2015

TRAFFIC MONITORING PROGRAM

City of Carlsbad Growth Management Plan
FINAL REPORT: December 22, 2015

City of Carlsbad

Michael Baker INTERNATIONAL

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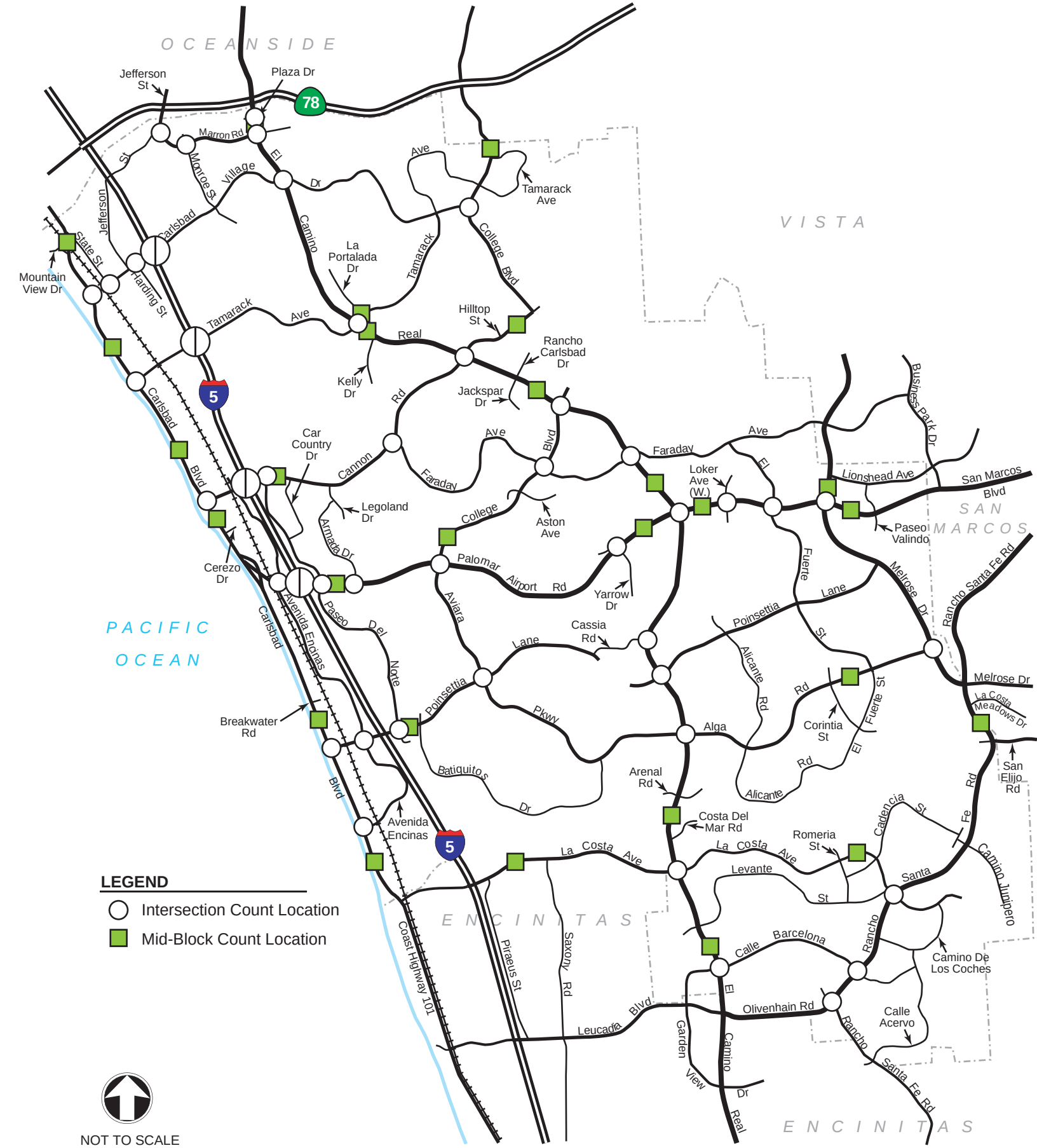
1. INTRODUCTION

PROJECT OVERVIEW

Cities around the nation have developed Growth Management Plans in an effort to manage growth within their cities. An important component of a Growth Management Plan is a Traffic Monitoring Program, which includes the collection and analysis of data on critical mid-block roadway segments and at major intersections throughout the city. Typically, Traffic Monitoring Programs include the collection of data for average daily traffic volumes recorded at mid-block locations, and peak hour turning movement counts at major signalized and unsignalized intersections. The field data is then reduced to the morning and afternoon peak hours, and level of service capacity analysis is performed based on existing geometrics and lane configurations. The analysis of intersections and mid-block roadway segment locations allows the city to identify potential capacity problem areas where deficient operations exist or may become problematic in the future. This information assists the city in determining the traffic impacts of future development in the vicinity of these existing or future problem locations where capacity deficiencies are known to exist and in determining the improvements that may be needed to mitigate the deficiencies.

For the last 27 years, the City of Carlsbad has monitored traffic patterns throughout the City. This 2015 Annual Report documents the results of the Growth Management Plan Traffic Monitoring Program for the identified forty-nine (49) key intersections and twenty-seven (27) key mid-block roadway segment locations. Similar analysis has been prepared annually from 1989 to 2014 during the summer months, which provides a basis for comparison.

The City of Carlsbad is a coastal community located in Southern California, 35 miles north of San Diego, and the current population is approximately 111,000. Interstate 5 runs north and south near the western edge of Carlsbad and is a major commuter route carrying a significant amount of through traffic as the primary coastal route linking San Diego to Orange County and Los Angeles. The Carlsbad Circulation system includes the following arterials: El Camino Real, Palomar Airport Road, Rancho Santa Fe Road, Melrose Drive, College Boulevard, Aviara Parkway/Alga Road, La Costa Avenue, and Carlsbad Boulevard. The major roadways within the City of Carlsbad and the intersections and mid-block locations evaluated in this year's Traffic Monitoring Program are shown in **Figure 1-1**.



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2015 PROJECT LOCATION MAP

FIGURE 1-1

ANNUAL REPORT ORGANIZATION

Field Data Services of Arizona collected traffic counts during the Summer of 2015 at requested mid-block roadway segment locations and intersections within the City of Carlsbad. For the first time since data collection efforts began in 1989 for the annual Traffic Monitoring Program, traffic counts were also collected in mid-September 2015 at three (3) mid-block locations and ten (10) intersections where school-related traffic is expected to have the greatest effect on traffic patterns and operations. The results of this data collection are provided in the appendix following this report.

As mentioned previously, a total of twenty-seven (27) mid-block roadway segment count locations were identified by the City of Carlsbad. Average daily traffic (ADT) volume data was collected for a 48-hour period at each location. Michael Baker International coordinated the placement of the counters with City staff and later reviewed the ADT volumes to ensure accuracy and consistency with the prior year's data. Roadway segment analyses were performed for the critical peak hours. The results of the mid-block roadway segment analysis for the 2015 count period are contained in **Chapter 2**.

Although mid-block roadway segment operations are more critical in rural areas, in urban settings intersection operations are a more critical factor of roadway operations. Therefore, the City of Carlsbad identified forty-nine (49) key intersections to be analyzed. AM (6:30 to 9:30 AM) and PM (3:30 to 6:30 PM) peak period turn movement volumes were collected at each intersection. The data was reduced to the AM and PM peak hours to identify the peak turn movement volumes and approach delays. This data was then analyzed using the Intersection Capacity Utilization (ICU) method for signalized intersections. The results of the intersection data collection and analysis are provided in **Chapter 3**.

This 2015 Annual Report of the City of Carlsbad's Traffic Monitoring Program represents the fourth year in which mid-block pedestrian and bicycle counts were added to the data collection efforts. Five (5) key mid-block locations were selected by City staff where pedestrian and bicycle activities are among the highest in the City. The results of the mid-block pedestrian and bicycle data collection are contained in **Chapter 4**.

Critical analysis findings and conclusions are provided in **Chapter 5**. Chapter 5 also includes operational issues, suggestions for potential improvements at critical locations, and recommendations for future traffic monitoring activities.

2. MID-BLOCK ROADWAY SEGMENT COUNTS

Mid-block roadway segment counts were collected at twenty-seven (27) locations throughout the City of Carlsbad and are shown in **Figure 2-1**. The roadway segment counts were collected using mechanical tube counters that were placed and monitored for two consecutive days (48-hours). From the 48-hour counts, the average daily traffic (ADT) volumes were determined, and these ADT volumes for the 2015 count period are summarized in **Appendix A** following this report. The City of Carlsbad uses a one-direction maximum capacity of 1,800 vehicles per lane, per hour, in the peak period. Mid-block roadway segment operations were determined based on the maximum one-direction lane volume to capacity ratio.

The mid-block roadway segment Level of Service (LOS) ranges are based on the maximum one-direction lane volume to capacity ratios, which correlate as follows:

Ratio	LOS
0.0 – 0.60	**A**
0.61 – 0.70	**B**
0.71 – 0.80	**C**
0.81 – 0.90	**D**
0.91 – 1.00	**E**
Greater than 1.00	**F**

Figure 2-1 illustrates the 2015 mid-block roadway segment levels of service during the peak hour. **Table 2-1** summarizes and compares the 2015 mid-block roadway segment analysis with data from 2011, 2012, 2013 and 2014.

The results of the mid-block roadway segment analysis showed that all locations operate at LOS A or B based on the 2015 counts. No locations were identified as operating at LOS C, D, E or F. The City of Carlsbad considers LOS C or better acceptable for mid-block operations during the AM and PM peak hours. Peak hour operations at LOS D, E, or F are considered deficient.

The results of the 2015 analysis show the following changes in traffic patterns along the City's arterials from the previous year:

- Palomar Airport Road: overall increase of 1%
- El Camino Real: overall increase of less than 1%
- Melrose Drive: increase of 9% (only one segment counted)
- Carlsbad Boulevard: overall increase of 1%
- La Costa Avenue: overall increase of 2.5%
- Rancho Santa Fe Road: increase of 2% (only one segment counted)
- Poinsettia Lane: increase of 4.5% (only one segment counted)
- Tamarack Avenue: decrease of 3.5% (only one segment counted)
- Cannon Road: overall increase of 2%
- College Boulevard: overall increase of 1.5%
- Alga Road: increase of 1% (only one segment counted)

The results of the 2015 counts show that there has been a slight overall increase in traffic from last year's count program, with a total of sixteen (16) mid-block locations showing an increase in ADT. Citywide, the overall change in traffic volumes along the arterials included in the 2015 count program was an increase of one percent (1%) from the previous year.

The increases in traffic from last year's counts ranged from less than one percent (1%) to twenty percent (20%). The largest increases in ADT from last year's counts occurred at the following mid-block locations:

- Melrose Drive from Lionshead Avenue to Palomar Airport Road (#11): increase of 9%
- Carlsbad Boulevard from Tamarack Avenue to Tierra Del Oro (#14): increase of 20%

Out of the twenty-seven (27) mid-block locations that were analyzed in the previous year, eleven (11) locations experienced a decrease in ADT from the previous 2014 counts. The decreases ranged from less than one percent (1%) to six percent (6%), with an average decrease of three percent (3%) at these eleven locations. The largest decreases in ADT from last year's counts occurred at the following mid-block locations:

- Palomar Airport Road from Melrose Drive to Paseo Valindo (#4): decrease of 5%
- Carlsbad Boulevard from Cannon Road to Cerezo Drive (#15): decrease of 6%

As discussed on page 3 of this report, traffic counts were collected during mid-September 2015 at a total of three (3) mid-block locations to determine the potential changes in traffic while local schools are in session. The September counts were collected at the following three (3) mid-block locations:

- El Camino Real, from Tamarack Avenue to Kelly Drive (#6);
- Tamarack Avenue, from El Camino Real to La Portalada Drive (#22); and
- Cannon Road, from Hilltop Street to College Boulevard (#24).

Despite the additional traffic on these roadways from local schools, the September 2015 counts showed only a modest increase on El Camino Real from Tamarack Avenue to Kelly Drive (+3%), and decreases in traffic on the segments of Tamarack Avenue (-3.5%) and Cannon Road (-2.5%) where September counts were collected.

There have been two roadway construction projects that may have contributed to some of the changes in ADT from the previous year's count program. The first project is the Carlsbad Desalination Project, which is constructing a desalination plant and a 10-mile pipeline from the coast to the San Diego County Water Authority's distribution system in San Marcos. Construction on the Carlsbad Desalination Project began in December 2012 and is expected to be completed in early 2016.

Within the City of Carlsbad, most of the pipeline construction has been completed. However, at the time the counts were collected in Summer 2015, long-term lane closures were still in effect on Cannon Road from Grand Pacific Drive to Hemingway Drive, and on portions of Faraday Avenue between Cannon Road and Camino Hills Drive.

During the 2015 TMP count program, the pipeline construction resulted in lane closures and reduced capacity along the following roadway segments within the City of Carlsbad:

Cannon Road from Grand Pacific Drive to Hemingway Drive
Travel lanes reduced to one lane in each direction of travel from Grand Pacific Drive to Faraday Avenue, and reduced to one westbound lane and two eastbound lanes from Faraday Avenue to Hemingway Drive. Bike lanes closed, bikes must share roadway with vehicles.

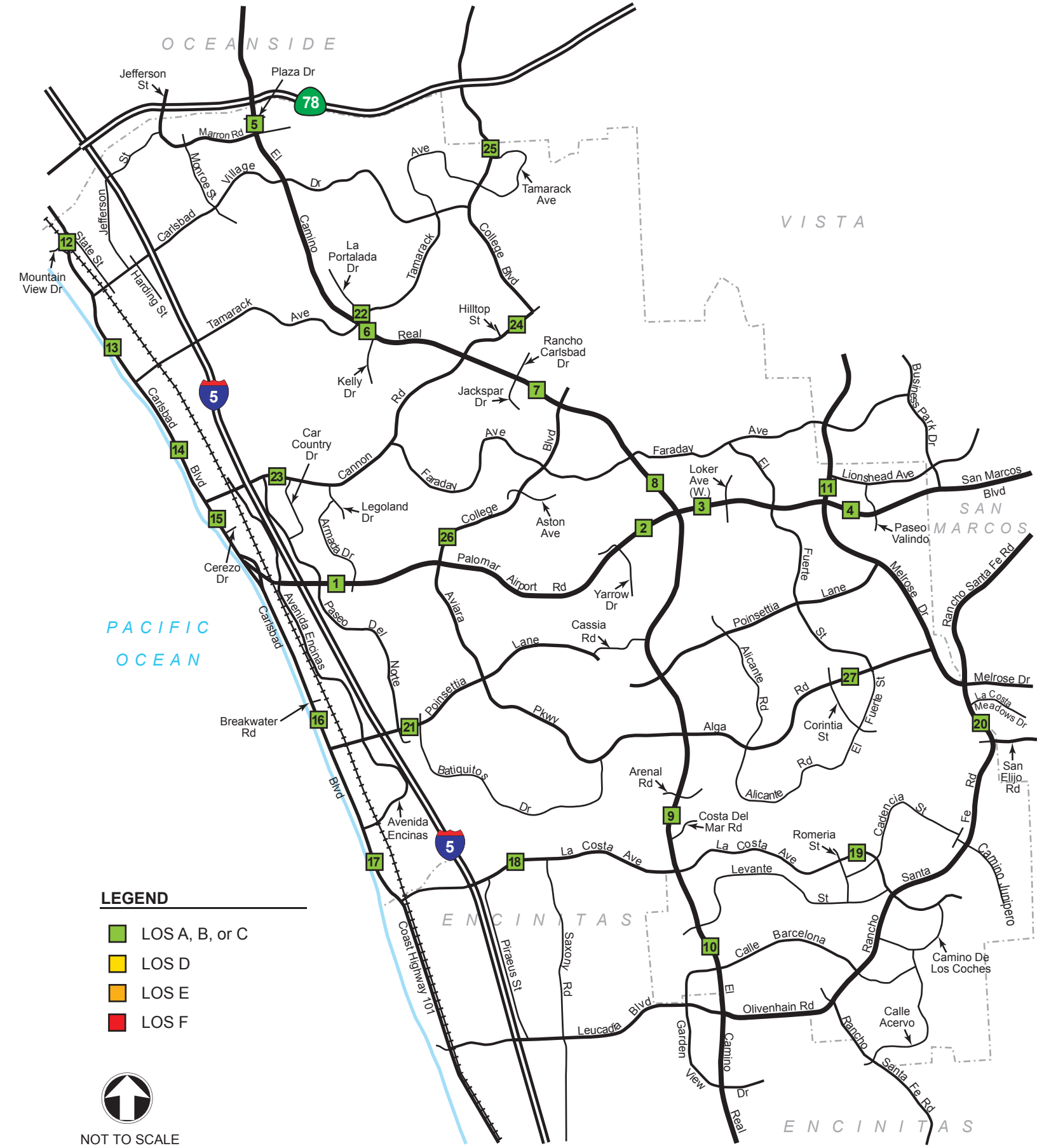
Faraday Avenue from Cannon Road to Camino Hills Drive
Existing westbound lane closed for about three-quarters of a mile where roadway is divided by raised median, and one lane in each direction provided within the existing eastbound direction.

The second project is the widening of El Camino Real between Chestnut Drive and Tamarack Avenue, which is a City-funded Capital Improvements Program project and is expected to be completed in early 2016. The segment of El Camino Real currently under construction between Chestnut Drive and Tamarack Avenue was reduced to two lanes without bike lanes in each direction of travel at the time the counts were collected. In addition, all four travel lanes are temporarily striped along the west half of the roadway while the construction occurs on the east half of the roadway.

The third project is the widening of El Camino Real between Tamarack Avenue and Cannon Road, which is a developer-funded project that being constructed in conjunction with the development of the Robertson Ranch project. The construction on this segment of El Camino Real did not result in lane closures at the time the counts were collected. However, northbound El Camino Real between Kelly Drive and Tamarack Avenue was realigned to the west to match the realigned segment of El Camino Real north of Tamarack Avenue. The El Camino Real widening project between Tamarack Avenue and Cannon Road is also expected to be completed in 2016.

Although these construction projects have implemented long-term lane closures along several roadway segments, overall daily traffic volumes in the vicinity of these projects do not appear to have changed significantly from the counts collected for last year's TMP. Traffic may not be avoiding these construction areas due to a lack of alternate parallel routes, particularly on El Camino Real.

Although the mid-block roadway segment analysis can accurately assess the capacity of the through lanes in one direction of travel, overall traffic conditions in urban and suburban settings are influenced more by the operations of major intersections. The results of the 2015 intersection level of service operations analysis are provided in Chapter 3 of this report.



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2015 MID-BLOCK ROADWAY SEGMENT LEVELS OF SERVICE

FIGURE 2-1

Table 2-1
City of Carlsbad Mid-Block Roadway Segment LOS Analysis Summary

Location Number	Segment	Segment Location	Summer 2011		Summer 2012		Summer 2013		Summer 2014		Summer 2015 [1]	
			ADT	Peak LOS [2]	ADT	Peak LOS [2]	ADT	Peak LOS [2]	ADT	Peak LOS [2]	ADT	Peak LOS [2]
1	Palomar Airport Rd.	Paseo Del Norte to Armada Dr.	48,249	A	48,626	A	52,555	A	52,779	A	55,501	A
2	Palomar Airport Rd.	Yarrow Dr. to El Camino Real	33,440	A	35,154	A	34,017	A	37,900	A	38,433	A
3	Palomar Airport Rd.	El Camino Real to Loker Ave (W.)	45,902	A	52,786	A	48,560	A	50,651	A	50,445	A
4	Palomar Airport Rd.	Melrose Dr. to Paseo Valindo	32,678	A	31,880	A	31,469	A	32,566	A	30,912	A
5	El Camino Real	Plaza Dr to Marron Rd	27,806	A	29,245	A	29,355	A	30,288	A	30,056	A
6	El Camino Real	Tamarack Ave. to Kelly Dr.	25,036	A	22,514	A	25,198	A	26,430	A	27,150	A
7	El Camino Real	Jackspar Dr. to College Blvd.	----	----	32,393	B	34,869	B	38,195	B	37,541	B
8	El Camino Real	Faraday Ave. to Palomar Airport Rd.	36,281	A	30,477	A	31,739	A	34,867	A	34,378	A
9	El Camino Real	Arenal Rd. to Costa Del Mar Rd.	47,151	B	49,760	B	49,299	B	51,393	B	51,499	B
10	El Camino Real	Levante St. to Calle Barcelona	33,507	A	35,782	A	35,434	A	36,495	A	37,873	A
11	Melrose Dr.	Lionshead Ave. to Palomar Airport Rd.	23,830	A	25,387	A	27,253	A	27,857	A	30,378	A
12	Carlsbad Blvd	State St. to Mountain View Dr.	13,320	A	13,743	A	14,791	A	13,156	A	12,991	A
13	Carlsbad Blvd	Acacia Ave. to Cherry Ave.	----	----	17,653	A	19,001	A	18,668	A	18,011	A
14	Carlsbad Blvd	Tamarack Ave. to Tierra Del Oro	----	----	19,224	A	17,319	A	17,396	A	20,894	A
15	Carlsbad Blvd	Cannon Rd. to Cerezo Dr.	16,565	A	16,128	A	16,755	A	17,714	A	16,668	A
16	Carlsbad Blvd	Breakwater Rd. to Poinsettia Ln.	12,936	A	13,656	A	15,193	A	16,289	A	16,539	A
17	Carlsbad Blvd	Avenida Encinas to La Costa Ave.	16,214	A	16,089	A	17,943	A	19,888	A	19,167	A
18	La Costa Ave	Piraeus St to Saxony Rd.	33,742	A	35,371	A	38,373	A	37,795	A	38,415	A
19	La Costa Ave	Romeria St. to Cadencia St.	12,196	A	12,043	A	12,087	A	12,266	A	12,861	A
20	Rancho Santa Fe Rd	La Costa Meadows Dr. to San Elijo Rd.	27,187	A	30,793	A	28,979	A	28,959	A	29,512	A
21	Poinsettia Ln.	Paseo Del Norte to Batiquitos Dr.	24,353	A	24,801	A	25,075	A	25,071	A	26,174	A
22	Tamarack Ave	El Camino Real to La Portalada Dr.	8,663	A	7,905	A	7,705	A	7,669	A	7,390	A
23	Cannon Rd.	Paseo Del Norte to Car Country Dr.	25,717	A	25,420	A	26,399	A	23,460	A	24,702	A
24	Cannon Rd.	Hilltop St. to College Blvd.	17,462	A	17,764	A	18,561	A	19,281	A	18,814	A
25	College Blvd.	N. City Limits to Tamarack Ave. (N.)	24,815	A	24,670	A	25,769	A	26,275	A	26,830	A
26	College Blvd.	Aston Ave. to Palomar Airport Rd.	13,635	A	13,806	A	13,744	A	14,710	A	14,762	A
27	Alga Rd	Corintia St. to El Fuerte St.	10,856	A	10,454	A	10,299	A	10,415	A	10,538	A

Note: Locations shaded in gray were collected in mid-September 2015 at the direction of City staff.

[1] All counts were collected during the summer months (July and August) except for the three (3) shaded locations that were collected in mid-September 2015.

[2] Roadway segment levels of service are based on peak hour operating conditions. For detailed peak hour analysis, refer to Table A-2 in Appendix A of this report.

3. INTERSECTION TURN MOVEMENT COUNTS

Intersection turn movement counts were collected in 2015 at forty-nine (49) major intersections around the City. At the request of City staff, three (3) intersections that were included in last year's TMP were removed from the 2015 TMP, and three (3) new intersections were added to the 2015 TMP.

The three (3) intersections that were included in previous TMP Reports but are not included in the 2015 TMP Report are listed below:

1) Rancho Santa Fe Road and San Elijo Road (formerly #27);
2) I-5 Southbound Ramps and La Costa Avenue (formerly #48); and
3) I-5 Northbound Ramps and La Costa Avenue (formerly #49).

The three (3) new intersections that have been included in the 2015 TMP Report are as follows:

1) Rancho Santa Fe Road and Calle Barcelona (now #28);
2) I-5 Southbound Ramps and Tamarack (now #44); and
3) I-5 Northbound Ramps and Tamarack Avenue (now #45).

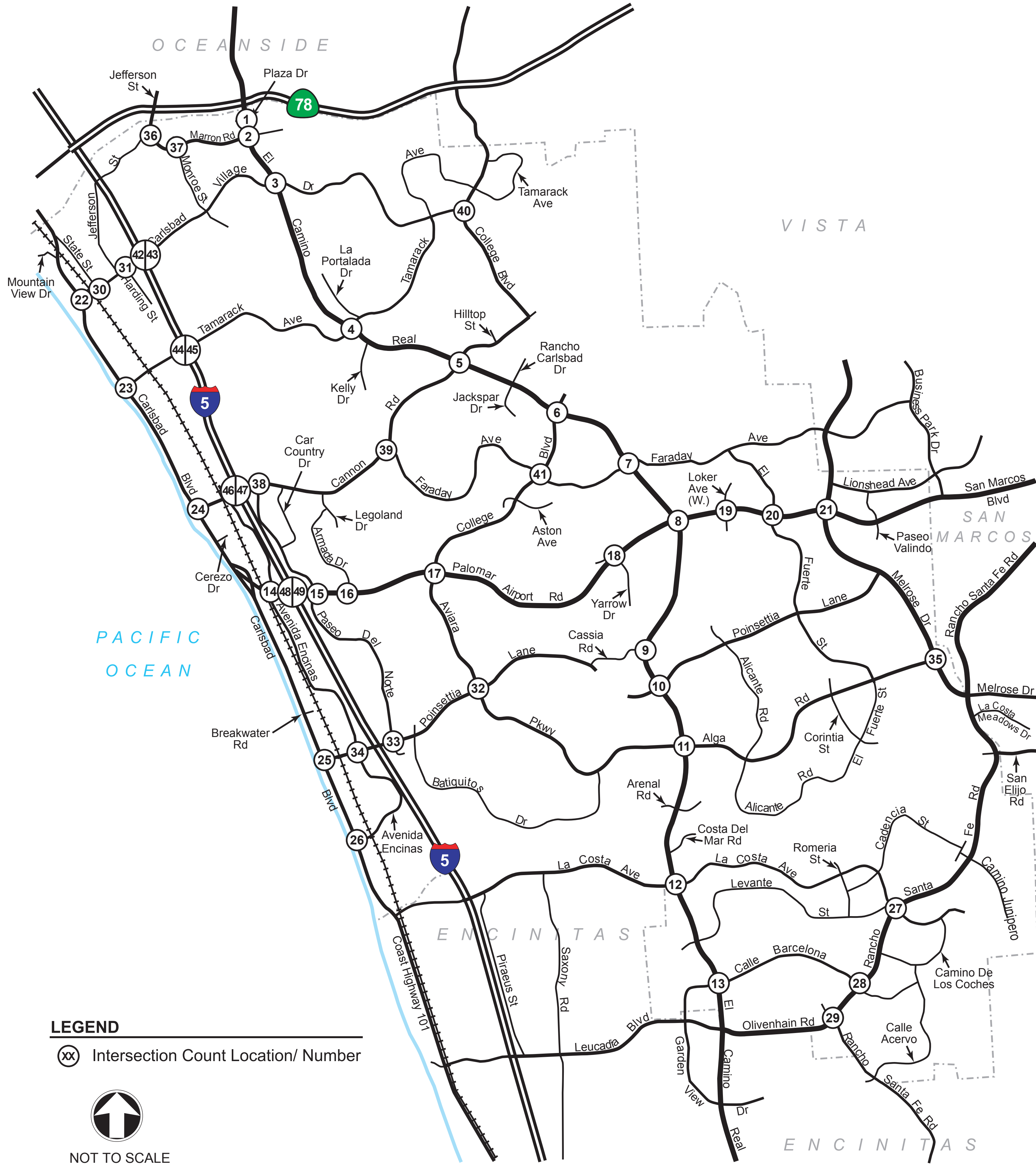
The locations of the intersections included in the 2015 Traffic Monitoring Program (TMP) Report are shown graphically in **Figure 3-1**. The turn movement counts were conducted during the AM peak period (6:30 to 9:30 AM) and the PM peak period (3:30 to 6:30 PM). The data from each three-hour period was divided into fifteen-minute periods to accurately identify the peak hour that occurs within the AM and PM peak periods. The counts were collected mid-week on a Tuesday, Wednesday or Thursday. The intersection turning movement count data is provided in **Appendix B** following this report.

During the count period, Michael Baker International staff monitored traffic conditions and noted locations where capacity or signal timing resulted in queues or operational deficiencies that may not be readily obvious using the ICU methodology. Field observations of peak period traffic conditions are described in detail later in this chapter.

The forty-nine (49) intersections were analyzed using the ICU methodology using calculation worksheets developed in an Excel spreadsheet. The count data was provided in Excel format, and imported directly into the ICU calculation worksheets. The peak hour volumes, peak hour factors, and ICU calculations are included in the worksheets for the forty-nine (49) intersections evaluated in the 2015 Report.

The ICU calculations performed assumed the following lane group capacities:

Lane Group	Capacity
Thru Lanes	2,000 vehicles per hour per lane
Turn Lanes	1,800 vehicles per hour per lane
Dual Turn Lanes	1,800 vehicles per hour per lane



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2015 INTERSECTION LOCATION MAP

FIGURE 3-1

The ICU methodology reports level of service (LOS) based on volume-to-capacity ratios ranging from 0.0 to 1.0:

Ratio	LOS
0.0 – 0.60	**A**
0.61 – 0.70	**B**
0.71 – 0.80	**C**
0.81 – 0.90	**D**
0.91 – 1.00	**E**
Greater than 1.00	**F**

One of the limitations of the ICU methodology is that it does not account for closely spaced signalized intersections where traffic volumes are heavy and queues spill back to adjacent intersections. The ICU methodology assumes that each intersection operates in isolation of other intersections; therefore, signal coordination, progression of through traffic, and queue spillback are not accounted for in the analysis. Using the ICU methodology at closely spaced intersections with heavy peak hour traffic may result in calculated levels of service that are better than what actually occurs at these intersections during the peak hours.

Since last year's data collection effort, the City has implemented modifications and improvements at the following intersections evaluated in the 2015 TMP:

El Camino Real and Faraday Avenue (#7)

- Eastbound approach: When the pipeline construction along Faraday Avenue through the intersection was completed, the desalination project incorrectly restriped the eastbound approach of El Camino Real and Faraday Avenue that converted the original through/right-turn lane to a dedicated through lane. The current configuration at the eastbound approach is one left-turn lane, two through lanes and one right-turn lane.

  The City has requested that the desalination project restripe the eastbound approach to its original lane configuration with one left-turn lane, one through lane, one shared through/right lane, and one right-turn lane. It is anticipated that the requested restriping of the eastbound approach to its original condition will be completed before the 2016 TMP data collection commences.

El Camino Real and Calle Barcelona (#13)

- Westbound approach: The westbound approach was restriped to convert one of the two through lanes to a dedicated right-turn lane. The new configuration at the westbound approach is one left-turn lane, one through lane and one right-turn lane.

Melrose Drive and Palomar Airport Road (#21)

- Northbound Approach: The northbound approach was restriped to open up all four (4) through lanes now that pipeline construction is completed along Melrose Drive.
- Southbound Approach: The southbound approach was permanently restriped with two (2) left-turn lanes, two (2) through lanes, and two (2) right-turn lanes. The configuration at the southbound approach has not changed from last year's data collection effort; however it is now considered a permanent improvement.

Jefferson Street and Marron Road (#36)

- Westbound approach: Westbound right-turn overlap was installed at the traffic signal.

The above-listed intersection modifications and improvements resulted in the following changes in operations since last year's TMP:

El Camino Real and Faraday Avenue (#7)
At the intersection of El Camino Real and Faraday Avenue, from 2014 to 2015 there was a 0.08 increase in the ICU ratio during the PM peak hour, and level of service changed from LOS C to LOS D. The restriping at the eastbound approach reduced the capacity of the right-turn movement, which resulted in the PM peak hour increase in the ICU ratio and change in LOS from C to D.

As described on page 11, the desalination project incorrectly restriped the eastbound approach when the pipeline construction through the intersection was completed, and the City has requested that the desalination project restripe the eastbound approach back to its original condition. Based on the PM peak hour volumes that were collected at El Camino Real and Faraday Avenue for the 2015 TMP, the ICU ratio during the PM peak hour should be 0.77, which would be LOS C operations if the striping at the eastbound approach were correct at the time the counts were collected.

El Camino Real and Calle Barcelona (#13)
At the intersection of El Camino Real and Calle Barcelona, from 2014 to 2015 there was a slight decrease in the ICU ratio and an improvement in operations from LOS B to LOS A during the PM peak hour. However, the improvement in LOS is more likely a result of the 6% decrease in traffic volumes at the intersection from 2014 to 2015 rather than the striping modification at the westbound approach.

Jefferson Street and Marron Road (#36)
At the intersection of Jefferson Street and Marron Road, from 2014 to 2015 there was a -0.13 decrease in the ICU ratio and an improvement in operations from LOS B to LOS A during the PM peak hour. Traffic volumes were virtually unchanged from 2014 to 2015; therefore, the improvement in LOS during the PM peak hour was a result of the right-turn overlap that was installed at the westbound approach of the intersection.

The construction of the pipeline for the Carlsbad Desalination Project resulted in the on-going closure of lanes and modification of the traffic signal phasing at only one intersection during the 2015 TMP data collection effort: Cannon Road and Faraday Avenue (#39). There has been no change in intersection capacity or signal phasing at the intersection since last year's TMP. Below is the lane configuration at Cannon Road and Faraday Avenue at the time the Summer 2015 traffic counts were collected:

Cannon Road and Faraday Avenue (#39)

- Northbound Approach: One shared left-turn/through/right-turn lane
- Eastbound Approach: One left-turn lane, one through lane and one right-turn lane
- Westbound Approach: One left-turn lane and one shared through/right-turn lane

At the intersection of Cannon Road and Faraday Avenue, there was a slight decrease in traffic volumes from 2014 to 2015, which resulted in a slight decrease in the ICU ratio; however, PM peak hour operations in Summer 2015 remained unchanged at LOS D.

As previously discussed, the El Camino Real widening project has resulted in on-going lane closures between Chestnut Drive and Tamarack Avenue, which includes lane closures at the southbound approach of the intersection of El Camino Real and Tamarack Avenue. Below is the modified lane configuration at El Camino Real and Tamarack Avenue at the time the 2015 traffic counts were collected:

El Camino Real and Tamarack Avenue (#4)

- Southbound Approach: Reduced to one left-turn lane, one through lane and one shared through/right-turn lane (restriping removed the southbound right-turn lane).

There were no lane closures at the other intersection approaches, although the northbound approach was realigned to the west to match the realigned segment of El Camino Real north of Tamarack Avenue.

At the intersection of El Camino Real and Tamarack Avenue, there was an overall 4% decrease in traffic volumes from 2014 to 2015, which resulted in a slight decrease in the ICU ratio during the AM peak hour despite the reduction in intersection capacity. There was a slight increase in the PM peak hour ICU ratio from 2014 to 2015. Operations remained at LOS B during both the AM and PM peak hours, with no change in LOS from 2014 to 2015.

As discussed on page 3 of this report, turning movement counts were collected at a total of ten (10) intersections during mid-September 2015 when local schools were back in session.

As discussed on page 3 of this report, turning movement counts were collected during mid-September 2015 at a total of ten (10) intersections to determine the potential changes in traffic operations while local schools are in session. The September counts were collected at the following ten (10) intersections:

1) El Camino Real and Tamarack Avenue (#4);
2) El Camino Real and Cannon Road (#5);
3) El Camino Real and Calle Barcelona (#13);
4) Rancho Santa Fe Road and La Costa Avenue (#27);
5) Rancho Santa Fe Road and Calle Barcelona (#28);
6) Rancho Santa Fe Road and Olivenhain Road-Camino Alvaro (#29);
7) Poinsettia Lane and Aviara Parkway (#32);
8) Melrose Drive and Alga Road (#35);
9) I-5 Southbound Ramps and Tamarack Avenue (#44); and
10) I-5 Northbound Ramps and Tamarack Avenue (#45).

Out of the above-listed intersections, the following three intersections - Rancho Santa Fe Road and Calle Barcelona (#28), I-5 Southbound Ramps and Tamarack Avenue (#44), and I-5 Northbound Ramps and Tamarack Avenue (#45) are new to the City's TMP and so cannot be compared to previous years.

The ICU calculations for the most of the ten (10) 2015 TMP intersection counts collected in mid-September showed little change in operations and LOS from Summer 2014 to September 2015. Despite the additional school-related traffic on the roadways, most of the September 2015 counts showed only nominal differences in AM and PM peak period traffic between Summer 2014 and September 2015.

The most significant change in ICU ratios occurred at the intersection of Melrose Drive and Alga Road, where an increase of 0.27 was calculated during the AM peak hour. However, AM peak hour operations only changed from LOS A to LOS B. The increase in the ICU ratio and change in LOS was a result of significantly higher turning movement volumes at Melrose Drive and Alga Road in September 2015 versus Summer 2014. It is assumed that the large increase in traffic (+31%) at the intersection is partially attributed to the nearby schools being in session at the time the counts were collected.

Field observations of the intersections evaluated in the 2015 TMP revealed that closely spaced intersections near freeway interchanges experience the highest occurrences of vehicular queue spillbacks into adjacent intersections. Arterials observed to experience the greatest congestion through closely spaced intersections are El Camino Real between SR-78 and Marron Road, Carlsbad Village Drive between Harding Street and Pio Pico Drive, Cannon Road between I-5 and Car Country Drive, and Palomar Airport Road between Avenida Encinas and Armada Drive. The ICU calculations for these intersections in the vicinity of freeway interchanges at I-5 and at SR-78 may be reporting a better level of service than what actually occurs during the morning and afternoon peak traffic periods.

Citywide, the following observations were made during the collection of intersection turning movement counts in Summer and September 2015:

- Overall the changes in the turning movement volumes and ICU calculations for the intersections have been minimal from 2014 to 2015.

- The most significant increases in turning movement volumes and ICU ratios from 2014 to 2015 occurred at Melrose Drive and Alga Road during the AM peak hour, and at Palomar Airport Road and I-5 Northbound Ramps during the PM peak hour. Operations at Melrose Drive and Alga Road changed from LOS A to LOS B during the AM peak hour from 2014 to 2015. At the intersection of Palomar Airport Road and I-5 Northbound Ramps, PM peak hour operations from 2014 to 2015 changed from LOS B to LOS C. Overall turning movement volumes increased by 31% at Melrose Drive and Alga Road, and increased by 12% at Palomar Airport Road and I-5 Northbound Ramps.

- The most significant decreases in turning movement volumes and ICU ratios from 2014 to 2015 occurred at El Camino Real and Poinsettia Lane during the AM peak hour, and at Palomar Airport Road and El Fuerte Street during the PM peak hour. From 2014 to 2015, turning movement volumes at El Camino Real and Poinsettia Lane decreased by approximately 18% during the AM peak hour. At Palomar Airport Road and El Fuerte Street from 2014 to 2015, PM peak hour turning movement volumes have decreased by 8% and operations have improved from LOS D to LOS C.

- From 2014 to 2015, overall turning movement volumes have increased at intersections along Palomar Airport Road (west of El Camino Real), Carlsbad Boulevard, and Rancho Santa Fe Road. The increase in peak hour volumes at intersections on Carlsbad Boulevard may be attributed to increased congestion on I-5 resulting in traffic using Carlsbad Boulevard as an alternate route.

  Overall turning movement volumes have decreased at intersections along El Camino Real, College Boulevard, Cannon Road and Faraday Avenue. Although the daily traffic volumes along some segments of El Camino Real, College Boulevard, Cannon Road show only slight increases or decreases from last year's TMP counts, there appears to be a more prominent decrease in the intersection turning movement volumes along these roadways during the AM and PM peak hours. The decreases during the peak hours may be a result of traffic avoiding peak hour congestion and queuing near the ongoing pipeline construction activities and the construction activities associated with the widening of El Camino Real.

The ICU calculations and LOS for the previous 2011 through 2015 TMP Reports are summarized in **Table 3-1**. The ICU calculation worksheets are provided in Appendix B along with the intersection turning movement count data. **Figure 3-2** and **Figure 3-3** illustrate the intersection LOS for the AM and PM peak hours, respectively.

The City of Carlsbad considers LOS D or better acceptable for intersection operations during the AM and PM peak hours, and peak hour operations at LOS E or F are considered deficient. The results of the ICU analysis for the 2015 Report showed that none of the 49 intersections included in this analysis are currently operating at deficient levels of service.

Although LOS D is considered an acceptable LOS for peak hour operations, intersections that are identified as operating at LOS D are considered locations that may potentially become deficient in the future as regional traffic volumes increase. Intersection operations for these intersections are described in greater detail in this TMP report, and it is recommended that the City monitor these locations closely over the next several years to identify potential operational deficiencies during the peak periods. The following two (2) intersections are currently operating at LOS D during either the AM or PM peak hours:

Location #	Intersection	ICU	LOS	Period
7	El Camino Real & Faraday Avenue	0.86	D	PM peak
39	Cannon Road & Faraday Avenue	0.81	D	PM peak

The following describes the 2015 peak period operations of the two (2) intersections that are operating at LOS D:

El Camino Real and Faraday Avenue (#7)

The ICU calculations based on the 2015 counts show that this intersection is operating at a mid LOS D during the PM peak hour. From 2014 to 2015, PM peak period operations at this intersection have changed from a high LOS C to a mid LOS D. Turning movement volumes at the intersection have actually decreased by almost 3% from 2014 to 2015; however, the recent restriping of the eastbound approach (as described on page 11) reduced the capacity of the critical right-turn movement, resulting in a 0.08 increase in the ICU ratio and change in operations from LOS C to LOS D.

As described on page 11, after the pipeline construction through the intersection was completed, the desalination project incorrectly restriped the eastbound approach when they converted the original through/right-turn lane to a dedicated through lane. The current configuration at the eastbound approach is one left-turn lane, two through lanes and one right-turn lane. The City has requested that the desalination project restripe the eastbound approach back to its original condition. It is anticipated that the requested restriping of the eastbound approach to its original condition will be completed before the 2016 TMP data collection commences.

As described on page 12, ICU calculations performed at the intersection with correct lane configuration at the eastbound approach show that PM peak hour operations would remain at LOS C based on the 2015 TMP counts that were collected at the intersection.

Cannon Road and Faraday Avenue (#39)

Based on the ICU calculations from the 2014 to 2015 counts, operations at Cannon Road and Faraday Avenue have remained at LOS D during the PM peak hour. Overall, PM peak hour turning movement volumes have decreased slightly from 2014 to 2015. The 2015 counts show that traffic is generally continuing to avoid the sections of Cannon Road and Faraday Avenue where the pipeline construction is occurring, and are using other parallel arterials such as Palomar Airport Road. It is anticipated that turning movement volumes at Cannon Road and Faraday Avenue will increase significantly and operations will improve when the pipeline construction is completed and the currently closed lanes are open to traffic again.

From 2014 to 2015, operations at the following intersections have improved from LOS D to LOS C:

- El Camino Real and Cannon Road (#5): PM peak hour
- Palomar Airport Road and El Fuerte Street (#20): PM peak hour

At both El Camino Real and Cannon Road and at Palomar Airport Road and El Fuerte Street, turning movement volumes have decreased from 2014 to 2015, resulting in improved operations at both intersections.

Table 3-1
Intersection Capacity Utilization Analysis Summary

Count #	Intersection	Summer 2011 Peak Hour				Summer 2012 Peak Hour				Summer 2013 Peak Hour				Summer 2014 Peak Hour				Summer 2015 [1] Peak Hour			
		AM		PM		AM		PM		AM		PM		AM		PM		AM		PM	
		ICU Ratio	LOS	ICU Ratio	LOS	ICU Ratio	LOS	ICU Ratio	LOS	ICU Ratio	LOS	ICU Ratio	LOS	ICU Ratio	LOS	ICU Ratio	LOS	ICU Ratio	LOS	ICU Ratio	LOS
1	El Camino Real & Plaza Dr.	0.34	A	0.66	B	0.32	A	0.62	B	0.33	A	0.63	B	0.33	A	0.64	B	0.35	A	0.65	B
2	El Camino Real & Marron Rd.	0.34	A	0.53	A	0.37	A	0.55	A	0.39	A	0.55	A	0.38	A	0.56	A	0.43	A	0.57	A
3	El Camino Real & Carlsbad Village Dr.	0.45	A	0.59	A	0.45	A	0.58	A	0.44	A	0.57	A	0.46	A	0.60	A	0.48	A	0.58	A
4	El Camino Real & Tamarack Ave.	0.64	B	0.59	A	0.66	B	0.53	A	0.68	B	0.63	B	0.69	B	0.61	B	0.66**	B**	0.62**	B**
5	El Camino Real & Cannon Rd.	0.61	B	0.80	C	0.64	B	0.76	C	0.71	C	**0.81**	**D**	0.67	B	**0.81**	**D**	0.69	B	0.75	C
6	El Camino Real & College Blvd.	0.61	B	0.55	A	0.48	A	0.72	C	0.54	A	0.61	B	0.58	A	0.67	B	0.54	A	0.61	B
7	El Camino Real & Faraday Ave.	0.66	B	0.72	C	0.62	B	0.76	C	0.69	B	0.75	C	0.68	B	0.78	C	0.64	B	**0.86**	**D**
8	El Camino Real & Palomar Airport Rd.	0.58	A	0.77	C	0.55	A	0.80	C	0.60	A	**0.81**	**D**	0.62	B	0.80	C	0.60	A	0.79	C
9	El Camino Real & Cassia Rd.	0.64	B	0.61	B	0.62	B	0.64	B	0.59	A	0.65	B	0.63	B	0.70	B	0.66	A	0.66	B
10	El Camino Real & Poinsettia Ln.	0.39	A	0.56	A	0.41	A	0.57	A	0.40	A	0.44	A	0.46	A	0.48	A	0.40	A	0.50	A
11	El Camino Real & Alga Rd./Aviara Pkwy	0.63	B	**0.83**	**D**	0.65	B	0.72	C	0.62	B	0.72	C	0.61	B	0.70	B	0.68	B	0.72	C
12	El Camino Real & La Costa Ave.	0.78	C	**0.85**	**D**	0.67	B	0.68	B	0.69	B	**0.82**	**D**	0.73	C	0.79	C	0.73	C	0.77	C
13	El Camino Real & Calle Barcelona	0.48	A	0.61	B	0.52	A	0.62	B	0.52	A	0.61	B	0.55	A	0.61	B	0.53	A	0.59	A
14	Palomar Airport Rd. & Avenida Encinas	0.54	A	0.74	C	0.49	A	0.67	B	0.59	A	**0.81**	**D**	0.55	A	0.75	C	0.53	A	0.76	C
15	Palomar Airport Rd. & Paseo Del Norte	0.58	A	0.66	B	0.71	C	0.79	C	0.67	B	0.75	C	0.66	B	0.72	C	0.64	B	0.71	C
16	Palomar Airport Rd. & Armada Dr.	0.52	A	0.72	C	0.54	A	0.68	B	0.53	A	0.71	C	0.58	A	0.71	C	0.64	B	0.75	C
17	Palomar Airport Rd. & College Blvd./ Aviara Pkwy	0.59	A	0.76	C	0.56	A	0.74	C	0.53	A	0.71	C	0.56	A	0.70	B	0.56	A	0.77	C
18	Palomar Airport Rd. & Yarrow Dr.	0.43	A	0.54	A	0.43	A	0.63	B	0.48	A	0.62	B	0.52	A	0.68	B	0.45	A	0.64	B
19	Palomar Airport Rd. & Loker Ave. (W.)	0.66	B	0.69	B	0.74	C	0.71	C	0.68	B	0.68	B	0.72	C	0.66	B	0.67	B	0.70	B
20	Palomar Airport Rd. & El Fuerte St.	0.56	A	0.65	B	0.61	B	0.80	C	0.56	A	0.80	C	0.58	A	**0.82**	**D**	0.59	A	0.76	C
21	Palomar Airport Rd. & Melrose Dr.	0.71	C	0.58	A	**0.90**	**D**	0.59	A	**0.89**	**D**	0.67	B	0.77	C	0.71	C	0.79	C	0.70	B
22	Carlsbad Blvd. & Carlsbad Village Dr.	0.30	A	0.57	A	0.36	A	0.56	A	0.33	A	0.47	A	0.32	A	0.46	A	0.30	A	0.52	A
23	Carlsbad Blvd & Tamarack Ave.	0.30	A	0.53	A	0.35	A	0.56	A	0.36	A	0.49	A	0.41	A	0.49	A	0.50	A	0.51	A
24	Carlsbad Blvd. & Cannon Rd.	0.58	A	0.80	C	0.41	A	0.70	B	0.43	A	0.65	B	0.50	A	0.70	B	0.48	A	0.76	C
25	Carlsbad Blvd. & Poinsettia Ln.	0.27	A	0.52	A	0.27	A	0.36	A	0.39	A	0.38	A	0.42	A	0.42	A	0.39	A	0.41	A

Note: Intersections operating at LOS D are indicated in bold. Although LOS D is considered acceptable for peak hour operations, these intersections are identified as becoming potentially deficient in the future and need to be monitored closely as regional traffic volumes increase. Locations shaded in gray were collected in mid-September 2015 at the direction of City staff.

** AM and PM peak hour LOS calculations are based on construction impacts at the intersection.

[1] All counts were collected during the summer months (July and August) except for the shaded locations that were collected in mid-September 2015.

Table 3-1 (continued)
Intersection Capacity Utilization Analysis Summary

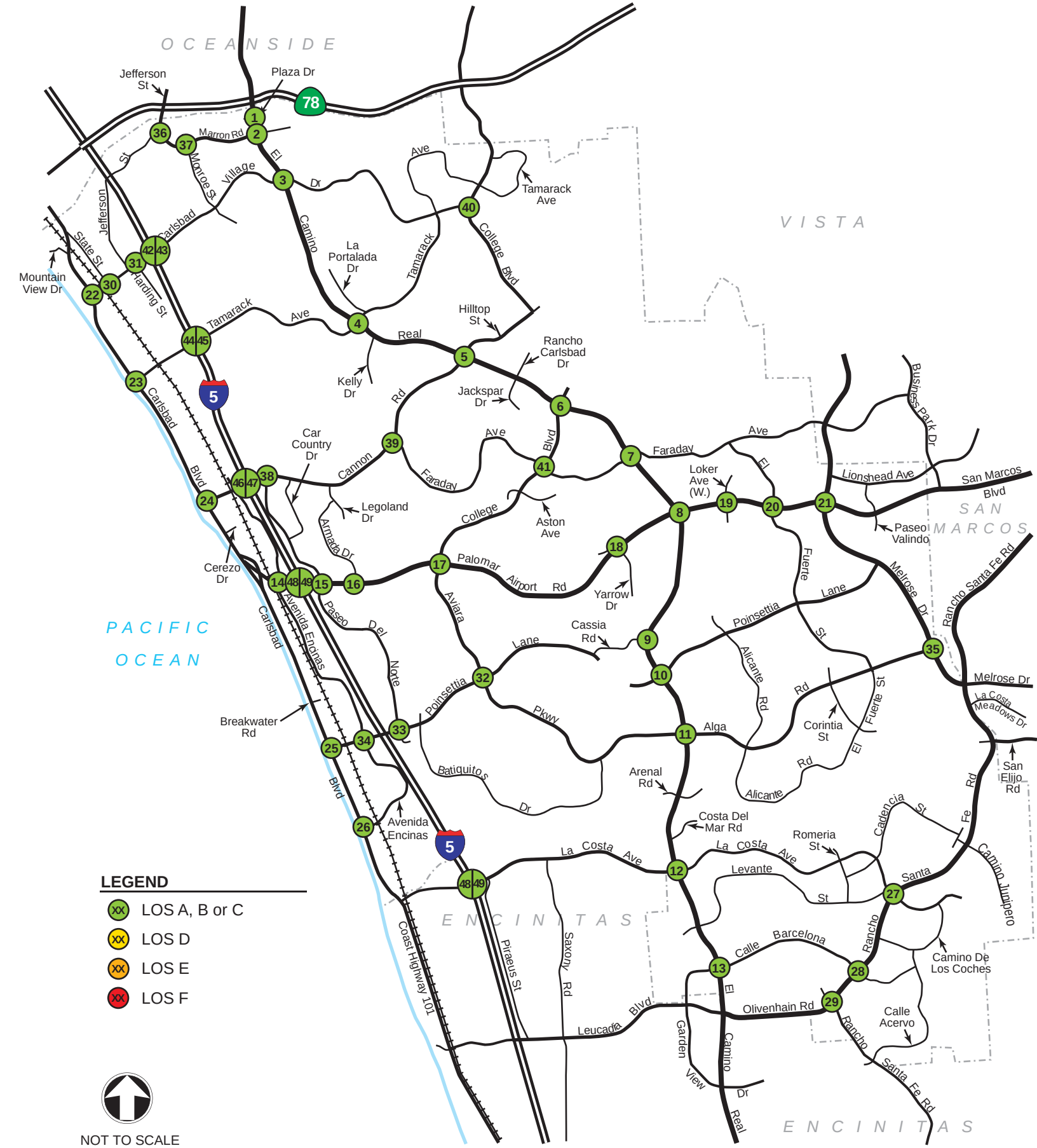
Count #	Intersection	Summer 2011 Peak Hour				Summer 2012 Peak Hour				Summer 2013 Peak Hour				Summer 2014 Peak Hour				Summer 2015 [(1)] Peak Hour			
		AM		PM		AM		PM		AM		PM		AM		PM		AM		PM	
		ICU Ratio	LOS	ICU Ratio	LOS	ICU Ratio	LOS	ICU Ratio	LOS	ICU Ratio	LOS	ICU Ratio	LOS	ICU Ratio	LOS	ICU Ratio	LOS	ICU Ratio	LOS	ICU Ratio	LOS
26	Carlsbad Blvd. & Avenida Encinas	0.30	A	0.57	A	0.30	A	0.34	A	0.39	A	0.34	A	0.42	A	0.38	A	0.43	A	0.35	A
27	Rancho Santa Fe Rd. & La Costa Ave.	0.62	B	0.59	A	0.62	B	0.61	A	0.59	A	0.66	B	0.55	A	0.61	B	0.52	A	0.60	A
28	Rancho Santa Fe Rd. & Calle Barcelona	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.70	B	0.66	B
29	Olivenhain Rd & Rancho Santa Fe Rd./ Camino Alvaro	0.56	A	0.59	A	0.61	B	0.55	A	0.65	B	0.63	B	0.67	B	0.63	B	0.64	B	0.64	B
30	Carlsbad Village Dr. & State St.	0.24	A	0.37	A	0.29	A	0.41	A	0.28	A	0.38	A	0.25	A	0.34	A	0.26	A	0.36	A
31	Carlsbad Village Dr. & Harding St.	0.37	A	0.53	A	0.50	A	0.64	A	0.46	A	0.57	A	0.45	A	0.64	B	0.43	A	0.60	B
32	Poinsettia Ln. & Aviara Pkwy.	0.44	A	0.51	A	0.42	A	0.53	A	0.39	A	0.56	A	0.44	A	0.58	A	0.49	A	0.68	B
33	Poinsettia Ln. & Paseo Del Norte	0.60	A	0.64	B	0.59	A	0.67	B	0.54	A	0.70	B	0.58	A	0.66	B	0.59	A	0.66	B
34	Poinsettia Ln. & Avenida Encinas	0.53	A	0.69	B	0.52	A	0.65	B	0.42	A	0.72	C	0.52	A	0.69	B	0.51	A	0.67	B
35	Melrose Dr. & Alga Rd.	0.47	A	0.57	A	0.44	A	0.58	A	0.44	A	0.59	A	0.42	A	0.62	B	0.69	B	0.66	B
36	Jefferson St. & Marron Rd.	0.35	A	0.55	A	*				0.58	A	0.58	A	0.29	A	0.62	B	0.28	A	0.49	A
37	Monroe St. & Marron Rd.	0.21	A	0.34	A	0.37	A	0.44	A	0.23	A	0.35	A	0.21	A	0.34	A	0.20	A	0.34	A
38	Cannon Rd. & Paseo Del Norte	0.56	A	0.54	A	0.52	A	0.53	A	0.59	A	0.56	A	0.48	A	0.52	A	0.53	A	0.55	A
39	Cannon Rd. & Faraday Ave.	0.36	A	0.58	A	0.48	A	0.56	A	0.48	A	0.60	A	0.55**	A**	**0.85****	**D****	0.57**	A**	**0.81****	**D****
40	College Blvd. & Carlsbad Village Dr.	0.51	A	0.46	A	0.49	A	0.45	A	0.51	A	0.51	A	0.54	A	0.55	A	0.51	A	0.51	A
41	College Blvd. & Faraday Ave.	0.44	A	0.54	A	0.48	A	0.51	A	0.50	A	0.52	A	0.56**	A**	0.63**	B**	0.37	A	0.41	A
42	I-5 SB Ramps & Carlsbad Village Dr.	0.55	A	0.68	B	0.49	A	0.66	B	0.50	A	0.64	B	0.49	A	0.72	C	0.51	A	0.73	C
43	I-5 NB Ramps & Carlsbad Village Dr.	0.54	A	0.66	B	0.68	B	**0.81**	B	0.57	A	0.67	B	0.59	A	0.71	C	0.55	A	0.73	C
44	I-5 SB Ramps & Tamarack Ave.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.60	A	0.52	A
45	I-5 NB Ramps & Tamarack Ave.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.73	C	0.59	A
46	I-5 SB Ramps & Cannon Rd.	0.47	A	0.48	A	0.46	A	0.49	A	0.53	A	0.51	A	0.47	A	0.46	A	0.43	A	0.47	A
47	I-5 NB Ramps & Cannon Rd.	0.49	A	0.58	A	0.47	A	0.65	A	0.50	A	0.67	B	0.44	A	0.63	B	0.45	A	0.56	A
48	I-5 SB Ramps & Palomar Airport Rd.	0.42	A	0.45	A	0.44	A	0.47	A	0.44	A	0.50	A	0.49	A	0.47	A	0.57	A	0.54	A
49	I-5 NB Ramps & Palomar Airport Rd.	0.64	B	0.71	C	0.66	B	0.65	C	0.65	B	0.68	B	0.65	B	0.67	B	0.71	C	0.75	C

Note: Intersections operating at LOS D are indicated in bold. Although LOS D is considered acceptable for peak hour operations, these intersections are identified as becoming potentially deficient in the future and need to be monitored closely as regional traffic volumes increase. Locations shaded in gray were collected in mid-September 2015 at the direction of City staff.

* Count data not collected in 2012 due to construction that resulted in the closure of Jefferson Street during the Summer counts period.

** AM and PM peak hour LOS calculations are based on construction impacts at the intersection.

[(1)] All counts were collected during the summer months (July and August) except for the shaded locations that were collected in mid-September 2015.



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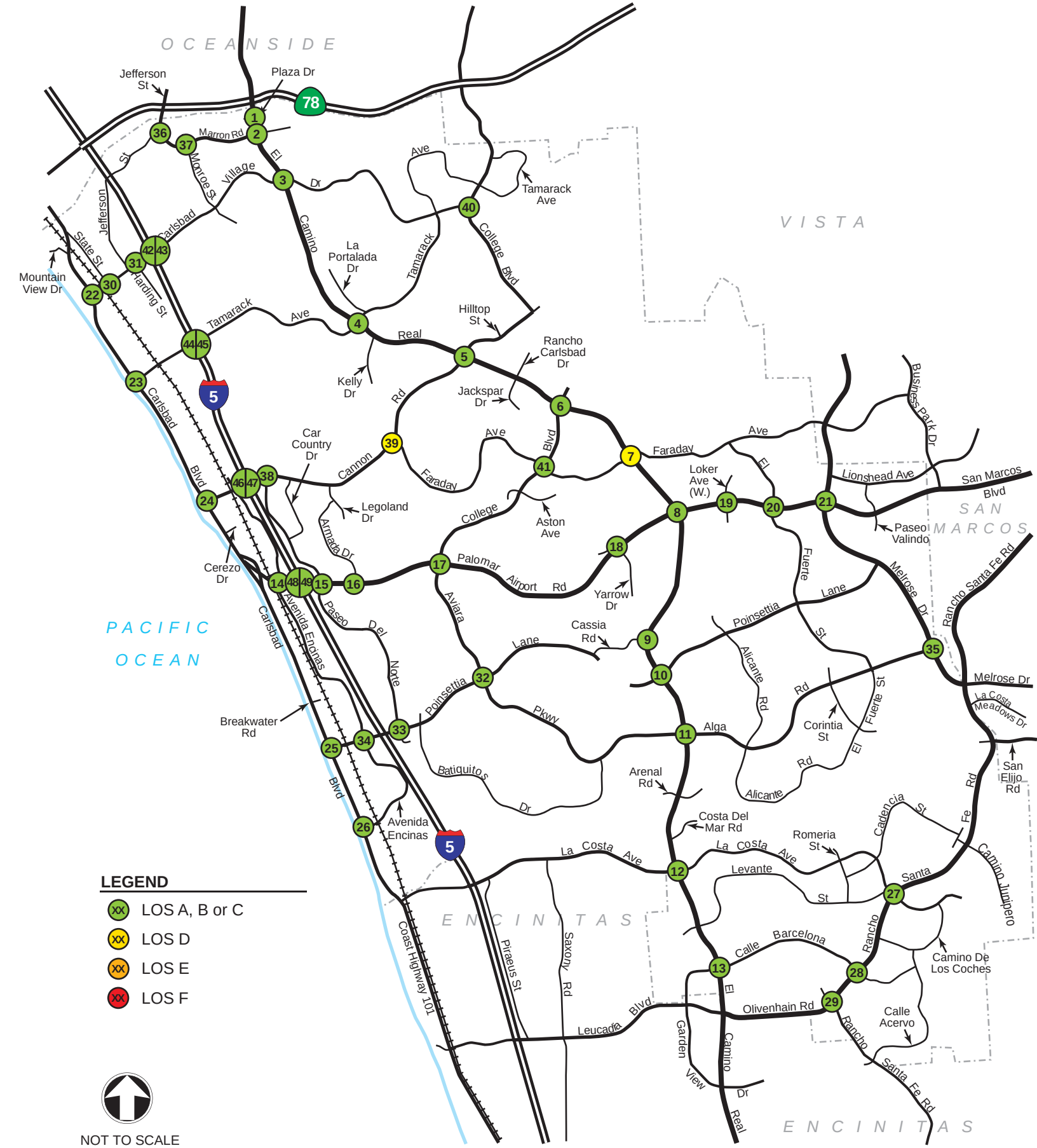
2015 AM PEAK HOUR INTERSECTION LEVELS OF SERVICE

Figure 3-2



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2015 PM PEAK HOUR INTERSECTION LEVELS OF SERVICE

Figure 3-3

4. MID-BLOCK PEDESTRIAN AND BICYCLE COUNTS

The City of Carlsbad has recently updated their General Plan Mobility Element, which includes a shift from the traditional focus on vehicular traffic flow and operations to a multi-modal focus. A multi-modal focus accounts for all users of the City's roadway network, including motorized vehicles, transit riders, bicyclists and pedestrians. In an effort to document pedestrian and bike activity in the community, the TMP includes peak period pedestrian and bike activity along Carlsbad Boulevard and in the Village. The 2015 Annual Report of the City of Carlsbad's Traffic Monitoring Program is the fourth year in which mid-block pedestrian and bicycle counts were added to the data collection efforts.

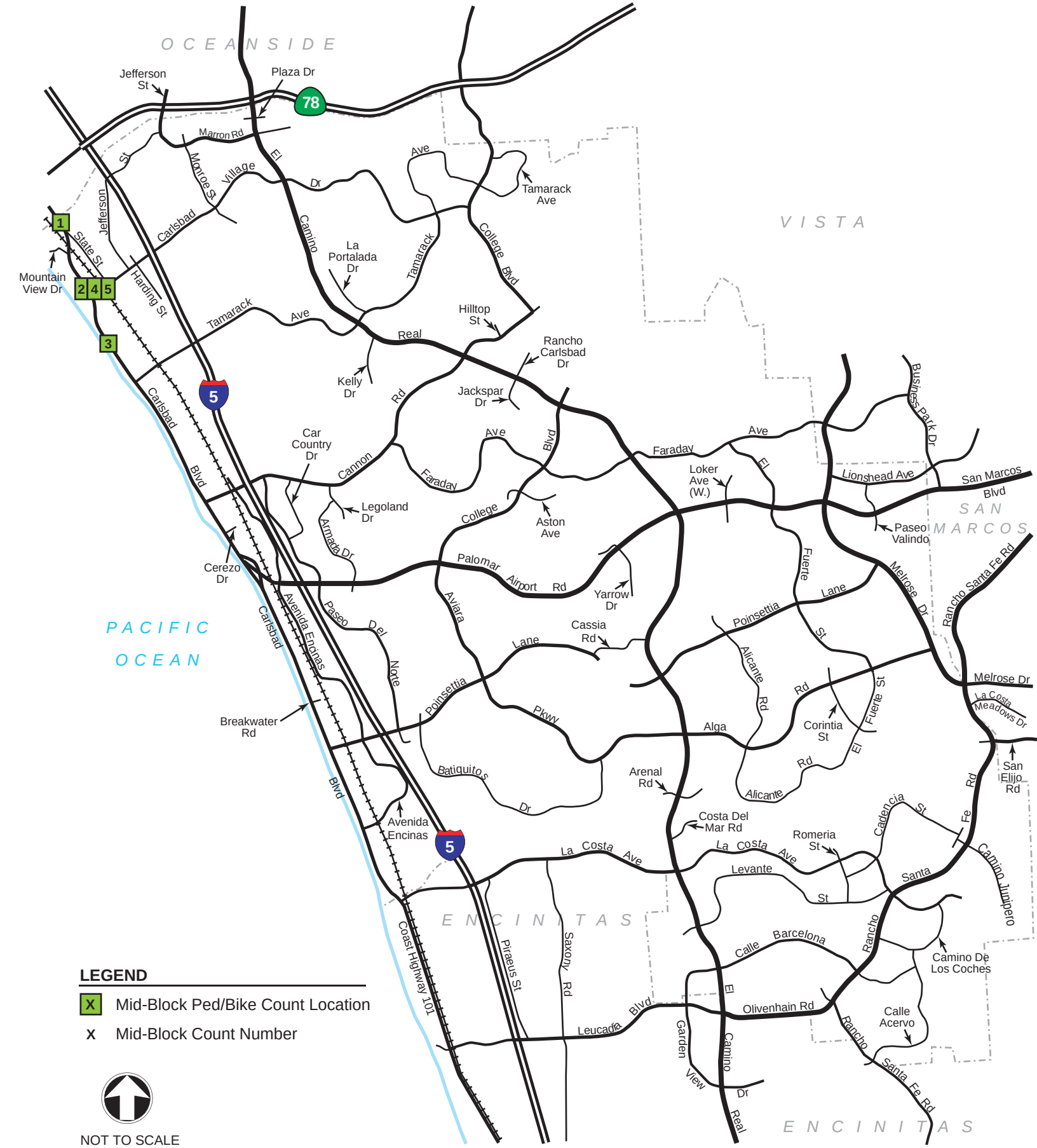
Five (5) key mid-block locations were selected by City staff in the previous 2012, 2013 and 2014 Annual Reports where pedestrian and bicycle activities are among the highest in the City. These same (5) mid-block locations were also selected for this 2015 Annual Report, which are as follows:

1. Carlsbad Boulevard between Carlsbad-Oceanside Boundary and State Street
2. Carlsbad Boulevard between Grand Avenue and Carlsbad Village Drive
3. Carlsbad Boulevard between Chestnut Avenue and Maple Avenue
4. Carlsbad Village Drive between Carlsbad Boulevard and Washington Street
5. Grand Avenue between Washington Street and State Street

Pedestrian and bicycle counts for the above-listed mid-block locations were collected on a weekday (Wednesday, July 15, 2015), and also on a weekend (Saturday, July 25, 2015) during three peak two-hour periods (7:00 - 9:00 AM, 11:00 AM – 1:00 PM, and 4:00 – 6:00 PM). Data was collected in 15-minute intervals for each direction of travel at each mid-block location. The locations of the mid-block pedestrian and bicycle counts are shown in **Figure 4-1**. Pedestrian and bicycle mid-block count data is provided in **Appendix C** following this report.

The peak hour counts for each period were calculated from the 15-minute data, and are summarized below in Table 4-1. Table 4-1 reveals the following characteristics about the pedestrian and bicycle activities at the selected locations:

- Weekday pedestrian and bicycle activities are highest during the PM peak period (4:00 – 6:00 PM).
- Weekend pedestrian and bicycle activities are highest during the Midday peak period (11:00 AM – 1:00 PM).
- The highest level of weekday pedestrian activity occurs on the beachside path along the west side of Carlsbad Boulevard between Chestnut Avenue and Maple Avenue, during the AM peak hour.
- The highest level of weekend pedestrian activity occurs along the west side of Carlsbad Boulevard between Grand Avenue and Carlsbad Village Drive, during the PM peak hour.
- The highest levels of bicycle activity occur along Carlsbad Boulevard between Chestnut Avenue and Maple Avenue on both weekdays and weekends.
- Overall pedestrian and bicycle activities are higher on the weekends than during the week.



LEGEND

X Mid-Block Ped/Bike Count Location

X Mid-Block Count Number

NOT TO SCALE

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2015 MID-BLOCK PEDESTRIAN AND BICYCLE COUNT LOCATIONS

Figure 4-1

Table 4-1
Summary of Mid-Block Pedestrian and Bicycle Counts

Location Number	Segment	Segment Location	Direction	AM Peak Hour		Midday Peak Hour		PM Peak Hour	
				Peds	Bikes	Peds	Bikes	Peds	Bikes
Weekday Counts (Wednesday, July 15, 2015)									
1	Carlsbad Blvd.	Carlsbad-Oceanside Boundary to State St.	NB	10	27	7	27	14	40
			SB	12	34	12	28	6	25
2	Carlsbad Blvd.	Grand Ave. to Carlsbad Village Dr.	NB	77	13	175	29	173	22
			SB	49	15	272	16	205	23
3	Carlsbad Blvd.	Chestnut Ave. and Maple Ave.	NB	13	31	29	43	35	37
			SB	329	45	286	56	258	32
4	Carlsbad Village Dr.	Carlsbad Blvd. to Washington St.	EB	58	13	162	14	246	28
			WB	30	5	122	9	285	20
5	Grand Ave.	Washington St. to State St.	EB	20	15	107	4	261	11
			WB	26	11	68	8	109	17
Weekday Total				**624**	**209**	**1,240**	**234**	**1,592**	**255**
Weekend Counts (Saturday, July 25, 2015)									
6	Carlsbad Blvd.	Carlsbad-Oceanside Boundary to State St.	NB	9	102	12	84	6	45
			SB	13	77	8	105	7	59
7	Carlsbad Blvd.	Grand Ave. to Carlsbad Village Dr.	NB	96	128	139	60	224	20
			SB	80	55	370	129	371	20
8	Carlsbad Blvd.	Chestnut Ave. and Maple Ave.	NB	47	111	64	131	51	62
			SB	291	131	322	157	231	91
9	Carlsbad Village Dr.	Carlsbad Blvd. to Washington St.	EB	47	4	175	35	168	31
			WB	44	25	165	15	178	15
10	Grand Ave.	Washington St. to State St.	EB	39	16	117	16	121	16
			WB	49	8	99	37	109	25
Weekend Total				**715**	**657**	**1,471**	**769**	**1,466**	**384**

A comparison between the Summer 2014 pedestrian and bicycle counts and last year's counts showed the following trends in pedestrian and bicycle activity:

- Overall, pedestrian activity at the five selected mid-block locations has increased approximately 11% during the week, and has decreased approximately 9% on the weekend from last year's counts.
- Overall, bicycle activity at the five selected mid-block locations has decreased approximately 9% during the week, and has decreased approximately 22% on the weekend from last year's counts.

Since the pedestrian and bicycle counts were collected last summer for the 2014 Annual Report, the City of Carlsbad has implemented the following improvements to pedestrian and bicycle facilities such as:

- Sidewalk improvements on both sides of the Carlsbad Boulevard bridge over the railroad tracks between State Street and Mountain View Drive;
- New bike lanes on Alicante Road between Poinsettia Lane and Alga Road;
- Wider bike lanes with buffers along Cannon Road between Paseo Del Norte and Grand Pacific Drive;
- Wider bike lanes on Batiquitos Drive between Poinsettia Lane and Black Swan Place; and
- Wider bike lanes on Rancho Santa Fe Road between Olivenhain Road and Calle Acervo.

The pedestrian and bicycle counts collected for the 2015 Annual Report shows that overall pedestrian activity has slightly increased, and overall bicycle activity has decreased from last year's data collection efforts. The decrease in overall bicycle activity may be due to warmer temperatures that may have reduced the number of cyclists on the days the 2015 counts were collected versus the days the 2014 counts were collected.

5. CONCLUSIONS

The purpose of the City of Carlsbad Annual Growth Management Plan Traffic Monitoring Program (TMP) is to monitor the growth of traffic on the City's arterials and at intersections. The City of Carlsbad identified forty-nine (49) key intersections and twenty-seven (27) key mid-block roadway segment locations for analysis. In previous years, a higher number of intersections and roadway segments were included in the Annual TMP, but as traffic operations have improved following the completion of several key roadway extension improvements, fewer intersections and roadway segments are monitored than in the previous years.

At the request of City staff, three (3) intersections that were included in last year's TMP were removed from the 2015 TMP, and three (3) new intersections were added to the 2015 TMP. The twenty-seven (27) mid-block roadway segments are the same locations that were selected for data collection and analysis in the TMP for the previous three years.

This 2015 Annual Report of the City of Carlsbad's Traffic Monitoring Program is the fourth year in which mid-block pedestrian and bicycle counts were added to the data collection efforts. Five (5) key mid-block locations were counted during weekday and weekend peak periods where pedestrian and bicycle activities are among the highest in the City.

The results of the mid-block roadway segment counts and analysis show that all twenty-seven (27) mid-block locations are currently operating at LOS A or B during the AM and PM peak periods. Overall traffic volumes on the City's arterials have increased by an average of one (1) percent from 2014 to 2015.

The results of the 2015 intersection counts and ICU calculations show that none of the selected forty-nine (49) intersections are currently operate at deficient levels of service (LOS E or F) during the AM or PM peak hours. Intersections that are identified as operating at LOS D are considered locations that may potentially become deficient in the future as regional traffic volumes increase.

The following two (2) of the forty-nine study intersections are currently operating at LOS D during the AM or PM peak hours:

Location #	Intersection	ICU	LOS	Period
7	El Camino Real & Faraday Avenue	0.86	D	PM peak
39	Cannon Road & Faraday Avenue	0.81	D	PM peak

At El Camino Real and Faraday Avenue, the LOS D operations are a result of the incorrectly restriped lane configuration at the eastbound approach after the desalination pipeline construction activities were completed (as described on page 11). The City has requested that the desalination project restripe the eastbound approach to its previous lane configuration. Once the correct lane configuration is restored at the eastbound approach, PM peak hour operations at El Camino Real and Faraday Avenue will return to LOS C.

The LOS D operations at Cannon Road and Faraday Avenue are a result of the reduced lane capacity associated with the pipeline construction for the Carlsbad Desalination Project, at the time the traffic counts were collected (July 2015). However, the pipeline construction along Cannon Road and Faraday Avenue was completed by Fall 2015 and all lanes at the intersection are currently open to traffic. It is expected that PM peak hour operations have improved to LOS A, which was the reported PM level of service from the Summer 2013 TMP Report before the pipeline construction began.

In conclusion, this report provides an assessment of overall traffic operations throughout the City, and identifies trends in traffic patterns from the previous years. As shown, there has been an overall slight increase in traffic city-wide (1%) from 2014 to 2015. Arterials with the highest increases in traffic include Melrose Drive, Poinsettia Lane, La Costa Avenue, and Cannon Road. The City should use this report to identify locations where additional traffic monitoring may be needed in the future.