DIRECT ACCESS RAMPS / LOCAL CIRCULATION SYSTEM OPERATIONS REPORT

TECHNICAL REPORT NO. 7

Interstate 5 North Coast Corridor Project

SAN DIEGO COUNTY, CALIFORNIA
DISTRICT 11-SD-5 (PM R28.4/R55.4)
EA 235800 (P ID 11-000-0159)

AUGUST 2007

I-5 North Coast Corridor Project

Draft Technical Report #7
Direct Access Ramps/Local Circulation System Operations Report

August 2007

Caltrans

NORTH COAST INTERSTATE 5 CORRIDOR

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Direct Access Ramp / Local Circulation System Operations Report
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1.0 Introduction

The Direct Access Ramp / Local Circulation System Operations Report has been prepared in support of the I-5 North Coast Corridor Project. The I-5 North Coast Corridor Project proposes 26 miles of added capacity to the I-5 corridor between La Jolla and Camp Pendleton, including new freeway main lanes, High Occupancy Vehicle (HOV)/managed lanes, and Direct Access Ramps (DARs) which will connect to the HOV/Managed lanes. Proposed DAR connections would be located at Voigt Drive (City of San Diego), Manchester Avenue (City of Encinitas), Cannon Road (City of Carlsbad), and Oceanside Boulevard (City of Oceanside). The DAR connections as proposed would provide direct access from adjacent interchange arterials to the HOV/managed lanes.

Five (5) traffic scenarios are being evaluated for the I-5 North Coast Corridor Project, including various build and no-build options under both near-term (2015) and long-term (2030) conditions. This report, the DAR/Local Circulation System Operations Report *(Technical Report No. 7)* has been prepared to identify and assess the impacts of the DARs. This assessment includes a comparison of future year 2030 peak hour traffic operations within the DAR areas of influence for the 10+4 without DAR and 10+4 with DAR traffic scenarios.

The year 2030 average daily traffic volumes and peak hour turning movements as used in this analysis are presented in *Technical Report No. 5 –Traffic Demand Forecasting Report, (Wilson & Company August 2007*).

1.1 Project History

The analysis of the DAR connections and intersections within the defined DAR areas of influence is in response to requests by the local jurisdictions through the Technical Working Group for the I-5 North Coast Corridor Project. The Technical Working Group established for the project consists of (but not exclusively) representatives from the local jurisdictions, including the cities of San Diego, Encinitas, Carlsbad, and the Oceanside. These jurisdictions, along with Caltrans, were involved in the identification of the DAR areas of influence and key intersections for analysis, as described below.

1.2 Project Study Area

The defined project study area includes the area of influence for each DAR location. For each DAR location, the DAR area of influence establishes the extent of potentially affected roadway segments and intersections in the vicinity of each of the proposed DAR locations. These roadway segments and intersections are the focus of the local circulation system impact assessment, as presented in this report.

Two future Year 2030 scenarios were modeled utilizing the SANDAG Series 10 Transportation Model and provided the basis for identifying the DAR areas of influence:

- Year 2030 Baseline without DARs – established long-range traffic conditions for the Year 2030 without the proposed DARs.
- Year 2030 Baseline with DARs – established long-range traffic conditions for the Year 2030 with construction of the proposed DARs.

The DAR areas of influence were defined based upon an average change of 500 vehicles per day or greater on individual segments within the local arterial circulation system with the implementation of the DARs. The DAR areas of influence were then used along with local jurisdiction and Caltrans staff recommendations to define the project study area for the DAR/Local Circulation System Operations Study. The methodology utilized to identify the DAR areas of influence is discussed in more detail in *Technical Report No.1 – Area of Influence Analysis*, (*Wilson & Company 2004)*.

Figure 1-1 displays the I-5 North Coast Corridor Project study area map including the DAR areas of influence. Study area intersections (DAR intersections and arterial intersections within the DAR areas of influence) are identified by a letter/number combination in alphabetical order from south to north. As shown on the graphic, the project study area includes a total of 16 interchange intersections and 53 arterial related intersections for a total of 69 project study area intersections. The analysis also included a review of daily traffic conditions on the key arterial segments within the I-5 North Coast Corridor.

1.3 Scenarios Evaluated

The DAR local circulation impact assessment was prepared by a comparison of the with and without DAR scenarios under future year 2030 conditions:

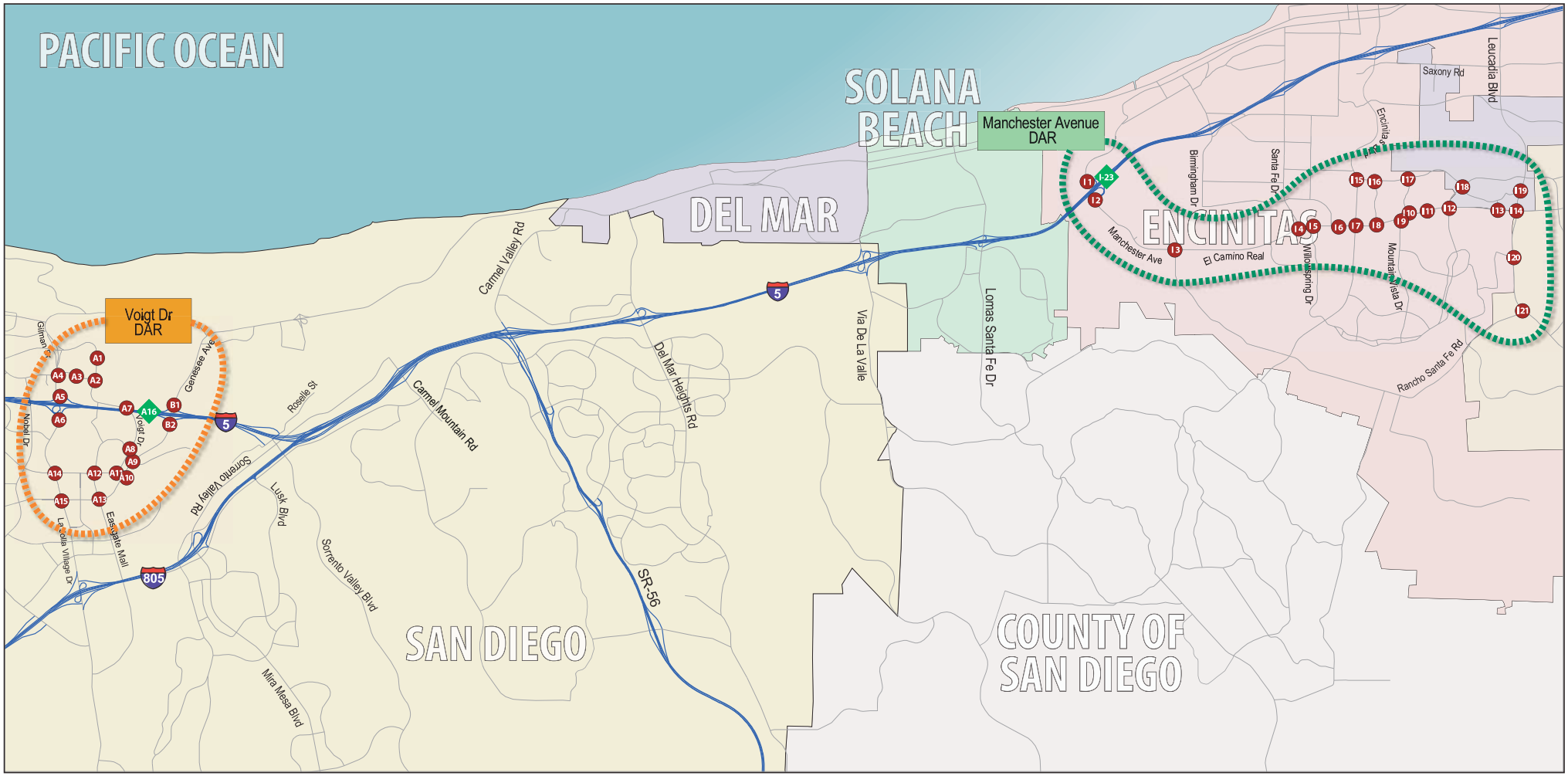
1. *Year 2030 10+4 without Direct Access Ramps Scenario.* This scenario includes ten (10) general purpose lanes on I-5 (south of SR 78) plus four (4) HOV/managed lanes. DAR connections to HOV/managed lanes were not included as part of this scenario.
2. *Year 2030 10+4 with Direct Access Ramps Scenario.* This scenario includes ten (10) general purpose lanes on I-5 (south of SR 78) plus four (4) HOV/managed lanes. Four separate DAR connections were included at the following locations, from south to north:
   a. Voigt Drive (City of San Diego)
   b. Manchester Avenue (City of Encinitas)
   c. Cannon Road (City of Carlsbad)
   d. Oceanside Boulevard (City of Oceanside)

1.4 DAR Impacts

The purpose of this report is to identify impacts of the DAR connections on the local circulation system within the DAR areas of influence. Impacts were identified using criteria consistent with local and regional guidelines as summarized in **Section 2.0 Analysis Methodology**. Also presented in this report are recommended improvements to the local circulation system to address any identified impacts. This will provide the opportunity for both Caltrans and the local jurisdictions to note and address related project design requirements at this early stage of the project development process.

1.5 Report Organization

Following this introductory section, **Section 2.0** describes the methodologies used to evaluate the forecast Year 2030 peak hour (AM and PM) intersection operations and arterial roadway segment performance for each scenario. **Section 3.0** presents the analysis results for each of the scenarios including the assumed lane configurations, reported delay and LOS, and roadway segment capacity analysis. Intersections and roadway segments with potential impacts as a result of the DARs are identified. **Section 4.0** summarizes DAR related impacts and provides recommended improvements to address the identified impacts.



LEGEND

- XX = Intersection ID Number
- XX = DAR Intersection ID Number
- = Voigt Drive DAR Area Of Influence
- = Manchester Avenue DAR Area Of Influence

0.75 0 0.75 Miles

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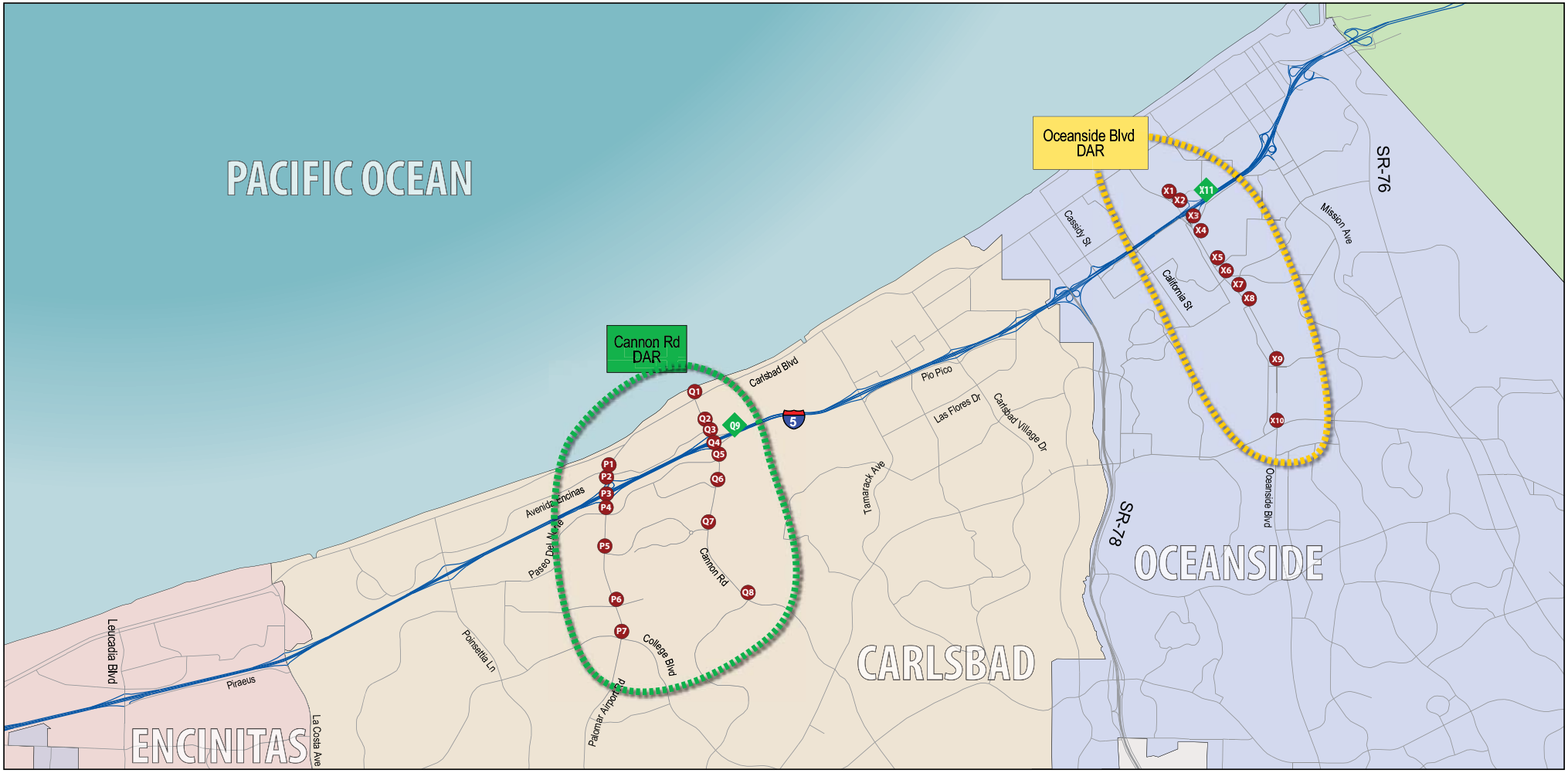
FIGURE 1-1. DAR AREA OF INFLUENCE

PROJECT AREA KEY MAP



LEGEND

- XX = Intersection ID Number
- XX = DAR Intersection ID Number
- = Cannon Road DAR Area Of Influence
- = Oceanside Boulevard DAR Area Of Influence

0.8 0 0.8 Miles

FIGURE 1-1. DAR AREA OF INFLUENCE
PROJECT AREA KEY MAP

2.0 Analysis Methodology

As reported in *Technical Report No. 4 – Existing Conditions Traffic Analysis (Wilson & Company March 2006)*, a uniform set of methodologies and standards was established for the I-5 North Coast Corridor Project traffic operational and impact assessment. The adopted approach is consistent with the procedures detailed in Appendix D (Traffic Impact Studies Guidelines) of the *2002 Congestion Management Program Update*, dated January 2003. The guidelines were prepared under the direction of the San Diego Traffic Engineers' Council (SANTEC) and the Institute of Transportation Engineers (ITE – California Border Section).

As stated in the guidelines, the purpose of a traffic impact study is to forecast, describe, and analyze the traffic effects a development would have on the existing and future circulation infrastructure. In this particular application, the subject of the study is not a traditional development project but rather the potential implementation of multiple DARs along the I-5 North Coast Corridor. The construction of the DARs will have the effect of altering future traffic patterns in the immediate vicinity of the proposed interchange locations, thus creating the potential for traffic impacts on the adjacent roadway system. The following sections summarize key aspects of the traffic analysis methodologies and threshold criteria that were utilized in this study.

2.1 Intersection Operations

The Year 2030 assessment of the intersections within the DAR areas of influence was conducted using SYNCHRO[1]. This program is widely recognized as an operations analysis tool for signalized and unsignalized intersections, interchange areas, and arterials. SYNCHRO uses the Highway Capacity Manual (HCM) 2000[2] signalized intersection methodology to generate a measure of effectiveness called Level of Service (LOS).

SYNCHRO is particularly useful in modeling the flow of traffic through a network of intersections, while accounting for the impacts of adjacent intersection operations. This is beneficial in analyzing closely spaced signalized intersections where traffic flow is affected by signal coordination and/or vehicle spillback from the adjacent intersections. Since these characteristics are prevalent at the I-5 interchange intersections as well as the adjacent nearby surface street intersections, the SYNCHRO software was determined to be appropriate for this study.

A SYNCHRO network was developed for each interchange in the respective DAR areas of influence. Network inputs included specifications and laneage of the roadway links comprising the network, intersection geometrics, peak hour traffic volumes and flow characteristics, and signal control parameters.

The measure of effectiveness reported for the analyses is the overall intersection control delay. The LOS delay thresholds are different for signalized intersections versus unsignalized intersections. **Table 2.1** shows the intersection standards for both signalized intersections and unsignalized intersections. The threshold value for intersections in this analysis is LOS D. Consistent with 2002 SANDAG CMP standards[3], any intersection at or above LOS D is considered acceptable, while intersections operating at or over capacity (LOS E or F) are unacceptable and were called out as an impact in the analysis.

Table 2.1 Level of Service Standards for Signalized and Unsignalized Intersections

LOS*	Signalized Intersection Control Delay (s/veh)	Unsignalized Intersection Control Delay (s/veh)
A	≤ 10	≤ 10
B	10-20	10-15
C	20-35	15-25
D	35-55	25-35
E	55-80	35-50
F	≥80	≥50

Source: Highway Capacity Manual 2000
**LOS Threshold Value for the analysis is LOS D*

2.2 Roadway Segment Analysis

The capacities of major roadways in the study area were evaluated using the methodology described in Appendix D (Traffic Impact Studies Guidelines) of the *2002 Congestion Management Program Update*, dated January 2003. **Table 2.2** reproduces the capacity thresholds identified in the CMP plus additional classifications not accounted for in the CMP. Forecast average daily traffic volumes exceeding the thresholds in Table 2.2 were identified as *over-capacity*.

The standards shown in Table 2.2 are generally used as long-range planning guidelines to determine the functional classification of roadways. The actual capacity of roadway facilities can vary by the specific characteristics of each facility. Typically, the performance or LOS of a roadway segment is based on its ability to accommodate peak hour traffic volumes. Within the San Diego Region, the standard practice is to focus on the performance of the intersections along a roadway segment, rather than the roadway segment as a whole. Since intersection performance is considered a better indicator of the level of traffic operations, corrective improvements are also based on intersection performance.

[1] SYNCHRO/SimTraffic v6 (Build 612) (Windows 95/98/NT/2000), Copyright 1993-2003 by Trafficware.

[2] Highway Capacity Manual 2000, Transportation Research Board, National Research Council, National Academy of Sciences, 2000

[3] Some jurisdictions may have different threshold standards other than those used for this analysis.

Table 2.2 All-Day Roadway Segment Capacity Thresholds		
Street Classification	**Number of Lanes**	**Vehicles per Day**
Expressway	6	70,000
Prime Arterial	8	72,000
Prime Arterial	6	55,000
Major Arterial	6	45,000
Major Arterial	4	35,000
Secondary Arterial/Collector	4	25,000
Secondary Arterial/Collector	2	12,000
Collector – no center turn lane	4	13,000
Collector – continuous left turn lane	2	13,000
Collector – no fronting property	2	9,000
Source: Table D-2, Appendix D (Traffic Impact Studies Guidelines) of the 2002 Congestion Management Program Update; Wilson & Company, August 2007		

2.3 Impact Criteria

Appendix D (Traffic Impact Studies Guidelines) of the *2002 Congestion Management Program Update*, dated January 2003, defines project impact thresholds corresponding to the type of roadway facility. These thresholds are generally based upon an acceptable increase in the volume / capacity (v/c) ratio for roadway and freeway segments, and upon increases in vehicle delays for intersections.

Table 2.3 summarizes the impact thresholds which were utilized to identify potential impacts to both roadway segments and intersections As shown, LOS D is considered acceptable for both roadway and intersection operations.

Table 2.3 Project Impact Thresholds		
Level of Service (LOS) with Project*	**Allowable Change Due to Impact**	
E & F	**Roadway Segments**	**Intersections**
	V/C	**Delay (sec)****
	0.02	2
Source: Appendix D (Traffic Impact Studies Guidelines) of the 2002 Congestion Management Program Update		

Notes:

* All level of service (LOS) measurements are based upon HCM procedures for intersection peak-hour conditions. Volume to capacity (V/C) ratios for roadway segments were estimated on an ADT/24-hour traffic volume basis. The acceptable LOS for both roadways, and intersections is "D"

**Delay is defined as the average stopped delay per vehicle measured in seconds for intersections

3.0 Year 2030 Traffic Analysis Results

3.1 Year 2030 Intersection Analysis

This section documents the Year 2030 intersection analysis results for the two future year corridor improvements scenarios: (10+4 without DAR and the 10+4 with DAR). The comparison of these scenarios provided the basis for identification of DAR related impacts on the local circulation system.

Figure 3-1 (**Appendix A**) displays the assumed lane configurations for both the Year 2030 10+4 without DAR and the Year 2030 10+4 with DAR scenarios. The assumed Year 2030 roadway lane configurations were developed in coordination with Caltrans staff and reflect implementation of an expanded I-5 freeway cross-section and implementation of the proposed DARs as graphically shown in Figure 3.1 (green arrows), the implementation of the proposed DARs would create new or modified intersections, as follows:

Voigt DAR – With the implementation of Voigt DAR, Caltrans plans to re-align Voigt Drive to connect with Genesee Avenue across from Campus Point Drive. Voigt Drive would also be widened to a four-lane roadway from the DAR location to Genesee Avenue. The widening will also include lane configuration improvements on the northbound and southbound legs at the intersection of Genesee Avenue/Voigt Drive/Campus Point Drive. A new intersection will also be constructed along Voigt Drive just east of the Gilman Drive/Voigt Drive intersection that will be the DAR access point.

Manchester DAR – With the implementation of the Manchester DAR, a new intersection would be constructed along Manchester Drive, just east of the I-5 northbound ramps.

Cannon DAR – With the implementation of the Cannon DAR, a north leg would be constructed at the intersection of Cannon Road / Paseo Del Norte to connect the DAR to the surrounding roadway network. The new intersection of the DAR and Cannon Road will have additional lanes to include a southbound left-turn lane and a through/right lane, a westbound right-turn lane, an eastbound left-turn lane, and a northbound through lane.

Oceanside DAR – With the implementation of the Oceanside DAR, State Tree Drive would be extended to connect with the DAR access point.

Along with proposed managed lanes and DAR related network changes, the I-5 North Coast Corridor Project also plans to expand the lane geometry at key interchanges as noted by blue arrows in Figure 3-1.

Buildout conditions of the adopted local roadway networks were also assumed as appropriate and consistent with the local circulation elements. These assumed local roadway improvements are noted in Figure 3-1 by orange arrows.

Year 2030 peak hour intersection turning movement volumes are shown in **Figure 3-2** and **Figure 3-3,** respectively, (**Appendix B** and **Appendix C**) for the without DAR and with DAR scenarios.

Table 3.1 displays overall AM and PM peak hour intersection delay[4] and Level of Service[5] results for both the with and without DAR scenarios. In some cases, the projected intersection delay could not be computed due to HCM constraints. In these cases, the overall intersection Level of Service (LOS) was calculated based upon an ICU analysis, with these intersections shown with a "-" in the delay column. In addition, intersections that would not exist in a particular scenario were identified with a "N/A" in the delay and LOS columns.

Based upon a comparison of delay and LOS associated with the two scenarios and using the impact criteria presented in Section 2.3, intersections with potential DAR related impacts were identified and noted with a "Yes" (or "No" if there is not a potential impact) in the last column of Table 3.1.

Table 3.1 Year 2030 Peak Hour Intersection Level of Service and Delay Results

DAR	ID	Key Intersection	Year 2030 AM					Year 2030 PM					Impact ?
			Without DAR		With DAR		Change (sec)	Without DAR		With DAR		Change (sec)	
			Delay (sec)	LOS	Delay (sec)	LOS		Delay (sec)	LOS	Delay (sec)	LOS		
Voigt DAR	A1	Gilman Dr / Meyers Dr *	32.4	C	35.9	D	3.5	58.5	E	50.7	D	-7.8	No
	A2	Villa La Jolla / Gilman Dr	30.9	C	23.4	C	-7.5	24.7	C	22.2	C	-2.5	No
	A3	Villa La Jolla / Veterans Affairs Medical Ctr	192.9	F	170.3	F	-22.6	94.2	F	95.6	F	1.4	No
	A4	Villa La Jolla / La Jolla Village Dr	33.5	C	22.7	C	-10.8	12.3	B	12.2	B	-0.1	No
	A5	I-5 SB Ramps / La Jolla Village Dr	83.0	F	28.9	C	-54.1	30.8	C	11.4	B	-19.4	No
	A6	I-5 NB Ramps / La Jolla Village Dr	-	E	-	F	-	-	F	-	F	-	No
	A7	Gilman Dr / Voigt Dr*	41.3	D	19.8	B	-21.5	42.2	D	14.7	B	-27.5	Yes
	A8	Campus Point Dr / Voigt Dr	41.8	D	38.2	D	-3.6	141.9	F	116.7	F	-25.2	No
	A9	Genesee Ave / Campus Point	11.5	B	13.6	B	2.1	15.6	B	14.6	B	-1.0	No
	A10	Genesee Ave / Regents Rd	18.9	B	19.5	B	0.6	35.3	D	32.3	C	-3.0	No
	A11	Regents Rd / Health Science Dr	70.0	E	64.7	E	-5.3	44.9	D	42.0	D	-2.9	No
	A12	Regents Rd / Eastgate Mall	34.8	C	33.1	C	-1.7	35.0	C	43.7	D	8.7	No
	A13	Genesee Ave / Eastgate Mall	42.7	D	42.0	D	-0.7	67.0	E	55.0	D	-12.0	No
	A14	Regents Rd / La Jolla Village Dr	53.7	D	52.7	D	-1.0	71.0	E	72.9	E	1.9	No
	A15	Genesee Ave / La Jolla Village Dr	N/A	N/A	50.6	D	N/A	N/A	N/A	42.6	D	N/A	No
	A16	DAR Entrance / Voigt Dr	99.7	F	86.1	F	-13.6	138.2	F	101.4	F	-36.8	N/A
	B1	I-5 SB Ramps / Genesee Ave	70.2	E	60.0	E	-10.2	176.5	F	121.0	F	-55.5	No

[4] Some jurisdictions may use different LOS calculation methods (e.g. Traffix, ICU vs HCM) which may produce different results.

[5] Overall intersection delay and Level of Service does not include the effect of queue blocking from a downstream ramp meter.

Table 3.1 Year 2030 Peak Hour Intersection Level of Service and Delay Results

DAR	ID	Key Intersection	Year 2030 AM					Year 2030 PM					Impact ?
			Without DAR		With DAR		Change (sec)	Without DAR		With DAR		Change (sec)	
			Delay (sec)	LOS	Delay (sec)	LOS		Delay (sec)	LOS	Delay (sec)	LOS		
Voigt DAR	B2	I-5 NB Ramps / Genesee Ave	32.4	C	35.9	D	3.5	58.5	E	50.7	D	-7.8	No
Manchester DAR	I1	I-5 SB Ramps / Manchester Ave	24.0	C	23.5	C	-0.5	35.5	D	20.1	C	-15.4	No
	I2	I-5 NB Ramps / Manchester Ave	30.7	C	22.8	C	-7.9	34.8	C	26.0	C	-8.8	No
	I3	El Camino Real / Manchester Ave	21.0	C	21.9	C	0.9	19.0	B	24.0	C	5.0	No
	I4	El Camino Real / Santa Fe Dr	15.3	B	15.3	B	0.0	11.1	B	10.0	A	-1.1	No
	I5	El Camino Real / Willowspring Dr **	43.6	D	50.9	D	7.3	31.4	C	36.3	D	4.9	No
	I6	El Camino Real / De La Plaza Drwy	12.1	B	12.3	B	0.2	13.5	B	14.5	B	1.0	No
	I7	El Camino Real / Encinitas Blvd	40.7	D	41.3	D	0.6	**83.3**	**F**	**84.8**	**F**	1.5	No
	I8	El Camino Real / Via Moleno	13.0	B	13.4	B	0.4	25.2	C	27.1	C	1.9	No
	I9	El Camino Real / Mountain Vista Dr	19.0	B	18.1	B	-0.9	29.0	C	28.0	C	-1.0	No
	I10	El Camino Real / Via Montoro	6.6	A	7.0	A	0.4	8.3	A	8.1	A	-0.2	No
	I11	El Camino Real / Shopping Center Drwy	5.5	A	5.5	A	0.0	14.5	B	14.5	B	0.0	No
	I12	El Camino Real / Garden View Rd	22.6	C	22.5	C	-0.1	26.0	C	25.5	C	-0.5	No
	I13	El Camino Real / Town Center Dr	18.6	B	19.2	B	0.6	23.5	C	23.2	C	-0.3	No
	I14	El Camino Real / Olivenhain Rd	49.5	D	49.6	D	0.1	**122.0**	**F**	**119.4**	**F**	-2.6	No
	I15	Via Cantebria / Encinitas Blvd	29.9	C	30.3	C	0.4	37.2	D	39.4	D	2.2	No
	I16	Via Cantebria / Via Molena	3.3	A	3.5	A	0.2	7.9	A	7.7	A	-0.2	No
	I17	Via Cantebria / Via Montoro	4.7	A	4.0	A	-0.7	13.1	B	12.7	B	-0.4	No
	I18	Garden View Road / Via Cantebria	22.5	C	23.6	C	1.1	28.9	C	28.3	C	-0.6	No
	I19	Leucadia Blvd / Town Center Dr	22.0	C	22.0	C	0.0	27.8	C	27.8	C	0.0	No
	I20	Amargosa Drive / Olivenhain Rd	**92.6**	**F**	**92.6**	**F**	0.0	25.4	C	25.4	C	0.0	No
	I21	Rancho Santa Fe Rd / Olivenhain Rd	17.3	B	17.3	B	0.0	16.5	B	16.5	B	0.0	No
	I22	DAR Entrance / Manchester Ave	**N/A**	N/A	13.3	B	N/A	**N/A**	N/A	7.3	A	N/A	No
	I23	Manchester DAR Ramp**	**N/A**	N/A	7.5	A	N/A	**N/A**	N/A	5.5	A	N/A	No
Cannon DAR	P1	Avenida Encinas / Palomar Airport Rd	**125.2**	**F**	**90.3**	**F**	-34.9	**97.3**	**F**	**85.1**	**F**	-12.2	No

Table 3.1 Year 2030 Peak Hour Intersection Level of Service and Delay Results

DAR	ID	Key Intersection	Year 2030 AM					Year 2030 PM					Impact ?
			Without DAR		With DAR		Change (sec)	Without DAR		With DAR		Change (sec)	
			Delay (sec)	LOS	Delay (sec)	LOS		Delay (sec)	LOS	Delay (sec)	LOS		
Cannon DAR	P2	I-5 SB Ramps / Palomar Airport Rd	**167.1**	**F**	21.4	C	-145.7	**162.2**	**F**	17.3	B	-144.9	No
	P3	I-5 NB Ramps / Palomar Airport Rd	**147.0**	**F**	**99.9**	**F**	-47.1	**219.2**	**F**	**189.8**	**F**	-29.4	No
	P4	Paseo del Norte / Palomar Airport Rd	**185.7**	**F**	**131.9**	**F**	-53.8	**285.1**	**F**	**274.5**	**F**	-10.6	No
	P5	Armada Dr / Palomar Airport Rd	**185.1**	**F**	**145.6**	**F**	-39.5	**235.4**	**F**	**219.9**	**F**	-15.5	No
	P6	Hidden Valley Rd / Palomar Airport Rd	**85.0**	**F**	**66.2**	**E**	-18.8	**83.6**	**F**	**77.2**	**E**	-6.4	No
	P7	College Blvd / Palomar Airport Rd.	**201.6**	**F**	**190.4**	**F**	-11.2	**159.8**	**F**	**149.4**	**F**	-10.4	No
	Q1	Carlsbad Blvd / Cannon Rd	54.0	D	44.2	D	-9.8	**184.6**	**F**	**188.5**	**F**	3.9	Yes
	Q2	Avenida Encinas / Cannon Rd	41.0	D	47.2	D	6.2	37.2	D	33.7	C	-3.5	No
	Q3	I-5 SB Ramps / Cannon Rd	**77.5**	**E**	48.7	D	-28.8	45.9	D	32.0	C	-13.9	No
	Q4	I-5 NB Ramps / Cannon Rd	37.3	D	37.8	D	0.5	51.8	D	22.4	C	-29.4	No
	Q5	Paseo Del Norte / DAR Access / Cannon Rd	**85.5**	**F**	**152.4**	**F**	66.9	28.9	C	**122.8**	**F**	93.9	Yes
	Q6	Cannon Rd / Car Country Dr	14.8	B	13.9	B	-0.9	29.4	C	29.8	C	0.4	No
	Q7	Lego Dr / Cannon Rd	24.1	C	13.5	B	-10.6	28.9	C	29.7	C	0.8	No
	Q8	Faraday Ave / Cannon Rd	27.7	C	**73.6**	**E**	45.9	**170.0**	**F**	**185.7**	**F**	15.7	Yes
	Q9	Cannon DAR Ramp**	**N/A**	N/A	**66.1**	**E**	N/A	**N/A**	N/A	**72.1**	**E**	N/A	N/A
	R1	Tamarack Ave / Carlsbad Blvd	11.1	B	11.1	B	0.0	15.5	B	15.5	B	0.0	No
Oceanside DAR	X1	Vine St / Oceanside Blvd	13.9	B	17.7	B	3.8	12.4	B	11.4	B	-1.0	No
	X2	I-5 SB Ramps / Oceanside Blvd	77.0	E	51.8	D	-25.2	57.8	E	48.6	D	-9.2	No
	X3	I-5 NB Ramps/ Oceanside Blvd	36.0	D	26.4	C	-9.6	56.9	E	53.8	D	-3.1	No
	X4	State Tree / Oceanside Blvd	14.1	B	19.2	B	5.1	22.3	C	29.0	C	6.7	No
	X5	Greenbrier Dr / Oceanside Blvd	5.9	A	8.9	A	3.0	14.0	B	19.9	B	5.9	No
	X6	Crouch St / Oceanside Blvd	26.7	C	35.0	C	8.3	88.2	F	96.0	F	7.8	Yes
	X7	N. Canyon Dr / Oceanside Blvd **	22.3	C	27.6	C	5.3	608.1	F	591.9	F	-16.2	No
	X8	Industry St / Oceanside Blvd **	-	F	-	F	-	-	F	-	F	-	Yes
	X9	Foussat St / Oceanside Blvd	7.9	A	12.3	B	4.4	27.2	C	31.1	C	3.9	No

Table 3.1 Year 2030 Peak Hour Intersection Level of Service and Delay Results

DAR	ID	Key Intersection	Year 2030 AM					Year 2030 PM					Impact ?
			Without DAR		With DAR		Change (sec)	Without DAR		With DAR		Change (sec)	
			Delay (sec)	LOS	Delay (sec)	LOS		Delay (sec)	LOS	Delay (sec)	LOS		
Oceanside DAR	X10	El Camino Real / Oceanside Blvd	45.6	D	50.6	D	5.0	102.9	F	100.9	F	-2.0	No
	X11	Oceanside DAR Ramps**	N/A	N/A	5.8	A	N/A	N/A	N/A	5.0	A	N/A	No

Source: Wilson & Company, August 2007

Notes:
Δ Change in average delay between the without and with DAR scenarios.
* Four-way Stop Control
** Two-way Stop Control
\- Indicates that delay could not be computed due to HCM constraints
N/A Not applicable – the intersection does not exist in this scenario
Impact? Does the addition of the DAR create an impact at the intersection?
Bold Letters indicate an unacceptable Level of Service

Highlighted Cells indicate a potentially impacted intersection

.

As shown in Table 3.1, the addition of the DARs would result in the addition of more than two seconds of delay at a number of intersections forecast to operate at LOS E or F conditions without the DARs. Based upon the impact criteria presented in Section 2.3, these intersections represent potential traffic impacts related to implementation of the DARs. **Table 3.2** summarizes the identified DAR impacted intersections by DAR location.

Table 3.2 Summary of DAR Impacted Intersections

DAR	ID	Key Intersection	Impacted Peak Hour	
			AM	PM
Voigt DAR	A7	Gilman Dr / Voigt Dr*	X	X
Cannon DAR	Q1	Carlsbad Blvd / Cannon Rd		X
	Q5	Paseo Del Norte / DAR Access / Cannon Rd	X	X
	Q8	Faraday Ave / Cannon Rd		X
Oceanside DAR	X6	Crouch St / Oceanside Blvd		X
	X8	Industry St / Oceanside Blvd **	X	X

Source: Wilson & Company, August 2007

Notes:
* Four-way Stop Control
** Two-way Stop Control

3.2 Roadway Segment Capacity Analysis

Table 3.3 displays the results of the roadway segment capacity analysis, including Year 2030 forecast daily volumes (ADT) by roadway segment within the DAR areas of influence for both the with and without DAR scenarios. The table also identifies whether the forecast ADT is over or under the respective capacity (LOS D) of the roadway, based upon the roadway classifications shown in Table 2.2. Impacts related to implementation of the DARs were identified using the criteria presented in Section 2.3 (a change from under to over-capacity or greater than 2.0 percent change in the volume/capacity ratio on roadway segments forecast to operate at over-capacity conditions under the without DAR scenario.)

Table 3.3 Year 2030 Roadway Segment Capacity Analysis

DAR	Street	Segment		Class	No. of Lanes	Capacity	Year 2005 Existing ADT	Year 2030 10+4 w/o DAR		Year 2030 10+4 w/ DAR		Change in Forecast ADT	Impact
		From	To					ADT	Over / Under Capacity	ADT	Over / Under Capacity		
Voigt DAR	Genesee Ave	N. Torrey Pines Rd.	I-5	Prime	6	55,000	34,800	41,100	Under	41,100	Under	0	No
		I-5	Campus Point	Prime	6	55,000	29,000	44,000	Under	37,300	Under	-6700	No
		Campus Point	Eastgate Mall	Prime	6	55,000	22,600	36,900	Under	39,800	Under	2900	No
		Eastgate Mall	La Jolla Village	Prime	6	55,000	27,300	26,700	Under	23,800	Under	-2900	No
	La Jolla Village Dr	Torrey Pines Rd.	La Jolla Scenic Dr.	Major	4	35,000	21,000	42,800	Over	42,800	Over	0	No
		La Jolla Scenic Dr.	Gilman Dr.	Prime	6	55,000	47,000	34,800	Under	34,800	Under	0	No
		Gilman Dr.	Villa La Jolla Dr.	Prime	6	55,000	43,000	48,000	Under	48,000	Under	0	No
		Villa La Jolla Dr.	I-5	Prime	6	55,000	43,000	60,600	Over	56,900	Over	-3700	No
		I-5	Genesee Ave	Prime	6	55,000	43,000	43,500	Under	41,500	Under	-2000	No
Manchester DAR	Leucadia Blvd	S Coast HWY	I-5	Second	2	12,000	29,700	19,200	Over	19,200	Over	0	No
		I-5	Saxony Rd	Major	4	35,000	17,000	45,900	Over	44,940	Over	-960	No
		Saxony Rd	Garden View Rd	Major	4	35,000	29,500	44,600	Over	43,640	Over	-960	No
		Garden View Rd	El Camino Real	Major	4	35,000	34,000	27,900	Under	26,940	Under	-960	No
		El Camino Real	Rancho Santa Fe	Prime	6	55,000	23,000	34,900	Under	34,900	Under	0	No
	Encinitas Blvd	S Coast HWY	I-5	Major	4	35,000	33,000	34,400	Under	34,100	Under	-300	No
		I-5	Quail Gardens Dr	Prime	6	55,000	13,000	35,600	Under	34,300	Under	-1300	No
		Quail Gardens Dr	Balour Dr	Prime	6	55,000	33,100	33,000	Under	31,900	Under	-1100	No
		Balour Dr	El Camino Real	Prime	6	55,000	28,000	25,300	Under	24,400	Under	-900	No
		El Camino Real	Santa Fe Dr.	Prime	6	55,000	21,000	31,800	Under	31,800	Under	0	No
	Santa Fe Dr.	San Elijo	I-5	Second	2	12,000	30,000	22,300	Over	22,300	Over	0	No
	Santa Fe Dr.	I-5	Lake Dr.	Second	2	12,000	24,300	20,300	Over	19,000	Over	-1300	No
		Lake Dr.	S El Camino Real	Second	2	12,000	13,000	14,700	Over	13,800	Over	-900	No
	Birmingham Dr	San Elijo	I-5	Second	2	12,000	9,000	20,700	Over	19,800	Over	-900	No
		I-5	Lake Dr.	Second	2	12,000	26,200	5,700	Under	5,700	Under	0	No

Table 3.3 Year 2030 Roadway Segment Capacity Analysis

DAR	Street	Segment		Class	No. of Lanes	Capacity	Year 2005 Existing ADT	Year 2030 10+4 w/o DAR		Year 2030 10+4 w/ DAR		Change in Forecast ADT	Impact
		From	To					ADT	Over / Under Capacity	ADT	Over / Under Capacity		
Manchester DAR	Manchester Ave	Birmingham	I-5	Second	2	12,000	57,200	9,200	Under	10,400	Under	1200	No
		I-5	El Camino Real	Prime	6	45,000	53,200	36,400	Under	39,600	Under	3200	No
		El Camino Real	Rancho Santa Fe	Prime	6	12,000	40,000	9,200	Under	9,200	Under	0	No
	El Camino Real	La Costa Ave	Olivenhain Rd	Prime	8	72,000	21,000	34,900	Under	35,100	Under	200	No
		Olivenhain Rd	Mountain Vista Rd	Prime	8	72,000	22,000	41,400	Under	42,900	Under	1500	No
		Mountain Vista Rd	Encinitas Blvd	Prime	6	55,000	29,000	47,300	Under	48,900	Under	1600	No
		Encinitas Blvd	Santa Fe Rd	Prime	6	55,000	24,000	26,900	Under	29,000	Under	2100	No
		Santa Fe Rd	Manchester Ave	Prime	6	55,000	40,000	22,700	Under	25,600	Under	2900	No
Cannon DAR	Cannon Rd	N Coast HWY	I-5	Major	4	35,000	18,000	13,700	Under	14,300	Under	600	No
		I-5	Paseo Del Norte	Major	4	35,000	18,000	33,000	Under	33,600	Under	600	No
		Paseo Del Norte	Legoland Dr	Major	4	35,000	15,000	31,600	Under	36,600	Over	5000	**Yes**
		Legoland Dr	El Camino Real	Major	4	35,000	15,000	31,600	Under	32,600	Under	1000	No
		El Camino Real	College Blvd	Major	4	35,000	8,000	18,700	Under	18,900	Under	200	No
	Palomar Airport Rd	N Coast HWY	I-5	Prime	6	55,000	7,712	27,500	Under	26,900	Under	-600	No
		I-5	Paseo Del Norte	Prime	6	55,000	26,096	66,500	Over	61,500	Over	-5000	No
		Paseo Del Norte	College Blvd	Prime	6	55,000	9,030	59,900	Over	57,400	Over	-2500	No
		College Blvd	S El Camino Real	Prime	6	55,000	15,000	42,900	Under	42,700	Under	-200	No
	Pacific Coast Highway	Tamarack Ave	Cannon Rd	Major	4	35,000	30,000	20,400	Under	20,400	Under	0	No
		Cannon Rd	Airport Rd	Major	4	35,000	33,200	13,500	Under	12,900	Under	-600	No
		Airport Rd	Poinsettia Ln	Major	4	35,000	32,500	16,900	Under	16,900	Under	0	No
Oceanside DAR	Mission Ave	N Coast HWY	I-5	Major	4	35,000	18,000	30,500	Under	30,500	Under	0	No
		I-5	N Canyon Dr	Major	4	35,000	23,000	51,800	Over	50,600	Over	-1200	No
		N Canyon Dr	Mesa Drive	Major	4	35,000	21,000	47,600	Over	46,700	Over	-900	No
		Messa Drive	Foussat St	Major	4	35,000	30,000	46,000	Over	45,500	Over	-500	No

Table 3.3 Year 2030 Roadway Segment Capacity Analysis

DAR	Street	Segment		Class	No. of Lanes	Capacity	Year 2005 Existing ADT	Year 2030 10+4 w/o DAR		Year 2030 10+4 w/ DAR		Change in Forecast ADT	Impact
		From	To					ADT	Over / Under Capacity	ADT	Over / Under Capacity		
Oceanside DAR	Mission Ave	Foussat St	El Camino Real	Major	4	35,000	20,000	46,400	Over	46,000	Over	-400	No
		El Camino Real	Douglas Dr	Major	4	35,000	40,000	40,200	Over	40,000	Over	-200	No
	Oceanside Blvd	N Coast HWY	I-5	Second	4	25,000	37,000	17,300	Under	17,600	Under	300	No
		I-5	N Canyon Dr	Major	4	35,000	37,000	47,200	Over	51,200	Over	4,000	**Yes**
		N Canyon Dr	El Camino Real	Major	4	35,000	30,000	39,600	Over	41,600	Over	2000	**Yes**
		El Camino Real	Rancho Del Oro	Prime	6	55,000	23,000	30,600	Under	30,600	Under	0	No

Source: Wilson & Company, August 2007

Notes:

Bold Letters indicate roadway segment impact.

The roadway segments listed below were identified as operating over-capacity under forecast year 2030 conditions and with a 2.0 percent or greater increase in volume and with a corresponding increase of 2.0 percent or greater increase in v/c with implementation of the DARs. Based on the impact criteria presented in Section 2.3, an increase of 2.0 percent or greater in v/c represents a DAR related impact.

- Cannon Road, between Paseo Del Norte and Legoland Drive (16 percent increase in v/c).
- Oceanside Boulevard, between I-5 and North Canyon Drive (8 percent increase in v/c).
- Oceanside Boulevard, between North Canyon Drive and El Camino Real (5 percent increase in v/c).

In general, the increase in v/c is the result of volume changes on the network surrounding the DAR locations. For example, with implementation of the DAR at Cannon Road, trips from Palomar Airport Road would shift to Cannon Road to access the DAR. Similarly, trips would be diverted to Oceanside Boulevard from other routes and interchanges to access the DAR.

4.0 Mitigation Improvements

This section documents the DAR related impacts on the study area local circulation system, as well as intersection and roadway improvements that would be necessary to mitigate identified significant traffic impacts.

It is important to note that all I-5 North Coast Corridor Project mitigation improvements must be consistent with and otherwise conform with the respective circulation elements and community plans of the jurisdictions in which the improvements would take place.

4.1 Intersections

Based upon the significance criteria presented in Section 2.3, the addition of the four DARs would create significant traffic impacts at the following six (6) intersection locations:

- Gilman Drive / Voigt Drive
- Carlsbad Boulevard / Cannon Road
- Paseo Del Norte / Cannon Road
- Faraday Avenue / Cannon Road
- Crouch Street / Oceanside Boulevard
- Industry Street / Oceanside Boulevard

The following improvements would be necessary to mitigate the identified significant traffic impacts at the above noted locations:

- Gilman Drive / Voigt Drive – Signalize intersection; provide two westbound left-turn lanes and a single eastbound left-turn lane.
- Carlsbad Boulevard / Cannon Road – Modify signal phasing to include a northbound right-turn overlap phase.
- Paseo Del Norte / Cannon Road – Provide an eastbound right-turn lane; modify signal phasing to include an eastbound right-turn overlap phase.
- Faraday Avenue / Cannon Road - Re-stripe northbound shared right/through/left-turn lane to a through/right-turn shared lane; provide a second westbound left-turn lane.
- Crouch Street / Oceanside Boulevard – Re-stripe the northbound through-lane to a shared left/through-lane.
- Industry Street / Oceanside Boulevard – Either signalize intersection or restrict the northbound and southbound left turn movements by channelizing the median.

Caltrans would be responsible for a fair-share contribution to the improvements listed above or comparable improvements identified or planned by the local jurisdictions.

Table 4.1 summarizes the Year 2030 peak hour intersection level of service and delay results with inclusion of the improvements listed above. As shown, with the implementation of the proposed improvements, all intersections potentially impacted by the DARs would operate below the significant impact thresholds outlined in Section 2.3.

Table 4.1 Year 2030 Peak Hour Intersection Level of Service and Delay Results With Mitigation Improvements

			AM					PM				
			Without DAR		With DAR With Mitigation			Without DAR		With DAR With Mitigation		
DAR	ID	Key Intersection	Delay (Sec)	LOS	Delay (Sec)	LOS	Change (Sec)	Delay (Sec)	LOS	Delay (Sec)	LOS	Change (Sec)
Voigt	A7	Gilman Dr / Voigt Dr [1]	-	E	44.4	D	-	-	F	50.8	D	-
Cannon	Q1	Carlsbad Blvd / Cannon Rd	54.0	D	49.1	D	-4.9	**184.6**	F	**176.4**	F	-8.2
	Q5	Paseo Del Norte / DAR Access / Cannon Rd	**85.5**	F	**67.6**	E	-17.9	28.9	C	49.9	D	21.0
	Q8	Faraday Ave / Cannon Rd	27.7	C	**59.1**	E	31.4	**170.0**	F	**113.2**	F	-56.8
Oceanside	X6	Crouch St / Oceanside Blvd	26.7	C	31.3	D	4.6	**88.2**	F	**84.7**	F	-3.5
	X8	Industry St / Oceanside Blvd [1]	-	F	21.0	C	-	-	F	14.3	B	-

Source: Wilson & Company, August 2007

Notes:
- Indicates that delay could not be computed due to HCM constraints
[1] Assumed intersection signalization as improvement
Bold Letters indicate an unacceptable Level of Service

Figure 4-1 (**Appendix D**) displays the Mitigation Improvements (purple arrows) for the Year 2030 10+4 with DAR scenario.

4.2 Roadway Segments

Based upon the significance criteria presented in Section 2.3, the addition of the four DARs would create significant traffic impacts to the following three (3) roadway segments:

- Cannon Road, between Paseo Del Norte and Legoland Drive
- Oceanside Boulevard, between I-5 and North Canyon Drive
- Oceanside Boulevard, between North Canyon Drive and El Camino Real

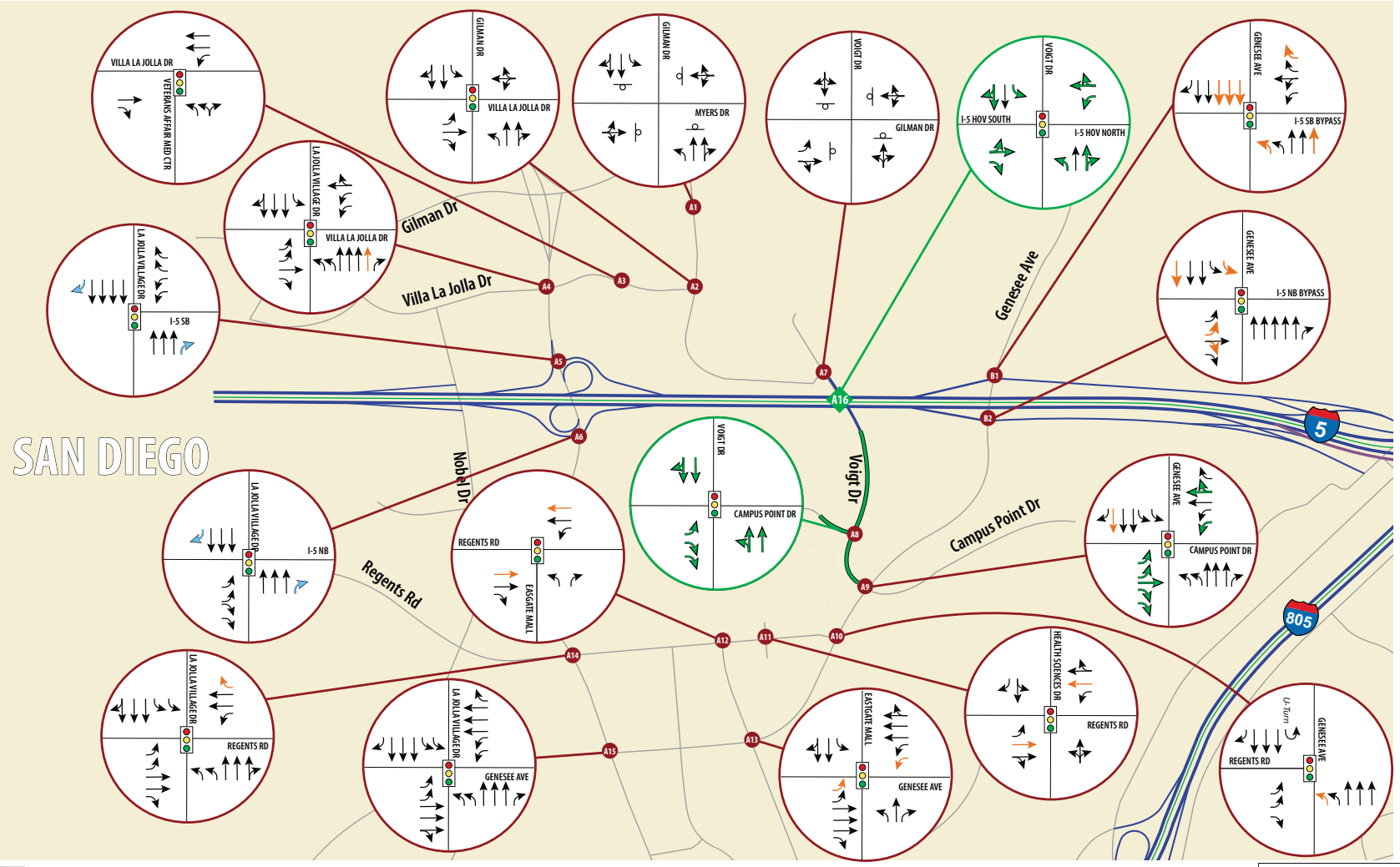
The following improvements would be necessary to mitigate the identified significant traffic impacts at the above locations.

- Cannon Road, between Paseo Del Norte and Legoland Drive – Widen from a four-lane Major roadway to a six-lane Prime arterial.
- Oceanside Boulevard, between I-5 and North Canyon Drive – Widen from a four-lane Major roadway to a six-lane Prime arterial.
- Oceanside Boulevard, between North Canyon Drive and El Camino Real – Widen from a four-lane Major roadway to a six-lane Prime arterial.

It should be noted that the above improvement on Cannon Road is not consistent with the designated roadway classification in City of Carlsbad Circulation Element. In a similar manner, the improvements identified for Oceanside Boulevard are also not consistent with the City of Oceanside Circulation Element. Caltrans would however be responsible for a fair-share contribution to comparable improvements identified or planned by the local jurisdictions.

Appendix A

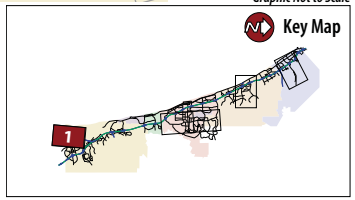
Figure 3-1. Year 2030 Intersection Lane Configurations



LEGEND

- XX Intersection ID Number
- Traffic Signal
- Stop Sign
- Free Right Turn
- U-Turn
- Existing Lane Configuration
- I-5 North Coast Corridor Project Improvement
- DAR Associated Improvement
- Local Network Improvement (Local CE/Master Plan)

Graphic Not to Scale



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N·O·R·T·H C·O·A·S·T INTERSTATE 5 CORRIDOR

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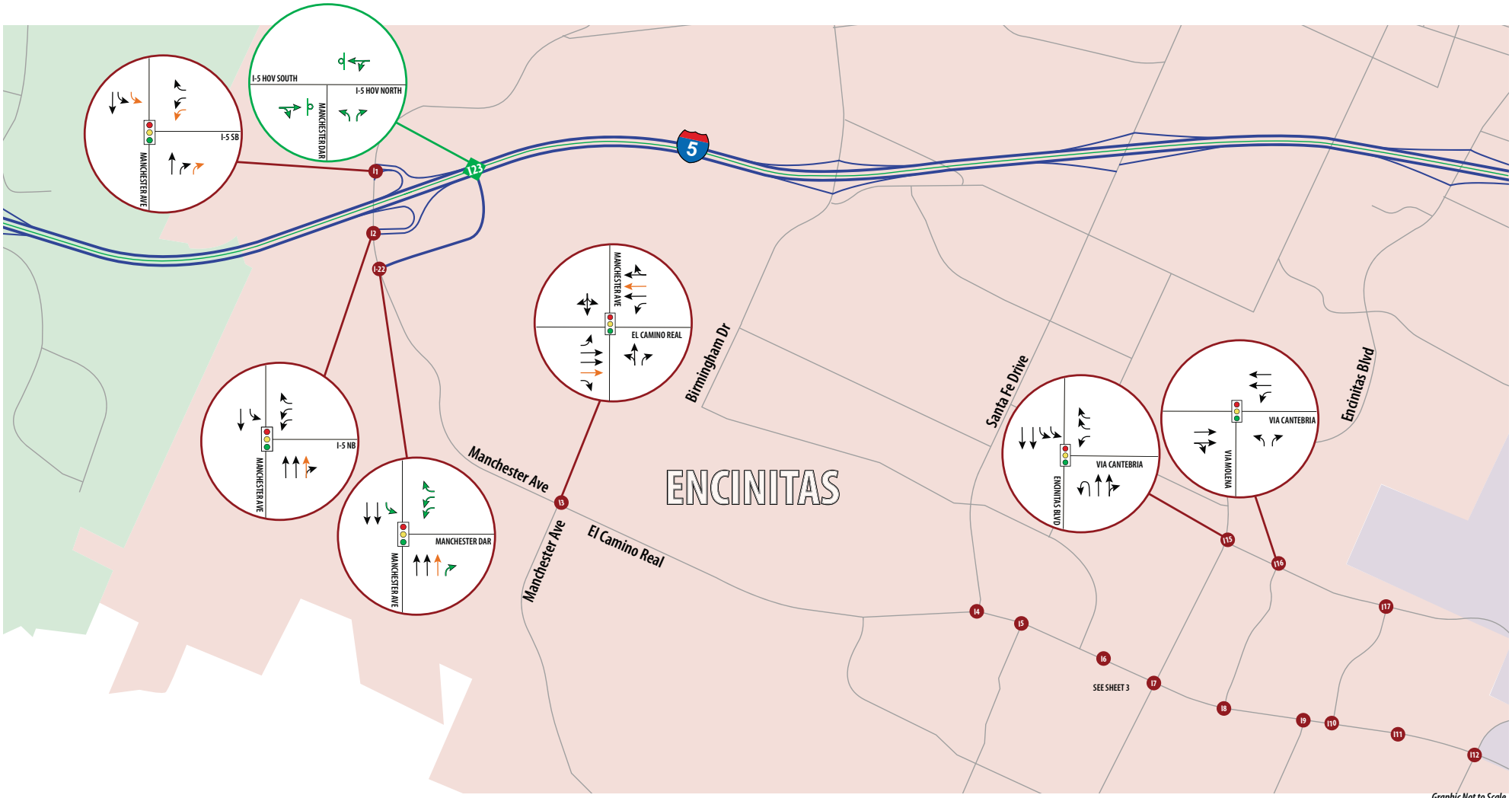
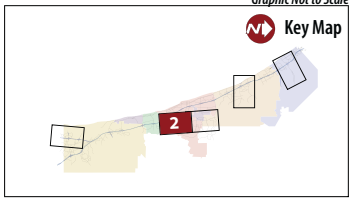
FIGURE 3-1. YEAR 2030 10+4 BUILD INTERSECTION LANEAGE CONDITIONS



Graphic Not to Scale



LEGEND

- Intersection ID Number
- Traffic Signal
- Stop Sign
- Free Right Turn
- U-Turn
- Existing Lane Configuration
- I-5 North Coast Corridor Project Improvement
- DAR Associated Improvement
- Local Network Improvement (Local CE/Master Plan)

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NORTH COAST INTERSTATE 5 CORRIDOR

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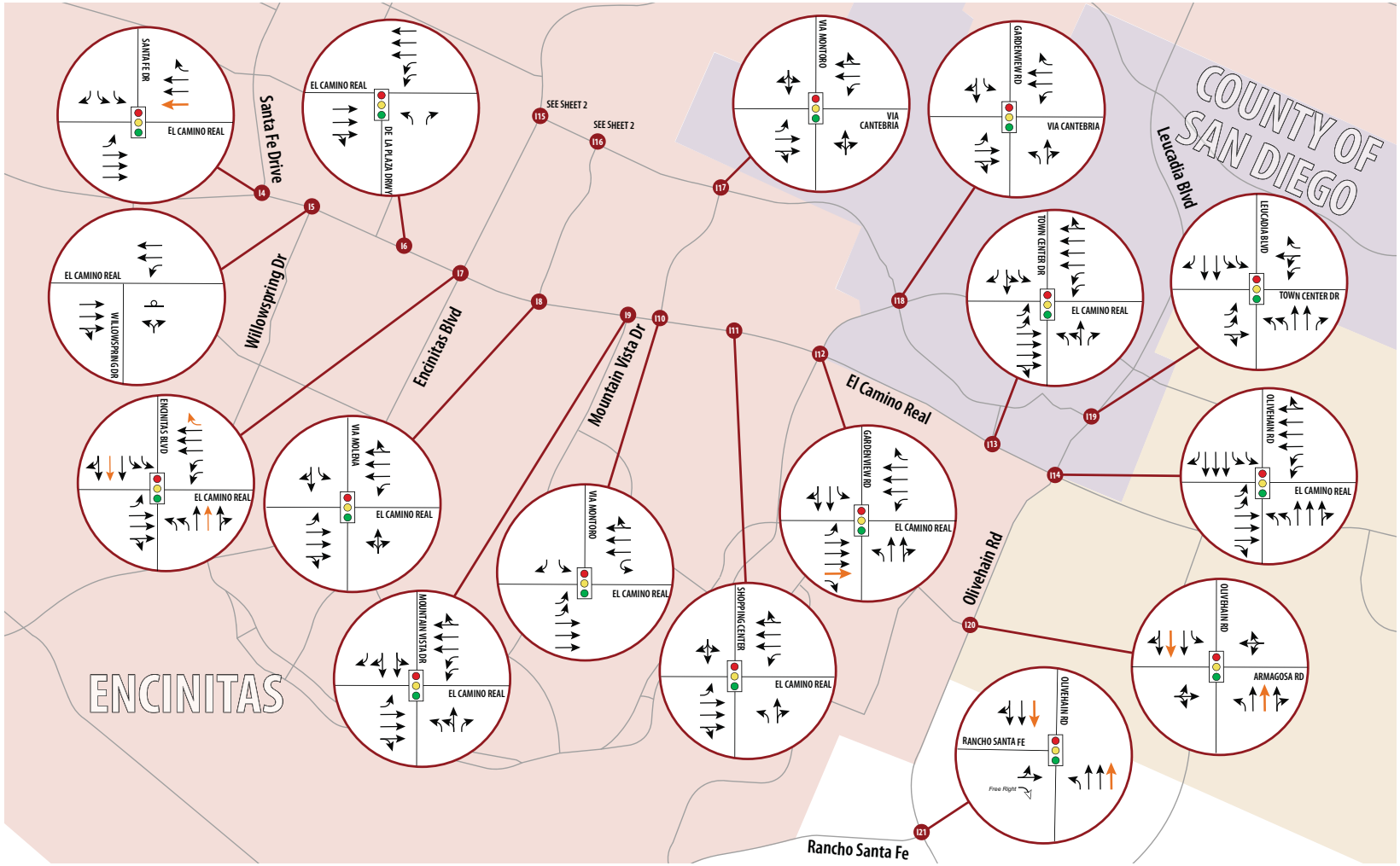
FIGURE 3-1. YEAR 2030 10+4 BUILD INTERSECTION LANEAGE CONDITIONS

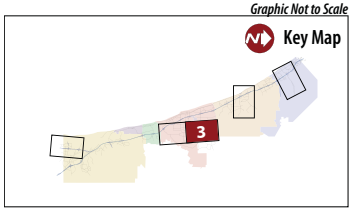
Sheet 2



LEGEND

- Intersection ID Number
- Traffic Signal
- Stop Sign
- Free Right Turn
- U-Turn
- Existing Lane Configuration
- I-5 North Coast Corridor Project Improvement
- DAR Associated Improvement
- Local Network Improvement (Local CE/Master Plan)

Graphic Not to Scale



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NORTH COAST INTERSTATE 5 CORRIDOR

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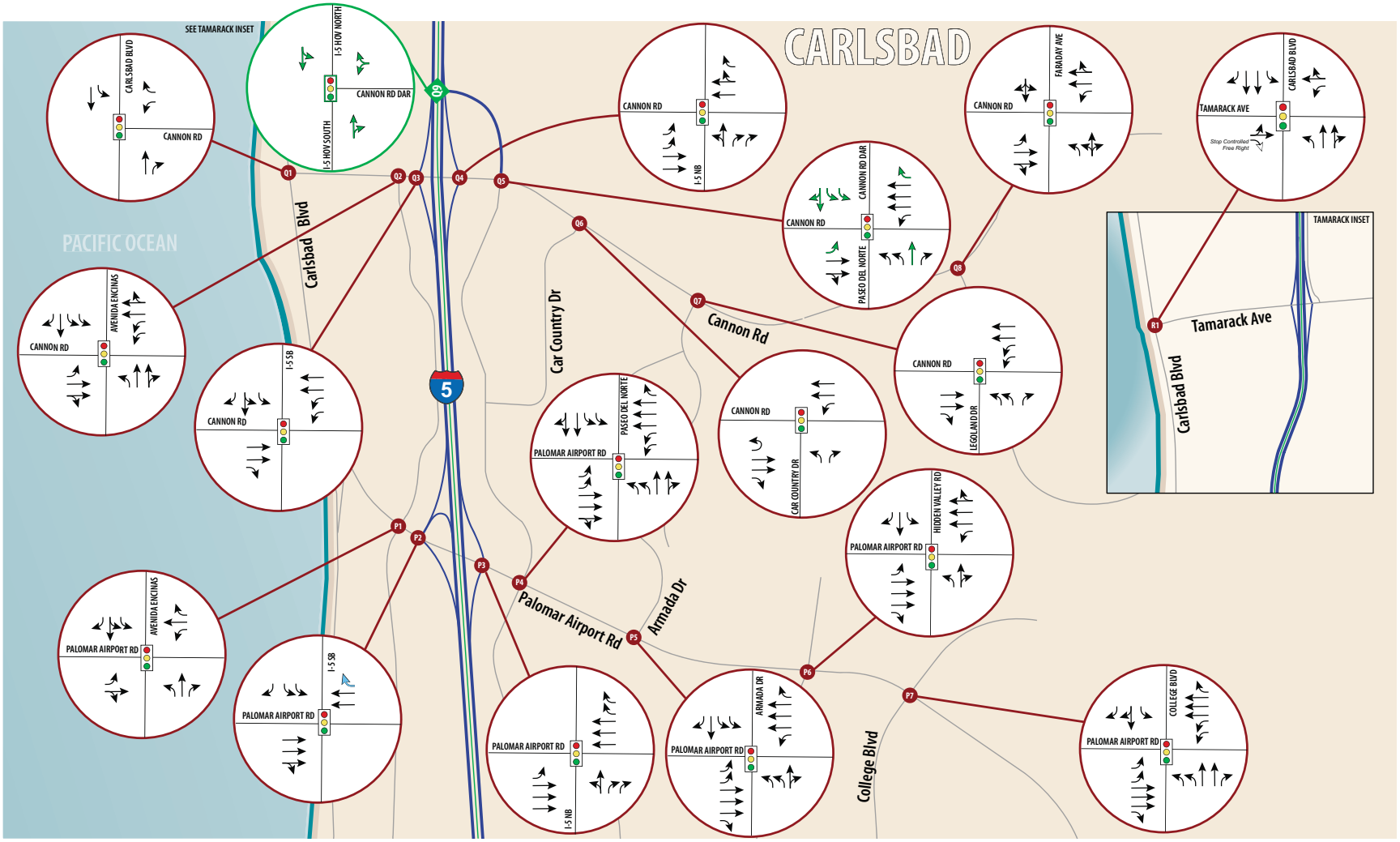
FIGURE 3-1. YEAR 2030 10+4 BUILD INTERSECTION LANEAGE CONDITIONS

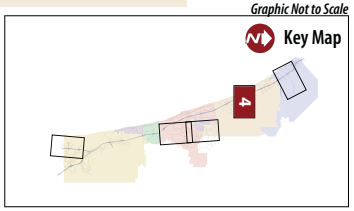
Sheet 3



LEGEND

- Intersection ID Number
- Traffic Signal
- Stop Sign
- Free Right Turn
- U-Turn
- Existing Lane Configuration
- I-5 North Coast Corridor Project Improvement
- DAR Associated Improvement
- Local Network Improvement (Local CE/Master Plan)

Graphic Not to Scale



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NORTH COAST INTERSTATE 5 CORRIDOR

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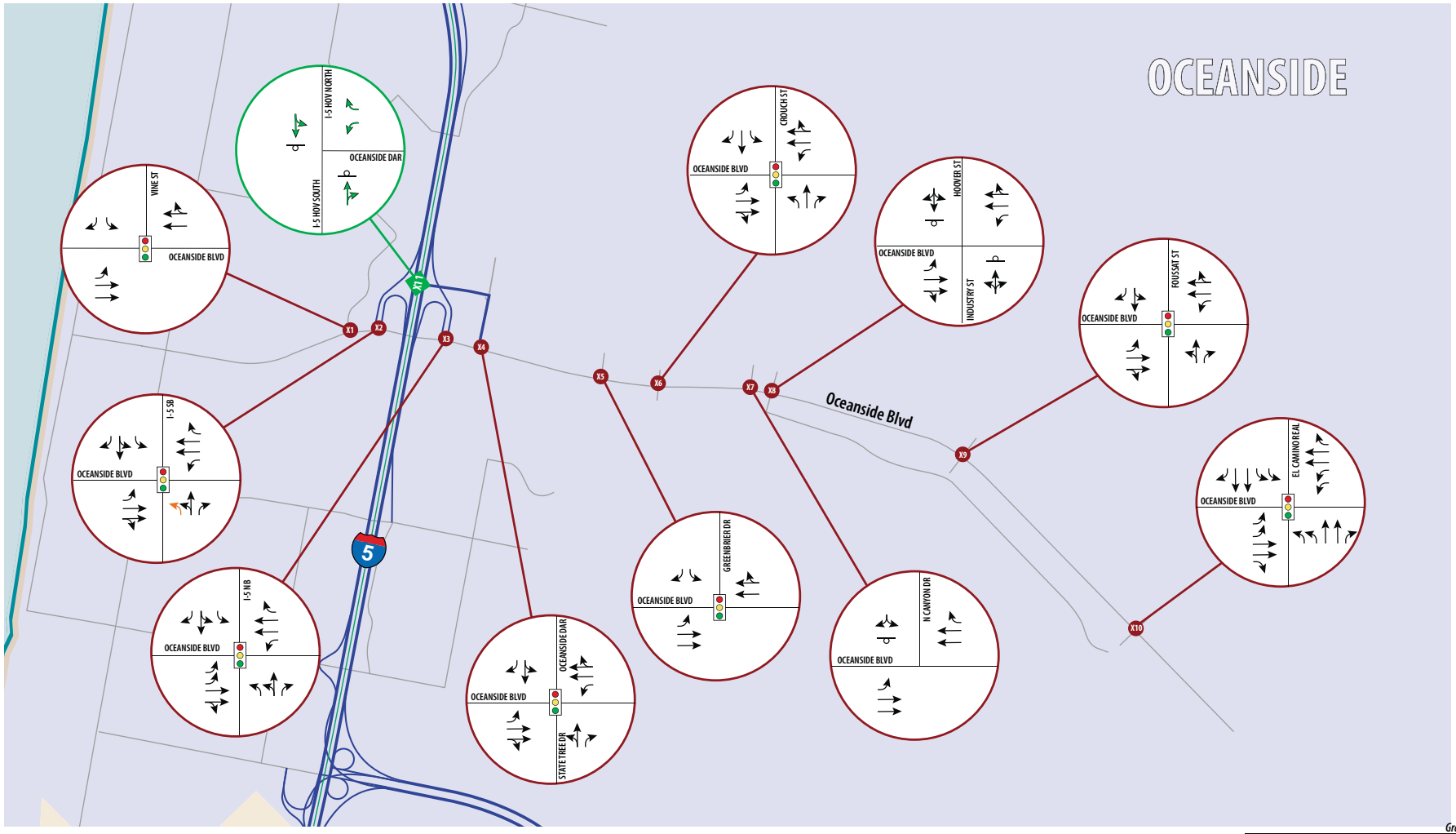
FIGURE 3-1. YEAR 2030 10+4 BUILD INTERSECTION LANEAGE CONDITIONS

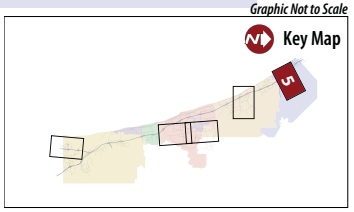
Sheet 4



LEGEND

- XX Intersection ID Number
- Traffic Signal
- Stop Sign
- Free Right Turn
- U-Turn
- Existing Lane Configuration
- I-5 North Coast Corridor Project Improvement
- DAR Associated Improvement
- Local Network Improvement (Local CE/Master Plan)

Graphic Not to Scale



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NORTH COAST INTERSTATE 5 CORRIDOR

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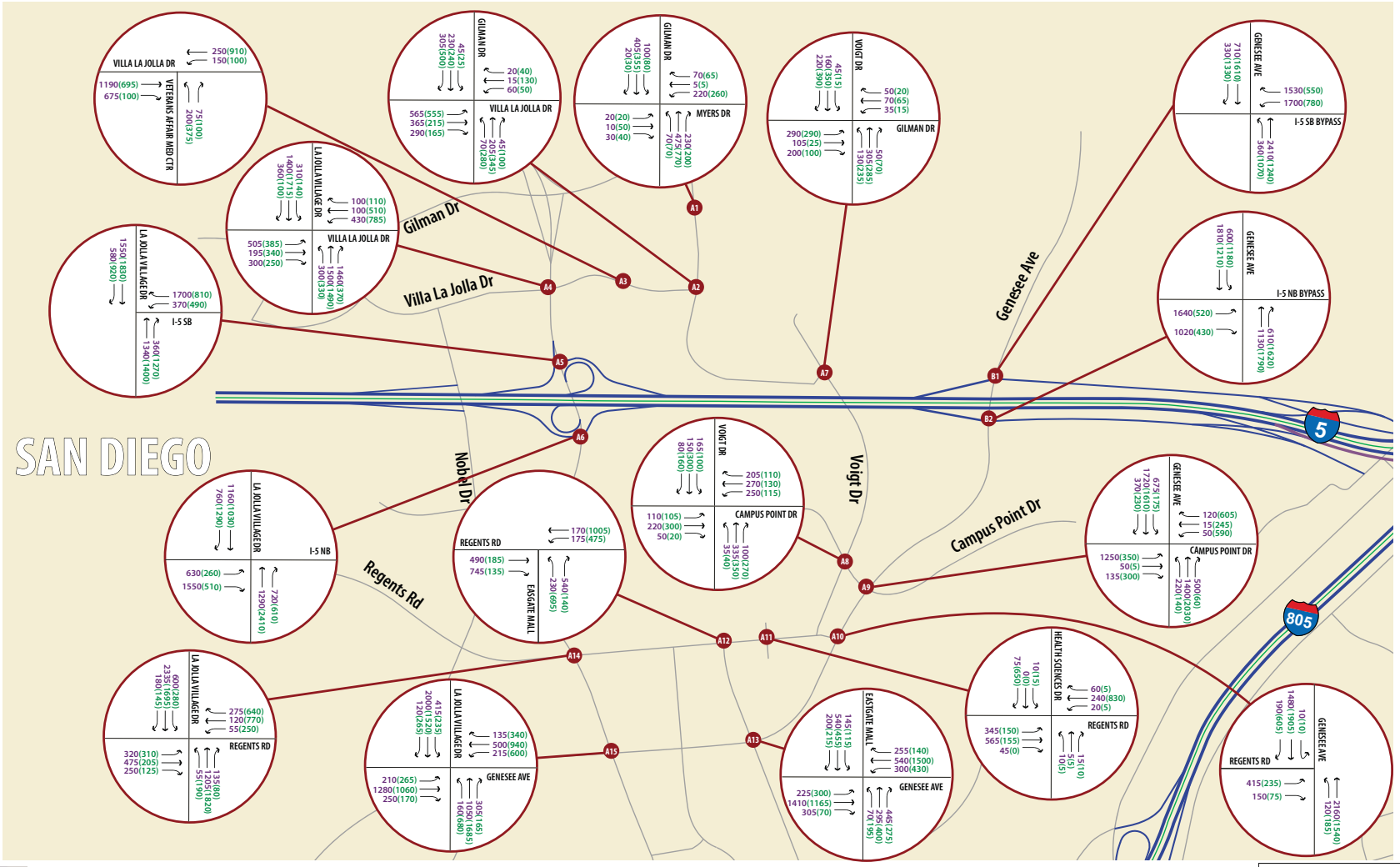
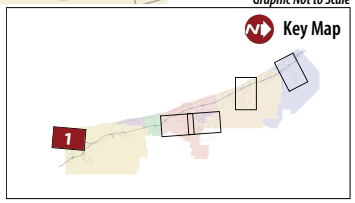
FIGURE 3-1. YEAR 2030 10+4 BUILD INTERSECTION LANEAGE CONDITIONS

Appendix B

Figure 3-2. Year 2030 10+4 without Direct Access Ramps – Peak Hour Turning Movements and Level of Service



Graphic Not to Scale



LEGEND

- XX = Intersection ID Number
- XX = DAR Intersection ID Number
- = HOV Ingress / Egress
- = I-5 Mainline
- = I-5 HOV

XX (XX) = AM Peak Hour Turning Volume (PM Peak Hour Turning Volume)

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(X,XXX) (PM Peak Hour)

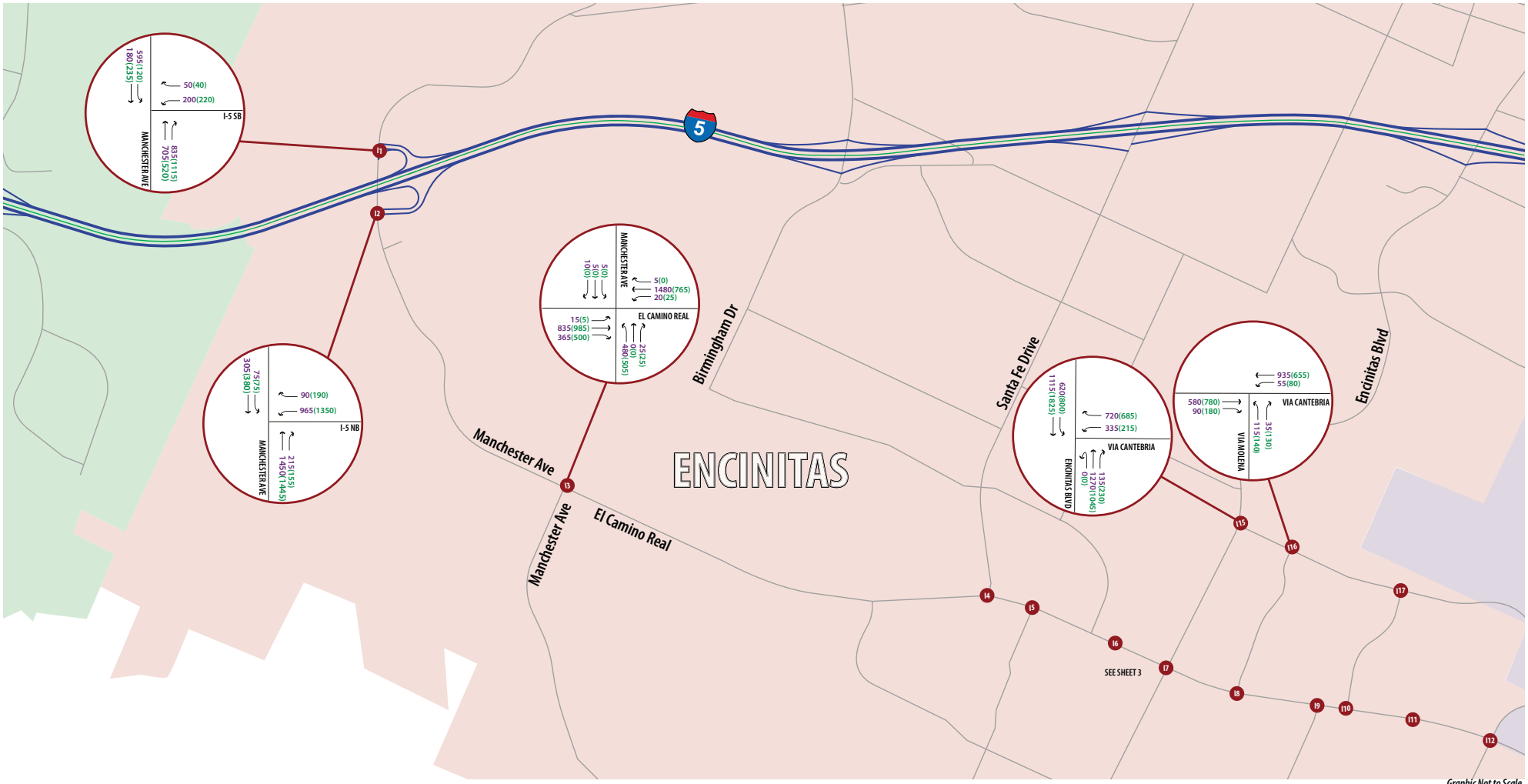
Caltrans

NORTH COAST INTERSTATE 5 CORRIDOR

WILSON & COMPANY ENGINEERS & ARCHITECTS

FIGURE 3-2. YEAR 2030 10+4 without DAR TRAFFIC FORECASTING DATA

Sheet 1



LEGEND

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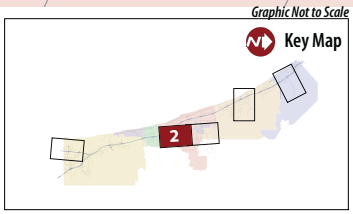
Graphic Not to Scale



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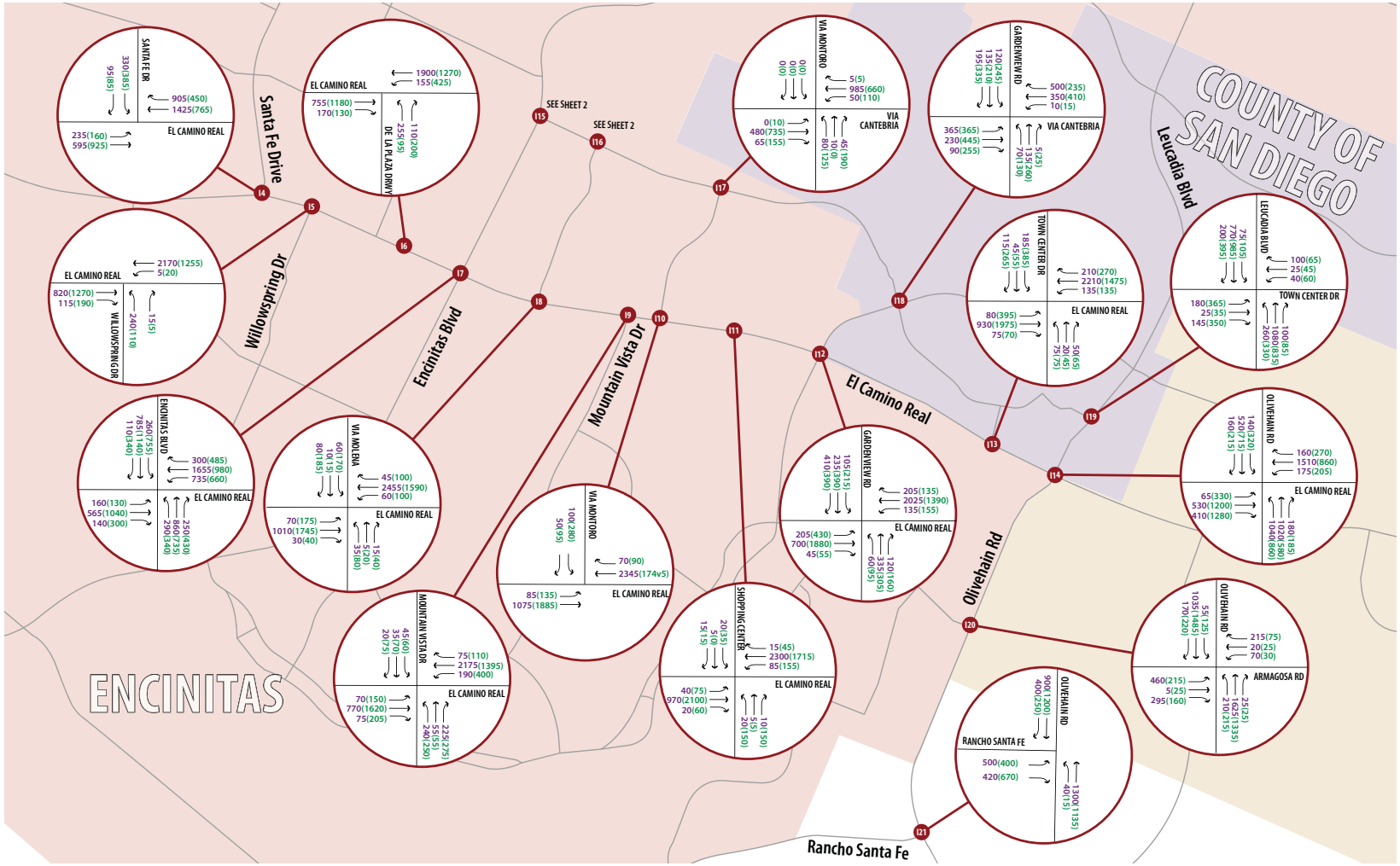
NORTH COAST INTERSTATE 5 CORRIDOR

WILSON & COMPANY ENGINEERS & ARCHITECTS

FIGURE 3-2. YEAR 2030 10+4 without DAR TRAFFIC FORECASTING DATA
Sheet 2



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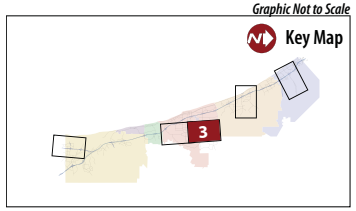

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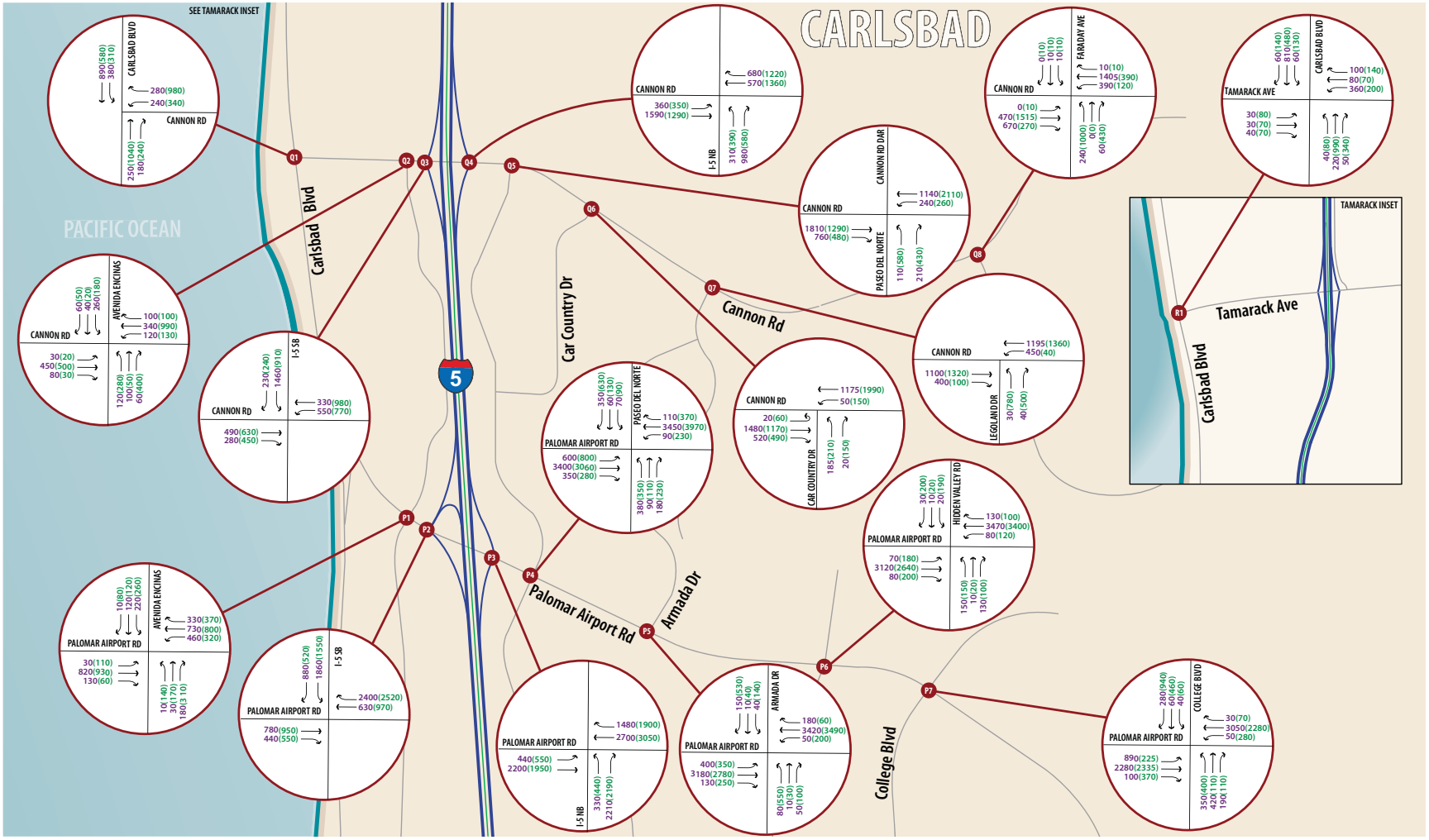
FIGURE 3-2. YEAR 2030 10+4 without DAR TRAFFIC FORECASTING DATA

Sheet 3



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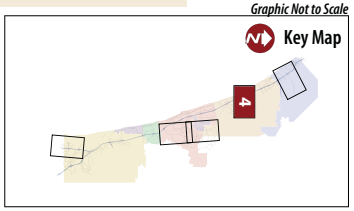

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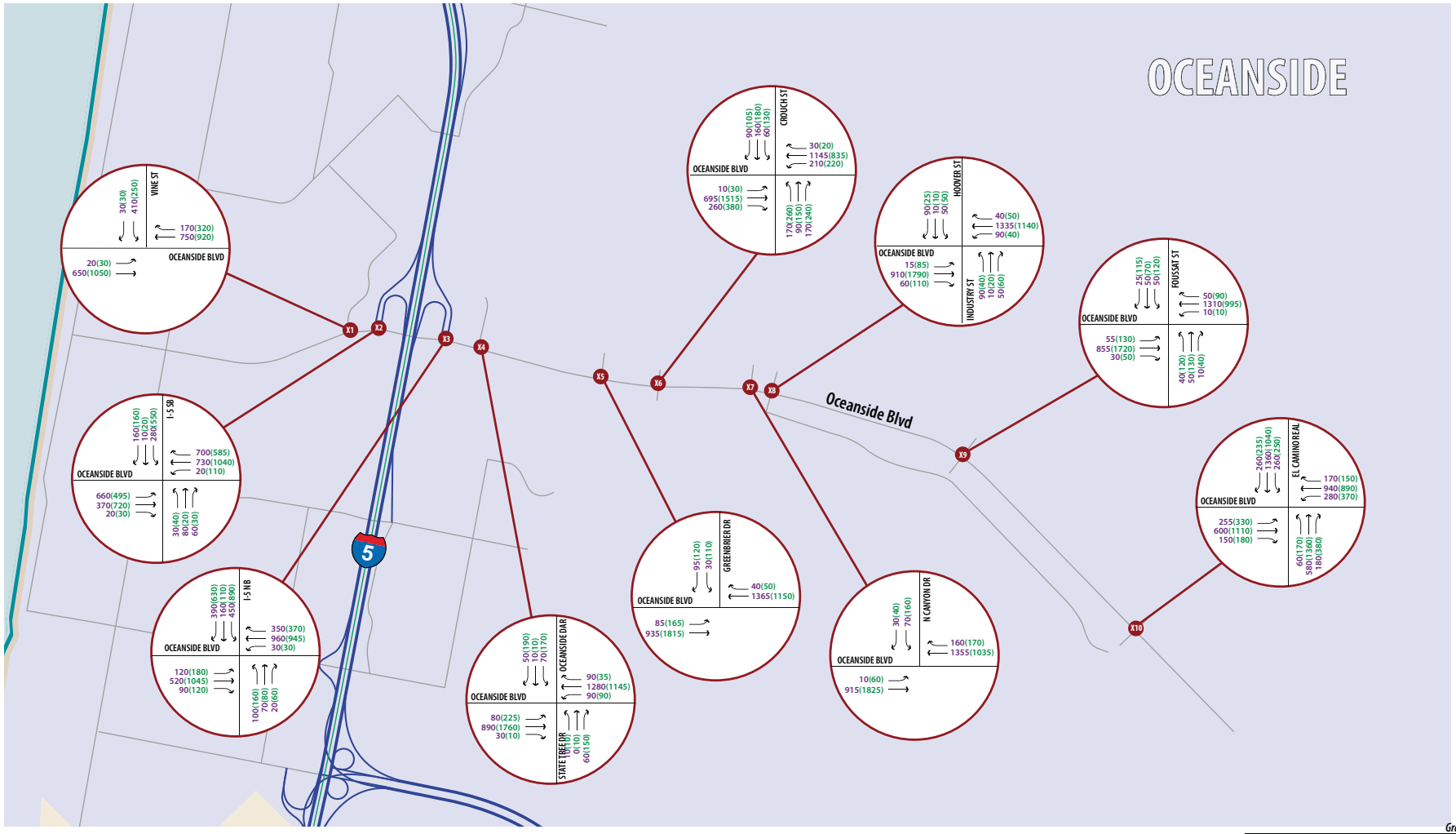
NORTH COAST INTERSTATE 5 CORRIDOR

WILSON & COMPANY ENGINEERS & ARCHITECTS

FIGURE 3-2. YEAR 2030 10+4 without DAR TRAFFIC FORECASTING DATA

Sheet 4



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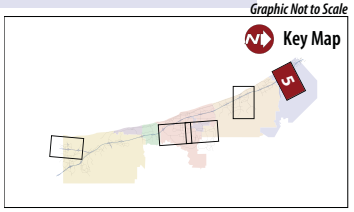

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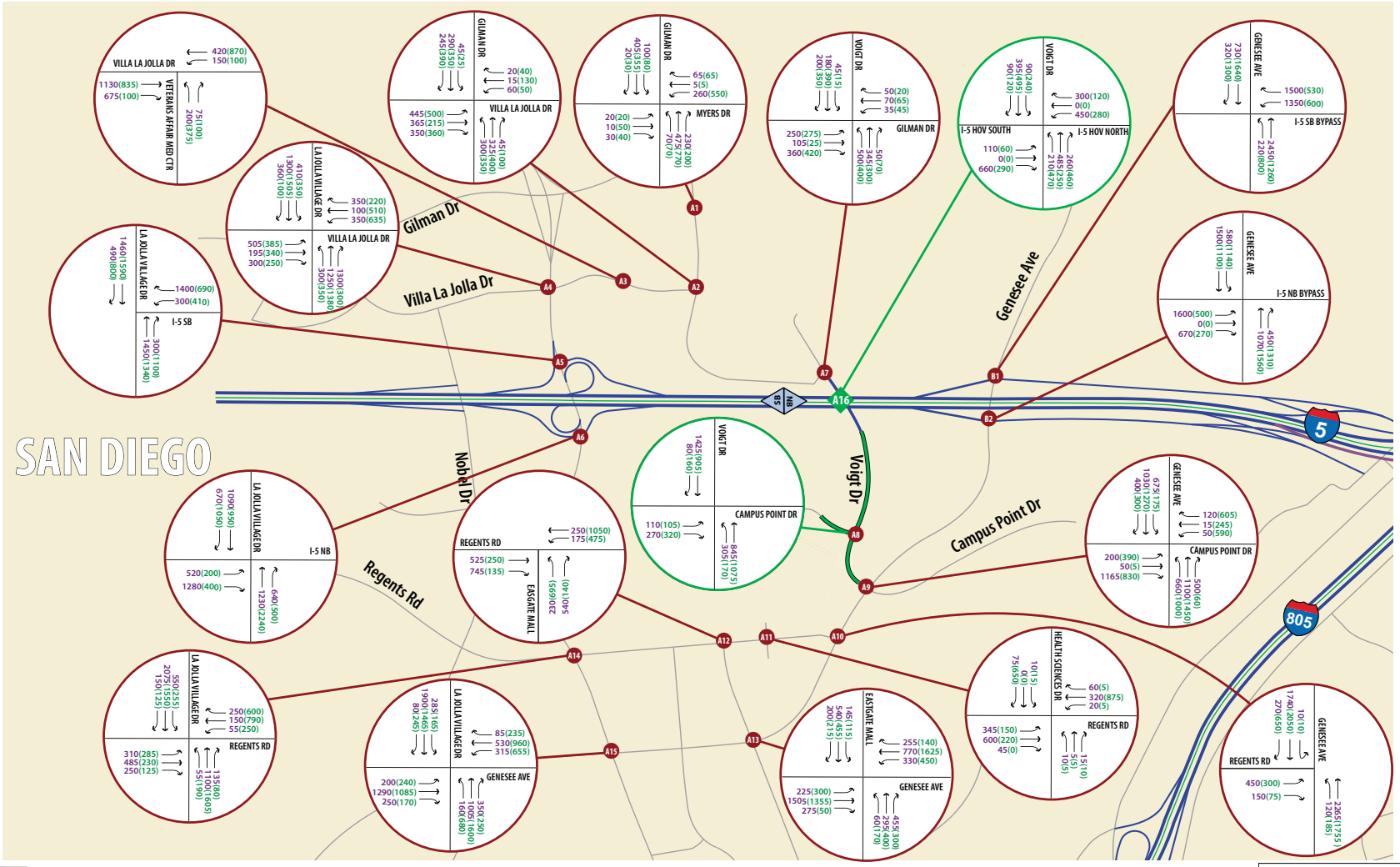
FIGURE 3-2. YEAR 2030 10+4 without DAR TRAFFIC FORECASTING DATA

Sheet 5

Appendix C

Figure 3-3. Year 2030 10+4 with Direct Access Ramps – Peak Hour Turning Movements and Level of Service



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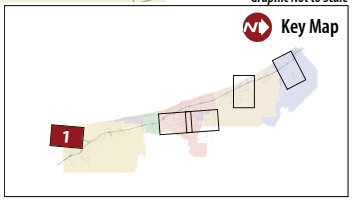

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NORTH COAST INTERSTATE 5 CORRIDOR

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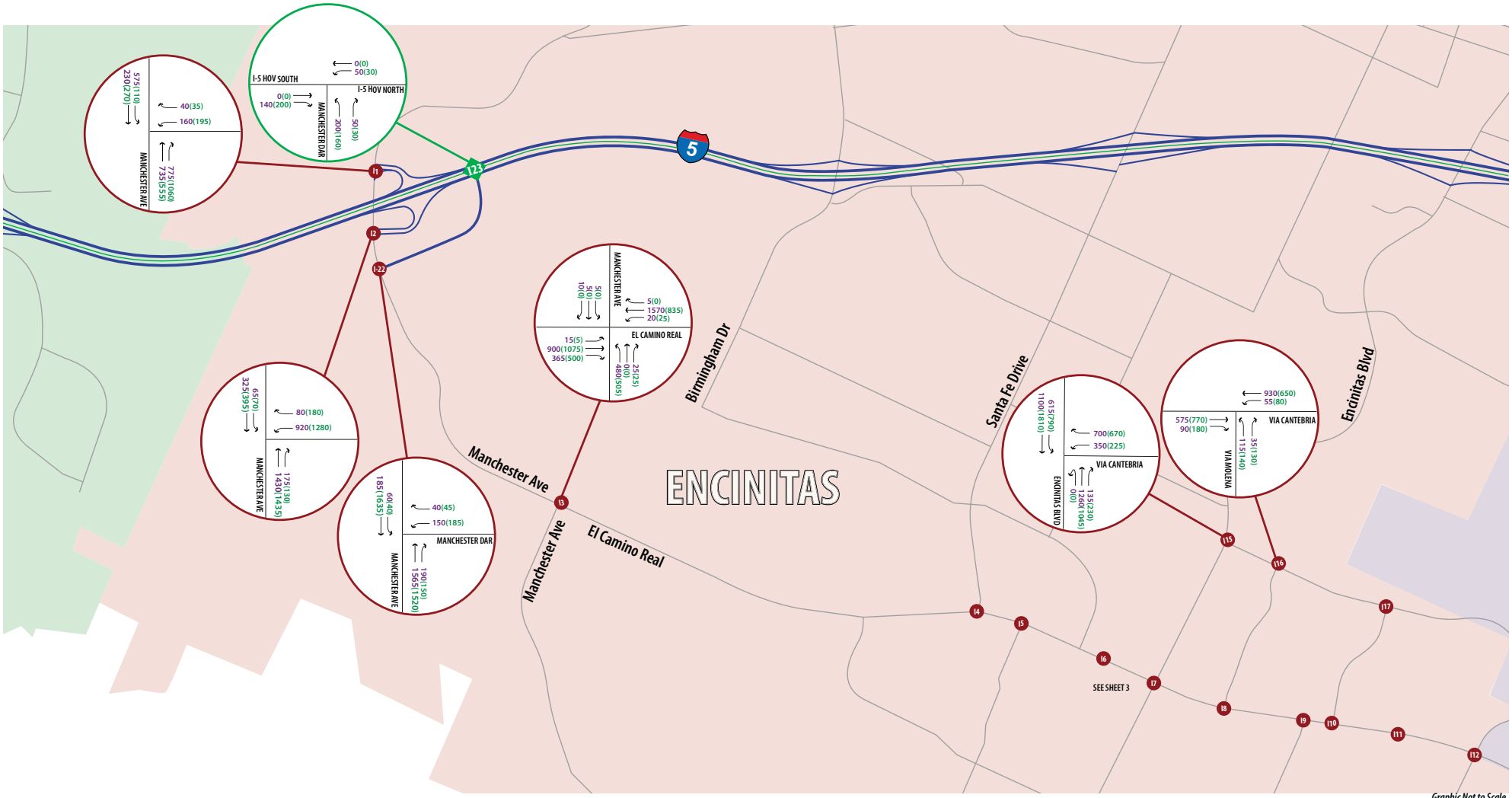
FIGURE 3-3. YEAR 2030 10+4 with DAR TRAFFIC FORECASTING DATA

Sheet 1



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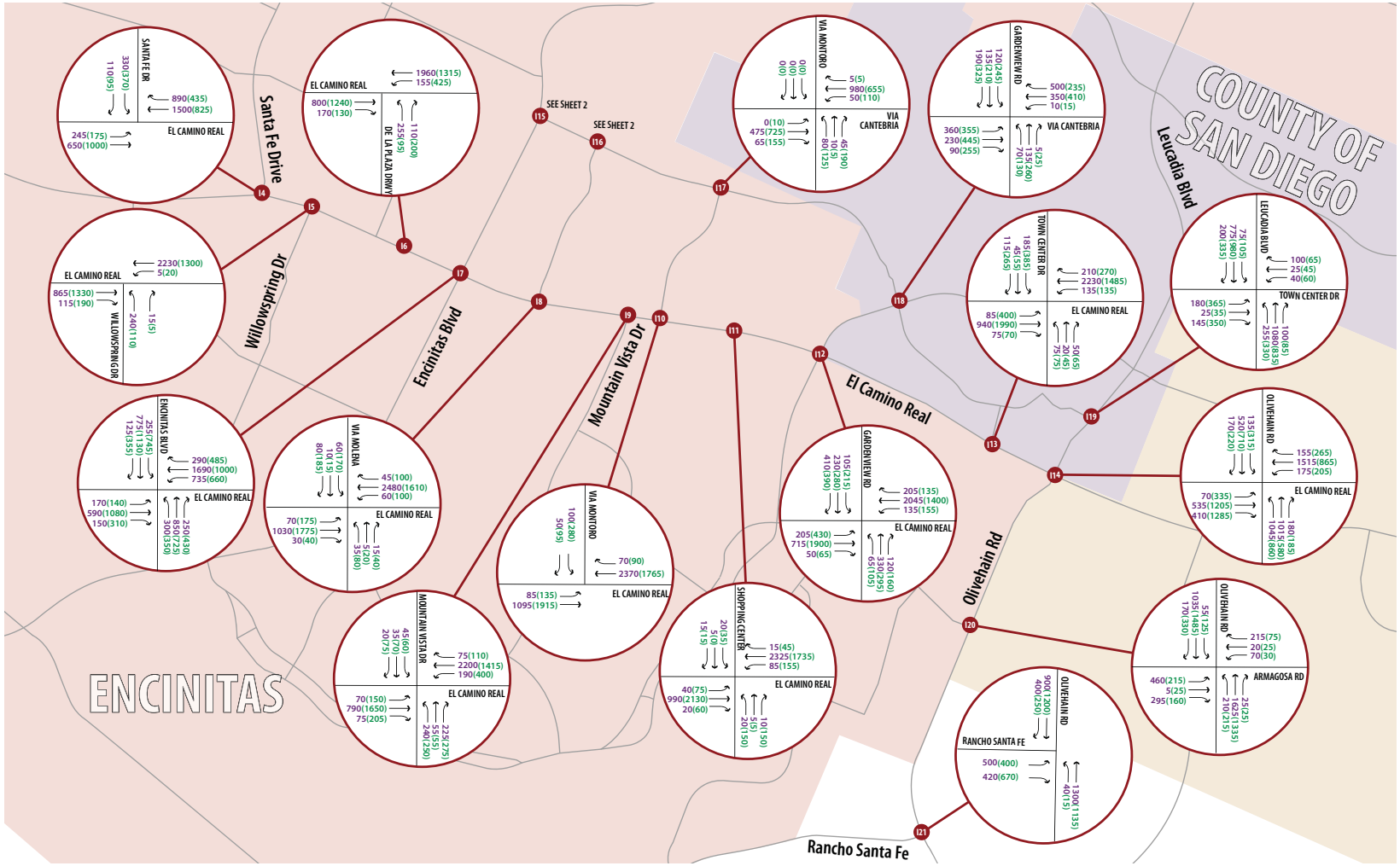
NORTH COAST INTERSTATE 5 CORRIDOR

WILSON & COMPANY ENGINEERS & ARCHITECTS

FIGURE 3-3. YEAR 2030 10+4 with DAR TRAFFIC FORECASTING DATA

Sheet 2



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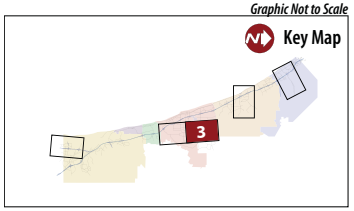

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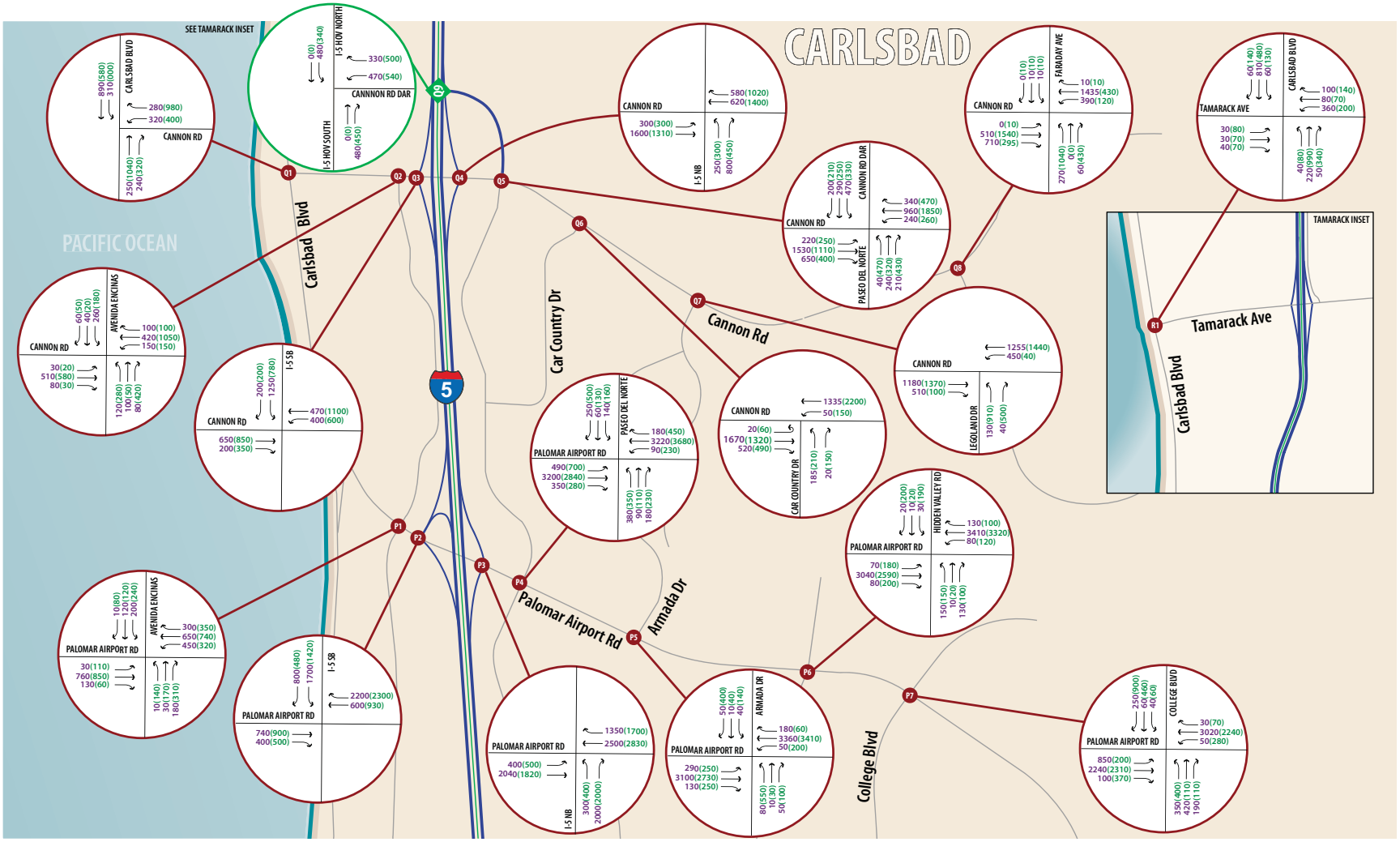
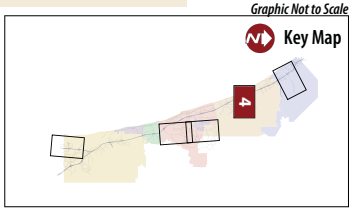
FIGURE 3-3. YEAR 2030 10+4 with DAR TRAFFIC FORECASTING DATA

Sheet 3



Graphic Not to Scale



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NORTH COAST INTERSTATE 5 CORRIDOR

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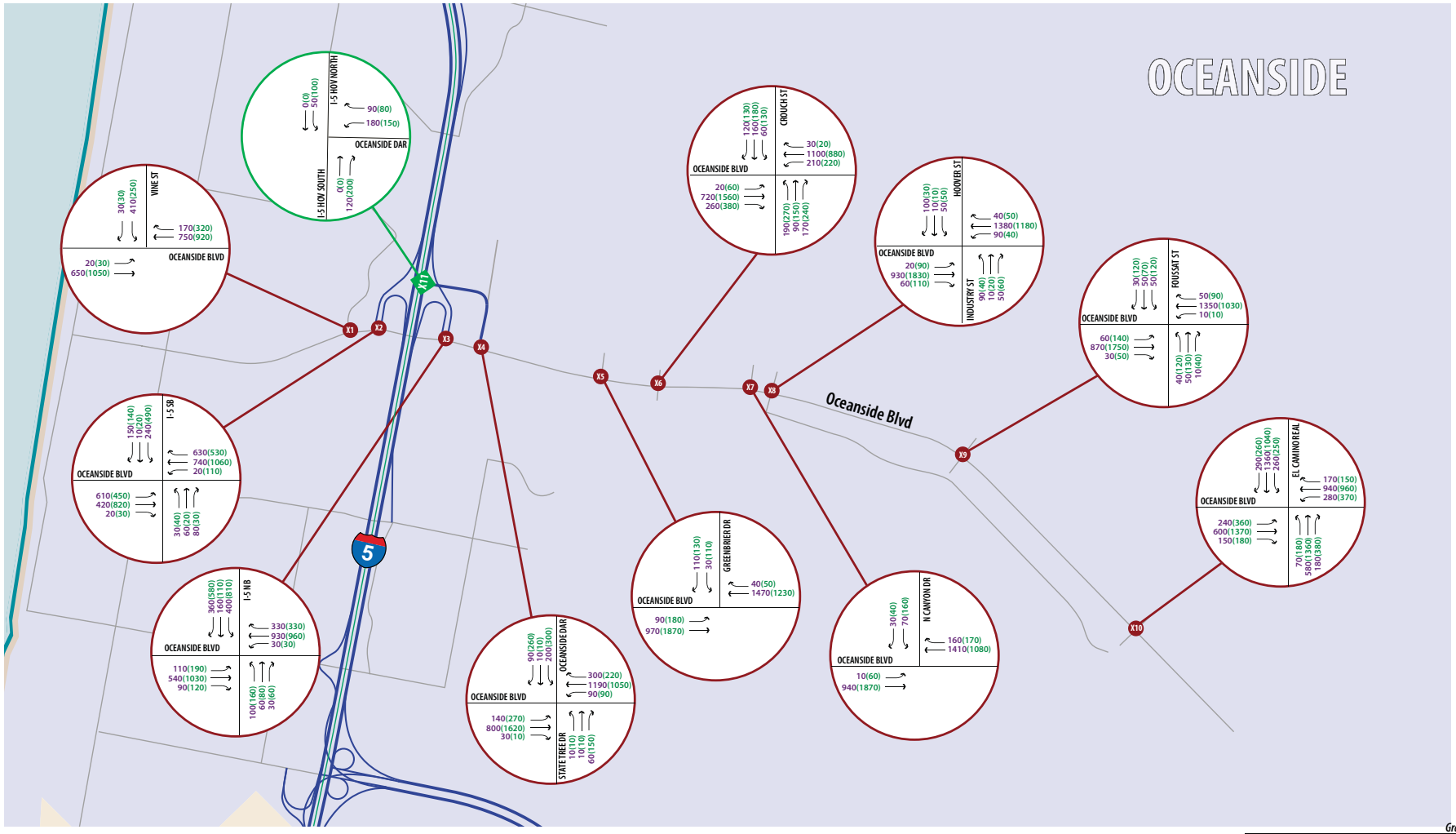
FIGURE 3-3. YEAR 2030 10+4 with DAR TRAFFIC FORECASTING DATA

Sheet 4



Graphic Not to Scale

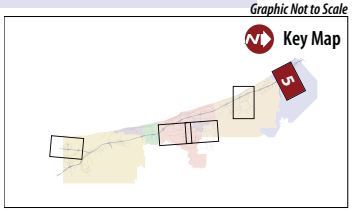


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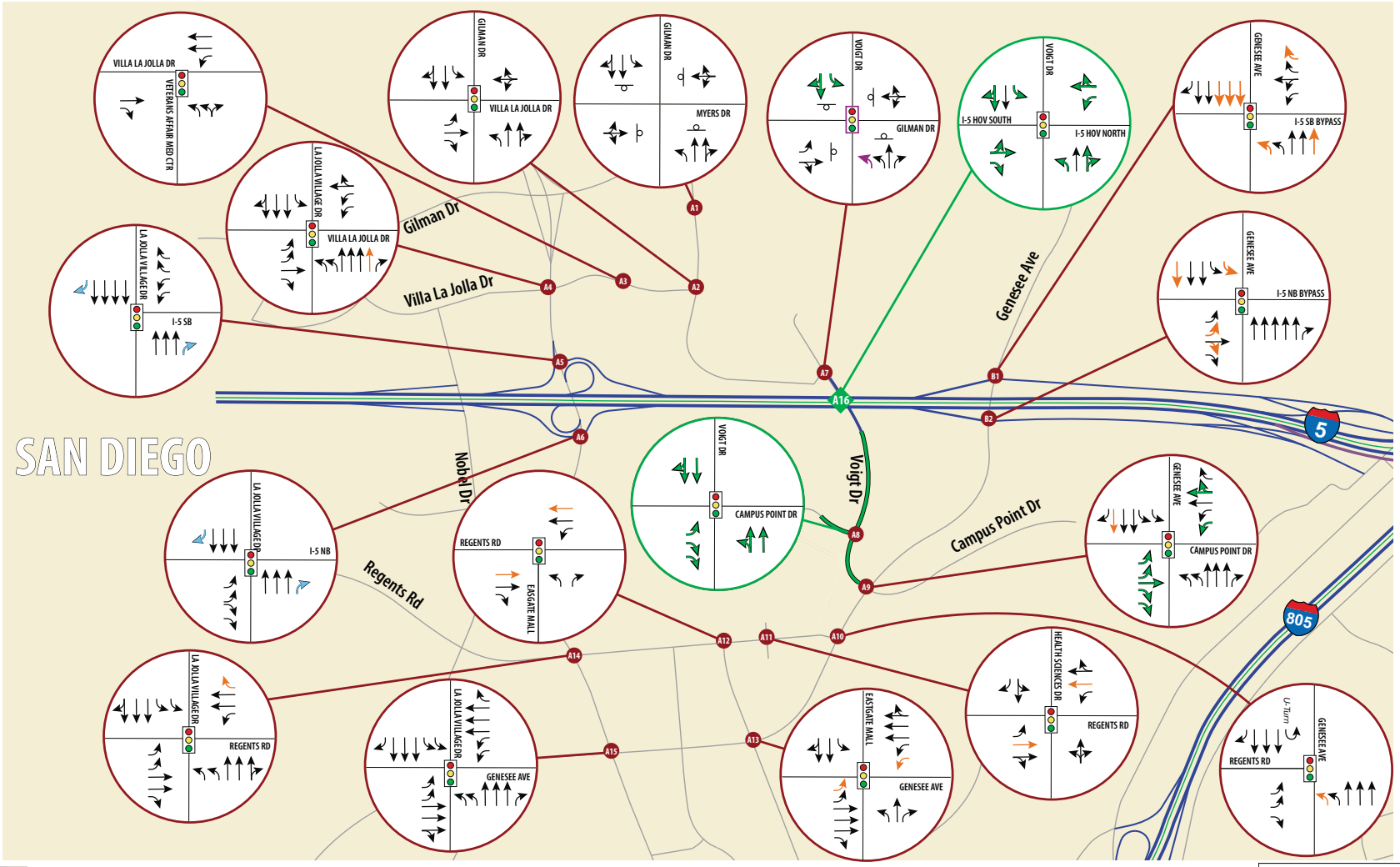
FIGURE 3-3. YEAR 2030 10+4 with DAR TRAFFIC FORECASTING DATA

Sheet 5

Appendix D

Figure 4-1. Year 2030 Intersection Lane Configurations With Improvement Mitigations



Lane Configuration

LEGEND

- Intersection ID Number
- Traffic Signal
- Stop Sign
- Free Right Turn
- U-Turn
- Existing Lane Configuration
- I-5 North Coast Corridor Project Improvement
- DAR Associated Improvement
- Local Network Improvement (Local CE/Master Plan)
- DAR Improvement Mitigation

Graphic Not to Scale

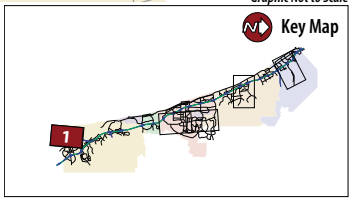


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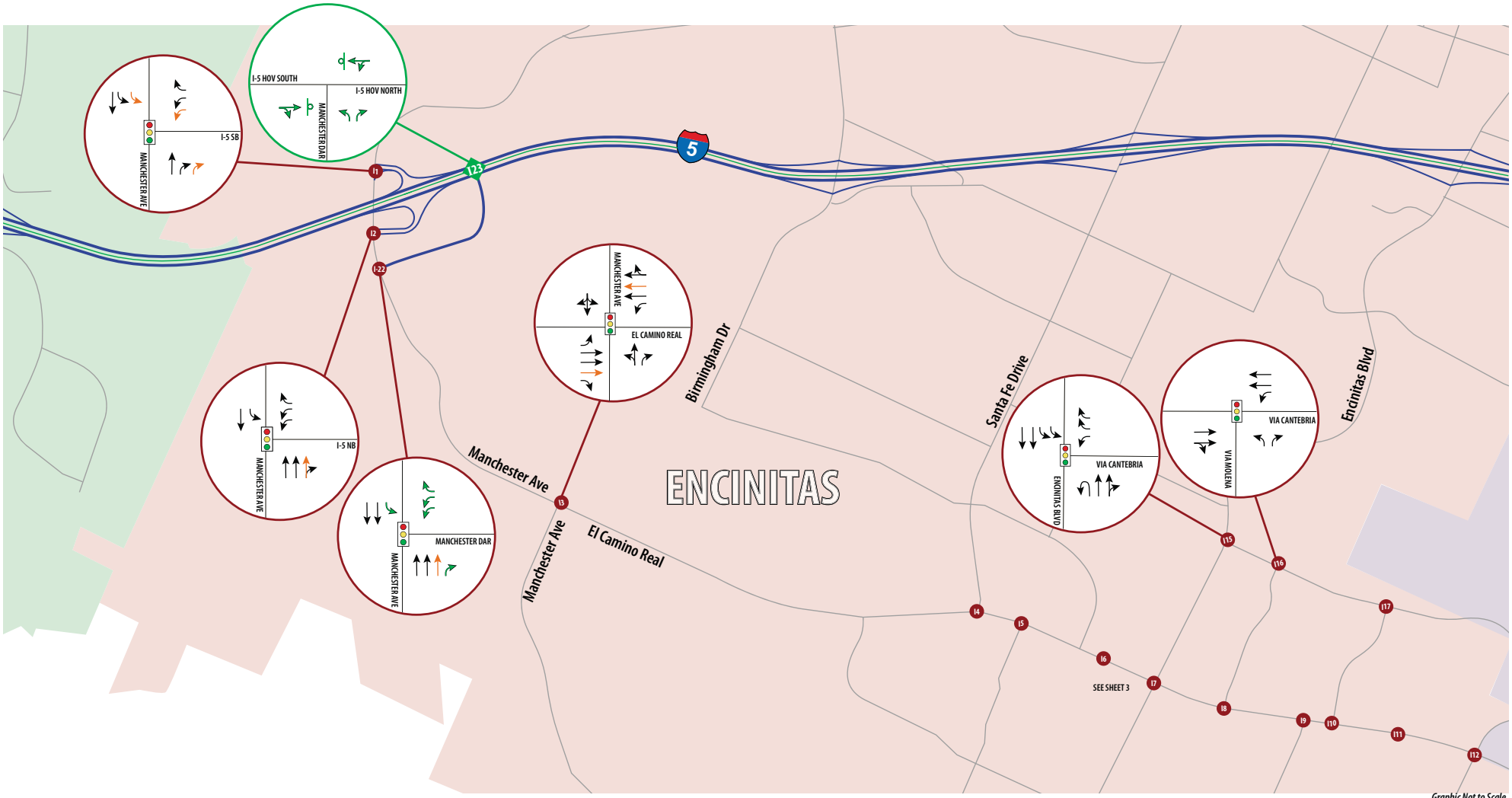
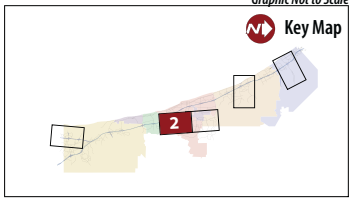
FIGURE 4-1. YEAR 2030 10+4 BUILD INTERSECTION LANEAGE CONDITIONS WITH IMPROVEMENT MITIGATION



Graphic Not to Scale



LEGEND

- XX Intersection ID Number
- Traffic Signal
- Stop Sign
- Free Right Turn
- U-Turn
- Existing Lane Configuration
- I-5 North Coast Corridor Project Improvement
- DAR Associated Improvement
- Local Network Improvement (Local CE/Master Plan)
- DAR Improvement Mitigation

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NORTH COAST INTERSTATE 5 CORRIDOR

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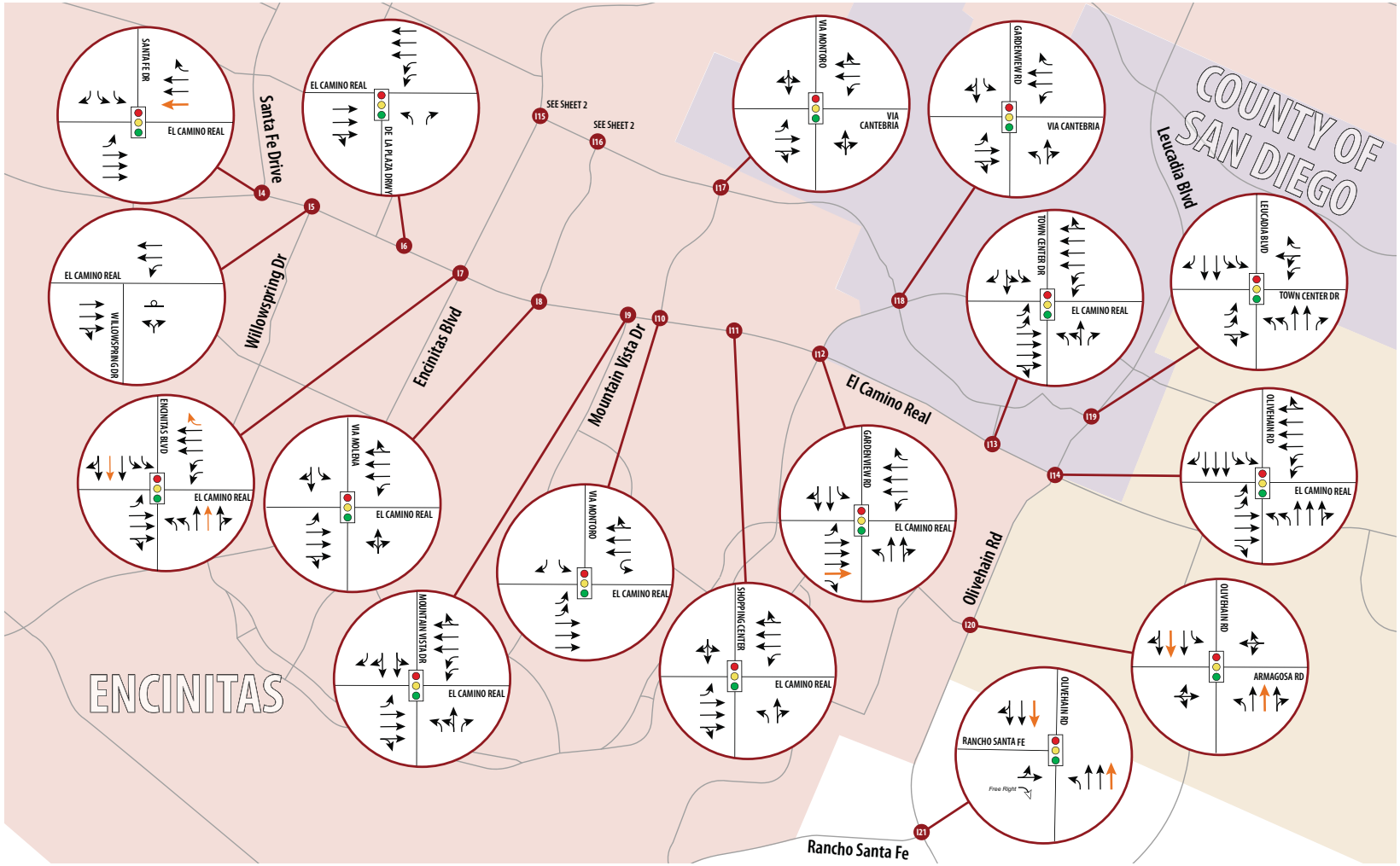
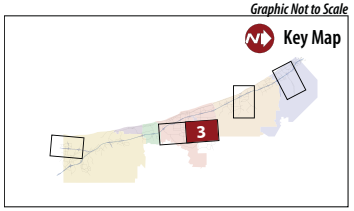
FIGURE 4-1. YEAR 2030 10+4 BUILD INTERSECTION LANEAGE CONDITIONS WITH IMPROVEMENT MITIGATION



LEGEND

- Intersection ID Number
- Traffic Signal
- Stop Sign
- Free Right Turn
- U-Turn
- Existing Lane Configuration
- I-5 North Coast Corridor Project Improvement
- DAR Associated Improvement
- Local Network Improvement (Local CE/Master Plan)
- DAR Improvement Mitigation

Graphic Not to Scale



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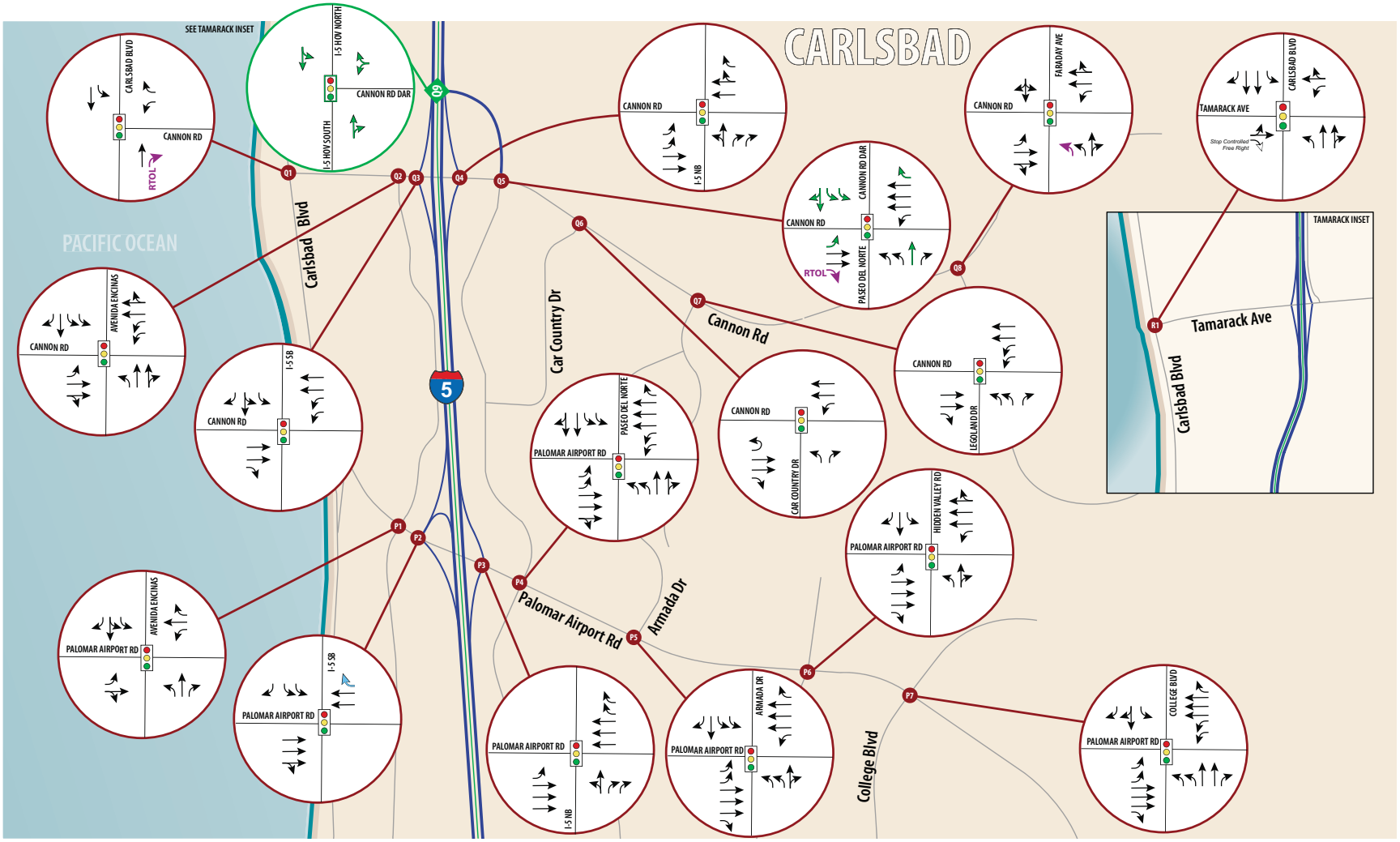
N·O·R·T·H C·O·A·S·T INTERSTATE 5 CORRIDOR

WILSON & COMPANY ENGINEERS & ARCHITECTS

FIGURE 4-1. YEAR 2030 10+4 BUILD INTERSECTION LANEAGE CONDITIONS WITH IMPROVEMENT MITIGATION



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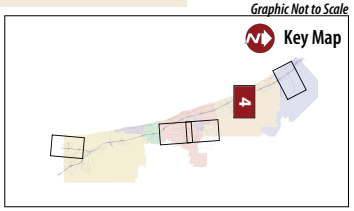

LEGEND

- XX Intersection ID Number
- Traffic Signal
- Stop Sign
- Free Right Turn
- U-Turn
- RTOL Right-Turn Overlap
- Existing Lane Configuration
- I-5 North Coast Corridor Project Improvement
- DAR Associated Improvement
- Local Network Improvement (Local CE/Master Plan)
- DAR Improvement Mitigation

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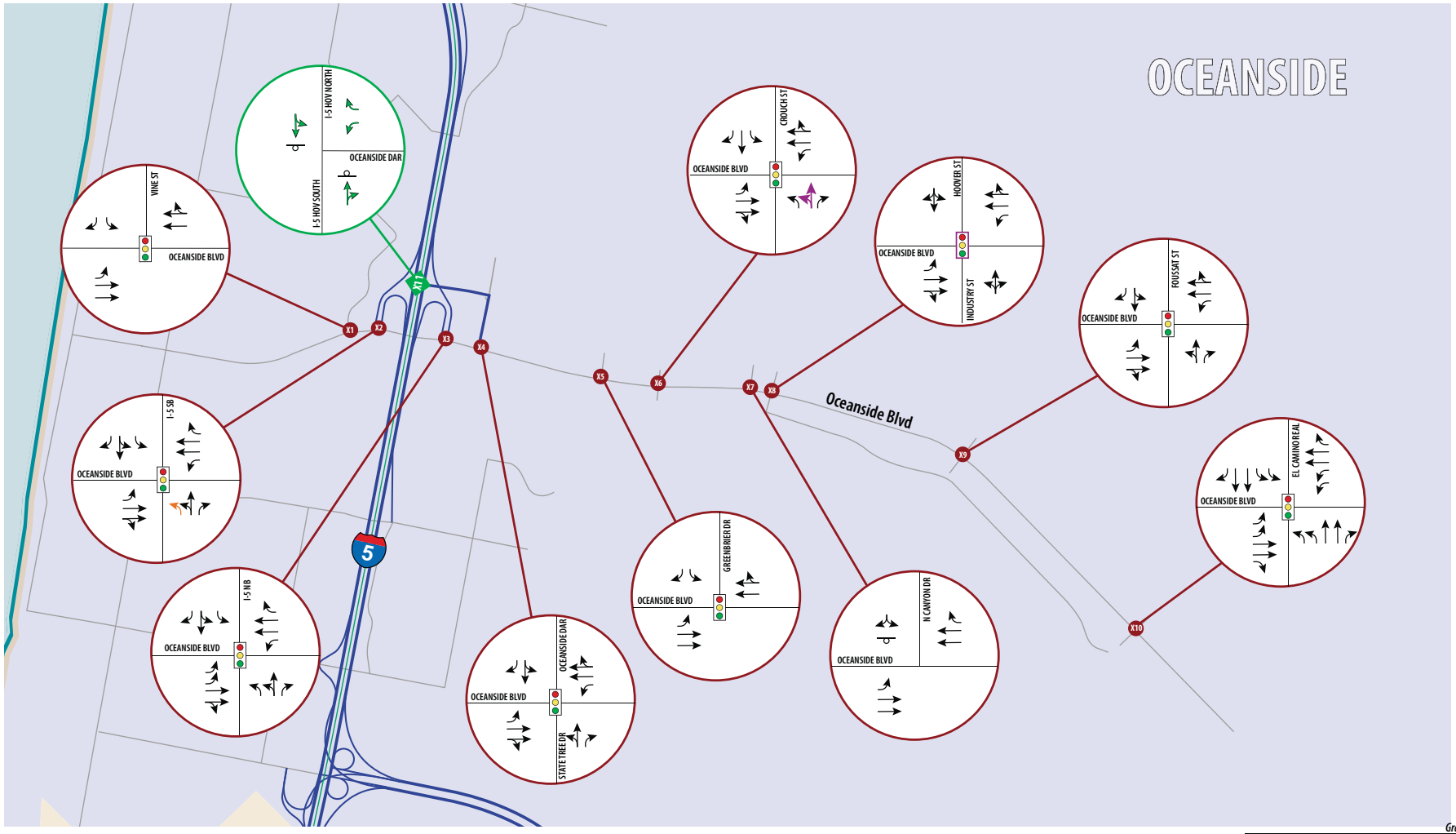
NORTH COAST INTERSTATE 5 CORRIDOR

WILSON & COMPANY ENGINEERS & ARCHITECTS

FIGURE 4-1. YEAR 2030 10+4 BUILD INTERSECTION LANEAGE CONDITIONS WITH IMPROVEMENT MITIGATION



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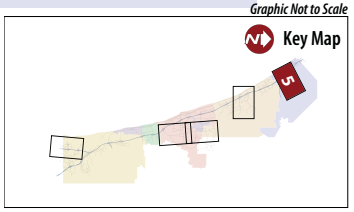

LEGEND

- XX Intersection ID Number
- Traffic Signal
- Stop Sign
- Free Right Turn
- U-Turn
- Existing Lane Configuration
- I-5 North Coast Corridor Project Improvement
- DAR Associated Improvement
- Local Network Improvement (Local CE/Master Plan)
- DAR Improvement Mitigation

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FIGURE 4-1. YEAR 2030 10+4 BUILD INTERSECTION LANEAGE CONDITIONS WITH IMPROVEMENT MITIGATION