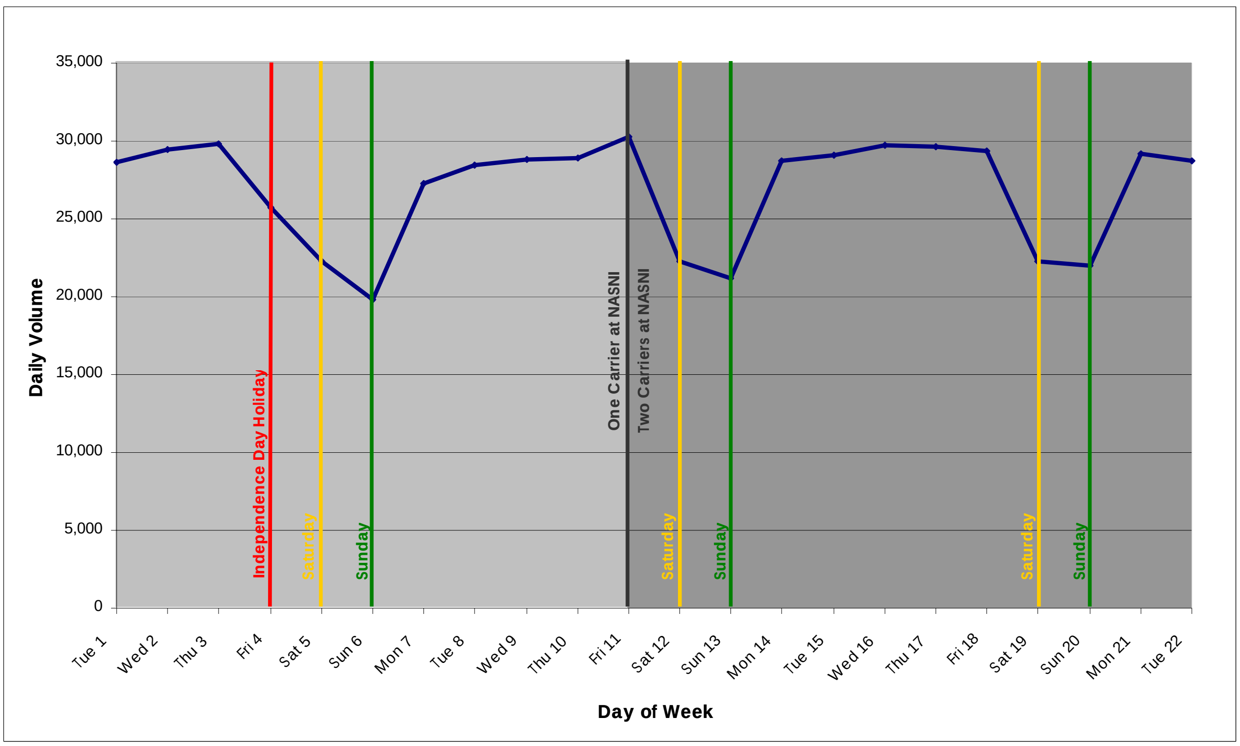
As can be seen in the figure, ambient traffic volumes at this major access point to the city remain relatively constant throughout the month, with daily volumes varying by less than 10% during any week. From the figure, it is also possible to observe the impact of weekend days and holidays on reducing the overall traffic volume, which is consistent with the reduction in resident commute traffic expected on these non-work days.

A review of the figure indicates an increase in overall traffic volume between the week preceding and the week following July 11, 2003, which is reflective of the increase in carrier activity at NASNI on that date. Between these two weeks, daily traffic volumes increased by approximately 5,000 vehicles per day (approximately 6%) for respective days. It is likely that this increase in traffic is directly attributable to the increase in carrier activity at NASNI in the absence of any other significant change in activity within the City of Coronado. The increased daily traffic volumes were sustained through the following week during which time two carriers continued to be berthed. It is interesting to note the decline in total daily traffic volumes in the final week of July 2003 and in the days immediately prior to the departure of one carrier on the weekend of August 2, 2003 and August 3, 2003. This decline in traffic is most likely attributable to a decline in preparation, maintenance or crew personnel activities around the two carriers, although this is difficult to substantiate due to limited available information on specific NASNI activities.

Figure 2.20 illustrates daily traffic volumes on SR-75 (Silver Strand) south of Tulagi Road. Despite the increased activity at NASNI, daily traffic volumes along the Silver Strand remained relatively constant during the week before and after July 11, 2003 with the exception of an approximately 3% increase in traffic volumes (approximately 1000 vehicles per day) on the date that the additional carrier arrived. The relatively constant daily traffic volumes at this location suggest the impact of activity at NASNI is concentrated more on the roadways linking east-west between the Coronado Bridge and NASNI.

Based on the review of short term traffic trends for the duration of data collection activities, it is felt that the overall impact of traffic variations as a result of increased carrier activity at NASNI is relatively minor in the context of ambient traffic conditions. However, to reflect the impacts of additional carrier generated traffic, any adjustments to existing traffic to reconcile data differences (as described in previous sections) will be increased to reflect the worst case condition and thus providing the most conservative basis for evaluation. Such an adjustment was necessary for data on Fourth Street west of Orange Boulevard with data for different location being collected during the week before and after July 11, 2003, respectively. To reconcile the data inconsistencies most likely attributable to increased carrier generated traffic, data at locations observed in the week prior to July 11, 2003 was adjusted upward to reflect the heavier traffic flow conditions observed in the week after July 11, 2003.

Figure 2.20 Monthly Traffic Volumes – SR-75 (Silver Strand) South of Tulagi Road (near NAB)



Source: Caltrans Permanent Count Station, July 2003
City of Coronado Traffic Condition Log

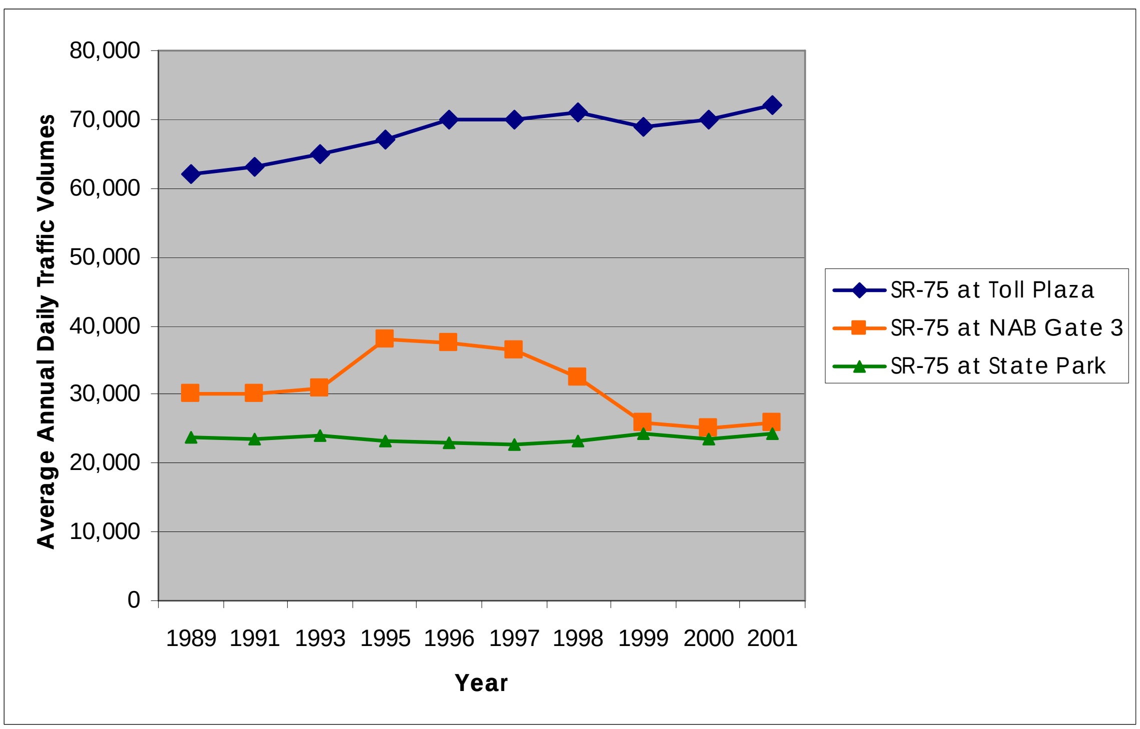
2.4.5 *Average Annual Daily Traffic Volume Trends*

Due to the highly developed nature of the City of Coronado, traffic growth to and from the community is relatively confined and substantial growth in traffic generated by local businesses and residents is not likely. However, the significant influence that the Naval facilities have on traffic in the city has been highlighted in the previous sections, and variations in activity levels at these facilities could potentially have a significant impact on traffic volumes and distribution patterns within Coronado.

Figure 2.21 illustrates average annual daily traffic volumes (AADT) for SR-75 at the two roadway access points to the city. As shown in the figure, AADT volume has increased approximately 10,000 or 15% in the 12 years from 1989 to 2001 on SR-75 in the vicinity of the Coronado Bridge. This growth has resulted in AADT volumes in excess of 70,000 on the Coronado Bridge approach to the City of Coronado. By contrast, volumes on SR-75 in the vicinity of the Silver Strand Beach State Park entrance (south of the City of Coronado) have remained relatively constant between 1989 and 2001.

It is interesting to note that traffic in the vicinity of NAB has decreased approximately 4,500 or 15% overall between 1989 and 2001 despite an increase of over 7,500 between 1993 and 1995. This overall decline is not reflected at the State Park location and therefore appears to be isolated to the vicinity of NAB and most likely reflects activity on the base. The decline in traffic volumes at this location has resulted in AADT volumes of approximately 25,000 remaining consistent at this location from 1999 to 2001. This AADT volume is only slightly higher than that observed at the State Park entrance further to the south (approximately 2,400 in 2001).

Figure 2.21 Average Annual Daily Traffic Volumes (1989 – 2001)



Source: Caltrans District 11 Traffic Census

2.4.6 Truck Traffic Volume Trends

Observed truck volumes adjacent to major traffic generators within the City of Coronado demonstrate that there is a relatively minor share of trucks on most roadways in the City, as a proportion of overall traffic. **Table 2.9** details traffic volumes for various vehicle classifications including semi trucks with 3 or more axles (vans/straight trucks with 2 axles are indicated separately). The table indicates that the highest volume of truck traffic is observed on SR-75 in the vicinity of the Coronado Bridge Toll Plaza with 446 trucks present in a twelve hour period from 5:30 AM to 5:30 PM. The location with the second highest truck volume is the NASNI First Street Gate with 220 trucks. SR-75 (Silver Strand) south of Tulagi has the third highest 12 hour volume with 101 trucks.

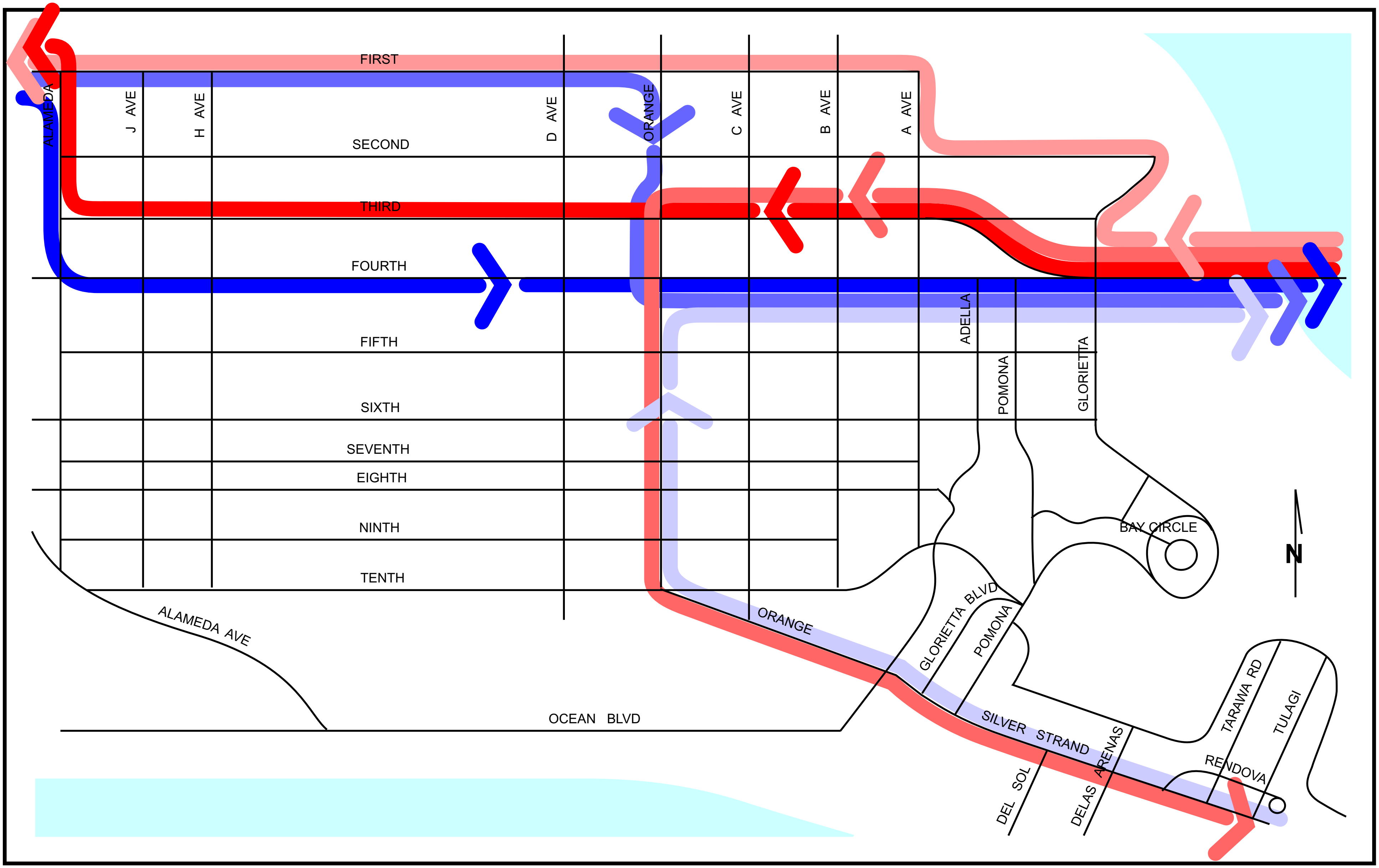
The various truck volumes described in the table is generally consistent with the observed truck traffic flows through the City of Coronado. A review of the various intersection turning movement counts collected as part of the City-Wide Major Traffic Study highlights three primary directional truck traffic flows through the city. These flows are schematically illustrated in **Figure 2.22**. This figure highlights the most notable westbound truck traffic flows along Glorietta Boulevard/First Street and Third Street/Alameda Boulevard as trucks move between the bridge and the NASNI First Street Gate. Additional notable westbound to southbound truck traffic is observed along Third Street/Orange Avenue as trucks move between the bridge and the Coronado 'village' area continuing along the Silver Strand. In reverse, the most notable east bound truck traffic flows were observed First Street/Orange Avenue/Fourth Street and Alameda Boulevard/Fourth Street as trucks depart the NASNI First Street Gate destined for the bridge. Reverse truck traffic was also observed entering the city from the Silver Strand and continuing northbound and eastbound along Orange Avenue/Fourth Street.

Table 2.9 12 Hour Vehicle Classification Volumes

Location	Autos	Vans & Buses	Semi Trucks	Total
NASNI 1st St. Gate	11,164	404	220	11,788
Tarawa/Interior Rd	174	11	3	188
Tulagi/Interior Rd	415	4	4	423
SR-75 at Bridge Toll Plaza	48,404	673	446	49,523
SR-75 s/o Tulagi	19,405	469	101	19,975
NAB Main Gate s/o Tarawa	7,308	171	33	7,512
NASNI Ocean Gate	3,829	26	9	3,864
NASNI Main Gate	21,671	247	37	21,955
Hotel Del Coronado Entrance	1,940	25	2	1,967
Strand Way/Rendova	811	0	0	811

Data collected July 2003 through August 2003

It should be noted that NASNI has modified its current truck circulation policy within the base to minimize truck impacts to residential city streets. According to NASNI, truck traffic is no longer permitted to exit the base using First Street and all truck traffic must exit through the Fourth Street Gate. The effectiveness of this change in policy will most likely lead to a redistribution of eastbound NASNI truck traffic with the majority of trucks now traveling exclusively on Fourth Street to access the bridge from the base.



PB 100 YEARS

CORONADO CITYWIDE TRAFFIC STUDY

Primary Truck Traffic Flows

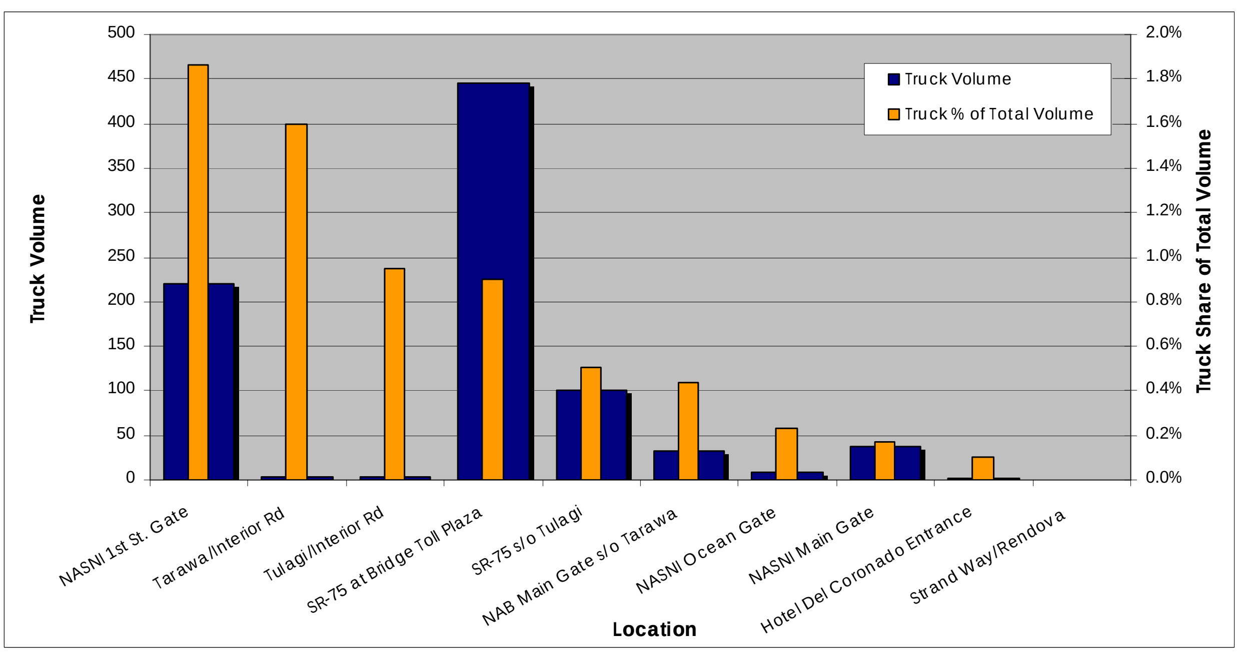
FIGURE
2.22

The pending relocation of the NASNI main gate to Third Street may also impact the distribution of truck trips within the City of Coronado. The proposed NASNI Third Street gate is intended to provide improved facilities for conducting security screening of trucks entering the base potentially influencing NASNI use of alternate gates for truck access and causing a redistribution of truck traffic toward the Third Street gate.

Shifts in truck traffic accessing NASNI would make it appropriate for the City of Coronado to consider de-designating certain truck routes that would no longer be necessary to provide access to NASNI. Truck routes are adopted and deleted by City Council ordinance. Upon completion of the proposed NASNI Main Gate at Third Street, it is recommended that the Coronado City Council adopt an ordinance to modify the City of Coronado's designated truck routes to remove current routes 4 (First Street from Orange Avenue to Alameda Boulevard) and 5 (Glorietta Boulevard to Second Street to A Avenue from SR-74 to First Street) from the system.

When truck volumes are assessed as a share of the total vehicle volume, it becomes clear that trucks represent a relatively low proportion of total vehicles at the locations where data were collected. **Figure 2.23** indicates that only two locations show trucks constituting more than 1% of the total vehicles observed. At the NASNI First Street Gate trucks represent approximately 1.8% of the total traffic while trucks at Tarawa and Interior Road trucks represent 1.6% of all traffic (although the overall traffic volume at this location is extremely low). For all other locations trucks represent less than 1% of the total traffic which is relatively low by typical standards. As a frame of reference, the Highway Capacity Manual (HCM) 2000, published by the Transportation Research Board, indicates that truck volumes of 2% of total traffic would be considered the minimum (default) threshold for transportation planning and traffic analysis purposes within urban areas.

Figure 2.23 12 Hour Truck Traffic Volumes



2.4.7 *Ongoing Traffic Monitoring*

The traffic analysis included as part of the Citywide Major Traffic Study reflect a 'snapshot' look at the traffic volumes and circulation patterns within the City of Coronado. To facilitate the early identification of future transportation system deficiencies and to determine the ongoing effectiveness of transportation system improvements within the city, it is appropriate to establish a permanent data collection program to track traffic changes over time.

Caltrans currently maintains two permanent vehicle count stations within the City of Coronado. These stations are located on SR-75 in the vicinity of the bridge toll plaza and south of Tulagi Road near NAB, and are the source of the limited traffic volume trend information described previously. In addition to these two existing count stations, it would be appropriate for the City of Coronado and Caltrans to consider the installation of up to six additional permanent count stations along SR-75 and SR-282 to monitor changing traffic volumes and patterns within the city.

It is recommended that the following locations be considered as candidate sites for additional permanent count stations on SR-75 and SR-282:

- Third Street between A Avenue and B Avenue
- Third Street between F Avenue and G Avenue
- Fourth Street between A Avenue and B Avenue
- Fourth Street between F Avenue and G Avenue
- Orange Avenue between Fifth Street and Sixth Street
- Orange Avenue south of Ocean Boulevard

Where possible, the recommended station locations endeavor to incorporate sites where vehicle flow is sustained to minimize the impact of counter limitations with vehicle detection at extremely low speeds. Since these locations fall along State highways, Caltrans typical standards for traffic counting stations would be most appropriate for these locations. A typical Caltrans traffic count station consists of the following equipment:

- Inductive loop detectors – used to detect the presence of vehicles
- Model 170 controller cabinet assembly – used to collect inputs from loop detectors and convert to data
- Electrical service enclosure – used to provide power to the controller assembly and loops
- Standard pull boxes – used as housing to connect conduit and wiring
- Rigid steel or PVC conduit – encasement used to protect wiring from pull boxes to the controller cabinet assembly
- Detector lead in cable (DLC) – connects and transmits input from the loop detectors to the controller cabinet assembly
- Miscellaneous wiring

These stations may or may not be interconnected to a central traffic management center. Such interconnection can be accomplished through the use of telephone modem, fiber optics, or VSAT (very small aperture terminal).

The combination of the existing and recommended count station locations on SR-75 and SR-282 will provide for ongoing observation of traffic moving in and out of Coronado, as well as for observation of changing trends in traffic volumes and changing distribution along Coronado's principal arterials. Observations at these stations will be sufficient to enable the identification of changes in traffic generation within the City of Coronado and the determination of shifts in island traffic patterns. Regular monitoring at these stations will also allow the determination of daily, seasonal and annual traffic flow trends and the relationship between traffic growth and major activity changes within the city (such as changes in activity levels at Navy facilities).

To supplement the State highway count stations, the City of Coronado may consider additional regular count stations at strategic locations within the city street system. Candidate locations may include:

- First Street between F Avenue and G Avenue
- First Street west of Alameda Boulevard
- Third Street west of Alameda Boulevard
- Fourth Street west of Alameda Boulevard
- Sixth Street between A Avenue and B Avenue
- Sixth Street between F Avenue and G Avenue
- Ocean Boulevard west of Alameda Boulevard
- Alameda Boulevard between Fourth Street and Fifth Street
- Pomona Avenue between Fourth Street and Fifth Street
- Glorietta Boulevard between Fourth Street and Fifth Street
- RH Dana Place south of Orange Avenue

These locations represent strategic sites to enable the City of Coronado to monitor shifting traffic patterns within the city, and particularly on streets impacted by overflow and bypass traffic from SR-75 and SR-282. Other candidate locations may be identified as appropriate to address specific ongoing traffic flow issues within the City of Coronado.

A range of technologies are available for the collection of data at these locations, depending on the needs of the City of Coronado. Should data collection at these locations be determined to be necessary only at regular sampling intervals (possibly as infrequent as biennially) and not on an ongoing basis, permanent count stations would not be mandated. In this scenario, traditional inexpensive tube counting devices or 'tablet' devices could be installed as necessary to collect the desired data. Alternatively, permanent count stations could be installed using traditional loop detection equipment with data collected at the desired intervals using removable counters (similar to tube counters) or on an ongoing basis using permanent counters similar to those typically currently used by Caltrans. Examples of this traditional type of counter is the Jamar TRAX series of counters with models offering a variety of capabilities including the ability to use loop detection and the ability to collect a variety of data including counts, speeds and classification. The TRAX III counter represents the most versatile of the TRAX series with the ability to collect binned volume, speed and classification using tubes or induction loops.

Recent technological innovations in traffic counting equipment include the use of video vehicle detection equipment (such as 'Autoscope' sensors) or low-power infrared lasers aimed at reflectors or other markings in the pavement. Each of these technologies has the inherent advantage of being less susceptible to equipment failure once installed and calibrated, and generally these types of detectors can be more effective at determining vehicle speed and classification in addition to volume, presence or number of axles. However, these technologies are only suited to permanent installations, are susceptible to interference from dust, fog or water, and are generally more expensive to initially acquire than traditional traffic counting equipment (although installation and long term maintenance cost savings can make these units equally as cost effective as permanent induction loop counters).

Other technologies include true presence microwave radar and doppler microwave technologies. These technologies are capable of vehicle counting and vehicle speed measurement, but not vehicle classification. The doppler microwave technology cannot detect stopped or very slow-moving vehicles, while the true presence microwave radar can. The doppler microwave technology measures speed directly per vehicle, while the true presence microwave radar only provides average speed data. The true presence microwave radar can also operate in side-looking mode to service multiple lanes. Both technologies perform well in inclement weather. In order to obtain accurate counts, both technologies require a narrow-beam antenna to confine the footprint to a single lane in forward-looking mode.

Selection of the best technology depends on the specifics of each application. However, in light of the various pros and cons mentioned above, and given the maturity and accuracy of traditional traffic counting equipment, it may represent the most suitable option for many of the City of Coronado's ongoing traffic counting needs. Exceptions for specific consideration of alternative technologies may include the three locations identified immediately west of Alameda Boulevard at the primary entrance and exits from NASNI. At each of these locations, the combination of slow moving or stopped vehicles and limited space availability could prohibit the effective use of traditional counting equipment and necessitate the use of video, radar or microwave technologies which could be installed 'remotely' on light posts or signal heads at the respective intersections with Alameda Boulevard.

2.5 City of Coronado Written Policy Review

In anticipation of defining the problem statement that will establish the framework for evaluating the various mitigation measures identified as part of the Citywide Major Traffic Study, it is necessary to complete a review of the City's current Circulation Element. The review of the City's current General Plan Circulation Element is intended to verify the appropriateness of stated transportation vision and goals and objectives. Where necessary, changes in written policy will be recommended to provide the framework for focusing transportation system investments to better accommodate existing and future traffic, and to minimize the impacts of traffic on the quality of life within the City of Coronado.

The Circulation Element is a mandated element of the city's General Plan Policy Document. The City of Coronado adopted its first Circulation Element in 1971. In 1984, the

City Council appointed an ad hoc Transportation Circulation Committee to organize community involvement to develop a new draft General Plan Circulation Element. In 1989, a Unified Transportation Planning Group (UTPG) was formed to develop a California Transportation Commission funding request for Coronado Bridge traffic related circulation projects. The UTPG was tasked by the City Council to create a Unified Transportation Plan (UTP) with the goals of

- mitigating impacts of traffic on the community and commuter,
- to improve traffic flow and safety,
- to improve cross-highway safety and accessibility,
- to reduce volume of traffic in and approaching the City

In 1990, the City Staff merged the UTP into the old General Plan Circulation Strategy document to create a new draft Circulation Element. After a number of workshops and Public Hearings to discuss the draft element and various alternatives to it, the draft element was subsequently revised and approved in concept by the City Council in 1993. The final Environmental Impact Report for this draft was certified by the City Council in July 1995 and the Element itself in September 1995, and adopted by the City Council on October 17, 1995.

The City's Circulation Element addresses both motorized and non-motorized transportation along with water vessel circulation, which forms an integral part of mobility in an 'island' community like Coronado. The document also tries to deal with the interrelationships between the various transportation modes by coordinating policies and programs within the City's General Plan Circulation, Transportation, Parking and Land Use Element.

2.5.1 Circulation Element Goals

The Circulation Element Goals for the City of Coronado are described as follows:

1. Provide a disciplined traffic circulation system to correlate with and assist in achieving the following overall concept for the Coronado General Plan: "To preserve and improve Coronado primarily as a beautiful, pleasant residential community in which to live, work, shop and pursue leisure time activities."
2. Accommodate present and future traffic in a manner consistent with the higher priority of the Coronado General Plan concept to preserve the community's residential character.
3. Achieve a systematic classification scheme for city streets based on function and compatibility with adjacent land uses.
4. Provide circulation patterns that are continuous and clear to the users.
5. Provide circulation service that is safe for pedestrian, bicycle and motor vehicle traffic, efficient for all users, and direct in accordance with movement desires.
6. Respect the integrity and stability of neighborhoods, school areas, hospitals, and other activity centers.
7. Minimize pedestrian/ bicycle/ motor vehicle conflict points within the system.
8. Provide adequate pedestrian, bicycle and motor vehicle access to all parcels.

9. Reduce the adverse environmental and safety impacts and ameliorate the unpleasant side effects of traffic circulation (bulk, noise, fumes, clutter, cross traffic barrier and the physical isolation of areas from each other).
10. Minimize through traffic movement on local and residential streets.
11. Reduce excessive traffic speeds on residential streets through the use of traffic control measures and modifications to the street design as appropriate.
12. Provide residential streets with the clear appearance of the local function.
13. Achieve on the arterial system a level of service (LOS) "C" with a peak traffic hour LOS of "D" through the year 2010.
14. Consider incorporation into the "City of Coronado CEQA Guidelines" local significance thresholds of what is not significant project traffic generation in regard to requiring additional CEQA analysis for the average daily trips generated by small projects.
15. Consider incorporation into the "City of Coronado CEQA Guidelines" standardized traffic related project mitigation.

Though for the most part the individual goals for the Circulation System are applicable to a moderately sized island community like Coronado and are in accordance to its General Plan concept of enhancing its residential characteristic, the definition of such an extensive list of goals inherently results in difficulty applying the goals as the basis for measuring successful accomplishment. Like those of many municipal planning documents, the goals of the City of Coronado Circulation Element strive to be all encompassing resulting in a combination of nebulous, ambiguous goals with limited applicability, redundant goals, and very specific and occasionally overreaching parametric goals.

Planning goals are intended to serve as the foundation for all subsequent steps in the planning process. The statement of planning goals establishes the overall vision and framework from which problems or deficiencies are able to be identified and potential solution are able to be measured and evaluated. For this reason it is necessary to ensure that planning goals are clearly and concisely articulated.

A review of the City of Coronado Circulation Element goals reveals three core elements that are reiterated throughout. These three elements represent the focus of the City of Coronado General Plan vision and are most appropriate to serve as the basis for concise Circulation Element Goals.

These three elements are:

- Alleviate the adverse impacts of traffic circulation within the community
- Minimize through traffic intrusion into residential neighborhoods
- Facilitate safe traffic circulation and interaction between modes

Applying these three elements as transportation planning goals, objectives can be defined as specific, measurable statements related to the attainment of the goals. These objectives subsequently serve as the basis for developing measures of effectiveness (MOEs) to reveal the degree of attainment of each objective and in turn each goal thereby enabling the City of Coronado to assess the effectiveness of alternative transportation strategies to address the respective transportation goals.

The intent of the Citywide Major Traffic Study is not to supercede the Circulation Element, but rather to supplement the Circulation Element through a review of current and future transportation system performance and the adequacy of the Circulation Element goals to respond to transportation system needs. In this context, it is recommended that the City of Coronado initiate a comprehensive review of the adequacy of Circulation Element Goals to address community vision and transportation system needs. It is recommended that the Circulation Element goals be restructured to concisely address the three core elements described previously, and that objectives and MOEs be defined to measure attainment of the prescribed goals.

Borrowing from the existing Circulation Element goals, the following list provides an example of how specific objectives could be applied to qualify each of the recommended core elements/goals.

- Alleviate the adverse impacts of traffic circulation within the community
    - Achieve a peak period level of service (LOS) D on the arterial street system through 2010
    - Ameliorate traffic impacts on the environment, including emissions, noise, aesthetics and neighborhood fragmentation

- Minimize through traffic intrusion into residential neighborhoods
    - Classify city streets based on function and compatibility with adjacent land uses
    - Utilize traffic control measures to preserve the character of city streets

- Facilitate safe traffic circulation and interaction between modes
    - Provide adequate access for all transportation system users
    - Minimize conflict points within the transportation system
    - Control excessive vehicle speeds on city streets

2.5.2 Circulation Element Vehicular Circulation Plan

The Circulation Plan predominantly relies on the existing State Highway 75 and 282 to form the principal/major arterial framework of the city. The balance of the City's street system is subsequently categorized as Minor Arterial, Collector and Local based on typical design characteristics and thresholds of Average Daily Traffic (ADT) that these streets carry.

Figure 2.24 and **Figure 2.25** illustrate the City of Coronado Circulation Plan and the respective functional classification of city streets. The following list summarizes the daily ADT capacity ranges of different streets based on their functional classification as defined in the City of Coronado Circulation Element:

- Principal Arterial : >15,000 ADT
- Minor Arterial : 7,500 -15,000 ADT
- Collector : 2,500 -7,500 ADT
- Local : <2,500 ADT

Figure 2.24 City of Coronado Circulation Plan (Village)

Figure 2.25 City of Coronado Circulation Plan (Strand)

Examination of existing traffic conditions in the previous section reveals that while many of the streets comply with the minimum recommendation in their functional class as defined in the Circulation Element, a few are carrying more than the maximum range indicated. For this reason, it is appropriate to review the Circulation Plan functional classifications in the context of the current functional levels of city streets, and to provide recommendations for addressing inconsistencies in the Circulation Plan.

- *Principal Arterial* - The Circulation Plan identifies only SR-75 and SR-282 as the principal arterials for the City of Coronado. This designation appropriately reflects the inter-regional significance and function of these facilities which provide connectivity between the City of Coronado and surrounding communities.

- *Minor Arterial* – Pomona Avenue, Alameda Boulevard, Ocean Boulevard and the northerly section of Orange Avenue are currently designated as minor arterials, and these facilities generally function consistent with this designation by providing connectivity between major trip generators within the City of Coronado and the principal arterial highways. The most notable exception is Pomona Avenue, which despite the minor arterial designation, functions primarily as a collector street. The lesser function of Pomona Avenue is most likely attributable to the limited access to and from SR-75. Conversely, parallel Glorietta Boulevard, which is designated as a collector, carries extremely high northbound volumes north of Sixth Street due to the ease of access from Glorietta Boulevard to eastbound SR-75 and the Coronado Bridge. As a result, it is necessary to address the discrepancy in function, performance and classification in the vicinity of Pomona Avenue and Glorietta Boulevard to clarify the expectations and operational characteristics for the respective streets.

- *Collector Street* – A number of streets in the City of Coronado have been designated as collector streets. These facilities provide access to and between the local street system and the arterial street system.
    - Although several collector streets carry less than the prescribed functional class minimum volumes, the function of these facilities generally remains consistent with the classification of a collector streets.
    - B Avenue and H Avenue both carry approximately 1,000 vehicles daily. Due to the grid layout of the street system in the Village portion of Coronado, the function of these streets and adjacent streets as local or collector could be considered interchangeable.
    - First Street and Glorietta Boulevard (north of Sixth Street) carry traffic volumes approaching or exceeding the maximum threshold for collector streets, primarily due to overflow and bypass traffic from principal arterials SR-75 and SR-282. Incorporating suitable design elements or reclassification of these facilities to reflect the relationship between function, performance and classification is appropriate to ensure consistency with the Circulation Plan.
    - Fifth Street (classified as a local street) tends to function similar to Sixth Street (classified as a collector) due to the impact of overflow traffic

from SR-75 and SR-282. Similarly, the incorporation of suitable design elements or reclassification of Fifth Street (or Sixth Street) is appropriate.

- *Local Street* – Any streets not classified as principal arterial, minor arterial or collector are considered local streets, which serve to provide direct access to property. Within the City of Coronado, local streets generally function consistent with the designation. Notable exceptions are Second Street and Fifth Street, which are impacted by overflow traffic from SR-75 and SR-282.

A comparison of the functional classification ADT thresholds defined in the Circulation Element to other peer resources validates the appropriateness of these ranges for the City of Coronado. The major peer resource for comparing the ADT functional classification thresholds is the San Diego Association of Governments (SANDAG) Congestion Management Program Traffic Impact Studies Guidelines that consolidates the San Diego Traffic Engineers Council and Institute of Transportation Engineers California Border Section (SANTEC/ITE) Traffic Study Guidelines. The following **Table 2.10** summarizes the ADT thresholds for differing functional classifications and highlights the relatively conservative thresholds for street within the City of Coronado.

Table 2.10 ADT Threshold Range Comparison by Functional Classification

Functional Class	Threshold Range	
	City of Coronado Circulation Element	SANDAG CMP Traffic Impact Studies Guidelines
Principal Arterial	Greater than 15,000	15,000 to 50,000
Minor Arterial	7,500 to 15,000	10,000 to 30,000
Collector	2,500 to 7,500	2,500 to 15,000
Local	Less than 2,500	Less than 8,000

Sources: City of Coronado General Plan Circulation Element, October 17, 1995
SANDAG 2002 Congestion Management Program Update, Appendix D; Traffic Impact Studies Guidelines, January 2003

It should be noted that, while ADT based consideration is a useful planning tool, it has limited relevance in identifying roadway capacity and determining roadway performance. Roadway performance is typically limited by intersection performance, and for this reason intersection performance is utilized exclusively as the basis for evaluating the performance of the City of Coronado street system as part of the Citywide Major Traffic Study.

For the purpose of evaluating project specific traffic impacts associated with the development activity in the City of Coronado, the SANDAG Congestion Management Program Traffic Impact Studies Guidelines provides appropriate methodologies and criteria for completing such analyses. The use of these regional guidelines for the purposes of evaluating traffic impacts in the City of Coronado provides consistency with other agencies in the San Diego metropolitan area and applies the most defensible methodology and criteria based on national and regional experiences. Furthermore, agency staff, developers and consultants serving Coronado are familiar with the SANDAG guidelines ensuring a standardized analysis approach and minimizing the potential for unnecessary confusion and irregularities evaluating project related traffic impacts.

3.0 SHORT-TERM FORECAST CONDITIONS

Utilizing the intersection turning movement existing data as a basis, this section describes the development of short-term traffic forecasts for the City of Coronado and the analysis of short-term future traffic conditions. The short-term traffic forecast incorporates the traffic impacts of future expansion at key traffic generators in the City, including NASNI, NAB and the Hotel Del Coronado.

Intersection level of service analysis was completed for the short-term forecast. The short-term forecast analysis results will be compared to existing conditions and will be used as the basis for identifying future short-term traffic mitigation needs for the City of Coronado street system.

3.1 Short-Term Traffic Forecast Methodology

Short-term traffic forecasts for the City of Coronado were developed based on the existing traffic conditions data collected in July and August, 2003, as part of this study. The existing conditions data for intersection turning movements were modified to account for anticipated increases in traffic generation within the City of Coronado with the intent of utilizing this information to analyze peak-hour short-term future traffic conditions. A number of assumptions were made in projecting the short-term traffic. The traffic forecast assumptions were developed in consultation with staff from the City of Coronado Engineering Department and were subsequently endorsed by City staff prior to completing the traffic forecasts. The short-term future traffic forecast assumptions are described in detail as follows:

1. A nominal 3 percent general area growth factor was applied to traffic volumes at all of the study intersections. This general area growth factor is intended to represent the incremental traffic increase resulting from small-scale infill development and re-development projects as well as growth in recreation and tourist traffic within the City of Coronado. Traffic movements into and out of NASNI, NAB and Hotel Del Coronado were not considered as part of the incremental traffic increase since traffic growth at these locations was forecast and applied to City intersections through a separate process.

2. The traffic projection for NASNI assumes that three naval carriers are in port. The traffic counts taken in July 2003 reflect an activity level that is comprised of the “ambient” base activities (when no carriers are in port) and the additional activity associated with two carriers in port. The presence of one or two carriers in port is fairly common and therefore the assumption of three carriers in port represents a somewhat elevated level of activity at NASNI and the U.S. Naval Amphibious Base. Since we only have traffic data at the gates for the one naval base activity level (representing two carriers in port), it was necessary to make an assumption concerning the amount of traffic contributed by the carriers relative to the ambient NASNI activity (with no carriers in port). The current conservative estimation assumes that each carrier adds approximately 10% more traffic to the “ambient” level, which is generally consistent with the observations described in **Section 2.4.4.** In the case of two carriers being in port, the traffic volume at each gate is broken

out as: 80% ambient, 10% carrier #1, and 10% carrier #2. With this assumption carrier #3 would increase the base level count (with 2 carriers) by 10% over the July 2003 counts.

3. The distribution of added traffic from NASNI and NAB onto the study area roadway network has been estimated based on the results of "select zone" traffic analysis assignment maps generated by the SANDAG regional travel demand forecast model.

4. The increment of added traffic for the Hotel Del Coronado expansion was taken directly from the Linscott Law & Greenspan (LLG) January 2001 traffic study for the hotel expansion. The trip generation rate used in the study has been reviewed and it appears to be reasonable.

5. The distribution of traffic added by the hotel expansion was taken in part from the traffic study and in part from the SANDAG select zone analysis assignment results. The LLG study also used a SANDAG select zone analysis to determine the distribution of trips to and from the Hotel Del Coronado. However, since the extents of the LLG study did not cover the entire City of Coronado, the results of the SANDAG select zone analysis completed as part of this study were utilized to assign the trips throughout the City.

3.1.1 Short-Term Forecast Traffic Generation and Distribution

Application of Assumption 1 described above resulted in incremental traffic being allocated at each intersection throughout the City of Coronado. Traffic generation associated with the remaining assumptions and specifically affecting NASNI, NAB and the Hotel Del Coronado was calculated separately. **Table 3.1** indicates the incremental trip generation calculated for NASNI, NAB and the Hotel Del Coronado.

Table 3.1 Short-Term Forecast Incremental Traffic Generation

Location	Added Traffic Generation			
	AM In	AM Out	PM In	PM Out
NASNI				
First St. Gate	189	14	24	101
Fourth St. Gate	184	28	74	194
Ocean Blvd. Gate	85	5	15	56
Total NASNI	**458**	**47**	**113**	**351**
U.S. Naval Amphibious Base				
NE Tarawa Rd.	49	18	17	37
SW Tarawa Rd.	53	2	9	39
Total NAB	**102**	**20**	**26**	**76**
Hotel Del Coronado	**77**	**51**	**102**	**68**
Total	**637**	**118**	**241**	**495**

The general distribution of the incremental traffic generated by NASNI, NAB and the Hotel Del Coronado was derived from the SANDAG select zone analysis assignment and Hotel Del Coronado Traffic Study. The general distribution of additional traffic for these major traffic generators is outlined in Table 3.2.

Table 3.2 Short-Term Forecast Incremental Traffic Distribution

Location	Trip Distribution		
	Within Coronado	Coronado Bridge	Silver Strand
NASNI			
First St. Gate	12	83	5
Fourth St. Gate	12	83	5
Ocean Blvd. Gate	12	83	5
U.S. Naval Amphibious Base			
NE Tarawa Rd.	24	56	20
SW Tarawa Rd.	24	56	20
Hotel Del Coronado	19	69	22

Following the distribution of the incremental additional traffic, further modifications were completed to the traffic forecast to ensure appropriate balancing of corridor volumes. Additional forecast volume adjustments were also made for PM peak period eastbound traffic along Fourth Street to better reflect to influence of traffic flow 'spiking' that occurs following the end of shifts at NASNI on the hour and half hour. These spikes have a notable impact on traffic along Fourth Street effectively overloading the system and therefore needed to be quantified in the context of this study. An approximately 15% increase to eastbound future forecast traffic volumes along Fourth Street was made to reflect the impact of PM peak hour traffic spiking from NASNI.

3.2 Short-Term Forecast Traffic Volume Data

Tables 3.3 and **3.4** summarize the resultant short-term forecast intersection traffic volumes for the AM and PM peak hour periods, respectively. **Figures 3.1** and **3.2** illustrate the short-term forecast peak hour turning movements at each of the intersections being analyzed as part of this study.

Table 3.3 Short-Term Forecast AM Peak Hour Intersection Volumes

#	Intersection	Northbound			Southbound			Eastbound			Westbound			Total
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
1	Alameda Blvd & First St	1,150	0	26	0	0	0	0	37	118	9	930	0	2,270
2	Alameda Blvd & Third St	0	0	0	0	130	0	0	0	0	1,509	0	744	2,383
3	Alameda Blvd & Fourth St	485	0	41	83	22	1,537	0	259	54	0	0	0	2,481
4	Alameda Blvd & Fifth St	0	304	6	6	64	0	0	0	0	6	0	216	602
5	Alameda Blvd & Sixth St	2	282	4	5	71	4	24	6	2	4	13	29	446
6	Alameda Blvd & Country Club	2	224	0	0	89	0	0	0	4	0	0	0	319
7	Alameda Blvd & Ocean Blvd	0	0	0	66	0	3	0	54	0	0	554	171	848
8	H Ave & First St	12	0	14	0	0	0	0	46	1	3	830	0	906
9	H Ave & Third St	10	11	0	0	2	4	0	0	0	0	2,216	12	2,255
10	H Ave & Fourth St	0	35	29	13	10	0	0	541	2	0	0	0	630
11	H Ave & Fifth St	2	36	2	0	4	3	1	6	0	4	313	7	378
12	H Ave & Sixth St	5	21	3	1	2	6	9	12	1	2	93	5	160
13	H Ave & Tenth St	2	6	2	8	9	5	15	44	0	4	74	15	184
14	D Ave & First St	5	1	14	8	1	1	0	70	1	1	813	3	918
15	D Ave & Third St	2	11	0	0	34	0	0	0	0	34	1,696	4	1,781
16	D Ave & Fourth St	0	16	18	26	43	0	0	566	2	0	0	0	671
17	D Ave & Fifth St	1	14	4	1	22	0	1	11	0	2	260	1	317
18	D Ave & Sixth St	2	45	21	13	33	4	2	25	6	6	71	1	229
19	D Ave & Eighth St	6	11	26	6	20	0	2	68	1	3	35	1	179
20	D Ave & Tenth St	0	0	0	23	0	2	4	72	0	0	80	13	194
21	Orange Ave & First St	339	0	61	0	0	0	0	5	47	294	311	0	1,057
22	Orange Ave & Second St	52	408	73	3	168	208	3	14	52	100	313	26	1,420
23	Orange Ave & Third St	53	174	0	0	363	8	0	0	0	1,866	1,619	336	4,419
24	Orange Ave & Fourth St	0	219	291	354	1,962	0	21	406	51	0	0	0	3,304
25	Orange Ave & Fifth St	37	505	8	30	1,986	143	5	3	8	4	17	23	2,769
26	Orange Ave & Sixth St	31	500	7	23	1,471	53	21	11	23	5	15	18	2,178
27	Orange Ave & Eighth St	19	525	4	7	1,460	20	44	12	15	8	10	0	2,124
28	Orange Ave & Tenth St	53	472	3	32	1,474	33	27	21	47	8	14	22	2,206
29	Orange Ave & Ocean Blvd	635	489	7	18	1,194	116	29	83	81	19	26	8	2,705
30	Orange Ave & Pomona Ave	0	0	0	85	0	5	0	1,424	0	0	981	532	3,027
31	C Ave & First St	96	0	3	0	2	2	1	28	39	6	717	0	894
32	C Ave & Third St	3	0	0	0	0	7	0	0	0	0	3,814	4	3,828
33	C Ave & Fourth St	0	2	14	8	3	0	1	1,267	3	0	0	0	1,298
34	C Ave & Sixth St	12	13	10	1	10	4	6	42	6	4	22	3	133
35	C Ave & Eighth St	3	9	3	2	23	5	4	26	0	2	22	0	99
36	C Ave & Tenth St	4	16	5	7	15	10	3	56	5	4	35	2	162
37	C Ave & Orange Ave	0	0	0	11	0	9	24	1,371	0	0	522	12	1,949
38	B Ave & First St	79	1	0	1	2	1	8	18	13	14	636	4	777
39	B Ave & Third St	1	1	0	0	0	12	0	0	0	0	3,666	5	3,685
40	B Ave & Fourth St	0	3	19	9	4	0	5	1,289	4	0	0	0	1,333
41	B Ave & Fifth St	2	28	1	6	2	2	4	28	5	0	27	2	107
42	B Ave & Sixth St	4	19	3	6	8	5	8	31	3	0	26	3	116
43	B Ave & Tenth St	11	13	15	2	12	3	1	49	14	6	26	1	153
44	Pomona Ave & Fourth St	0	0	240	0	0	0	0	1,337	96	0	3,809	0	5,482
45	Pomona Ave & Fifth St	3	315	190	2	84	5	0	22	20	1	7	1	650
46	Pomona Ave & Sixth St	10	534	41	14	93	2	5	44	6	7	25	10	791
47	Pomona Ave & Glorietta Blvd	0	0	0	0	0	127	465	176	0	0	26	2	796
48	Glorietta Blvd & Third St	85	803	8	2	2	7	0	0	4	2	0	4	917
49	Glorietta Blvd & Fourth St	0	0	520	0	0	54	0	1,621	49	0	3,763	142	6,149
50	Glorietta Blvd & Fifth St	4	217	0	0	57	6	241	0	13	0	0	0	538
51	Glorietta Blvd & Sixth St	10	171	0	0	63	5	61	0	16	0	0	0	326
52	Glorietta Blvd & Orange Ave	0	0	0	1	0	9	7	1,442	0	0	970	6	2,435
53	Silver Strand & De Las Arenas Ave	27	1,627	20	47	1,268	20	59	5	7	10	1	21	3,112
54	Silver Strand & Rendova Dr.	0	1,660	1	337	1,556	0	0	0	0	2	0	10	3,566
55	Silver Strand & Tarawa Rd	253	1,615	6	607	304	413	23	35	4	30	81	198	3,569
56	Silver Strand & Tulagi Rd	0	1,976	764	0	314	0	0	0	0	21	0	3	3,078

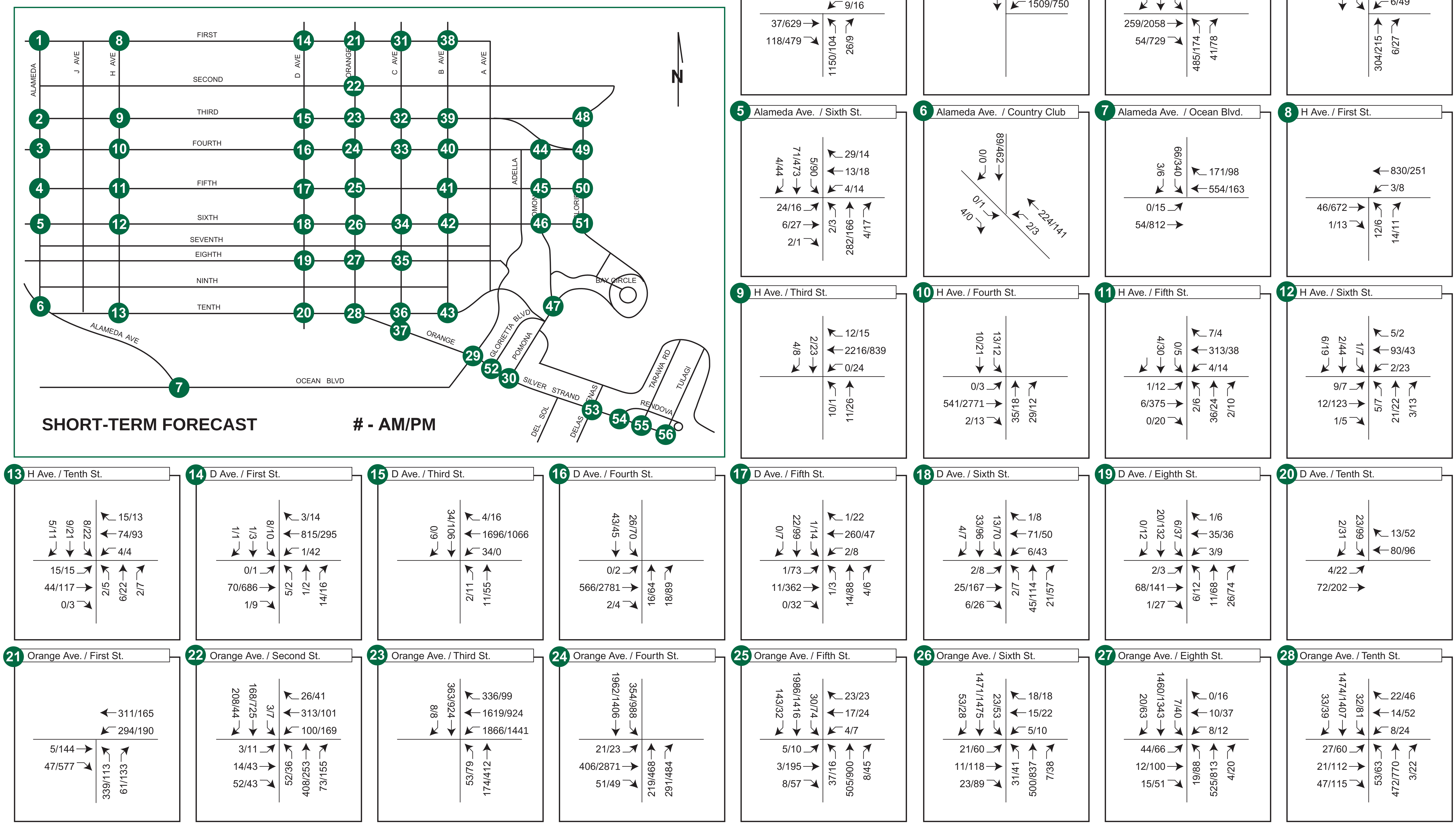
Table 3.4 Short-Term Forecast PM Peak Hour Modified Intersection Volumes

#	Intersection	Northbound			Southbound			Eastbound			Westbound			Total
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
1	Alameda Blvd & First St	104	0	9	0	0	0	0	629	479	16	156	0	1,393
2	Alameda Blvd & Third St	0	0	0	0	466	0	0	0	0	750	0	61	1,277
3	Alameda Blvd & Fourth St	174	0	78	329	244	646	0	2,058	729	0	0	0	4,258
4	Alameda Blvd & Fifth St	0	215	27	420	540	0	0	0	0	49	0	21	1,272
5	Alameda Blvd & Sixth St	8	166	17	90	473	44	16	27	1	14	18	14	888
6	Alameda Blvd & Country Club	3	141	0	0	462	0	1	0	0	0	0	0	607
7	Alameda Blvd & Ocean Blvd	0	0	0	340	0	6	15	812	0	0	163	98	1,434
8	H Ave & First St	6	0	11	0	0	0	0	672	13	8	251	0	961
9	H Ave & Third St	1	26	0	0	23	8	0	0	0	24	839	15	936
10	H Ave & Fourth St	0	18	12	12	21	0	3	2,771	13	0	0	0	2,850
11	H Ave & Fifth St	6	24	10	5	30	1	12	375	20	14	38	4	539
12	H Ave & Sixth St	7	22	13	7	44	19	7	123	5	23	45	2	317
13	H Ave & Tenth St	5	22	7	22	21	11	15	117	3	4	93	13	333
14	D Ave & First St	2	2	16	10	3	1	1	686	9	42	295	14	1081
15	D Ave & Third St	11	55	0	0	106	9	0	0	0	0	1,066	16	1,263
16	D Ave & Fourth St	0	64	89	70	45	0	2	2,781	4	0	0	0	3,055
17	D Ave & Fifth St	3	88	6	14	99	7	73	362	32	8	47	22	761
18	D Ave & Sixth St	7	114	57	70	96	7	8	167	26	43	50	8	653
19	D Ave & Eighth St	12	68	74	37	132	12	3	141	27	9	36	6	557
20	D Ave & Tenth St	0	0	0	99	0	31	22	202	0	0	96	52	502
21	Orange Ave & First St	113	0	133	0	0	0	0	144	577	190	165	0	1,322
22	Orange Ave & Second St	36	253	155	7	725	44	11	43	43	169	101	41	1,628
23	Orange Ave & Third St	79	412	0	0	924	8	0	0	0	1,441	924	99	3,887
24	Orange Ave & Fourth St	0	468	484	988	1,406	0	23	2,871	49	0	0	0	6,289
25	Orange Ave & Fifth St	16	900	45	74	1,416	32	10	195	57	7	24	23	2,799
26	Orange Ave & Sixth St	41	837	38	53	1,475	28	60	118	89	10	22	18	2,789
27	Orange Ave & Eighth St	88	813	20	40	1,343	63	66	100	51	12	37	16	2,649
28	Orange Ave & Tenth St	63	770	22	81	1,407	39	60	112	115	24	52	46	2,791
29	Orange Ave & Ocean Blvd	213	762	40	69	1,359	77	123	176	771	48	23	25	3,686
30	Orange Ave & Pomona Ave	0	0	0	172	0	24	3	1,843	0	0	799	671	3,512
31	C Ave & First St	36	1	19	3	0	3	4	237	36	9	295	9	652
32	C Ave & Third St	2	1	0	0	0	24	0	0	0	2	2,416	22	2,467
33	C Ave & Fourth St	0	3	22	5	3	0	2	4,295	11	0	0	0	4,341
34	C Ave & Sixth St	14	46	11	5	28	1	22	194	31	6	43	4	405
35	C Ave & Eighth St	19	61	4	4	38	12	14	93	23	2	45	4	319
36	C Ave & Tenth St	18	49	27	24	33	24	27	199	34	20	96	21	572
37	C Ave & Orange Ave	0	0	0	30	0	8	79	1,365	0	0	846	52	2,380
38	B Ave & First St	39	7	12	4	4	15	20	217	37	3	266	11	635
39	B Ave & Third St	3	4	0	0	0	47	0	0	0	2	2,411	28	2,495
40	B Ave & Fourth St	0	3	72	4	3	0	6	4,298	10	0	0	0	4,396
41	B Ave & Fifth St	9	65	13	8	15	7	75	67	68	2	29	13	371
42	B Ave & Sixth St	9	74	6	1	33	9	25	184	5	2	34	3	385
43	B Ave & Tenth St	58	69	41	10	49	7	12	114	94	11	68	4	537
44	Pomona Ave & Fourth St	0	0	221	0	0	0	0	4,357	70	0	2,467	0	7,115
45	Pomona Ave & Fifth St	11	203	215	2	128	7	9	79	27	4	10	0	695
46	Pomona Ave & Sixth St	16	410	165	20	139	1	11	124	28	3	5	5	927
47	Pomona Ave & Glorietta Blvd	0	0	0	5	0	158	555	536	0	0	54	4	1,312
48	Glorietta Blvd & Third St	75	202	27	23	30	24	11	5	12	15	12	15	451
49	Glorietta Blvd & Fourth St	0	0	1,535	0	0	76	0	4,590	31	0	2,447	213	8,892
50	Glorietta Blvd & Fifth St	6	854	0	0	26	8	353	0	11	0	0	0	1,258
51	Glorietta Blvd & Sixth St	14	558	0	0	34	3	328	0	8	0	0	0	945
52	Glorietta Blvd & Orange Ave	0	0	0	5	0	11	39	1,823	0	0	765	40	2,683
53	Silver Strand & De Las Arenas Ave	32	1,185	48	57	1,782	131	130	23	45	41	7	18	3,499
54	Silver Strand & Rendova Dr.	0	1,306	0	0	1,869	0	31	0	24	9	0	265	3,504
55	Silver Strand & Tarawa Rd	50	802	8	212	1,852	66	271	70	210	29	90	430	4,090
56	Silver Strand & Tulagi Rd	0	796	84	0	1,844	0	0	0	0	299	0	5	3,028

CORONADO CITYWIDE TRAFFIC STUDY

Peak Hour Turning Movement Volumes Pt. 1

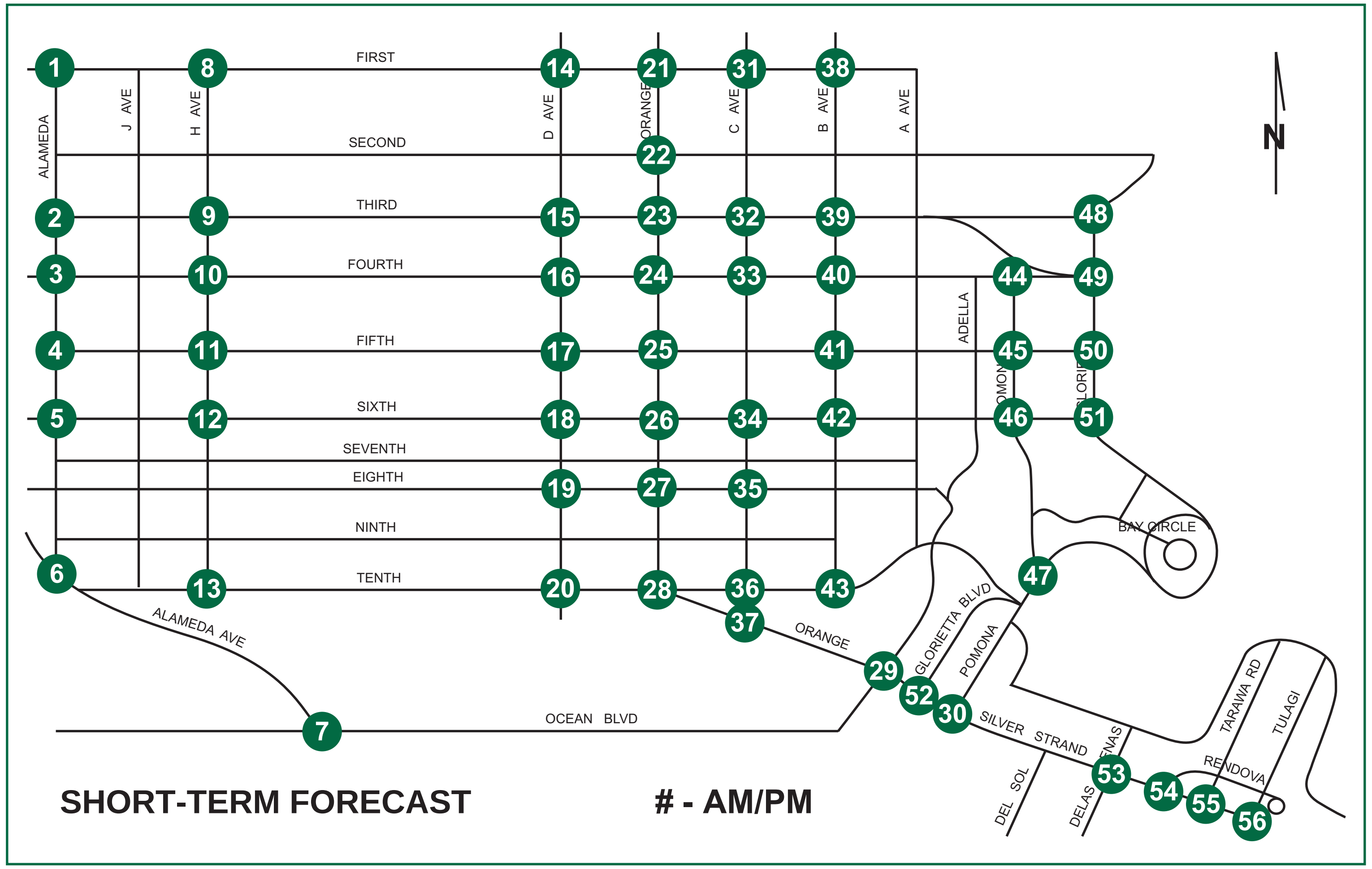
FIGURE 3.1

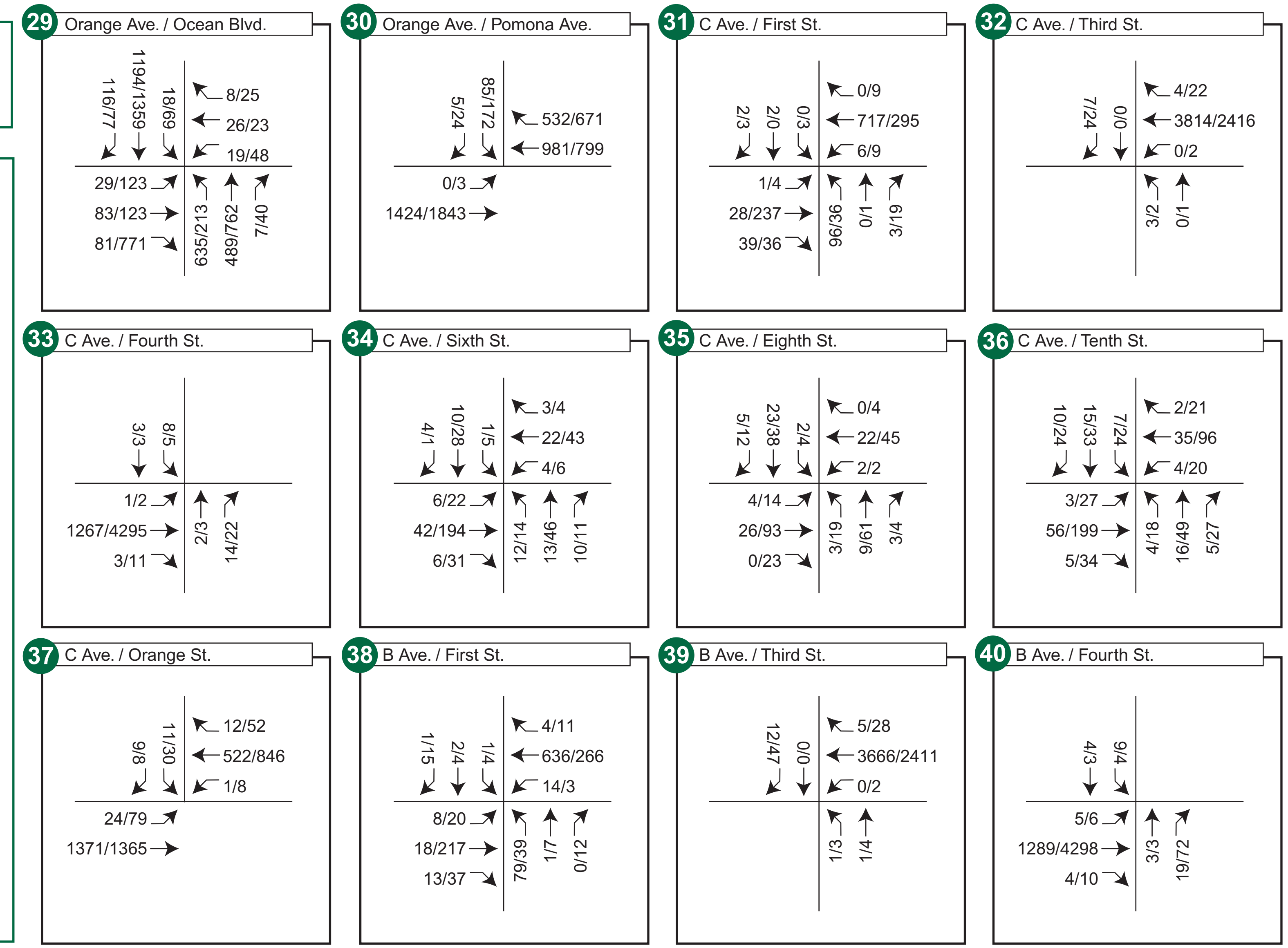


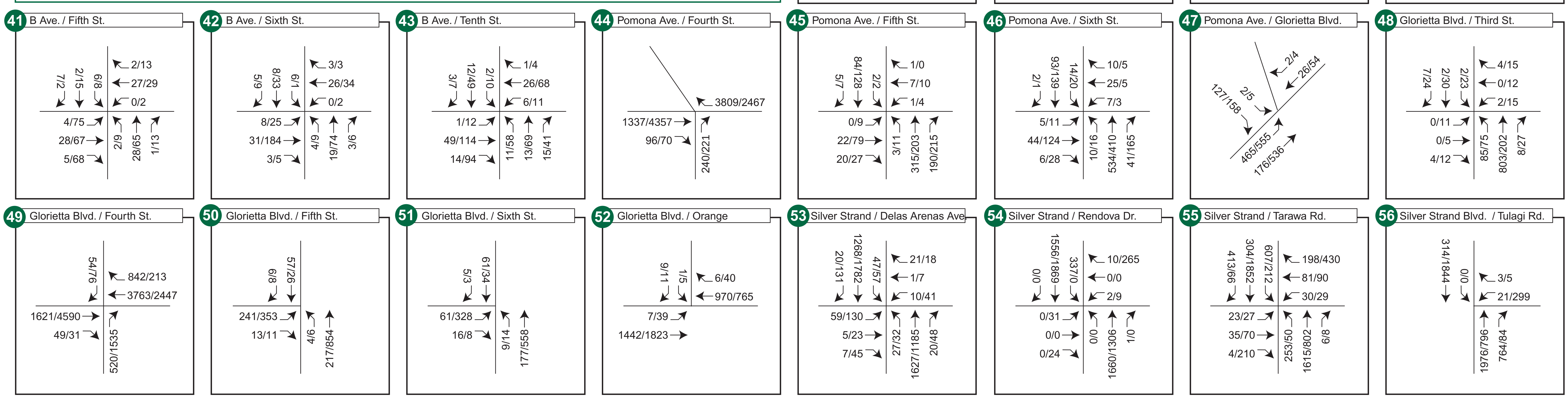
CORONADO CITYWIDE TRAFFIC STUDY

Peak Hour Turning Movement Volumes Pt. 2

FIGURE 3.2







3.3 Short Term Forecast Intersection Traffic Analysis

The analysis of the short-term AM and PM peak hour conditions was performed using the same approach as that used for the existing conditions analysis described in **Section 2.3**. Intersection delay and LOS were determined for each of the study intersections using Trafficware Synchro© and based on the short-term forecast traffic conditions. Trafficware Synchro provides the ability to evaluate alternate signal timing and phasing to ensure optimal intersection performance. For the purpose of evaluating the short-term forecast traffic conditions, each signalized intersection was first analyzed to optimize signal timing and phasing before quantifying control delay and overall intersection level of service.

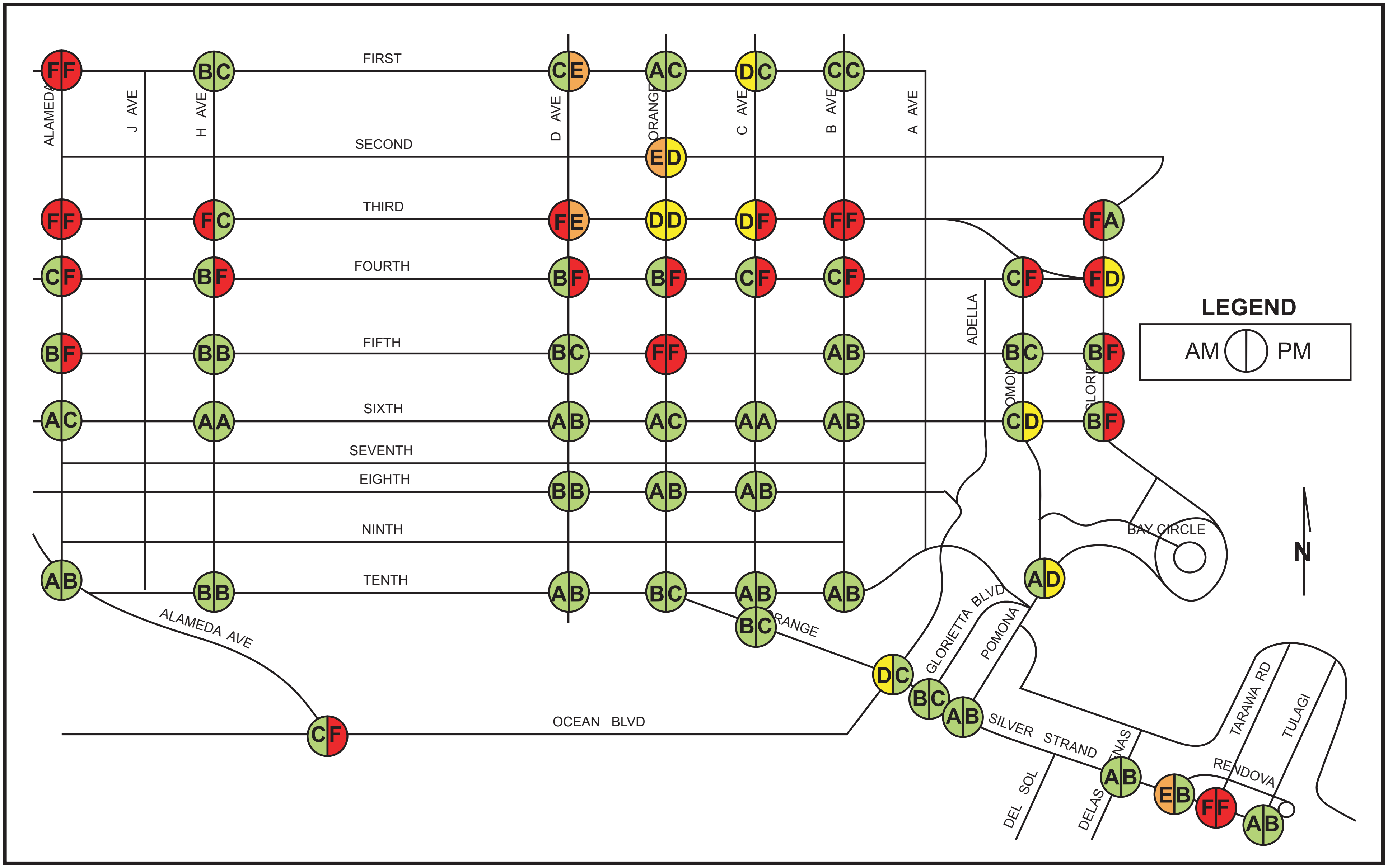
The existing and short-term forecast approach or intersection delay and corresponding level of service for each of the study intersections in the AM and PM peak hour periods are shown in **Table 3.5** and **Figure 3.3.** The detailed short-term forecast analysis results are provided in **Appendix B**.

As shown in the **Table 3.5** and **Figure 3.3**, many of the study intersections operate at acceptable levels of service of C or better during both the AM and PM peak hours. Those that operate at levels of service D or worse during either the AM or PM peak hours under short-term forecast traffic conditions will be detailed in the following sections by type of control with explanations for their performance limitations.

Table 3.5 Existing and Short-Term Forecast Peak Hour Delay and Level of Service

#	Intersection	Control [1]	Existing AM		Short Term AM		Existing PM		Short Term PM	
			Delay [2]	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	Alameda Blvd & First St	2	>50	F	>50	F	>50	F	>50	F
2	Alameda Blvd & Third St	2	>50	F	>50	F	>50	F	>50	F
3	Alameda Blvd & Fourth St	A	11.3	B	12.7	B	48.1	E	>50	F
4	Alameda Blvd & Fifth St	2	12.4	B	13.2	B	>50	F	>50	F
5	Alameda Blvd & Sixth St	A	7.8	A	7.9	A	9.1	A	17.1	C
6	Alameda Blvd & Country Club	2	8.9	A	8.9	A	13.0	B	13.6	B
7	Alameda Blvd & Ocean Blvd	2	14.4	B	16.8	C	>50	F	>50	F
8	H Ave & First St	2	9.4	A	13.4	B	14.4	B	18.4	C
9	H Ave & Third St	2	>50	F	>50	F	21.0	C	24.0	C
10	H Ave & Fourth St	2	11.8	B	12.7	B	>50	F	>50	F
11	H Ave & Fifth St	2	12.1	B	12.6	B	13.9	B	14.5	B
12	H Ave & Sixth St	A	7.3	A	7.4	A	7.5	A	8.1	A
13	H Ave & Tenth St	2	9.9	A	10.0	B	11.3	B	11.5	B
14	D Ave & First St	2	18.2	C	24.0	C	29.4	D	45.1	E
15	D Ave & Third St	2	>50	F	>50	F	>50	F	46.5	E
16	D Ave & Fourth St	2	13.8	B	14.5	B	>50	F	>50	F
17	D Ave & Fifth St	2	11.9	B	12.1	B	23.5	C	25.0	C
18	D Ave & Sixth St	A	7.3	A	7.4	A	8.5	A	10.7	B
19	D Ave & Eighth St	2	10.1	B	10.1	B	14.1	B	14.5	B
20	D Ave & Tenth St	2	9.8	A	9.9	A	12.3	B	12.7	B
21	Orange Ave & First St	S	8.8	A	9.2	A	9.7	A	22.1	C
22	Orange Ave & Second St	2	38.4	E	46.1	E	20.3	C	25.8	D
23	Orange Ave & Third St	S	23.3	C	43.8	D	25.7	C	37.0	D
24	Orange Ave & Fourth St	S	14.4	B	17.6	B	59.5	E	>80	F
25	Orange Ave & Fifth St	2	>50	F	>50	F	>50	F	>50	F
26	Orange Ave & Sixth St	S	6.8	A	9.1	A	18.0	B	21.5	C
27	Orange Ave & Eighth St	S	8.1	A	9.2	A	16.0	B	17.5	B
28	Orange Ave & Tenth St	S	16.0	B	17.4	B	26.6	C	31.2	C
29	Orange Ave & Ocean Blvd	S	29.2	C	52.7	D	21.9	C	29.2	C
30	Orange Ave & Pomona Ave	S	6.5	A	7.0	A	10.4	B	11.7	B
31	C Ave & First St	2	18.3	C	25.1	D	15.0	B	15.8	C
32	C Ave & Third St	2	22.4	C	26.7	D	50.0	F	>50	F
33	C Ave & Fourth St	2	15.6	C	16.1	C	>50	F	>50	F
34	C Ave & Sixth St	A	7.1	A	7.1	A	7.8	A	9.2	A
35	C Ave & Eighth St	2	9.5	A	9.5	A	11.3	B	11.4	B
36	C Ave & Tenth St	2	9.8	A	9.9	A	14.0	B	14.6	B
37	C Ave & Orange Ave	2	12.6	B	14.1	B	19.8	C	22.1	C
38	B Ave & First St	2	16.4	C	21.3	C	15.9	C	16.9	C
39	B Ave & Third St	2	>50	F	>50	F	>50	F	>50	F
40	B Ave & Fourth St	2	18.5	C	18.7	C	>50	F	>50	F
41	B Ave & Fifth St	2	9.5	A	9.6	A	12.5	B	11.8	B
42	B Ave & Sixth St	2	9.6	A	9.6	A	11.9	B	12.1	B
43	B Ave & Tenth St	2	9.7	A	9.7	A	13.4	B	13.7	B
44	Pomona Ave & Fourth St	2	18.3	C	21.1	C	>50	F	>50	F
45	Pomona Ave & Fifth St	2	13.7	B	14.1	B	19.8	C	16.1	C
46	Pomona Ave & Sixth St	2	21.6	C	23.4	C	34.2	D	34.2	D
47	Pomona Ave & Glorietta Blvd	A	9.1	A	9.5	A	14.1	B	34.9	D
48	Glorietta Blvd & Third St	A	11.2	B	>50	F	7.8	A	9.6	A
49	Glorietta Blvd & Fourth St	2	50.0	E	>50	F	22.8	C	27.4	D
50	Glorietta Blvd & Fifth St	2	14.4	B	15.0	B	>50	F	>50	F
51	Glorietta Blvd & Sixth St	2	10.8	B	11.2	B	25.4	D	>50	F
52	Glorietta Blvd & Orange Ave	2	13.1	B	13.8	B	15.5	C	16.6	C
53	Silver Strand & De Las Arenas Ave	S	7.6	A	7.9	A	12.3	B	13.2	B
54	Silver Strand & Rendova Dr	S	75.0	E	77.2	E	12.8	B	14.9	B
55	Silver Strand & Tarawa Rd	S	63.3	E	>80	F	68.1	E	>80	F
56	Silver Strand & Tulagi Rd	S	2.6	A	2.8	A	15.8	B	17.8	B

[1] 2 = Two-Way Stop, A = All-Way Stop, S = Traffic Signal
[2] Delay for two-way stop controlled intersections is for the approach with the highest delay



CORONADO CITYWIDE TRAFFIC STUDY

Short Term AM/PM Peak Hour Intersection Level of Service

FIGURE
3.3

3.3.1 Two-Way Stop Controlled Intersections

As shown in **Table 3.6** below, a total of 21 two-way stop controlled intersections operate at LOS D or worse during either the AM or PM peak hour under short-term forecast traffic conditions. At nearly all of these intersections the number of vehicles on the side street is very small, but they are opposed by such heavy volumes on the main street that there are insufficient gaps for them to turn onto or cross the heavy volume street. This situation results in long delays for the generally limited number of side street vehicles leading the calculated long average delays and poor levels of service. By contrast, the average vehicle delay for the overall intersection is generally very low due to the much greater number of vehicles able to pass freely through the intersection without delay highlighting the trade-off made by incurring considerable delay to a few vehicles for the benefit of overall intersection performance.

Table 3.6 Two-Way Stop Controlled Intersections with Unacceptable LOS

#	Intersection	Existing AM		Short Term AM		Existing PM		Short Term PM	
		Delay [1]	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	Alameda Blvd & First St	>50	F	>50	F	>50	F	>50	F
2	Alameda Blvd & Third St	>50	F	>50	F	>50	F	>50	F
4	Alameda Blvd & Fifth St	12.4	B	13.2	B	>50	F	>50	F
7	Alameda Blvd & Ocean Blvd	14.4	B	16.8	C	>50	F	>50	F
9	H Ave & Third St	>50	F	>50	F	21.0	C	24.0	C
10	H Ave & Fourth St	11.8	B	12.7	B	>50	F	>50	F
14	D Ave & First St	18.2	C	24.0	C	29.4	D	45.1	E
15	D Ave & Third St	>50	F	>50	F	>50	F	46.5	E
16	D Ave & Fourth St	13.8	B	14.5	B	>50	F	>50	F
22	Orange Ave & Second St	38.4	E	46.1	E	20.3	C	25.8	D
25	Orange Ave & Fifth St	>50	F	>50	F	>50	F	>50	F
31	C Ave & First St	18.3	C	25.1	D	15.0	B	15.8	C
32	C Ave & Third St	22.4	C	26.7	D	50.0	F	>50	F
33	C Ave & Fourth St	15.6	C	16.1	C	>50	F	>50	F
39	B Ave & Third St	>50	F	>50	F	>50	F	>50	F
40	B Ave & Fourth St	18.5	C	18.7	C	>50	F	>50	F
44	Pomona Ave & Fourth St	18.3	C	21.1	C	>50	F	>50	F
46	Pomona Ave & Sixth St	21.6	C	23.4	C	34.2	D	34.2	D
49	Glorietta Blvd & Fourth St	50.0	E	>50	F	22.8	C	27.4	D
50	Glorietta Blvd & Fifth St	14.4	B	15.0	B	>50	F	>50	F
51	Glorietta Blvd & Sixth St	10.8	B	11.2	B	25.4	D	>50	F

[1] Delay for two-way stop controlled intersections is for the approach with the highest delay

As described in **Section 2.3.1**, it should be noted that often the actual delay experienced by drivers is reduced by drivers taking more aggressive actions to complete their desired maneuver. Drivers experiencing lengthy delays will often take advantage of less than sufficient gaps in opposing traffic to complete their desired maneuver and to avoid further delay. This phenomena occurs at locations within the City of Coronado, particularly for two-way stop controlled streets intersecting Third Street, Fourth Street and Orange Avenue where uncontrolled through traffic volumes are very high.

1. Alameda & First – Both of the stop controlled approaches on First Street fail in the AM peak hour due to the very high volume of traffic turning left into the base off of Alameda Boulevard. With over 1,100 vehicles making this turn there are very limited available gaps for side street traffic to enter.

In the PM peak hour much of the delay occurs in the westbound direction for the 16 vehicles wishing to turn left onto southbound Alameda and opposed by nearly 1,100 vehicles exiting the base. In reality it is likely that courteous drivers will allow the few vehicles turning left to go before them so the delay will not be as bad as represented by the analysis calculations.

2. Alameda & Third – The 130 southbound through vehicles in the AM peak hour cause this intersection to fail due to their difficulty in crossing the steady stream of over 1,500 vehicles turning left onto southbound Alameda Boulevard. When security processing delays cause traffic to back up to this location, courteous drivers allow side street traffic to proceed in front of them.

The problem is essentially the same in the PM peak hour with 566 vehicles moving south on Alameda being opposed by 750 vehicles turning left from Third to Alameda.

4. Alameda & Fifth – The side street delay in the PM peak hour is caused by the 50 vehicles turning left onto southbound Alameda Boulevard being opposed by over 1,000 vehicles on Alameda Boulevard.

7. Alameda & Ocean – Vehicles on southbound Alameda Boulevard turning left onto eastbound Ocean Boulevard in the PM peak hour experience delays due to the combination of the high volume (340) of vehicles making the turn and the high volume (990) opposing the turn.

9. H & Third – In the AM peak hour the few vehicles crossing Third Street are delayed due to the over 2,200 vehicles on Third Street. Since there are only 13 vehicles crossing the street, the delay affects a very small portion of the overall intersection traffic.

10. H & Fourth – This is essentially the same situation as the previous intersection and other Third and Fourth street intersections. At this location, poor level of service occurs during the PM peak hour when Fourth Street traffic is heaviest although the 45 vehicles crossing Fourth Street represent only a small percentage of the total traffic using the intersection.

14. D & First – The northbound approach operates at LOS E in the PM peak hour with 14 vehicles turning onto or crossing First Street being delayed by about 1000 opposing vehicles.

15. D & Third – In the AM peak hour there are 34 southbound vehicles crossing Third Street and opposed by nearly 1,700 vehicles. Adequate gaps may be created by the adjacent traffic signal on Orange Avenue metering upstream traffic and thereby improving the side street delay.

The situation is replicated during the PM peak hour when 106 southbound vehicles cross Third Street opposed by over 1,000 vehicles.

16. D & Fourth – During the PM peak hour 112 southbound vehicles cross Third Street opposed by over 2,100 vehicles. At this location there is no immediate upstream signal to meter traffic and create the necessary gaps.

22. Orange & Second – The westbound approach to this intersection operates at LOS E during the AM peak hour. This is due to the large volume (313) of through vehicles on Second Street being opposed by over 600 vehicles on Orange Avenue. It is likely that this large volume on Second Street represents drivers that are seeking an alternate route to First Street and Third Street. The situation is similar in the PM peak hour, when the westbound approach operates at LOS D.

25. Orange & Fifth – At this intersection 25 vehicles on Fifth Street are opposed by over 2,500 vehicles on Orange Avenue during AM peak hour. This intersection is also aided by the close proximity to upstream signals on Orange Avenue and the wide median that allows for vehicles to cross Orange Avenue in two steps.

The situation is more severe in the PM peak hour when over 200 vehicles are approaching on the side streets, but are opposed by over 2,400 vehicles on Orange Avenue.

32. C & Third – The northbound approach at this intersection operates at LOS D during the AM peak hour and LOS F during the PM peak. While there are only three vehicles using this approach in each of the peak hours, they are opposed by extremely high volumes of through vehicles on Third Street limiting the available gaps and resulting in delay for the few vehicles desiring to enter or cross Third Street.

33. C & Fourth – Both the southbound and northbound approaches to this intersection operate at LOS F in the PM peak hour. The northbound approach has a total of 25 vehicles crossing or turning right and the southbound approach has eight vehicles crossing or turning left. These vehicles are opposed by over 3,600 through vehicles on Fourth Street, which makes it very difficult to find an acceptable gap.

39. B & Third – The northbound approach to this intersection operates at LOS F in both the AM and PM peak hours with considerable delay. In the morning there are only two vehicles on the approach, but over 3,600 on Third Street. During the evening peak hour there are seven vehicles using the approach with just over 2,400 vehicles on Third Street.

40. B & Fourth – Both the southbound and northbound approaches to this intersection operate at LOS F in the PM peak hour. The northbound approach has a total of 25 vehicles crossing or turning right and the southbound approach has seven vehicles crossing or turning left. These vehicles are opposed by over 3,600 through vehicles on Fourth Street, which makes it very difficult to find an acceptable gap, particularly for the crossing traffic.

44. Pomona & Fourth – The northbound approach, which only allows a right turn onto eastbound Third Street, operates at LOS F in the PM peak hour with considerable delay. There are 240 vehicles turning right at this location opposed by over 3,800 vehicles on Third Street.

46. Pomona & Sixth – This intersection, which is two-way stop controlled on the east and westbound approaches, experiences LOS D with 34.2 seconds of delay on the eastbound approach in the PM peak hour. This leg of the intersection has 135 through or left vehicles opposed by about 750 vehicles on Pomona Avenue.

49. Glorietta & Fourth – This intersection has a free right turn for the northbound movement to eastbound SR-75 across the Coronado Bridge. This free right removes the northbound right turn volumes from the level of service calculations so the only stop controlled movement is the southbound right turn. In the AM peak hour this right turn operates at LOS F with 54 vehicles turning right opposed by over 3,700 through vehicles.

During the PM peak hour the southbound right turn experiences 27.4 seconds of average vehicle delay for LOS D. There are 76 vehicles turning right opposed by over 2,400 through vehicles.

Since the northbound free right was not included in the level of service calculations, a simulation was performed. Simulations actually model the flow of traffic and the interactions between intersections throughout the entire network. In the AM peak hour, the free right and corresponding merge into traffic on eastbound SR-75 works effectively with 520 northbound right turn vehicles merging into three lanes of traffic carrying approximately 1,600 vehicles. However, during the PM peak hour the conditions at this location deteriorate with over 1,500 vehicles turning right and merging into three lanes carrying over 4,500 vehicles. The conflicts at the merge point cause traffic to back up in both the eastbound and northbound directions. The simulation calculates an average eastbound queue in the right lane of about 235 feet from the intersection, which is nearly halfway between Glorietta and Pomona.

50. Glorietta & Fifth – The eastbound approach at this intersection experiences considerable delay in the PM peak hour. This is caused by more than 450 vehicles turning left onto northbound Glorietta Boulevard being opposed by over 800 vehicles.

51. Glorietta & Sixth – The eastbound approach at this intersection operates at LOS F in the PM peak hour with 58.2 seconds of average vehicle delay. This is caused by over 300 vehicles turning left onto northbound Glorietta Boulevard opposed by about 600 through vehicles.

3.3.2 All-Way Stop Controlled Intersections

As shown in **Table 3.7**, three all-way stop controlled intersections operate at LOS D or worse during either the AM or PM peak hour under short-term forecast traffic conditions.

Table 3.7 All-Way Stop Controlled Intersections with Unacceptable LOS

#	Intersection	Existing AM		Short Term AM		Existing PM		Short Term PM	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
3	Alameda Blvd & Fourth St	11.3	B	12.7	B	48.1	E	>50	F
47	Pomona Ave & Glorietta Blvd	9.1	A	9.5	A	14.1	B	34.9	D
48	Glorietta Blvd & Third St	11.2	B	>50	F	7.8	A	9.6	A

3. Alameda & Fourth – This intersection operates at LOS F in the PM peak hour with substantial average vehicle delay. The southbound and eastbound right turn movements were not included in the level of service calculations since the southbound is a free right and the eastbound has similar geometry to a free right, but is controlled by a yield sign. The eastbound approach experiences the most delay with over 300 seconds of delay per vehicle and a volume of over 1,400 vehicles. The southbound approach also operates at LOS F with over 80 seconds of delay per vehicle and a volume of over 800 vehicles.

47. Pomona & Glorietta – This intersection operates at LOS D in the PM peak hour with an average intersection delay of 34.9 seconds per vehicle. Most of that delay comes from the eastbound approach on Glorietta Boulevard, which serves approximately 1,100 vehicles. The north and southbound movements have considerably less traffic on them with an average volume of 111 vehicles per direction.

48. Glorietta & Third – This intersection operates at LOS F in the AM peak hour with an average intersection delay of 57.4 seconds per vehicle. The vast majority of this delay is experienced on the northbound approach on Glorietta Boulevard, which serves over 900 vehicles primarily headed to First Street as an alternative to Third Street.

3.3.3 Signalized Intersections

As shown in **Table 3.8**, five signalized intersections operate at LOS D or worse during either the AM or PM peak hour under short-term forecast traffic conditions.

Table 3.8 Signalized Intersections with Unacceptable LOS

#	Intersection	Existing AM		Short Term AM		Existing PM		Short Term PM	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
23	Orange Ave & Third St	23.3	C	43.8	D	25.7	C	37.0	D
24	Orange Ave & Fourth St	14.4	B	17.6	B	59.5	E	>80	F
29	Orange Ave & Ocean Blvd	29.2	C	52.7	D	21.9	C	29.2	C
54	Silver Strand & Rendova	75.0	E	77.2	E	12.8	B	14.9	B
55	Silver Strand & Tarawa Rd	63.3	E	>80	F	68.1	E	>80	F

23. Orange & Third – This intersection operates at LOS D in both the AM and PM peak hours with an average intersection delay of 43.8 and 37.0 seconds per vehicle, respectively. In the morning there are over 3,800 vehicles using Third Street and therefore utilizing a considerable portion of the signal green time at the expense of the other movements. The 53 northbound left vehicles experience an average delay of over 150 seconds per vehicle because they are not provided sufficient green time. Also, the left turn volume on Third Street is higher than that going straight, which suggests that the shared left/through lane should probably become an exclusive left turn lane.

In the PM peak hour the situation is much the same, but with slightly lower volumes. However, the southbound through volume is much higher, which conflicts with the northbound left movement. Again the left turn volume on Third Street is higher than the through volume.

24. Orange & Fourth – This intersection operates at LOS F in the PM peak hour with 168.1 seconds of average vehicle delay. This is obviously a very busy intersection with nearly 6,300 vehicles passing through it in the PM peak hour. Due to the extremely high volume of traffic at this location it is difficult to accommodate that many vehicles and still operate at an acceptable level of service. The delay is quite evenly distributed throughout the intersection with four of the six movements having over 100 seconds of average vehicle delay.

29. Orange & Ocean – This intersection operates at LOS D in the AM peak hour with an average intersection delay of 52.7 seconds per vehicle. The delay is very evenly split between the approaches with each having more than 50 seconds of delay. This intersection has a very heavy northbound left turn movement of 635 vehicles that is opposed by a heavy southbound through volume of nearly 1,200 vehicles. An additional left turn lane may help accommodate this traffic movement improving the overall intersection performance.

54. Silver Strand & Rendova – This intersection operates at LOS E during the AM peak hours with an average vehicle delay of 77.2 seconds under short-term forecast conditions. The opposition of 337 southbound left turns against 1,660 northbound through movements limits the available green time for the northbound through traffic thereby increasing delay incurred and reducing the level of service, particularly for this approach. The situation at this intersection is exacerbated by the need to allocate green time to the cross street traffic despite the low approach volumes on Rendova during the AM peak period.

55. Silver Strand & Tarawa – This intersection operates at LOS F in both the AM and PM peak hours with an average vehicle delay of 102.5 and 103.1 seconds, respectively. The intersection has over 3,400 vehicles in the morning and nearly 4,100 vehicles using it in the evening. The intersection has split timing on Tarawa Road, which means that the opposite legs of Tarawa Road get green time separately. In the AM peak hour the movement with the most delay is the southbound left turn onto Tarawa with a volume of 607. This competes for green time with the northbound through movement on Silver Strand with over 1,600 vehicles. In the morning, there is a lack of capacity turning left off of Silver Strand.

In the PM peak hour the situation is largely the reverse of the AM. The movement with the most delay is the northbound left turn onto Tarawa with a volume of 50. This competes for green time with the southbound through movement on Silver Strand with 1,850 vehicles. There are also larger side street volumes in the PM peak hour. By simply changing the eastbound through lane to a shared left-through lane the afternoon intersection delay can be reduced by nearly 20 seconds per vehicle. In the afternoon, the traffic exiting the base takes up much of the green time leaving less time for the heavier volumes on Silver Strand.

3.4 Peak Hour Traffic Signal Warrants

Alternative traffic control devices are the primary mitigation options for alleviating existing and short-term forecast traffic impacts at locations experiencing poor levels of service. In particular, traffic signals may mitigate traffic impacts at existing stop controlled intersections since traffic signals can more efficiently regulate conflicting traffic flows at high volume intersections. In preparation for evaluating traffic signals at candidate locations, it is appropriate to complete a traffic signal warrant analysis.

This analysis used the Peak Hour signal warrant for urban areas as prescribed in the 2003 Edition of the <u>Manual on Uniform Traffic Control Devices for Streets and Highways</u> (MUTCD) published by the Federal Highway Administration. Section 4C.04 of the MUTCD states that "the Peak Hour signal warrant is intended for use at a location where traffic conditions are such that for a minimum of 1 hour of an average day, the minor street traffic suffers undue delay when entering or crossing the major street." This methodology is applicable to peak hour traffic conditions in Coronado that are generally characterized by high volumes on arterial streets which inhibit access from and across other local streets.

The City of Coronado's current warrants for implementing traffic control devices parallels the provisions of the MUTCD. The MUTCD is considered the national standard for determining the applicability of traffic control devices for implementation in a specific location. The City of Coronado has effectively implemented the provisions of the MUTCD in determining warrants for signalization of intersections within the City of Coronado, as evidenced by the results of the following analysis.

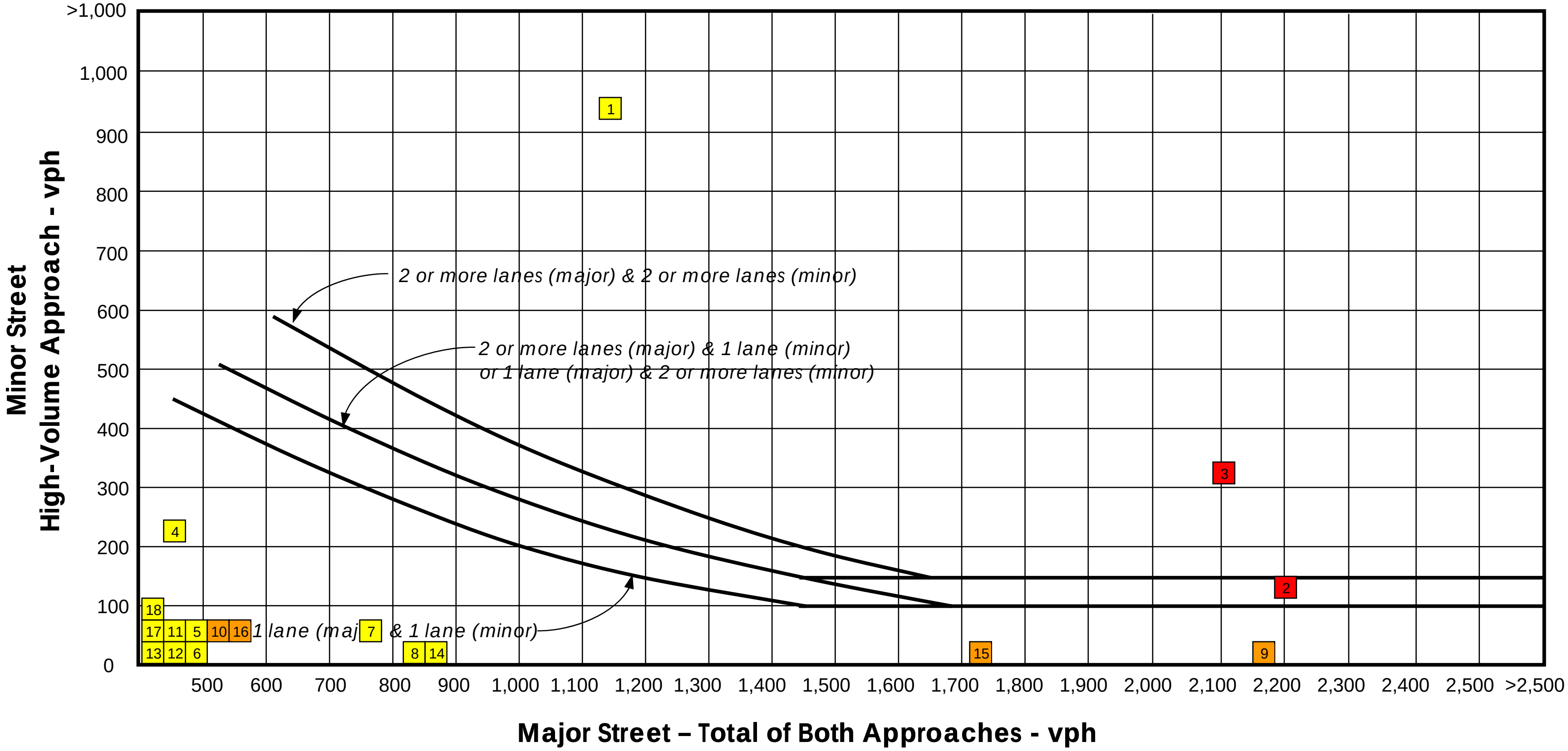
Figure 4C-3 of the MUTCD provides a chart to delineate the conflict between major and minor streets, and to determine if the Peak Hour signal warrant has been met. **Figure 3.4** through **Figure 3.9** plot the appropriate major and minor street AM and PM peak hour volumes on the MUTCD chart to determine locations that meet the Peak Hour signal warrant.

3.4.1 Unsignalized Intersections

Several currently unsignalized intersections were determined to meet the Peak Hour signal warrant in either the AM or PM peak hour, or both. As could be expected, most intersections determined to meet warrants are located along primary arterial roadways including Third Street, Fourth Street, Orange Avenue and Silver Strand. Other streets with multiple intersections that meet the Peak Hour signal warrant include Alameda Boulevard, Pomona Avenue and Glorietta Boulevard.

The following section provides a summary of key intersections that meet the Peak Hour signal warrant <u>and</u> experience poor level of service under short term forecast conditions. This information will serve as a basis for identifying those intersections that may benefit from the introduction of signalized traffic control.

Figure 3.4 Peak Hour Signal Warrant
Short-Term Forecast AM Peak Hour (Study Intersections 1 to 18)



Notes:
vph = vehicles per hour
* 150 vph applies as the lower threshold volume for a minor street approach with two or more lanes
** 100 vph applies as the lower threshold volume for a minor street approach with one lane

Legend:

1 1 lane/1 lane unsignalized intersection

1 2+ lane/1 lane unsignalized intersection

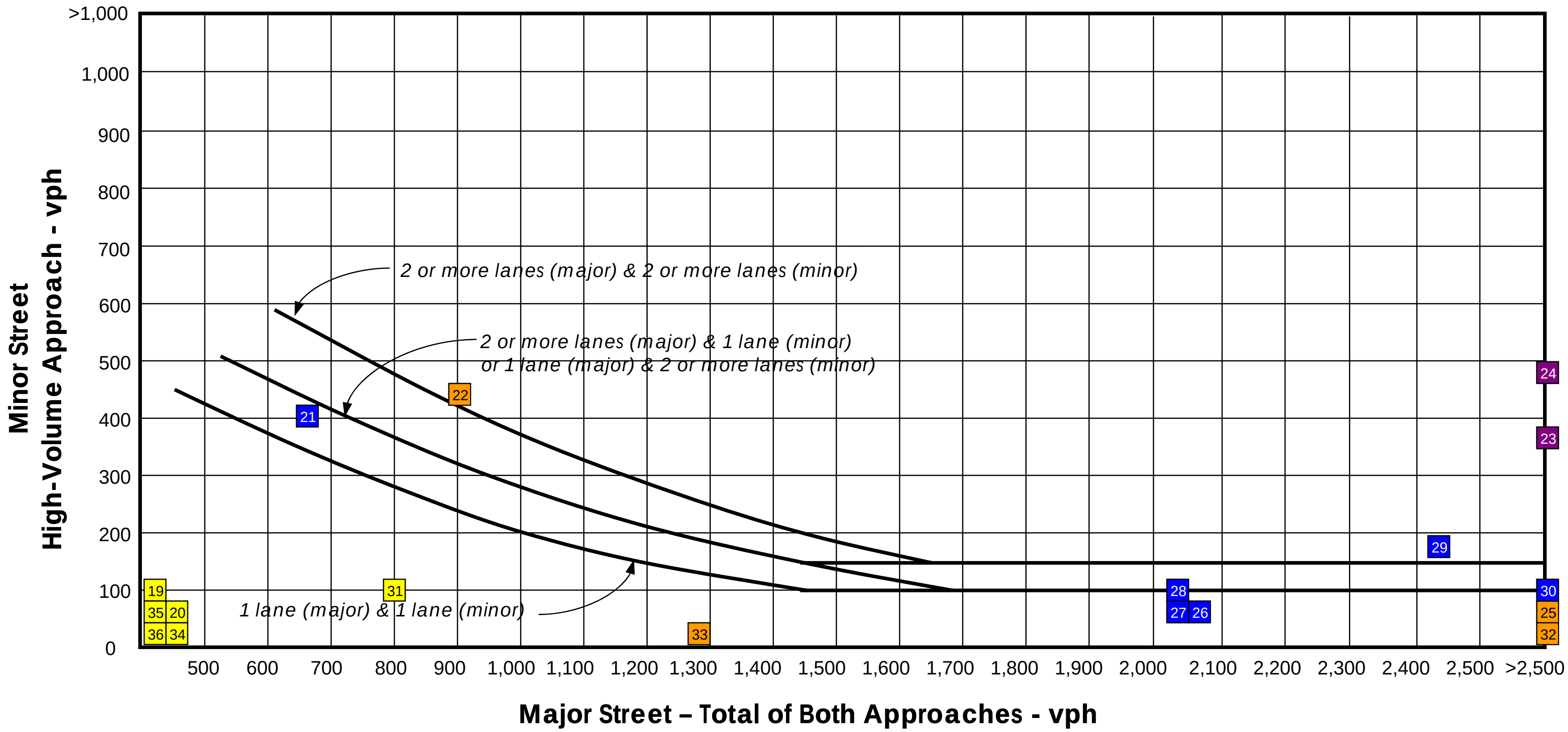
1 2+ lane/2+ lane unsignalized intersection

1 1 lane/1 lane signalized intersection

1 2+ lane/1 lane signalized intersection

1 2+ lane/2+ lane signalized intersection

Figure 3.5 Peak Hour Signal Warrant
Short-Term Forecast AM Peak Hour (Study Intersections 19 to 36)



Notes:
vph = vehicles per hour
* 150 vph applies as the lower threshold volume for a minor street approach with two or more lanes
** 100 vph applies as the lower threshold volume for a minor street approach with one lane

Legend:

1 1 lane/1 lane unsignalized intersection

1 2+ lane/1 lane unsignalized intersection

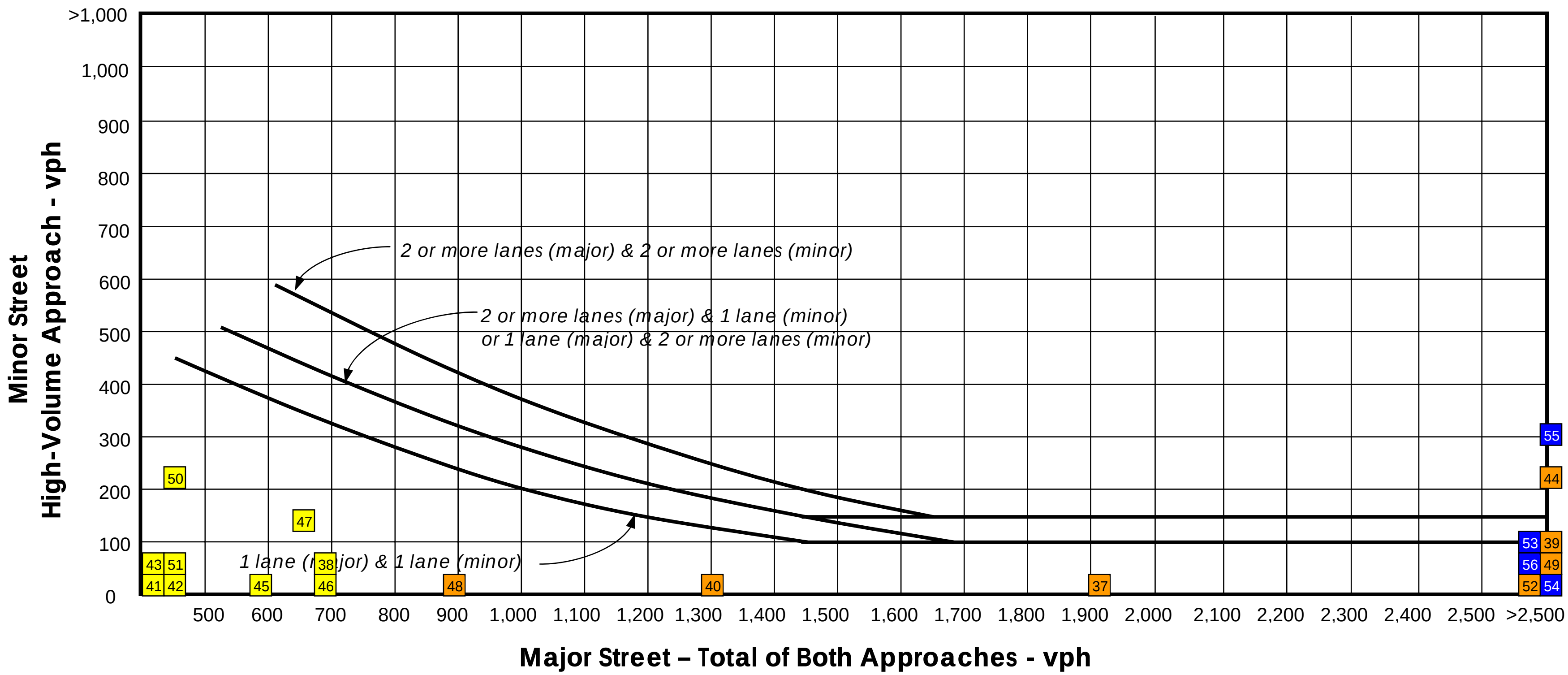
1 2+ lane/2+ lane unsignalized intersection

1 1 lane/1 lane signalized intersection

1 2+ lane/1 lane signalized intersection

1 2+ lane/2+ lane signalized intersection

Figure 3.6 Peak Hour Signal Warrant
Short-Term Forecast AM Peak Hour (Study Intersections 37 to 56)



Notes:
vph = vehicles per hour
* 150 vph applies as the lower threshold volume for a minor street approach with two or more lanes
** 100 vph applies as the lower threshold volume for a minor street approach with one lane

Legend:

1 1 lane/1 lane unsignalized intersection

1 2+ lane/1 lane unsignalized intersection

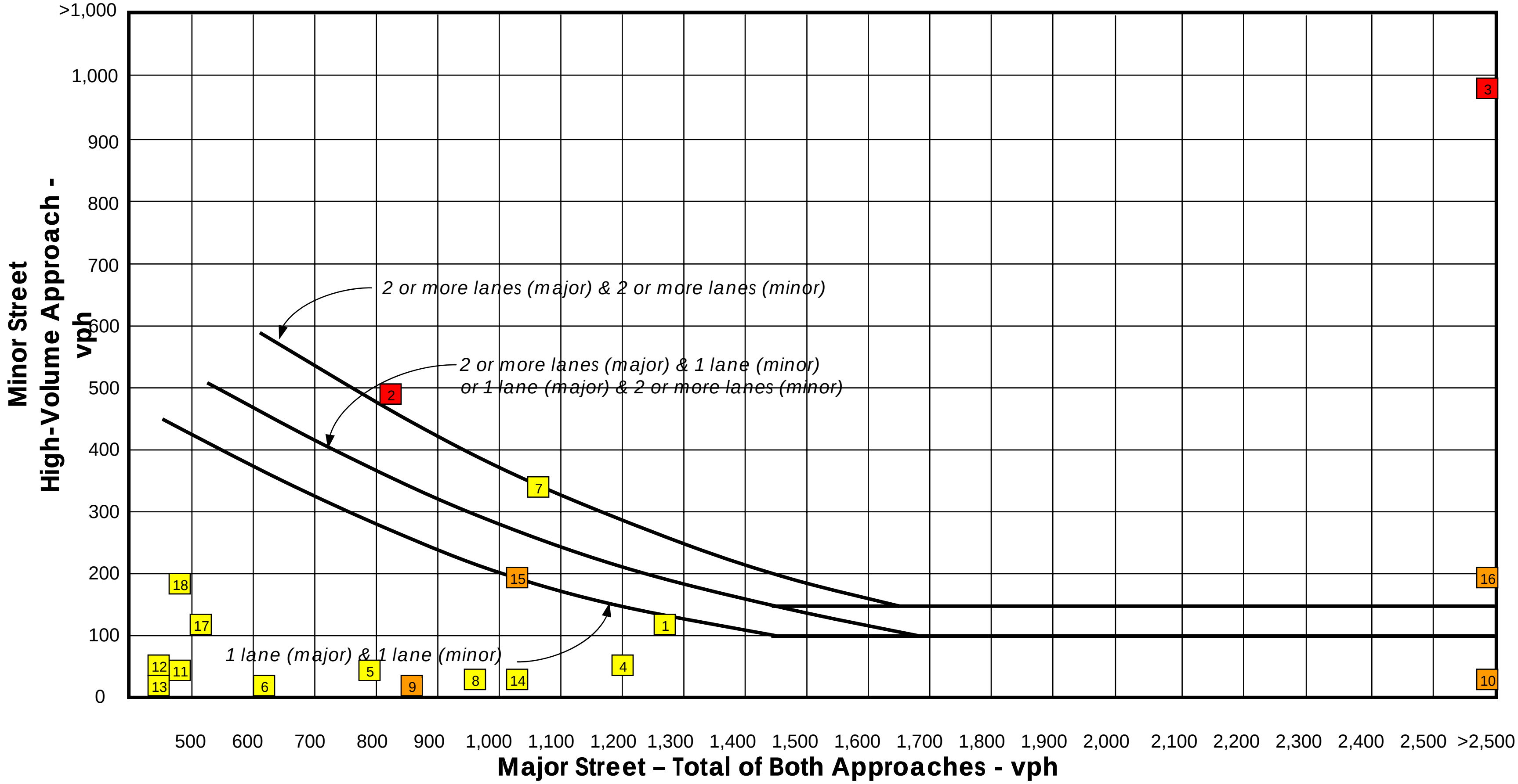
1 2+ lane/2+ lane unsignalized intersection

1 1 lane/1 lane signalized intersection

1 2+ lane/1 lane signalized intersection

1 2+ lane/2+ lane signalized intersection

Figure 3.7 Peak Hour Signal Warrant
Short-Term Forecast PM Peak Hour (Study Intersections 1 to 18)



Notes:
vph = vehicles per hour
* 150 vph applies as the lower threshold volume for a minor street approach with two or more lanes
** 100 vph applies as the lower threshold volume for a minor street approach with one lane

Legend:

1 1 lane/1 lane unsignalized intersection

1 2+ lane/1 lane unsignalized intersection

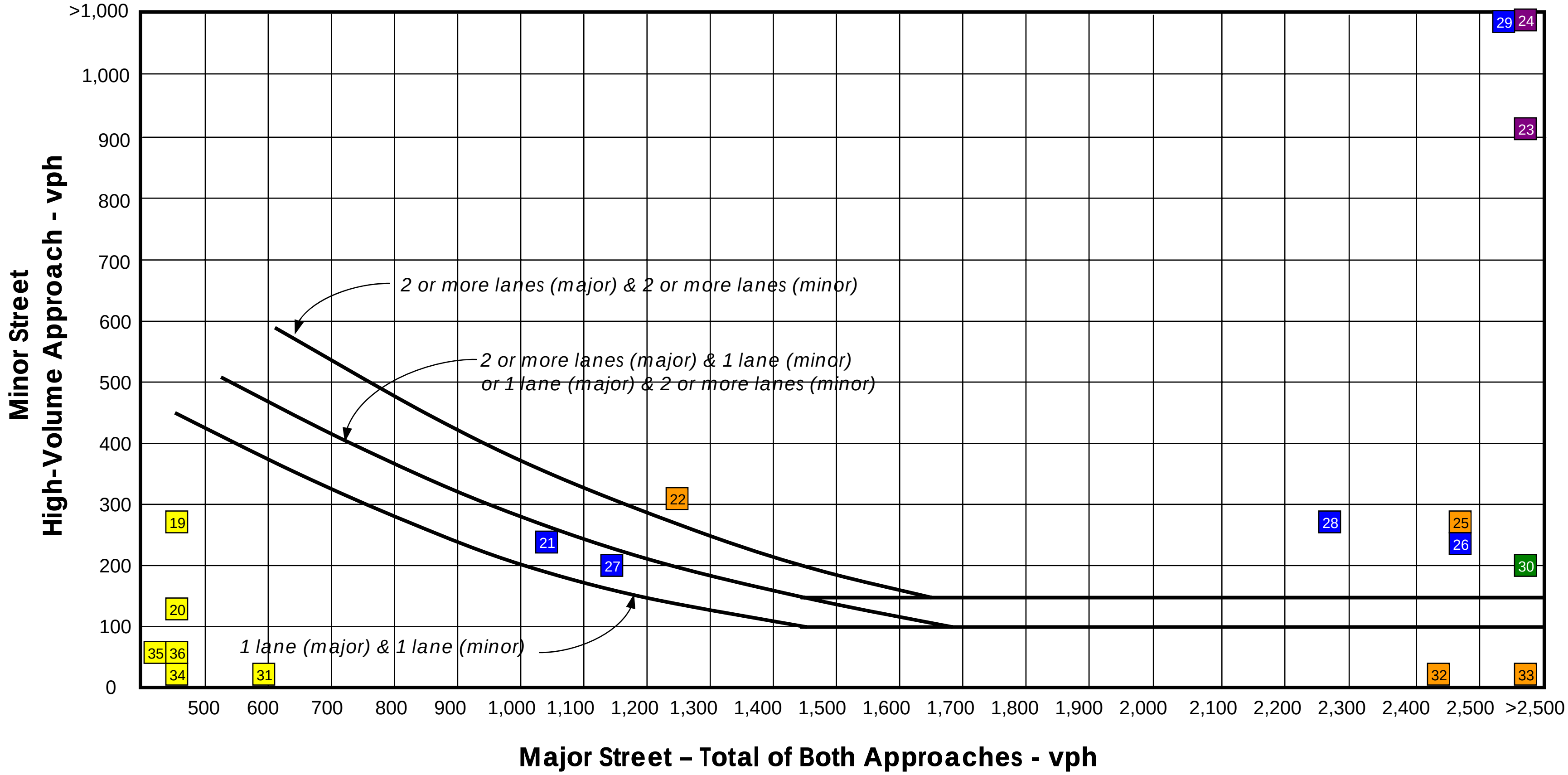
1 2+ lane/2+ lane unsignalized intersection

1 1 lane/1 lane signalized intersection

1 2+ lane/1 lane signalized intersection

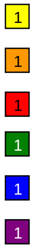
1 2+ lane/2+ lane signalized intersection

Figure 3.8 Peak Hour Signal Warrant
Short-Term Forecast PM Peak Hour (Study Intersections 19 to 36)



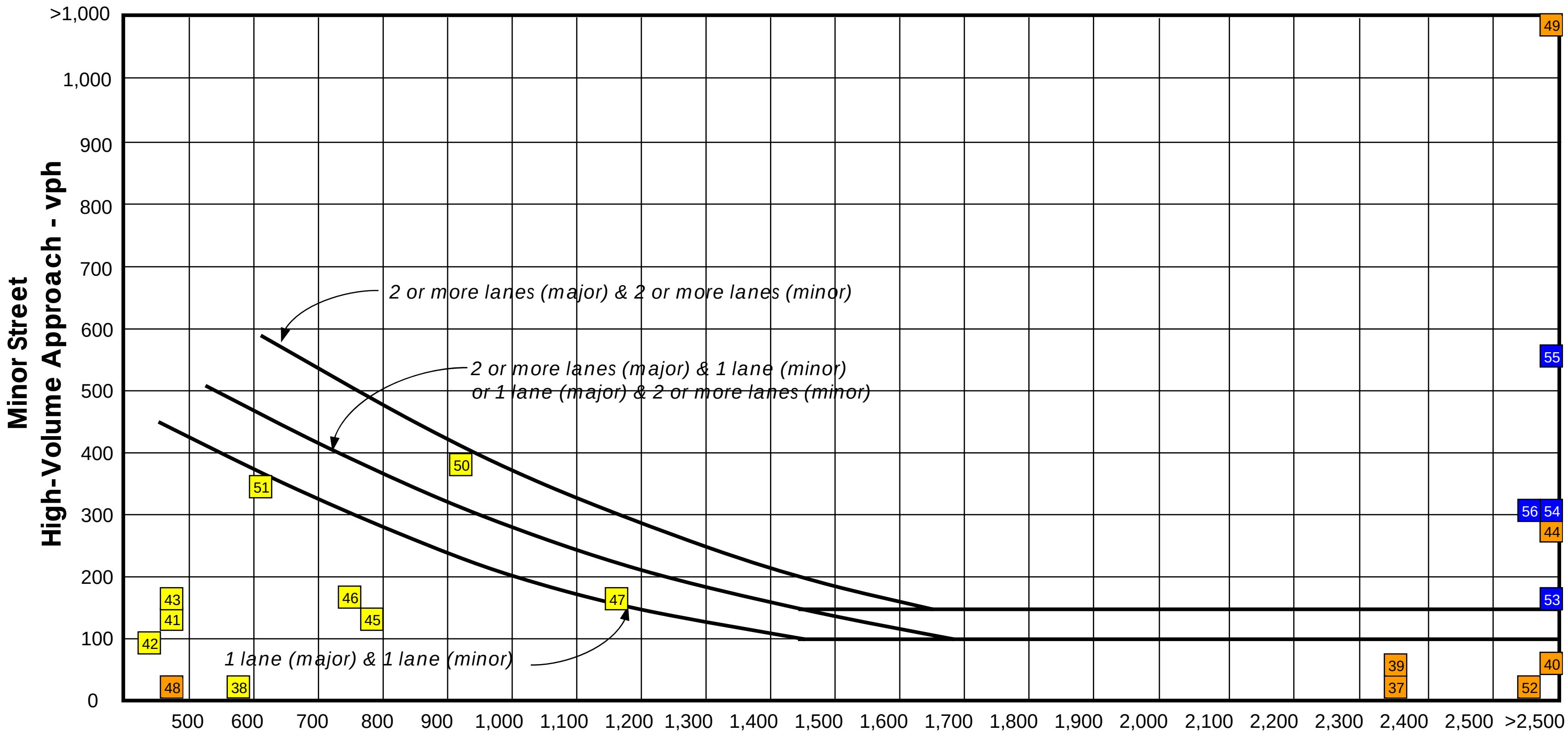
Notes:
vph = vehicles per hour
* 150 vph applies as the lower threshold volume for a minor street approach with two or more lanes
** 100 vph applies as the lower threshold volume for a minor street approach with one lane

Legend:



1 lane/1 lane unsignalized intersection
2+ lane/1 lane unsignalized intersection
2+ lane/2+ lane unsignalized intersection
1 lane/1 lane signalized intersection
2+ lane/1 lane signalized intersection
2+ lane/2+ lane signalized intersection

Figure 3.9 Peak Hour Signal Warrant
Short-Term Forecast PM Peak Hour (Study Intersections 37 to 56)



Major Street – Total of Both Approaches - vph

Notes:
vph = vehicles per hour
* 150 vph applies as the lower threshold volume for a minor street approach with two or more lanes
** 100 vph applies as the lower threshold volume for a minor street approach with one lane

Legend:

- 1 — 1 lane/1 lane unsignalized intersection
- 1 — 2+ lane/1 lane unsignalized intersection
- 1 — 2+ lane/2+ lane unsignalized intersection
- 1 — 1 lane/1 lane signalized intersection
- 1 — 2+ lane/1 lane signalized intersection
- 1 — 2+ lane/2+ lane signalized intersection

1. Alameda & First – The intersection of Alameda Boulevard and First Street meets the Peak Hour warrant under AM peak hour conditions and experiences an LOS F on the stop approach during both the morning and afternoon peak hours. The intersection sees especially high traffic volumes during the AM peak with conflicting high traffic volumes between the westbound First Street traffic and the northbound left Alameda Boulevard traffic.

2. Alameda & Third – Although the intersection clearly meets the Peak Hour signal warrant during the PM peak hour, it is also close to meeting warrants during the AM peak hour. The Alameda Boulevard and Third Street intersection experiences high traffic volumes in the westbound and southbound directions during both the morning and afternoon peak hours. As a result, this intersection experiences LOS F during both the morning and the afternoon peaks making it a suitable candidate for signalization.

3. Alameda & Fourth– The Alameda Boulevard and Fourth Street intersection experiences LOS B during the AM peak and LOS F during the afternoon peak, reflecting increased volumes of eastbound traffic leaving NASNI and their conflict with north-south cross-traffic during the PM peak. Despite the acceptable AM level of service and lower AM peak traffic, this intersection meets the Peak Hour signal warrant during both peak hours. During the PM peak hour, this location substantially exceeds the warrant threshold making signalization a candidate mitigation measure.

7. Alameda & Ocean – The Alameda Boulevard and Ocean Boulevard intersection experiences LOS C during the AM peak and LOS F during the PM peak, indicating increased conflict between cross-traffic during the afternoon peak. Although this intersection meets the peak hour signal warrant during the PM peak hour, the AM peak hour volumes do not indicate a need for signalization.

16. D & Fourth – The D Avenue and Fourth Street intersection meets the Peak Hour signal warrant during the PM peak hour, although the warrant analysis result clearly indicates the relatively low volume of traffic on D Street compared to the volume on Fourth Street. The D Street stop approaches to the intersection experience LOS B during the AM peak and LOS F during the PM peak. During the PM peak, 2,787 eastbound vehicles conflict with 115 southbound and 153 northbound vehicles at the intersection. This location typifies many of the intersections along Third Street and Fourth Street where the extremely high eastbound or westbound traffic volume impedes the north-south traffic flow. However at these locations the limited benefit afforded to north-south traffic by signalization can be detrimental to the overall performance of the intersection by introducing delay to the east or west traffic flows in the corridor.

22. Orange & Second – The Orange Avenue and Second Street intersection experiences an LOS E during the AM peak and an LOS D during the PM peak. This intersection meets the Peak Hour signal warrant during both peak periods making it suitable for consideration for future signalization. However, this intersection is located in close proximity to other signalized intersections and is substantially impacted by upstream metering and downstream blocking at the intersections of Orange Avenue and First, Third and Fourth Streets. The combined influence of these intersections possibly limits the effectiveness of signalization as a means of mitigating marginal LOS at this location.

25. Orange & Fifth – Like the intersection of Orange Avenue and Second Street, this intersection is substantially impacted by nearby signalized intersections and the influence of upstream metering and downstream blocking. This intersection does meet the Peak Hour signal warrant during the PM peak hour and experiences LOS F on the Fifth Street stop approaches during both the morning and the afternoon peaks. However, the merits of signalizing this intersection to accommodate predominately 'cut-through' traffic are reduced as a result of the combined influence of nearby signalized intersections.

44. Pomona & Fourth – The Pomona Avenue and Fourth Street intersection experiences LOS C during the AM peak and LOS F during the PM peak on the Pomona northbound stop approach, indicating the conflicting volumes of northbound right traffic from Pomona and eastbound through traffic on Fourth. During the PM peak, 4,427 eastbound and 221 northbound vehicles enter the intersection meeting the Peak Hour signal warrant. During the AM peak hour the intersection also meets the peak hour warrant. However, Pomona Avenue only provides for right in-right out movements at this location thereby limiting the effectiveness of signalizing the intersection

47. Pomona & Glorietta – This intersection currently operates as an elongated five-way all-way stop control although only the northerly Pomona and Glorietta conjunction of this irregularly configured intersection has been analyzed. Under short-term forecast conditions, this intersection marginally meets the Peak Hour signal warrant for the PM peak hour only. The provision of a westbound left turn movement from Third Street to either Glorietta, A, B, or C Avenue would likely have a significant impact on this intersection causing it to clearly meet the Peak Hour signal warrant.

49. Glorietta & Fourth – In its present configuration, the Glorietta Boulevard and Fourth Street intersection provides right in-right out movements on both northbound and southbound approaches and experiences an LOS F during the AM peak and an LOS D during the PM peak. Like the Pomona and Fourth intersection described previously, this intersection also clearly meets peak hour signal warrants in the PM peak period although the benefits of a signal to serve the current configuration would be limited. This intersection has been identified as a candidate location for providing a westbound left turn movement from Fourth Street including the subject of an unsuccessful referendum initiative in November 2004.

50. Glorietta & Fifth – Impacted by the high amount of 'cut-through' traffic seeking to access Fourth Street from Glorietta Boulevard during the afternoon peak, the Glorietta Boulevard and Fifth Street intersection experiences LOS F during this period. Similarly, this intersection does meet the Peak Hour signal warrant during the PM peak hour, although the absence of a signal at this location may provide indirect benefit to the local neighborhood by effectively limiting the number of vehicles able to accomplish the eastbound left from Fifth to Glorietta and seeking to bypass traffic on Fourth Street by using this route.

4.0 PROBLEM AND POLICY STATEMENT

The purpose of the City-Wide Major Traffic Study is to implement and execute an accurate traffic volume monitoring program, to develop a process for evaluating a project's impact on traffic flow and to devise comprehensive City-wide solutions and mechanisms to alleviate current and future traffic congestion. The preceding sections of this report have detailed the collection of existing traffic data, the development of short term traffic forecasts, the evaluation of existing and short term traffic conditions and the nature of current City written policy regarding transportation. In preparation for the identification and analysis of measures to mitigate the existing and short term traffic problems, this section will define the nature of the traffic problem within the City of Coronado, recommend appropriate goals for the City transportation network and explore alternate policy statements leading to the endorsement by the Coronado City Council of a preferred policy to guide future City transportation investments.

4.1 Transportation Problem

Roadways within the City of Coronado are experiencing ever increasing traffic congestion as a result of the overall growth in traffic volumes within the City. The overall growth in traffic volumes is typified by the growth in traffic entering and exiting the City of Coronado on SR-75 across the Coronado Bridge. Currently, traffic volumes across the bridge can exceed 90,000 vehicles per day reflecting significant traffic growth over recent years. By comparison, average daily traffic volumes on the Coronado Bridge were approximately 65,000 vehicles per day as recently as ten years ago.

Congestion on roadways within the City of Coronado has increased with the growing traffic volumes circulating within the City. Many factors have contributed to the increase in traffic volumes and congestion within the City, including infill development and redevelopment activities within the City, reassignment of a third aircraft carrier to NASNI and increased military base activity in the wake of the September 11, 2001 terrorist attacks and the subsequent 'War on Terror'. Furthermore, the elimination of the toll for using the Coronado Bridge may have exacerbated the growth in traffic within the Coronado by facilitating increased recreational traffic to attractions within the City and additional regional cut-through traffic seeking to bypass congestion on the Interstate 5 corridor.

The impact of increased traffic volumes is evident in the results of the evaluation of existing traffic conditions completed as part of this study. During peak periods, the performance of many intersections within the City of Coronado is impacted by high traffic volumes leading to delay to motorists and poor levels of service. In particular, the influence of high traffic volumes along several key arterial streets, including SR-75/SR-282 (Third Street and Fourth Street) and Alameda Boulevard is evident in the LOS at various two-way stop controlled intersections where cross street traffic is impeded by uncontrolled high arterial street traffic flows. At several other intersections, the situation is exacerbated by the confluence of high volume flows in opposing directions that exceed the capacity of the traffic signal or four-way stop controls.

In seeking alternatives to congested conditions, commuter traffic within the City of Coronado is increasingly diverting off the designated arterial roadways and onto local residential streets that parallel arterial streets. While it is noted that all streets, with the possible exception of Orange Avenue, have residential frontage and therefore could be termed 'residential', out of necessity, some of the streets have been classified in ascending order as Collector, Minor Arterial and Principal Arterial. Each of these street classifications is expected to carry increasing volumes of traffic. The 'spill-over' of commuter traffic onto streets not designated in the Circulation Element of the General Plan (local streets), creates an undesirable situation with high traffic volumes impacting the quality of life and safety of neighborhoods. Arterials, unlike local streets, have design features and regulations in place to accommodate higher speeds and greater traffic volumes associated with the higher street classification.

The anticipated continued growth in traffic within Coronado is expected to compound the already apparent congestion along major corridors traversing the City and the infiltration of commuter traffic into residential neighborhoods. The results of the analysis of short-term forecast traffic conditions described in **Section 3.3** indicate the expected further deterioration of traffic conditions throughout the City. While the decreased performance at most local street to local street intersections does not constitute a meaningful decline to overall traffic performance, the decreased performance at many intersections along arterial streets does reflect a measurable decline in LOS. This situation is particularly evident along SR-75 (Third Street and Fourth Street) where nearly all crossing streets analyzed as part of this study were determined to have poor LOS on the controlled approaches. Furthermore, under short-term forecast conditions, the intersection of Orange Avenue and Fourth Street in particular was determined to have unacceptable delay and poor LOS during the PM peak period reflecting the convergence of very high opposing traffic volumes and the further deterioration of traffic performance at this signalized intersection.

While the traffic performance of many of the intersections along the arterial streets is characterized by poor LOS on the intersecting local streets, it is important to recognize the overall traffic performance trade-off at these locations. By limiting the level of traffic control along the arterial streets, more traffic is able to be accommodated along these arterials. By accommodating more traffic, these arterial streets are better able to perform the intended function of moving commuter traffic through the City without necessitating excess traffic diversion or infiltration into surrounding residential neighborhoods. Striving to significantly improve side street traffic flows across these arterials could potentially have the consequence of further impeding arterial traffic flows thereby increasing delay and causing more traffic to divert onto alternative parallel local streets.

4.2 Transportation Goals

A review of the City of Coronado Circulation Element goals reveals three core elements that reflect the desire to reduce the impacts of traffic on the community. In particular, these elements include specific reference to minimizing traffic intrusion into residential neighborhoods. These three elements are:

1. Alleviate the adverse impacts of traffic circulation within the community
2. Minimize through traffic intrusion into residential neighborhoods
3. Facilitate safe traffic circulation and interaction between modes

Applying these three elements as transportation planning goals, objectives can be defined as specific, measurable statements related to the attainment of the goals. Borrowing from the existing Circulation Element goals, the following list provides specific objectives to qualify each of the recommended core elements/goals.

1. Alleviate the adverse impacts of traffic circulation within the community
   - Achieve acceptable peak period level of service on the arterial street system through 2010
   - Ameliorate traffic impacts on the environment, including emissions, noise, aesthetics and neighborhood fragmentation

2. Minimize through traffic intrusion into residential neighborhoods
   - Classify city streets based on function and compatibility with adjacent land uses
   - Utilize traffic control measures to preserve the character of city streets

3. Facilitate safe traffic circulation and interaction between modes
   - Provide adequate access for all transportation system users
   - Minimize conflict points within the transportation system
   - Control excessive vehicle speeds on city streets

These objectives subsequently serve as the basis for assessing the effectiveness of alternative transportation strategies to address the respective transportation goals.

Recent initiatives led by the City of Coronado have endeavored to accomplish the goals of the Circulation Element to reduce the impact of traffic on local neighborhoods. Modifications to signal timings, phasing and turning lane configuration at the intersections of Third Street at Orange Avenue and Fourth Street at Orange Avenue have strived to maximize the effectiveness of the traffic signals at these locations. Additionally, semi-diverters were previously installed on A Avenue, B Avenue and C Avenue to help minimize commuter traffic diversion onto these local streets and to sustain traffic flows along Third Street and Fourth Street by reducing cross street conflicts. Following the approval of a ballot initiative by Coronado residents in November 2004, the semi-diverters were subsequently removed from these locations in January 2005.

The changes in the traffic circulation have caused the proliferation of requests for additional localized traffic control. However, this piecemeal approach to implementing traffic control has been criticized for being ineffective or for shifting problems between neighborhoods.

4.3 Transportation Policy Statement

As a basis for determining appropriate solutions to address traffic problems, it is necessary to reaffirm and clearly state the policy position of the City of Coronado regarding traffic problems within the City. Traffic, and in particular commuting between the Coronado Bridge and NASNI, is a fact of life within the City of Coronado and will continue to be a fact of life within the City. Recent efforts of the City to address transportation problems have clearly been consistent with goals to reduce local street intrusion and to maximize arterial street utilization for commuter traffic. However, the effort to accomplish these goals has been criticized for shifting traffic and impeding the ability of some residents to access local streets. Unfortunately, the efforts to reduce neighborhood intrusion will have an impact on the mobility of local residents since reducing neighborhood intrusion cannot be accomplished without some limitation on resident mobility. For this reason, the City of Coronado must contemplate and clearly resolve its position on transportation policy as a basis for determining the most appropriate solutions.

The City of Coronado is faced with three possible policy options to respond to the traffic problems within the City, and in particular the issue of commuter traffic and its impact on the overall quality of life to City residents. These policy options are described as follows:

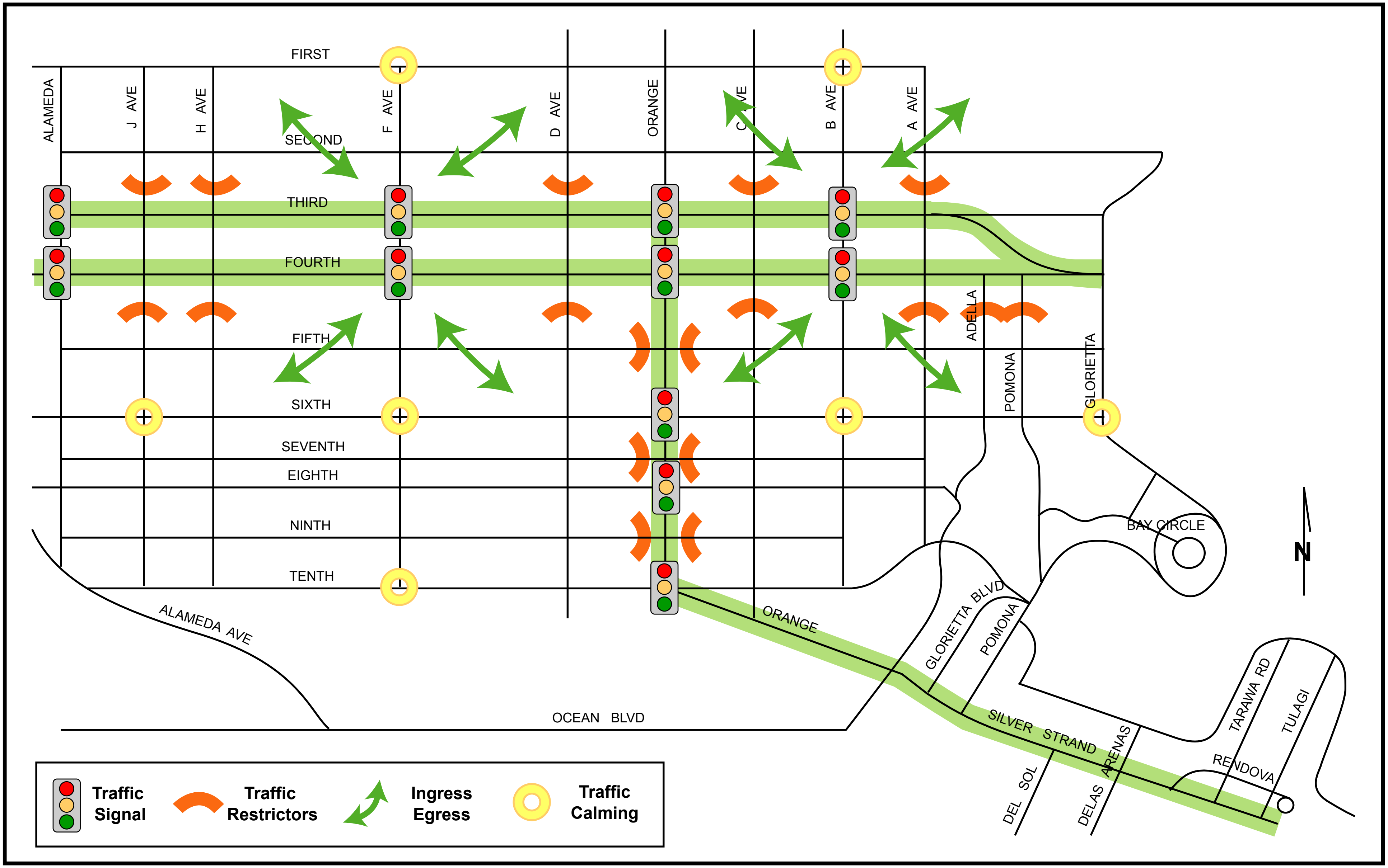
1. *Maximize the existing arterial and collector street system to accommodate commuter traffic while reducing traffic intrusion into residential neighborhoods.*

   This policy option is most consistent with current Circulation Element goals and the core elements/goals described previously in this section. The accomplishment of this option would generally involve channeling traffic onto existing arterial and collector corridors and restricting the ability of through traffic to penetrate residential neighborhoods. Under this option, commuter and cross-town residential traffic flows would be concentrated exclusively on existing arterial and collector streets thereby confining the resultant impacts, although the impacts of traffic would be exacerbated by the limited capacity provided by existing arterial and collector streets. Candidate improvements under this option would include additional traffic signals and turning lanes at key arterial to arterial (or collector) intersections (such as Third Street or Fourth Street at Alameda Boulevard) to maximize arterial traffic flows, and the inclusion of semi-diverters, traffic calming or cul-de-sac treatments to restrict access from arterial streets to local streets. Restricting turning movements by signage can also be used to restrict access; however, this method of control would require significant police presence to enforce.

   A conceptual illustration of Policy Option 1 is provided in **Figure 4.1**.

2. *Supplement the existing arterial and collector street system to provide additional arterial route options and capacity for commuter traffic while reducing traffic intrusion into the majority of residential neighborhoods.*

   This policy option is a compromise of the other two options and is generally consistent with current Circulation Element goals. The accomplishment of this option would involve channeling traffic onto existing arterial and collector corridors in addition to newly designated arterial or collector streets to provide additional capacity. Improvements to these arterial streets would maximize capacity and traffic flow while incorporating elements to restrict the ability of through traffic to intrude into residential neighborhoods.



CORONADO CITYWIDE TRAFFIC STUDY

Policy Option 1: Maximize Existing Arterial System While Reducing Intrusions into Neighborhoods

FIGURE 4.1

Under this option, the majority of traffic would be concentrated on arterial and collector streets thereby confining the resultant impacts, although newly designated arterial and collector streets would incur a disproportionately high share of the resultant impacts relative to the current traffic conditions experienced on these streets. Candidate improvements under Policy Option 2 could include reclassifying the designation of Glorietta Boulevard, First Street, F Avenue or B Avenue to a higher classification. These reclassified streets would in turn be integrated with Third and Fourth Streets with the provision of traffic signals with full turning movements at the intersection(s) with Fourth Street and Third Street, as applicable.

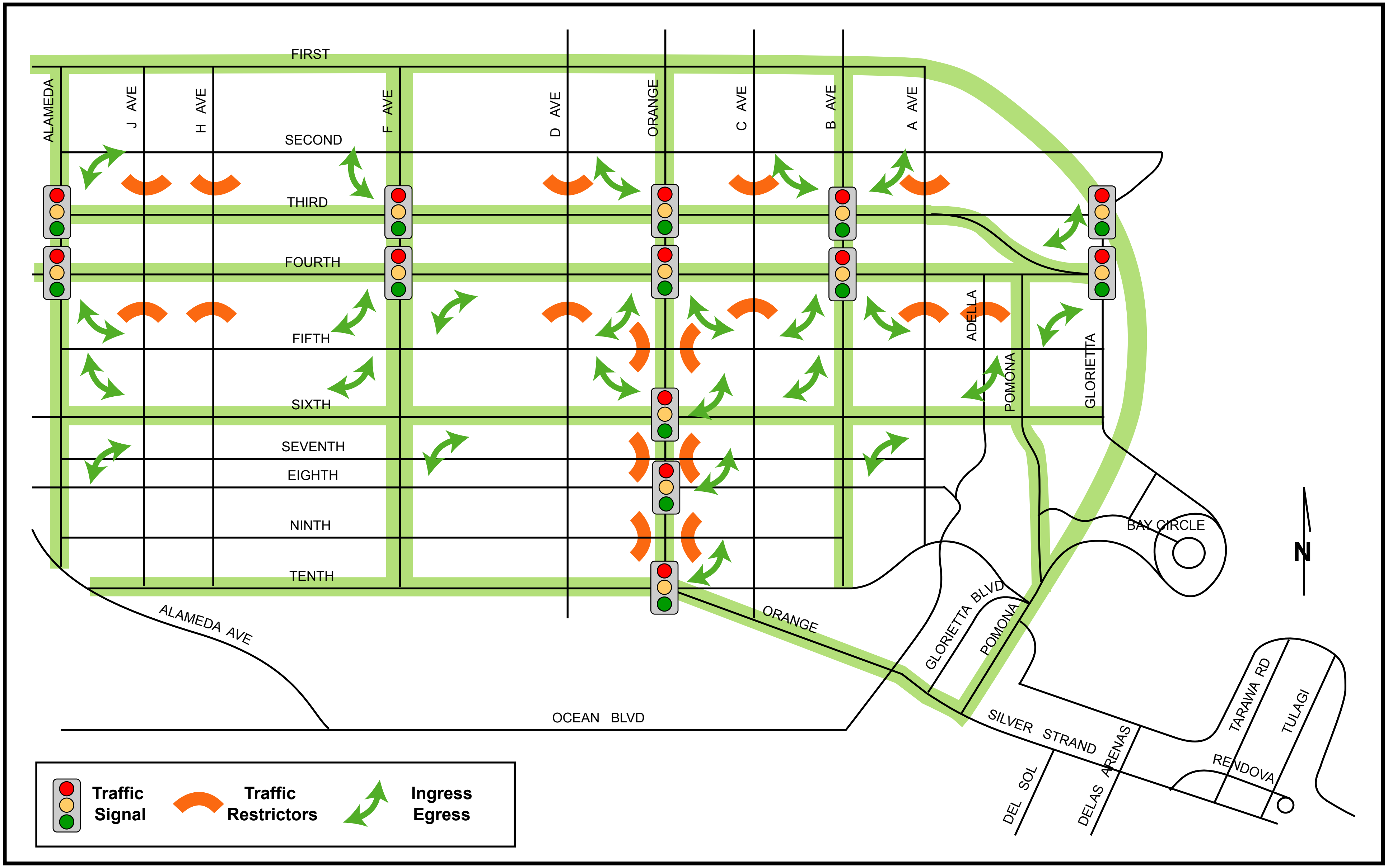
A conceptual illustration of Policy Option 1 is provided in **Figure 4.2**.

3. *Provide accessibility to all City streets to offer the maximum possible route options for commuter and local residential traffic.*

   This policy option is effectively a 'do nothing' option that would retain the current traffic access controls or eliminate existing traffic access controls and prohibitions allowing accessibility for all traffic to all City streets. Due to the grid nature of the street system, this option would ensure maximum accessibility to all residents and would provide multiple route options for traffic within the City. Under this option, traffic would remain fluid tending to seek the path of least resistance resulting in a higher rate of neighborhood traffic intrusion and the broader influence of resultant impacts. Impacts would tend to be less pronounced on arterial and collector streets due to the availability of additional route options and capacity. Candidate improvements under this option could include the removal of the existing semi-diverters and turning restrictions.

   A conceptual illustration of Policy Option 3 is provided in **Figure 4.3**.

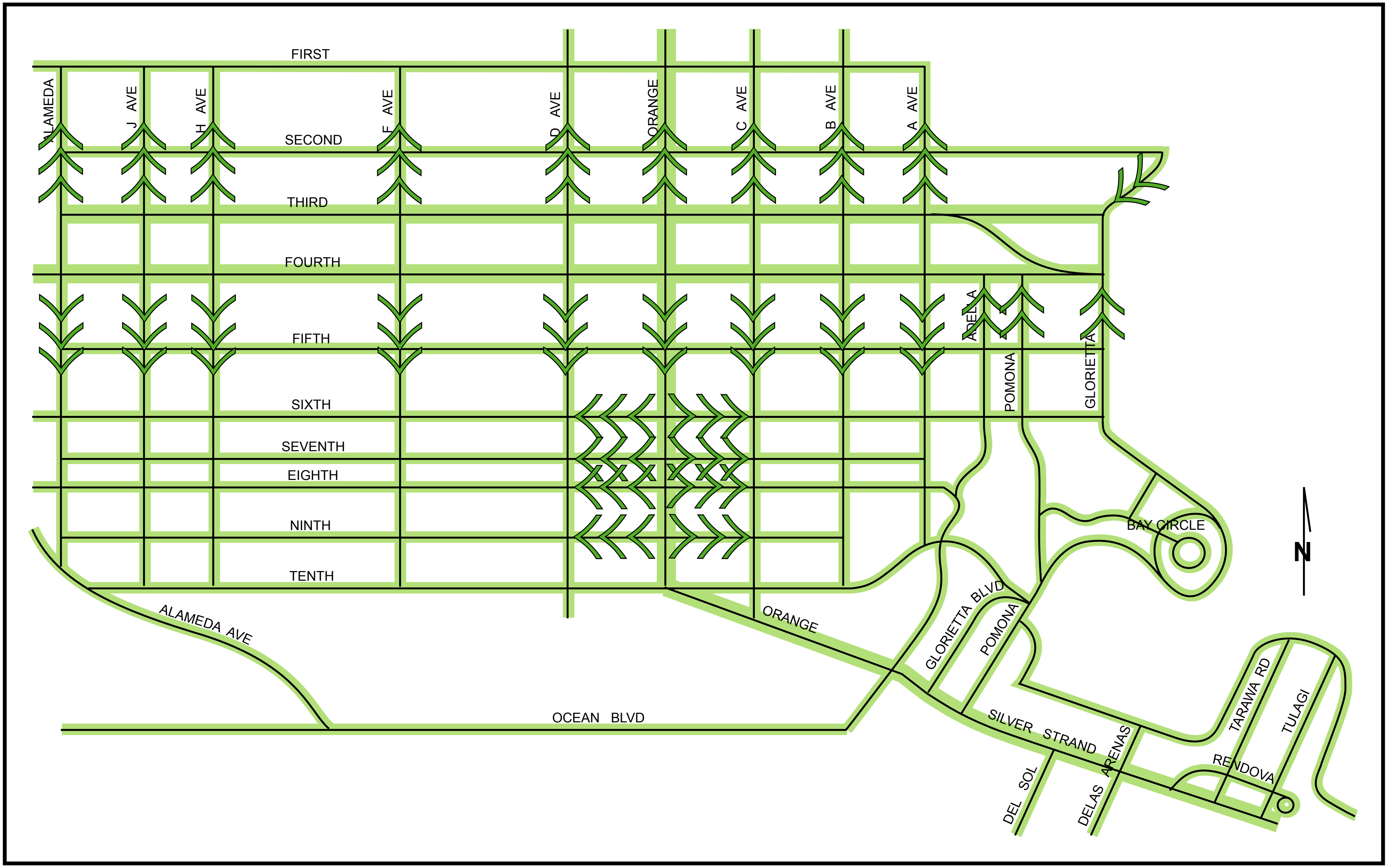
At a Special Council Meeting held on August 5, 2004, the Coronado City Council discussed the issue of traffic and its impact on the City of Coronado, and considered the previously described policy options to respond to the traffic problems within the City. At this meeting, the City Council took action to "adopt Policy Statement Option 1 with the understanding that the City will look into and explore both ends of Glorietta Boulevard and extending the left hand turn lane on 4th." With the affirmation of a definitive City Council policy as the basis for addressing traffic issues within the City of Coronado, it is possible to identify and evaluate alternative strategies that strive to *maximize the existing arterial and collector street system to accommodate commuter traffic while reducing traffic intrusion into residential neighborhoods.*



CORONADO CITYWIDE TRAFFIC STUDY

Policy Option 2: Supplement Existing Arterial System with Additional Route Options While Reducing Intrusion into Most Neighborhoods

FIGURE 4.2



CORONADO CITYWIDE TRAFFIC STUDY

Policy Option 3: Provide Accessibility to All Streets to Offer Maximum Route Options

FIGURE 4.3

5.0 ALTERNATIVES ANALYSIS

Based on the analysis of existing and short-term forecast traffic conditions and building upon the adopted policy of the Coronado City Council, this section defines and evaluates the two improvement alternatives identified to address short-term traffic needs within the City of Coronado. The analysis of alternative strategies for mitigating existing and short-term forecast traffic impacts quantifies the traffic circulation benefits and impacts of potential improvements. This information will provide the Coronado City Council and staff with the necessary information to recommend and implement street improvements that appropriately address existing and short-term traffic needs.

Intersection level of service analysis using re-distributed short-term forecast traffic was completed as the basis for the alternatives analysis. The alternatives analysis results for relevant intersections are compared to the results for the evaluation of short term forecast traffic conditions as the basis for determining the relative effectiveness of the improvement measures proposed.

5.1 Alternatives Description

The two alternatives to be evaluated were defined as follows:

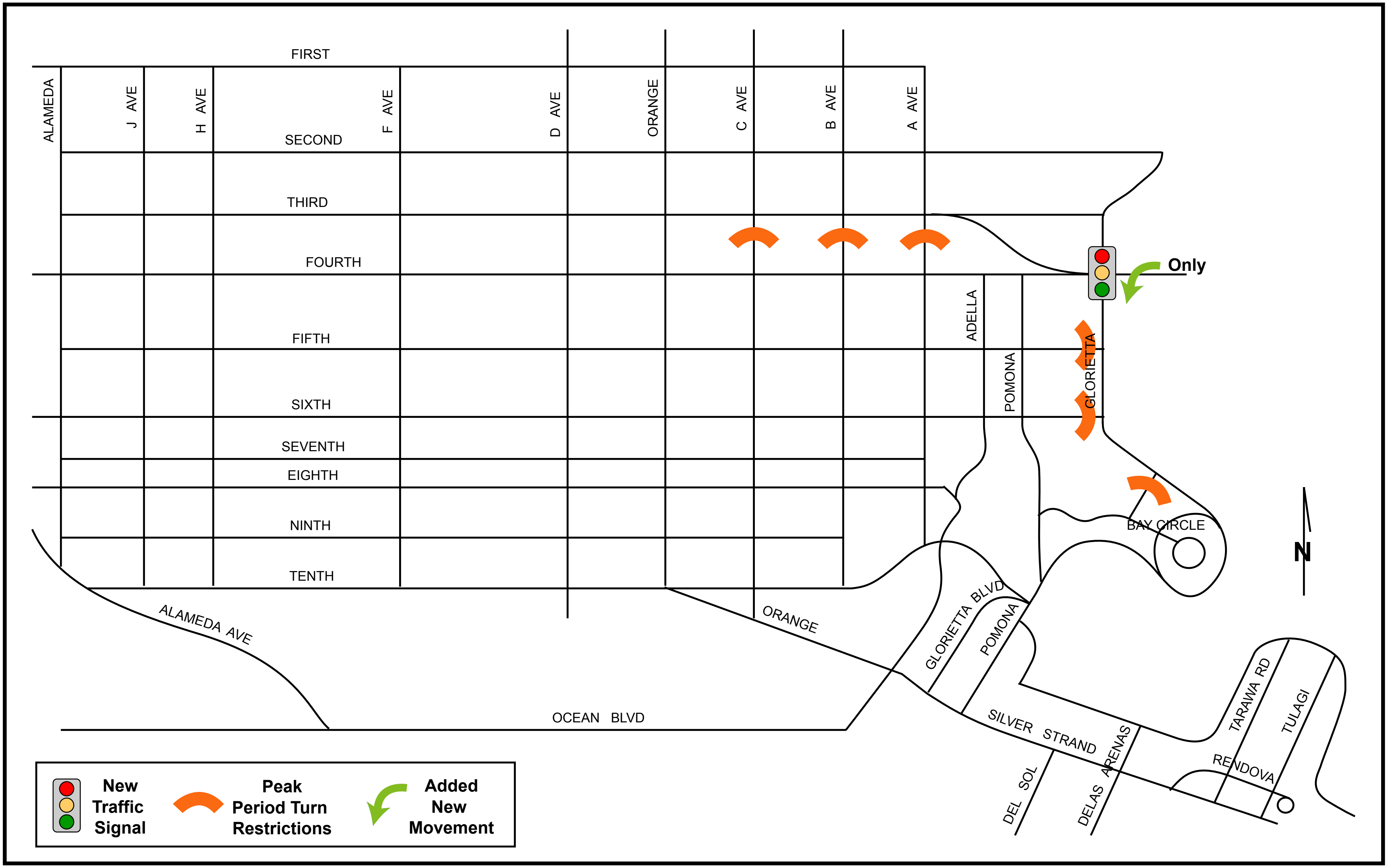
Alternative 1 – Specifically identified in the August 5, 2004 recommendation of the Coronado City Council, Alternative 1 simply involves the signalization of Fourth Street at Glorietta to allow for WBL turns at that location in addition to the existing WBR and NBR turning movements. In addition, this alternative assumes the semi-diverters at Third/Fourth and A, B, C have been removed although AM and PM peak period WBL turning prohibitions would remain in place for A, B, and C at Third intersections. SBR turns would also be prohibited along Glorietta during the peak periods.

Due to the specific traffic movements addressed by this alternative, as well as the relative traffic flows and their associated impacts anticipated by time of day, only the PM peak hour short-term forecast conditions will be evaluated. For the purpose of analyzing Alternative 1, the PM peak hour clearly represents the most critical and significantly impacted time of day when conflicting eastbound through and westbound left turn volumes are greatest.

Figure 5.1 illustrates the improvements associated with Alternative 1.

Alternative 2 – Consistent with the August 5, 2004 recommendation of the Coronado City Council, Alternative 2 is a more encompassing alternative and involves the following elements to maximize traffic flow along existing arterial and collector streets whilst minimizing the impact to local streets and neighborhoods:

- Signalizing Third and Fourth at B to provide for all traffic movements
- Signalizing Third and Fourth at F to provide for all traffic movements (for the purpose of the analysis, signalization of Third and Fourth at H was evaluated due to the availability of necessary traffic data)
- Signalizing Third and Fourth at Alameda to provide for all traffic movements



CORONADO CITYWIDE TRAFFIC STUDY

Alternative 1
Associated Improvements

FIGURE
5.1

- Extending the SBL storage at Orange and Fourth all the way back to Third
- Extending the NBL and SBL storage at Tarawa and SR-75 (Silver Strand)
- Extending the SBL storage at Rendova and SR-75 (Silver Strand)
- Removing the semi-diverters at Third and A, B, C although AM and PM peak period WBL turning prohibitions would remain in place for A and C at Third intersections (B Street would be signalized as described previously).

This alternative also assumes the relocation of the NASNI Main Entrance Gate to Third Street thereby eliminating the current westbound left at Third and Alameda to southbound right at Fourth and Alameda maneuver to access the base. As a result, this alternative assumes the segment of Alameda from Third to Fourth would be reverted to two-way traffic flows replacing the current one-way southbound configuration. This alternative also assumes the existing Fourth Street NASNI gate would remain to serve only as the main exit from the base.

Figure 5.2 illustrates the various elements of Alternative 2

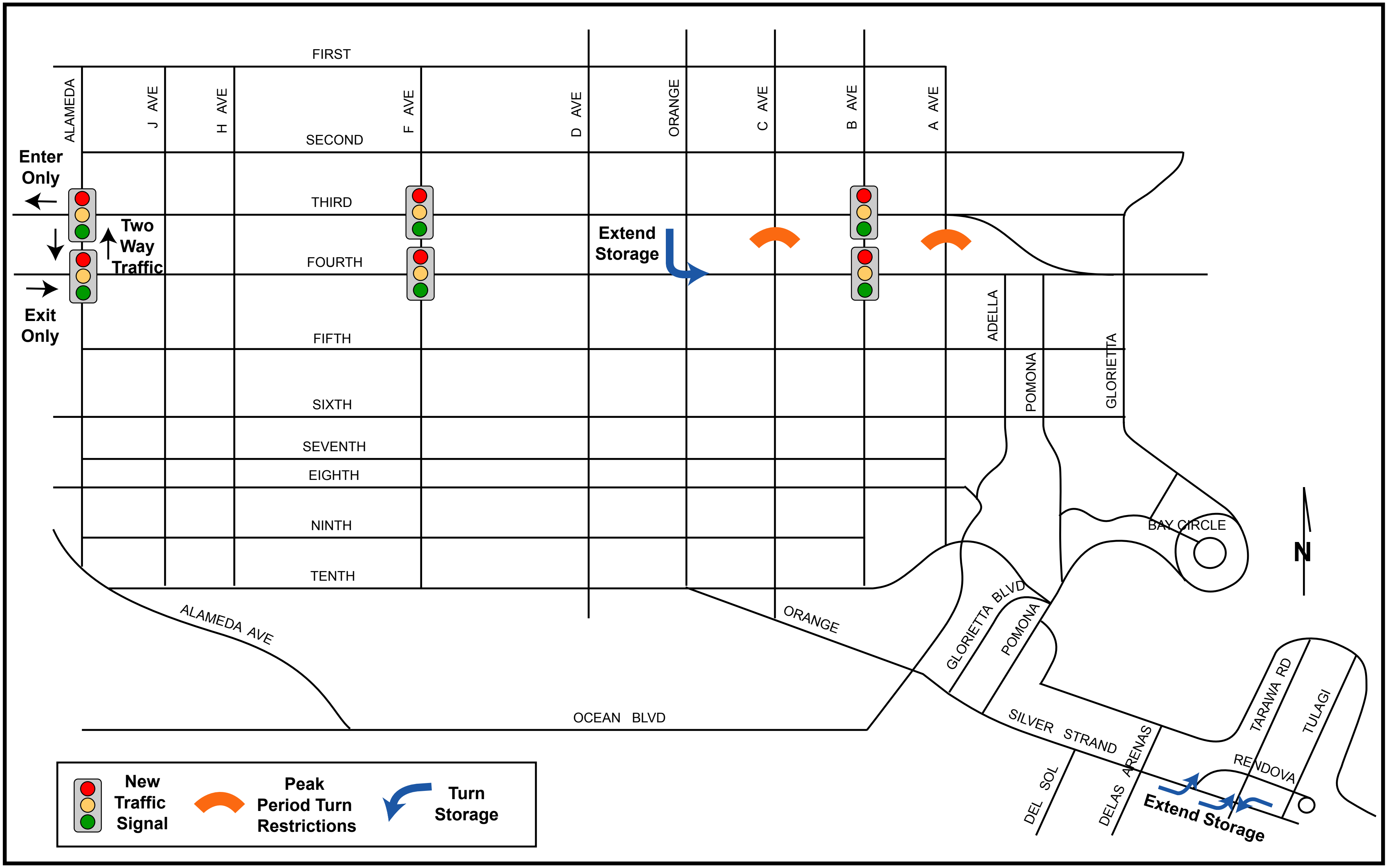
5.2 Alternative 1

The evaluation of Alternative 1 involved the development of a revised Short-Term Forecast for the PM peak hour reflecting the redistribution of traffic that would follow the provision of the westbound left movement at Fourth and Glorietta. The resultant traffic forecast was subsequently used as the basis for evaluating the benefits and impacts of this improvements using the Trafficware Synchro© model developed previously as part of the City-Wide Major Traffic Study. The methodology for redistributing traffic, the resultant revised PM peak hour short-term traffic forecast and the analysis results are described in the following sections.

5.2.1 Alternative 1 Traffic Redistribution Methodology

The redistribution of traffic to reflect the impact of providing a westbound left turning movement from Fourth to Glorietta was developed based primarily on the patterns observed in the reverse direction. With the current provision of a northbound right from Glorietta to Fourth, this pattern is effectively the counter flow to that available once a westbound left is provided.

A review of the short-term forecast traffic data for northbound traffic to eastbound Fourth (SR-74 across the Coronado Bridge) indicates that approximately 54% of the northbound right trips on to Fourth from Orange, C, B, Pomona and Glorietta originate south of the Glorietta/Pomona split; 21% filter up through 5th, 6th, B and C; and 24% make the northbound right at Fourth and Orange. Assuming the reverse pattern is true for the 1,441 forecast to make the westbound left from Third to Orange during the PM peak period, as many as 1,090 could be expected to complete the westbound left turn at Glorietta to pursue alternative options to Orange for destinations further south and west. Clearly operational constraints at the proposed intersection would limit the amount of traffic able to complete this movement regardless of the desired destination. By restricting the southbound right movements along Glorietta at Fifth and Sixth during the peak hours, a maximum of 782 vehicles could be the expected demand to complete the westbound left at Glorietta.



CORONADO CITYWIDE TRAFFIC STUDY

Alternative 2
Associated Improvements

FIGURE
5.2

By assigning the anticipated 782 vehicles to complete the westbound left at Glorietta, an equivalent number of vehicles are no longer observed to complete this movement at Orange. **Table 5.1** summarizes the resultant short-term forecast PM peak hour redistributed traffic based on the previously described assumptions for impacted intersections. Volumes modified from the initial short-term PM peak hour forecast have been highlighted.

Table 5.1 Short-Term Forecast PM Peak Hour Intersection Volumes – Alternative 1

#	Intersection	Northbound			Southbound			Eastbound			Westbound			Total
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
23	Orange Ave & Third St	79	412	0	0	924	8	0	0	0	659	924	99	3,105
24	Orange Ave & Fourth St	0	468	484	988	624	0	23	2,871	49	0	0	0	5,507
25	Orange Ave & Fifth St	16	900	45	74	634	32	10	195	57	7	24	23	2,017
26	Orange Ave & Sixth St	41	837	38	53	693	28	60	118	89	10	22	18	2,007
27	Orange Ave & Eighth St	88	813	20	40	561	63	66	100	51	12	37	16	1,867
28	Orange Ave & Tenth St	63	770	22	81	625	39	60	112	115	24	52	46	2,009
29	Orange Ave & Ocean Blvd	213	762	40	69	577	77	123	176	771	48	23	25	2,904
30	Orange Ave & Pomona Ave	0	0	0	954	0	24	3	1,061	0	0	799	671	3,512
47	Pomona Ave & Glorietta Blvd	0	0	0	5	0	158	555	536	0	0	836	4	2,094
49	Glorietta Blvd & Fourth St	0	0	1,535	0	0	76	0	4,590	31	782	1,665	213	8,892
50	Glorietta Blvd & Fifth St	6	854	0	0	808	8	353	0	11	0	0	0	2,040
51	Glorietta Blvd & Sixth St	14	558	0	0	816	3	328	0	8	0	0	0	1,727

To validate the redistributed traffic under Alternative 1, SANDAG was requested to execute the regional travel demand forecast model (SANDAG Transportation Forecast Series 10) to evaluate the impact of permitting the westbound left turn at Fourth and Glorietta. The results of the base year (2000) model runs indicated that the southbound volumes on Glorietta Boulevard south of Fourth Street increased from 145 to 516 during the PM peak hour. Similarly, the southbound volumes on Pomona Avenue north of Silver Strand increased from 31 to 481 as a result of providing the westbound left turn at Fourth and Glorietta.

Consistent with the significant increase in traffic on Glorietta Boulevard and Pomona Avenue, a commensurate decrease in southbound traffic was observed on Orange Avenue south of Third Street. For example, the southbound traffic on Orange Avenue decrease from 1,476 to 1,051 under base year conditions for the PM peak hour, before and after the provision of the westbound left turn, respectively. Similarly, the southbound traffic on Orange/Silver Strand south of R.H. Dana/Ocean decrease from 1,437 to 961 as a result of implementing the improvements recommended by Alternative 1.

Although the raw base year model outputs do not correspond directly with the redistributed traffic described previously, the significant shift in traffic away from southbound Orange and toward southbound Glorietta is consistent with the redistribution assumptions. For the purpose of this analysis, the use of the redistributed short-term forecast PM peak hour traffic is appropriate to demonstrate the relative impacts of anticipated short-term traffic under Alternative 1.

5.2.2 *Alternative 1 Intersection Traffic Analysis*

The analysis of the short-term PM peak hour conditions for Alternative 1 was performed using Trafficware Synchro©. Optimized signal timing and phasing, intersection delay and LOS were determined for select intersections likely to be impacted substantially by the redistribution of traffic following the provision of a westbound left turn at Fourth and Glorietta. The results of this analysis are summarized in **Table 5.2** which compares intersection delay and corresponding level of service for the relevant study intersections. The detailed short-term forecast analysis results for Alternative 1 are provided in **Appendix C**.

Table 5.2 PM Peak Hour Delay and Level of Service – Alternative 1

#	Intersection	Control [1]	Existing PM		Short Term PM		Alternative 1	
			Delay	LOS	Delay	LOS	Delay	LOS
23	Orange Ave & Third St	S	25.7	C	37.0	D	24.0	C
24	Orange Ave & Fourth St	S	59.5	E	>80	F	>80	F
26	Orange Ave & Sixth St	S	18.0	B	21.5	C	15.0	B
27	Orange Ave & Eighth St	S	16.0	B	17.5	B	13.3	B
28	Orange Ave & Tenth St	S	26.6	C	31.2	C	24.1	C
29	Orange Ave & Ocean Blvd	S	21.9	C	29.2	C	16.4	B
30	Orange Ave & Pomona Ave	S	10.4	B	11.7	B	>80	F
47	Pomona Ave & Glorietta Blvd	A	14.1	B	34.9	D	>50	F
49	Glorietta Blvd & Fourth St	2	22.8	C	27.4	D	>80	F

[1] 2 = Two-Way Stop, A = All-Way Stop, S = Traffic Signal

[2] Delay for two-way stop controlled intersections is for the approach with the highest delay

5.2.3 *Alternative 1 Findings and Recommendations*

As could be expected, the results of the analysis indicate a modest improvement in delay and LOS for most intersections along Orange Avenue between Third Street and R.H. Dana Drive/Ocean Boulevard. With the exception of Orange at Fourth, the average control delay at the intersections improved over the short-term forecast conditions as a result of the reduction in overall traffic following the diversion of vehicles to Glorietta Boulevard. In contrast, conditions along Glorietta Boulevard/Pomona Avenue show considerable deterioration in delay and LOS as a result of the additional traffic load.

24. Orange & Fourth – Despite the reduction in southbound through traffic volume at Orange and Fourth as a result of traffic utilizing Glorietta, the average control delay at the intersection of Orange and Fourth actually increases under Alternative 1 (168.1 seconds in the baseline Short-Term Forecast and 186.8 seconds under Alternative 1). This anomaly occurs because the critical movements at this intersection are not affected by the reduction in southbound through traffic and the overall reduction in traffic volume at the intersection subsequently increases the average control delay. The overall impact on this intersection is negligible as the eastbound through, northbound through and southbound left movements remain unchanged and represent the basis of the delay experienced at this intersection.

30. Orange & Pomona – Following the redistribution of additional traffic to southbound Glorietta Boulevard and away from Orange Avenue, the LOS at the intersection of Orange (Silver Strand) and Pomona, where this diverted traffic returns to southbound Silver Strand, deteriorates significantly. Average control delay at this intersection increases from

11.7 seconds to 137.9 seconds as a result of the increased southbound left traffic from Pomona to Silver Strand conflicting with the through traffic on Silver Strand.

To mitigate the impacts of this additional traffic it would be necessary to add one additional southbound left turn lane on the Pomona southbound approach to Silver Strand, thereby allowing traffic to more efficiently utilize the southbound left turn green time. **Appendix C** includes analysis results for the Alternative 1 Mitigated scenario. The results of this analysis are summarized in Table 5.3 indicating that the average control delay under the mitigated scenario decreases from 137.9 seconds to 25.3 seconds with the additional southbound left turn lane. Consistent with the reduction in delay, the LOS for the intersection improves from an unacceptable F to an acceptable C.

Table 5.3 PM Peak Hour Delay and Level of Service – Alternative 1 Mitigated

#	Intersection	Short Term PM		Alternative 1		Alt 1 Mitigated	
		Delay	LOS	Delay	LOS	Delay	LOS
30	Orange Ave & Pomona Ave	11.7	B	>80	F	25.3	C
47	Pomona Ave & Glorietta Blvd	34.9	D	>50	F	49.2	D
49	Glorietta Blvd & Fourth St	27.4	D	>80	F	>80	F

47. Pomona & Glorietta – Like the intersection of Orange (Silver Strand) and Pomona, the existing all-way stop controlled intersection at Pomona and Glorietta is significantly impacted by the additional traffic utilizing Glorietta under Alternative 1. The stop control at this intersection is simply unable to accommodate the demand on the southbound Glorietta Boulevard approach to the intersection. The results of the Alternative 1 analysis indicate that the average control delay for this approach would exceed 6 minutes while the average control delay for the intersection would exceed 3 minutes.

As indicated in **Table 5.3** above, appropriate mitigation to the intersection is able to significantly reduce the average control delay and will enable the intersection to operate at an acceptable LOS D. This mitigation would require signalization of this intersection and the provision of one additional lane on the southbound Glorietta approach to this intersection (identified as the westbound through movement on the intersection analysis worksheets included in **Appendix C**). With these additional improvements to the intersection, the average control delay on the southbound Glorietta approach is reduced to less than 1 minute, and the delay for the overall intersection is reduced to 49.2 seconds.

49. Glorietta & Fourth – The intersection of Glorietta and Fourth is the focus of Alternative 1 and represents the most critical intersection to be analyzed. With the introduction of the westbound left at Glorietta and Fourth, an interruption to the eastbound traffic flow on Fourth is introduced to allow for the conflicting westbound left traffic movement.

Based on an anticipated westbound left turn volume of 782, the intersection simply cannot accommodate the westbound left and eastbound through and results in LOS F for both movements with an optimized cycle length of 150 seconds and a 49 second/101 second split for the westbound left/eastbound through respectively.

Under this condition the westbound left would experience an average delay of almost 5 minutes (assuming a single westbound left turn lane is provided), while the eastbound through traffic experiences just over 4 minutes of average delay. With mitigation to provide dual westbound left turn lanes, the average control delay for the westbound left is reduced to a little over 3 minutes. Similarly, the average delay for the eastbound through traffic is reduced to approximately 2 minutes, although the overall intersection still continues to operate at LOS F with an average delay of 99.5 seconds. Clearly the implementation of Alternative 1 would have a substantial negative impact on traffic in the city should this improvement proceed with the intent of accommodating maximum demand for the westbound left movement.

To achieve LOS D for the eastbound Fourth Street approach, it would be necessary to reduce the westbound left split time to 14 seconds on a 150 second optimized cycle length. With the reduced green time and a dual westbound left turn lane, approximately 122 vehicles per hour could be adequately accommodated through the intersection. This would result in a LOS E for the westbound left at this volume with a 77.5 second average delay. The eastbound through movement would now operate with a 136 second split and experience a 54.2 second average delay. The overall intersection would operate at LOS C experiencing an average control delay of 33.4 seconds.

Table 5.4 summarizes results for the analysis assuming the Alternative 1 Optimum Demand condition with detailed worksheets provided in Appendix C.

Table 5.4 PM Peak Hour Delay and Level of Service – Alternative 1 Optimum Demand

#	Intersection	Short Term PM		Alternative 1		Alt 1 Mitigated		Alt 1 Optimum Demand	
		Delay	LOS	Delay	Delay	Delay	LOS	Delay	LOS
23	Orange Ave & Third St	37.0	D	24.0	C	20.4	C	32.3	C
24	Orange Ave & Fourth St	>80	F	>80	F	>80	F	>80	F
26	Orange Ave & Sixth St	21.5	C	15.0	B	13.4	B	20.0	B
28	Orange Ave & Tenth St	31.2	C	24.1	C	22.2	C	28.6	C
29	Orange Ave & Ocean Blvd	29.2	C	16.4	B	16.2	B	27.4	C
30	Orange Ave & Pomona Ave	11.7	B	>80	F	25.3	C	17.5	B
47	Pomona Ave & Glorietta Blvd	34.9	D	>50	F	49.2	D	39.0	E
49	Glorietta Blvd & Fourth St	27.4	D	>80	F	>80	F	33.4	C

The reduction in the westbound left turn volume accommodated under the Alternative 1 Optimum Demand condition also provides downstream benefits to intersections along Glorietta and Pomona. Most notably, the intersection of Orange (Silver Strand) and Pomona is able to maintain an acceptable LOS in its current configuration with no additional mitigation to accommodate the Alternative 1 Optimum Demand traffic volumes. Similarly, delay and LOS for the intersection of Glorietta and Pomona deteriorate minimally under the Optimum Demand condition, despite the current all-way stop configuration of the intersection.

Orange Avenue intersections north of Pomona also benefit from the limited southbound traffic now able to utilize Glorietta Boulevard. At these intersections, average control delay is reduced from that experienced under the baseline Short-Term Forecast condition with the most notable improvement in delay and LOS at the intersection of Orange and Third.

5.3 Alternative 2

The evaluation of Alternative 2 involved the development of redistributed short-term forecasts for both the AM and PM peak hours to reflect the anticipated impacts of the improvements associated with Alternative 2. The resultant traffic forecasts were subsequently used as the basis for evaluating Alternative 2 using the Trafficware Synchro© model developed previously as part of the City-Wide Major Traffic Study. The methodology for redistributing traffic, the resultant revised short-term traffic forecasts and the analysis results are described in the following sections.

5.3.1 Alternative 2 Traffic Redistribution Methodology

The redistribution of short-term traffic forecasts to reflect the impact of Alternative 2 was based on the independent evaluation of the impacts of each specific improvement leading to the assignment of the cumulative traffic impacts to the baseline short-term forecasts. The underlying assumptions of the impacts of each improvement element were reviewed and subsequently endorsed by City of Coronado Engineering Department staff prior to completing the traffic redistribution. The traffic redistribution assumptions for Alternative 2 are described in detail as follows:

- **General Assumptions**

  Based on past traffic history, it is assumed that the installation of traffic signals at the intersections of Third and Fourth at B and the removal of the semi-diverters at Third/Fourth and A, B, C would generally result in increased traffic on Pomona and Glorietta. For the purpose of Alternative 2, it was assumed that despite the removal of the semi-diverters at A, B and C, peak hour turning restrictions would be enforced at A and C Avenues thereby eliminating any notable impact of the semi diverter removal.

  Locations in the Village area of Coronado or south along Silver Strand were assumed to be the destination for the majority of westbound left turns at Third and Orange. Furthermore, it was assumed that some of those westbound left turns would utilize B to complete the westbound left seeking Pomona and Glorietta as an alternative to Orange (approximately 375 and 152 vehicles during the AM and PM peak hours, respectively).

  With the opening of the NASNI gate at Third Street, Alameda Boulevard is assumed to be reconfigured between Third and Fourth to allow for two-way traffic with northbound vehicles continuing along Alameda and making a northbound left turn on Third to enter the base. Westbound traffic on Third will proceed directly into the base, thereby substantially reducing the existing westbound left turn volumes at the intersection of Third and Alameda.

- **Redistribution Assumptions for Signalizing Third and Fourth at B**

  It is assumed that this improvement would result in a reduction in westbound left turns at the intersection of Third and Orange. Assuming westbound left turns are prohibited from Third to A and C during the peak hours, any traffic seeking an alternative to Orange Avenue would need to utilize B Avenue. As evidenced by existing traffic patterns, the traffic diverting to B would likely move toward Pomona and Glorietta to reach Silver Strand. The remaining traffic would still continue to make westbound left turns at Third and Orange. In order to proceed to Pomona and Glorietta, it is assumed that approximately 75% of the traffic utilizing B would make a southbound left at Fourth, approximately 20% would make a southbound left at Fifth (due to the two-way stop configuration to control east-west traffic), and approximately 5% would make a southbound left at Sixth. For all redistributed traffic, historical information conveyed by the City of Coronado indicates that approximately 90% of traffic traveling eastbound on Fourth would make a right turn at Pomona, with the remaining 10% continuing east to make a right turn at Glorietta.

For the northbound right turns at Fourth and Orange, it is assumed that 50% of the total traffic would utilize Fifth and Sixth to move to B following signalization (with an even split between Fifth and Sixth). For the southbound left turns at Fourth and Orange, it is assumed that 50% of the traffic making the westbound left turn at First and Orange would use B and C as an alternative. Similarly, during the PM Peak, it is assumed that approximately 50% of the eastbound right turns at First and Orange would proceed to First and B to make an eastbound right, and then proceed south to Fourth to make a southbound left.

- **Redistribution Assumptions for Signalizing Third and Fourth at H**

For the purpose of this analysis, the signalization of H at Third and Fourth are evaluated as a substitute for the signalization of F at Third and Fourth, due to the availability of necessary traffic data. It is assumed that the signalization of H at Third and Fourth would result in similar redistribution of traffic when compared to the signalization of F at Third and Fourth.

Based on the existing two-way stop control at First and H, approximately 15% and 85% of the AM and PM peak hour traffic, respectively, would likely divert from the westbound right turn at Third and Alameda. It is assumed this small amount of traffic may make a westbound right at Third and H to make a northbound left at First and H before continuing westbound.

This improvement is not anticipated to have any noticeable impact on the distribution of eastbound traffic along Fourth Street due to the influence of signalized intersections downstream.

- **Redistribution Assumptions for NASNI Entrance Gate at Third Street**

With the opening of the NASNI Main Entrance Gate at Third Street, it is assumed that Alameda Boulevard from Third Street to Fourth Street would be reverted from one-way southbound to two-way traffic operations thereby allowing northbound traffic to proceed along the full length of Alameda Boulevard. With the new gate, westbound traffic on Third will proceed directly into the base, thereby reducing the existing westbound left turn volumes at the intersection of

Third and Alameda and eliminating the corresponding southbound right volumes at Fourth and Alameda.

- **Redistribution Assumptions for Signalizing Third and Fourth at Alameda**

  This is primarily an operational improvement. With the exception of the westbound left movement at Third and Alameda to the southbound right movement at Fourth and Alameda that is made redundant by the provision of the new NASNI Main Entrance Gate, it is assumed that this improvement would generally improve traffic operations and therefore not result in a change to traffic patterns.

- **Redistribution Assumptions for Extending the SBL at Orange and Fourth**

  This is an operational improvement only. It is assumed that it will moderately improve traffic operations at this location and therefore not directly result in a change to traffic patterns.

- **Redistribution Assumptions for Extending the Left Turn Storage at Tarawa and Rendova**

  This is an operational improvement only. It is assumed that it will improve traffic operations at these intersections but not result in a change to overall traffic patterns.

- **Redistribution Assumptions for Removing the Semi-Diverters on A, B and C at Third**

  As discussed previously, it is assumed that the traffic destined for the south and west (approximately 375 and 152 vehicles during the AM and PM peak hours, respectively) would utilize B Avenue to access Pomona and Glorietta. The enforcement of westbound left turn prohibitions from Third to A and C during the peak hours would effectively negate any potential for peak hour traffic diversion to A or C following the removal of the semi-diverters.

The improvements included in Alternative 2 would primarily result in changes to the traffic patterns for traffic with origins and destinations to the south of Fourth Street and east of Orange Avenue. The changes in traffic patterns would most likely result in a reduction of traffic volumes on Orange Avenue south of Fourth Street and a commensurate increase in traffic on B Avenue, Pomona Avenue and Glorietta Boulevard. **Tables 5.5** and **5.6** summarize AM and PM peak hour traffic volumes, respectively, based on the redistribution resulting from the Alternative 2 improvements. Values that are changed from the baseline short-term forecast have been highlighted. **Figures 5.3** and **5.4** illustrate the corresponding short-term forecast turning movement volumes for Alternative 2.

Table 5.5 Short-Term Forecast AM Peak Hour Intersection Volumes – Alternative 2

#	Intersection	Northbound			Southbound			Eastbound			Westbound			Total
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
1	Alameda Blvd & First St	1,050	0	26	0	0	0	0	37	118	9	1,030	0	2,270
2	Alameda Blvd & Third St	485	35	0	0	130	37	0	0	0	9	1,500	644	2,840
3	Alameda Blvd & Fourth St	0	520	41	83	22	0	0	259	54	0	0	0	979
4	Alameda Blvd & Fifth St	0	304	6	6	64	0	0	0	0	6	0	216	602
5	Alameda Blvd & Sixth St	2	282	4	5	71	4	24	6	2	4	13	29	446
6	Alameda Blvd & Country Club	2	224	0	0	89	0	0	0	4	0	0	0	319
7	Alameda Blvd & Ocean Blvd	0	0	0	66	0	3	0	54	0	0	554	171	848
8	H Ave & First St	112	0	14	0	0	0	0	46	1	3	830	0	1,006
9	H Ave & Third St	14	11	0	0	2	4	0	0	0	0	2,116	112	2,259
10	H Ave & Fourth St	0	35	29	13	10	0	0	541	2	0	0	0	630
11	H Ave & Fifth St	2	36	2	0	4	3	1	6	0	4	313	7	378
12	H Ave & Sixth St	5	21	3	1	2	6	9	12	1	2	93	5	160
13	H Ave & Tenth St	2	6	2	8	9	5	15	44	0	4	74	15	184
14	D Ave & First St	5	1	14	8	1	1	0	70	1	1	813	3	918
15	D Ave & Third St	2	11	0	0	34	0	0	0	0	34	1,696	4	1,781
16	D Ave & Fourth St	0	16	18	26	43	0	0	566	2	0	0	0	671
17	D Ave & Fifth St	1	14	4	1	22	0	1	11	0	2	260	1	317
18	D Ave & Sixth St	2	45	21	13	33	4	2	25	6	6	71	1	229
19	D Ave & Eighth St	6	11	26	6	20	0	2	68	1	3	35	1	179
20	D Ave & Tenth St	0	0	0	23	0	2	4	72	0	0	80	13	194
21	Orange Ave & First St	339	0	61	0	0	0	0	5	47	154	311	0	917
22	Orange Ave & Second St	52	408	73	3	28	208	3	14	52	100	313	26	1,280
23	Orange Ave & Third St	53	174	0	0	223	8	0	0	0	1,291	1,619	336	3,704
24	Orange Ave & Fourth St	0	219	146	214	1,387	0	21	406	51	0	0	0	2,444
25	Orange Ave & Fifth St	37	360	83	30	1,411	143	5	3	8	4	17	23	2,124
26	Orange Ave & Sixth St	31	430	77	23	896	53	21	11	23	19	15	18	1,617
27	Orange Ave & Eighth St	19	525	4	7	885	20	44	12	15	8	10	0	1,549
28	Orange Ave & Tenth St	53	472	3	32	899	33	27	21	47	8	14	22	1,631
29	Orange Ave & Ocean Blvd	635	489	7	18	619	116	29	83	81	19	26	8	2,130
30	Orange Ave & Pomona Ave	0	0	0	660	0	5	0	849	0	0	981	532	3,027
31	C Ave & First St	96	0	3	0	2	2	1	28	39	66	577	0	814
32	C Ave & Third St	3	0	0	0	60	7	0	0	0	0	3,239	4	3,313
33	C Ave & Fourth St	0	2	14	58	13	0	1	982	3	0	0	0	1,073
34	C Ave & Sixth St	12	13	10	1	10	14	6	112	6	4	22	3	213
35	C Ave & Eighth St	3	9	3	2	23	5	4	26	0	2	22	0	99
36	C Ave & Tenth St	4	16	5	7	15	10	3	56	5	4	35	2	162
37	C Ave & Orange Ave	0	0	0	11	0	9	24	796	0	1	522	12	1,375
38	B Ave & First St	79	1	0	1	2	1	8	18	13	94	556	4	777
39	B Ave & Third St	1	1	0	0	80	12	0	0	0	375	3,091	5	3,565
40	B Ave & Fourth St	0	3	164	364	104	0	5	1,064	4	0	0	0	1,708
41	B Ave & Fifth St	2	98	1	81	27	2	79	28	5	0	27	2	352
42	B Ave & Sixth St	4	19	3	31	8	5	78	31	3	0	26	3	211
43	B Ave & Tenth St	11	13	15	2	12	3	1	49	14	6	26	1	153
44	Pomona Ave & Fourth St	0	0	240	0	0	0	0	1,387	521	0	3,809	0	5,957
45	Pomona Ave & Fifth St	3	315	190	2	509	5	0	22	95	1	7	1	1,150
46	Pomona Ave & Sixth St	10	534	41	14	593	2	5	44	31	7	25	10	1,316
47	Pomona Ave & Glorietta Blvd	0	0	0	0	2	652	465	176	0	0	76	2	1,373
48	Glorietta Blvd & Third St	85	803	8	2	2	7	0	0	4	2	0	4	917
49	Glorietta Blvd & Fourth St	0	0	520	0	0	54	0	1,621	99	0	3,763	842	6,899
50	Glorietta Blvd & Fifth St	4	217	0	0	107	6	241	0	13	0	0	0	588
51	Glorietta Blvd & Sixth St	10	171	0	0	113	5	61	0	16	0	0	0	376
52	Glorietta Blvd & Orange Ave	0	0	0	1	0	9	7	867	0	0	970	6	1,860
53	Silver Strand & De Las Arenas Ave	27	1,627	20	47	1,268	20	59	5	7	10	1	21	3,112
54	Silver Strand & Rendova Dr.	0	1,660	1	337	1,556	0	0	0	0	2	0	10	3,566
55	Silver Strand & Tarawa Rd	253	1,615	6	607	304	413	23	35	4	30	81	198	3,569
56	Silver Strand & Tulagi Rd	0	1,976	764	0	314	0	0	0	0	21	0	3	3,078

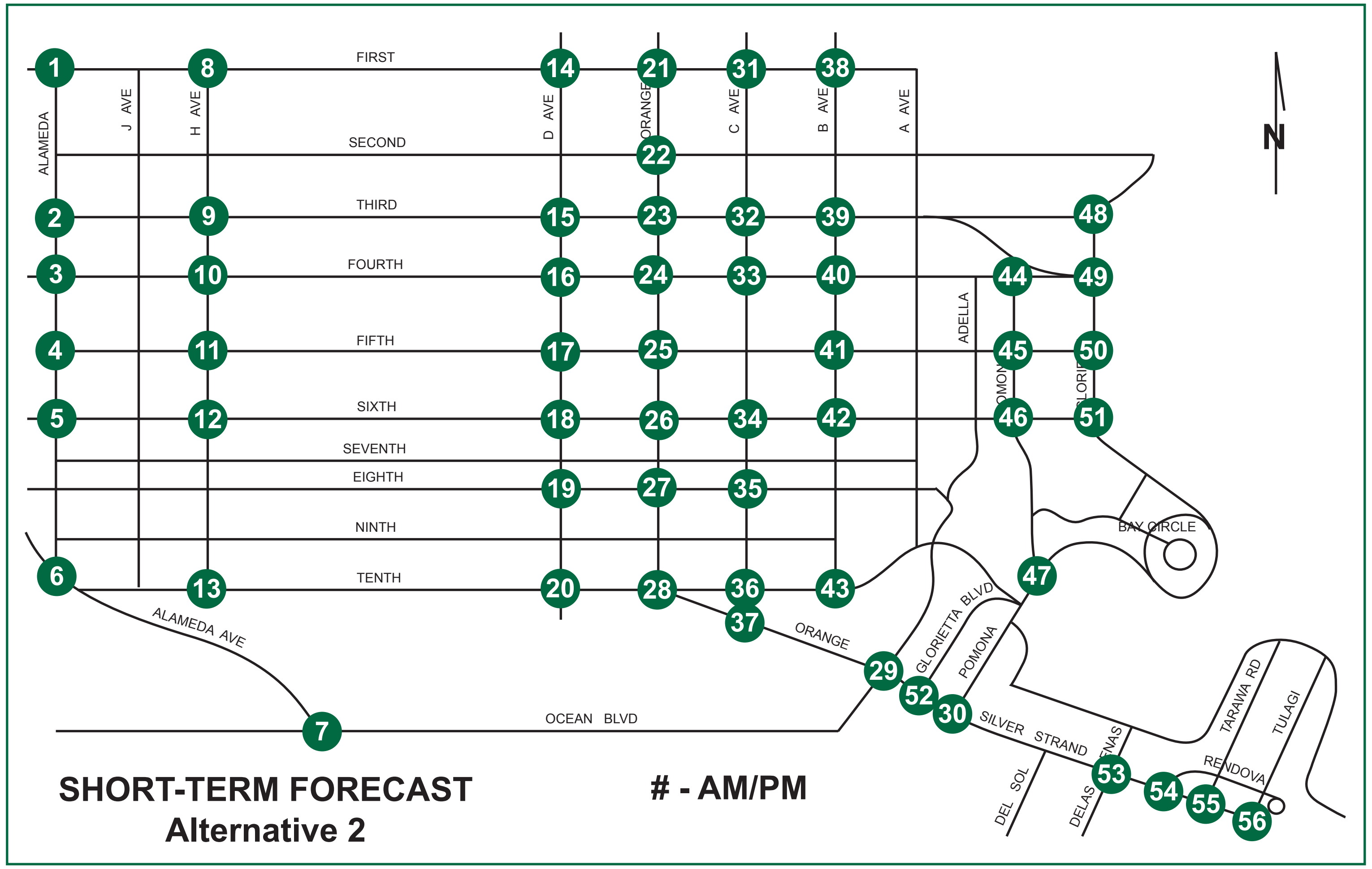
Table 5.6 Short-Term Forecast PM Peak Hour Intersection Volumes – Alternative 2

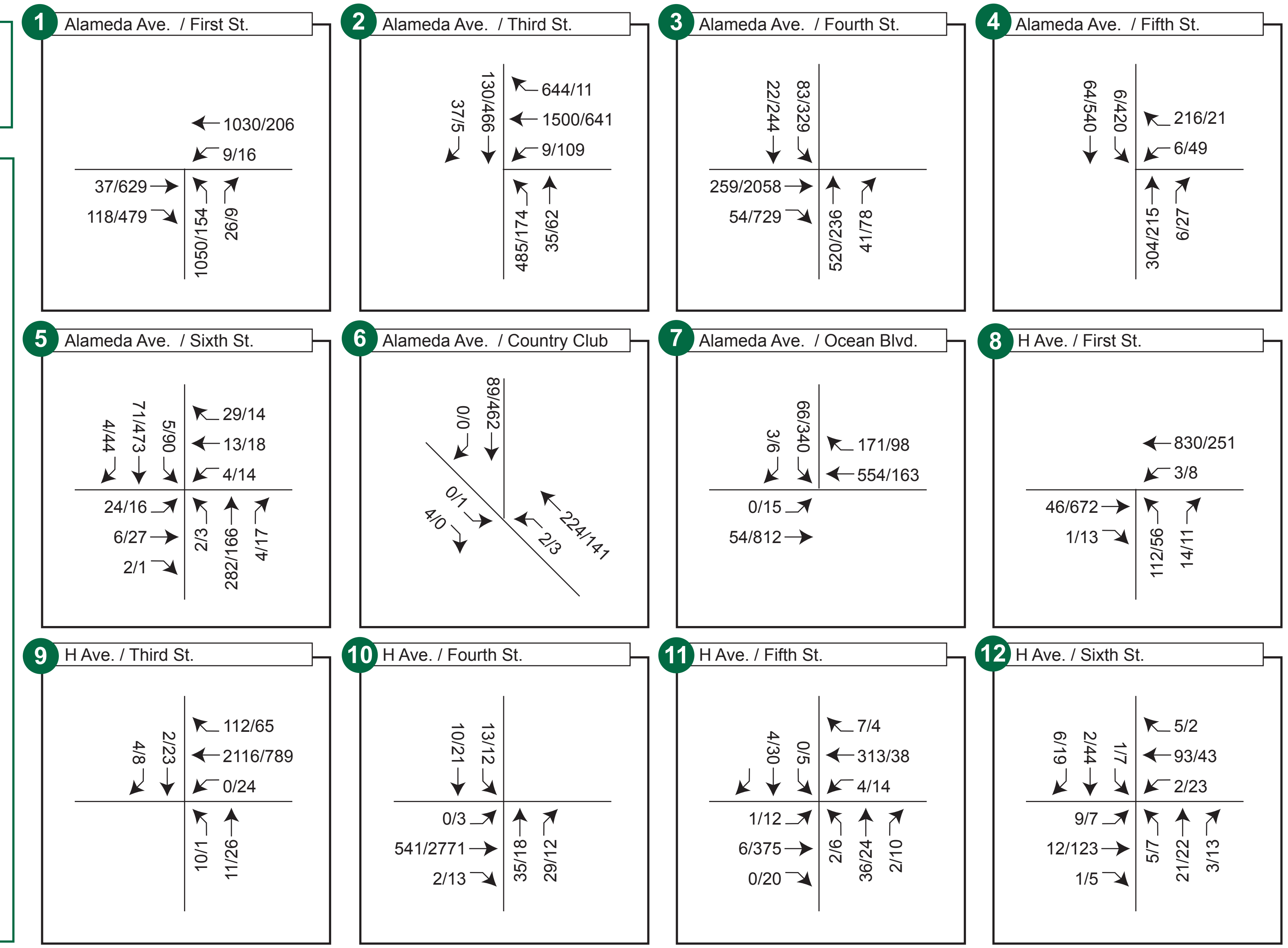
#	Intersection	Northbound			Southbound			Eastbound			Westbound			Total
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
1	Alameda Blvd & First St	54	0	9	0	0	0	0	529	579	16	206	0	1,393
2	Alameda Blvd & Third St	174	62	0	0	466	5	0	0	0	109	641	11	1,468
3	Alameda Blvd & Fourth St	0	236	78	429	244	0	0	2,058	729	0	0	0	3,774
4	Alameda Blvd & Fifth St	0	215	27	420	540	0	0	0	0	49	0	21	1,272
5	Alameda Blvd & Sixth St	8	166	17	90	473	44	16	27	1	14	18	14	888
6	Alameda Blvd & Country Club	3	141	0	0	462	0	1	0	0	0	0	0	607
7	Alameda Blvd & Ocean Blvd	0	0	0	340	0	6	15	812	0	0	163	98	1,434
8	H Ave & First St	56	0	11	0	0	0	0	572	13	8	251	0	911
9	H Ave & Third St	2	27	0	0	23	8	0	0	0	24	789	65	938
10	H Ave & Fourth St	0	18	12	12	21	0	3	2,771	13	0	0	0	2,850
11	H Ave & Fifth St	6	24	10	5	30	1	12	375	20	14	38	4	539
12	H Ave & Sixth St	7	22	13	7	44	19	7	123	5	23	45	2	317
13	H Ave & Tenth St	5	22	7	22	21	11	15	117	3	4	93	13	333
14	D Ave & First St	2	2	16	10	3	1	1	586	9	42	295	14	981
15	D Ave & Third St	11	55	0	0	146	9	0	0	0	27	1,016	16	1,280
16	D Ave & Fourth St	0	64	89	70	112	0	2	2,781	4	0	0	0	3,122
17	D Ave & Fifth St	3	88	6	14	99	7	73	362	32	8	47	22	761
18	D Ave & Sixth St	7	114	57	70	96	7	8	167	26	43	50	8	653
19	D Ave & Eighth St	12	68	74	37	132	12	3	141	27	9	36	6	557
20	D Ave & Tenth St	0	0	0	99	0	31	22	202	0	0	96	52	502
21	Orange Ave & First St	113	0	133	0	0	0	0	394	227	100	165	0	1,132
22	Orange Ave & Second St	36	253	155	7	285	44	11	43	43	169	101	41	1,188
23	Orange Ave & Third St	79	412	0	0	484	8	0	0	0	1,256	874	99	3,212
24	Orange Ave & Fourth St	0	468	244	548	1,181	0	23	2,871	49	0	0	0	5,384
25	Orange Ave & Fifth St	16	660	165	74	1,191	32	10	195	57	7	24	23	2,454
26	Orange Ave & Sixth St	41	717	158	53	1,250	28	60	118	89	15	22	18	2,569
27	Orange Ave & Eighth St	88	813	20	40	1,118	63	66	100	51	12	37	16	2,424
28	Orange Ave & Tenth St	63	770	22	81	1,182	39	60	112	115	24	52	46	2,566
29	Orange Ave & Ocean Blvd	213	762	40	69	1,134	77	123	176	771	48	23	25	3,461
30	Orange Ave & Pomona Ave	0	0	0	397	0	24	3	1,618	0	0	799	671	3,512
31	C Ave & First St	36	1	19	3	0	3	4	487	36	49	205	9	852
32	C Ave & Third St	2	1	0	0	40	24	0	0	0	2	2,191	22	2,282
33	C Ave & Fourth St	0	3	22	40	8	0	2	3,715	11	0	0	0	3,801
34	C Ave & Sixth St	14	46	11	5	28	6	22	314	31	6	43	4	530
35	C Ave & Eighth St	19	61	4	4	38	12	14	93	23	2	45	4	319
36	C Ave & Tenth St	18	49	27	24	33	24	27	199	34	20	96	21	572
37	C Ave & Orange Ave	0	0	0	30	0	8	79	1,140	0	8	846	52	2,163
38	B Ave & First St	39	7	12	4	4	15	20	217	287	53	216	11	885
39	B Ave & Third St	3	4	0	0	300	47	0	0	0	152	2,186	28	2,720
40	B Ave & Fourth St	0	3	262	429	28	0	6	3,758	10	0	0	0	4,496
41	B Ave & Fifth St	9	185	13	33	15	7	145	167	68	2	29	13	686
42	B Ave & Sixth St	9	74	6	1	33	9	145	184	5	2	34	3	505
43	B Ave & Tenth St	58	69	41	10	49	7	12	114	94	11	68	4	537
44	Pomona Ave & Fourth St	0	0	271	0	0	0	0	4,377	250	0	2,467	0	7,365
45	Pomona Ave & Fifth St	11	253	265	2	308	7	9	129	52	4	10	0	1,050
46	Pomona Ave & Sixth St	16	510	165	20	344	1	11	124	28	3	5	5	1,232
47	Pomona Ave & Glorietta Blvd	0	0	0	5	1	363	655	436	0	0	74	4	1,538
48	Glorietta Blvd & Third St	75	202	27	23	30	24	11	5	12	15	12	15	451
49	Glorietta Blvd & Fourth St	0	0	1,535	0	0	76	0	4,590	51	0	2,447	213	8,912
50	Glorietta Blvd & Fifth St	6	754	0	0	46	8	453	0	11	0	0	0	1,278
51	Glorietta Blvd & Sixth St	14	458	0	0	54	3	328	0	8	0	0	0	865
52	Glorietta Blvd & Orange Ave	0	0	0	5	0	11	39	1,598	0	0	765	40	2,458
53	Silver Strand & De Las Arenas Ave	32	1,185	48	57	1,782	131	130	23	45	41	7	18	3,499
54	Silver Strand & Rendova Dr.	0	1,306	0	0	1,869	0	31	0	24	9	0	265	3,504
55	Silver Strand & Tarawa Rd	50	802	8	212	1,852	66	271	70	210	29	90	430	4,090
56	Silver Strand & Tulagi Rd	0	796	84	0	1,844	0	0	0	0	299	0	5	3,028

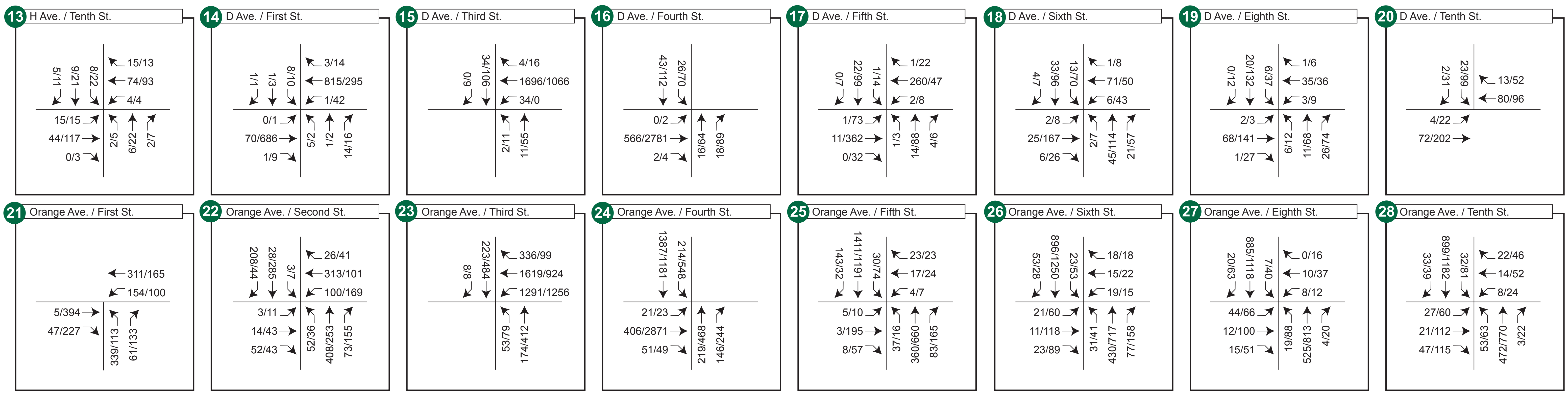
CORONADO CITYWIDE TRAFFIC STUDY

Peak Hour Turning Movement Volumes Pt. 1

FIGURE 5.3



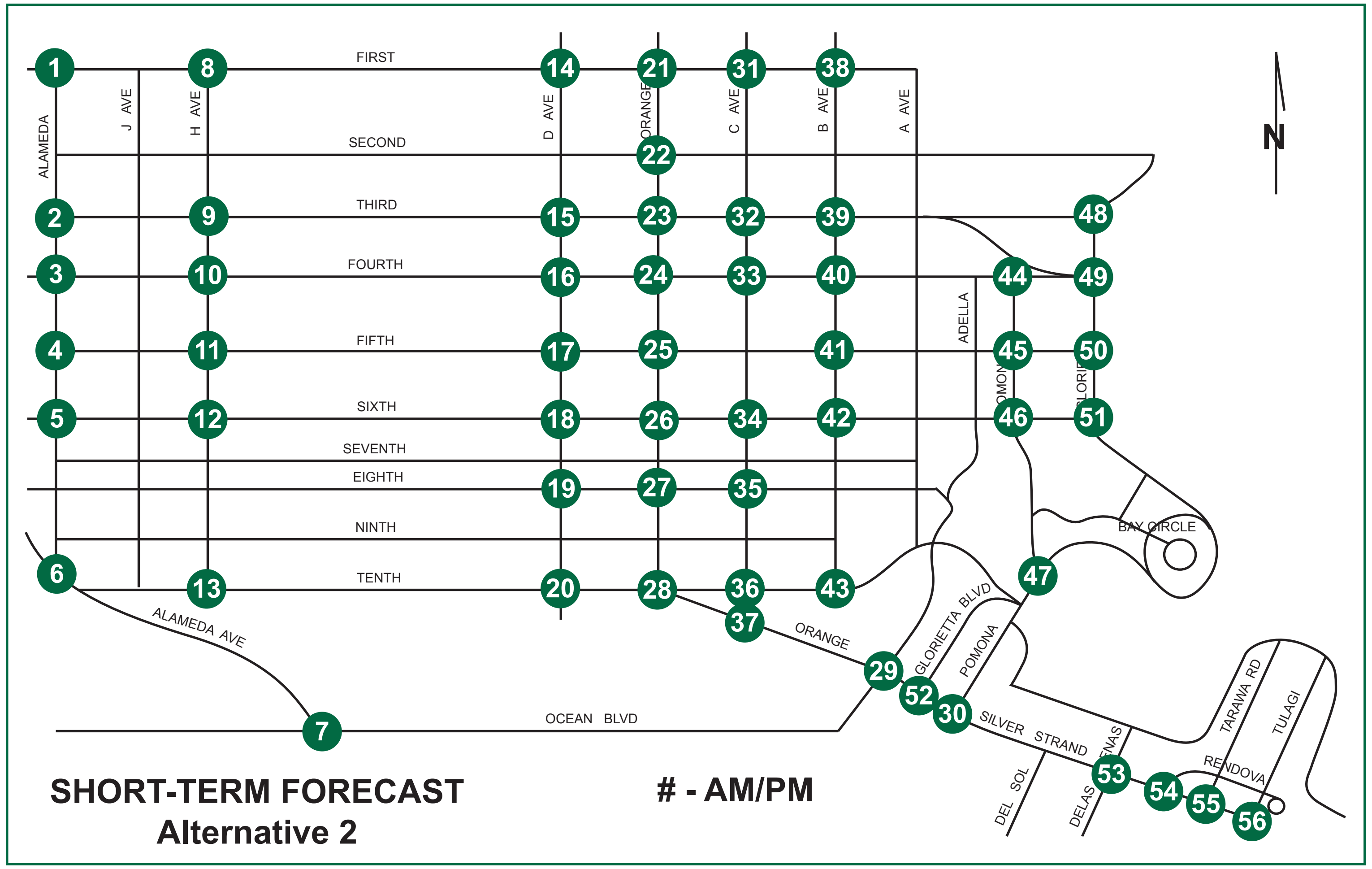


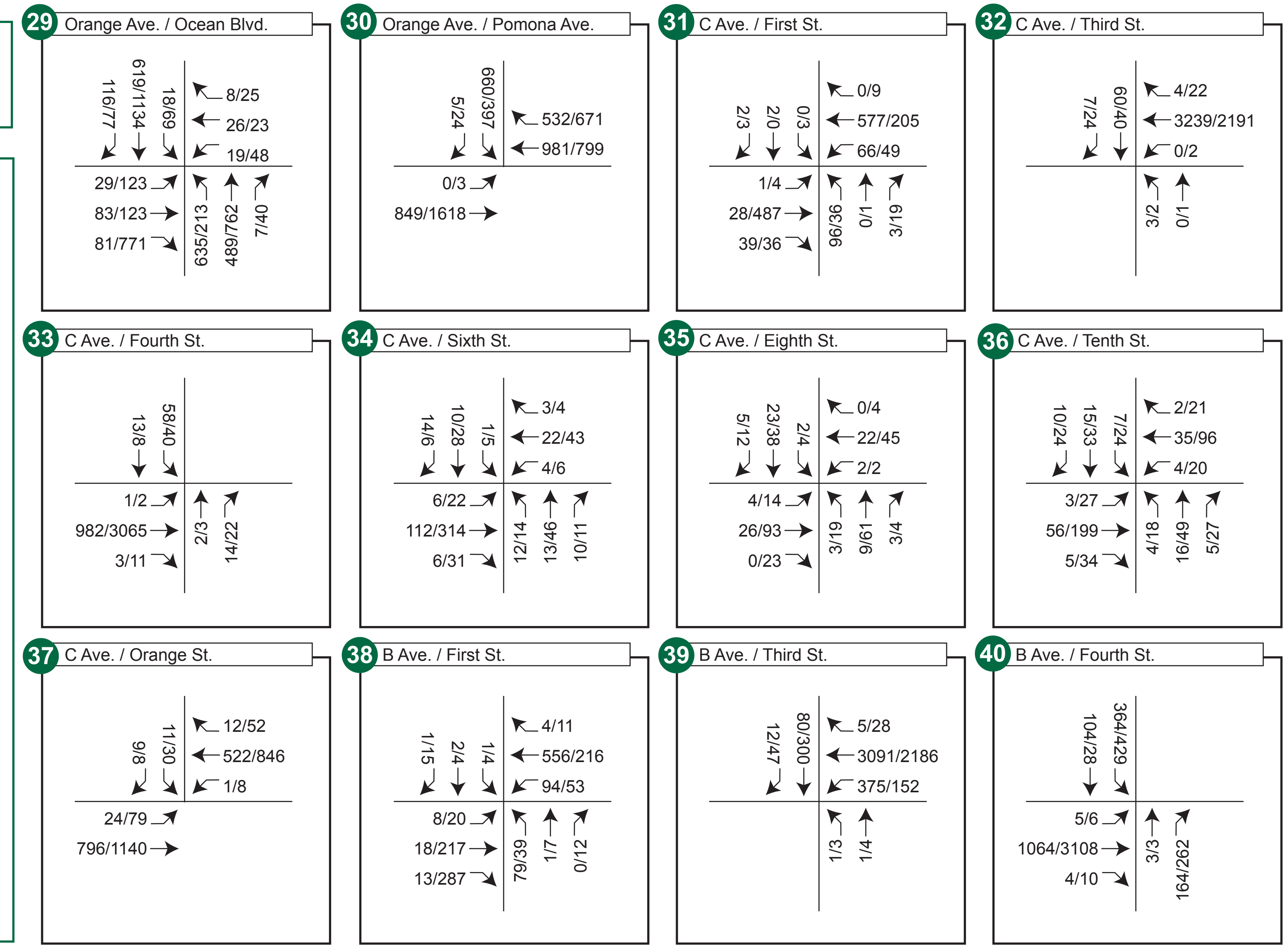


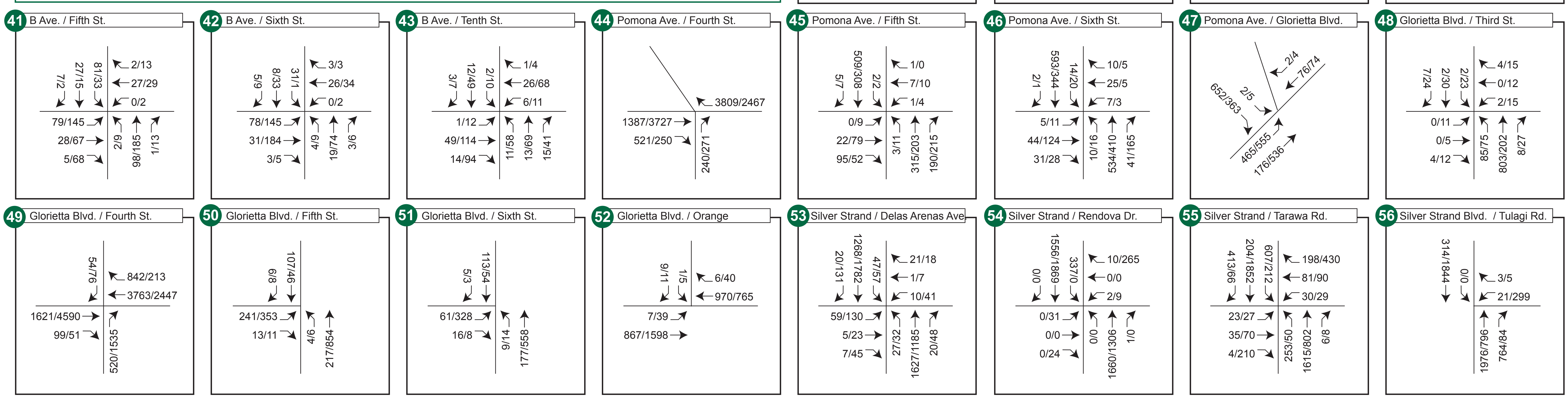
CORONADO CITYWIDE TRAFFIC STUDY

Peak Hour Turning Movement Volumes Pt. 2

FIGURE 5.4







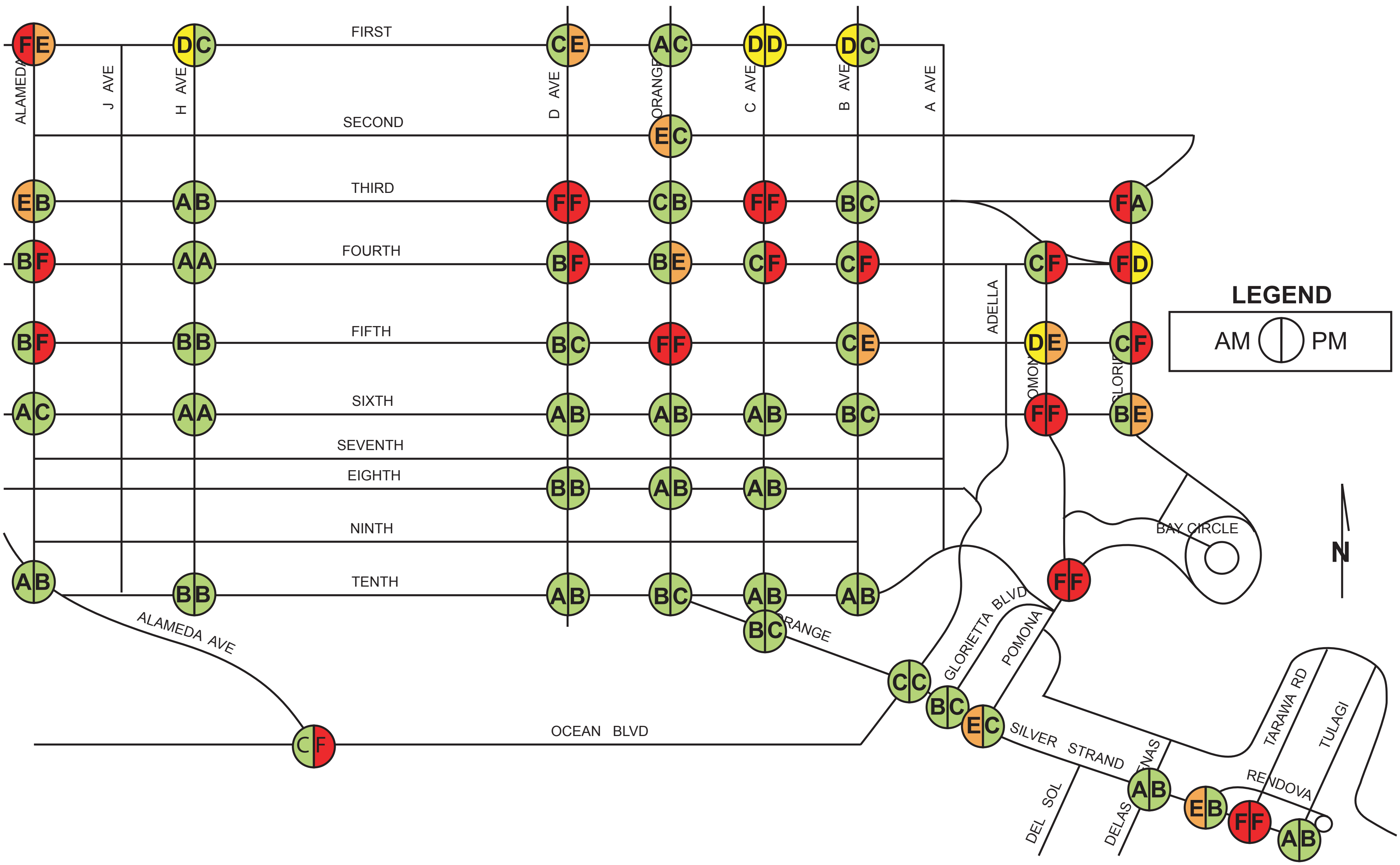
5.3.2 Alternative 2 Intersection Traffic Analysis

The analysis of the short-term peak hour conditions for Alternative 2 was performed using Trafficware Synchro©. Optimized signal timing and phasing, intersection delay and LOS were determined for all study intersections. **Table 5.7** summarizes the results of this analysis comparing average control delay and the corresponding level of service for each intersection to the baseline short-term forecast analysis results. **Figure 5.5** illustrates the LOS results for Alternative 2 and the detailed analysis worksheets for Alternative 2 are provided in **Appendix D**.

Table 5.7 Peak Hour Delay and Level of Service – Alternative 2

#	Intersection	Control [1]	Short Term AM		Alternative 2 AM		Short Term PM		Alternative 2 PM	
			Delay [2]	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	Alameda Blvd & First St	2	>50	F	>50	F	>50	F	40.0	E
2	Alameda Blvd & Third St	2 - S	>50	F	74.6	E	>50	F	16.4	B
3	Alameda Blvd & Fourth St	A - S	12.7	C	15.1	B	>50	F	>80	F
4	Alameda Blvd & Fifth St	2	13.2	B	13.2	B	>50	F	>50	F
5	Alameda Blvd & Sixth St	A	7.9	A	9.7	A	17.1	C	17.1	C
6	Alameda Blvd & Country Club	2	8.9	A	8.9	A	13.6	B	13.6	B
7	Alameda Blvd & Ocean Blvd	2	16.8	C	16.8	C	>50	F	>50	F
8	H Ave & First St	2	13.4	B	32.8	D	18.4	C	25.0	C
9	H Ave & Third St	2 - S	>50	F	5.1	A	24.0	C	16.1	B
10	H Ave & Fourth St	2 - S	12.7	B	5.3	A	>50	F	3.1	A
11	H Ave & Fifth St	2	12.6	B	12.6	B	14.5	B	14.5	B
12	H Ave & Sixth St	A	7.4	A	7.6	A	8.1	A	8.1	A
13	H Ave & Tenth St	2	10.0	B	10.0	B	11.5	B	11.5	B
14	D Ave & First St	2	24.0	C	24.2	C	45.1	E	36.2	E
15	D Ave & Third St	2	>50	F	>50	F	46.5	E	>50	F
16	D Ave & Fourth St	2	14.5	B	14.5	B	>50	F	>50	F
17	D Ave & Fifth St	2	12.1	B	12.1	B	25.0	C	25.0	C
18	D Ave & Sixth St	A	7.4	A	7.7	A	10.7	B	10.7	B
19	D Ave & Eighth St	2	10.1	B	10.1	B	14.5	B	14.5	B
20	D Ave & Tenth St	2	9.9	A	9.9	A	12.7	B	12.7	B
21	Orange Ave & First St	S	9.2	A	8.7	A	22.1	C	20.8	C
22	Orange Ave & Second St	2	46.1	E	36.2	E	25.8	D	16.2	C
23	Orange Ave & Third St	S	43.8	D	21.4	C	37.0	D	13.2	B
24	Orange Ave & Fourth St	S	17.6	B	11.7	B	>80	F	65.0	E
25	Orange Ave & Fifth St	2	>50	F	>50	F	>50	F	>50	F
26	Orange Ave & Sixth St	S	9.1	A	7.4	A	21.5	C	16.5	B
27	Orange Ave & Eighth St	S	9.2	A	7.9	A	17.5	B	11.8	B
28	Orange Ave & Tenth St	S	17.4	B	16.3	B	31.2	C	30.4	C
29	Orange Ave & Ocean Blvd	S	52.7	D	30.2	C	29.2	C	23.0	C
30	Orange Ave & Pomona Ave	S	7.0	A	63.6	E	11.7	B	27.1	C
31	C Ave & First St	2	25.1	D	25.0	D	15.8	C	26.8	D
32	C Ave & Third St	2	26.7	D	>50	F	>50	F	>50	F
33	C Ave & Fourth St	2	16.1	C	15.0	C	>50	F	>50	F
34	C Ave & Sixth St	A	7.1	A	7.7	A	9.2	A	11.3	B
35	C Ave & Eighth St	2	9.5	A	9.5	A	11.4	B	11.4	B
36	C Ave & Tenth St	2	9.9	A	9.9	A	14.6	B	14.6	B
37	C Ave & Orange Ave	2	14.1	B	12.0	B	22.1	C	17.7	C
38	B Ave & First St	2	21.3	C	26.0	D	16.9	C	24.1	C
39	B Ave & Third St	2 - S	>50	F	14.0	B	>50	F	31.3	C
40	B Ave & Fourth St	2 - S	18.7	C	28.6	C	>50	F	>80	F
41	B Ave & Fifth St	2	9.6	A	18.4	C	11.8	B	40.1	E
42	B Ave & Sixth St	2	9.6	A	11.2	B	12.1	B	16.9	C
43	B Ave & Tenth St	2	9.7	A	9.7	A	13.7	B	13.7	B
44	Pomona Ave & Fourth St	2	21.1	C	16.1	C	>50	F	>50	F
45	Pomona Ave & Fifth St	2	14.1	B	25.8	D	16.1	C	41.8	E
46	Pomona Ave & Sixth St	2	23.4	C	>50	F	34.2	D	>50	F
47	Pomona Ave & Glorietta Blvd	A	9.5	A	>50	F	34.9	D	>50	F
48	Glorietta Blvd & Third St	A	>50	F	>50	F	9.6	A	9.6	A
49	Glorietta Blvd & Fourth St	2	>50	F	>50	F	27.4	D	27.4	D
50	Glorietta Blvd & Fifth St	2	15.0	B	16.9	C	>50	F	>50	F
51	Glorietta Blvd & Sixth St	2	11.2	B	11.9	B	>50	F	39.1	E
52	Glorietta Blvd & Orange Ave	2	13.8	B	10.7	B	16.6	C	15.5	C
53	Silver Strand & De Las Arenas Ave	S	7.9	A	7.9	A	13.2	B	11.7	B
54	Silver Strand & Rendova Dr	S	77.2	E	77.2	E	14.9	B	11.4	B
55	Silver Strand & Tarawa Rd	S	>80	F	>80	F	>80	F	>80	F
56	Silver Strand & Tulagi Rd	S	2.8	A	2.8	A	17.8	B	12.6	B

[1] 2 = Two-Way Stop, A = All-Way Stop, S = Traffic Signal
[2] Delay for two-way stop controlled intersections is for the approach with the highest delay



CORONADO CITYWIDE TRAFFIC STUDY

Short Term AM/PM Peak Hour Intersection Level of Service - Alternative 2

FIGURE
5.5

5.3.3 Alternative 2 Findings and Recommendations

The most notable benefit of Alternative 2 is the moderate improvement in delay and LOS on Orange Avenue south of Third Street. This improvement in delay and LOS is directly attributable to the addition of signals on B Avenue at Third Street and Fourth Street thereby providing an alternative route for southbound traffic. However, the improvement in delay and LOS on Orange is provided at the expense of intersections on B, Pomona and Glorietta south of Fourth, which now experience higher traffic volumes as a result of the new route options.

With the provision of the NASNI Main Entrance Gate at Third Street and the signalization of the adjacent intersection at Alameda and Third, average delay and LOS for AM peak hour traffic is improved. The signalization of intersections on Third at Alameda and H, and on Fourth at Alameda and H also provide substantial benefit to north-south traffic previously confronted with an almost impenetrable traffic barrier.

The following section summarizes findings and, as necessary, recommendations for additional mitigation for key study intersections most significantly affected by the improvements associated with Alternative 2. **Table 5.8** summarizes analysis results for key intersections where additional mitigation measures have been evaluated. Detailed worksheets analyzing the additional mitigation measures are included in **Appendix D**.

Table 5.8 Peak Hour Delay and Level of Service – Alternative 2 Mitigated

#	Intersection	Control [1]	Alternative 2 AM		Alt 2 AM Mitigated		Alternative 2 PM		Alt 2 PM Mitigated	
			Delay [2]	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	Alameda Blvd & First St	2 - S	>50	F	16.5	B	40.0	E	8.8	A
2	Alameda Blvd & Third St	2 - S	74.6	E	31.4	C	16.4	B	16.0	B
3	Alameda Blvd & Fourth St	A - S	15.1	B	15.9	B	>80	F	38.5	D
24	Orange Ave & Fourth St	S	11.7	B	9.4	A	65.0	E	47.5	D
30	Orange Ave & Pomona Ave	S	63.6	E	13.0	B	27.1	C	16.4	B
40	B Ave & Fourth St	2 - S	28.6	C	8.6	A	>80	F	47.3	D
45	Pomona Ave & Fifth St	2 - A	25.8	D	13.7	B	41.8	E	12.4	B
46	Pomona Ave & Sixth St	2 - A	>50	F	18.3	C	>50	F	14.8	B
47	Pomona Ave & Glorietta Blvd	A - S	>50	F	16.5	B	>50	F	16.0	B
54	Silver Strand & Rendova Dr	S	77.2	E	18.6	B	11.4	B	12.8	B
55	Silver Strand & Tarawa Rd	S	>80	F	44.3	D	>80	F	71.1	E

[1] 2 = Two-Way Stop, A = All-Way Stop, S = Traffic Signal
[2] Delay for two-way stop controlled intersections is for the approach with the highest delay

1. Alameda & First – Despite a modest improvement in PM peak delay and LOS as a result of the redistribution of traffic utilizing signalized intersections upstream, the intersection of Alameda and First still experiences unacceptable average delay, particularly during the AM peak hour. As indicated in **Section 3.4**, the intersection of Alameda and First meets the Peak Hour signal warrant during the AM peak hour when relatively high northbound and westbound traffic volumes conflict as they approach the NASNI First Street Gate.

To accomplish acceptable LOS at this intersection, it would be necessary to complete the signalization of the intersection, and to include dual northbound left turn lanes and dual westbound through lanes. With the implementation of these additional mitigation measures, the AM peak hour LOS would improve from F to B and the average control delay would be reduced to 16.5 seconds. A similar improvement in PM peak hour LOS and delay is also observed during the PM peak hour following additional mitigation.

2. Alameda & Third – Following the signalization of this intersection under Alternative 2, the average delay and LOS at this intersection is substantially improved, particularly in the PM peak hour when LOS improves from F to B. Although the LOS during the AM peak hour is also improved, the resultant LOS E and 74.6 second average delay is considered to be unacceptable in most circumstances. A critical element of this delay is the high AM peak hour volume of westbound right turn traffic presently sharing a lane with westbound through traffic.

The addition of a dedicated westbound right turn lane at Alameda and Third is necessary to achieve acceptable LOS and average delay. With the provision of a dedicated westbound right storage lane, the average delay at this intersection is improved to 31.4 seconds and LOS C during the AM peak hour.

3. Alameda & Fourth – Despite the signalization of this intersection under Alternative 2, the LOS for this intersection does not improve significantly. In the AM peak hour, the average delay actually increases moderately although overall LOS does improve with signalization.

During the PM peak hour, delay is significantly reduced, particularly for traffic traveling along Alameda Boulevard. However, the reduction in delay is not sufficient enough to now reflect an acceptable level of service for the intersection. Furthermore, the benefits of this improvement are also reduced in comparison to the existing intersection operations due to the use of manual traffic control. Currently, traffic control at this intersection is supplemented by the use of a NASNI officer providing direction during the PM peak hours to improve the operation of the intersection compared to the calculated performance measures described in this study.

To maximize performance at this signalized intersection, it is necessary to provide a dedicated eastbound right turn lane in addition to dual southbound left turn lanes. Following the provision of these additional mitigation measures, the average control delay during the PM peak is reduced to 38.5 seconds and acceptable LOS D.

9. H & Third – The signalization of this intersection provides significant benefit to north-south traffic flows with only minor impact to westbound traffic due to the limited availability of north-south green time. The signalization of this intersection to improve north-south accessibility results in a 5.1 second average delay and LOS A during the AM peak hour, and 16.1 second average delay and LOS B during the PM peak hour.

10. H & Fourth – Related to the previously described intersection, the signalization of this intersection also provides significant benefit to north-south traffic flows with only minimal impact to westbound traffic. The signalization of this intersection to improve north-south flow results in a 5.3 second average delay and LOS A during the AM peak hour, and 3.1 second average delay and LOS A during the PM peak hour.

23. Orange & Third – Similar to the results for Alternative 1, the availability of an additional southbound route in Alternative 2 benefits the performance of intersections along Orange Avenue, and in particular the intersection of Orange and Third. With a share of the southbound traffic diverting at B and Third, the AM peak hour average delay is reduced from 43.8 seconds to 21.4 seconds (LOS D to LOS C), while the PM peak delay is reduced from 37.0 seconds to 13.2 seconds (LOS D to LOS B).

24. Orange & Fourth – Possibly the most critical intersection within the City of Coronado, particularly during the PM peak period, this intersection also benefits modestly from the diversion of southbound traffic to an alternate route. However, the benefits during the PM peak hour are not sufficient to be reflected in an acceptable LOS.

Under Alternative 2, the AM peak hour average delay at the intersection of Orange and Fourth is reduced from 17.6 seconds to 11.7 seconds, thereby maintaining LOS B. However, during the PM peak period, the conflict of high eastbound through, southbound left and northbound right traffic results in unacceptable LOS, despite the benefit of reduced southbound through volumes. Under Alternative 2, the average delay is reduced from 168.1 seconds to 65.0 seconds during the PM peak hour (LOS F to LOS E). The extension of the southbound left turn storage lanes also provides some operational benefit, reducing the effects of excessive queuing and resultant blocking of the adjacent southbound through lanes.

To accomplish LOS D at this intersection during the PM peak hour, additional capacity is required for critical movements. With the provision of a dedicated eastbound left turn lane, triple northbound through lanes, dual northbound right turn lanes and triple southbound through lanes, the average delay of the intersection is reduced to 47.5 seconds. A third southbound left turn lane would also be required to achieve acceptable LOS for the southbound left turn movement (this improvement is not analyzed in the worksheets included in Appendix D).

Clearly, the physical constraints of this intersection limit the ability to implement the additional mitigation measures described. Right-of-way availability, proximity to adjoining development, utility location and aesthetics each limit the ability to implement substantial capacity improvements to the intersection of Orange and Fourth.

30. Orange & Pomona – Like Alternative 1, this intersection experiences a deterioration in average delay and LOS as a result of traffic now utilizing Pomona (via Third and B in the case of Alternative 2) as an alternative to Orange. With the additional traffic on the southbound approach to this intersection, average delay increases from 7.0 seconds to 63.6 seconds during the AM peak hour (LOS A to LOS E). In the PM peak hour, delay increases from 11.7 seconds to 27.1 seconds (LOS B to LOS C).

To successfully mitigate the impacts of this additional southbound traffic, it is necessary to provide dual southbound left turning lanes at the intersection of Orange (Silver Strand) and Pomona. With the addition of a second southbound left turn lane, the AM Peak hour average delay is reduced to 13.0 seconds and LOS B.

39. B and Third – The signalization of this intersection substantially improves the delay and LOS for the northbound and southbound approaches, in addition to providing a new alternative route for traffic headed south and west of the intersection. Despite the additional traffic now completing the westbound left maneuver, the average delay for the intersection is 14.0 seconds (LOS B) during the AM peak hour and 31.3 seconds (LOS C) during the PM peak period following signalization of the intersection.

40. B and Fourth – The impact of additional southbound traffic coming from the newly signalized upstream intersection on B Avenue is evident in the increased delay and reduced LOS experienced at this intersection. During the PM peak hour, the average delay at this intersection exceeds 5 minutes on both the southbound and eastbound approaches due to the conflict of overwhelming volumes of traffic.

With the provision of a dedicated northbound right turn lane, dual southbound left turn lanes and the use of a protected/permitted southbound left turn signal phase, the overall delay of the intersection can be reduced to 47.3 and LOS D during the PM peak hour, although the average delay for the southbound approach would still exceed 3 minutes. Like Alternative 1 for the intersection of Fourth and Glorietta, the signal timing and phasing to accomplish acceptable LOS on each approach at this intersection during the PM peak hour is commensurate with a southbound approach volume of approximately 150 to 200 vehicles per hour.

45. Pomona & Fifth – Like several intersections on B, Pomona and Glorietta south of Fourth, this intersection experiences deterioration in delay and LOS as a result of the additional southbound traffic now able to utilize these streets as an alternative to Orange Avenue. As a result of the southbound traffic now diverting at Third and B, the average delay on the eastbound and westbound stop controlled approaches at this intersection increase to 22.6 seconds and 25.8 seconds (LOS C and D), respectively, during the AM peak hour, and 41.8 seconds and 24.8 seconds (LOS E and C), respectively, during the PM peak hour.

The introduction of all-way stop control at this intersection (and other similar intersections) would provide some benefit to existing stop approaches by reducing delay and retaining acceptable overall intersection performance. For the intersection of Pomona and Fifth, the introduction of all-way stop control and the use of dual northbound and southbound approach lanes would result in an overall intersection average delay of 13.7 seconds (LOS B) during the AM peak hour and 12.4 seconds (LOS B) during the PM peak hour.

46. Pomona & Sixth – Similar to the previously described intersection, this intersection also experiences deterioration in delay and LOS as a result of the additional southbound traffic. In the case of Pomona at Sixth, the eastbound and westbound stop controlled approaches at this intersection experience LOS F during both the AM and PM peak hours.

The introduction of all-way stop control and dual northbound and southbound approaches at this intersection would again substantially improve the delay to the existing stop approaches. For the intersection of Pomona and Sixth, an overall average control delay of 18.3 seconds (LOS C) would be observed during the AM peak hour and 14.8 seconds (LOS B) during the PM peak hour with this additional mitigation.

A consideration in the use of all-way stop control along Pomona is the use of this street for arterial traffic. Pomona Avenue is currently designated as a minor arterial in the City of Coronado General Plan Circulation Element. The use of all-way stop control at intersections along Pomona Avenue may reduce the street's ability to effectively to operate as a minor arterial by introducing more frequent stopping points. Conversely, the use of all-way stop controls along Pomona (and parallel streets) can serve to effectively manage traffic performance at these intersections and help to minimize excessive cut-through or bypass traffic.

47. Pomona & Glorietta – As in Alternative 1, and like the previously described intersections, the intersection of Pomona and Glorietta also experiences increased delay and reduced LOS. Under Alternative 2, the intersection experiences an average delay of 61.0 seconds (LOS F) during the AM peak period and 98.2 seconds (LOS F) during the PM peak period.

As described in **Section 3.4**, this intersection is marginal for meeting the Peak Hour signal warrant for the PM peak hour only. However, the irregular configuration of the existing five-way all-way stop controlled intersection merits consideration for signalization to improve traffic flow and safety. In addition, the increase in southbound traffic attributable to the addition of westbound left turn traffic at Third and B clearly exceeds the requirements for the Peak Hour signal warrant.

Although the analysis considers only the northernmost conjunction of Pomona and Glorietta, the results clearly indicate the performance benefits of signalizing this intersection. With signalization and no additional lane capacity improvements, this intersection achieves LOS B during both AM and PM peak hours, with 16.5 seconds of delay during the AM peak hour, and 16.0 seconds during the PM peak hour. Additional lane capacity improvements are capable of further improving the overall performance of this intersection.

54. Silver Strand & Rendova – The extension of the southbound left turn storage lane at this location provides some operational benefit, reducing the effects of excessive queuing and resultant blocking of the adjacent southbound through lanes. However, this improvement does not result in an improvement in the overall performance of the intersection, which operates at unacceptable LOS E during the AM peak hour.

The addition of dual southbound left turn lanes is effective at mitigating the poor LOS at this intersection. With the addition of dual southbound left turn lanes and appropriate optimization of signal timing, the average intersection delay is reduced to 18.6 seconds (LOS B) during the AM peak hour and 12.8 seconds (LOS B) during the PM peak hour.

55. Silver Strand & Tarawa – Similar to the previously described intersection, the extension of the left turn storage lanes at this location also provide operational benefit but limited improvement in the overall performance of the intersection. Under short-term forecast conditions, this intersection operates at LOS F during both AM and PM peak hours. In particular, the PM peak hour experiences significant delay, primarily attributable to the extremely high volume of eastbound approach traffic exiting the Naval Amphibious Base training facility.

Additional capacity is required on each critical approach to this intersection to mitigate the impacts of the high traffic demand. A dedicated westbound left turn lane and dual left turn lanes for the northbound, southbound and eastbound approaches would all be necessary to achieve a notable improvement in delay and LOS at this intersection. With these capacity improvements and signal timing optimization, the intersection could achieve an average delay of 44.3 seconds (LOS D) during the AM peak hour and 71.1 seconds (LOS E) during the PM peak hour. Despite the improvements in delay and LOS over baseline conditions, the PM peak hour would still experience unacceptable LOS due to the difficulty accommodating the volume of traffic exiting NAB on the eastbound approach. Travel demand management techniques such as flexible work scheduling, incentives to use alternative transportation modes, and limiting pedestrian crossings to the south side of the intersection may also provide incremental improvements in delay and LOS at this intersection by nominally reducing demand at the height of the PM peak hour.

6.0 CONCLUSION AND RECOMMENDATIONS

This section of the study report provides a summary of key study findings and recommends improvements to mitigate the impacts of short-term traffic growth within the City of Coronado. The analysis of existing and short-term forecast traffic conditions indicates that continued traffic growth in Coronado is expected to compound congestion along major corridors and exacerbate infiltration of commuter traffic into residential neighborhoods. While the decreased performance at most local street to local street intersections does not constitute a meaningful decline to overall traffic performance, the decreased performance at many intersections along arterial streets does reflect a measurable decline in LOS.

A review of the City of Coronado Circulation Element goals reveals three core elements that reflect the desire to reduce the impacts of traffic on the community. These three elements are:

1. Alleviate the adverse impacts of traffic circulation within the community
2. Minimize through traffic intrusion into residential neighborhoods
3. Facilitate safe traffic circulation and interaction between modes

Applying these three elements as transportation planning goals, objectives can be defined as specific, measurable statements related to the attainment of the goals. Borrowing from the existing Circulation Element goals, the following objectives qualify each of the recommended goals.

1. Alleviate the adverse impacts of traffic circulation within the community
   - ♦ Achieve acceptable peak period level of service on the arterial street system through 2010
   - ♦ Ameliorate traffic impacts on the environment, including emissions, noise, aesthetics and neighborhood fragmentation

2. Minimize through traffic intrusion into residential neighborhoods
   - ♦ Classify city streets based on function and compatibility with adjacent land uses
   - ♦ Utilize traffic control measures to preserve the character of City streets

3. Facilitate safe traffic circulation and interaction between modes
   - ♦ Provide adequate access for all transportation system users
   - ♦ Minimize conflict points within the transportation system
   - ♦ Control excessive vehicle speeds on City streets

As a basis for determining the most appropriate transportation strategies to address the respective transportation goals and objectives, the Coronado City Council affirmed a definitive policy position regarding traffic problems within the City. At a Special Council Meeting held on August 5, 2004, the Coronado City Council took action to adopt the following Policy Statement:

Maximize the existing arterial and collector street system to accommodate commuter traffic while reducing traffic intrusion into residential neighborhoods.

The City Council adopted Policy Statement is consistent with the core goals described previously. The accomplishment of this Policy Statement generally involves channeling traffic onto existing arterial and collector corridors and restricting the ability of through traffic to penetrate residential neighborhoods. Candidate improvements under this option would include additional traffic signals and turning lanes at key arterial to arterial (or collector) intersections to maximize arterial traffic flows, and the inclusion of treatments to restrict access from arterial streets to local streets.

The action of the Coronado City Council specifically identified the signalization and addition of a westbound left turn lane at the intersection of Fourth Street and Glorietta Boulevard, and the extension of the southbound left turn storage lanes at Fourth Street and Orange Avenue as an alternative to be analyzed as part of the City-Wide Major Traffic Study. The second alternative analyzed included the following specific improvement elements identified in consultation with City staff:

- Signalizing Third and Fourth at B to provide for all traffic movements
- Signalizing Third and Fourth at F to provide for all traffic movements (for the purpose of the analysis, signalization of Third and Fourth at H was evaluated due to the availability of necessary traffic data)
- Signalizing Third and Fourth at Alameda to provide for all traffic movements
- Extending the SBL storage at Orange and Fourth all the way back to Third
- Extending the NBL and SBL storage at Tarawa and SR-75 (Silver Strand)
- Extending the SBL storage at Rendova and SR-75 (Silver Strand)
- Removing the semi-diverters at Third and A, B, C although AM and PM peak period WBL turning prohibitions would remain in place for A and C at Third intersections (B Street would be signalized as described previously).

The analysis of these alternative strategies generally indicates the ability to gain overall improvement to traffic circulation within the City of Coronado, subject to the implementation of appropriate mitigation measures to address the specific impacts of each identified improvement. The following summary details recommended improvements and associated mitigation measures to achieve short-term traffic circulation benefits for the City of Coronado:

- Provision of a signalized westbound left turn at Fourth and Glorietta, Fourth and Pomona, or Third and B to facilitate southbound traffic flow. While the intersections of Third at Glorietta and Third at B were analyzed as part of the study, the current designation of Pomona Avenue as a minor arterial street and the tendency for traffic to seek Pomona as the most direct route south to Silver Strand may make this the most appropriate location for this treatment. Regardless of the preferred location for providing the westbound left movement from SR-75, it will be necessary to strategically allocate green time for this movement to preserve LOS for the eastbound traffic flows and to control the volume of traffic able to complete this maneuver.

- In conjunction with the recommended westbound left movement at Third/Fourth, it will be necessary to complete traffic control improvements to mitigate the downstream impacts of additional southbound traffic. Necessary improvements will likely include the provision of peak hour turn restrictions, all-way stop controls at various intermediate intersections, the provision of traffic signals at the Glorietta and Pomona five-way intersection, and the provision of additional southbound capacity at the signalized intersection of Pomona and Orange (Silver Strand). This added capacity could be in the form of an additional southbound left turn lane from Pomona to SR-75. This additional capacity may be difficult to construct due to right-of-way constraints.

- Signalization of the intersection at Alameda and First, subject to the anticipated future utilization of the NASNI First Street Gate (to be determine in conjunction with the Department of Navy), is recommended. Assuming sustained levels of utilization for the First Street Gate, signalization of the intersection and the provision of dual northbound left turn lanes and dual westbound through lanes are necessary to ensure an acceptable LOS. It is recommended that no major action be taken at this intersection until after the Third Street Gate is constructed and the resulting traffic patterns are reevaluated.

- Implementation of the NASNI Third Street Main Entrance Gate and signalization of the Alameda at Third intersection with a minimum of three westbound through lanes proceeding to the NASNI gate are recommended. Signalization of this intersection may (depending on the new traffic flow pattern) also need to include the addition of a dedicated westbound right turn lane at Alameda and Third to achieve acceptable LOS.

- Signalization of the Alameda at Fourth intersection is recommended. To maximize performance at this signalized intersection, it is necessary to provide a dedicated eastbound right turn lane in addition to dual southbound left turn lanes.

- Reverting Alameda Boulevard between Third Street and Fourth Street to two way traffic flows eliminates unnecessary detours of north-south traffic to parallel local streets.

- The signalization of H at Third and Fourth provides significant benefit to north-south traffic flows. The current designation of H Avenue as a collector street and the unbroken length of H Avenue from First to Tenth make these appropriate locations to serve local traffic access needs from Third and Fourth. Careful consideration must be given to signal timing and coordination at these intersections to preserve the major east-west traffic flows.

  Alternatively, F Avenue may provide a suitable location for signalization at Third and Fourth. Although F Avenue is interrupted by a school thereby limiting its ability to provide access to local neighborhoods, this street does serve as the most direct access to the school generating considerable pedestrian traffic. Signalization of F Avenue at Third and Fourth would provide benefit to pedestrians by facilitating the safer crossing of Third and Fourth Streets, particularly by school aged children during peak traffic periods.

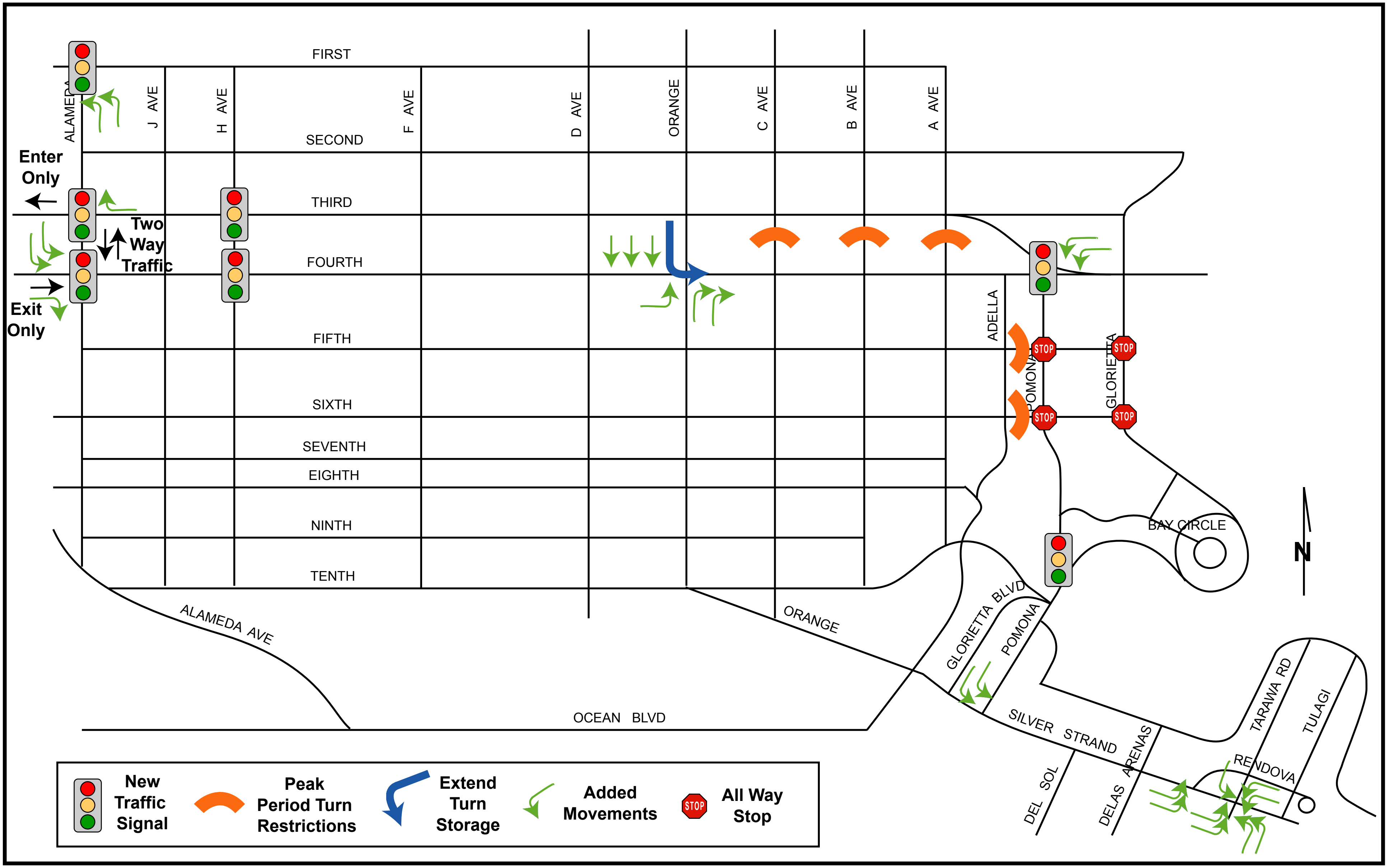
- Additional capacity is required to accommodate critical movements at the intersection of Orange and Fourth. In addition to extending the southbound left turn storage to reduce the effects of excessive queuing and blocking, it will be necessary to provide a dedicated eastbound left turn lane, triple northbound through lanes, dual northbound right turn lanes and triple southbound through lanes to achieve an acceptable LOS at this location. Clearly, physical constraints limit the ability to implement these additional mitigation measures. More detailed evaluation of the benefits and impacts of these recommended improvements will be necessary to determine the most appropriate level of mitigation for this intersection.

- Extension of the southbound left turn storage and the addition of dual southbound left turn lanes at Silver Strand and Rendova is necessary to mitigate the poor LOS at this intersection.

- Additional storage capacity is required on each critical approach at the intersection of Silver Strand and Tarawa to mitigate the impacts of the high traffic demand. A dedicated westbound left turn lane and dual left turn lanes for the northbound, southbound and eastbound approaches would all be necessary to achieve a notable improvement in delay and LOS at this intersection. However, the PM peak hour would still experience unacceptable LOS due to the difficultly accommodating the extremely high volume of traffic exiting NAB on the eastbound approach. Travel demand management techniques such as flexible work scheduling and incentives to use alternative transportation modes, as well as limiting pedestrian crossings to the south side of the intersection may also provide incremental benefits at this intersection by nominally reducing demand at the height of the PM peak hour.

Figure 6.1 illustrates the improvements recommended to mitigate the impacts of short-term forecast traffic on the City of Coronado.

In addition to the improvements described previously and illustrated in **Figure 6.1**, it would be appropriate to consider additional all-way stop control, two-way stop control and turn restrictions to limit the ability of commuter traffic to penetrate local neighborhoods. The use of these traffic control mechanisms would be most appropriate on local streets adjacent to and paralleling Third Street, Fourth Street and Orange Avenue. The use of such traffic control would be consistent with the stated policy of the City Council to *maximize the existing arterial and collector street system to accommodate commuter traffic while reducing traffic intrusion into residential neighborhoods.*



CORONADO CITYWIDE TRAFFIC STUDY

Recommended City-Wide Short-Term Traffic Improvements

FIGURE 6.1

7.0 APPENDICES

Appendix A Existing Conditions Synchro Intersection Level-of-Service Analysis Results

Appendix B Short Term Forecast Conditions Synchro Intersection Level-of-Service Analysis Results

Appendix C Short Term Forecast Conditions Alternative 1 (PM Peak Only) Synchro Intersection Level-of-Service Analysis Results

Appendix D Short Term Forecast Conditions Alternative 2 Synchro Intersection Level-of-Service Analysis Results