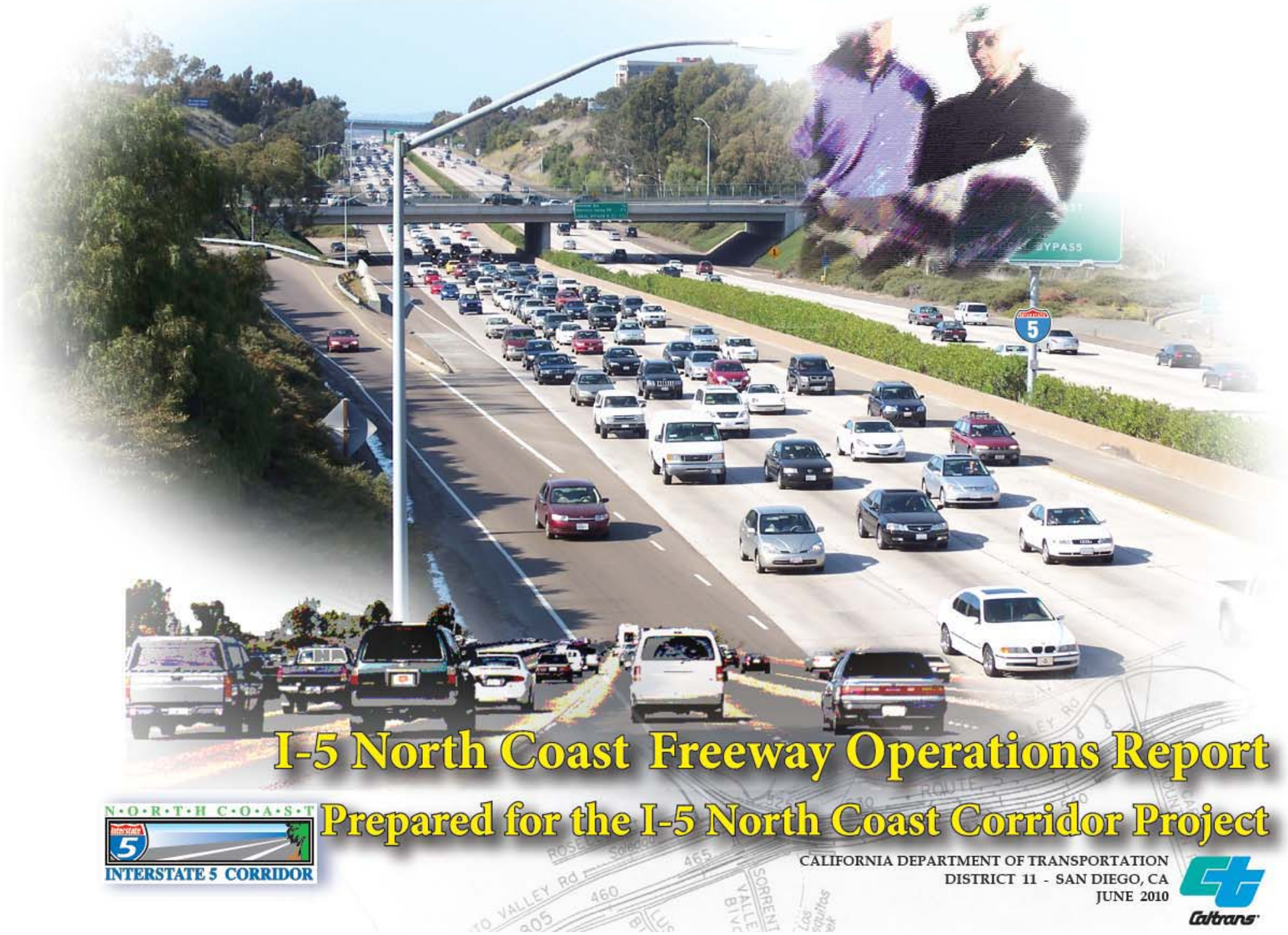

I-5 North Coast Freeway Operations Report

Prepared for the I-5 North Coast Corridor Project

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

CALIFORNIA DEPARTMENT OF TRANSPORTATION
DISTRICT 11 - SAN DIEGO, CA
JUNE 2010

Caltrans

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1.0 Introduction

The Freeway Operations Report was prepared in support of the proposed I-5 North Coast Corridor Project (Project). The Project would increase capacity of the existing I-5 freeway by adding up to four High Occupancy Vehicle (HOV) lanes/Managed lanes and up to two general purpose lanes to the existing facility, depending on the Project alternative. Also proposed by the Project are Direct Access Ramps at four different locations, providing the HOV/Managed lanes with access to interchange arterials. The Project begins at La Jolla Village Drive in San Diego and extends northward approximately 27 miles to Harbor Drive in Oceanside (see Figure 1.1). The Freeway Operations Report provides information regarding current freeway operations of the I-5 within the Project limits and estimates future freeway operations for the various proposed Project alternatives.

1.1 Purpose

The purpose of the Freeway Operations Report is to present the existing traffic conditions within the Project limits and the future traffic conditions for the proposed alternatives of the Project. The Freeway Operations Report contains an assessment of freeway operations for the existing conditions and the proposed alternatives, and a comparison of the operations of the proposed Project alternatives.

1.2 Scope

Specific freeway operations were analyzed using year 2030 traffic forecasts for each alternative to determine how well the proposed designs address capacity and operations along the Project corridor. The following freeway operations were analyzed in detail for the existing conditions and proposed alternatives for the AM and PM time peaks: travel times for freeway segments and the corridor, Level of Service at various freeway segments, and weaving conditions between ramp junctures along the Project corridor. In addition to the AM and PM time peak analyses; daily vehicle-hours of delay, Average Daily Traffic, Vehicle Miles Traveled and weekend traffic are presented for the main lanes. HOV/Managed Lanes utilization is also presented.

Freeway operations were analyzed utilizing the methodologies described in the Highway Capacity Manual (HCM) and the Highway Design Manual (HDM). A Freeway Corridor Simulation Model, FREQ12, was utilized to estimate travel times and delay for the "No Build", "8+4", and "10+4" conditions in various future years. FREQ12 is a traffic modeling computer program that contains a method for predicting and illustrating the location, extent and duration of traffic congestion in freeway systems. FREQ12 was also used to predict potential future year bottleneck locations and associated queuing for the alternatives. The Freeway Performance Measurement System (PeMS), a software tool developed and maintained at the University of California, Berkeley, that gathers, stores, and analyzes real time traffic, was used to determine existing weekday bottleneck areas within the Project limits of the I-5 freeway and obtain traffic trends from 2003 through 2006 for comparison purposes. PeMS was also used to evaluate historical and existing weekday and weekend traffic travel times.

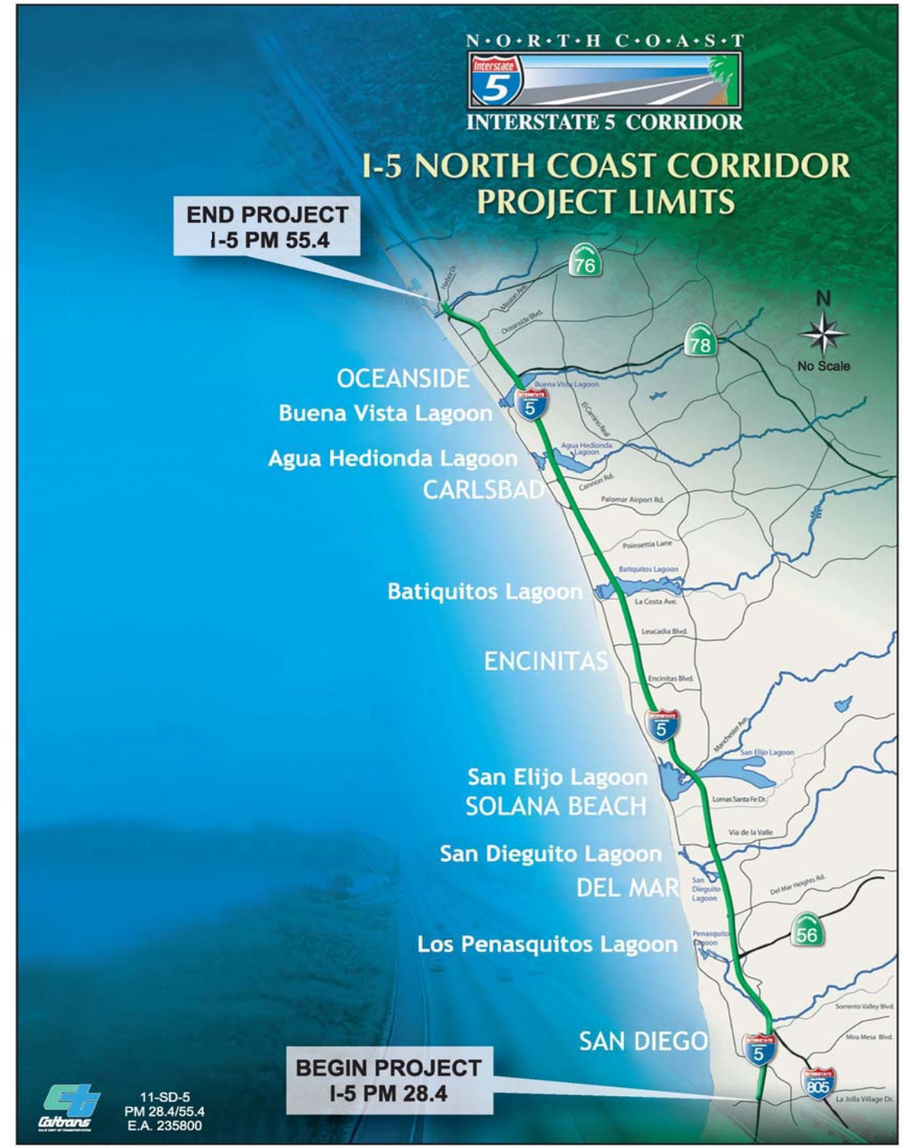


Figure 1.1 Project Location Map

1.3 Organization

The Freeway Operations Report is divided into 9 chapters. The Report purpose, scope and organization, are presented in Chapter 1. The Project description and alternatives are presented in Chapter 2 (see the Project Report for a detailed description of the Project alternatives). The existing freeway traffic conditions are presented in Chapter 3. Annual Average Daily Traffic (AADT) and Vehicle-Miles Traveled (VMT) are presented in Chapter 4. In Chapter 5, the existing and forecasted travel time and main lane delay generated by the traffic modeling computer program FREQ12 are discussed. Chapter 6 contains Level of Service results for the Project corridor. Results of the traffic weaving analysis and potential ramp metering effects are presented in Chapter 7. Current and historical weekend traffic data is presented in Chapter 8. Chapter 9 presents historical High Occupancy Vehicle (HOV) data and discusses future HOV/Managed Lanes usage.

2.0 Project Description

The Project limits of the I-5 North Coast Corridor span approximately 27 miles between La Jolla Village Drive and Harbor Drive. The Project limits are delineated in Figure 1.1. Within the Project limits, the existing I-5 freeway consists of eight general purpose lanes with 27 separate interchanges. The existing I-5 has two 6-mile long HOV lanes (one lane in each direction) between the I-5/I-805 junction and the Via de la Valle undercrossing. Auxiliary lanes exist between interchanges at various locations along the freeway. The existing conditions represent the year 2006. Currently an HOV extension project is under construction to extend the existing northbound and southbound HOV lanes along I-5 from the north end of the San Dieguito River Bridge to the south end of the San Elijo Lagoon Bridge. This project is scheduled for a completion in 2009.

The following alternatives for the Project are presented and considered in the Draft Environmental Impact Statement (EIS):

10+4 with Buffer Alternative
10+4 with Barrier Alternative
8+4 with Buffer Alternative
8+4 with Barrier Alternative
No-Build Alternative

The four "Build" alternatives propose to construct up to four High Occupancy Vehicle (HOV)/Managed lanes and up to two additional main lanes, depending on the alternative. Auxiliary lanes located between freeway on and off ramps would be constructed to facilitate weaving movements in various sections of the Project limits. The project also includes four Direct Access Ramps (DARs) that would allow local traffic to enter and exit the median HOV/managed lanes from and to new overcrossings without having to access the main traffic lanes. The DARs are proposed to be located near Voigt Drive (City of San Diego), Manchester Avenue (City of Encinitas), Cannon Road (City of Carlsbad), and Oceanside Boulevard (City of Oceanside). A new park and ride facility is also proposed for the Manchester Avenue DAR area.

Traffic volumes and lane configurations for the existing conditions (Year 2006) are presented in Exhibit A. The predicted traffic volumes in the year 2030 and proposed lane configurations for the 8+4 and 10+4 Build Alternatives are presented in Exhibits B and C, respectively. The traffic volumes presented in the Exhibits B and C are based on Wilson & Company's *Traffic Demand Forecasting Report*.

2.1 Proposed 10+4 Alternatives

Both versions of the proposed 10+4 alternative (with buffer and with barrier) add two HOV/ Managed lanes in the existing I-5 freeway median between La Jolla Village Drive and the I-5/I-805 junction. Ten main lanes are proposed between La Jolla Village Drive and Genesee Avenue. The main lanes undergo a series of lane transitions (reductions or additions) depending on direction (i.e., northbound or southbound) between Genesee Avenue and the I-5/I-805 junction. Between the I-5/I-805 junction and State Route 78, the alternative proposes up to four median HOV/Managed lanes

and outside widening resulting in up to ten main lanes. Between State Route 78 and Harbor Drive, the alternative proposes four median HOV/Managed lanes and eight main lanes. The additional number of main and auxiliary lanes included in both 10+4 alternatives varies at specific locations to accommodate traffic volume projections.

2.2 Proposed 8+4 Alternatives

Both versions of the proposed 8+4 alternative (with buffer and with barrier) add two HOV/Managed lanes (one northbound and one southbound) in the existing I-5 freeway median between La Jolla Village Drive and the I-5/I-805 junction. Four HOV/Managed lanes (two northbound and two southbound) would continue north in the I-5 median from the I-5/I-805 junction to the extent of the Project limits at Harbor Drive in the City of Oceanside. Neither version of the 8+4 alternative proposes the construction of additional main lanes on I-5, thus maintaining the current configuration of 8 total main lanes throughout the Project corridor. The additional number of auxiliary lanes included in both 8+4 alternatives varies at specific locations to accommodate traffic volume projections. The 8+4 alternative includes the construction of DAR facilities.

2.3 No Build Alternative

Corridor widening would not occur under the No Build alternative. The existing freeway conditions would only be modified according to projects currently programmed and/or under construction.

3.0 Existing Conditions

Traffic volumes contained in Exhibit A were used to determine existing conditions of the I-5 corridor within the Project limits. Current freeway operations were assessed by examining historical recurrent bottlenecks (Chapter 3), weekday travel times for the historical and existing conditions (Chapters 3 and 5), historical and future annual average daily traffic (Chapter 4), delay (Chapter 5), main lane Level of Service (Chapter 6), interchange to interchange weaving (Chapter 7), weekend travel times for the historical and existing conditions (Chapter 8), and existing HOV traffic volumes (Chapter 9).

3.1 Existing Facility

Within the Project limits, the existing I-5 freeway consists of eight (8) general purpose lanes with 27 separate interchanges. Auxiliary lanes exist at various locations along the freeway between interchanges. The existing I-5 has two HOV lanes (one lane in each direction) between the I-5/I-805 junction and the Via de la Valle undercrossing. The existing conditions represent the year 2006. Auxiliary lanes exist at various locations along the freeway between interchanges. The I-5 freeway intersects four separate freeways within the Project limits: I-805, State Route 56, State Route 78, and State Route 76. A separate 4-lane bypass facility runs parallel alongside the I-5 freeway between its junctions with the I-805 freeway and State Route 56.

The existing I-5 corridor's lane configurations, ramp locations, and traffic volumes within the Project limits are illustrated in Exhibit A. The existing volumes are a compilation of volumes collected by several sources (Caltrans and local agencies) from 2004 through 2006. The result is a hybrid traffic census representing existing conditions in the year 2006.

3.2 Freeway Performance Measurement System

The Freeway Performance Measurement System (PeMS), a software tool developed at the University of California, Berkeley, is a traffic collection, processing, and analysis program used to evaluate the performance of freeway systems. The PeMS database logs data from the California freeway traffic detectors as well as incident related data from the California Highway Patrol and weather data. PeMS obtains 30-second loop detector data in real time from each California Department of Transportation (Caltrans) district Transportation Management Center. Each 30-second data set consists of counts (number of vehicles crossing the loop). UC Berkeley hosts the PeMS server and stores all the data it receives allowing for the extraction of real time and historical data. PeMS is a joint effort by Caltrans, UC Berkeley, and the Partnership for Advanced Technology on Highways (PATH).

3.2.1 Travel Time

Recent (2003-2005) and existing (2006) data extracted from the PeMS database provided a comparison of average weekday freeway travel times along specific segments of the I-5. The results are the average weekday travel times for the northbound and southbound directions as shown in Figures 3.1 and 3.2 below. These two figures represent the average time to travel the entire project

area. For example, in Figure 3.1, if in the year 2005 a trip that started at 3:30 pm from La Jolla Village Drive and ended northward at Harbor Drive would take an average of 34 minutes.

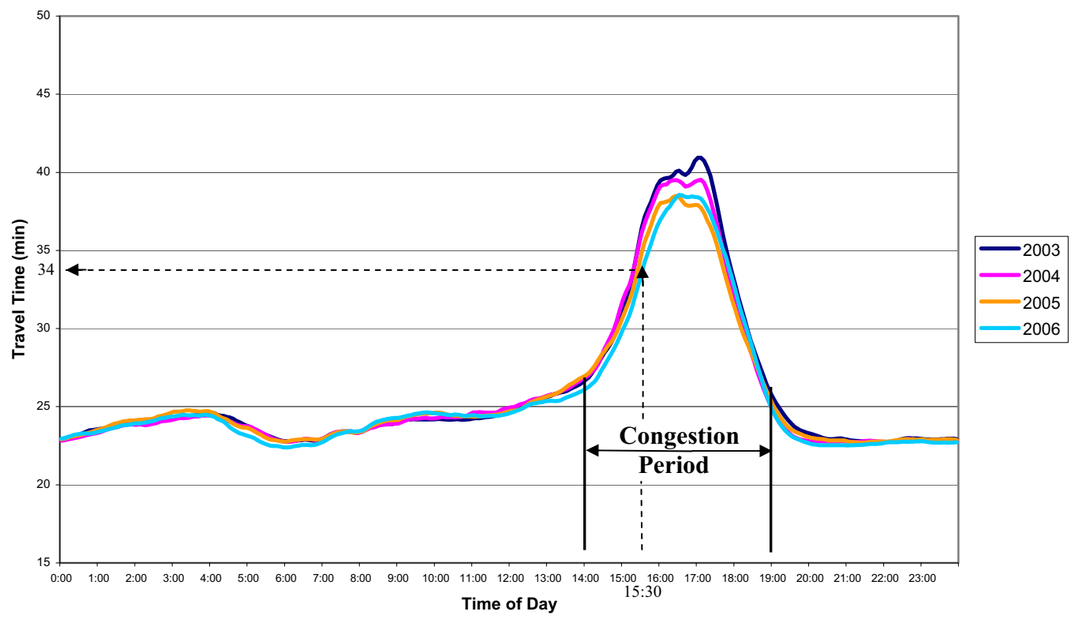


Figure 3.1 I-5 Northbound Weekday Traffic Average Travel Time: La Jolla Village Drive to Harbor Drive

For all years studied and in the northbound direction, there is an increase in travel time between 2 pm and 7 pm, for a total peak period of congestion of 5 hours. The trends for average travel time in respect to time of day from 2003 to 2005 have remained consistent. Figure 3.1 also shows a slight decrease in average travel time from about 40 minutes to 38 minutes between the years 2003 to 2006. The slight decrease in average PM peak travel time shown in Figure 3.1 may be due to influences of past construction activities in the corridor.

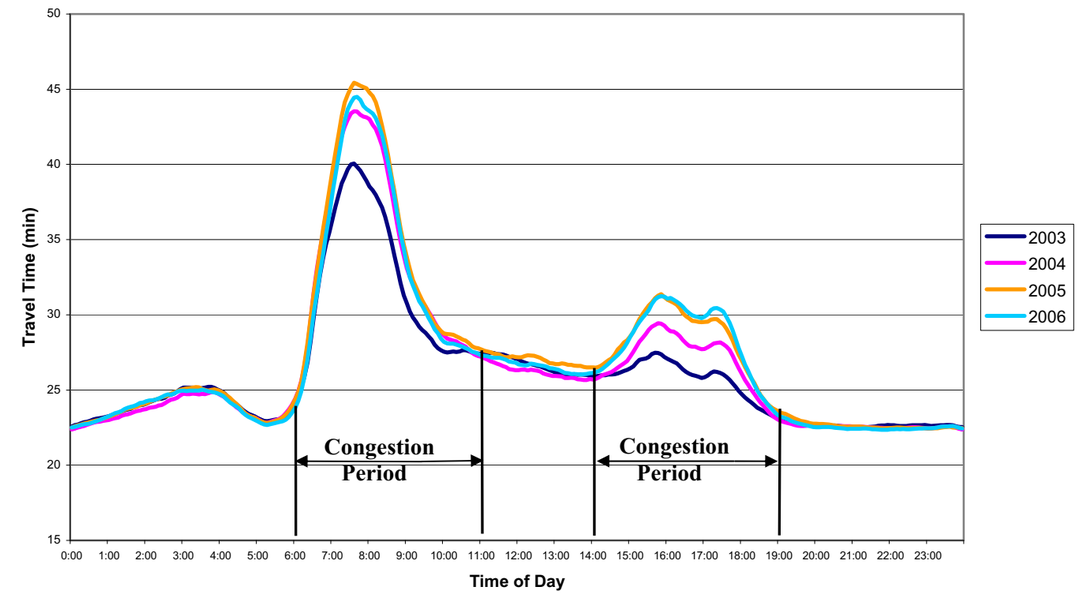


Figure 3.2 I-5 Southbound Weekday Traffic Average Travel Time: Harbor Drive to La Jolla Village Drive

The overall basic southbound trends illustrated by Figure 3.2 are similar from 2003 through 2006 with increasing AM and PM peak hour average travel times in each successive year. The average travel time during the southbound AM peak at 8:00 am has increased 5 minutes from 40 minutes in 2003 to 45 minutes in 2006. The average travel time during southbound PM peak has increased about 5 minutes from 26 minutes in 2003 to 31 minutes in 2006. The peak period of congestion has spread by about 30 minutes for both the AM and PM peaks.

Figure 3.2 illustrates that the AM peak is the primary directional peak with an average travel time in 2006 of 45 minutes. The PM peak has a much smaller travel time of about 32 minutes in 2006. Figure 3.2 is depicting a pattern of continuous congestion between 6:00 am and 7:00 pm.

3.2.2 Bottlenecks

A bottleneck is a persistent drop in speed between two locations on a freeway. A bottleneck can have a number of causes, including a change in capacity (like a reduction of the number of lanes), a visual distraction, an incident, a weaving section, etc. Bottlenecks can cause increased average travel time and congestion along the I-5 corridor. There are two classifications of bottlenecks: non-recurrent and recurrent. A non-recurrent bottleneck is due to an unforeseen event, such as an accident. A recurrent bottleneck is due to daily and predictable traffic patterns like those occurring during traffic rush-hour.

PeMS was utilized to detect weekday peak hour bottlenecks on the I-5 freeway within the Project limits for the year 2005. Summaries of the most recurrent weekday northbound and southbound bottlenecks are in Tables 3.1 and 3.2, respectively. Excluding weekends and holidays, there are a total of 247 weekdays in a calendar year. Bottlenecks in Tables 3.1 and 3.2 were identified by PeMS as occurring 20% of the time or more for the 2005 calendar year. The analysis performed was for main lanes only and excludes HOV lanes. PeMS uses 35 miles per hour as the reference speed for the delay associated with bottlenecks.

Bottlenecks with the same bottleneck number listed in the tables below are in close proximity to one another and thus overlap each other. Note that there are not any northbound bottlenecks within the Project limits in the AM peak hour

Table 3.1 2005 Northbound I-5 Bottlenecks

Bottleneck Number	Location	Peak Hour	Average Queue Length (mi)	Average Delay (veh-hrs)	Average Duration (hrs)
1	Carmel Valley Road	PM	5.0	723	2.6
1	Via de la Valle	PM	4.7	2900	3.3
1	Lomas Santa Fe	PM	6.7	1486	1.0
2	Leucadia Blvd	PM	2.9	369	0.9
3	Cannon Road	PM	3.7	986	2.0

Table 3.2 2005 Southbound I-5 Bottlenecks

Bottleneck Number	Location	Peak Hour	Average Queue Length (mi)	Average Delay (veh-hrs)	Average Duration (hrs)
4	Via de la Valle	AM	7.3	1037	0.8
4	Manchester Ave	AM	6.0	1671	1.8
4	Birmingham Dr	AM	4.5	441	0.6
5	Oceanside Blvd	PM	2.9	518	1.3
6	Manchester Ave	PM	5.3	1274	1.4
6	Birmingham Dr	PM	4.1	204	0.4

PeMS was also used to identify bottlenecks as aggregated speed plots, which are presented below for the bottlenecks listed in Tables 3.1 and 3.2. For example, the bottlenecks associated with bottleneck number 4 are illustrated in Figure 3.6. The data in Tables 3.1 and 3.2 represent averages for the year 2005 whereas the data in Figures 3.3 through 3.8 are for a single day occurrence, which basically represents the averages in graphic form.

The period of congestion is determined by the duration of the bottleneck, as seen in Figures 3.3 through 3.8, using the white "x" marks denoting the bottleneck location in conjunction with the Time of Day axis. The more "x" marks, the longer period of congestion at that particular location. For example, the first bottleneck identified in Figure 3.3 at Via de la Valle (postmile 36) has a duration of approximately 1 hour (3 pm to 4 pm). Yet when this bottleneck reappears at approximately 4:20 pm, it lasts until about 6:20 pm for a total period of congestion of 2 hours. The period of congestion for the bottlenecks in Figures 3.3 through 3.8 should be similar in most cases to their corresponding average duration in Tables 3.1 and 3.2.

The length of congestion, or length of queue, is determined using the Postmile axis in Figures 3.3 through 3.8. For example, the Via de la Valle bottleneck in Figure 3.3 at 5 pm has a queue length of approximately 3 miles.

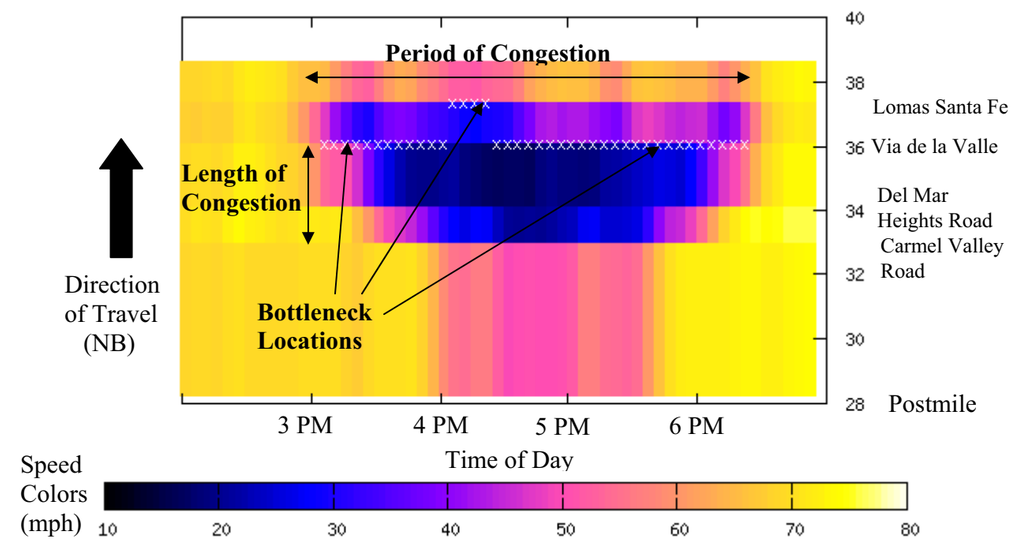


Figure 3.3 Aggregated Speed Plot for Bottleneck 1: NB from Carmel Valley Road to Lomas Santa Fe

The bottlenecks depicted in Figure 3.3 occurred on a typical weekday (May 17, 2005) at various afternoon times on a ten-mile stretch of freeway along the northbound I-5. Bottlenecks are identified at the Via de la Valle and Lomas Santa Fe undercrossings. The colors in the figure indicate the speed of the vehicles at different times and locations, which correspond to the color chart directly

beneath the figure. The darker colors indicate a slower travel speed, which is prevalent at the bottleneck locations and subsequent queues during the PM peak hour. The bottleneck at Lomas Santa Fe overlaps the bottleneck at Via de la Valle between 4 pm to 4:20 pm and thereby the "x" marks in the figure move to Lomas Santa Fe from Via de la Valle. In the northbound PM peak hour, the bottleneck at Via de la Valle occurred 247 times in 2005, which is the number of days examined by this analysis. The bottleneck at Lomas Santa Fe occurred 89 times during the 2005 calendar year.

The northbound PM bottleneck at the Via de la Valle undercrossing may be attributed to freeway geometry changes at this location. The HOV lane striping ends, converting the HOV lane into a general-purpose lane. Lane number five, an auxiliary lane, exits at Via de la Valle and shortly thereafter lane number 4 merges with lane number 3. In a distance of less than one thousand meters, the facility, which is comprised of five general-purpose lanes and one HOV lane, is transitions to a four general-purpose lane facility at this undercrossing.

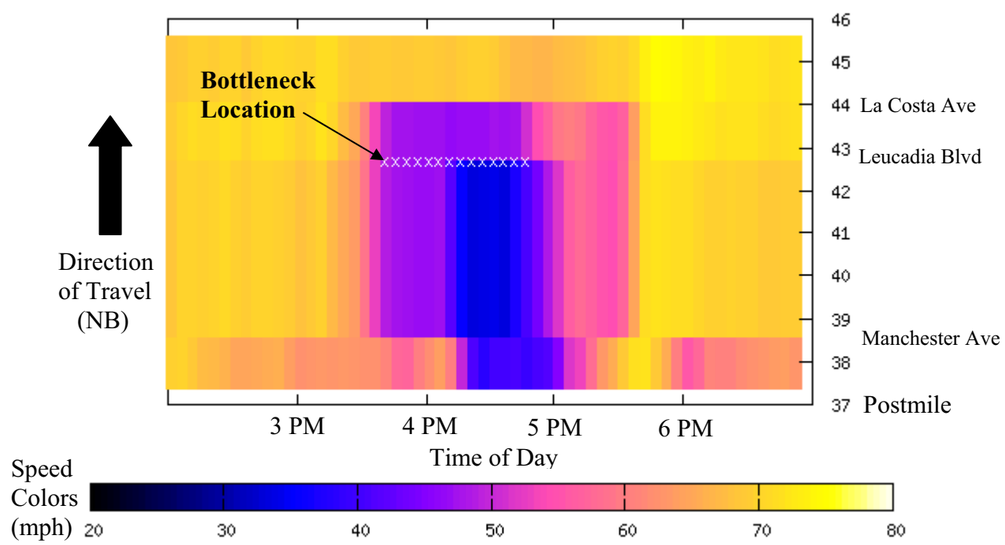


Figure 3.4 Aggregated Speed Plot for Bottleneck 2: NB at Leucadia Blvd

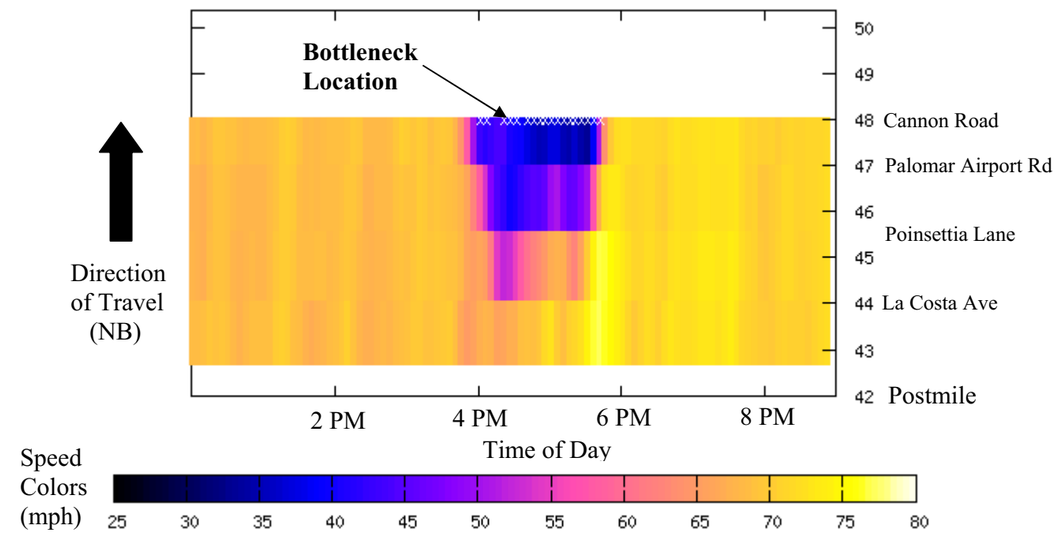


Figure 3.5 Aggregated Speed Plot for Bottleneck 3: NB at Cannon Road

The bottleneck depicted in Figure 3.4 is at Leucadia Boulevard for a typical weekday (May 25, 2005). The bottleneck occurred 79 times in the northbound PM peak hour in the year 2005. The queue shown in the figure is approximately 4 miles long and lasts about one hour.

The bottleneck depicted in Figure 3.5 is at Cannon Road for a typical weekday (April 21, 2005). The bottleneck shown has a congestion for approximately 2 hours with a queue length of 2.5 miles. The average speed at the Cannon Road bottleneck does not appear to go below 30 miles per hour on this particular day. At this location, I-5 appears to be at its most congested condition between 5:00 pm and 5:30 pm. The bottleneck at Cannon Road occurred 198 of the possible 247 weekdays in the year 2005.

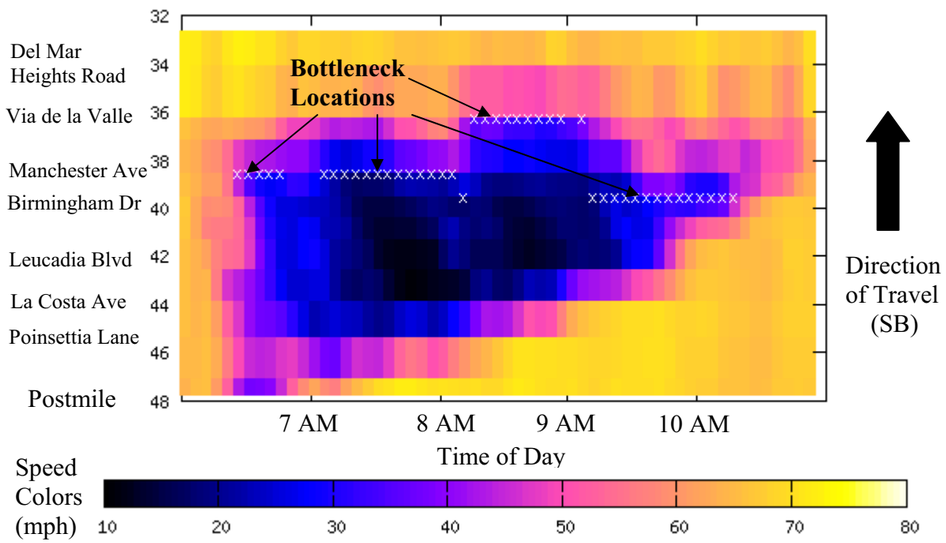


Figure 3.6 Aggregated Speed Plot for Bottleneck 4: SB from Birmingham Dr. to Via de la Valle

The bottlenecks depicted in Figure 3.6 occurred on a typical weekday (May 5, 2005). The Manchester Avenue and Birmingham Drive bottlenecks are about one mile apart. Although Figure 3.6 shows the initial primary bottleneck to be at Manchester Avenue, there is another bottleneck not identified in the figure occurring simultaneously at Birmingham Drive and overlap each other. The bottleneck at Birmingham Drive appears after 9 am when the bottleneck at Manchester Avenue has dissipated. In 2005, weekday bottlenecks at Manchester Avenue and Birmingham Drive in the southbound AM peak hour occurred 227 and 180 times, respectively. The aggregated speed plot indicates that vehicle speeds in the queue caused by the bottlenecks can be 10 miles per hour or less for a significant amount of time. The figure also illustrates how a third bottleneck at Via de la Valle occurs during the prime AM peak hour from 8 am to 9 am, although not as intensive as the bottlenecks at Manchester Avenue and Birmingham Drive. The bottlenecks at Manchester Avenue and Birmingham Drive are occurring during the same time period, yet overlap by the Via de la Valle bottleneck. The AM peak hour bottleneck at Via de la Valle recurred 56 times in 2005. The period of congestion on this particular day lasted for over 3 hours, with queues approaching La Costa Avenue and Poinsettia Lane, which is almost 8 miles away from Manchester Avenue.

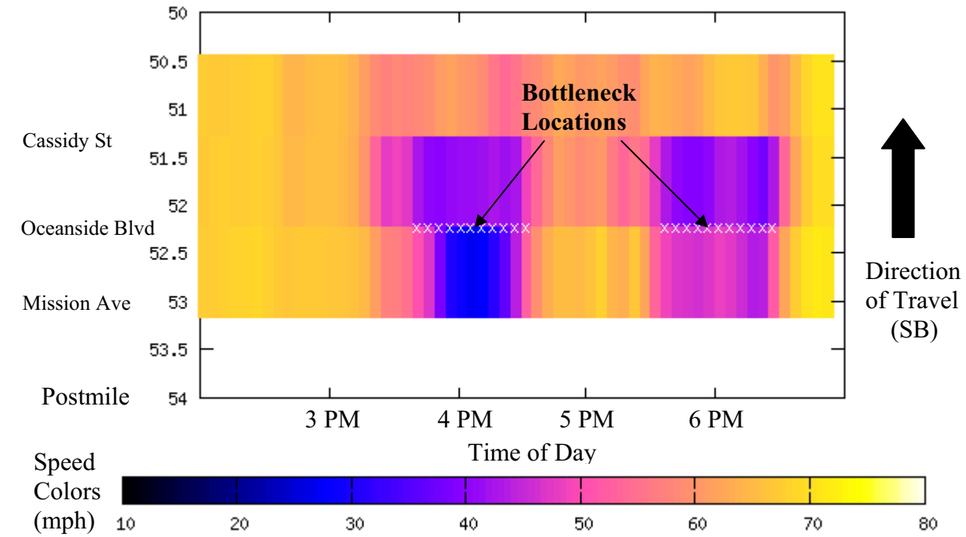


Figure 3.7 Aggregated Speed Plot for Bottleneck 5: SB at Oceanside Blvd

The bottleneck depicted in Figure 3.7 is at Oceanside Boulevard for a typical weekday (May 12, 2005). The southbound PM peak hour bottleneck at Oceanside Boulevard occurred 50 times in the year 2005. The queue shown in Figure 3.7 extends about one mile to Mission Avenue and possibly further since data in Table 3.2 indicates the average queue length to be about 3 miles. This queue cannot be verified or determined since PeMS has not been collected data further north on the southbound side of the I-5 freeway. Figure 3.7 shows that traffic undergoes relatively slower speeds after the bottleneck at Oceanside Boulevard from congestion due to weaving between Cassidy Street and State Route 78. This weaving occurs over a short distance of 350 meters.

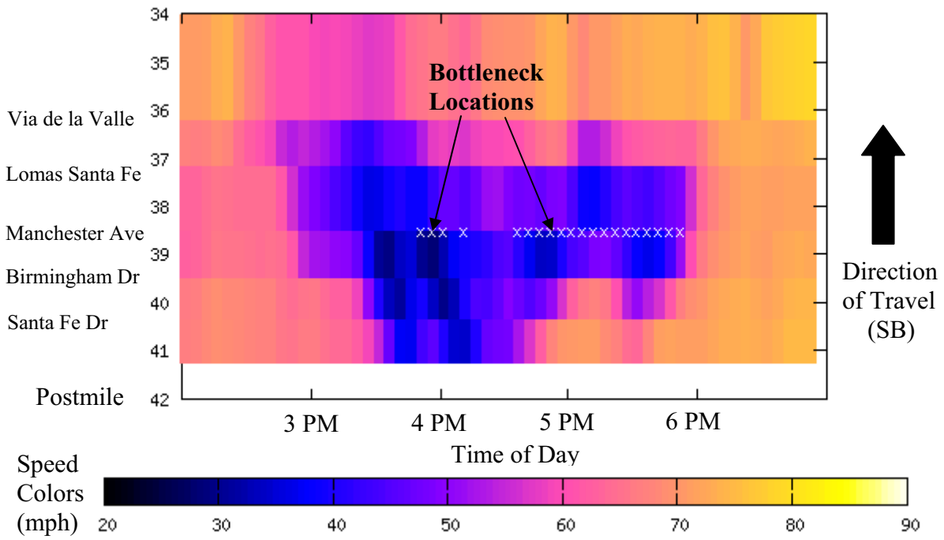


Figure 3.8 Aggregated Speed Plot for Bottleneck 6: SB Birmingham Dr to Manchester Ave

The bottlenecks depicted in Figure 3.8 occurred on a typical weekday (April 14, 2005). The figure indicates that traffic after the Manchester Avenue bottleneck travels at speeds of 30-40 miles per hour until the Lomas Santa Fe undercrossing. A bottleneck develops around 4 pm at Manchester Avenue and overlaps a bottleneck occurring simultaneously at Birmingham Drive. The queues from the bottleneck at Birmingham Drive extend north to the Santa Fe Drive interchange. The 3-mile segment of the I-5 from Lomas Santa Fe to Santa Fe Drive is consistently congested for approximately 3 hours in the afternoon from 3 pm to 6 pm. In the year 2005, the southbound PM peak hour bottlenecks at Manchester Avenue and Birmingham Drive occurred 117 and 57 times, respectively.

4 Annual Average Daily Traffic (AADT) and Vehicle-Miles Traveled (VMT)

4.1 Historical Traffic Trends

Historical traffic trends along the I-5 corridor are presented in terms of Annual Average Daily Traffic (AADT). Caltrans-Office of Traffic Operations provided historical AADT for the I-5 corridor. Table 3.1 summarizes AADT traffic trends at seven freeway segments along the I-5 corridor for the Years 1970, 1975, 1980, 1985, 1990, 1995 and 2000. The listed freeway segments were selected to represent the entire I-5 corridor with at least one segment in each affected city traversed by the Project. Table 4.1 shows that I-5 freeway (within the project area) had an increase in AADT during the years identified.

Table 4.1 I-5 Annual Average Daily Traffic (AADT)

Location		1970	1975	1980	1985	1990	1995	2000
From	To	ADT	ADT	ADT	ADT	ADT	ADT	ADT
La Jolla Village Drive	Genesee Ave	53,000	49,000	59,000	89,000	122,000	129,000	145,000
I-5 / I-805 Junction	Carmel Valley Road	48,000	75,000	103,000	155,000	219,000	213,000	254,000
Via de la Valle	Lomas Santa Fe	48,000	69,000	96,000	140,000	189,000	189,000	215,000
Encinitas Blvd	Leucadia Blvd	43,000	62,000	81,000	116,000	162,000	168,000	198,000
Palomar Airport Road	Cannon Road	44,500	61,000	79,000	109,000	156,000	159,000	190,000
SR-78	Oceanside Blvd	56,000	71,000	90,000	119,000	159,000	156,000	197,000
Mission Ave	SR-76	49,000	59,000	72,000	101,000	137,000	126,000	156,000

4.2 Future Traffic Conditions

Wilson & Company's *Traffic Demand Forecasting Report* (Technical Report No. 5) provides information on future year traffic forecasts within the project limits. Five different traffic scenarios were modeled using the SANDAG Series 10 Transportation Model to produce future year traffic forecasts, as follows:

1. *No-Build (Year 2030).*
2. *10+4 without Direct Access Ramps (Year 2030).*
3. *10+4 with Direct Access Ramps (Year 2030).*
4. *8+4 with Direct Access Ramps (Year 2030).*
5. *10+4 with Direct Access Ramps (Year 2015).*

SANDAG's Series 10 Transportation Model does not differentiate the design details for buffer or barrier alternatives to generate the forecasted traffic volumes. For example, the 2030-year 10+4 alternative with DAR traffic forecast is used for both buffer and barrier versions. Both barrier and buffer alternatives propose the same HOV/managed lane ingress and egress points and DAR locations.

The 2030-year traffic forecasts for the proposed alternatives (No Build, 8+4, and 10+4) have an average corridor demand range of 54% to 74% greater than the existing volumes. A list of forecasted 2030-year I-5 ADT at select locations along the Project corridor compared to the existing conditions is presented below.

Table 4.2 I-5 Annual Average Daily Traffic (AADT)

Location		Existing/2006 ADT	2030 No Build ADT	2030 8+4 ADT	2030 10+4 ADT
From	To				
La Jolla Village Drive	Genesee Ave	169,900	249,590	255,250	262,150
I-5 / I-805 Junction	Carmel Valley Road	281,400	412,640	425,750	434,250
Via de la Valle	Lomas Santa Fe	203,600	326,940	342,950	354,250
Encinitas Blvd	Leucadia Blvd	190,500	294,300	315,150	326,850
Palomar Airport Road	Cannon Road	188,500	290,100	309,850	320,350
SR-78	Oceanside Blvd	192,900	303,800	319,150	323,300
Mission Ave	SR-76	156,800	246,500	258,000	259,200

The No Build alternative demand on the I-5 freeway is 4% to 11% less than the 10+4 alternative and 1% to 8% less than the 8+4 alternative. The No Build scenario shows less demand than the 2030-year Build alternatives as a result of trip diversion to roadways that parallel the I-5 corridor.

The 2030-year traffic scenario for the 8+4 alternative with DAR has a 16% greater average ADT in the HOV lanes than the 2030-year traffic scenario for the 10+4 alternative with DAR. The result is attributed to having a more congested mainline on I-5, thereby causing more use of the HOV/managed lanes. The total corridor ADT (main line, HOV/managed lanes, and bypass) for the 8+4 alternative is about 3% less than the 10+4 alternative

4.3 Vehicle-Miles Traveled (VMT)

Vehicle-miles traveled (VMT) is the average traffic in a freeway segment multiplied by the total distance of that freeway segment. Existing VMT values from PeMS were compared with forecasted VMT values for the year 2030 within the project limits from La Jolla Village Drive to Harbor Drive for a total distance of 27 miles. VMT values for the year 2030 were estimated using the Regional Travel Demand Model.

Figure 4.1 compares the VMT values from PeMS in the northbound and southbound directions for existing conditions and the forecasted 2030 conditions for the no-build, 8+4, and 10+4 alternatives. In the northbound direction, the VMT for existing conditions, no-build, 8+4, and 10+4 alternatives are approximately 2,700,000, 3,459,000, 3,600,000, and 3,770,000, respectively. In the southbound direction, the VMT for existing conditions, no-build, 8+4, and 10+4 alternatives are approximately 2,740,000, 3,590,000, 3,722,000, and 3,864,000, respectively. The total existing VMT in the northbound and southbound directions for existing conditions, no-build, 8+4, and 10+4 alternatives are approximately 5,440,000, 7,049,000, 7,322,000, and 7,634,000, respectively.

The forecasted VMT for the year 2030 will increase for the no-build and build alternatives when compared to the existing VMT. The VMT increases incrementally between these alternatives due to the additional forecasted traffic that more lanes can provide.

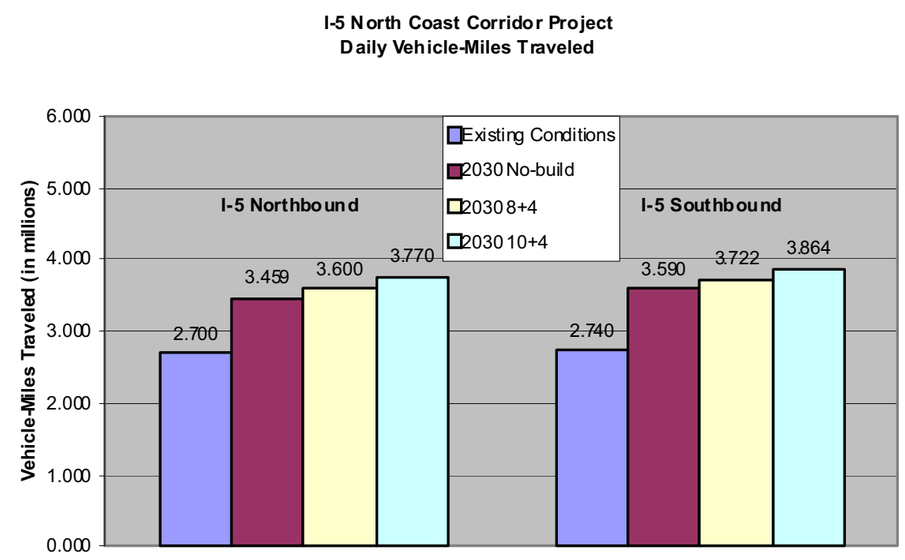


Figure 4.1 I-5 Northbound and Southbound Vehicle-Miles Traveled (VMT).

5 Existing and Forecasted Main Lanes Travel Times and Delay

FREQ12 is a macroscopic and deterministic traffic modeling computer program developed by Dr. Adolf May, Professor Emeritus of Civil Engineering, through the Institute of Transportation Studies at the University of California, Berkeley. FREQ12 version 3.01 was applied to generate hypothetical performance measures for the I-5 within the Project limits for the "No Build", "8+4", and "10+4" conditions in various future years. The program contains a method for estimating and illustrating the location, extent, and duration of traffic bottlenecks in freeway systems based on forecasted traffic volumes and hypothetical geometric configurations in similar fashion to PeMS illustration of aggregated speed plots for existing or historical traffic conditions. The program also creates graphical illustrations and numerical outputs of predicted performance measures, bottleneck locations, and queuing patterns. The program allows for future growth scenarios and geometric improvement designs, and permits analysis of HOV facilities and multiple bottleneck over-saturated flow conditions. FREQ12 utilizes the speed-flow relations found in the 2000 HCM. FREQ12 does not create a dynamic micro-simulation or animation of traffic flow, nor does account for accidents or special events. The types of performance measures that can be generated by FREQ12 include:

- Future Travel Time (average, per time period, etc)
- Future Delay (total, per vehicle average, per time period, etc)
- Future Queuing (lengths, locations, durations)

PeMS is used to assess freeway performance for the existing and historical traffic conditions. PeMS does not assess freeway performance in future years. FREQ12 is used to assess the freeway performance within the Project limits for the "No Build", "8+4", and "10+4" traffic conditions in various future years.

NOTE: It is expected that under actual conditions of increasing corridor delay, there would be some redistribution of traffic flow and vehicle delay to adjacent city street networks that is not quantified by the FREQ model. Under conditions of very high corridor delay (>25,000 veh-hrs) the FREQ model will at the least provide a qualitative comparison between the different alternatives being modeled.

For the purposes of this modeling project, equivalent traffic demand volumes were applied to each respective alternative for each future year being modeled. This was done to evaluate hypothetical performance measures for each alternative configuration under identical traffic demand conditions during that year.

It was assumed that some degree of mode shift will occur due to the differing geometric and delay conditions of each alternative. For the purposes of the FREQ model, different baseline HOV occupancy percentages for weekday peak hours were utilized for each alternative per the following schedule:

Alternative	2+ HOV %
Existing Conditions (2006):	12%
10+4 Alternative (2030):	14%
8+4 Alternative (2030):	17%
No Build Alternative (2030):	20%

PeMS existing traffic data was used to calibrate FREQ12 models. Figures 5.1 and 5.8 illustrate existing traffic data extracted from PeMS, which is then used to calibrate FREQ12 models. Traffic data such as weekday delay, travel time, traffic queuing, and duration of congestion generated by FREQ12 for the existing traffic conditions and proposed design alternatives at various future years are presented in Figures 5.2 through 5.7 and 5.9 through 5.15.

Figures 5.1 to 5.15 illustrate the following information:

Northbound I-5:

Existing conditions (Year 2006): For the purpose of calibration, FREQ12 calculated the average travel time, the average weekday delay, and the duration of congestion for the existing conditions. The FREQ12 results in figure 5.2 are consistent with PeMS data depicted in Figure 5.1.

The average travel time to travel the project area in the northbound direction is 25 minutes in the AM peak period and 38 minutes in the PM peak period, with average speeds of 65 and 43 mph, respectively.

The average weekday delay for the northbound direction is about 3,500 vehicle hours. The duration of congestion is about 5 hours in the PM peak period (no congestion in the AM peak period) with a queue length of about 4.5 miles.

No Build Alternative (Year 2015): The predicted average travel time to travel the project area in the northbound direction would be 29 minutes in the AM peak period and 61 minutes in the PM peak period with average speeds of 56 and 26 mph, respectively.

The average weekday delay for the northbound direction would be about 12,200 vehicle hours. The duration of congestion would be about 4 hours in the AM peak period and 6 hours in the PM peak period with queue lengths of 2 and 16 miles, respectively.

No Build Alternative (Year 2030): The predicted average travel time to travel the project area in the northbound direction would be 35 minutes in the AM peak period and 120 minutes in the PM peak period with average speeds of 46 and 13 mph, respectively.

The average weekday delay for the northbound direction would be about 35,000 vehicle hours. The duration of congestion would be about 4.5 hours in the AM peak period and 9 hours in the PM peak period with queue lengths of 2 and 23 miles, respectively.

8+4 Alternative (Year 2015): The predicted average travel time to travel the project area in the northbound direction would be 25 minutes in the AM peak period and 30 minutes in the PM peak period with average speeds of 65 and 54 mph, respectively.

The average weekday delay for the northbound direction would be about 250 vehicle hours. The duration of congestion would be about 3 hours in the PM peak period (no congestion in the PM peak period) with a queue length of 1 mile.

8+4 Alternative (Year 2030): The predicted average travel time to travel the project area in the northbound direction would be 26 minutes in the AM peak period and 65 minutes in the PM peak period with average speeds of 62 and 25 mph, respectively.

The average weekday delay for the northbound direction would be about 14,500 vehicle hours. The duration of congestion would be about 7 hours in the PM peak period (no congestion in the AM peak period) with a queue length of about 7 miles.

10+4 Alternative (Year 2015): The predicted average travel time to travel the project area in the northbound direction would be 24 minutes in the AM and PM peak periods with an average speed of 67 mph. There is no predicted congestion in the northbound direction (there is no Time-Space-Speed plot for 10+4 Alternative in the Year 2015).

10+4 Alternative (Year 2030): The predicted average travel time to travel the project area in the northbound direction would be 25 minutes in the AM peak period and 30 minutes in the PM peak period with average speeds of 65 and 54 mph, respectively.
The average weekday delay for the northbound direction would be about 200 vehicle hours. The duration of congestion would be about 3 hours in the PM peak period (no congestion in the AM peak period) with a queue length of about 1 mile.

Southbound I-5:

Existing conditions (Year 2006): For the purpose of calibration, FREQ12 calculated the average travel time, the average weekday delay, and the duration of congestion for the existing conditions. The FREQ12 results in figure 5.9 are consistent with PeMS data depicted in figure 5.8.

The average travel time to travel the project area in the southbound direction is 41 minutes in the AM peak period and 30 minutes in the PM peak period, with average speeds of 40 and 54 mph, respectively.

The average weekday delay for the southbound direction is 5,700 vehicle hours. The duration of congestion is about 5 hours in the AM peak period and 5 hours in the PM peak period with a queue length of about 5.5 miles.

No Build Alternative (Year 2015): The predicted average travel time to travel the project area in the southbound direction would be 53 minutes in the AM peak period and 88 minutes in the PM peak period with average speeds of 31 and 18 mph, respectively
The average weekday delay for the southbound direction would be about 36,000 vehicle hours. The duration of congestion would be about 5.5 hours in the AM peak period and 9 hours in the PM peak period with queue lengths of about 12 and 16.5 miles, respectively.

No Build Alternative (Year 2030): The predicted average travel time to travel the project area in the southbound direction would be 90 minutes in the AM peak period and 120 minutes in the PM peak period with average speeds of 18 and 13 mph, respectively.

The average weekday delay for the southbound direction would be about 80,000 vehicle hours. The duration of congestion would be about 5.5 hours in the AM peak period and 10 hours in the PM peak period with a queue length of about 19 and 25 miles, respectively.

8+4 Alternative (Year 2015): The predicted average travel time to travel the project area in the southbound direction would be 28 minutes in the AM peak period and 25 minutes in the PM peak period with average speeds of 58 and 65 mph, respectively.

The average weekday delay for the southbound direction would be about 450 vehicle hours. The duration of congestion would be about 3 hours in the AM peak period (no congestion in the PM peak period) with a queue length of about 2 miles.

8+4 Alternative (Year 2030): The predicted average travel time to travel the project area in the southbound direction would be 63 minutes in the AM peak period and 37 minutes in the PM peak period with average speeds of 26 and 44 mph, respectively.
The average weekday delay for the southbound direction would be about 20,200 vehicle hours. The duration of congestion would be about 5.5 hours in the AM peak period and 7 hours in the PM peak period with a queue length of about 21 miles.

10+4 Alternative (Year 2015): The predicted average travel time to travel the project area in the southbound direction would be 25 minutes in the AM peak period and 24 minutes in the PM peak period with average speeds of 65 and 67 mph, respectively.

The average weekday delay for the southbound direction would be about 50 vehicle hours. The duration of congestion would be about 1.5 hours in the AM peak period (no congestion in the PM peak period) with a queue length of about 0.5 mile.

10+4 Alternative (Year 2030): The predicted average travel time to travel the corridor in the southbound direction would be 35 minutes in the AM peak period and 30 minutes in the PM peak period with average speeds of 46 and 54 mph, respectively.

The average weekday delay for the southbound direction would be about 3,700 vehicle hours. The duration of congestion would be about 4 hours in the AM peak period and 4 hours in the PM peak period with queue lengths of about 4 and 6.5 miles, respectively.

Figure 5.1 I-5 NB In Project Area – PeMS Aggregated Speed Plot PM 28.0 – 55.0 November 16, 2006

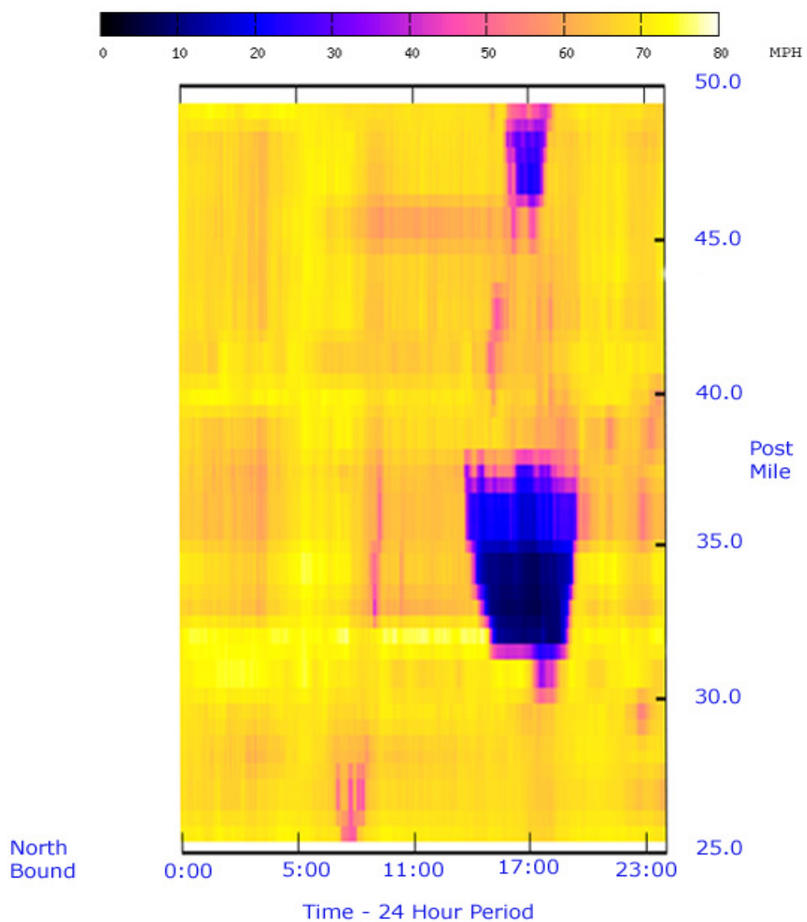


Figure 5.2 I-5 Northbound Year 2007 "Existing Conditions" FREQ12 Time-Space-Speed Diagram

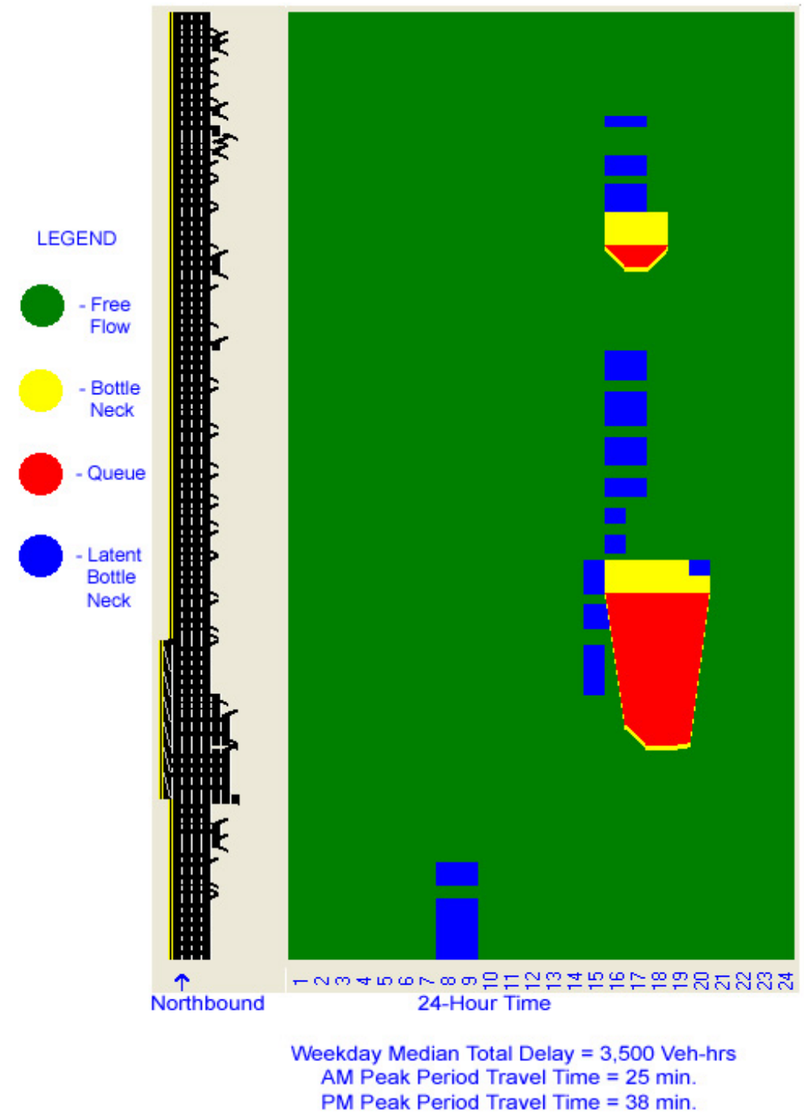
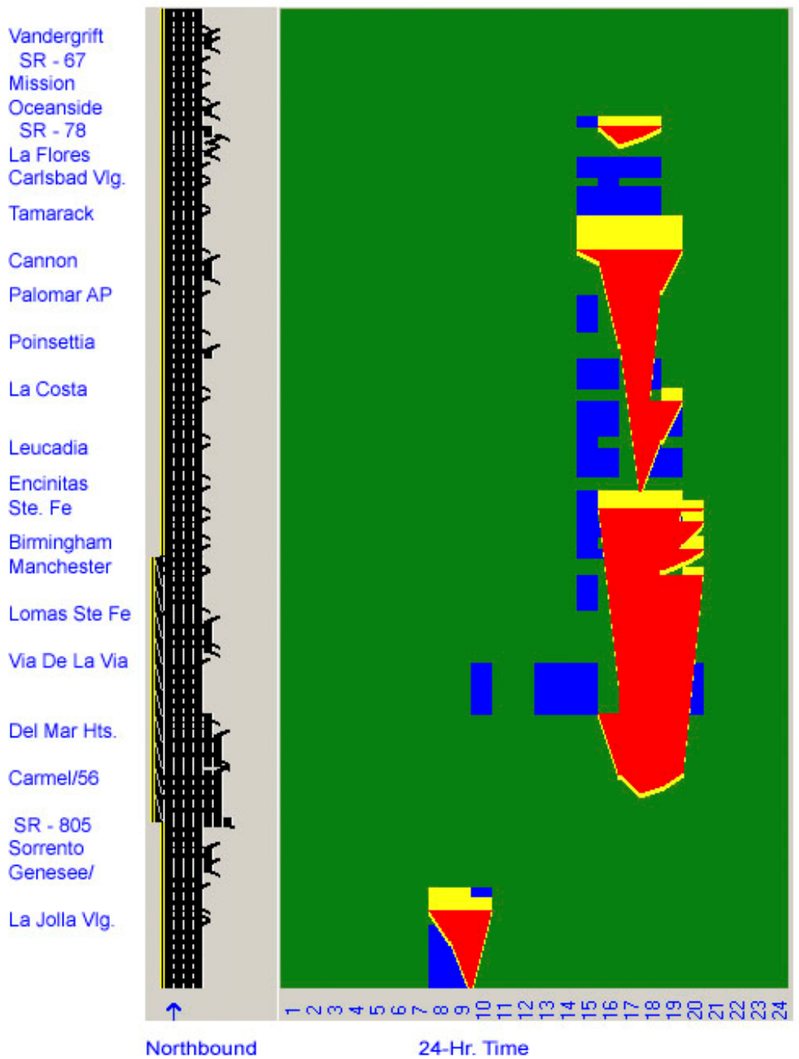
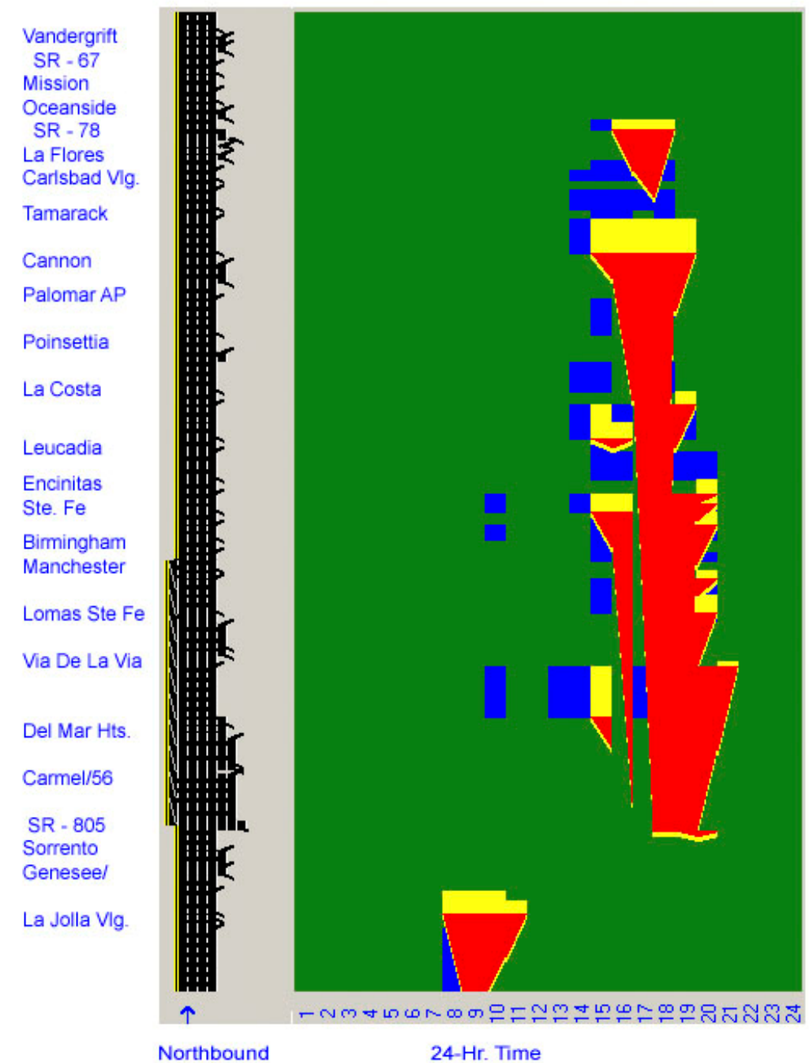


Figure 5.3 I-5 Northbound Year 2015 "No Build Alternative"
FREQ12 Time-Space-Speed Diagram



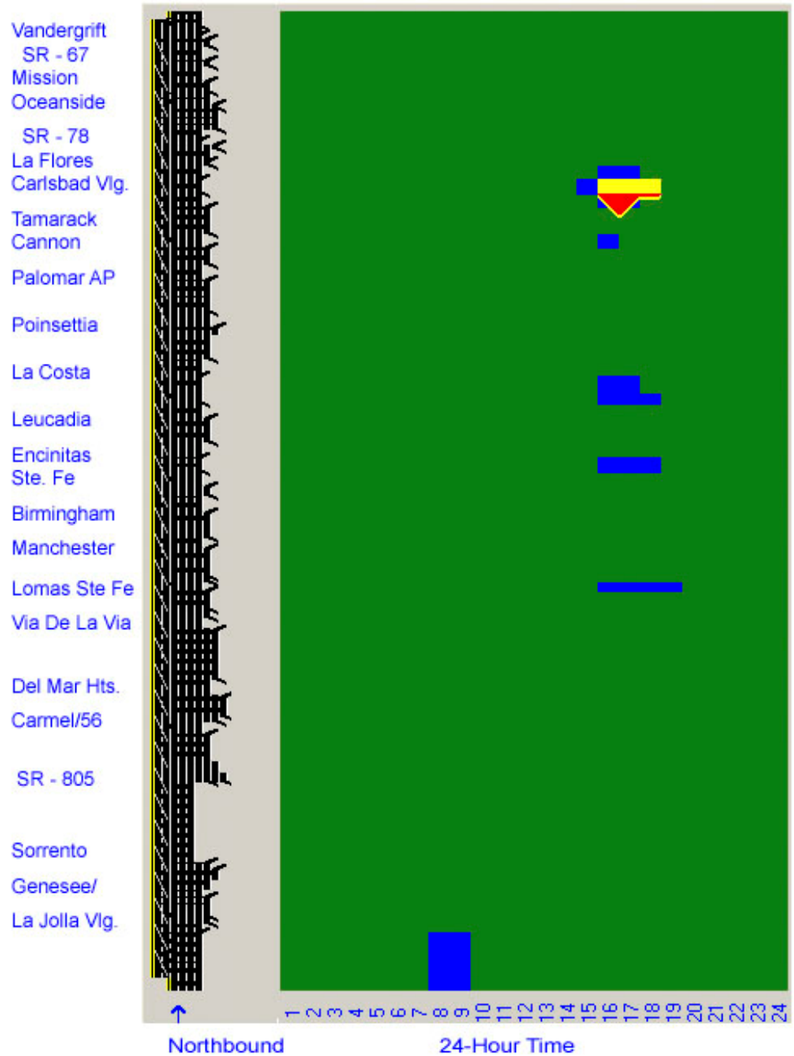
Weekday Median Delay = 7,000 Veh-hrs
AM Peak Period Travel Time = 28 min.
PM Peak Period Travel Time = 52 min.

Figure 5.4 I-5 Northbound Year 2030 "No Build Alternative"
FREQ12 Time-Space-Speed Diagram



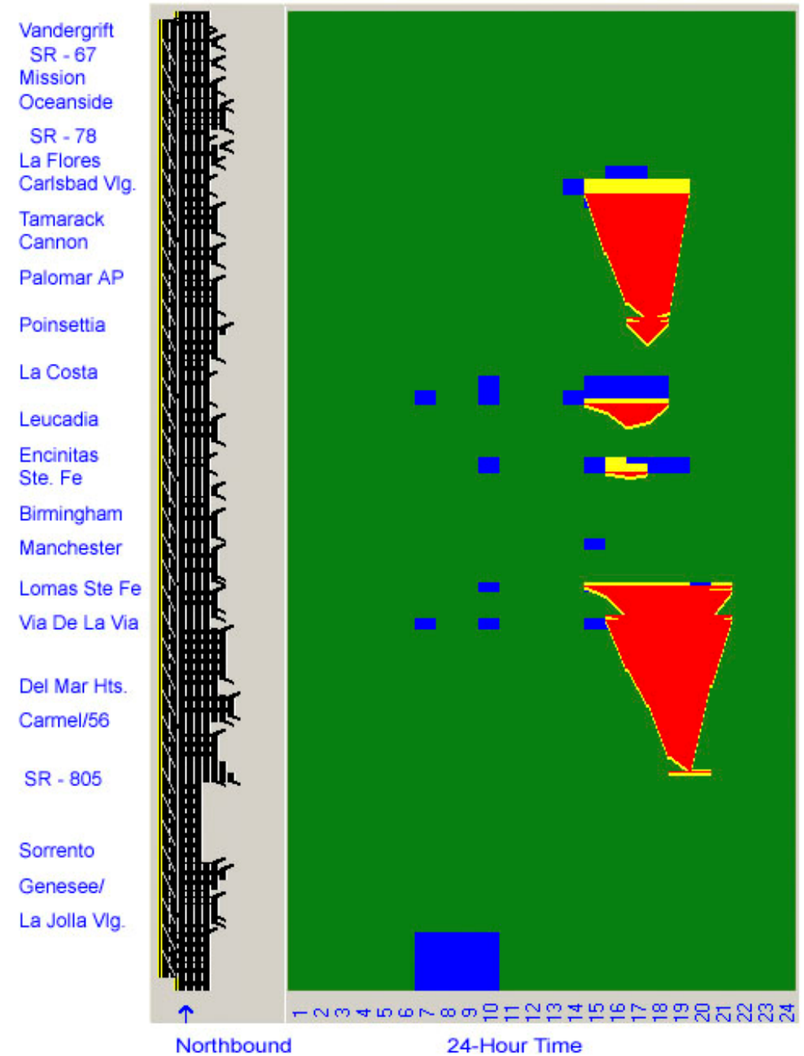
Weekday Median Delay = 13,700 Veh-hrs
AM Peak Period Travel Time = 29 min.
PM Peak Period Travel Time = 67 min.

Figure 5.5 I-5 Northbound Year 2015 "8+4 Alternative"
FREQ12 Time-Space-Speed Diagram



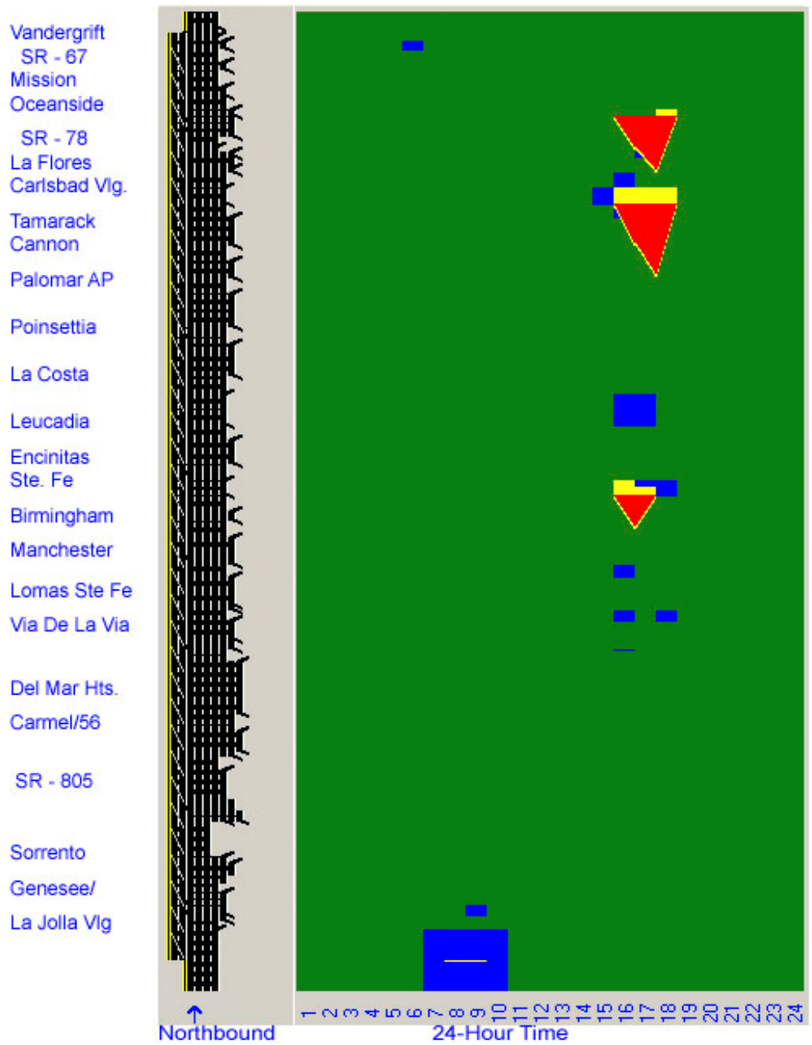
Weekday Median Delay = 50 Veh-Hrs
AM Peak Period Travel Time = 28 min.
PM Peak Period Travel Time = 29 min.

Figure 5.6 I-5 Northbound Year 2030 "8+4 Alternative"
FREQ12 Time-Space-Speed Diagram



Weekday Median Delay = 9,600 Veh-Hrs
AM Peak Period Travel Time = 29 min.
PM Peak Period Travel Time = 50 min.

Figure 5.7 I-5 Northbound Year 2030 "10+4 Alternative"
FREQ12 Time-Space-Speed Diagram



Weekday Median Delay = 600 Veh-Hrs
AM Peak Period Travel Time = 26 min.
PM Peak Period Travel Time = 30 min.

Figure 5.8 I-5 SB In Project Area – PeMS Aggregated Speed Plot
2nd Quarter of 2007

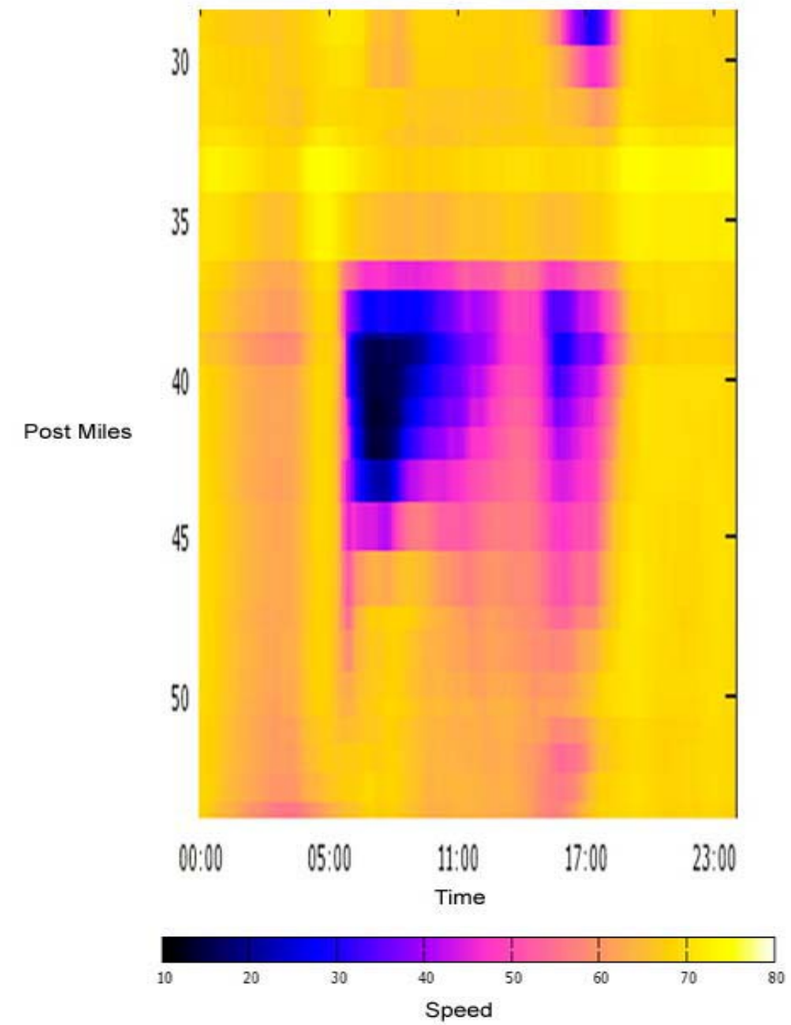
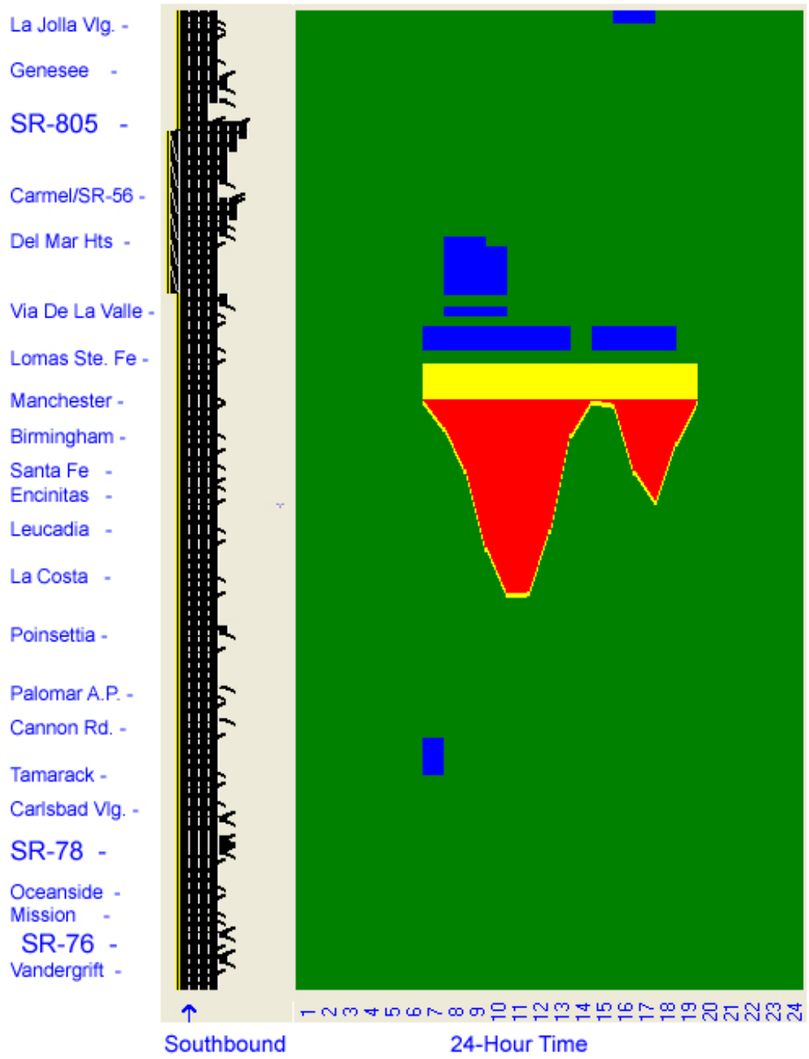
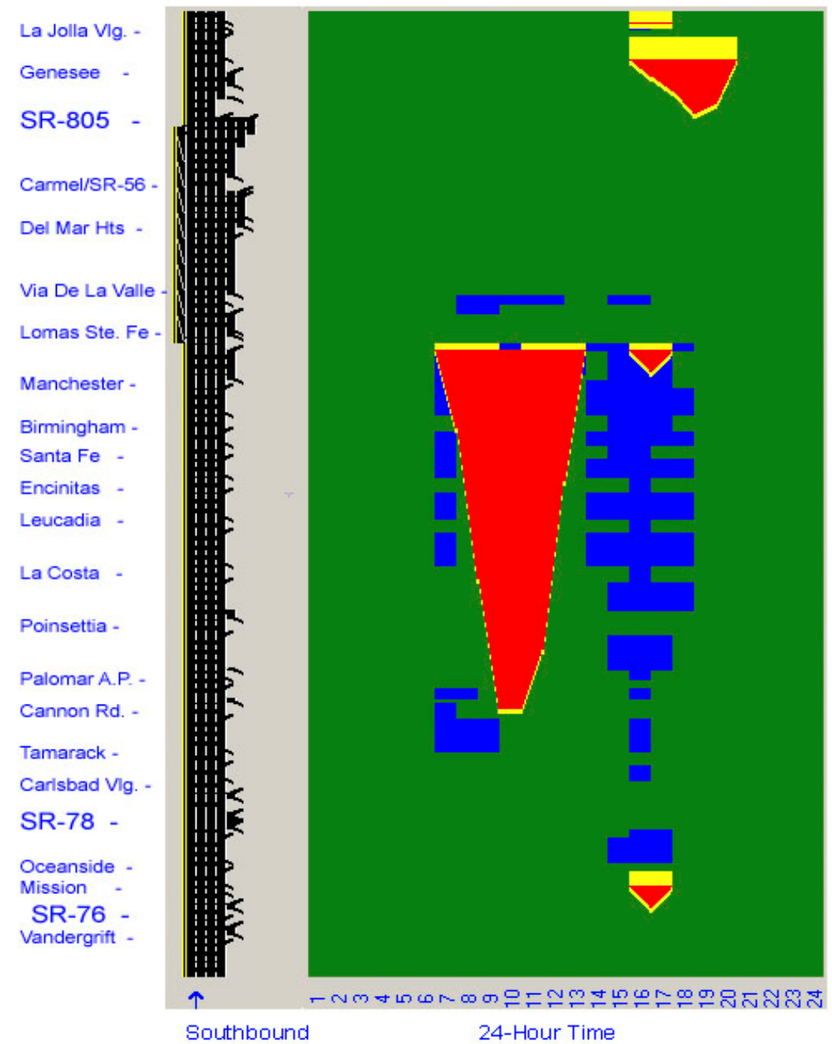


Figure 5.9 I-5 Southbound Year 2007 "Existing Conditions" FREQ12 Time–Space-Speed Diagram



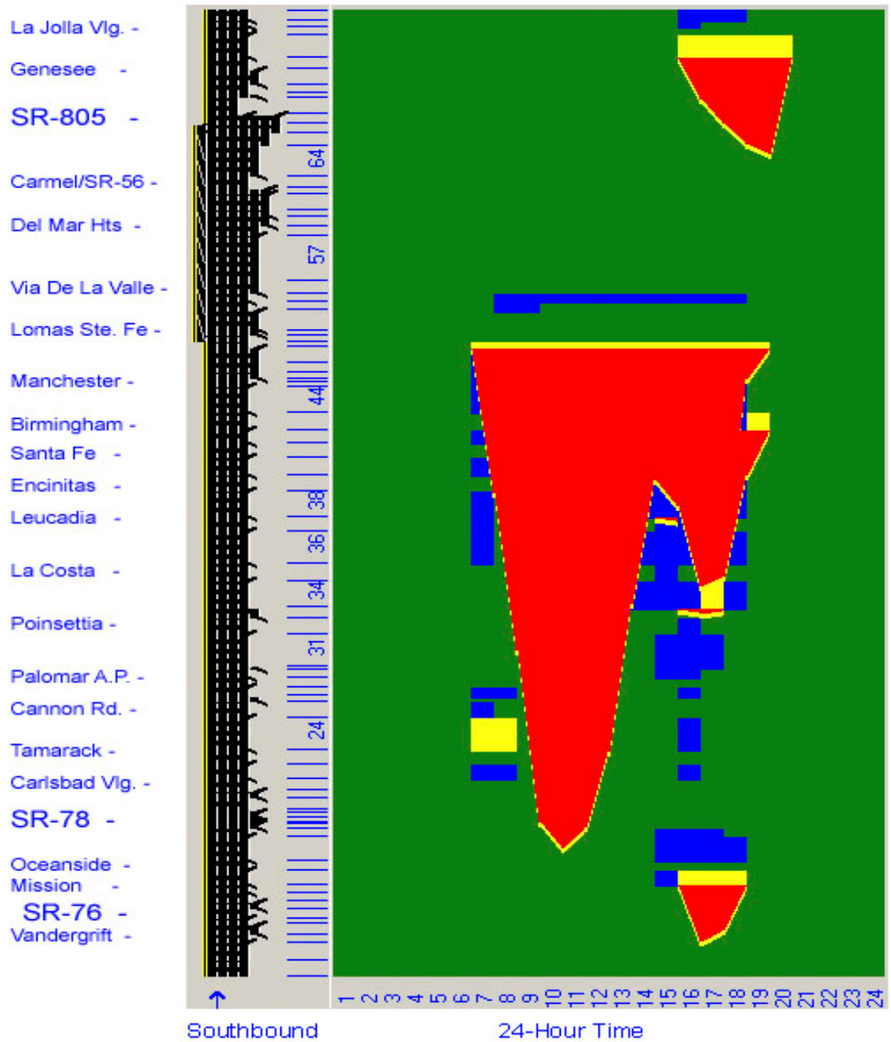
Weekday Median Delay = 4,700 Veh-hrs
AM Peak Period Travel Time = 41 min.
PM Peak Period Travel Time = 30 min.

Figure 5.10 I-5 Southbound Year 2015 "No Build Alternative" FREQ12 Time-Space Speed Diagram



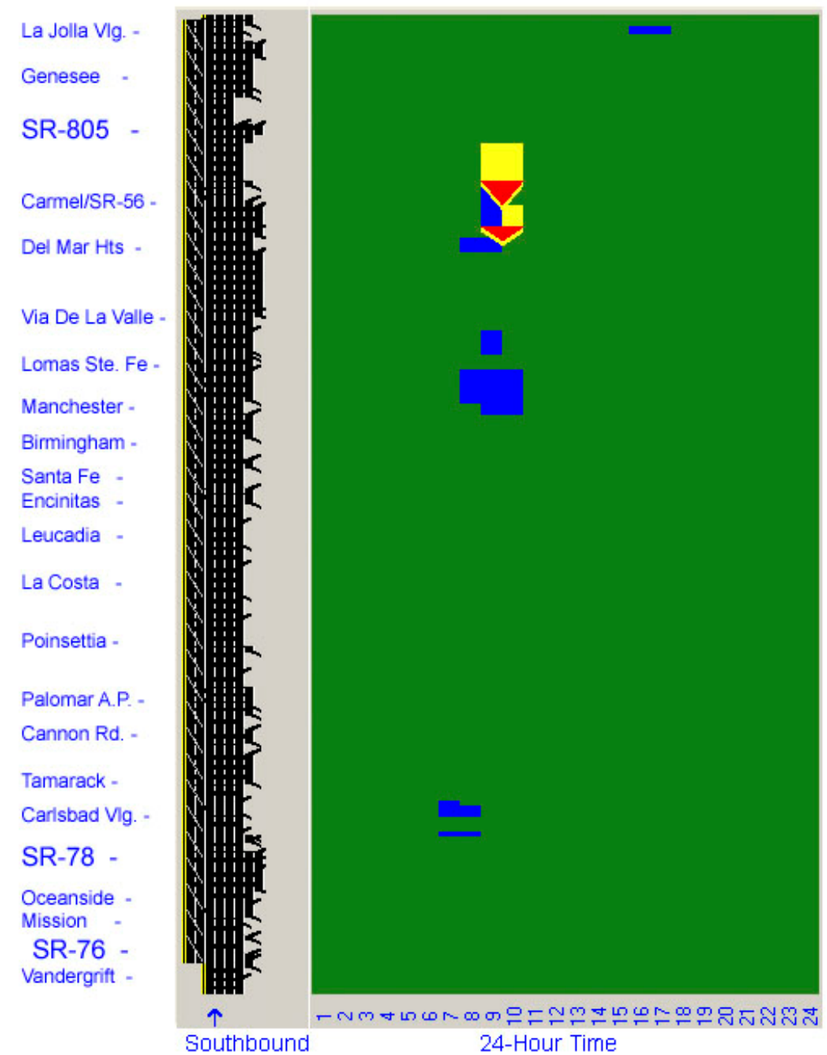
Weekday Median Delay = 5,200 Veh-hrs
AM Peak Period Travel Time = 43 min.
PM Peak Period Travel Time = 31 min.

Figure 5.11 I-5 Southbound Year 2030 "No Build Alternative"
FREQ12 Time-Space Speed Diagram



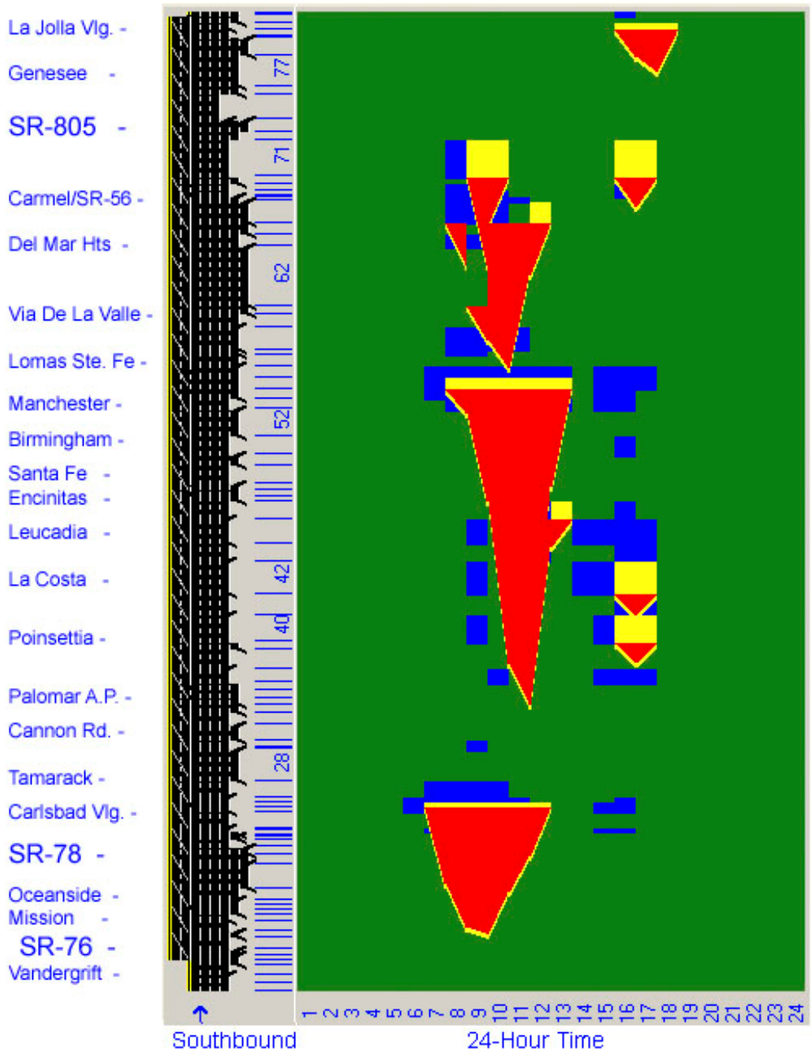
Weekday Median Delay = 14,000 Veh-hrs
AM Peak Period Travel Time = 53 min.
PM Peak Period Travel Time = 48 min.

Figure 5.12 I-5 Southbound Year 2015 "8+4 Alternative"
FREQ12 Time-Space Speed Diagram



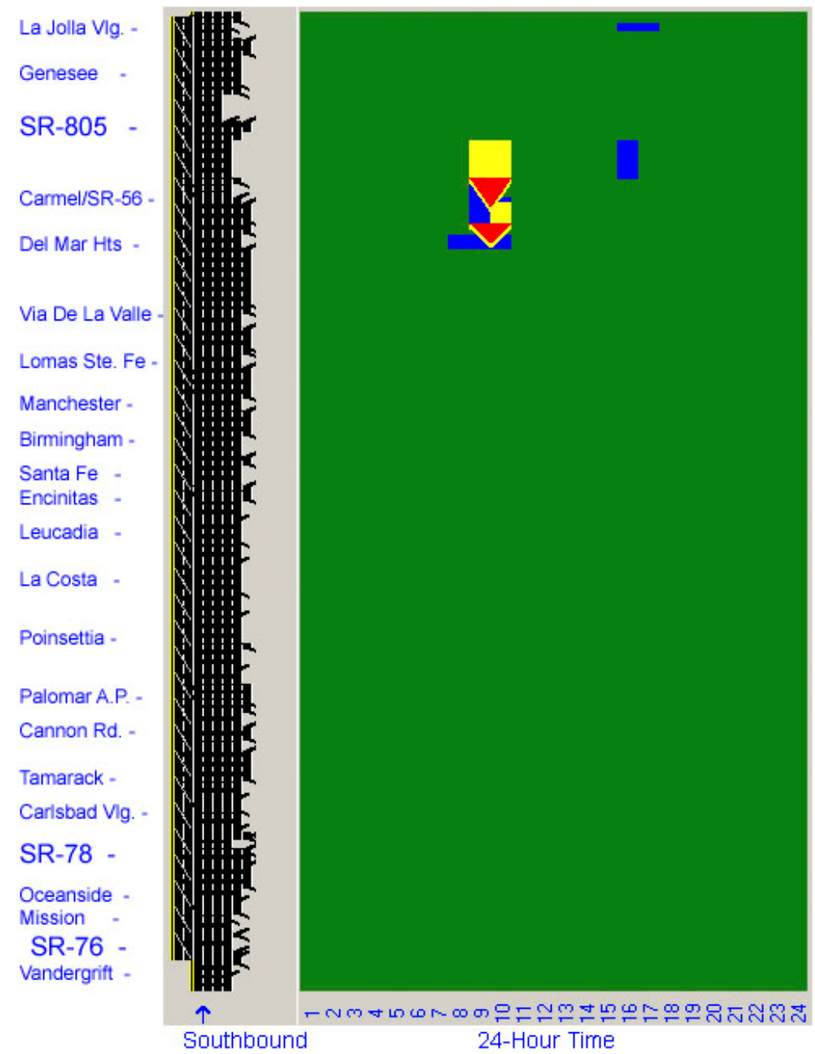
Weekday Median Delay = 100 Veh-hrs
AM Peak Period Travel Time = 26 min.
PM Peak Period Travel Time = 25 min.

Figure 5.13 I-5 Southbound Year 2030 "8+4 Alternative"
FREQ12 Time-Space Speed Diagram



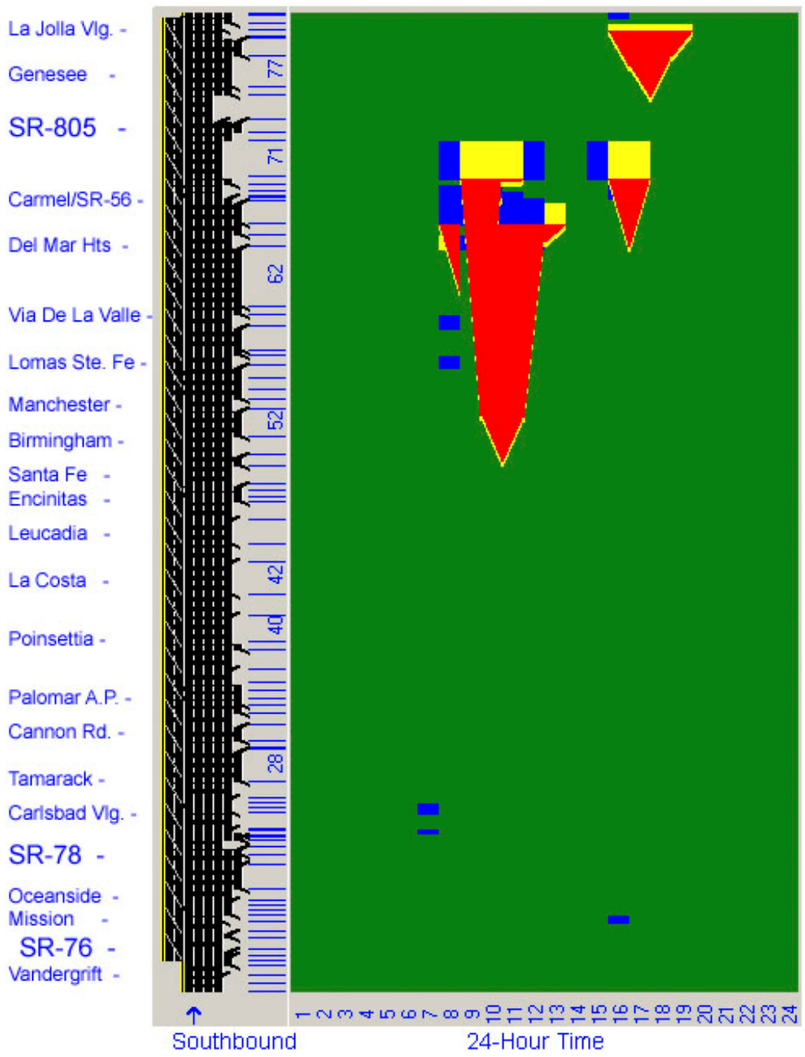
Weekday Median Delay = 8,000 Veh-hrs
AM Peak Period Travel Time = 47 min.
PM Peak Period Travel Time = 29 min.

Figure 5.14 I-5 Southbound Year 2015 "10+4 Alternative"
FREQ12 Time-Space Speed Diagram



Weekday Median Delay = 100 Veh-hrs
AM Peak Period Travel Time = 26 min.
PM Peak Period Travel Time = 26 min.

Figure 5.15 I-5 Southbound Year 2030 "10+4 Alternative"
FREQ12 Time-Space Speed Diagram



5.1 Travel Time

Travel times on the general purpose lanes for each Project alternative were estimated using the traffic computer model FREQ12 version 3.01. FREQ12 version 3.01 was applied to generate hypothetical performance measures for the I-5 within the Project limits for the "No Build", "8+4", and "10+4" conditions in various future years.

Figures 5.16 through 5.19 illustrate the predicted AM and PM peak hour travel times for the corridor in the northbound and southbound directions for existing conditions and each project alternative in various years.

5.1.2 Existing Travel Time

- ***Off-Peak Periods:***

The average existing travel time to travel the project area in the northbound or southbound direction during off-peak hours and in free flow conditions is about 23 to 25 minutes, with an average speed of 65 to 70 mph.

- ***Peak Periods:***

The existing average travel time to travel the project area in the southbound direction is 44 minutes in the AM peak period and 32 minutes in the PM peak period. The existing average travel time to travel the project area in the northbound direction is 24 minutes in the AM peak period and 39 minutes in the PM peak period.

5.1.3 Future Travel Time

- ***No Build Alternative:***

In the Year 2030- No Build Alternative, the average travel time to travel the project area in the southbound direction would be 53 minutes in the AM peak period and 48 minutes in the PM peak period. The average travel time to travel the project area in the northbound direction would be 29 minutes in the AM peak period and 67 minutes in the PM peak period.

- ***8+4 Alternative:***

In the Year 2030- 8+4 Alternative, the average travel time to travel the project area in the southbound direction would be 47 minutes in the AM peak period and 29 minutes in the PM peak period. The average travel time to travel the project area in the northbound direction would be 29 minutes in the AM peak period and 50 minutes in the PM peak period.

- ***10+4 Alternative:***

In the Year 2030- 10+4 Alternative, the average travel time to travel the corridor in the southbound direction would be 35 minutes in the AM peak period and 30 minutes in the PM peak period. The average travel time to travel the project area in the northbound direction would be 27 minutes in the AM peak period and 30 minutes in the PM peak period. In the Year 2030 with the 10+4 Alternative, the average travel time to travel the project area in the northbound and southbound directions in the AM and PM peak hours would be the same as existing conditions or less, suggesting that the current conditions would possibly be maintained, and possibly improved.

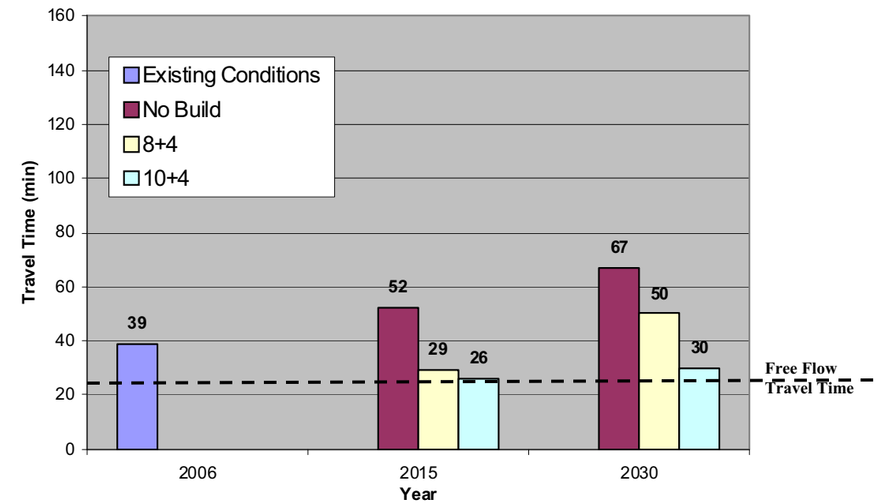


Figure 5.16 I-5 Northbound– FREQ12 General Purpose Lanes PM Peak Hour Travel Times (minutes)

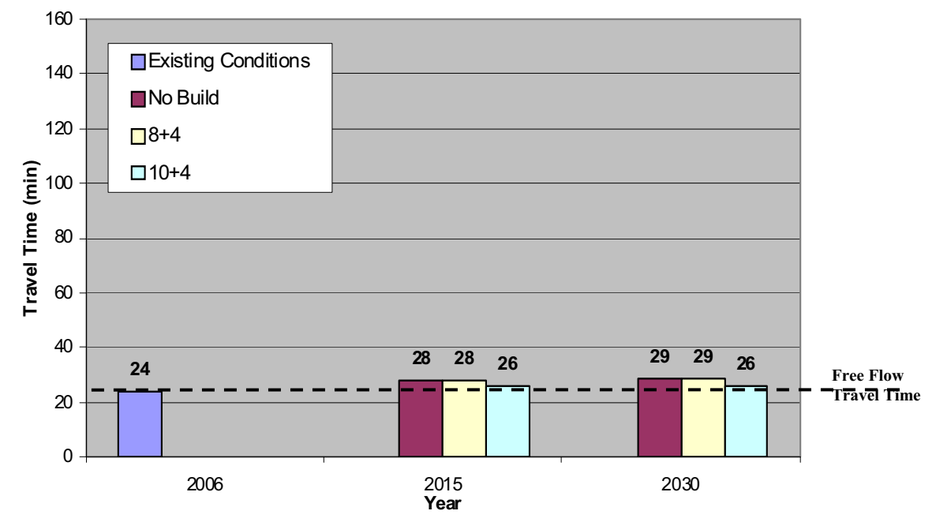


Figure 5.17 I-5 Northbound– FREQ12 General Purpose Lanes AM Peak Hour Travel Times (minutes)

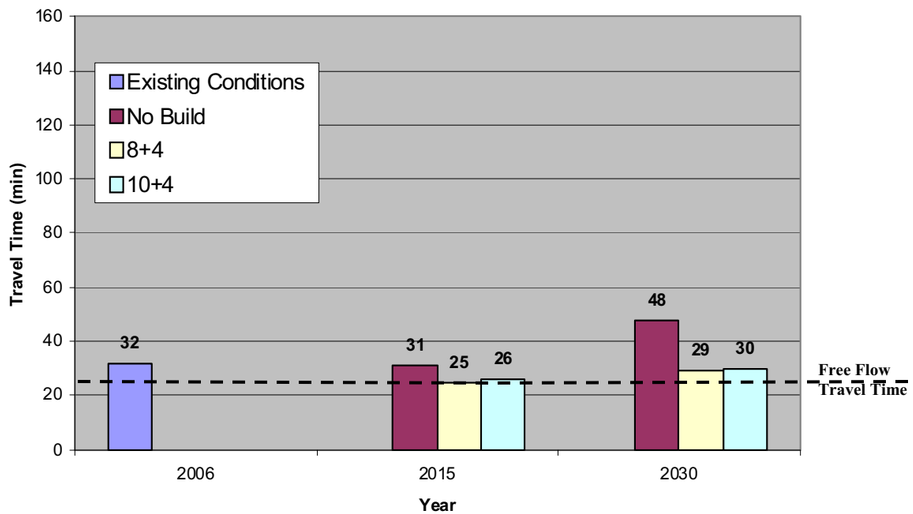


Figure 5.18 I-5 Southbound – FREQ12 General Purpose Lanes PM Peak Hour Travel Times (minutes)

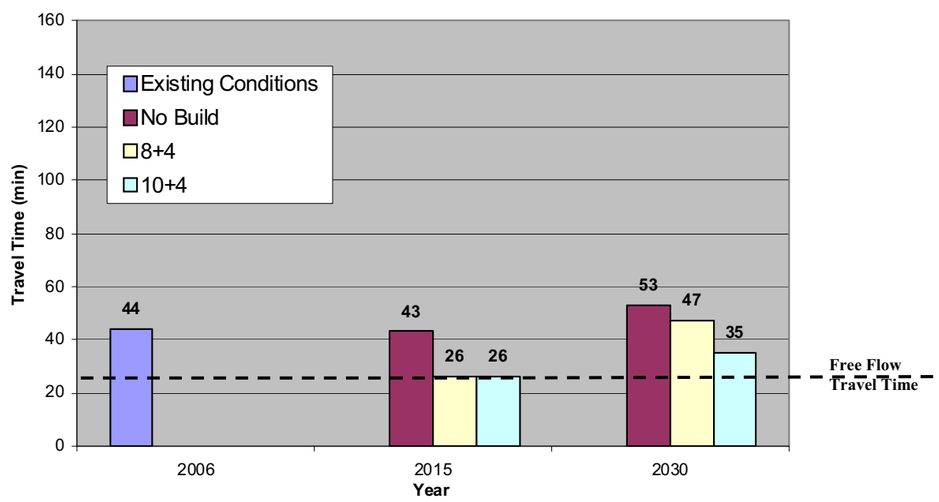


Figure 5.19 I-5 Southbound – FREQ12 General Purpose Lanes AM Peak Hour Travel Times (minutes)

5.2 Delay

Two common terms used in traffic characterization are *travel time* and *delay*. Travel time, as used in the context of this report, is the time it takes a vehicle to travel between two locations. Delay, in technical precepts, is an estimate, measured in vehicle-hours, of the difference between the actual speed (i.e. under congestion conditions) and the free-flow speed (i.e. under non-congestion conditions) of vehicles traveling the same roadway and distance. Delay under this definition is not a direct measure of time.

Total weekday delays (vehicle hours) for the existing conditions in the Year 2006 and each Project alternative in the Years 2015 and 2030 were estimated using the traffic computer model FREQ12 version 3.01.

The total weekday delay for existing conditions in the northbound and southbound directions are 3500 and 4200 vehicle hours, respectively. In the year 2030-No Build Alternative the predicted total weekday delay in the northbound would be 13,700 and the total weekday delay for the southbound direction would be 14,000 vehicle hours. In the year 2030-8+4 Alternative the predicted total weekday delay in the northbound and southbound directions would be 9,600 and 8,000 vehicle hours, respectively. In the year 2030 10+4 the predicted total weekday delay in the northbound and southbound directions would be 600 and 3,700 vehicle hours, respectively. Figures 14 and 15 indicate that with the implementation of 10+4 Alternative, in the Year 2030 the existing conditions would be maintained and possibly improved.

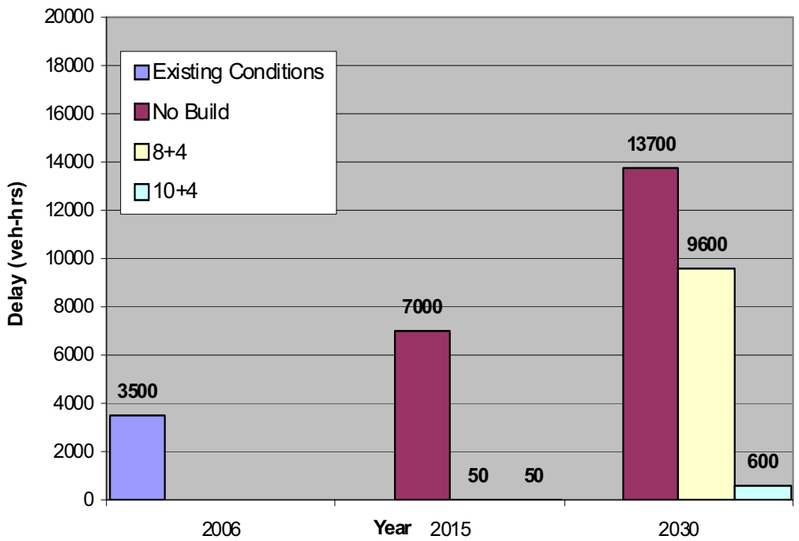


Figure 5.20 I-5 Northbound Weekday Daily Vehicle-Hours of Delay

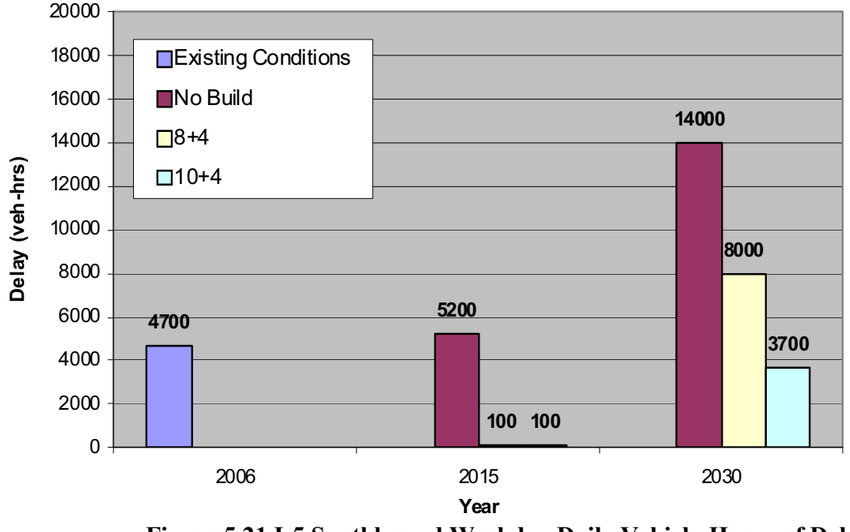


Figure 5.21 I-5 Southbound Weekday Daily Vehicle-Hours of Delay

5.2.1 Duration of Congestion

The duration of congestion for the existing conditions and each Project alternative in the Years 2015 and 2030 were estimated using the traffic computer model FREQ12 version 3.01.

Tables 5.1 and 5.2 list the predicted duration of congestion for the corridor in the northbound and southbound directions for the existing conditions and each project alternative in various years. The duration of congestion for the existing conditions in the northbound direction is about 5 hours in the PM peak hours (no congestions in the AM peak hours). In the southbound direction the duration of congestion is about 5 hours in the AM peak hours and no congestions in the PM peak hours. In the Year 2030 with No Build Alternative, the duration of congestion in the northbound direction would be about 3.5 hours in the AM peak hours and 6 hours in the PM peak hours. The duration of congestion in the southbound direction would be about 6 hours in the AM peak hours and 7 hours in the PM peak hours. In the Year 2030 with the 10+4 Alternative, the duration of congestion in the northbound direction would be about 2.5 hours in the PM peak hours (no predicted congestion in the AM peak hours). The duration of congestion in the southbound direction would be about 5 hours in the AM peak hours and 2 hours in the PM peak hours, which indicates that with the implementation of the 10+4 Alternative the existing conditions would be maintained and possibly improved in the Year 2030.

Table 5.1 I-5 Northbound AM and PM Peak Hour Congestion

Alternative	Year	AM PEAK HOUR			PM PEAK HOUR		
		Congestion		Duration (hrs)	Congestion		Duration (hrs)
		Begin	End		Begin	End	
Existing Conditions	2006	--	--	0	14:00	19:00	5
No Build	2015	7:30	10:00	2.5	14:00	19:00	5
	2030	7:30	11:00	3.5	14:00	20:00	6
8+4	2015	--	--	0	16:00	17:00	1
	2030	--	--	0	14:00	20:00	6
10+4	2015	--	--	0	--	--	0
	2030	--	--	0	16:00	18:30	2.5

Table 5.2 I-5 Southbound AM and PM Peak Hour Congestion

Alternative	Year	AM PEAK HOUR			PM PEAK HOUR		
		Congestion		Duration (hrs)	Congestion		Duration (hrs)
		Begin	End		Begin	End	
Existing Conditions	2006	6:30	11:30	5	--	--	0
No Build	2015	6:30	12:00	6.0	15:00	19:30	4.5
	2030	6:30	12:00	6.0*	12:00	19:00	7
8+4	2015	8:00	9:00	1	--	--	0
	2030	6:30	12:00	5.5	16:00	18:00	2
10+4	2015	8:30	10:00	1	--	--	0
	2030	7:00	12:00	5	16:00	18:00	2

- Congestion would continue through the AM and PM peak hours

6 Level of Service Analysis

Level of Service (LOS) is a qualitative measure describing operational conditions within a traffic stream, generally in terms of such service measures as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience. Six LOS are defined, with letters designating each level, from A to F, with LOS A representing the best operating conditions and LOS F the worst. Each LOS represents a range of operating conditions and the driver's perception of those conditions. Safety is not included in the measures that establish service levels. Figure 6.1 provides a general description of each LOS.

Main lane LOS was calculated for the existing conditions and each project alternative in the future using the HCS2000 version 4.1d software program, developed by McTrans. The program utilizes the methodology contained in the Highway Capacity Manual (HCM) for a Basic Freeway Segment to calculate results. The northbound and southbound directional LOS for both the AM and PM peak hours for the Project (existing conditions and all proposed alternatives) are summarized in Tables 6.1 and 6.2, respectively.

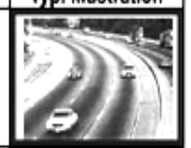
	Definition	Typ. Illustration
A	Represents a free-flow operation. Vehicles are almost completely unimpeded in their ability to maneuver within the traffic stream.	
B	Represents reasonably free-flow operation. The ability to maneuver within the traffic stream is slightly restricted.	
C	Represents a traffic flow with speeds near or at free-flow speed of the freeway. Ability to maneuver within the traffic stream is noticeably restricted.	
D	Represents speeds that begin to decline with increased density. Ability to maneuver within the traffic stream is noticeably limited.	
E	Represents operation at its capacity. Vehicles are closely spaced within the traffic stream and there are virtually no useable gaps to maneuver.	
F	Represents a breakdown of vehicle flow. This condition exists within queues forming behind the breakdown points.	

Figure 6.1 Level of Service (LOS) Description

Table 6.1 Northbound I-5 Estimated General Purpose Lane LOS Summary

Freeway Segment		Existing LOS		2030 No Build LOS		2030 8+4 LOS		2030 10+4 LOS		2015 10+4 LOS	
From	To	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
La Jolla Village Drive	Genesee Avenue	E	C	E	D	E	D	F	E	E	D
Genesee Avenue	Sorrento Valley Road	D	D	D	C	C	D	D	D	C	D
Sorrento Valley Road	I-5 / I-805 Junction	B	B	B	B	B	C	B	C	B	C
I-5 / I-805 Junction	Carmel Valley Road	C	C	C	C	C	C	C	D	C	C
Carmel Valley Road	Del Mar Heights Road	C	D	C	D	D	F	D	E	C	C
Del Mar Heights Road	Via de la Valle	C	D	F	F	D	F	E	F	D	F
Via de la Valle	Lomas Santa Fe	D	F	E	F	E	F	D	F	D	E
Lomas Santa Fe	Manchester Avenue	D	F	E	F	D	F	D	F	C	E
Manchester Avenue	Birmingham Drive	D	E	E	F	D	F	D	E	C	D
Birmingham Drive	Santa Fe Drive	D	E	E	E	D	F	D	E	C	D
Santa Fe Drive	Encinitas Blvd	D	E	E	E	D	F	D	E	C	D
Encinitas Blvd	Leucadia Blvd	D	F	E	F	D	F	D	E	C	D
Leucadia Blvd	La Costa Avenue	D	F	F	F	D	F	D	E	C	D
La Costa Avenue	Poinsettia Lane	D	F	F	F	D	F	D	E	C	D
Poinsettia Lane	Palomar Airport Road	D	E	F	E	D	F	D	E	C	D
Palomar Airport Road	Cannon Road	D	E	E	E	D	F	D	D	C	D
Cannon Road	Tamarack Avenue	D	F	E	F	D	F	C	E	C	D
Tamarack Avenue	Carlsbad Village Drive	D	F	D	F	D	F	C	E	C	D
Carlsbad Village Drive	Las Flores Drive	D	F	D	F	C	F	C	E	C	D
Las Flores Drive	SR-78	D	F	E	F	D	F	E	F	C	F
SR-78	California Street	C	C	D	D	D	D	E	F	D	D
California Street	Oceanside Blvd	C	C	E	E	D	E	E	F	D	D
Oceanside Blvd	Mission Avenue	D	D	E	D	D	D	E	E	D	D
Mission Avenue	SR-76	C	C	D	C	D	C	D	D	C	C
SR-76	Harbor Drive	D	C	E	C	D	C	E	C	D	C

Table 6.2 Southbound I-5 Estimated General Purpose Lane LOS Summary

Freeway Segment		Existing LOS		2030 No Build LOS		2030 8+4 LOS		2030 10+4 LOS		2015 10+4 LOS	
From	To	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Harbor Drive	SR-76	B	C	C	D	C	D	C	D	C	C
SR-76	Mission Avenue	C	B	D	D	C	D	D	D	C	C
Mission Avenue	Oceanside Blvd	C	C	E	E	D	D	D	E	D	D
Oceanside Blvd	Cassidy Street	D	C	F	F	C	C	D	D	C	C
Cassidy Street	SR-78	D	C	F	F	E	D	F	E	D	D
SR-78	Las Flores Drive	D	C	F	F	E	D	D	D	D	C
Las Flores Drive	Carlsbad Village Drive	D	C	F	E	E	D	D	D	D	C
Carlsbad Village Drive	Tamarack Avenue	D	C	F	E	E	D	E	D	D	C
Tamarack Avenue	Cannon Road	E	D	F	F	F	F	F	D	D	C
Cannon Road	Palomar Airport Road	D	C	F	E	E	D	D	D	D	C
Palomar Airport Road	Poinsettia Lane	E	D	F	F	E	E	D	D	D	C
Poinsettia Lane	La Costa Avenue	E	D	F	F	E	E	D	D	D	D
La Costa Avenue	Leucadia Blvd	E	D	F	F	F	E	E	D	D	D
Leucadia Blvd	Encinitas Blvd	F	D	F	F	F	E	E	D	D	C
Encinitas Blvd	Santa Fe Drive	E	D	E	F	E	E	D	D	D	C
Santa Fe Drive	Birmingham Drive	E	D	E	F	E	E	D	D	D	C
Birmingham Drive	Manchester Avenue	F	D	F	F	F	E	E	D	D	C
Manchester Avenue	Lomas Santa Fe	F	E	F	F	F	F	F	E	D	D
Lomas Santa Fe	Via de la Valle	F	E	F	F	F	F	F	E	E	D
Via de la Valle	Del Mar Heights Road	E	D	E	E	F	D	F	E	F	D
Del Mar Heights Road	Carmel Valley Road	D	D	F	E	F	D	F	E	C	B
Carmel Valley Road	I-5 / I-805 Junction	D	D	F	E	E	D	F	D	C	C
I-5 / I-805 Junction	Roselle Street	C	C	D	B	B	B	D	B	D	D
Roselle Street	Genesee Avenue	D	D	E	D	D	D	E	D	D	D
Genesee Avenue	La Jolla Village Drive	C	D	C	F	D	F	F	F	D	F

According to the LOS data summarized in Table 6.1, the existing northbound traffic conditions in the AM and PM peak hours generally exhibit a LOS rating of D or better, with the exception of a few LOS ratings of F in the PM peak hour. According to the LOS data summarized in Table 6.2, the existing southbound traffic conditions exhibit generally exhibit a LOS rating of D in both the AM and PM peak hours, with the exception of a few LOS ratings of F in the AM peak hour.

In the Year 2030-No Build Alternative, the northbound traffic conditions in the AM peak hour generally exhibit LOS ratings of D and E with the exception of a few LOS ratings of F. The majority of the northbound traffic conditions in the PM peak hour exhibit a LOS rating of F. The majority of the southbound traffic conditions exhibit LOS ratings of F in the AM and PM peak hours. The year 2030 No Build scenario has a lower overall LOS in the AM and PM peak hours, when compared to the existing conditions.

In the Year 2030-8+4 Alternative, the northbound traffic conditions in the AM peak hour generally exhibit a LOS rating of D while majority of the PM peak hour exhibit a LOS rating of F (Del Mar Heights Rd to SR 78). The southbound AM and PM peak hours will be similar to the LOS ratings of the existing conditions with the exception of a few segments where the LOS ratings degrade to F. With the 8+4 Alternative, the corridor will degrade in the AM and PM peak hours when compared to the existing conditions; however the AM and PM peak hour conditions will have a better level of service when compared to the year 2030 No Build scenario.

In the Year 2030-10+4 Alternative, the LOS ratings in the AM and PM peak hours for both the northbound and southbound directions will be very similar to the LOS ratings for the existing conditions, suggesting that the current LOS would possibly be maintained, and possibly improved in a few locations.

The data in Tables 6.1 and 6.2 indicate that in the year 2030, the I-5 southbound and northbound traffic conditions and freeway operations will deteriorate in both the AM and PM peak hours if no improvements are made.

7 Interchange to Interchange Weaving Analysis

Weaving sections exist on freeways between closely spaced ramps or interchanges. They are very common on urban freeways. Weaving can be a source of lane and facility breakdown when weaving adversely affects traffic operations. A traffic weave analysis provides a theoretical assessment of potential traffic impacts and lane breakdowns between ramp junctures as vehicles enter and exit the freeway. The LOS D method (Chapter 500 of the HDM) was used to analyze interchange to interchange weaving operations for the existing conditions and the proposed alternatives for both the northbound and southbound directions during the AM and PM peak hours using the forecasted traffic volumes contained in the Traffic Demand Forecasting Report prepared by Wilson & Company and as shown in exhibits A, B, and C.

7.1 LOS D Method Analysis

The Project was analyzed for weaving between interchanges in both the AM and PM peak hours. A summary of the weaving conditions in the northbound and southbound directions for the existing conditions and the future year traffic scenarios examined by the Project are contained in Tables 7.1 and 7.2, respectively. Freeway segments with the word “over” denote a segment that failed, exceeding the LOS D weaving limits for the weaving lane(s) (1,800 vphpl) and/or the non-weaving main thru lanes (2,000 vphpl). Segments marked “under” are operating at or better than LOS D according to the LOS D method. The segment from Genesee Avenue to Del Mar Heights Road was analyzed by the LOS D method as discussed in Section 7.4 (Bypass Weaving) of this Report.

The analysis results in Tables 7.1 and 7.2 were generated using unconstrained volumes (i.e. no ramp metering is used in the analysis). Subsequent sections of this report consider constrained volumes due to ramp metering. The methodology of the procedure does not take into account traffic weaving between general-purpose lanes and HOV/Managed lanes, or traffic influences from adjacent segments, HOV/Managed lanes, or DARs. Due to application limits of the LOS D method with the Project (i.e. number of lanes and large thru volume rates), the main lane thru traffic volumes that were not participating in the weaving process were uniformly distributed amongst the remaining lanes.

For the analysis conducted, the maximum length used for weaving was 900 meters. If a segment of freeway was 900 meters or less, the entire segment was analyzed as a weave section using the LOS D method. Any distance greater than 900 meters was considered outside the realm of weaving, which is consistent with standards contained in the HDM. For these long segments weaving was analyzed as merge and diverge sections at on-ramps and off-ramps, respectively.

7.1.1 Existing Conditions LOS D Analysis Results

For the northbound direction, the following existing freeway segments have traffic that exceeded the main lane threshold of 2,000 vphpl in the PM peak hour: Via de la Valle to Lomas Santa Fe, Lomas Santa Fe to Manchester Avenue, Manchester Avenue to Birmingham Drive, Birmingham Drive to Santa Fe Drive, Santa Fe Drive to Encinitas Blvd, Encinitas Blvd to Leucadia Blvd, Leucadia Blvd to La Costa Avenue, La Costa Avenue to Poinsettia Lane, Poinsettia Lane to Palomar Airport Road, Palomar Airport Road to Cannon Road, Cannon Road to Tamarack Avenue, Tamarack Avenue to Carlsbad Village Drive, Carlsbad Village Drive to Las Flores Drive, and Las Flores Drive to SR-78. The 2,000 vphpl main lane threshold was only exceeded in the northbound AM peak hour at Las Flores Drive to SR-78.

The following northbound existing I-5 freeway segments have traffic that exceed the weaving lane threshold of 1,800 vphpl in the AM peak hour: La Jolla Village Drive to Genesee Avenue, Via de la Valle to Lomas Santa Fe, La Costa Avenue to Poinsettia Lane, Poinsettia Lane to Palomar Airport Road, and SR-76 to Harbor Drive. The PM peak hour exceeded the weaving lane threshold at these locations: Del Mar Heights Road to Via de la Valle, Via de la Valle to Lomas Santa Fe, Lomas Santa

Fe to Manchester Avenue, Manchester Avenue to Birmingham Drive, Encinitas Blvd to Leucadia Blvd, Leucadia Blvd to La Costa Avenue, La Costa Avenue to Poinsettia Lane, Poinsettia Lane to Palomar Airport Road, Cannon Road to Tamarack Avenue, Las Flores Drive to SR-78, Oceanside Blvd to Mission Avenue, and Mission Avenue to SR-76.

The northbound segments between Via de la Valle and Las Flores Drive in the PM peak hour all have main thru traffic lanes operating well over the 2,000 vphpl threshold with values ranging

Table 7.1 Northbound LOS D Weaving Conditions (Unconstrained Ramp Demand Volumes)

Freeway Segment		Existing		2030 No Build		2030 8+4		2030 10+4		2015 10+4	
From	To	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
La Jolla Village Drive	Genesee Avenue	Over	Under	Over	Under	Over	Under	Over	Under	Over	Under
Del Mar Heights Road	Via de la Valle	Under	Over	Under	Over	Under	Over	Under	Over	Under	Under
Via de la Valle	Lomas Santa Fe	Over	Over	Under	Over	Under	Over	Under	Over	Under	Over
Lomas Santa Fe	Manchester Avenue	Under	Over	Under	Over	Under	Over	Under	Over	Under	Under
Manchester Avenue	Birmingham Drive	Under	Over	Over	Over	Under	Over	Under	Over	Under	Under
Birmingham Drive	Santa Fe Drive	Under	Over	Over	Over	Under	Over	Under	Under	Under	Under
Santa Fe Drive	Encinitas Blvd	Under	Over	Over	Over	Under	Over	Under	Over	Under	Under
Encinitas Blvd	Leucadia Blvd	Under	Over	Over	Over	Under	Over	Under	Over	Under	Under
Leucadia Blvd	La Costa Avenue	Under	Over	Over	Over	Under	Over	Under	Over	Under	Over
La Costa Avenue	Poinsettia Lane	Over	Over	Over	Over	Under	Under	Under	Under	Under	Under
Poinsettia Lane	Palomar Airport Road	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over
Palomar Airport Road	Cannon Road	Under	Over	Under	Over	Under	Over	Under	Over	Under	Over
Cannon Road	Tamarack Avenue	Under	Over	Over	Over	Under	Over	Under	Over	Under	Under
Tamarack Avenue	Carlsbad Village Drive	Under	Over	Under	Over	Under	Over	Under	Over	Under	Under
Carlsbad Village Drive	Las Flores Drive	Under	Over	Over	Over	Under	Over	Under	Under	Under	Under
Las Flores Drive	SR-78	Over	Over	Over	Over	Under	Over	Under	Over	Under	Over
SR-78	California Street	Under	Under	Under	Under	Under	Under	Under	Under	Under	Under
California Street	Oceanside Blvd	Under	Under	Over	Under	Under	Over	Under	Under	Under	Under
Oceanside Blvd	Mission Avenue	Under	Over	Over	Over	Over	Over	Over	Over	Under	Over
Mission Avenue	SR-76	Under	Over	Over	Over	Under	Over	Under	Over	Under	Over
SR-76	Harbor Drive	Over	Under	Over	Under	Over	Under	Over	Under	Over	Under

Table 7.2 Southbound LOS D Weaving Conditions (Unconstrained Ramp Demand Volumes)

Freeway Segment		Existing		2030 No Build		2030 8+4		2030 10+4		2015 10+4	
From	To	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Harbor Drive	SR-76	Under	Under	Under	Over	Under	Over	Under	Over	Under	Over
SR-76	Mission Avenue	Under	Under	Over	Over	Over	Under	Over	Over	Over	Under
Mission Avenue	Oceanside Blvd	Under	Under	Over	Over	Under	Under	Under	Under	Under	Under
Oceanside Blvd	Cassidy Street	Under	Under	Over	Over	Under	Under	Under	Under	Under	Under
Cassidy Street	SR-78	Over	Over	Over	Over	Under	Under	Under	Under	Under	Under
SR-78	Las Flores Drive	Over	Over	Over	Over	Under	Under	Over	Under	Under	Under
Las Flores Drive	Carlsbad Village Drive	Under	Under	Over	Over	Over	Under	Under	Under	Under	Under
Carlsbad Village Drive	Tamarack Avenue	Over	Under	Over	Over	Over	Over	Over	Under	Under	Under
Tamarack Avenue	Cannon Road	Over	Under	Over	Over	Over	Under	Under	Under	Under	Under
Cannon Road	Palomar Airport Road	Over	Under	Over	Under	Over	Over	Over	Over	Over	Under
Palomar Airport Road	Poinsettia Lane	Over	Under	Over	Over	Over	Over	Over	Over	Over	Over
Poinsettia Lane	La Costa Avenue	Over	Under	Over	Over	Over	Over	Under	Over	Under	Under
La Costa Avenue	Leucadia Blvd	Over	Under	Over	Over	Over	Over	Over	Over	Under	Under
Leucadia Blvd	Encinitas Blvd	Over	Under	Over	Over	Over	Over	Over	Under	Under	Under
Encinitas Blvd	Santa Fe Drive	Over	Under	Over	Over	Over	Over	Under	Under	Under	Under
Santa Fe Drive	Birmingham Drive	Over	Over	Over	Over	Over	Over	Under	Under	Under	Under
Birmingham Drive	Manchester Avenue	Over	Over	Over	Over	Over	Under	Under	Under	Under	Under
Manchester Avenue	Lomas Santa Fe	Over	Over	Over	Over	Over	Over	Under	Under	Under	Under

Lomas Santa Fe	Via de la Valle	**Over**	**Over**	**Over**	**Over**	**Over**	**Over**	**Over**	Under	Under	Under
Via de la Valle	Del Mar Heights Road	**Over**	**Over**	**Over**	**Over**	Under	Under	**Over**	Under	Under	Under
Genesee Avenue	La Jolla Village Drive	**Over**	**Over**	**Over**	**Over**	Under	**Over**	Under	**Over**	Under	**Over**

between 2,000 and 2,400 vphpl. These main lane demand volumes indicate that the I-5 northbound is currently operating above capacity in the PM peak hour.

The following existing southbound segments have traffic that exceeded the threshold of 1,800 vphpl in the AM peak hour: Cassidy Street to SR-78, SR-78 to Las Flores Drive, Tamarack Avenue to Cannon Road, Cannon Road to Palomar Airport Road, Palomar Airport Road to Poinsettia Lane, Poinsettia Lane to La Costa Avenue, La Costa Avenue to Leucadia Blvd, Leucadia Blvd to Encinitas Blvd, Birmingham Drive to Manchester Avenue, Manchester Avenue to Lomas Santa Fe, Lomas Santa Fe to Via de la Valle, Via de la Valle to Del Mar Heights Road, and Genesee Avenue to La Jolla Village Drive.

The existing southbound freeway segments have traffic that exceeded 1,800 vphpl in the PM peak hour are as follows: Cassidy Street to SR-78; SR-78 to Las Flores Drive, Birmingham Drive to Manchester Avenue, Manchester Avenue to Lomas Santa Fe, Lomas Santa Fe to Via de la Valle, Via de la Valle to Del Mar Heights Road, and Genesee Avenue to La Jolla Village Drive.

The following existing freeway segments have traffic that exceeded the main lane threshold of 2,000 vphpl in the AM peak hour in the southbound direction: Carlsbad Village Drive to Tamarack Avenue, Tamarack Avenue to Cannon Road, Palomar Airport Road to Poinsettia Lane, Poinsettia Lane to La Costa Avenue, La Costa Avenue to Leucadia Blvd, Leucadia Blvd to Encinitas Blvd, Encinitas Blvd to Santa Fe Drive, Santa Fe Drive to Birmingham Drive, Birmingham Drive to Manchester Avenue, Manchester Avenue to Lomas Santa Fe, Lomas Santa Fe to Via de la Valle, and Via de la Valle to Del Mar Heights Road.

In the PM peak hour, the following existing southbound segments have traffic that exceeded the main lane 2,000 vphpl threshold: Santa Fe Drive to Birmingham Drive, Birmingham Drive to Manchester Avenue, Manchester Avenue to Lomas Santa Fe, Lomas Santa Fe to Via de la Valle, Via de la Valle to Del Mar Heights Road, and Genesee Avenue to La Jolla Village Drive.

Most of the southbound segments between Las Flores Drive to Del Mar Heights Road in the AM peak hour have main thru traffic lanes operating over the 2,000 vphpl threshold with values between 1,800 and 2,400 vphpl. The southbound segments between Palomar Airport Road and Del Mar Heights Road in the PM peak hour have main thru traffic lanes operating near the 2,000 vphpl threshold with values ranging between 1,700 and 2,300 vphpl.

In the Oceanside area, the southbound direction has weaving issues between Cassidy Street and SR-78, and SR-78 and Las Flores Drive, in both the AM and PM peak hours due to weaving over a short distance (250-350 meters). In these areas, the weaving lane exceeds the threshold of 1,800 vphpl.

7.1.2 2030-Year No Build LOS D Analysis Results

The No Build scenario retains the basic geometry of the existing conditions with only minor improvements from projects currently programmed and/or under construction. The LOS D weaving analysis for the No Build was conducted using forecasted traffic volumes contained in Wilson & Company's Technical Report No. 5 for the year 2030. Most traffic in roadway segments in both the northbound and southbound directions exceeds the weaving lane threshold of 1,800 vphpl and/or the main lane threshold of 2,000 vphpl. In the No Build scenario, the number of congested weaving areas greatly increased when compared to the existing conditions (see Tables 7.1 and 7.2). Without improving the freeway and increasing its capacity to accommodate the forecasted traffic demand more sections of the freeway would become congested.

7.1.3 2030-Year 8+4 Alternative LOS D Analysis Results

According to Table 7.1, future traffic in the following I-5 freeway northbound segments of the 8+4 Alternative exceeds the main lane threshold of 2,000 vphpl and/or the weaving lane threshold of 1,800 vphpl in the AM and/or PM peak hour: La Jolla Village Drive to Genesee Avenue; Del Mar Heights Road to Via de la Valle; Via de la Valle to Lomas Santa Fe; Lomas Santa Fe to Manchester Avenue; Manchester Avenue to Birmingham Drive; Birmingham Drive to Santa Fe Drive; Santa Fe Drive to Encinitas Blvd; Encinitas Blvd to Leucadia Blvd; Leucadia Blvd to La Costa Avenue; Poinsettia Lane to Palomar Airport Road; Palomar Airport Road to Cannon Road; Cannon Road to Tamarack Avenue; Tamarack Avenue to Carlsbad Village Drive; Carlsbad Village Drive to Las Flores Drive; California Street to Oceanside Blvd; Oceanside Blvd to Mission Avenue; Mission Avenue to SR-76 and SR-76 to Harbor Drive.

In four cases, the weaving threshold of 1,800 vph was exceeded due to high off ramp volumes in the AM and/or PM peak hour. Those cases are: Genesee Avenue, Palomar Airport Road, Mission Avenue, and SR-76.

In addition, future traffic in the following I-5 freeway northbound segments exceeds the main lane threshold of 2,000 vphpl within the right lane in the AM and/or PM peak hour: Del Mar Heights Road to Via de la Valle, Via de la Valle to Lomas Santa Fe, Lomas Santa Fe to Manchester Avenue, Manchester Avenue to Birmingham Drive, Birmingham Drive to Santa Fe Drive, Santa Fe Drive to Encinitas Blvd, Encinitas Blvd to Leucadia Blvd, Leucadia Blvd to La Costa Avenue, Palomar Airport Road to Cannon Road, Cannon Road to Tamarack Avenue, Tamarack Avenue to Carlsbad Village Drive, Carlsbad Village Drive to Las Flores Drive, Oceanside Blvd to Mission Avenue, and SR-76 to Harbor Drive.

Future traffic in the following I-5 northbound freeway segments exceeds the weaving lane threshold of 1,800 vph at the on ramps and/or 1,800 vphpl along some locations within the auxiliary lane during the AM and/or PM peak hour: La Jolla Village Drive to Genesee Avenue, Palomar Airport Road to Cannon Road (along the auxiliary lane and at the on ramp), SR-78 to Oceanside Blvd (along the auxiliary lane), Mission Avenue to SR-76 (along the auxiliary lane) and SR-76 to Harbor Drive (along the auxiliary lane and at the on ramp).
For the southbound direction, the main lane threshold of 2,000 vphpl and/or the weaving lane threshold of 1,800 vphpl were exceeded during the AM and/or PM peak hour at the following freeway segments: Harbor Drive to SR-76, SR-76 to Mission Avenue, Las Flores Drive to Carlsbad Village Drive, Carlsbad Village Drive to Tamarack Avenue, Tamarack Avenue to Cannon Road, Cannon Road to Palomar Airport Road, Palomar Airport Road to Poinsettia Lane, Poinsettia Lane to La Costa Avenue, La Costa Avenue to Leucadia Blvd, Leucadia Blvd to Encinitas Blvd, Encinitas Blvd to Santa Fe Drive, Santa Fe Drive to Birmingham Drive, Birmingham Drive to Manchester Avenue, Manchester Avenue to Lomas Santa Fe, Lomas Santa Fe to Via de la Valle, and Genesee Avenue to La Jolla Village Drive.

Continuing southbound along the I-5 freeway, future traffic in the following on ramps exceeds the weaving lane threshold of 1,800 vphpl during the AM and/or PM peak hours: Harbor Drive, SR-76, Palomar Airport Road, and Genesee Avenue.

Along the southbound direction, the main lane threshold of 2,000 vphpl and/or the weaving lane threshold of 1,800 vphpl were exceeded within the auxiliary lane or along the right most lane of the following segments during the AM and/or PM peak hour: Harbor Drive to SR-76, Carlsbad Village Drive to Tamarack Avenue, Cannon Road to Palomar Airport Road, and Poinsettia Lane to La Costa Avenue. The use of acceleration lanes at some of these locations did not reduce the weaving volumes to acceptable levels. The segments from Manchester Avenue to Lomas Santa Fe and Lomas Santa Fe to Via de la Valle also exceeded the main lane threshold of 2,000 vphpl in the AM and the PM peak hours, and these two segments both have distances greater than 900 meters.

7.1.4 2030-Year 10+4 Alternative LOS D Analysis Results

For the northbound direction, future traffic in the following I-5 freeway segments exceeds the weaving lane threshold of 1,800 vphpl in the AM peak hour: La Jolla Village Drive to Genesee Avenue, Poinsettia Lane to Palomar Airport Road, Mission Avenue to SR-76, and SR-76 to Harbor Drive.

Future traffic in the following I-5 northbound segments exceeds the weaving lane threshold of 1,800 vphpl in the PM peak hour: Del Mar Heights Road to Via de la Valle, Via de la Valle to Lomas Santa Fe, Santa Fe Drive to Encinitas Blvd, Encinitas Blvd to Leucadia Blvd, Leucadia Blvd to La Costa Avenue, Poinsettia Lane to Palomar Airport Road, Palomar Airport Road to Cannon Road, Cannon Road to Tamarack Avenue, Tamarack Avenue to Carlsbad Village Drive, Las Flores Drive to SR-78, Oceanside Blvd to Mission Avenue, and Mission Avenue to SR-76.

None of the traffic in the I-5 northbound segments examined for this alternative exceeded the main lane threshold of 2,000 vphpl in the AM peak hour. In the PM peak hour, future traffic in the following segments exceeds the threshold of 2,000 vphpl: Del Mar Heights Road to Via de la Valle, Via de la Valle to Lomas Santa Fe, Lomas Santa Fe to Manchester Avenue, and Manchester Avenue to Birmingham Drive.

Future traffic in the following southbound I-5 segments exceeds the main lane threshold of 2,000 vphpl in the AM peak hour: Lomas Santa Fe to Via de la Valle and Via de la Valle to Del Mar Heights Road. The 2,000 vphpl main lane threshold was not exceeded by any segment in the PM peak hour.

Future traffic in the following southbound I-5 freeway segments exceeds the weaving lane threshold of 1,800 vphpl in the AM peak hour: SR-76 to Mission Avenue, SR-78 to Las Flores Drive, Carlsbad Village Drive to Tamarack Avenue, Cannon Road to Palomar Airport Road, Palomar Airport Road to Poinsettia Lane, La Costa Avenue to Leucadia Blvd, Leucadia Blvd to Encinitas Blvd, Lomas Santa Fe to Via de la Valle, and Via de la Valle to Del Mar Heights Road.

Future traffic in the following southbound I-5 freeway segments exceeds the weaving lane threshold of 1,800 vphpl in the PM peak hour: Harbor Drive to SR-76, SR-76 to Mission Avenue, Cannon Road to Palomar Airport Road, Palomar Airport Road to Poinsettia Lane, Poinsettia Lane to La Costa Avenue, La Costa Avenue to Leucadia Blvd, and Genesee Avenue to La Jolla Village Drive.

The northbound on and off ramps at Palomar Airport Road is forecasted to have large volumes in both the AM and PM peak hours (on ramp: 1,750 and 2,200; off ramp: 2,300 and 2,400). The freeway in the proposed 10+4 alternative design to the north and south of this overcrossing consists of five main lanes with an 800-meter long deceleration lane at the northbound off ramp and a 950-meter auxiliary lane between the northbound on ramp and Cannon Road.

The 2030-year traffic forecast for the southbound on and off ramps at Palomar Airport Road predicts large volumes in both the AM and PM peak hours (on ramp: 2,600 and 2,800; off ramp: 2,500 and 1,900). These elevated ramp volumes caused this segment of the I-5 to exceed the LOS D weaving threshold of 1,800 vphpl at the ramps. The LOS D analysis results suggest that even with the proposed improvements of the 10+4 alternative, in the year 2030 ramp volumes at Palomar Airport Road continue to exceed the weaving capacity of the segment.

State Routes 78 and 76 are forecasted to have relatively large on and off ramp volumes in both northbound and southbound directions during the peak hours in the year 2030. Las Flores Drive, Mission Avenue, Harbor Drive, and Cassidy Street have on/off ramps that are closely spaced to the major interchanges at SR-78 and SR-76. Although the LOS D weaving analysis indicates that these areas are not necessarily problematic according to the constraints of the analysis in the year 2030, these areas remain of interest.

The northbound on ramp traffic from Las Flores Drive must weave across two lanes to exit to the eastbound SR-78. The weave distance remains relatively short in the proposed 10+4 alternative

(approximately 350 meters). This section of freeway can be expected to undergo recurrent congestion due to traffic weaving since the total exiting SR-78 traffic volumes are estimated for the year 2030 to be near 2,200 vehicles in the AM peak and 3,600 vehicles PM peak. Options to consider outside the scope of the Project to improve weaving conditions in this area could include braiding the ramps, moving the ramps, lengthening the weaving section, or closing local ramps. These options for this particular area would be studied as part of the separate I-5/SR 78 Interchange Project.

Similar weaving conditions as described in the previous paragraph may be present in the year 2030 in the southbound direction at the SR-78 interchange. Vehicles entering southbound I-5 at Cassidy Street would weave across two lanes within 300 meters to continue traveling southbound on I-5. Southbound I-5 traffic exiting at Las Flores Drive just south of SR-78 would weave across two lanes of traffic. The weaving at this location would be approximately 250 meters. Options to consider outside the scope of this project to improve weaving conditions would also be studied as part of the separate I-5/SR-78 Project.

The northbound SR-76 off ramp has an estimated 1,600 vehicles in the AM peak hour and 2,300 vehicles in the PM peak hour. The exiting traffic must weave into an auxiliary lane of approximately 450 meters in length containing on ramp traffic from Mission Avenue. The short weave distance and the large exiting volumes create friction in the right hand lanes, and this friction could influence adjacent lanes causing congestion and delay during the peak hours.

The northbound SR-76 on ramp has heavy volumes (AM: 2,200; PM: 1,650). The northbound off ramp at Harbor Drive is the primary exit ramp to the Camp Pendleton Marine Base with an AM peak hour volume of 2,100 and a PM peak hour volume of 1,250. The large weaving volumes between the SR-76 on ramp and the northbound Harbor Drive off ramp would create friction and congestion at this segment of the freeway.

The traffic conditions at the southbound SR-76 interchange ramps are similar to the northbound interchange ramps. The southbound SR-76 interchange ramps have large off ramp volumes (AM: 1,510; PM: 2,000) and on ramp volumes (AM: 2,500; PM: 1,900). The interchange is located 700 meters south of Harbor Drive and 400 meters north of Mission Avenue. Its close proximity to these ramps, combined with having large volumes, would create similar traffic conditions as described earlier.

7.1.5 2015-Year 10+4 Alternative LOS D Analysis Results

When compared to the other alternatives, the 2015-year 10+4 alternative indicates how increased capacity reduces main lane congestion. This alternative also contains problems at certain segments and ramps. There are similarities between the 2015- year 10+4 alternative and the 2030-year 8+4 and 10+4 alternatives as to which ramps exceed demand capacity and are perpetually problematic, regardless of freeway improvements. Freeway segments listed in Tables 7.1 and 7.2 for the year 2015 10+4 alternative that exceeded the weaving lane threshold also exceeded the weaving lane threshold in all the other scenarios examined.

Future traffic in the following I-5 northbound freeway segments exceeds the weaving lane threshold of 1,800 vphpl in the AM peak hour: La Jolla Village Drive to Genesee Avenue, Poinsettia Lane to Palomar Airport Road, and SR-76 to Harbor Drive.

Future traffic in the I-5 northbound segments that exceeds the weaving lane threshold of 1,800 vphpl in the PM peak hour are listed as follows: Via de la Valle to Lomas Santa Fe; Leucadia Blvd to La Costa Avenue; Poinsettia Lane to Palomar Airport Road; Palomar Airport Road to Cannon Road; Las Flores Drive to SR-78; Oceanside Blvd to Mission Avenue; Mission Avenue to SR-76.

Future traffic in the southbound I-5 freeway segments that exceeds the weaving lane threshold of 1,800 vphpl in the AM peak hour are SR-76 to Mission Avenue, Cannon Road to Palomar Airport Road, and Palomar Airport Road to Poinsettia Lane.

Future traffic in the following southbound I-5 freeway segments exceeds the weaving lane threshold of 1,800 vphpl in the PM peak hour: Harbor Drive to SR-76, Palomar Airport Road to Poinsettia Lane, and Genesee Avenue to La Jolla Village Drive.

Future traffic for the 10+4 alternative in the year 2015 in both the northbound and southbound directions would not exceed the main lane threshold of 2,000 vphpl in either the AM or PM peak hours.

All the locations noted above, for both the northbound and southbound directions, are also noted as "over" segments in Tables 6.1 and 6.2 for the 2030-year 10+4 alternative. Traffic in these segments exceeds the weaving lane threshold of 1,800 vphpl in the years 2015 and 2030 for the 10+4 alternative. The weaving lane threshold is exceeded by on and off ramp traffic in these segments in both time frames. The on ramp volumes cannot be reduced to levels below the 1,800 vphpl threshold and retain proper queue lengths and functional operations on the adjacent local roads. Since off ramp traffic is not ramp metered, demand at a particular off ramp can be decreased by drivers changing their own routes to avoid heavily impacted off ramps.

7.2 Project Corridor Weaving Improvements

The proposed 8+4 and 10+4 alternatives preserve most of the existing auxiliary lanes, acceleration lanes, and deceleration lanes within project limits. In certain locations, acceleration lanes and deceleration lanes are extended to create auxiliary lanes between interchanges. Table 7.3 contains a summary of the I-5 northbound and southbound roadway improvements (i.e. auxiliary, acceleration, and deceleration lanes) included in the proposed 8+4 and 10+4 alternatives to facilitate traffic weaving. The weaving improvements listed in Table 7.3 are also shown in Exhibits B and C for the proposed 2030-year 8+4 and 10+4 alternatives, respectively.

Table 7.3 Proposed Project Corridor Weaving Improvements

Freeway Segment		Proposed 8+4 Alternative		Proposed 10+4 Alternative	
From	To	Northbound	Southbound	Northbound	Southbound
La Jolla Village Drive	Genesee Avenue	Auxiliary Lane	Auxiliary Lane	Auxiliary Lane	Auxiliary Lane
Genesee Avenue	Roselle Street / Sorrento Valley Road	Braided Ramps	Braided Ramps	Braided Ramps	Braided Ramps
Roselle Street / Sorrento Valley Road	Carmel Valley Road	Maintain Existing Facility & Bypass	Maintain Existing Facility & Bypass	Maintain Existing Facility & Bypass	Maintain Existing Facility & Bypass
Carmel Valley Road	Del Mar Heights Road	Extend Bypass Facility	Extend Bypass Facility	Extend Bypass Facility	Extend Bypass Facility
Del Mar Heights Road	Via de la Valle	700 m Merge Lane & Decrease Main Lanes from 6 to 4	Auxiliary Lane	700 m Merge Lane & Decrease Main Lanes from 6 to 5	Auxiliary Lane
Via de la Valle	Lomas Santa Fe	No Improvement (Maintain Existing Auxiliary Lane)	No Improvement (Maintain Existing Auxiliary Lane)	No Improvement (Maintain Existing Auxiliary Lane)	No Improvement (Maintain Existing Auxiliary Lane)
Lomas Santa Fe	Manchester Avenue	Auxiliary Lane	Auxiliary Lane	Auxiliary Lane	Auxiliary Lane
Manchester Avenue	Birmingham Drive	Auxiliary Lane	Auxiliary Lane	Auxiliary Lane	Auxiliary Lane
Birmingham Drive	Santa Fe Drive	Auxiliary Lane	Auxiliary Lane	Auxiliary Lane	Auxiliary Lane
Santa Fe Drive	Encinitas Blvd	No Improvement (No Aux Lane)	Auxiliary Lane	No Improvement (No Aux Lane)	Auxiliary Lane
Encinitas Blvd	Leucadia Blvd	Auxiliary Lane	No Improvement (No Aux Lane)	Auxiliary Lane	No Improvement (No Aux Lane)
Leucadia Blvd	La Costa Avenue	No Improvement (No Aux Lane)	No Improvement (No Aux Lane)	No Improvement (No Aux Lane)	No Improvement (No Aux Lane)
La Costa Avenue	Poinsettia Lane	No Improvement (Additional Main Lane (5) & Maintain 450 m Diverge Lane)	No Improvement (Additional Main Lane (5) & Decrease Merge Lane to 300 m)	No Improvement (Maintain 450 m Diverge Lane)	Decrease Merge Lane to 300 m
Poinsettia Lane	Palomar Airport Road	No Improvement (Decrease Main Lanes: 5 to 4)	No Improvement (Additional Main Lane)	800 m Diverge Lane	Extend Merge Lane to 900 m
Palomar Airport Road	Cannon Road	No Improvement (Maintain Existing Auxiliary Lane)	No Improvement (Maintain Existing Auxiliary Lane)	No Improvement (Maintain Existing Auxiliary Lane)	No Improvement (Maintain Existing Auxiliary Lane)
Cannon Road	Tamarack Avenue	Auxiliary Lane	Auxiliary Lane	Auxiliary Lane	Auxiliary Lane
Tamarack Avenue	Carlsbad Village Drive	No Improvement (No Aux Lane)	No Improvement (No Aux Lane)	No Improvement (No Aux Lane)	No Improvement (No Aux Lane)
Carlsbad Village Drive	Las Flores Drive	No Improvement (Increase Main Lanes: 4 to 5)	No Improvement (Decrease Main Lanes: 5 to 4)	No Improvement (Increase Main Lanes: 5 to 6)	No Improvement (Decrease Main Lanes: 6 to 5)

Table 7.3 Proposed Project Corridor Weaving Improvements (continued)

Freeway Segment		Proposed 8+4 Alternative		Proposed 10+4 Alternative	
From	To	Northbound	Southbound	Northbound	Southbound
Las Flores Drive	SR-78	No Improvement (Main lanes: 5-6-4)	No Improvement (Main lanes: 4-6-5)	No Improvement (Decrease Main Lane: 6 to 4)	No Improvement (Increase Main Lane: 4 to 6)
SR-78	California St / Cassidy St	No Improvement (Increase Main Lanes: 4 to 6)	No Improvement (Decrease Main Lanes: 6 to 4)	No Improvement (Increase Main Lanes: 4 to 6)	No Improvement (Decrease Main Lanes: 6 to 4)
California St / Cassidy St	Oceanside Blvd	No Improvement (Decrease Main Lanes: 6 to 5)	No Improvement (Increase Main Lanes: 5 to 6)	No Improvement (Decrease Main Lanes: 6 to 5)	No Improvement (Increase Main Lanes: 5 to 6)
Oceanside Blvd	Mission Avenue	No Improvement (Decrease Main Lanes: 5 to 4)	No Improvement (Increase Main Lanes: 4 to 5)	No Improvement (Decrease Main Lanes: 5 to 4)	No Improvement (Increase Main Lanes: 4 to 5)
Mission Avenue	SR-76	Auxiliary Lane	No Improvement (Maintain Existing Auxiliary Lane)	Auxiliary Lane	No Improvement (Maintain Existing Auxiliary Lane)
SR-76	Harbor Drive	No Improvement (Maintain Existing Auxiliary Lane)	Extend Existing Auxiliary Lane	No Improvement (Maintain Existing Auxiliary Lane)	Extend Existing Auxiliary Lane

7.3 Ramp Meter Rates

It is anticipated that, under future year conditions, all freeway on ramp locations within the Project limits will be metered. The following two tables, Tables 7.4 and 7.5, summarize the northbound and southbound existing freeway ramp meter rates for the interchanges within the Project limits. The tables also contain recommended 2030-year meter rates for these on ramps in conjunction with the 8+4 and 10+4 design alternatives. The future ramp meter rates listed for the two design alternatives in each table were developed from the previously described LOS D weaving results. It is anticipated that these meter rates may improve projected freeway operations while simultaneously not overloading surface streets with excessive queue lengths. The 2030-year meter rates in Tables 7.4 and 7.5 are recommended meter rates for the proposed 8+4 and 10+4 design alternatives. Actual future meter rates would be based on actual freeway operations and field measurements.

Table 7.4 Northbound Ramp Meter Rates

Interchange	AM Peak			PM Peak		
	Existing On Ramp Volumes	2030 8+4 On Ramp Volumes	2030 10+4 On Ramp Volumes	Existing On Ramp Volumes	2030 8+4 On Ramp Volumes	2030 10+4 On Ramp Volumes
La Jolla Village Dr WB to I-5	460	640 (640)	640 (640)	370	500 (500)	500 (500)
La Jolla Village Dr EB to I-5	740	660 (660)	670 (670)	950	1050 (1000)	1050 (1000)
Genesee Avenue	1120	230 (230)	230 (230)	1840	1600 (1400)	1650 (1450)
Carmel Mountain Road	350	720 (670)	720 (670)	400	960 (910)	960 (910)
Carmel Valley Road	1160	360 (310)	390 (340)	1080	500 (450)	520 (470)
SR-56 WB to I-5 NB Bypass	DNE*	1730 (1530)	1730 (1530)	DNE*	1150 (1000)	1150 (1000)
Del Mar Heights Road	1040	1050 (975)	1300 (1225)	1640	1350 (1250)	1390 (1290)
Via de la Valle WB to I-5	470	400 (400)	460 (460)	400	520 (470)	530 (480)
Via de la Valle EB to I-5	320	410 (410)	430 (430)	600	690 (640)	720 (670)
Lomas Santa Fe WB to I-5	700	460 (460)	470 (470)	950	460 (410)	470 (420)
Lomas Santa Fe EB to I-5		480 (480)	490 (490)		530 (480)	550 (500)
Manchester Avenue	160	220 (220)	240 (240)	170	190 (190)	200 (200)
Birmingham Drive	580	500 (500)	530 (530)	450	430 (380)	430 (380)
Santa Fe Drive	480	560 (560)	590 (590)	590	670 (620)	700 (650)
Encinitas Blvd	640	770 (770)	800 (800)	880	960 (910)	1000 (950)
Leucadia Blvd	560	780 (780)	850 (850)	650	870 (820)	900 (850)
La Costa Avenue	660	820 (820)	850 (850)	660	870 (820)	900 (850)
Poinsettia Lane	480	820 (820)	900 (900)	420	750 (700)	820 (770)
Palomar Airport Road	1100	1720 (1620)	1750 (1650)	1800	2170 (1970)	2200 (2000)
Cannon Road	700	870 (870)	880 (880)	1050	1300 (1250)	1320 (1270)
Tamarack Avenue	520	530 (530)	540 (540)	410	640 (590)	650 (600)
Carlsbad Village Drive	480	590 (590)	600 (600)	550	660 (610)	670 (620)
Las Flores Drive	370	490 (390)	500 (400)	610	750 (600)	780 (630)
SR-78	1820	2490	2480	1850	2550	2620
California Street	200	250 (250)	250 (250)	180	280 (280)	300 (300)
Oceanside Blvd	450	490 (440)	500 (450)	440	580 (480)	600 (500)
Mission Avenue	400	790 (750)	800 (750)	300	450 (400)	450 (400)
SR-76	1600	2150 (1950)	2200 (2000)	950	1650 (1550)	1650 (1550)

volumes are in vehicles per hour
xxx (xxx) = on ramp peak hour volume (on ramp meter rate)
xxx = on ramp peak hour volume only

* DNE (Does Not Exist) - westbound SR-56 connector to I-5 northbound does not exist under existing conditions
**No ramp meter, on ramp traffic is free flow

Table 7.5 Southbound Ramp Meter Rates

Interchange	AM Peak			PM Peak		
	Existing On Ramp Volumes	2030 8+4 On Ramp Volumes	2030 10+4 On Ramp Volumes	Existing On Ramp Volumes	2030 8+4 On Ramp Volumes	2030 10+4 On Ramp Volumes
Harbor Drive	930	1200 (1100)	1200 (1100)	1600	2000 (1850)	2000 (1850)
SR-76	1560	2400 (2100)	2500 (2200)	910	1780 (1680)	1900 (1800)
Mission Avenue WB to I-5	850	1400 (1350)	1450 (1400)	710	1560 (1510)	1600 (1550)
Mission Avenue EB to I-5	370			450		
Oceanside Blvd	1150	1220 (1170)	1300 (1250)	830	950 (900)	1000 (950)
Cassidy Street	370	430 (380)	450 (400)	290	390 (340)	420 (370)
SR-78	2110	3120	3600	2360	2040	2500
Las Flores Drive	230	310 (260)	330 (280)	180	230 (180)	250 (200)
Carlsbad Village Drive	570	660 (585)	730 (655)	620	740 (690)	750 (700)
Tamarack Avenue	850	870 (795)	900 (825)	560	830 (780)	850 (800)
Cannon Road	320	540 (465)	600 (525)	600	860 (810)	950 (900)
Palomar Airport Road WB to I-5	750	2150 (1950)	2200 (2000)	1000	2250 (1950)	2300 (2000)
Palomar Airport Road EB to I-5	280	390 (340)	400 (350)	340	490 (440)	500 (450)
Poinsettia Lane	620	750 (700)	800 (750)	690	1030 (955)	1100 (1025)
La Costa Avenue	890	1050 (975)	1150 (1075)	720	830 (780)	900 (850)
Leucadia Blvd	580	780 (730)	900 (850)	520	780 (730)	900 (850)
Encinitas Blvd	680	760 (710)	800 (750)	720	850 (800)	900 (850)
Santa Fe Drive	460	580 (530)	600 (550)	420	490 (490)	500 (500)
Birmingham Drive	1000	860 (810)	900 (850)	440	440 (440)	450 (450)
Manchester Avenue	1200	1300 (1200)	1350 (1250)	1050	1130 (1080)	1170 (1120)
Lomas Santa Fe WB to I-5	700	370 (320)	390 (340)	690	370 (320)	390 (340)
Lomas Santa Fe EB to I-5		430 (380)	430 (380)		410 (360)	410 (360)
Via de la Valle WB to I-5	670	790 (740)	800 (750)	520	740 (690)	750 (700)
Via de la Valle EB to I-5	910	980 (930)	980 (930)	760	810 (760)	820 (770)
Del Mar Heights Road WB to I-5	900	790 (740)	790 (740)	600	580 (530)	600 (550)
Del Mar Heights Road EB to I-5	630	1190 (1115)	1250 (1175)	540	770 (720)	800 (750)
Carmel Valley Road	1320	1400 (1300)	1400 (1300)	1000	1050 (1000)	1050 (1000)

Table 7.5 Southbound Ramp Meter Rates (continued)						
Interchange	AM Peak			PM Peak		
	Existing On Ramp Volumes	2030 8+4 On Ramp Volumes	2030 10+4 On Ramp Volumes	Existing On Ramp Volumes	2030 8+4 On Ramp Volumes	2030 10+4 On Ramp Volumes
SR-56 WB to I-5 SB Bypass	2000	4000 (3500)	4000 (3500)	1400	2000 (1800)	2000 (1800)
Carmel Mountain Road	DNE*	1120 (1045)	1120 (1045)	DNE*	880 (830)	880 (830)
Roselle Street	1150	1330 (1280)	1330 (1280)	1780	1800 (1700)	1800 (1700)
Genesee Avenue	600	480 (430)	540 (490)	1700	2100 (2000)	2100 (2000)

volumes are in vehicles per hour
xxx (xxx) = on ramp peak hour volume (on ramp meter rate)
xxx = on ramp peak hour volume only
*DNE (Does Not Exist) – southbound Carmel Mountain Road on ramp does not exist under existing conditions
**No ramp meter, on ramp traffic is free flow

7.3.1 Weaving with Ramp Metering

LOS D weaving was reassessed using recommended future ramp meter rates as presented in Tables 7.6 and 7.7 for the northbound and southbound directions, respectively. Freeway segments with the word "over" denote a segment that failed, exceeding the LOS D weaving limits for the weaving lane(s) (1,800 vphpl) and/or the non-weaving main thru lanes (2,000 vphpl). Segments marked "under" are operating at a LOS of D or possibly better according to the LOS D method.

Table 7.6 Northbound LOS D Weaving Conditions with Ramp Metering

Freeway Segment		2030 8+4		2030 10+4	
From	To	AM Peak	PM Peak	AM Peak	PM Peak
La Jolla Village Drive	Genesee Avenue	**Over**	Under	**Over**	Under
Del Mar Heights Road	Via de la Valle	**Under**	**Over**	Under	**Over**
Via de la Valle	Lomas Santa Fe	Under	**Over**	Under	**Over**
Lomas Santa Fe	Manchester Avenue	Under	**Over**	Under	**Over**
Manchester Avenue	Birmingham Drive	Under	**Over**	Under	**Under**
Birmingham Drive	Santa Fe Drive	Under	**Over**	Under	Under
Santa Fe Drive	Encinitas Blvd	Under	**Under**	Under	**Over**
Encinitas Blvd	Leucadia Blvd	Under	**Under**	Under	**Under**
Leucadia Blvd	La Costa Avenue	Under	**Over**	Under	**Over**
La Costa Avenue	Poinsettia Lane	Under	Under	Under	Under
Poinsettia Lane	Palomar Airport Road	**Over**	**Over**	**Over**	**Over**
Palomar Airport Road	Cannon Road	Under	**Over**	Under	**Over**
Cannon Road	Tamarack Avenue	Under	**Under**	Under	**Under**
Tamarack Avenue	Carlsbad Village Drive	Under	**Over**	Under	**Under**
Carlsbad Village Drive	Las Flores Drive	Under	**Under**	Under	Under
Las Flores Drive	SR-78	Under	**Over**	Under	**Over**
SR-78	California Street	Under	Under	Under	Under
California Street	Oceanside Blvd	Under	**Over**	Under	Under
Oceanside Blvd	Mission Avenue	**Under**	**Over**	**Over**	**Over**
Mission Avenue	SR-76	Under	**Over**	Under	**Over**
SR-76	Harbor Drive	**Over**	Under	**Over**	Under

*Segments that improved from "over" to "under" are designated in bold green text

The ramp metering recommended in Table 7.4 improved the 2030-year 8+4 alternative northbound weaving operations along the following freeway segments in the AM peak hour (see Table 7.6) when compared to

the unconstrained volumes listed in Table 7.1: Del Mar Heights Road to Via de la Valle and Oceanside Blvd to Mission Avenue. In the PM peak hour, ramp metering improved the following segments: Santa Fe Drive to Encinitas Blvd, Encinitas Blvd to Leucadia Blvd, Cannon Road to Tamarack Avenue, and Carlsbad Village Drive to Las Flores Drive.

A comparison between the weaving conditions in Tables 7.1 and 7.6 show that ramp metering improved weaving operations in the northbound PM peak hour 2030-year 10+4 alternative for the segments from Manchester Avenue to Birmingham Drive, Encinitas Blvd to Leucadia Blvd, Cannon Road to Tamarack Avenue, and from Tamarack Avenue to Carlsbad Village Drive. Ramp metering did not affect weaving conditions in the northbound AM peak hour of the 2030-year 10+4 alternative.

The ramp metering recommended in Table 7.5 improved the 2030-year 8+4 alternative southbound weaving conditions along various freeway segments (see Table 7.7) when compared to the unconstrained volumes in Table 7.2. The improved weaving sections in the AM peak hour are Las Flores Drive to Carlsbad Village Drive, Tamarack Avenue to Cannon Road, Poinsettia Lane to La Costa Avenue, La Costa Avenue to Leucadia Blvd, Leucadia Blvd to Encinitas Blvd, Encinitas Blvd to Santa Fe Drive, Santa Fe Drive to Birmingham Drive, Birmingham Drive to Manchester Avenue, Manchester Avenue to Lomas Santa Fe, and Lomas Santa Fe to Via de la Valle. In the PM peak hour, the following segments improved with ramp metering: Poinsettia Lane to La Costa Avenue, La Costa Avenue to Leucadia Blvd, Leucadia Blvd to Encinitas Blvd, Encinitas Blvd to Santa Fe Drive, Santa Fe Drive to Birmingham Drive, Manchester Avenue to Lomas Santa Fe, and Lomas Santa Fe to Via de la Valle.

Ramp metering also improved weaving operations in the following southbound segments for the 2030-year 10+4 alternative: SR-78 to Las Flores Drive, Carlsbad Village Drive to Tamarack Avenue, La Costa Avenue to Leucadia Blvd, Leucadia Blvd to Encinitas Blvd, Manchester Avenue to Lomas Santa Fe, and Lomas Santa Fe to Via de la Valle in the AM peak hour, and La Costa Avenue to Leucadia Blvd in the PM peak hour.

Table 7.7 Southbound LOS D Weaving Conditions with Ramp Metering

Freeway Segment		2030 8+4		2030 10+4	
From	**To**	**AM Peak**	**PM Peak**	**AM Peak**	**PM Peak**
Harbor Drive	SR-76	Under	**Over**	Under	**Over**
SR-76	Mission Avenue	**Over**	Under	**Over**	**Over**
Mission Avenue	Oceanside Blvd	Under	Under	Under	Under
Oceanside Blvd	Cassidy Street	Under	Under	Under	Under
Cassidy Street	SR-78	Under	Under	Under	Under
SR-78	Las Flores Drive	Under	Under	**Under**	Under
Las Flores Drive	Carlsbad Village Drive	**Under**	Under	Under	Under
Carlsbad Village Drive	Tamarack Avenue	**Over**	**Over**	**Under**	Under
Tamarack Avenue	Cannon Road	**Under**	Under	Under	Under
Cannon Road	Palomar Airport Road	**Over**	**Over**	**Over**	**Over**
Palomar Airport Road	Poinsettia Lane	**Over**	**Over**	**Over**	**Over**
Poinsettia Lane	La Costa Avenue	**Under**	**Under**	Under	**Over**
La Costa Avenue	Leucadia Blvd	**Under**	**Under**	**Under**	**Under**
Leucadia Blvd	Encinitas Blvd	**Under**	**Under**	**Under**	Under
Encinitas Blvd	Santa Fe Drive	**Under**	**Under**	Under	Under
Santa Fe Drive	Birmingham Drive	**Under**	**Under**	Under	Under
Birmingham Drive	Manchester Avenue	**Under**	Under	Under	Under
Manchester Avenue	Lomas Santa Fe	**Under**	**Under**	**Under**	Under
Lomas Santa Fe	Via de la Valle	**Under**	**Under**	**Under**	Under
Via de la Valle	Del Mar Heights Road	Under	Under	Under	Under
Genesee Avenue	La Jolla Village Drive	Under	**Over**	Under	**Over**

*Segments that improved from "over" to "under" are designated in bold green text

7.4 Bypass Weaving

The geometry of the I-5 freeway changes with the inclusion or exclusion of the non-existent I-5/SR-56 connectors. Changes in freeway geometry influence traffic operations; hence both scenarios were examined. In the northbound direction, the future I-5/SR-56 connector, in concept, joins the SR-56 westbound traffic with the I-5 northbound traffic. For the southbound direction, the future I-5/SR-56 connector, in concept, joins the I-5 southbound traffic with the SR-56 eastbound traffic. Presently, these two connectors are proposed in a separate I-5/SR-56 interchange project. Tables 7.8 and 7.9 present the traffic weaving operations using the LOS D method in the bypass area of the I-5 from La Jolla Village Drive to Del Mar Heights Road in both the northbound and southbound directions, respectively, for the 2030-year 8+4 and 10+4 alternatives.

Table 7.8 Northbound Bypass Area Weaving

Freeway Segment		2030 8+4 Alternative				2030 10+4 Alternative			
		Without SR-56 Connector		With SR-56 Connector		Without SR-56 Connector		With SR-56 Connector	
From	To	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
La Jolla Village Drive	Genesee Avenue	Over	Under	Over	Under	Over	Under	Over	Under
Genesee Avenue	I-5 / I-805 Junction	Over	Under	Over	Under	Under	Under	Under	Under
Genesee Avenue	I-5 / I-805 Junction	Under	Over	Under	Over	Under	Over	Under	Over
Bypass	Carmel Mountain Rd	Under	Under	Under	Under	Under	Under	Under	Under
Carmel Mountain Rd	Bypass	Under	Under	Under	Under	Under	Under	Under	Under
I-5	Carmel Valley Rd	Under	Under	Under	Under	Under	Under	Under	Under
Carmel Valley Rd	Del Mar Heights Rd	X	X	Under	Under	X	X	Under	Under
Carmel Valley Rd	Del Mar Heights Rd	Over	Under	X	X	Under	Under	X	X
Bypass	I-5	X	X	Under	Over	X	X	Under	Over
Del Mar Heights Rd	I-5	Under	Over	X	X	Over	Over	X	X

All segments utilize ramp metering at on ramps
Highlighted freeway segment headings denote weaving areas in the Bypass
Non-highlighted freeway segment headings denote weaving areas in the main lanes of the I-5
Segments marked with an "X" were not analyzed (weaving does not occur at this location)

In the northbound direction with the conceptual I-5/SR-56 WB to NB connector, traffic on this connector enters the bypass just north of the Carmel Valley Road. The bypass reconnects to the I-5 freeway near the Del Mar Heights Road overcrossing. Without the I-5/SR-56 WB to NB connector, the northbound bypass merges with the I-5 immediately after the Carmel Valley Road undercrossing, which is the same configuration as existing conditions. The SR-56 traffic enters the I-5 northbound at the Carmel Valley Road on ramp. The primary segments of concern for this analysis are between Carmel Valley Road and the Del Mar Heights Road on ramp.

According to the results presented in Table 7.8, both the 8+4 and 10+4 alternatives have slightly improved weaving operations with the SR-56 connectors in. The construction of the SR-56 connector increases the northbound I-5 total capacity along the segment from Carmel Valley Road to Del Mar Heights Road because weaving is reduced. Also, the total traffic volume along this segment in the I-5 northbound main lanes is decreased since on ramp traffic from both Carmel Valley Road and the SR-56 is redirected to the northbound bypass. Weaving would occur more manageably as on and off ramp traffic is distributed in the northbound bypass across three lanes over a distance of approximately 1,100 meters.

Table 7.9 Southbound Bypass Area Weaving

Freeway Segment		2030 8+4 Alternative				2030 10+4 Alternative			
		Without SR-56 Connector		With SR-56 Connector		Without SR-56 Connector		With SR-56 Connector	
From	To	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
I-5	Del Mar Heights Rd	Under	Under	Over	Over	Under	Under	Under	Under
Del Mar Heights Rd	Carmel Valley Rd	Over	Over	X	X	Over	Over	X	X
Del Mar Heights Rd	Carmel Valley Rd	X	X	Over	Under	X	X	Over	Under
Carmel Valley Rd	I-5	Over	Under	Over	Under	Over	Over	Over	Under
Bypass	Carmel Mountain Rd	Over	Under	Over	Under	Over	Under	Over	Under
Carmel Mountain Rd	I-5 / I-805 Junction	Over	Under	Over	Under	Over	Under	Over	Under
Genesee Avenue	La Jolla Village Drive	Under	Over	Under	Over	Under	Over	Under	Over

All segments utilize ramp metering at on ramps
Highlighted freeway segment headings denote weaving areas in the Bypass
Non-highlighted freeway segment headings denote weaving areas in the main lanes of the I-5
Segments marked with an "X" were not analyzed (weaving does not occur at this location)

With the SR-56 connector constructed in the southbound direction, this traffic no longer exits at Carmel Valley Road and use the local road to eastbound SR-56. Instead traffic can continue directly to eastbound SR-56 via the connector.

Without the conceptual SB to EB SR-56 connector, there would not be any changes to the southbound I-5 between Del Mar Heights Road and Carmel Valley Road. All on ramps and off ramps would be from the main lanes. The southbound bypass begins prior to the Carmel Valley Road undercrossing. SB to EB SR-56 traffic exits at Carmel Valley Road.

The segment of primary interest in the southbound direction is between Del Mar Heights Road and Carmel Valley Road, and to a lesser extent, the on ramp at Carmel Valley Road to the southbound I-5. According to the results presented in Table 7.9, both the 8+4 and 10+4 alternatives have improved weaving operations with the conceptual SB to EB SR-56 connector. With the SB to EB SR-56 connector, the southbound I-5 total capacity would be increased along the segment from Del Mar Heights Road to Carmel Valley Road, allowing for improved weaving. Also, the total traffic volume in the I-5 southbound main lanes would be decreased since on ramp traffic from Del Mar Heights Road would be redistributed to the bypass. Table 7.9 indicates that the increases volume in the southbound bypass does not appear to affect weaving operations.

8 Weekend Traffic

8.1 Weekend Travel Time

During the year, a significant number of visitors to and from San Diego County use the I-5 corridor as their primary route of travel for both work and leisure, resulting in an influx of mid-day traffic on weekends. PeMS was used to examine average travel times on Saturday and Sunday using recent 2003-2006 average travel times on the I-5 within the Project limits. Travel on Saturday differs significantly than travel on Sunday. The most notable travel occurs on Saturday in the southbound direction, and secondly, on Sunday in the northbound direction. On Saturday in the southbound direction, the average travel time trend indicates an increased travel time period from 9:00 AM to 8:00 PM. On Sunday, work-related travel appears to be reduced, likely due to Sunday closure of the industrial/commercial sector, and the average travel time trend indicates an increased travel time period from 1:00 PM to 8:00 PM.

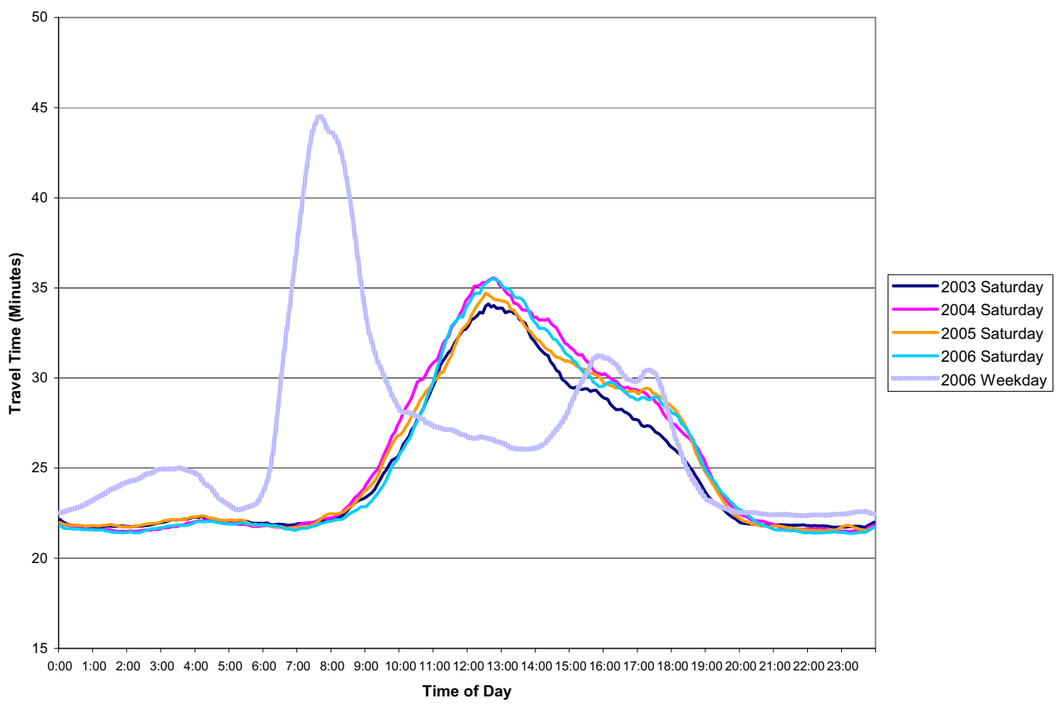


Figure 8.1 I-5 Southbound Saturday Traffic Average Travel Time: Harbor Drive to La Jolla Village Drive

Figures 8.1 – 8.4 represent the average travel time for the entire project area at any time of the day on Saturday and Sunday. The longest weekend average travel times exhibit a directional trend in the southbound direction on Saturday and in the northbound direction on Sunday. The figures are presented to depict this directional trend.

Figure 8.1 depicts the average travel time for the southbound direction along the corridor on a Saturday. The increase in average travel time occurs all day long beginning in the morning at 9 AM and ending at 8 PM. The peak average travel time occurs between 12 PM to 1 PM. The graph also shows that the peak average travel time has increased from years 2003 to 2006 along the corridor from 33 minutes to 35 minutes. Figure 8.1 also shows the 2006 weekday average travel time. The weekday average travel time shows two distinct peak travel times, one in the early morning (44 minutes) and the second in the evening (31 minutes), corresponding to the AM and PM weekday "rush hours."

Comparing the 2006 weekday and Saturday average travel times for the I-5 southbound, Saturday does not contain an AM time peak, which occurs on weekdays. The southbound Saturday average travel time exceeds the weekday average travel time between the 10:30 AM and 3:30 PM mid-day time period.

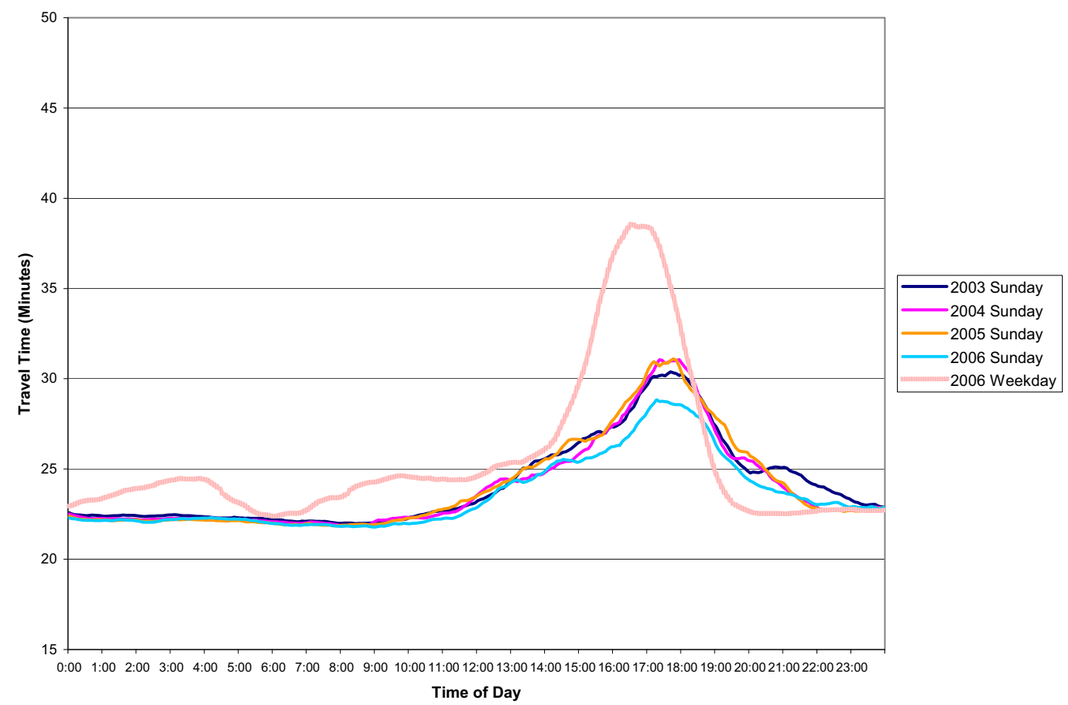


Figure 8.2 I-5 Northbound Sunday Traffic Average Travel Time: La Jolla Village Drive to Harbor Drive

Figure 8.2 shows the northbound Sunday average travel time versus time of day. The increase in average travel time occurs between the hours of 1 PM to 8 PM. The peak average travel time occurs between 5 PM to 6 PM. The graph also indicated that there is a downward trend for the average travel time in the corridor between the years of 2003 to 2006. The peak average travel time was reduced from 32 minutes to 28 minutes, which may be attributed to past construction activities. For the year 2006, the difference between the northbound weekday peak average travel time and the northbound Sunday peak average travel time is about 10 minutes.

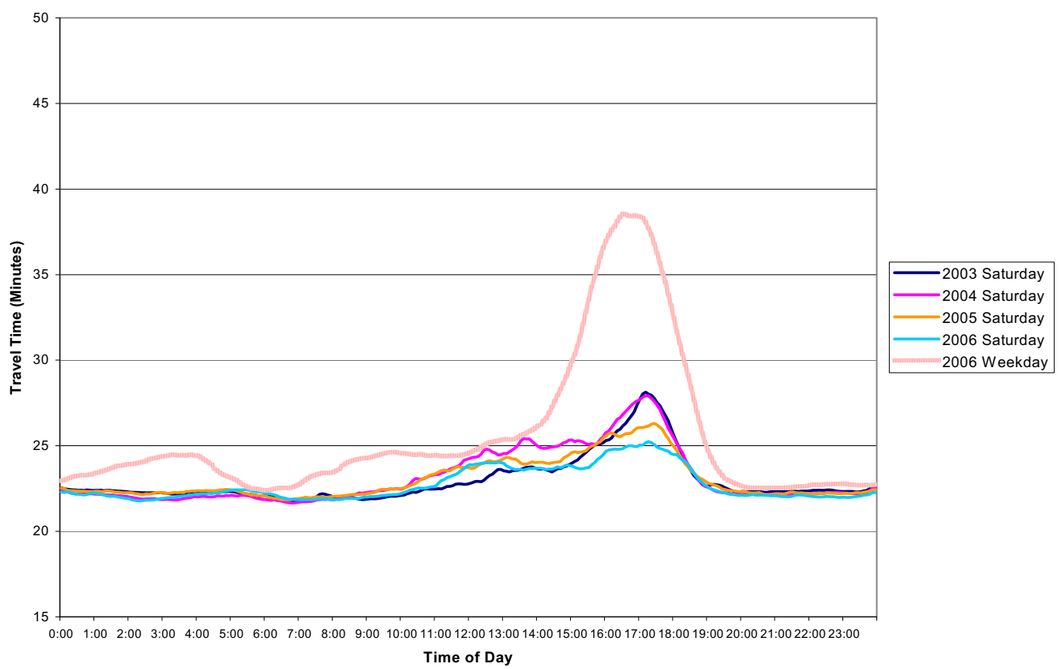


Figure 8.3 I-5 Northbound Saturday Traffic Average Travel Time: La Jolla Village Drive to Harbor Drive

Figure 8.3 illustrates the northbound Saturday average travel time versus the time of day. The graph indicates that on Saturdays, an increase in average travel time occurs between the hours of 11 AM to 7 PM and that the peak average travel time occurs between 5 PM to 6 PM. The Figure also shows that the peak average travel time between the years 2003 to 2006 was reduced from 28 minutes to 25 minutes, which may be attributed to past construction activities.

Comparing figure 8.2 and 8.3, the northbound Sunday average travel time has a higher peak than northbound Saturday average travel time, an indication of more commuters using the I-5 northbound on Sundays than northbound on Saturdays.

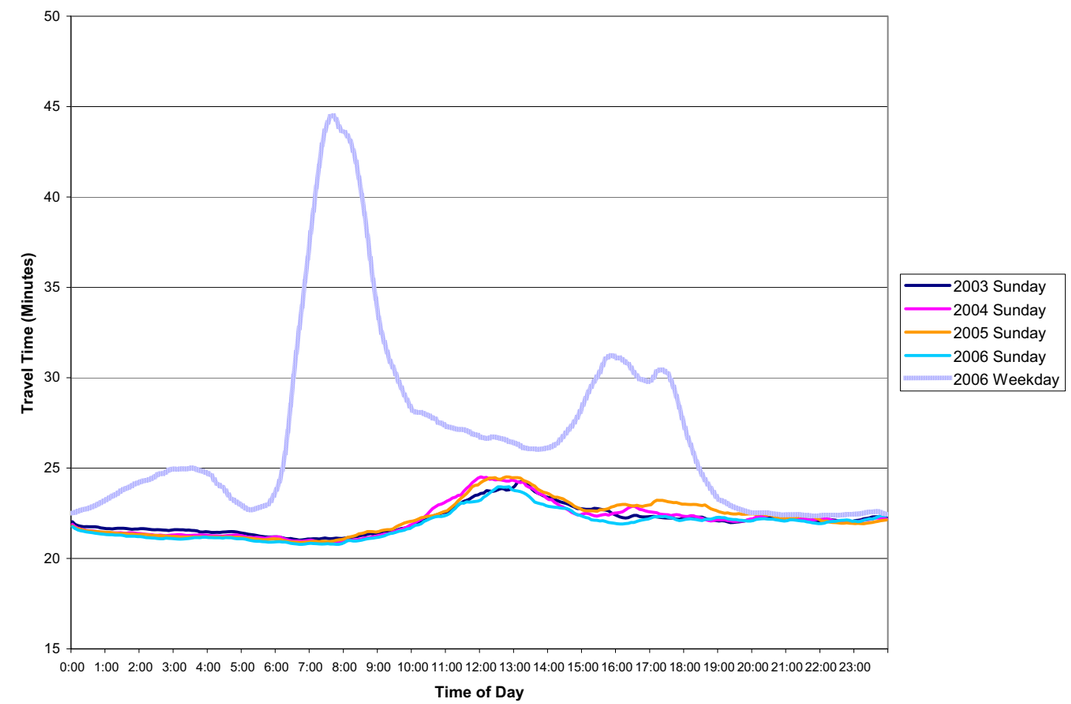


Figure 8.4 I-5 Southbound Sunday Traffic Average Travel Time: Harbor Drive to La Jolla Village Drive

In figure 8.4, the southbound Sunday average travel time is mostly free-flow traffic. There is a slight increase in average travel time between the hours of 11 AM to 3 PM, which can be attributed to inter-regional traffic. The peak occurs between 12 PM and 1 PM. The trend for the southbound Sunday average travel time in the corridor has remained almost the same for the years 2003 to 2006. There is only a slight decrease in travel time of about 1 minute for these years.

Unlike figure 8.1 the graph in figure 8.4 shows at any time the 2006 Sunday average travel time does not exceed the 2006 weekday average travel time. The traffic trend for the weekday and Sunday for the southbound direction is different. The weekday has distinct AM and PM peak, while Sunday has a slight peak in the afternoon.

8.2 Weekend High Occupancy Vehicle (HOV) Traffic

Wilson & Company performed a vehicle occupancy study for the I-5 corridor within the project limits. The study was performed to determine the proportion of high occupancy (2 or more passengers) vehicles in the I-5 weekend traffic stream. The field data was collected for a typical weekend (May 10 & 11, 2008).

Field data was collected using digital video cameras to capture traffic in each lane of each direction. The cameras were set up at three (3) overcrossings on I-5 with one camera per lane.

The following three study locations were selected to represent the entire I-5 traffic within the project limits:

1. Neptune Way, just south of SR 76, in Oceanside, with four (4) lanes of travel in each direction.
2. Leucadia Boulevard, in Encinitas, with four (4) lanes of travel in each direction.
3. Del Mar Heights Road, in Del Mar, with four (5) lanes of travel in each direction.

The HOV data was post-processed using a high-resolution large screen. Three 30-minute peak periods were selected for the study as follows: Morning peak from 10:00 to 10:30 AM, Mid-day peak from 1:00 to 1:30 PM and afternoon peak from 4:00 to 4:30 PM. The video data was viewed during these peak periods for southbound traffic using Saturday data and for northbound traffic using Sunday data. In a number of instances, due to poor or limited vision of the recorded videos, it was not possible to determine vehicle occupancy. The total number of vehicles viewed and post-processed was over 50,000 for both directions (approximately 25,000 vehicles for each direction). The overall proportion of "able-to-determine" to "unable-to-determine" data was approximately 50:50. Vehicle occupancy information in this study was classified as either single-occupancy vehicles (SOV), high-occupancy vehicles with 2 or more passengers (HOV-2), or "unable-to-determine" (UTD).

Table 8.1 lists the results for the Sunday, May 11, 2008 vehicle occupancy study in the northbound direction and Table 8.2 lists the results for the Saturday, May 10, 2008 vehicle occupancy study in the southbound direction. The tables present the SOV and HOV volumes for each of the peak periods at the three study locations and the number of vehicles for which the study was unable to assess occupancy.

The proportion of HOV to SOV in the northbound direction for the 10:00-10:30 AM period was 63:37, for 1:00-1:30 PM period was 54:46, and for 4:00-4:30 PM period was 64:36. The overall proportion for the northbound direction was 61:39. The proportion of HOV to SOV in the southbound direction for the 10:00-10:30 AM period was 57:43, for 1:00-1:30 PM period was 55:45, and for 4:00-4:30 PM period was 65:35. The overall proportion for the southbound direction was 59:41. The overall proportion of HOV to SOV for both northbound and southbound directions was approximately 60:40.

Table 8.1 I-5 NB Weekend HOV Summary- Sunday, May 11, 2008

TIME	ALL LANES				
	SOV	HOV-2	UTD*	TOTAL	HOV:SOV
10:00-10:30 AM	1,049	1,796	4,848	7,693	63:37
1:00-1:30 PM	1,425	1,663	5,800	8,888	54:46
4:00-4:30 PM	1,727	3,109	3,853	8,689	64:36
TOTAL	4,201	6,568	14,501	25,270	61:39

* UTD = UNABLE-TO-DETERMINE

Table 8.2 I-5 SB Weekend HOV Summary- Saturday, May 10, 2008

TIME	ALL LANES				
	SOV	HOV-2	UTD*	TOTAL	HOV:SOV
10:00-10:30 AM	2,233	2,955	2,987	8,175	57:43
1:00-1:30 PM	1,968	2,372	3,889	8,229	55:45
4:00-4:30 PM	1,488	2,810	4,242	8,540	65:35
TOTAL	5,689	8,137	11,118	24,944	59:41

* UTD = UNABLE-TO-DETERMINE

9 HOV/Managed Lanes

9.1 Description of Existing High Occupancy Vehicle (HOV) Lanes

HOV lanes are separate freeway lanes designated for multiple high occupancy vehicles, transit, low emission vehicles, motorcycles, and other permitted vehicles only. The purpose of HOV lanes is to reduce congestion on the main lanes, increase the person-moving capacity of the facility, decrease travel time, and to help reduce air pollution.

I-5 currently has two 6-mile long HOV lanes that operate in the northbound and southbound directions. The HOV lanes operate between the I-5/I-805 junction and the Via de la Valle undercrossing. The existing conditions represent the year 2006. Currently an HOV extension project is under construction to extend the existing northbound and southbound HOV lanes along I-5 from the north end of the San Dieguito River Bridge to the south end of the San Elijo Lagoon Bridge. This project is scheduled for a completion date of January 2009.

9.1.1 Existing HOV Traffic Volumes

The existing average weekday AM and PM peak hour HOV volumes on the segment of I-5 between I-5/I-805 Junction and Lomas Santa Fe Drive indicated that the average weekday peak hour morning and afternoon HOV lane traffic volumes in the northbound direction are 300 and 1,100 vehicles, respectively and along the southbound direction are 1200 and 350, respectively. The collected field data indicates that the vehicle distribution of users in this HOV lane in both the AM and PM peak hours is dominated by passenger cars (over 90%).

9.2 Future HOV/Managed Lanes

The 8+4 and 10+4 build alternatives propose to construct a total of four HOV/Managed lanes, two in each direction of travel. The four HOV/Managed lanes would traverse most of the Project limits on the I-5, from the I-5/I-805 merge to Harbor Drive in Oceanside, totaling a distance of approximately 27 miles. The HOV/Managed lanes would be separated from the main lanes by either a painted buffer or permanent concrete barrier, depending on the alternative chosen.

9.2.1 Description of HOV/Managed Lanes

HOV/Managed lanes are limited-access, barrier or buffer-separated freeway lanes that provide free or reduced cost access to qualifying HOVs, and also allow single occupancy vehicles (SOV) to gain access to HOV lanes by paying a toll. The tolls change throughout the day according to real-time traffic conditions to manage the number of vehicles in the HOV/Managed lanes and to maintain traffic volumes consistent with uncongested levels of service even during peak travel periods. Access to the lanes may be provided at intermittent points. The separation and the limited access points are important tools for managing traffic flows on HOV/Managed lanes.

Level of Service C (1650 vehicles per hour per lane) would be maintained on the HOV/Managed lanes for the I-5 corridor within project limits for both 8+4 and 10+4 build alternatives. The HOV/Managed lanes capacity would be approximately 3300 vehicles per hour (two HOV lanes) along the corridor, except the segment between La Jolla Village Drive and I-5/I-805 junction where the capacity would be approximately1650 vehicle per hour (one HOV lane).

A value pricing study was performed by Parsons Brinckerhoff Consultants to investigate the technical, financial, and feasibility of HOV/managed lanes on the corridor between the cities of La Jolla and Oceanside. Subjects of interest examined by the study included traffic operations (traffic demand, HOV/managed lane access, impacts to main lane traffic), pricing strategies (fixed/flat rate, preset variable rate, dynamic variable rate), electronic toll collection requirements, potential revenue, equity, and performance monitoring requirements. The study contains the following information:

- Value pricing for the I-5 managed lanes is feasible for both the 8+4 and 10+4 Alternatives and for both barrier-and buffer-separated design treatments.
- There is sufficient demand to justify a managed lane facility.
- Access will need to be controlled through any designated ingress and egress points along I-5 main lanes and direct access ramps (DAR) with local streets.
- The public is favorable to lane management.

9.2.2 Weekday HOV Volumes on the Managed Lanes

A list of select I-5 freeway segments within the Project limits and their respective weekday peak hour HOV volumes are compiled in Tables 9.1 and 9.2. The two tables provide a brief summary of weekday peak hour HOV traffic volumes for each alternative through each of the five cities traversed by the Project. SOV volumes are not included in the tables. Due to the fact that 8+4 alternative has four (4) general purpose lanes and 10+4 alternative has five (5) general purpose lanes, the general purpose lanes for the 8+4 alternative would be more congested, therefore the HOV/Managed lanes would attract more traffic. Consequently, the overall predicted traffic volumes in the Year 2030, on the HOV/Managed lanes with 8+4 alternative would be higher than the 10+4 alternative.

Table 9.1 Weekday Northbound HOV Volumes (SOV Volumes Not Included)

Freeway Segment		Existing*		2030 No Build*		2030 8+4		2030 10+4	
From	To	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
La Jolla Village Drive	Genesee Avenue	X	X	X	X	1,600	1,530	1,500	1,280
I-5 / I-805 Junction	Carmel Valley Road	300	1,100	1,920	1,620	2,000	2,540	1,880	2,450
Carmel Valley Road	Lomas Santa Fe	300	1,100	1,580	1,230	1,640	2,130	1,520	2,040
Santa Fe Drive	La Costa Avenue	X	X	X	X	2,120	2,470	1,900	2,270
La Costa Avenue	Cannon Road	X	X	X	X	2,030	2,180	1,820	2,170
SR-78	Oceanside Blvd	X	X	X	X	1,900	2,240	1,700	2,100

Table 9.2 Weekday Southbound HOV Volumes (SOV Volumes Not Included)

Freeway Segment		Existing*		2030 No Build*		2030 8+4		2030 10+4	
From	To	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Oceanside Blvd	SR-78	X	X	X	X	2,570	2,030	2,170	1,650
Cannon Road	La Costa Avenue	X	X	X	X	2,460	2,380	2,080	1,920
La Costa Avenue	Santa Fe Drive	X	X	X	X	2,410	2,330	2,050	1,880
Lomas Santa Fe	Carmel Valley Road	1,200	350	1,030	1,010	2,400	2,030	2,050	1,640
Carmel Valley Road	I-5 / I-805 Junction	1,200	350	1,500	1,480	2,800	2,430	2,450	2,040
Genesee Avenue	La Jolla Village Drive	X	X	X	X	1,500	1,850	1,120	1,460

9.2.3 Weekday-Peak Hour HOV/Managed Lanes Utilization and Tolling Capacity

The *Traffic Demand Forecasting Report* (Technical Report No. 5) prepared by Wilson & Company provides predicted HOV volumes for 8+4 and 10+4 alternatives in the Year 2030. Figures 9.1 to 9.5 present the demand weekday peak hour HOV volumes for 8+4 and 10+4 alternatives in the Year 2030 and compare them with the HOV/Managed lanes capacity.

The figures exhibit a directional trend to the HOV demand volume between the northbound and southbound directions. The demand volume in the northbound direction is higher during the PM peak hour and lower during the AM peak hour. In contrast, the demand volume in the southbound direction is lower during the PM peak hour and higher during the AM peak hour.

The tolling capacity for the HOV/managed lanes is the difference between the HOV/Managed Lanes capacity volume and the HOV demand volume. The tolling capacities along the corridor would change per changes in demand volumes in the AM and PM peak periods in the northbound and southbound directions. Figures 9.1 to 9.5 were utilized to develop Tables 9.3 and 9.4 that contain a list of the freeway segments along with the predicted Year 2030 average tolling capacities and average HOV demand volumes in the AM and PM peak periods for the 8+4 and 10+4 alternatives. The segments were selected to represent the entire I-5 corridor within the project limits.

The HOV/Managed Lanes with the 8+4 alternative would have less predicted tolling capacity than that with the 10+4 alternative in the Year 2030.

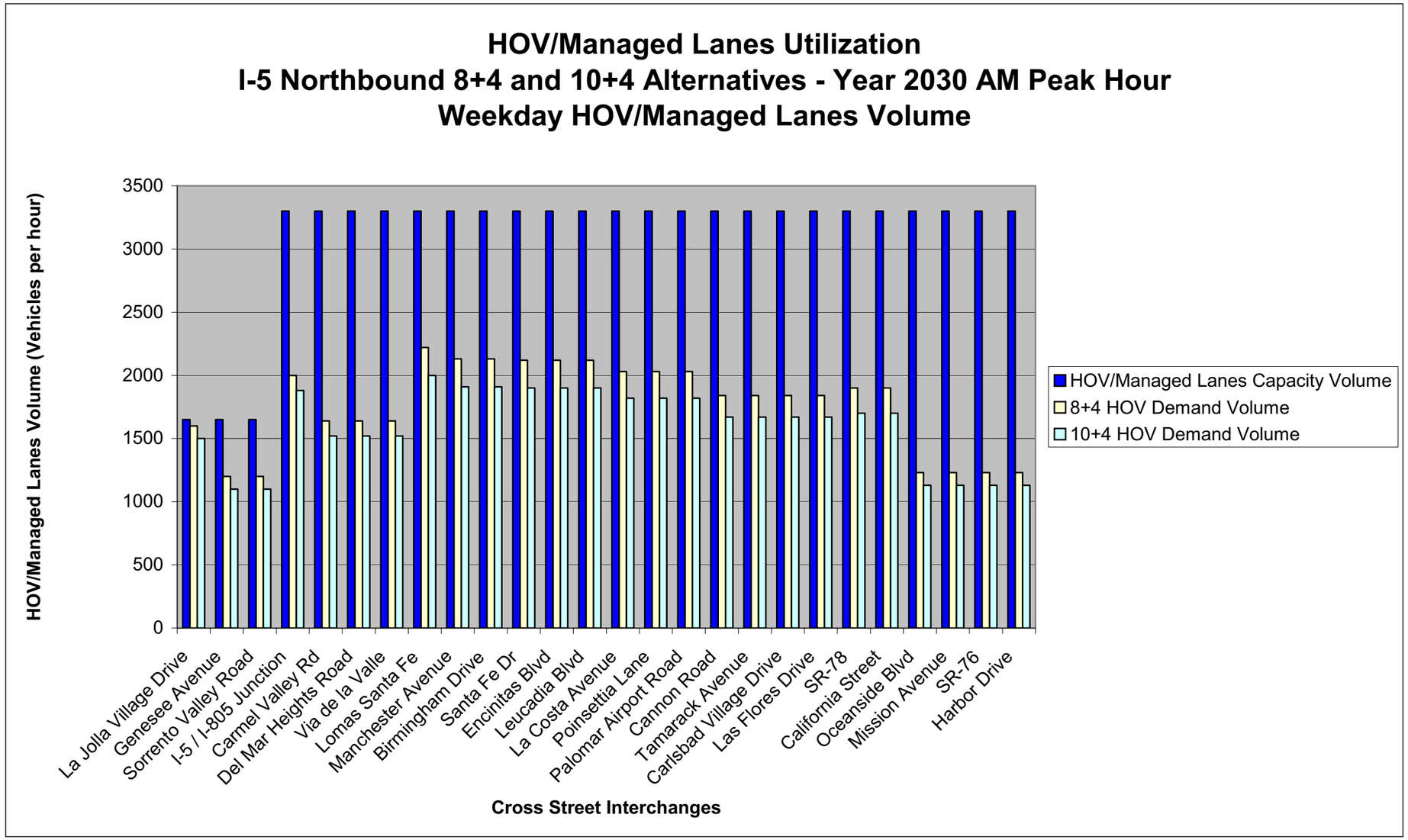


Figure 9.1 I-5 NB 8+4 and 10+4 Alternatives- Year 2030 AM Peak Hour Weekday HOV Managed Lanes Volume

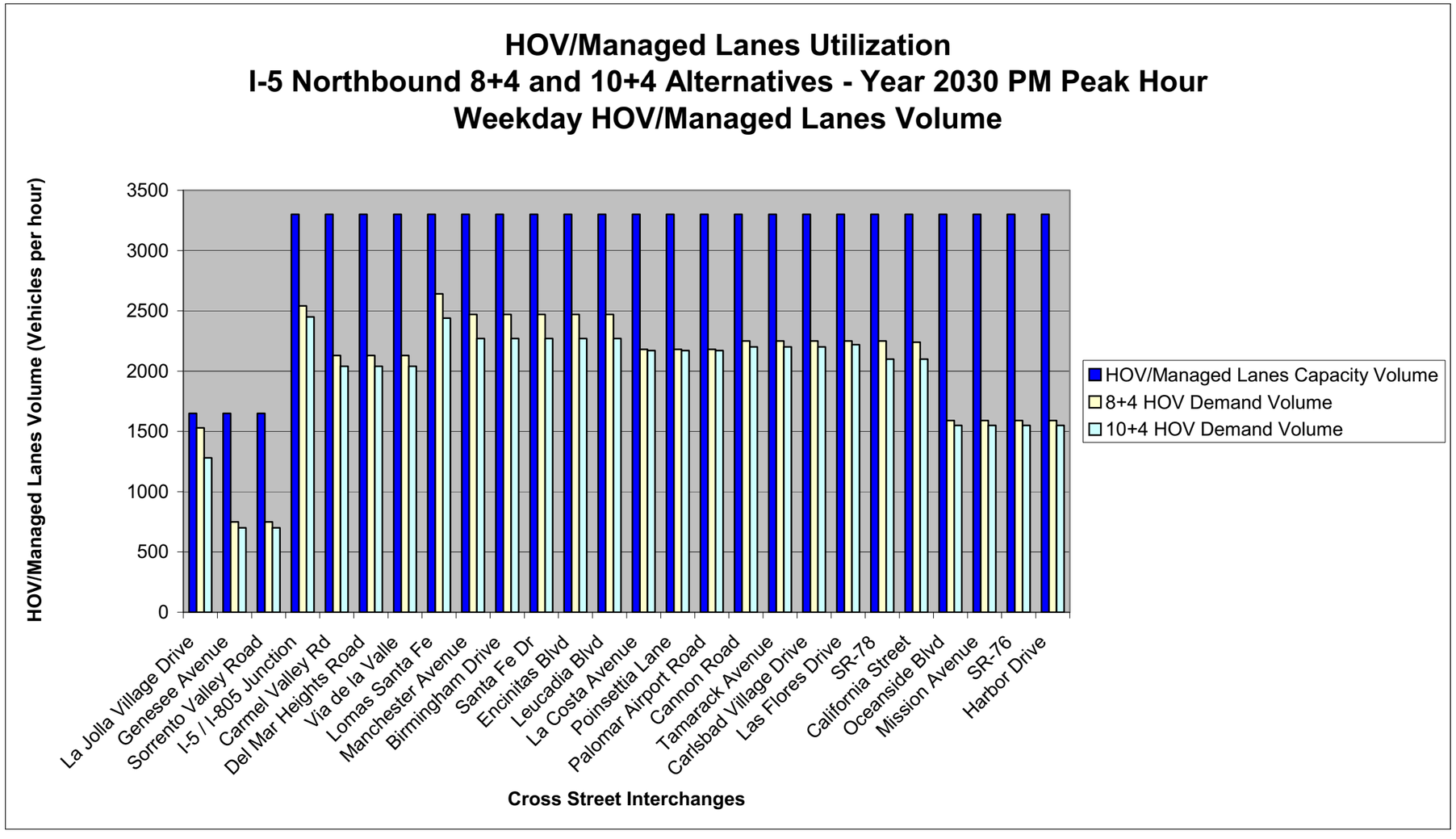


Figure 9.2 I-5 NB 8+4 and 10+4 Alternatives- Year 2030 PM Peak Hour Weekday HOV Managed Lanes Volume

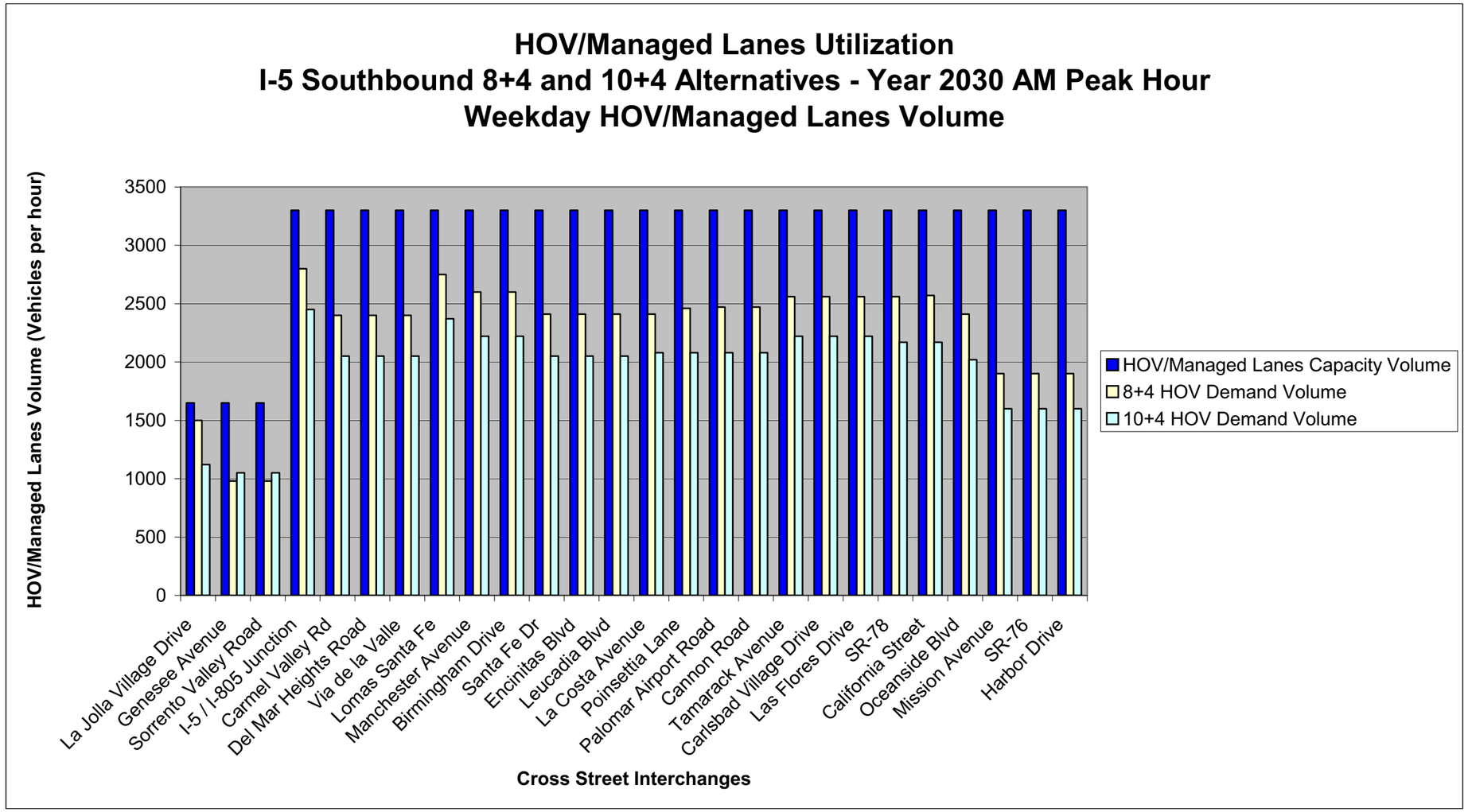


Figure 9.3 I-5 SB 8+4 and 10+4 Alternatives- Year 2030 AM Peak Hour Weekday HOV Managed Lanes Volume

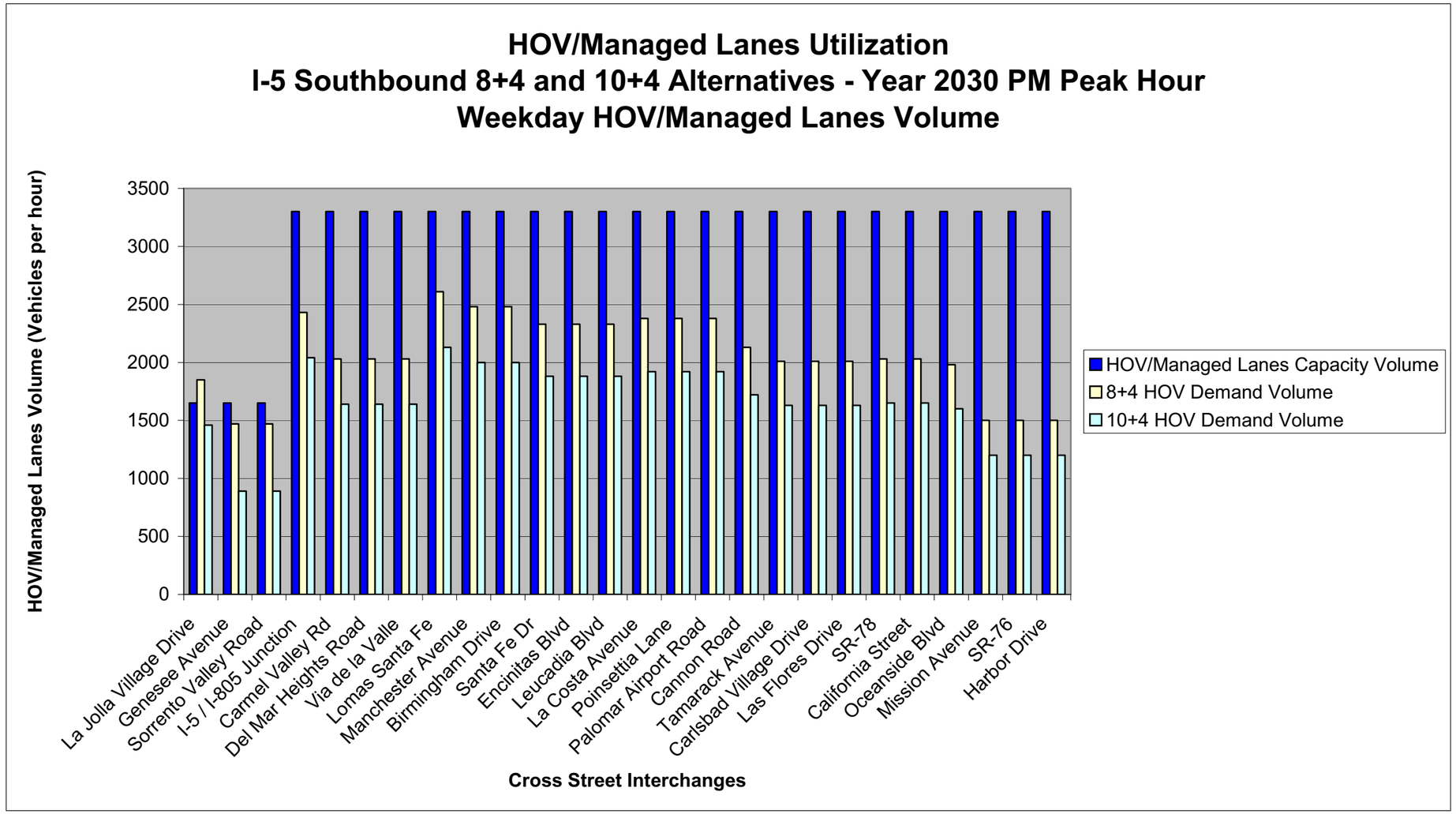


Figure 9.4 I-5 SB 8+4 and 10+4 Alternatives- Year 2030 PM Peak Hour Weekday HOV Managed Lanes Volume

Table 9.3 Weekday Northbound 2030 HOV Demand and Tolling Capacity Volumes (VPH) for 8+4 and 10+4

Freeway Segment		2030 HOV/Managed Lanes Capacity- 8+4 & 10+4	2030 8+4 HOV Demand		2030 8+4 Tolling Capacity		2030 10+4 HOV Demand		2030 10+4 Tolling Capacity	
From	To		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
La Jolla Village Drive	Genesee Avenue	1650	1,600	1,530	50	120	1,500	1,280	100	370
I-5 / I-805 Junction	Carmel Valley Road	3300	2,000	2,540	1,300	760	1,880	2,450	1,420	850
Carmel Valley Road	Lomas Santa Fe	3300	1,640	2,130	1,660	1,170	1,520	2,040	1,780	1,260
Santa Fe Drive	La Costa Avenue	3300	2,120	2,470	1,180	830	1,900	2,270	1,400	1,030
La Costa Avenue	Cannon Road	3300	2,030	2,180	1,270	1,120	1,820	2,170	1,480	1,130
SR-78	Oceanside Blvd	3300	1,900	2,250	1,400	1,050	1,700	2,100	1,600	1,200

Table 9.4 Weekday Southbound 2030 HOV Demand and Tolling Capacity Volumes (VPH) for 8+4 and 10+4

Freeway Segment		2030 HOV/Managed Lanes Capacity- 8+4 & 10+4	2030 8+4 HOV Demand		2030 8+4 Tolling Capacity		2030 10+4 HOV Demand		2030 10+4 Tolling Capacity	
From	To		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Oceanside Blvd	SR-78	3300	2,490	2,000	810	1,300	2,100	1,625	1,200	1,675
Cannon Road	La Costa Avenue	3300	2,470	2,300	830	1,000	2,080	1,850	1,220	1,450
La Costa Avenue	Santa Fe Drive	3300	2,410	2,350	890	950	2,060	1,890	1,240	1,410
Lomas Santa Fe	Carmel Valley Road	3300	2,520	2,220	780	1,080	2,160	1,800	1,140	2,160
Carmel Valley Road	I-5 / I-805 Junction	3300	2,400	2,030	900	1,270	2,050	1,640	1,250	1,660
Genesee Avenue	La Jolla Village Drive	1650	980	1,470	670	180	1,050	890	600	760

9.2.4 Weekend HOV/Managed Lanes Utilization and Tolling Capacity

Wilson & Company completed a study to determine the proportion of HOV in the I-5 weekend traffic stream. The study concluded that the overall proportion of HOV to single occupancy vehicles (SOV) was approximately 60:40. The weekend SOV and HOV volumes are presented in Tables 8.1 and 8.2 of Chapter 8 of this report.

The existing HOV to SOV proportions for a typical weekend along the northbound direction for the 10:00-10:30 AM, 1:00-1:30 PM, and 4:00-4:30 PM were 63:37, 54:46, and 64:36. The overall proportion for the northbound direction was 61:39. In the southbound direction the HOV proportions were 57:43, 55:44, and 65:35. The overall proportion for the southbound direction was 59:41. The predicted 2030 weekend HOV to SOV proportion would be consistent with the current proportion. Due to high existing HOV traffic in the existing I-5 weekend traffic stream during the weekend peak periods, no predicted weekend tolling capacity is expected in the Year 2030.

10.0 Effects of Opening the Interchange Modifications on I-5 at Lomas Sante Fe Drive and the HOV Extension between Via de la Valle and Manchester Road

Figures 10.1 to 10.4 amend Figures 3.1 and 3.2 and Tables 5.1 to 5.13 to report travel times and delay for the additional years 2007, 2008, and 2009. During the additional years mentioned (2007 and 2008), two Caltrans projects were initiated and completed. The two Caltrans projects were the modification of Lomas Sante Fe Interchange and extension of HOV lanes between Via de la Valle and Manchester Road, which were completed in June 2008 and September 2008, respectively.

During that time period (2007 to 2008), the aforementioned projects were completed and provided increased traffic capacity in these project areas. As a result, these two projects likely have decreased travel time in the overall corridor project area. In addition, an economic recession that reportedly started in December 2007 may have contributed to the decreased travel time within the corridor as personal and business travel was reduced.

10.1 Northbound Travel Time

Figure 10.1 illustrates that from 2003 to 2007, the trend for the average peak hour travel time with respect to time of day remained consistent with an average decrease of approximately 1 minute per year. From 2007 to 2008, the peak hour average travel time decreased by about 6 minutes. However, from 2008 to 2009, Figure 10.1 shows no change in travel time in the northbound direction.

As shown in Figure 10.1 for years 2003 to 2007, the peak congested period was spread between 2pm and 7pm for a total of 5 hours. Figure 10.1 illustrates that in 2008 and 2009, the peak congested period was spread between 3pm and 6:30pm, resulting in the reduction of peak congested period from approximately 5 hours to 3.5 hours.

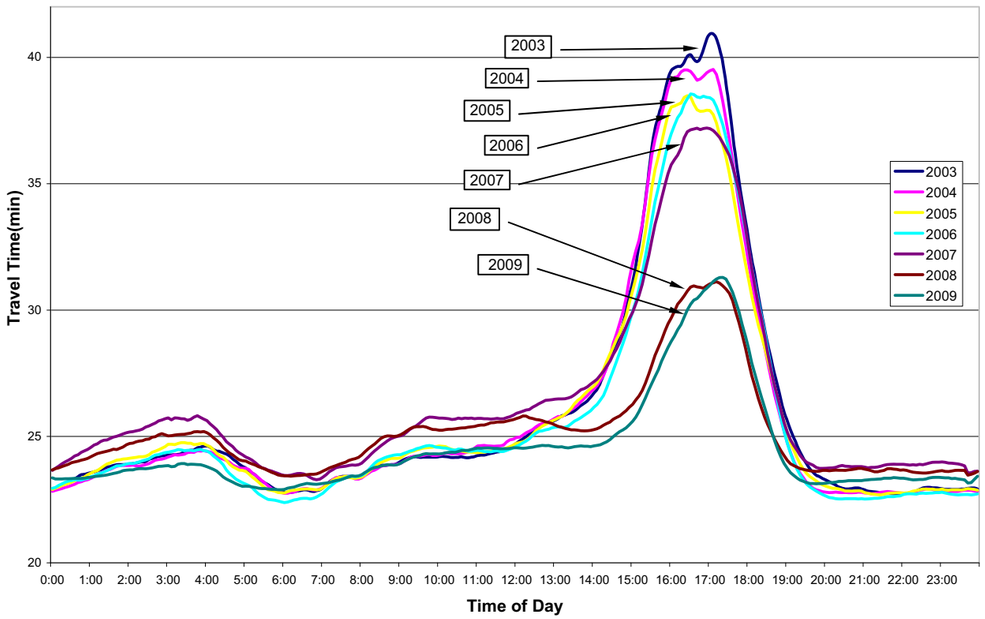


Figure 10.1: Northbound Weekday Traffic Average Travel Time: Harbor Drive to La Jolla Village Drive

10.2 Southbound Travel Time

Similarly, in the southbound direction, the effects of completing the HOV extension and Lomas Santa Fe Interchange projects, and the current economic recession, resulted in a decrease in southbound travel time, as illustrated in Figure 10.2. Before these projects were completed and prior to the recession, the overall basic southbound trends for the peak hour average travel time, as illustrated by Figure 10.2, was increasing from 2003 through 2007. Although travel time decreased in 2008 as compared to 2007 for the southbound direction, the overall trend was still increasing from 2008 through 2009.

The average travel time shown on Figure 10.2 during the southbound AM peak has increased 2 minutes from 45 minutes in 2006 to 47 minutes in 2007. From 2007 to 2009, the peak hour average travel time had decreased by 16 minutes from 47 minutes in 2007 to 31 minutes in 2009. The average travel time during southbound PM peak has increased about 5 minutes from 31 minutes in 2006 to 36 minutes in 2007. In 2008, average travel time decreased by 12 minutes to 34 minutes, but increased by 8 minutes to 42 minutes in 2009.

As shown in Figure 10.2, for years 2003 through 2007 and year 2009, the AM peak congested period was spread between 6am and 9am for a total of 3 hours. In 2008, the AM peak congested period occurred between 7am and 9am for a total of 2 hours, which is 1 hour less than the previous years (2003 to 2007) and the following year (2009). The PM peak congested period from 2003 through 2009, as illustrated on figure 10.2, was spread between 3:30pm and 6pm for a total of 2.5 hours.

Evidently, as shown above, the completion of the two improvement projects in 2008 coupled with the current economic recession contributed to the decreased average travel time along the northbound side of the corridor for PM travels. Similarly, for the southbound side, there is also decreased average travel time for AM and PM travels.

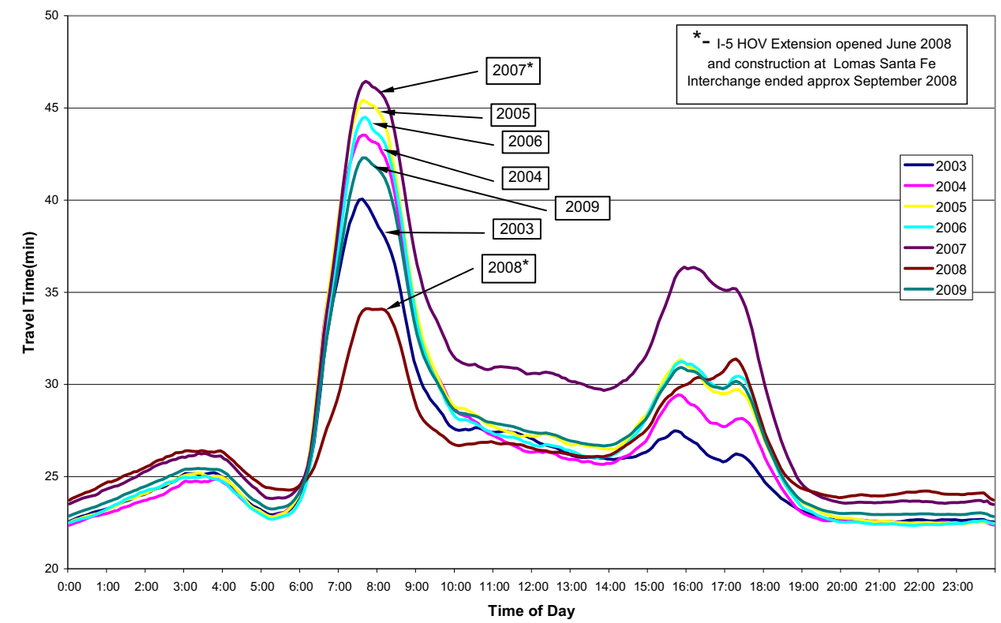


Figure 10.2: Southbound Weekday Traffic Average Travel Time: Harbor Drive to La Jolla Village Drive

10.3 Delay

Average weekday delays and weekday travel times reported in Figures 10.3 and 10.4 update the 2006 PeMS aggregated speed plots depicted in Figures 5.1 and 5.2. The average weekday travel times reported in Figures 10.3 and 10.4 cover the two week periods before and after the opening of the HOV and auxiliary lanes near Lomas Santa Fe. This is in contrast to Figures 10.1 and 10.2 that also report average weekday travel times but on a year-to-year basis (2003 to 2009). However, the resulting travel times in Figures 10.3 and 10.4 complement the data in Figures 10.1 and 10.2.

To account for the effect of opening the HOV and auxiliary lanes, PeMS data was obtained for both northbound and southbound directions on two week periods before and after the opening. For the northbound direction, data obtained from May 16 to May 30, 2008 and from June 2 to June 16, 2008

represent the conditions before and after the opening, respectively. Similarly, in the southbound direction, data collected from May 27 to June 10, 2008 and from June 12 to June 26, 2008 represent the conditions before and after the opening, respectively. In addition, only weekday data (Monday to Friday) was used to obtain the plots. The resulting diagrams (Figures 10.3 and 10.4) show color coded gradient plotted against the time of day and post mile locations along the I-5 corridor. The colors on the plots correspond to speeds along the corridor at different times of the day and ranges from 0 mph (black) to 70+mph (light yellow). In addition, the calculated average weekday delay and average weekday AM/PM travel times are depicted with the plots.

10.3.1 Northbound Delay

Figures 10.3 illustrates that traffic delay for the corridor was decreased due to the modifications. Prior to the opening of the HOV and auxiliary lanes near Lomas Santa Fe, the delay was 2000 vehicle hours according to the sample data used for Figure 10.3. After the opening of auxiliary lanes, the delay decreased from 2000 vehicle hours to 1200 vehicle hours. As a result, average weekday travel time decreased by 4 minutes from 31 minutes before the opening to 27 minutes after the opening.

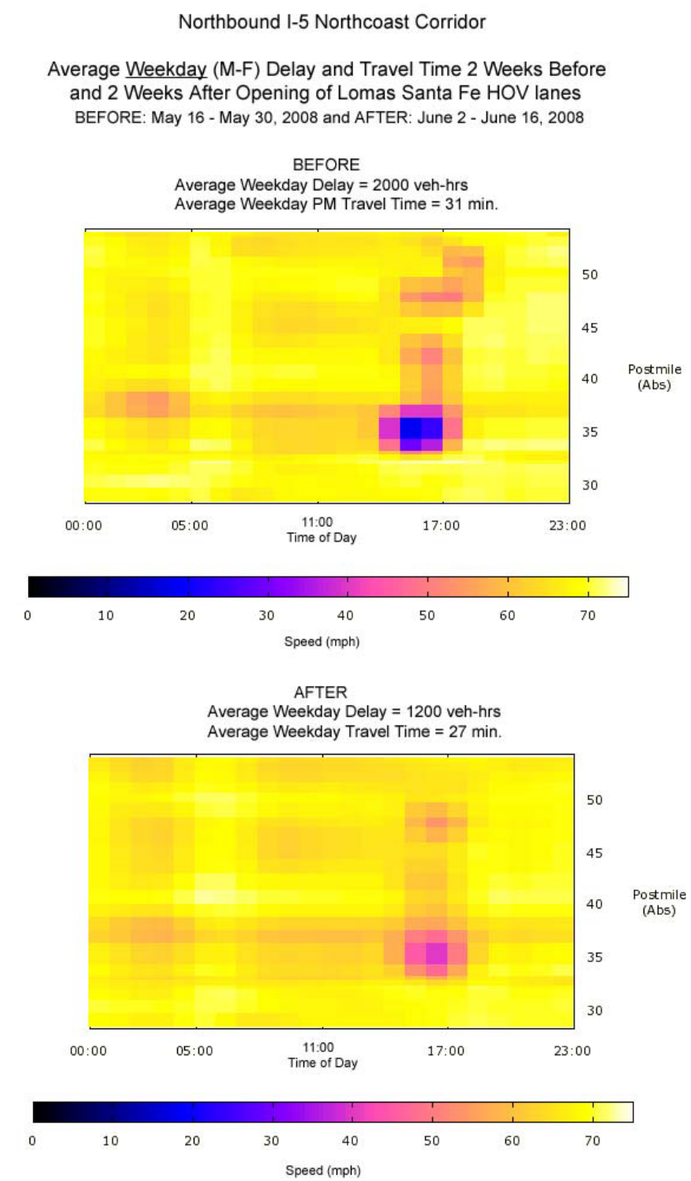


Figure 10.3: I-5 Northbound Weekday Daily Vehicle-Hours of Delay

10.3.2 Southbound Delay

Figures 10.4 illustrates that traffic delay for the corridor was decreased due to the modifications. Prior to the opening of the HOV and auxiliary lanes near Lomas Santa Fe, the delay was 3200 vehicle hours according to the sample data used for Figure 10.4. After the opening of auxiliary lanes, the delay decreased from 3200 vehicle hours to 850 vehicle hours. Accordingly, the average weekday AM travel time decreased by 13 minutes from 40 minutes before the opening to 27 minutes after the opening.

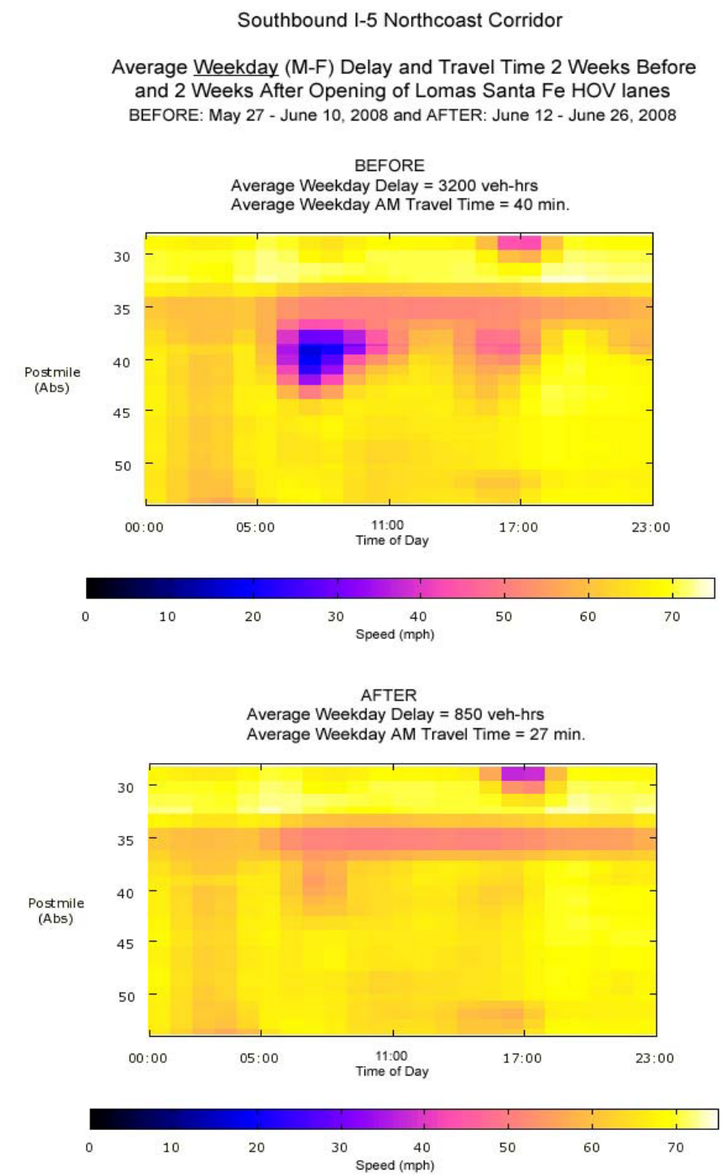
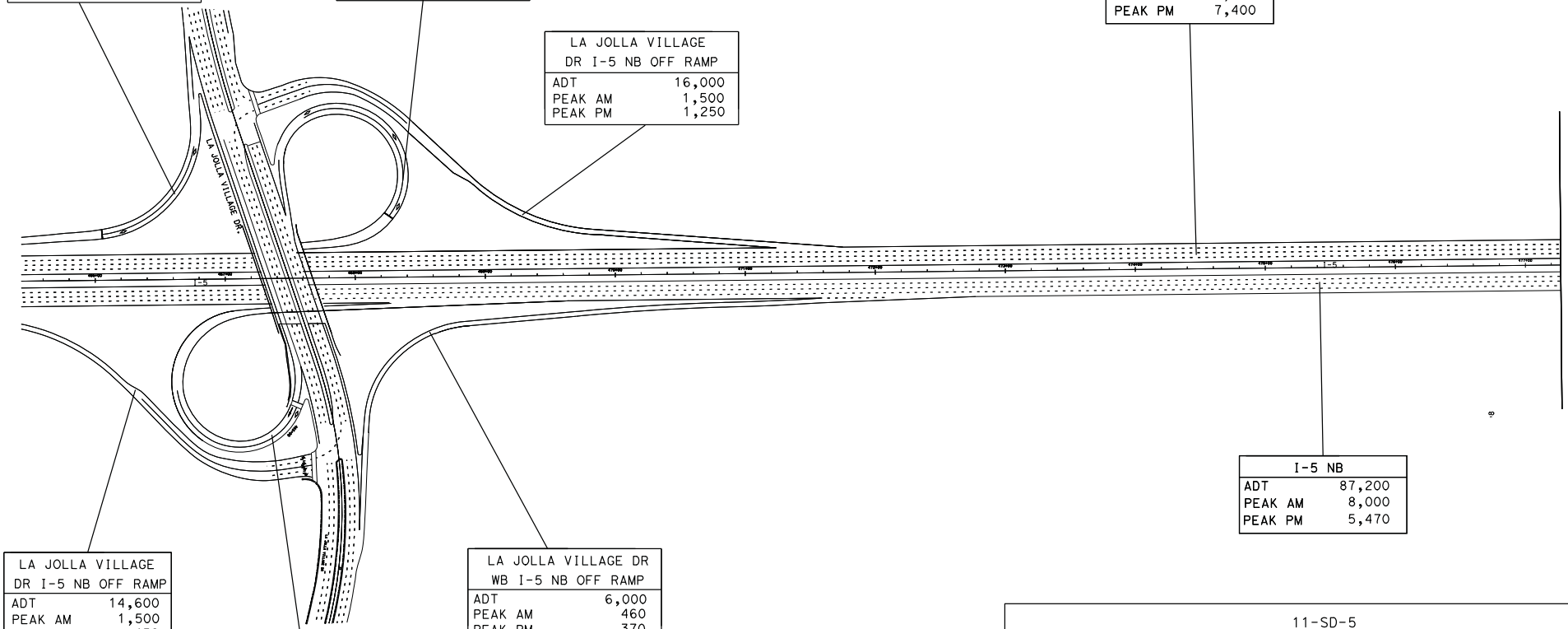


Figure 10.4: Southbound Weekday Daily Vehicle-Hours of Delay



LA JOLLA VILLAGE DR EB I-5 NB ON RAMP	
ADT	9,000
PEAK AM	350
PEAK PM	600

LA JOLLA VILLAGE DR WB I-5 NB OFF RAMP	
ADT	7,000
PEAK AM	250
PEAK PM	900

LA JOLLA VILLAGE DR I-5 NB OFF RAMP	
ADT	16,000
PEAK AM	1,500
PEAK PM	1,250

I-5 SB	
ADT	82,500
PEAK AM	5,430
PEAK PM	7,400

I-5 NB	
ADT	87,200
PEAK AM	8,000
PEAK PM	5,470

LA JOLLA VILLAGE DR I-5 NB OFF RAMP	
ADT	14,600
PEAK AM	1,500
PEAK PM	450

LA JOLLA VILLAGE DR EB I-5 NB OFF RAMP	
ADT	10,800
PEAK AM	740
PEAK PM	950

LA JOLLA VILLAGE DR WB I-5 NB OFF RAMP	
ADT	6,000
PEAK AM	460
PEAK PM	370

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

TRAFFIC VOLUMES AND LANE CONFIGURATIONS

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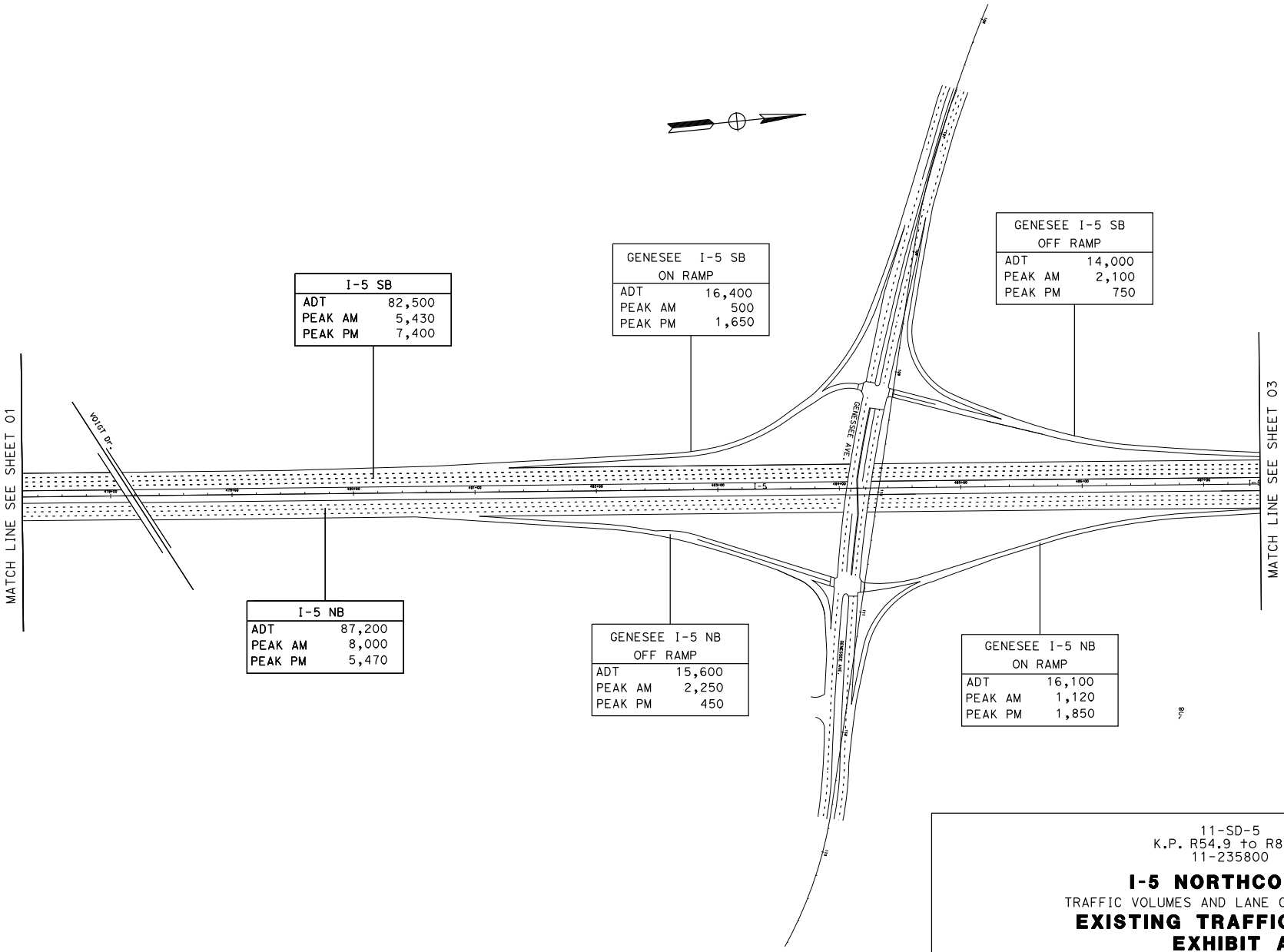

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

TRAFFIC VOLUMES AND LANE CONFIGURATIONS

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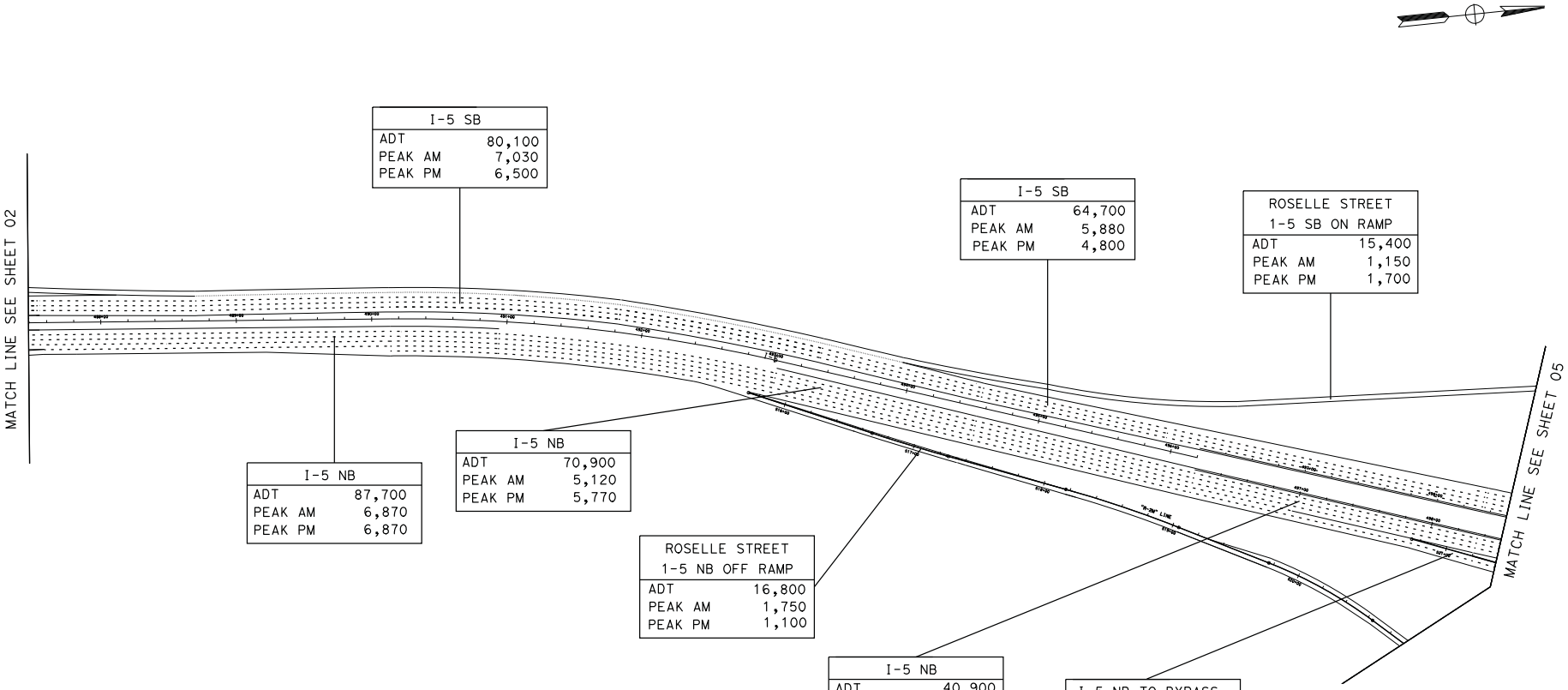

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

TRAFFIC VOLUMES AND LANE CONFIGURATIONS

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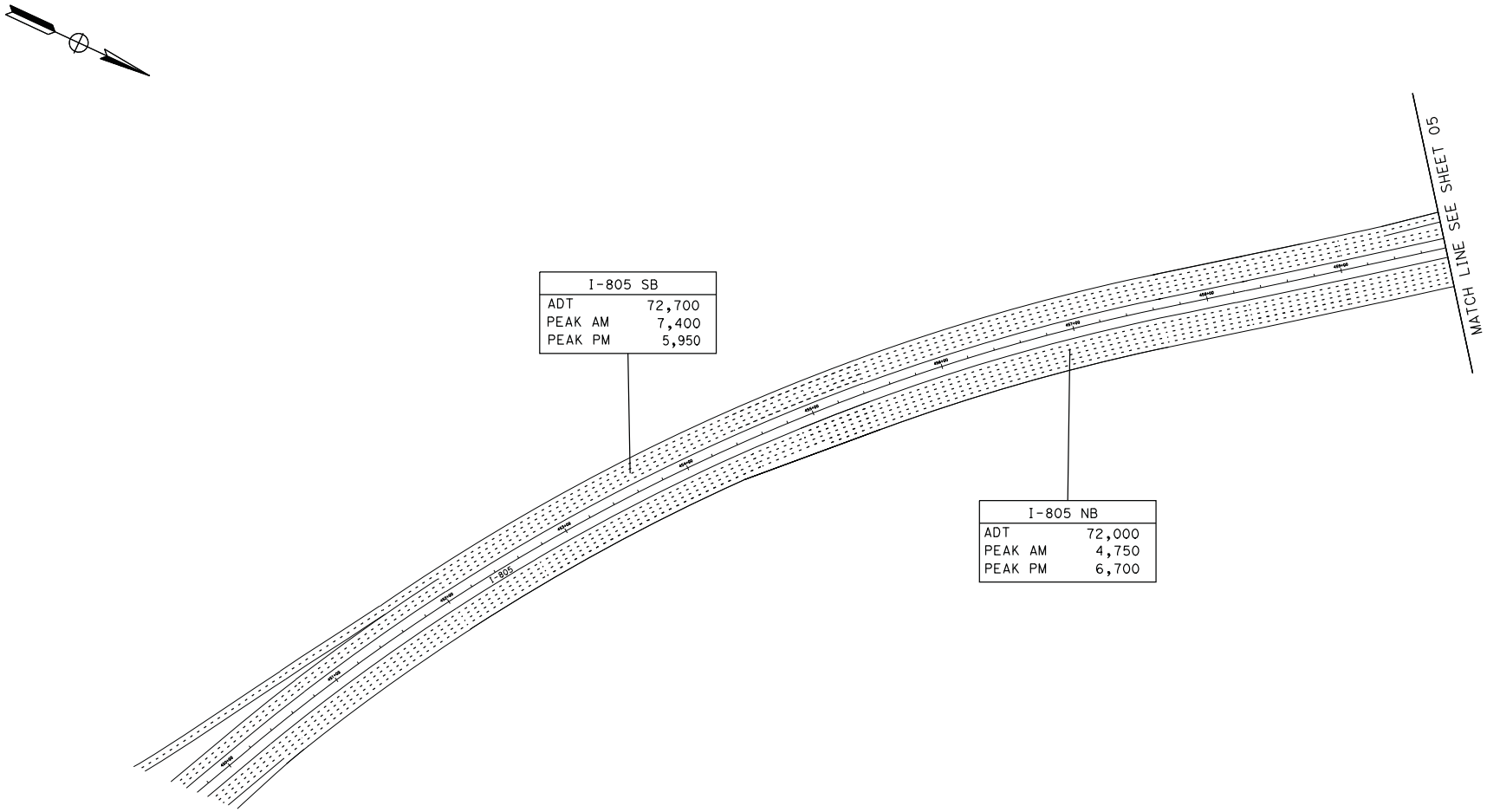

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

TRAFFIC VOLUMES AND LANE CONFIGURATIONS

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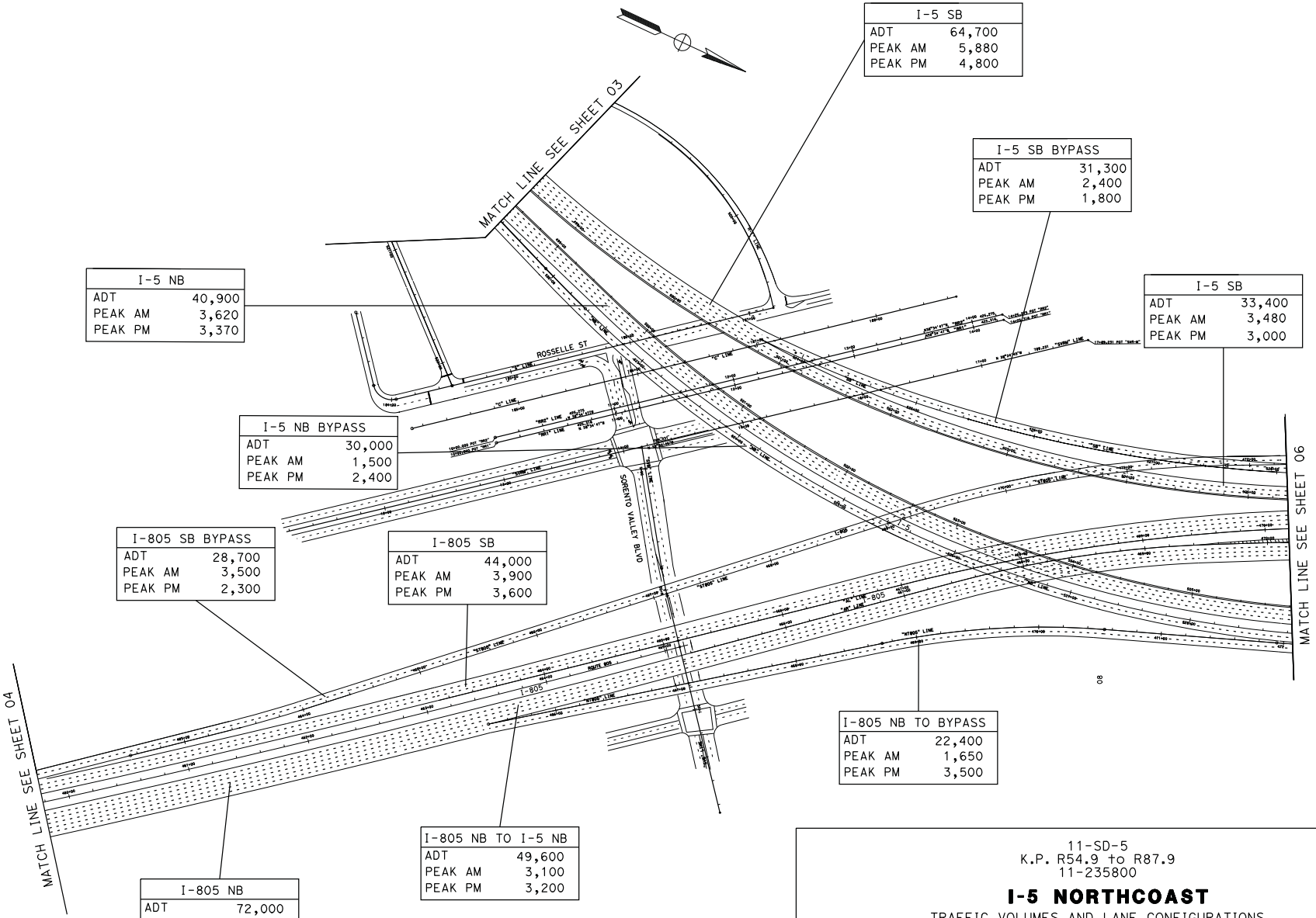

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

TRAFFIC VOLUMES AND LANE CONFIGURATIONS

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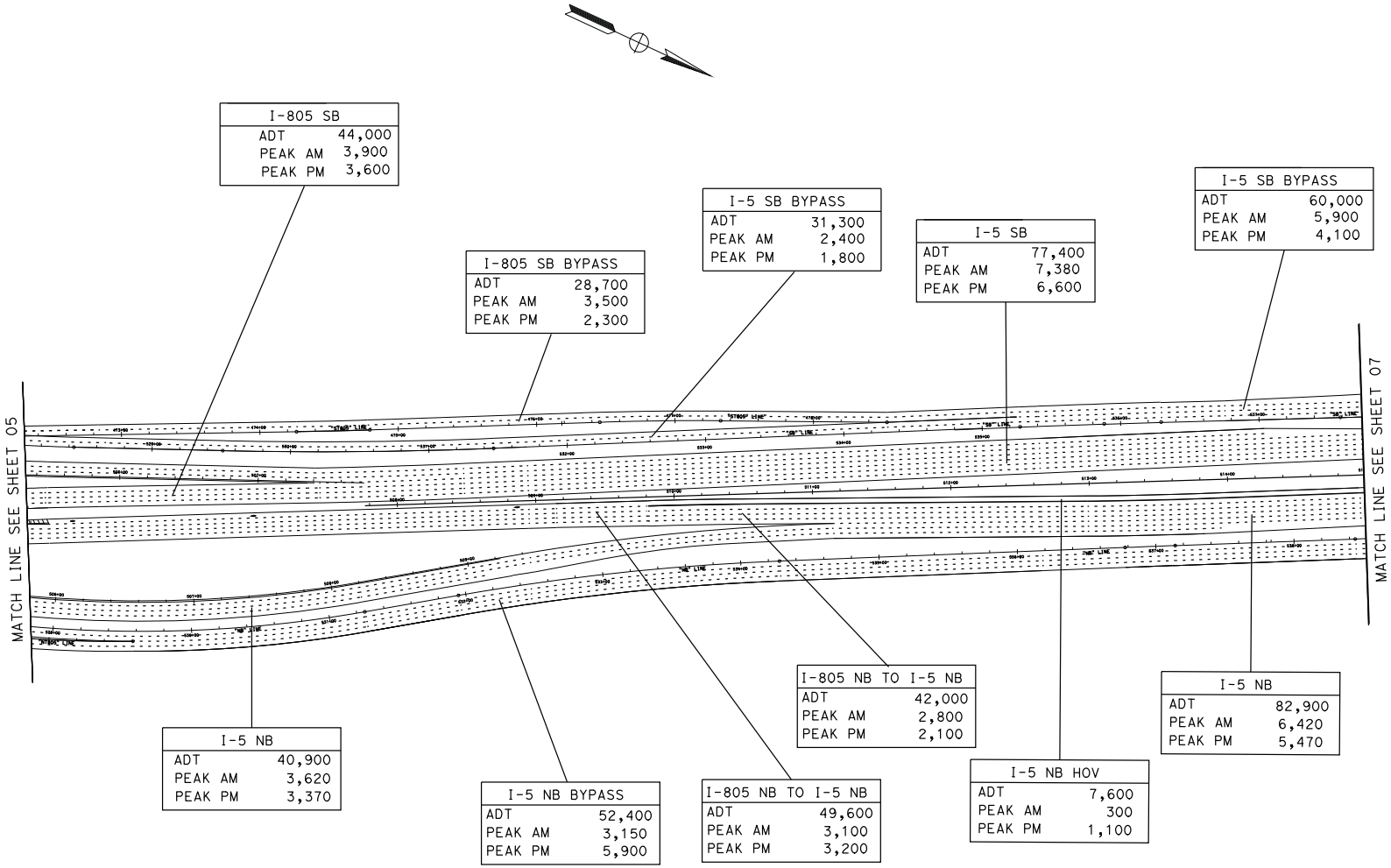

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXISTING TRAFFIC - 2006
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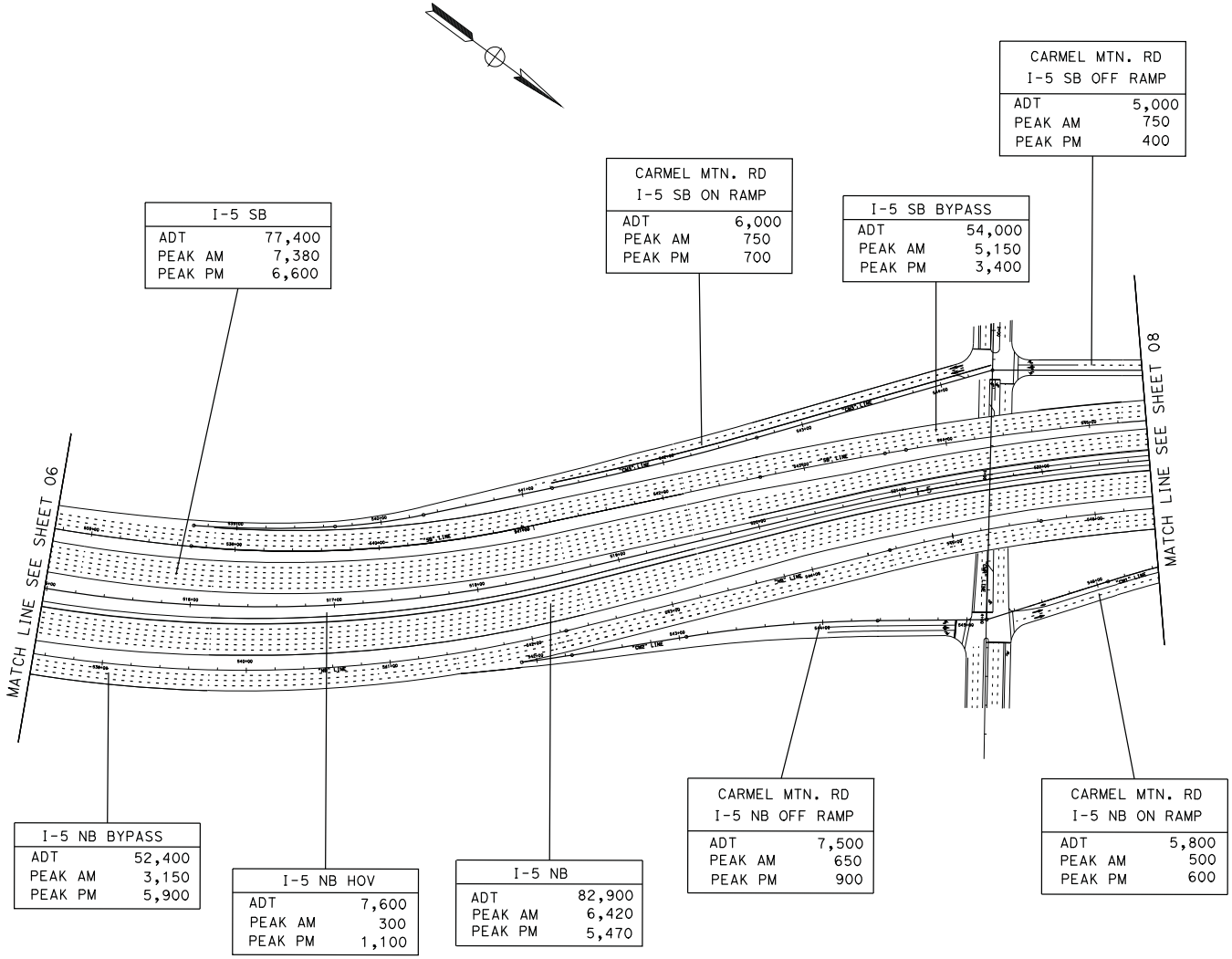

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

TRAFFIC VOLUMES AND LANE CONFIGURATIONS

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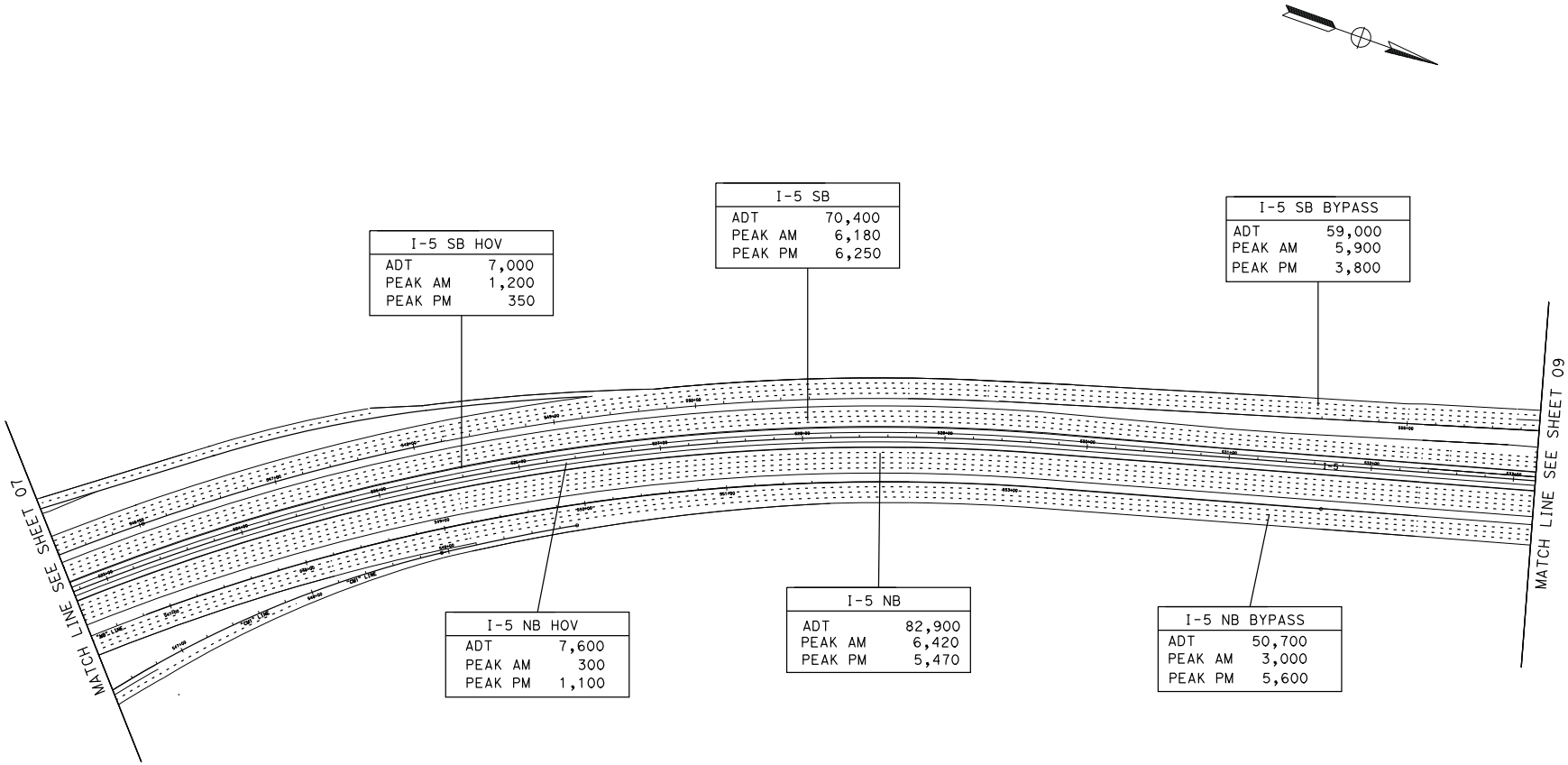

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXISTING TRAFFIC - 2006

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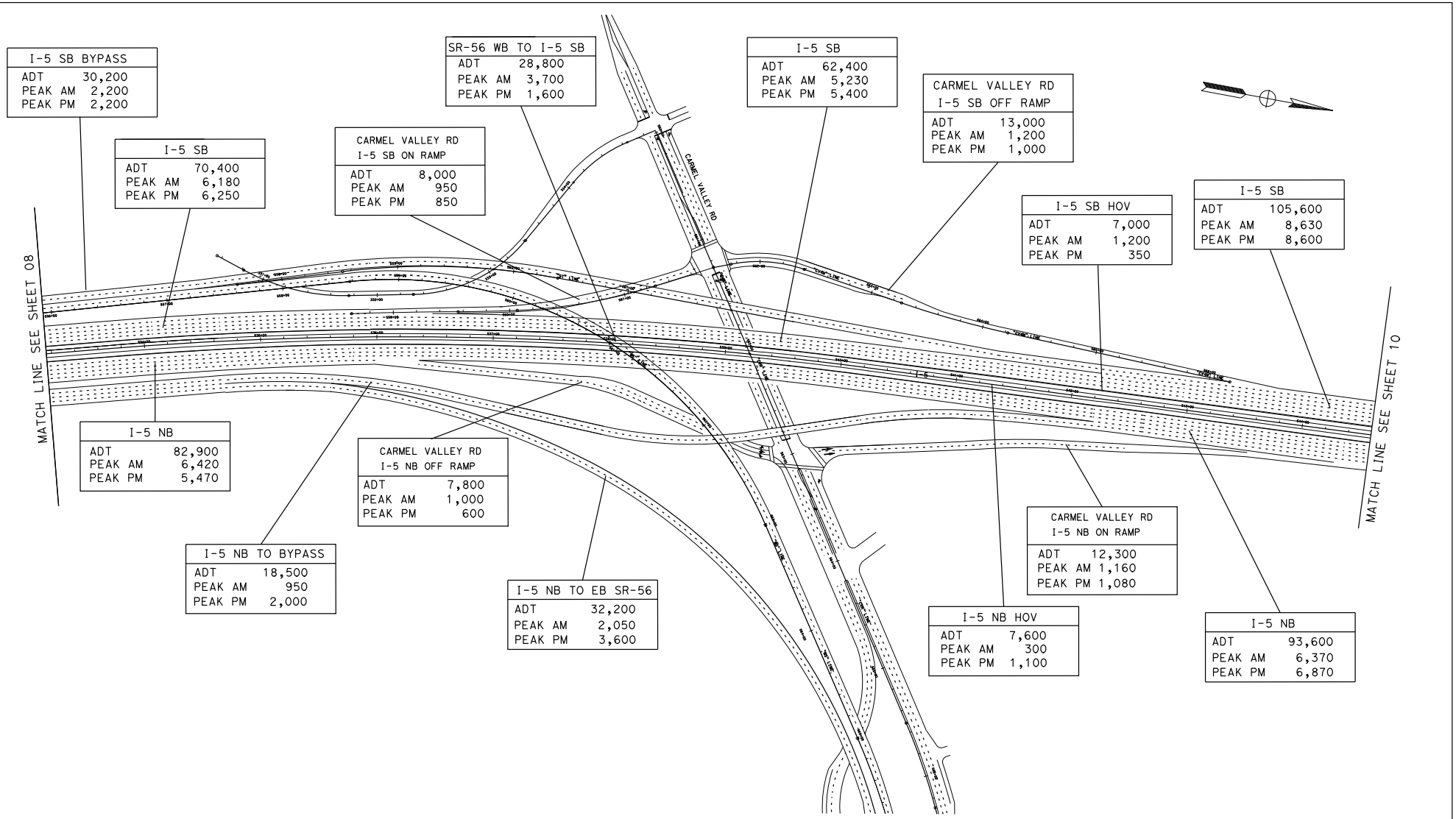

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXISTING TRAFFIC - 2006
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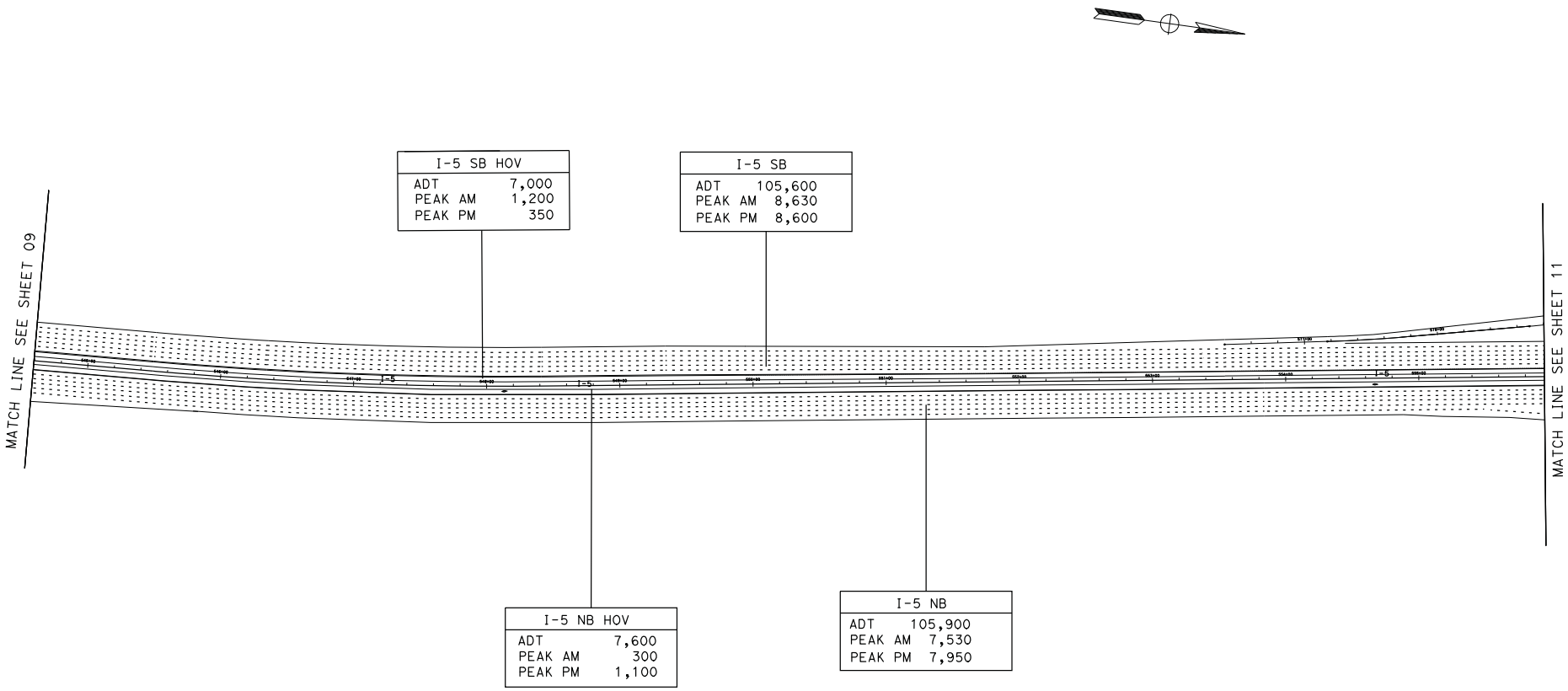

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXISTING TRAFFIC - 2006

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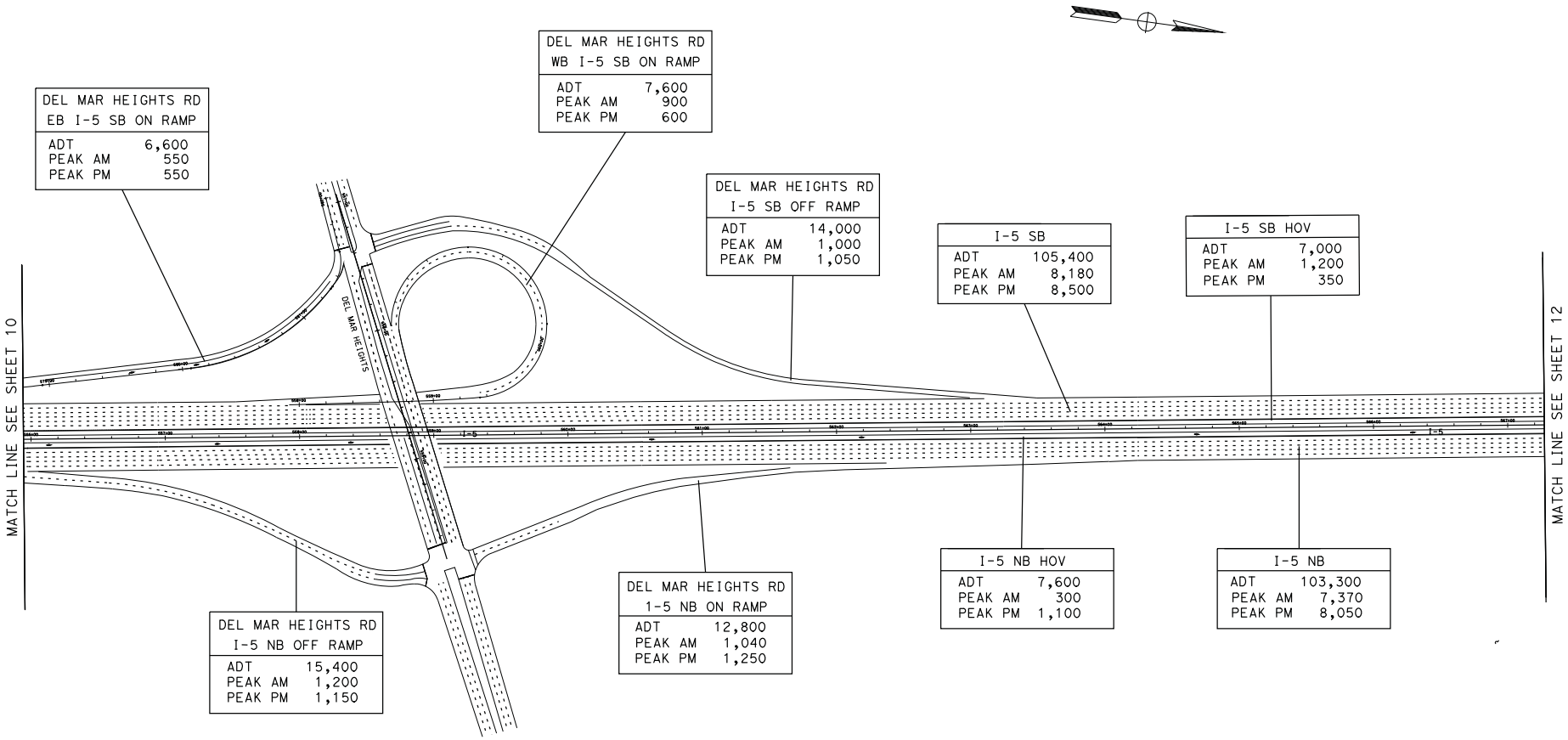

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXISTING TRAFFIC - 2006
EXHIBIT A

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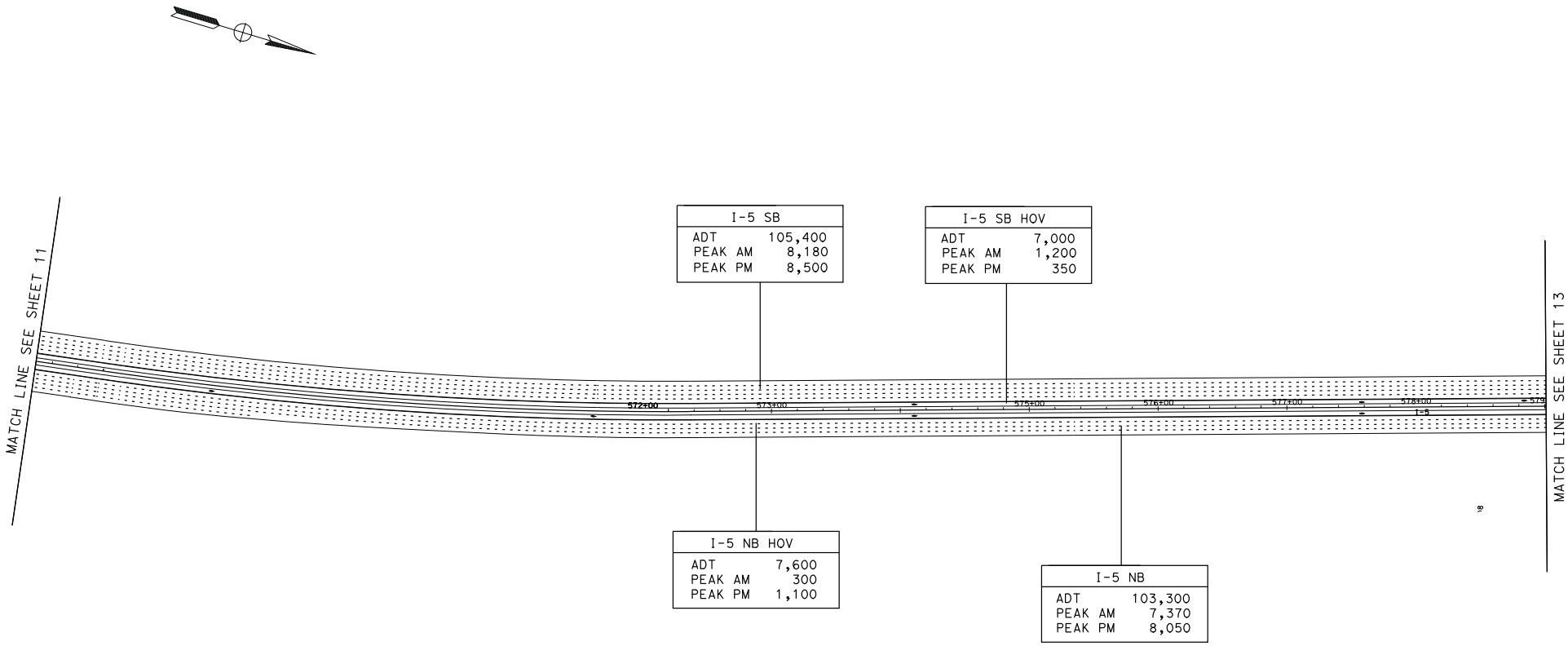

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXISTING TRAFFIC - 2006

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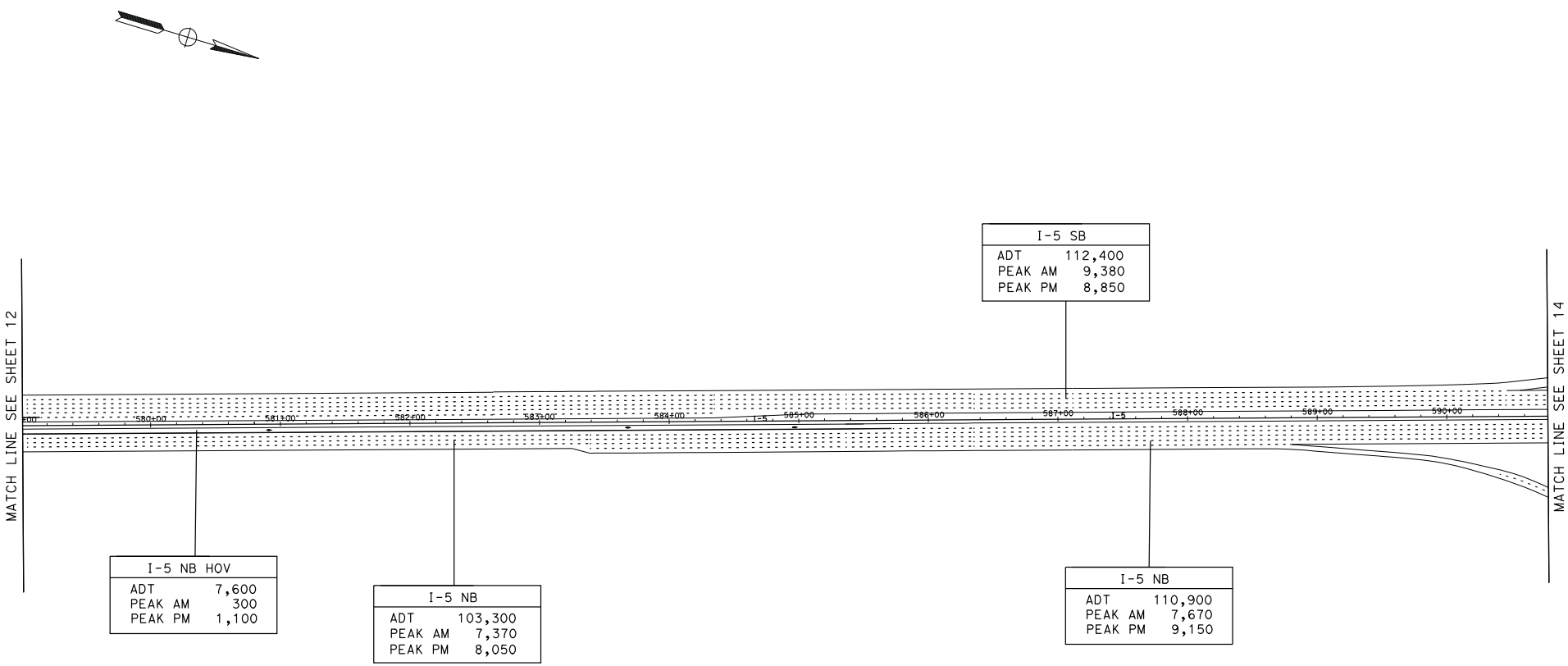

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXISTING TRAFFIC - 2006

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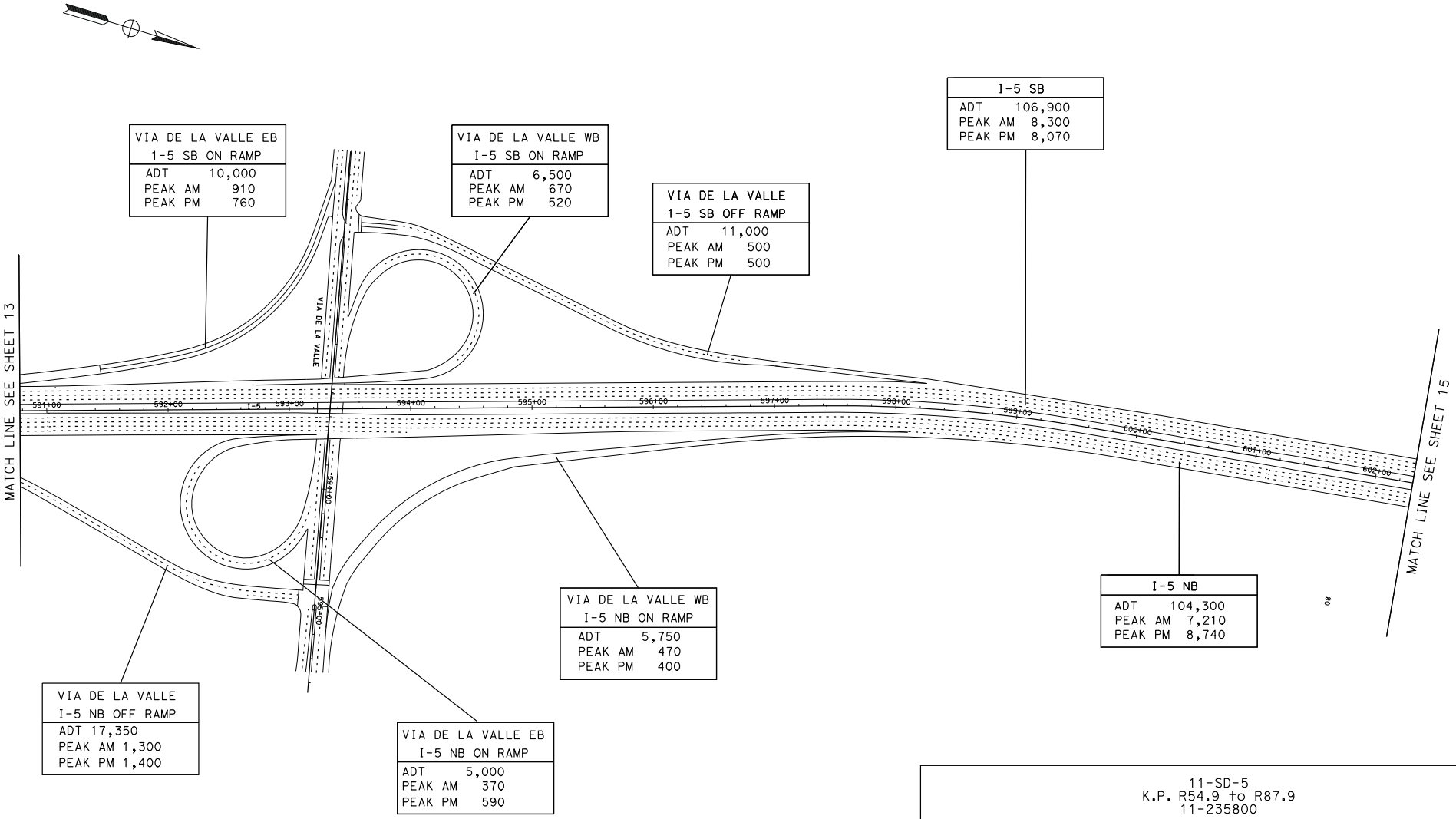

* Note: Existing demand volume

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXISTING TRAFFIC - 2006
EXHIBIT A

DATE PLOTTED => 25-AUG-2008

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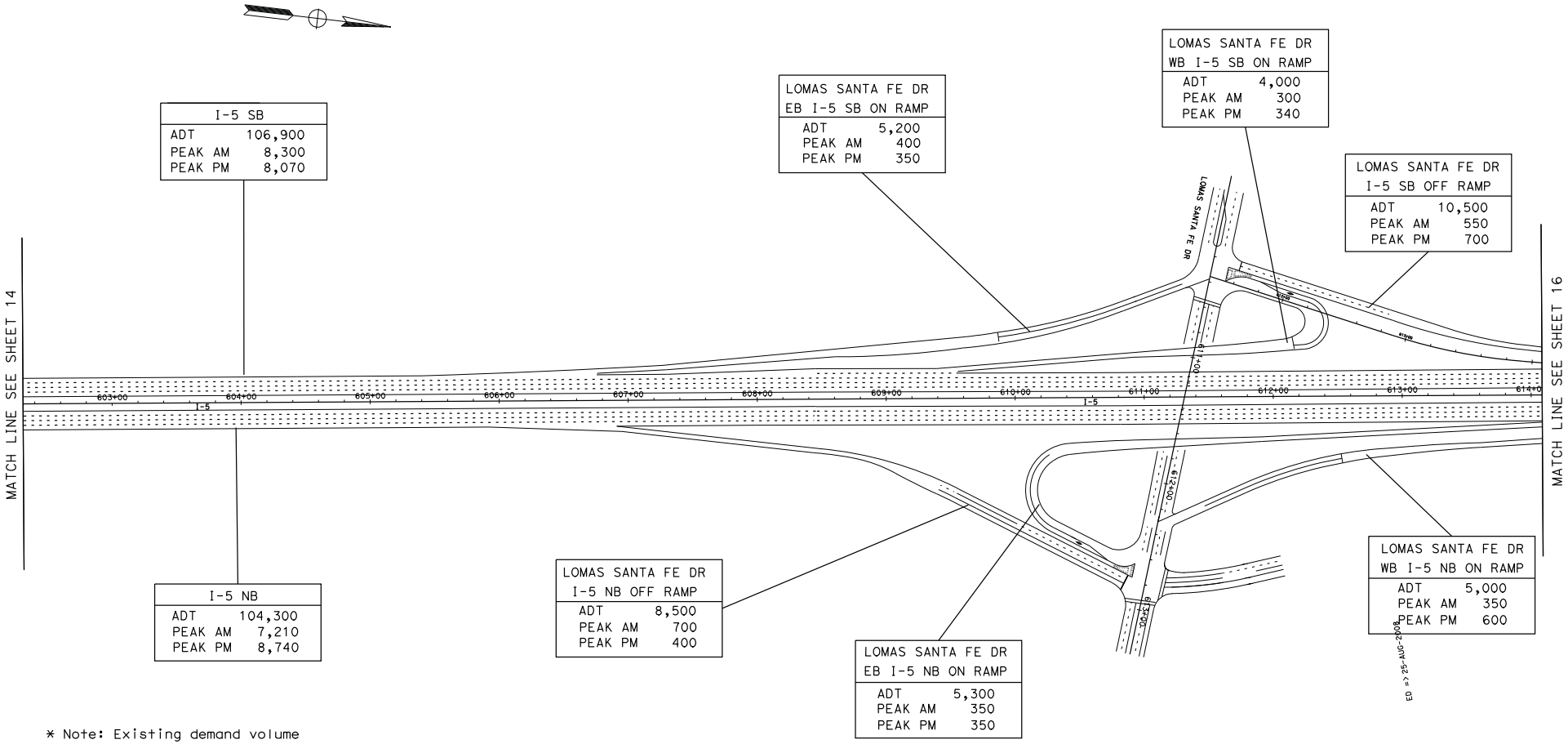


I-5 SB	
ADT	106,900
PEAK AM	8,300
PEAK PM	8,070

I-5 NB	
ADT	104,300
PEAK AM	7,210
PEAK PM	8,740

LOMAS SANTA FE DR EB I-5 SB ON RAMP	
ADT	5,200
PEAK AM	400
PEAK PM	350

LOMAS SANTA FE DR I-5 NB OFF RAMP	
ADT	8,500
PEAK AM	700
PEAK PM	400

LOMAS SANTA FE DR EB I-5 NB ON RAMP	
ADT	5,300
PEAK AM	350
PEAK PM	350

LOMAS SANTA FE DR WB I-5 SB ON RAMP	
ADT	4,000
PEAK AM	300
PEAK PM	340

LOMAS SANTA FE DR I-5 SB OFF RAMP	
ADT	10,500
PEAK AM	550
PEAK PM	700

LOMAS SANTA FE DR WB I-5 NB ON RAMP	
ADT	5,000
PEAK AM	350
PEAK PM	600

* Note: Existing demand volume

DATE PLOTTED => 25-AUG-2008

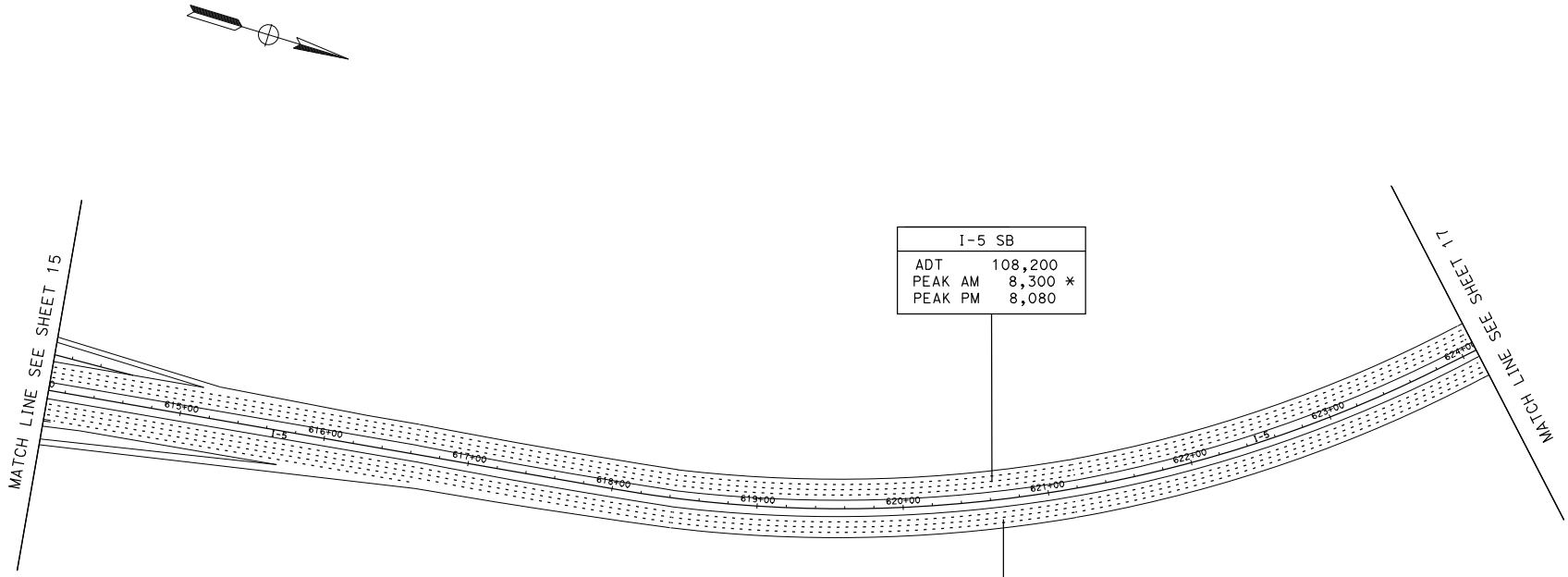
DGN FILE => existing_15LSFdFe.dgn

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXISTING TRAFFIC - 2006
EXHIBIT A



I-5 SB	
ADT	108,200
PEAK AM	8,300 *
PEAK PM	8,080

I-5 NB	
ADT	106,100
PEAK AM	7,210
PEAK PM	9,290

* Note: Existing demand volume

11-SD-5
K.P. R54.9 to R87.9
11-235800

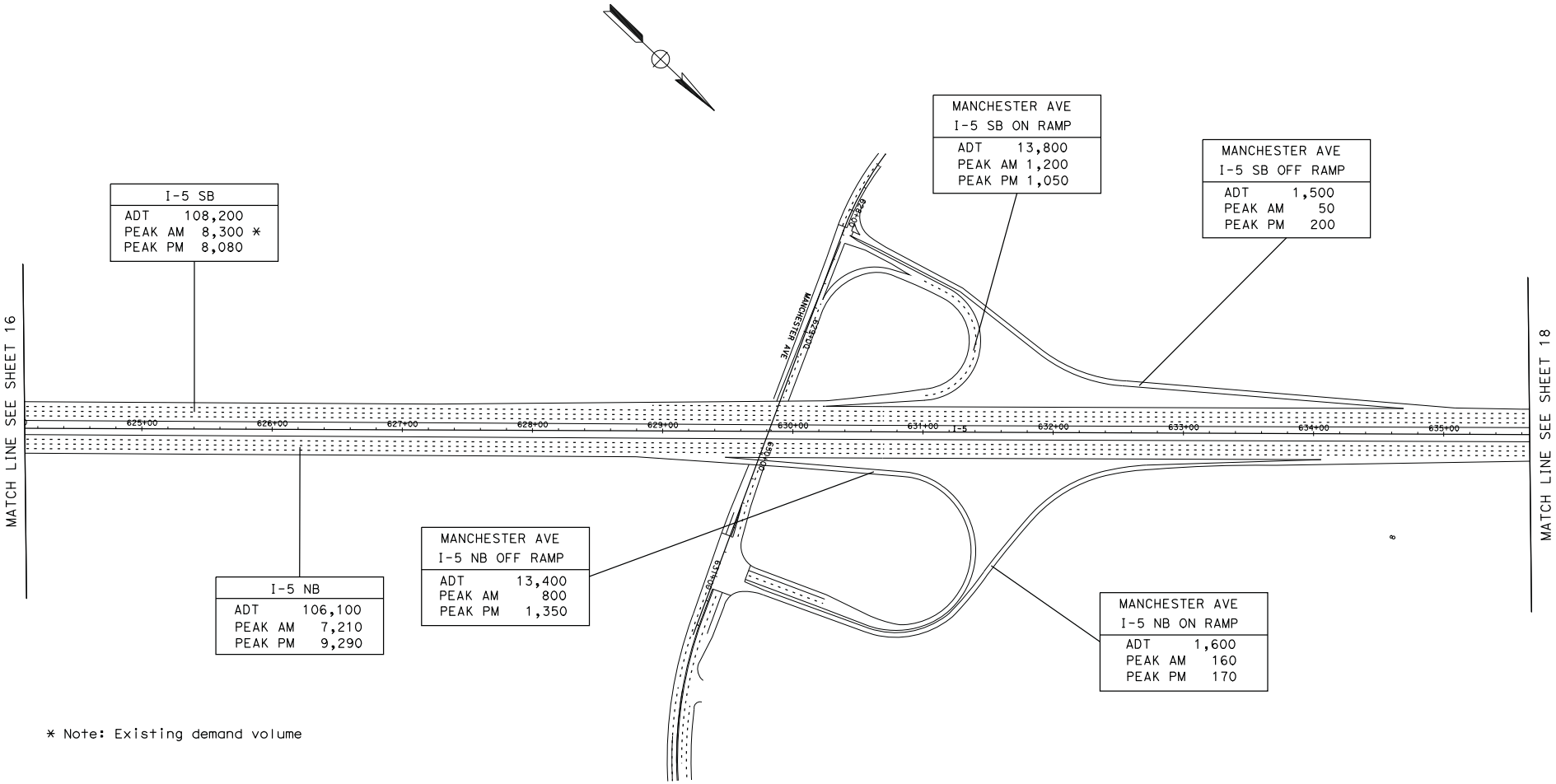
I-5 NORTHCOAST

TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXISTING TRAFFIC - 2006

EXHIBIT A

DGN FILE =>existing_16toManchstr.dgn
DATE PLOTTED =>25-AUG-2008



* Note: Existing demand volume

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

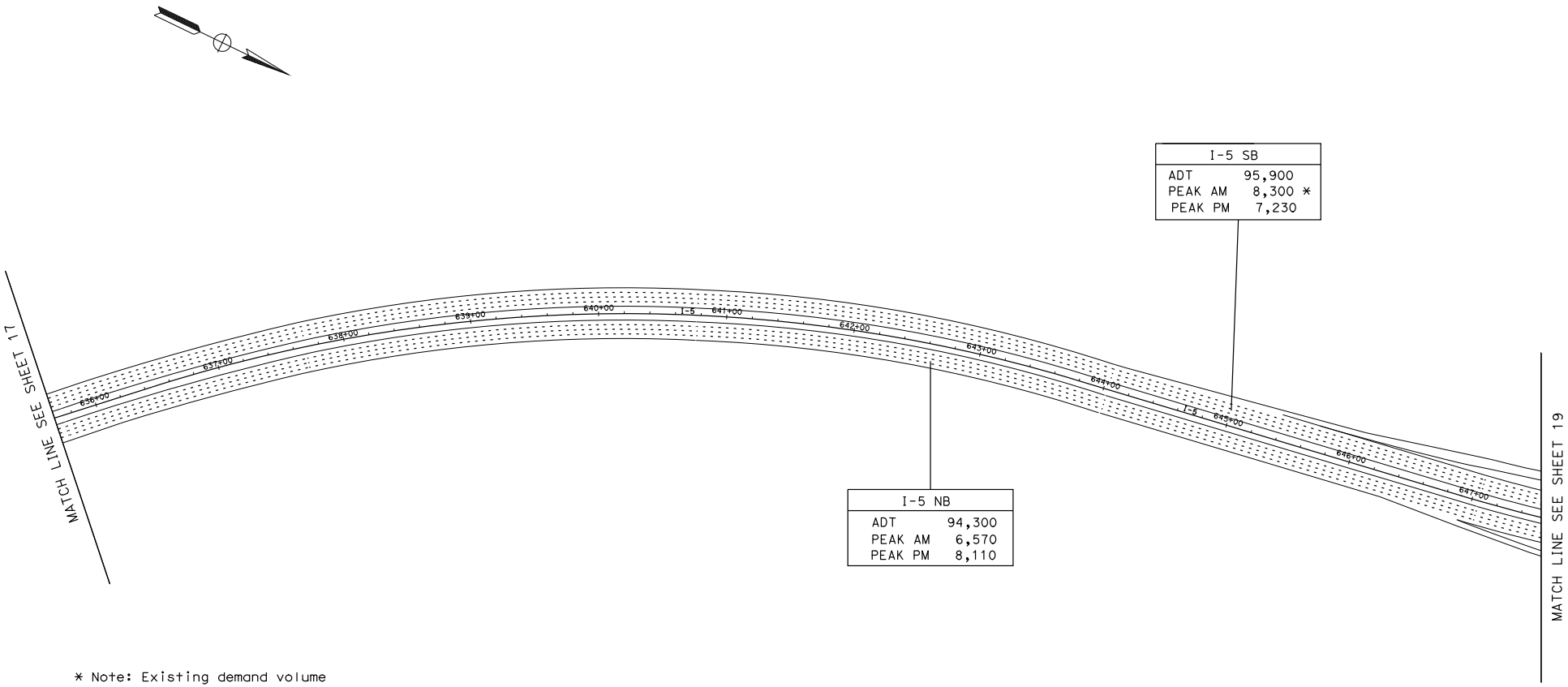
TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXISTING TRAFFIC - 2006

EXHIBIT A

DATE PLOTTED => 25-AUG-2008

DGN FILE =>existing_17Manchstr.dgn



I-5 SB	
ADT	95,900
PEAK AM	8,300 *
PEAK PM	7,230

I-5 NB	
ADT	94,300
PEAK AM	6,570
PEAK PM	8,110

* Note: Existing demand volume

DATE PLOTTED => 25-AUG-2008

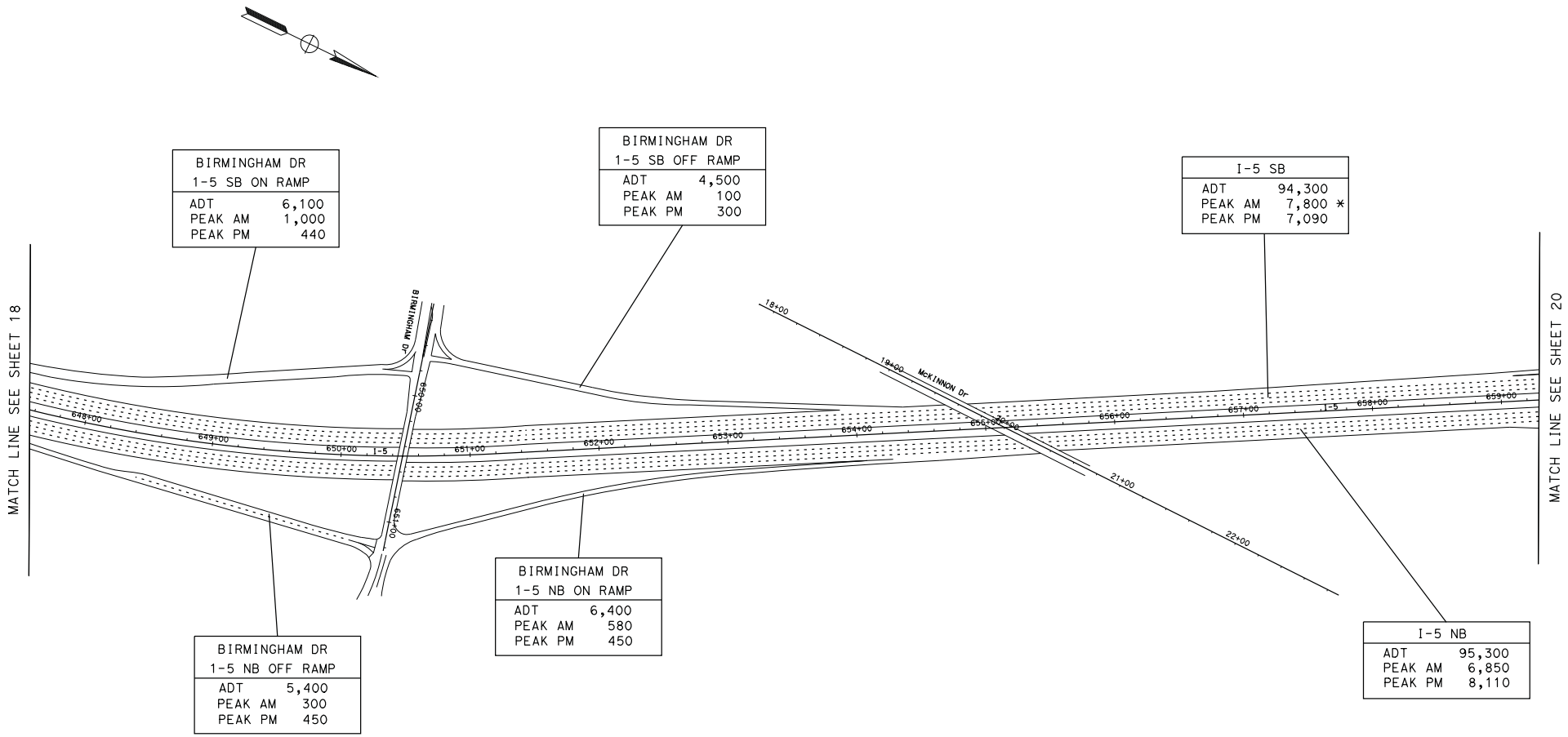
DGN FILE =>existing_18toBirmingham.dgn

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXISTING TRAFFIC - 2006
EXHIBIT A



BIRMINGHAM DR 1-5 SB ON RAMP	
ADT	6,100
PEAK AM	1,000
PEAK PM	440

BIRMINGHAM DR 1-5 SB OFF RAMP	
ADT	4,500
PEAK AM	100
PEAK PM	300

I-5 SB	
ADT	94,300
PEAK AM	7,800 *
PEAK PM	7,090

BIRMINGHAM DR 1-5 NB OFF RAMP	
ADT	5,400
PEAK AM	300
PEAK PM	450

BIRMINGHAM DR 1-5 NB ON RAMP	
ADT	6,400
PEAK AM	580
PEAK PM	450

I-5 NB	
ADT	95,300
PEAK AM	6,850
PEAK PM	8,110

* Note: Existing demand volume

11-SD-5
K.P. R54.9 to R87.9
11-235800

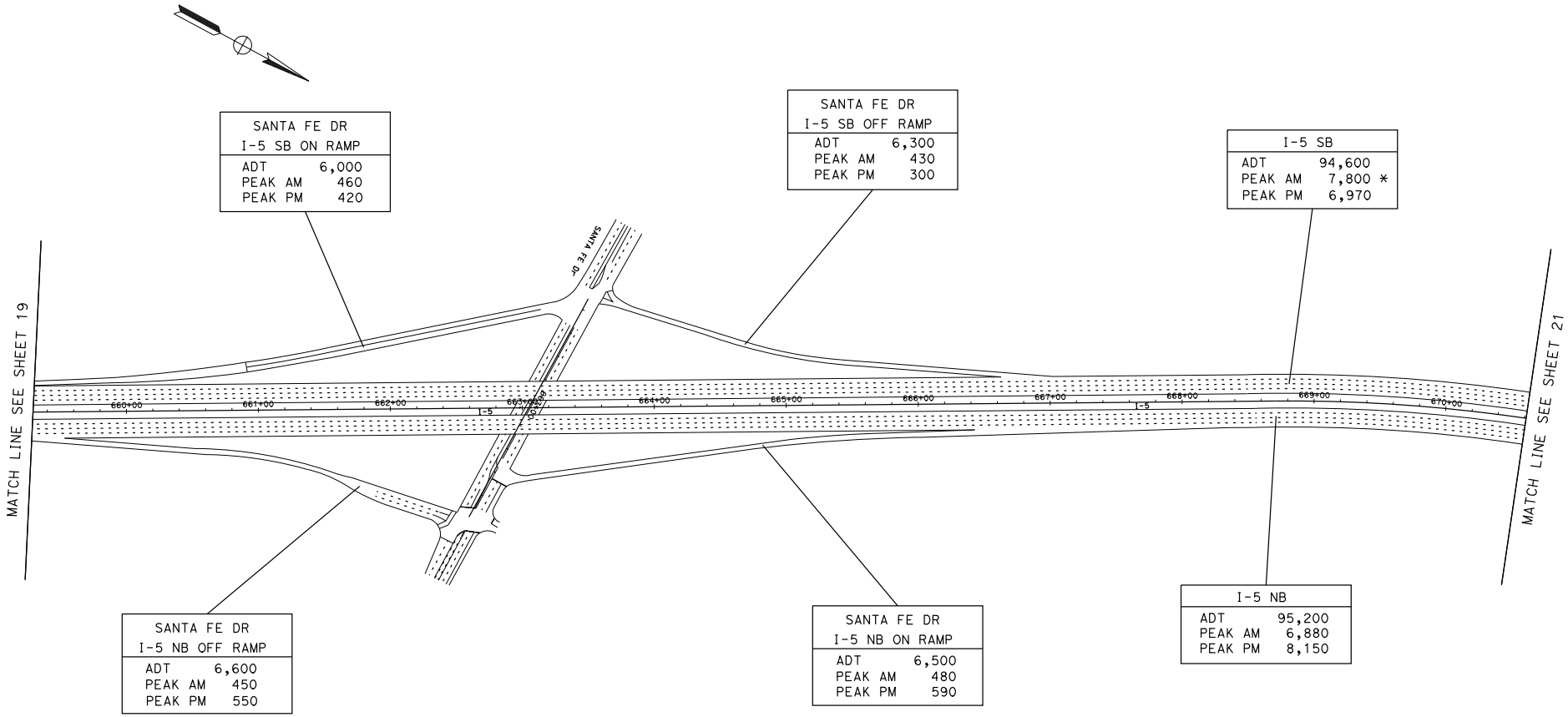
I-5 NORTHCOAST

TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXISTING TRAFFIC - 2006

EXHIBIT A

DGN FILE =>existing_19birmingham.dgn
DATE PLOTTED => 25-AUG-2008



* Note: Existing demand volume

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

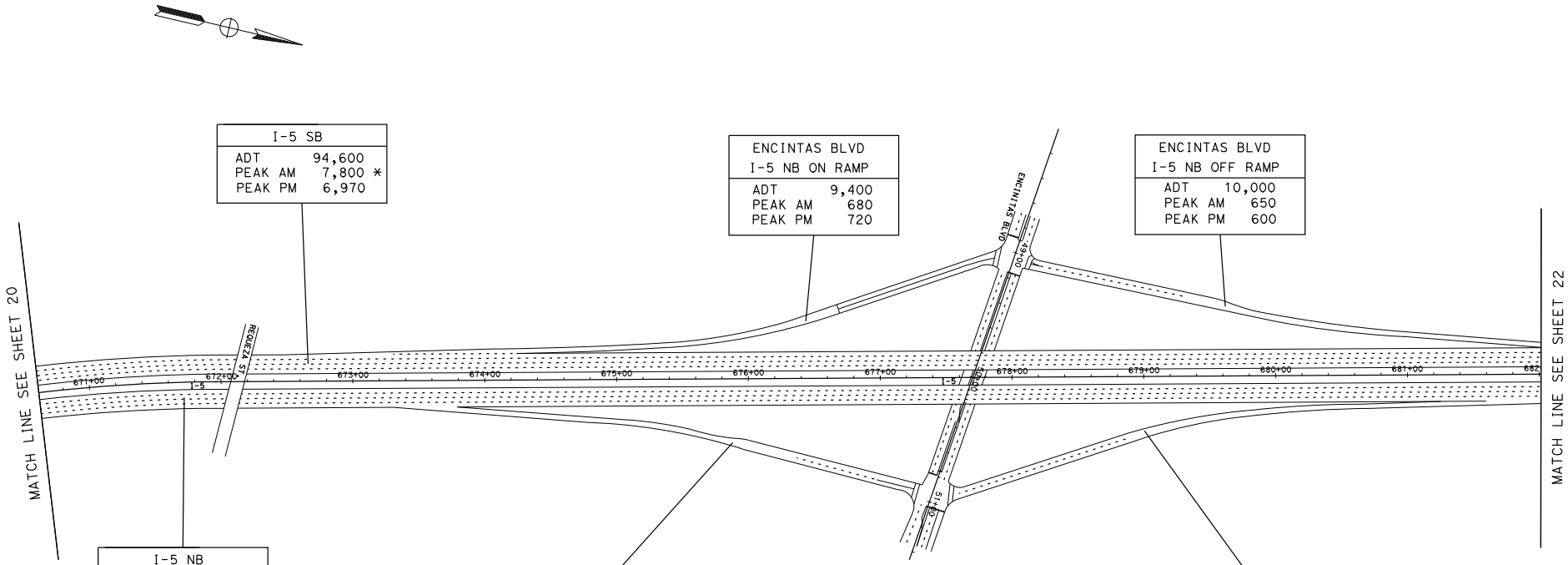
TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXISTING TRAFFIC - 2006

EXHIBIT A

DGN FILE =>existing_2005rafedr.dgn

DATE PLOTTED => 25-AUG-2008



* Note: Existing demand volume

11-SD-5
K.P. R54.9 to R87.9
11-235800

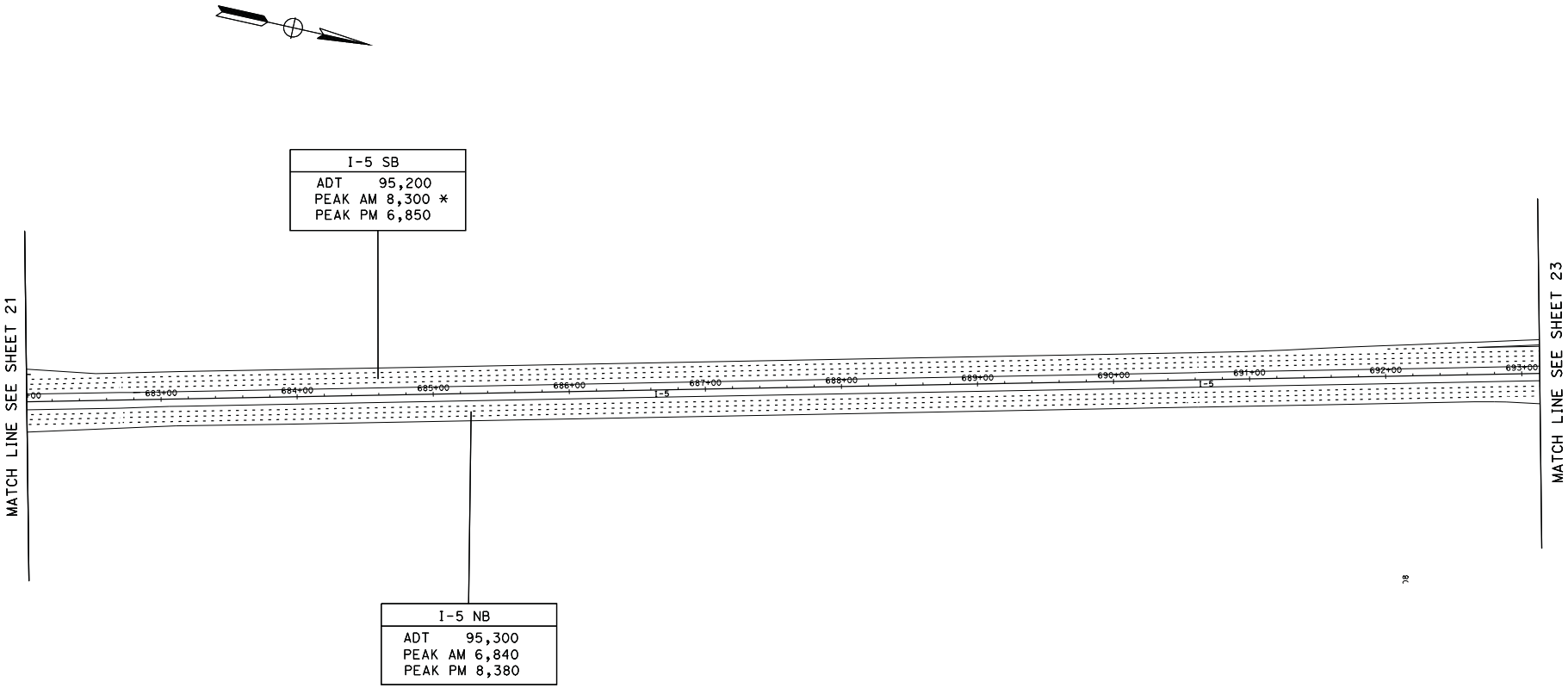
I-5 NORTHCOAST

TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXISTING TRAFFIC - 2006

EXHIBIT A

DGN FILE =>existing_21Encintas.dgn
DATE PLOTTED =>25-AUG-2008



* Note: Existing demand volume

DGN FILE =>existing_22toLeucdia.dgn DATE PLOTTED =>25-AUG-2008

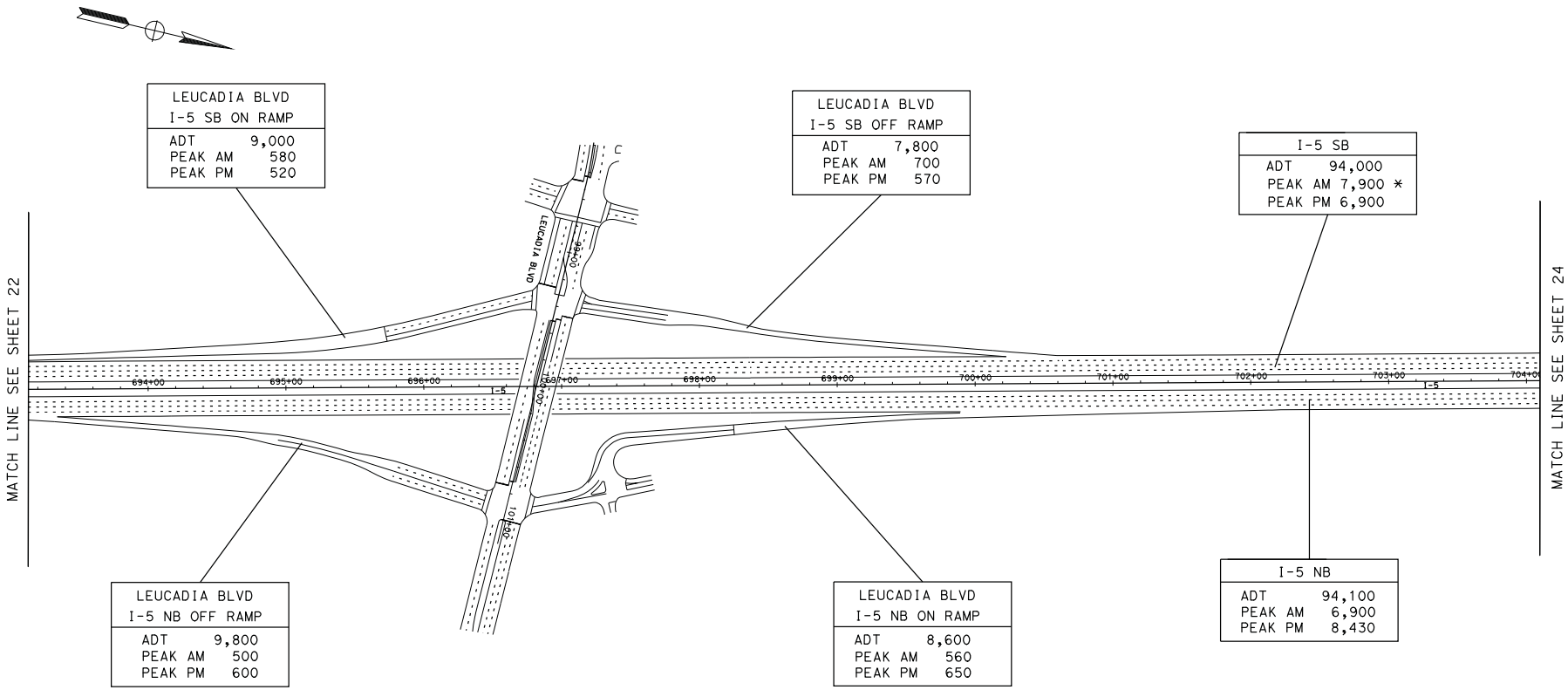
11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXISTING TRAFFIC - 2006

EXHIBIT A



* Note: Existing demand volume

DATE PLOTTED => 25-AUG-2008

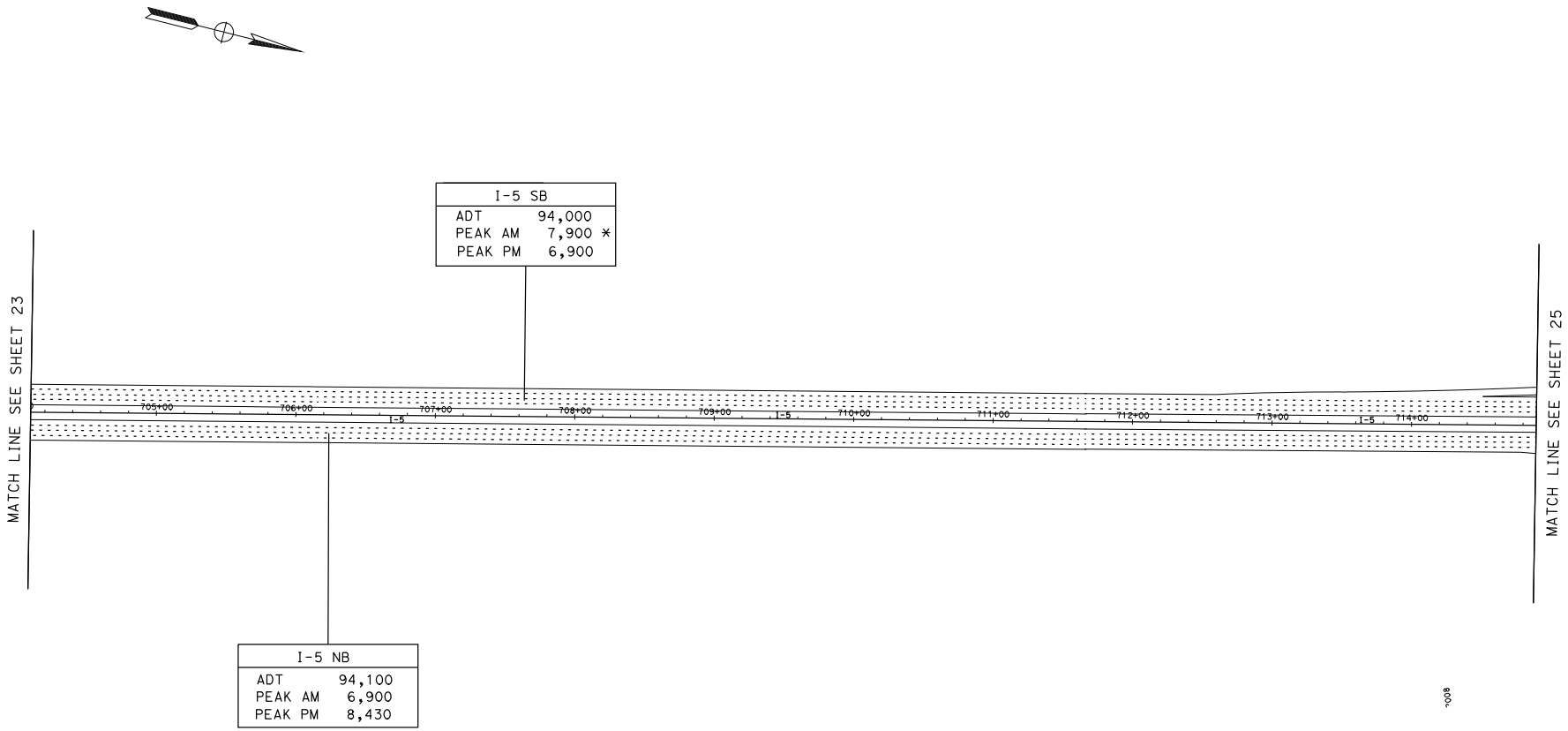
DGN FILE =>existing_23leucdia.dgn

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXISTING TRAFFIC - 2006
EXHIBIT A



* Note: Existing demand volume

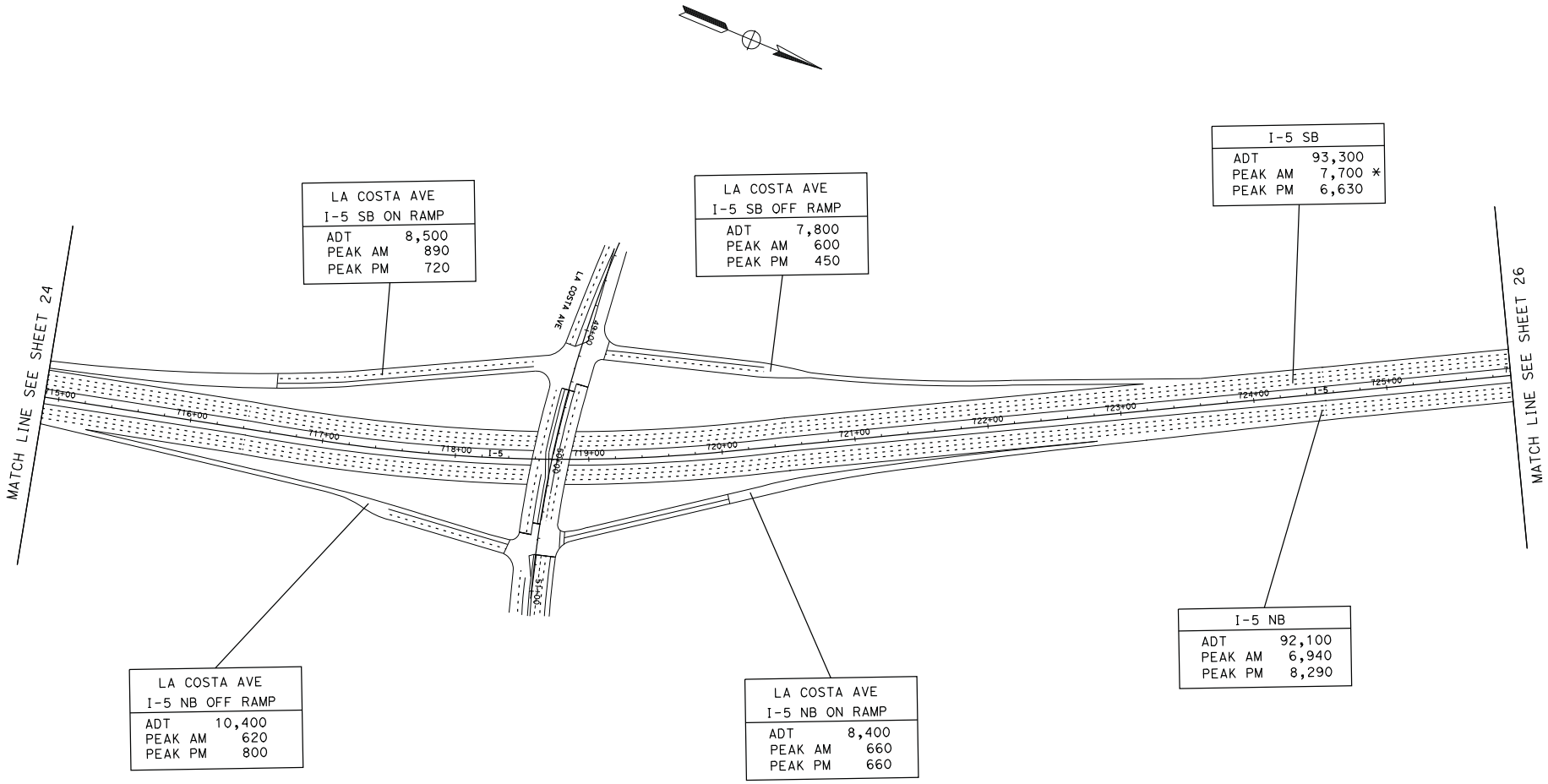
11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXISTING TRAFFIC - 2006
EXHIBIT A

DGN FILE => existing_24toLaCosta.dgn
DATE PLOTTED => 25-AUG-2008



* Note: Existing demand volume

11-SD-5
K.P. R54.9 to R87.9
11-235800

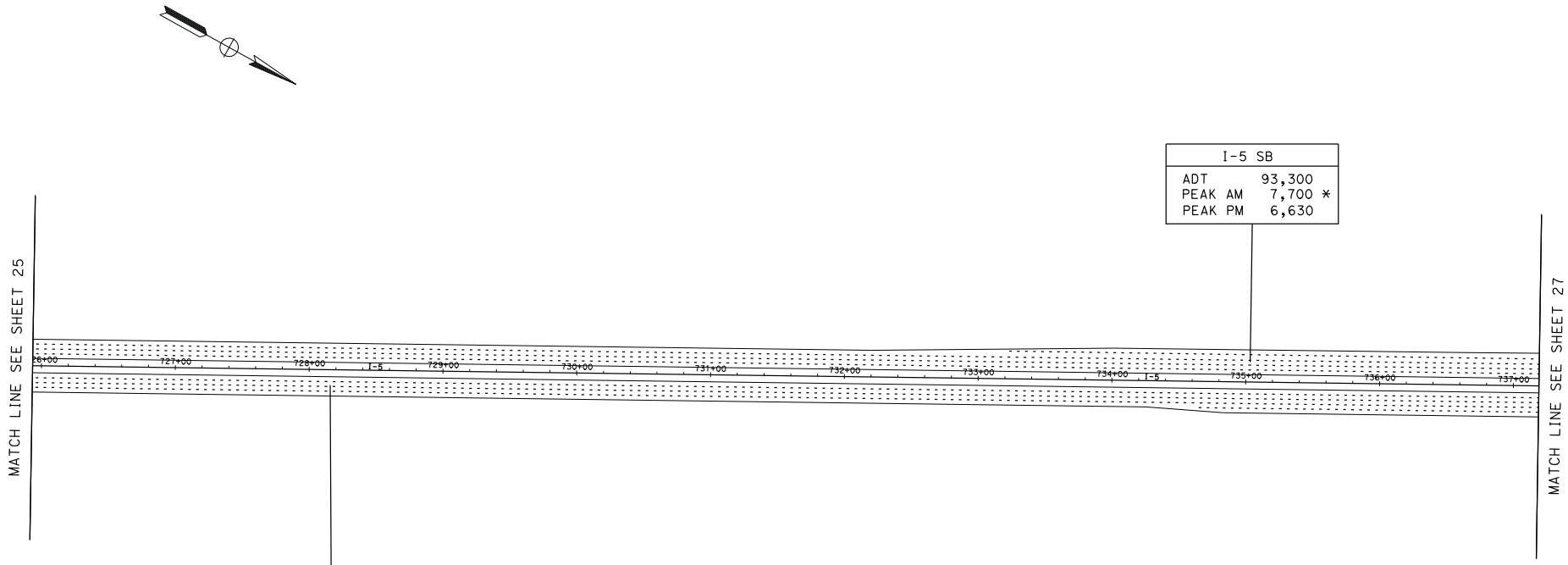
I-5 NORTHCOAST

TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXISTING TRAFFIC - 2006

EXHIBIT A

DGN FILE => existing_25LaCosta.dgn
DATE PLOTTED => 25-AUG-2008



* Note: Existing demand volume

11-SD-5
K.P. R54.9 to R87.9
11-235800

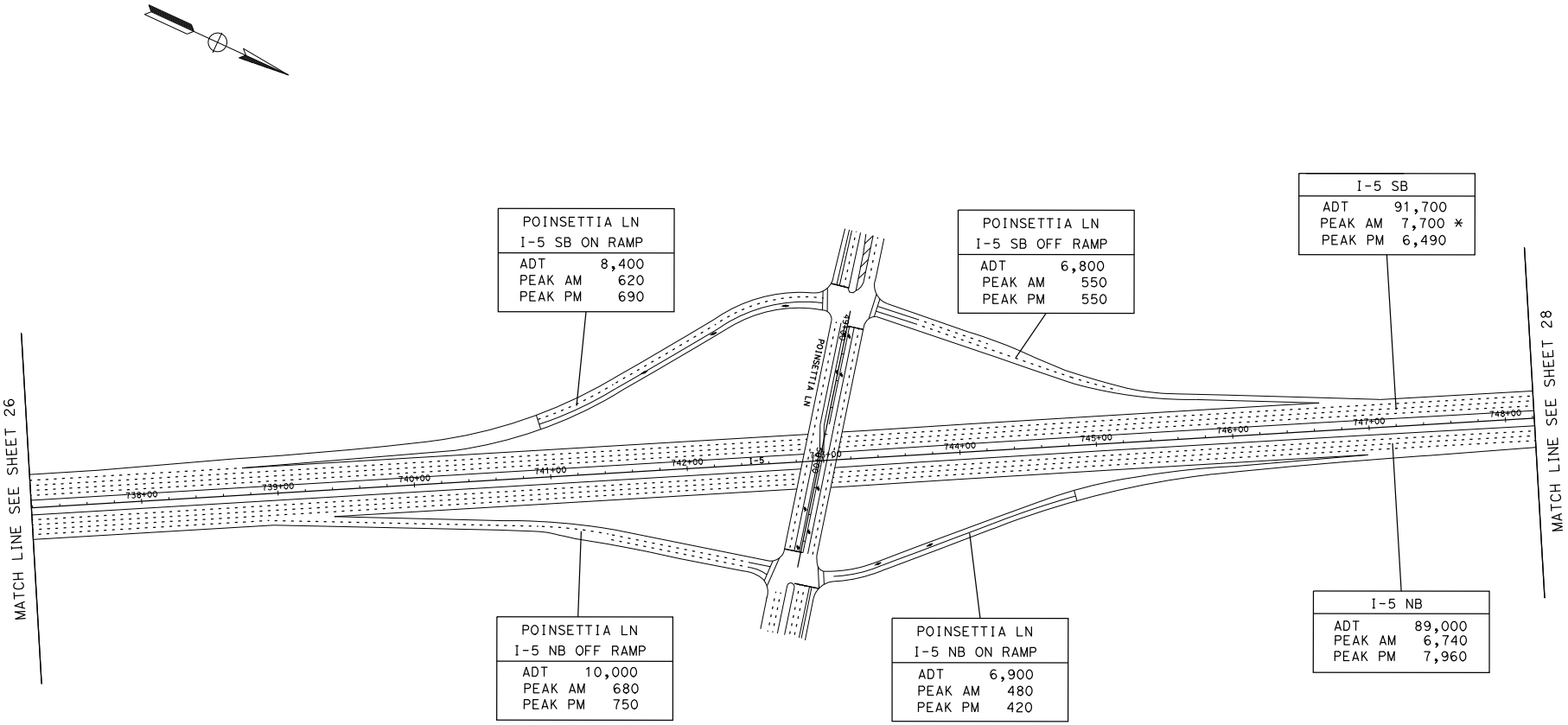
I-5 NORTHCOAST

TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXISTING TRAFFIC - 2006

EXHIBIT A

DGN FILE => existing_26toPolinsettia.dgn DATE PLOTTED => 25-AUG-2008



* Note: Existing demand volume

11-SD-5
K.P. R54.9 to R87.9
11-235800

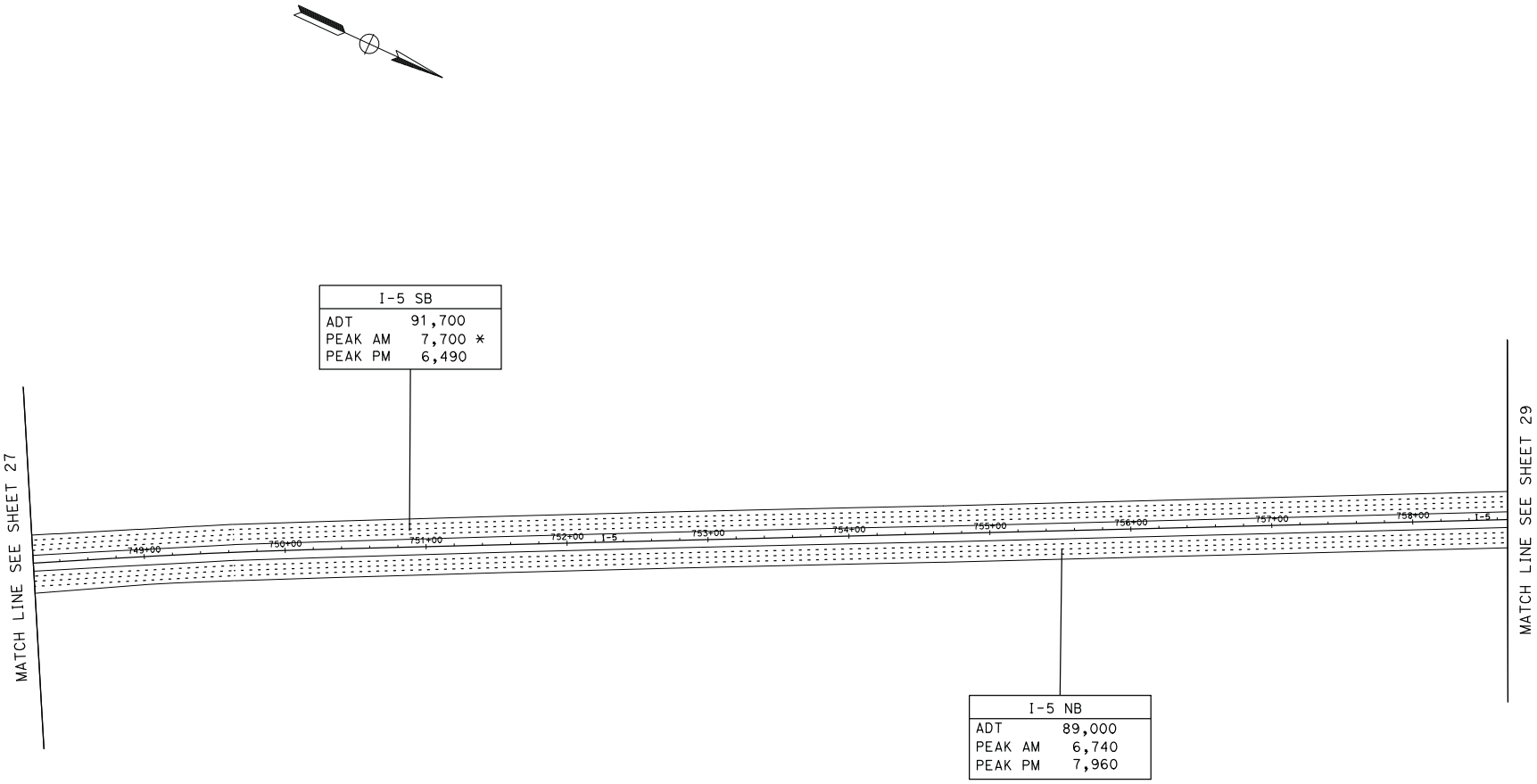
I-5 NORTHCOAST

TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXISTING TRAFFIC - 2006

EXHIBIT A

DGN FILE =>existing_27Poinsettia.dgn DATE PLOTTED =>25-AUG-2008



* Note: Existing demand volume

11-SD-5
K.P. R54.9 to R87.9
11-235800

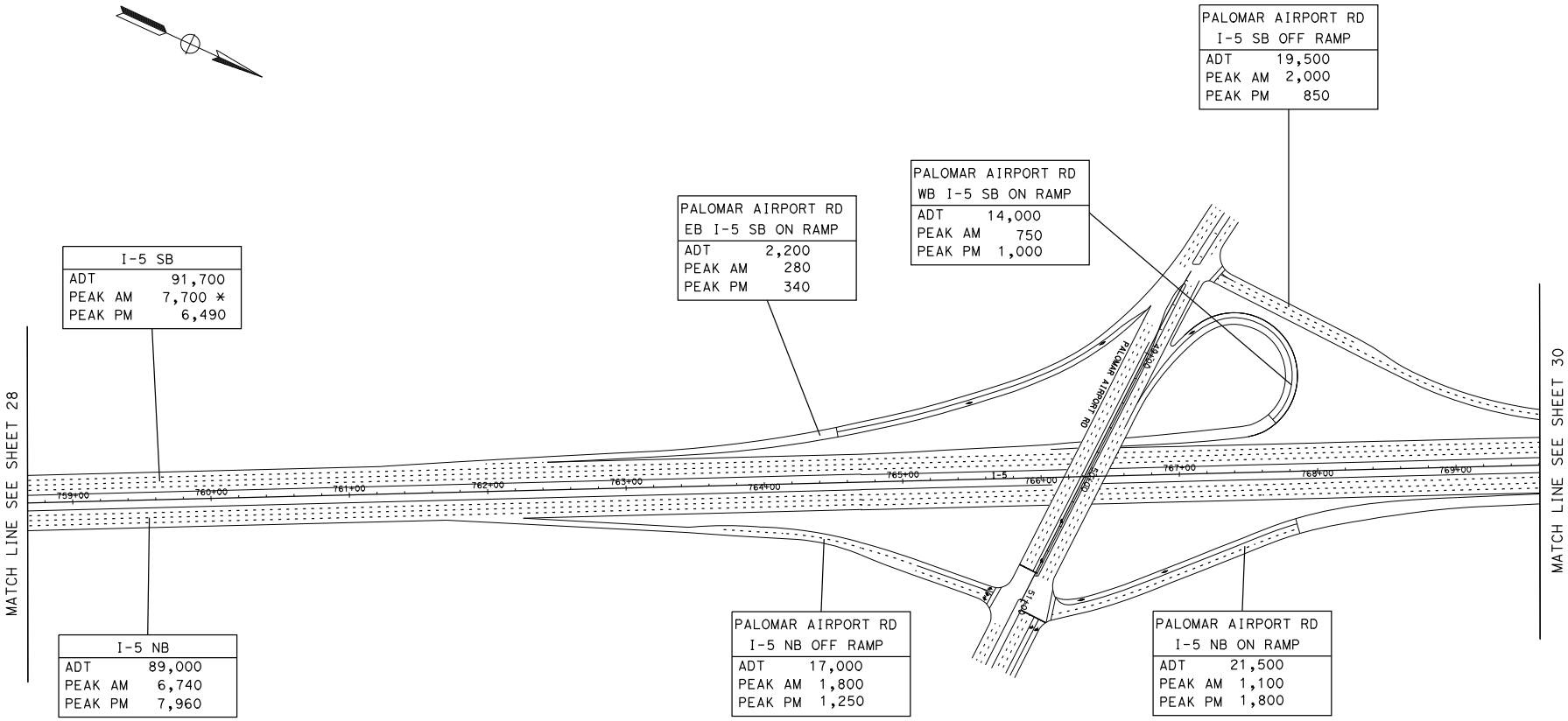
I-5 NORTHCOAST

TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXISTING TRAFFIC - 2006

EXHIBIT A

DGN FILE =>existing_28t=PalmrApt.dgn DATE PLOTTED =>25-AUG-2008



* Note: Existing demand volume

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

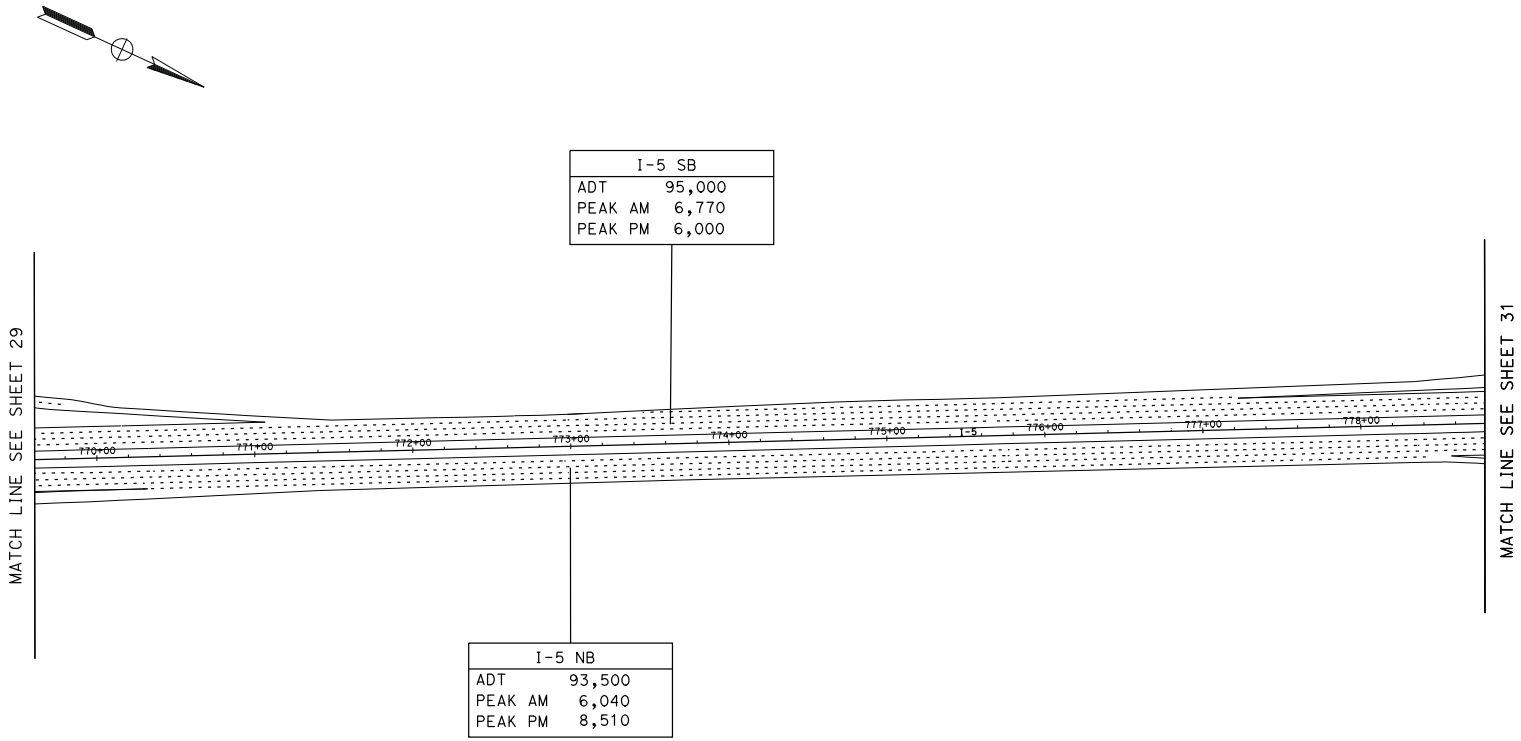
TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXISTING TRAFFIC - 2006

EXHIBIT A

DATE PLOTTED => 25-AUG-2008

DGN FILE =>



11-SD-5
K.P. R54.9 to R87.9
11-235800

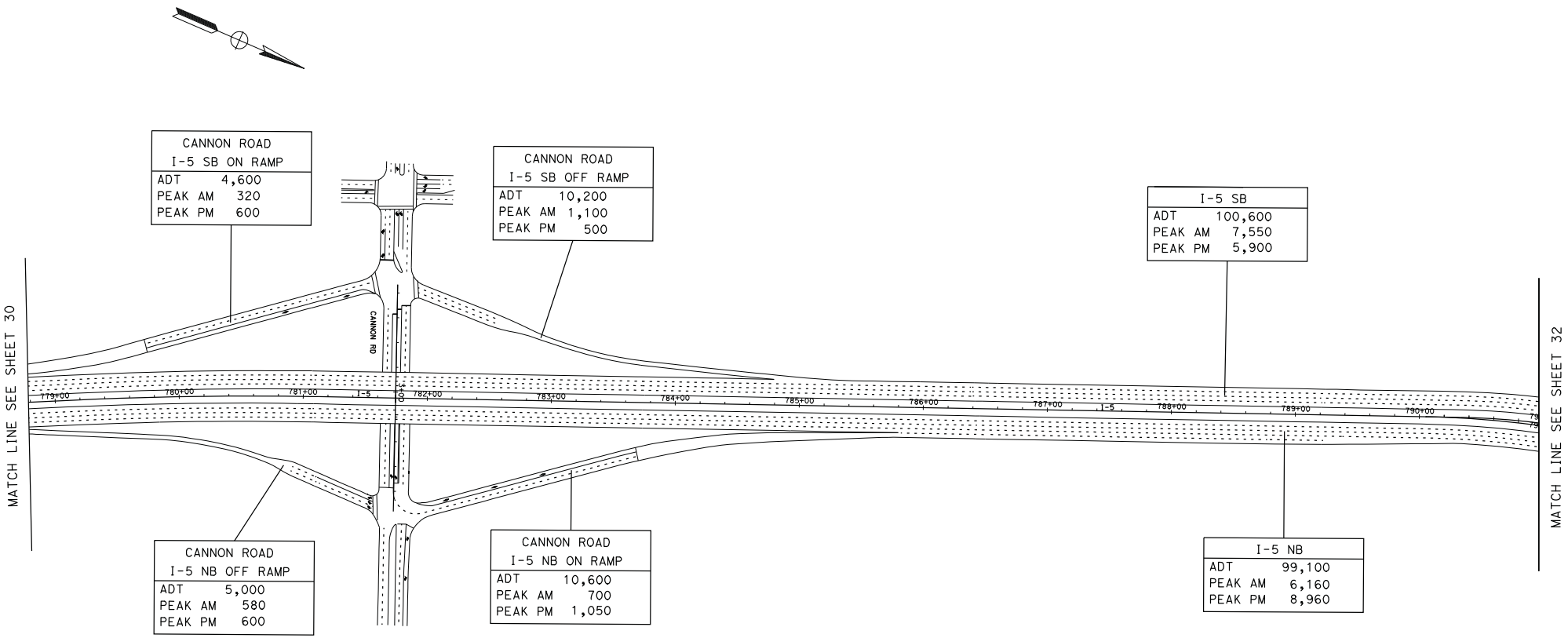
I-5 NORTHCOAST

TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXISTING TRAFFIC - 2006

EXHIBIT A

DGN FILE =>existing_30thcannon.dgn DATE PLOTTED => 25-AUG-2008



DGN FILE =>existing_31cannon.dgn

DATE PLOTTED => 25-AUG-2008

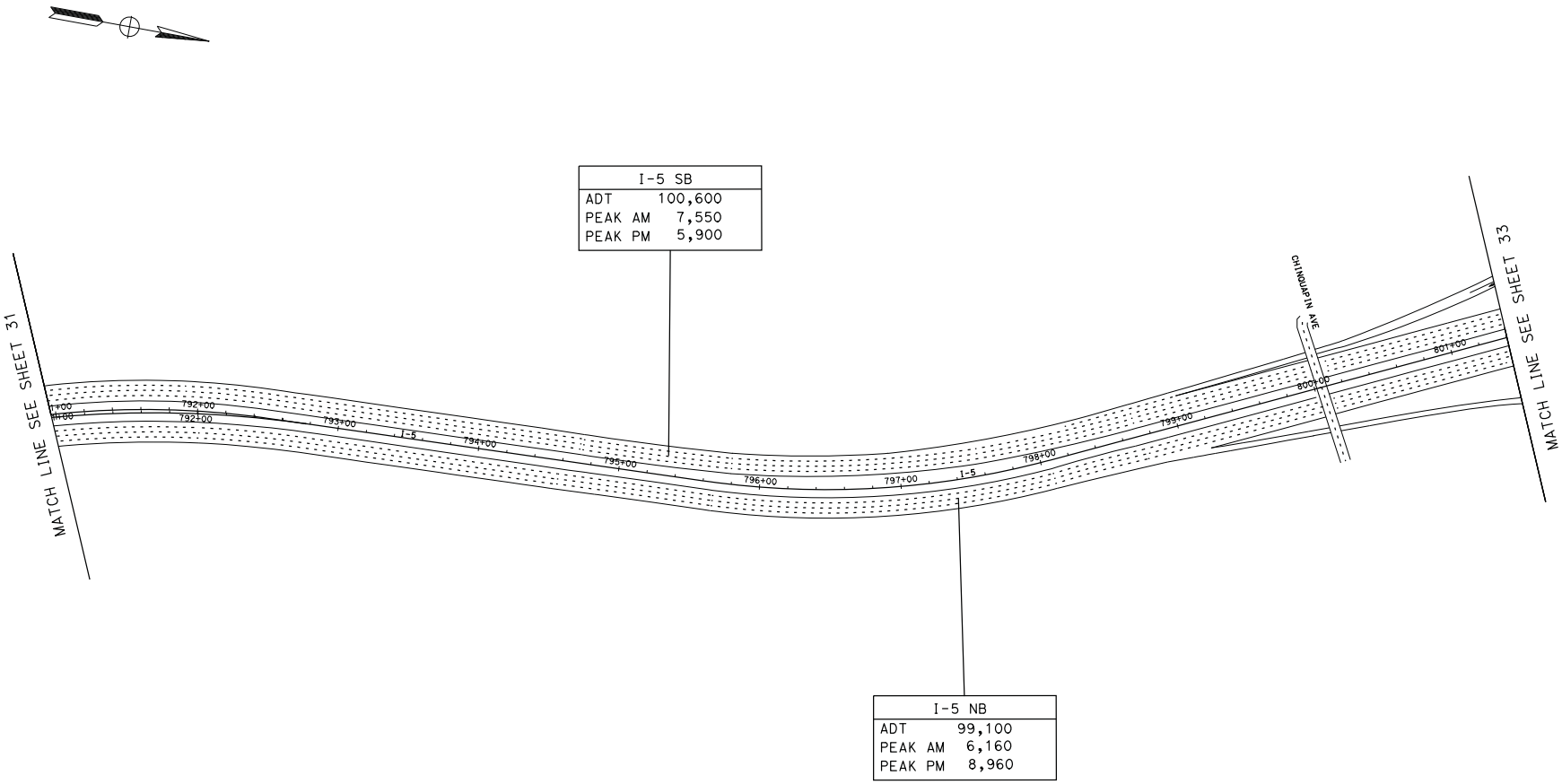
11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXISTING TRAFFIC - 2006

EXHIBIT A



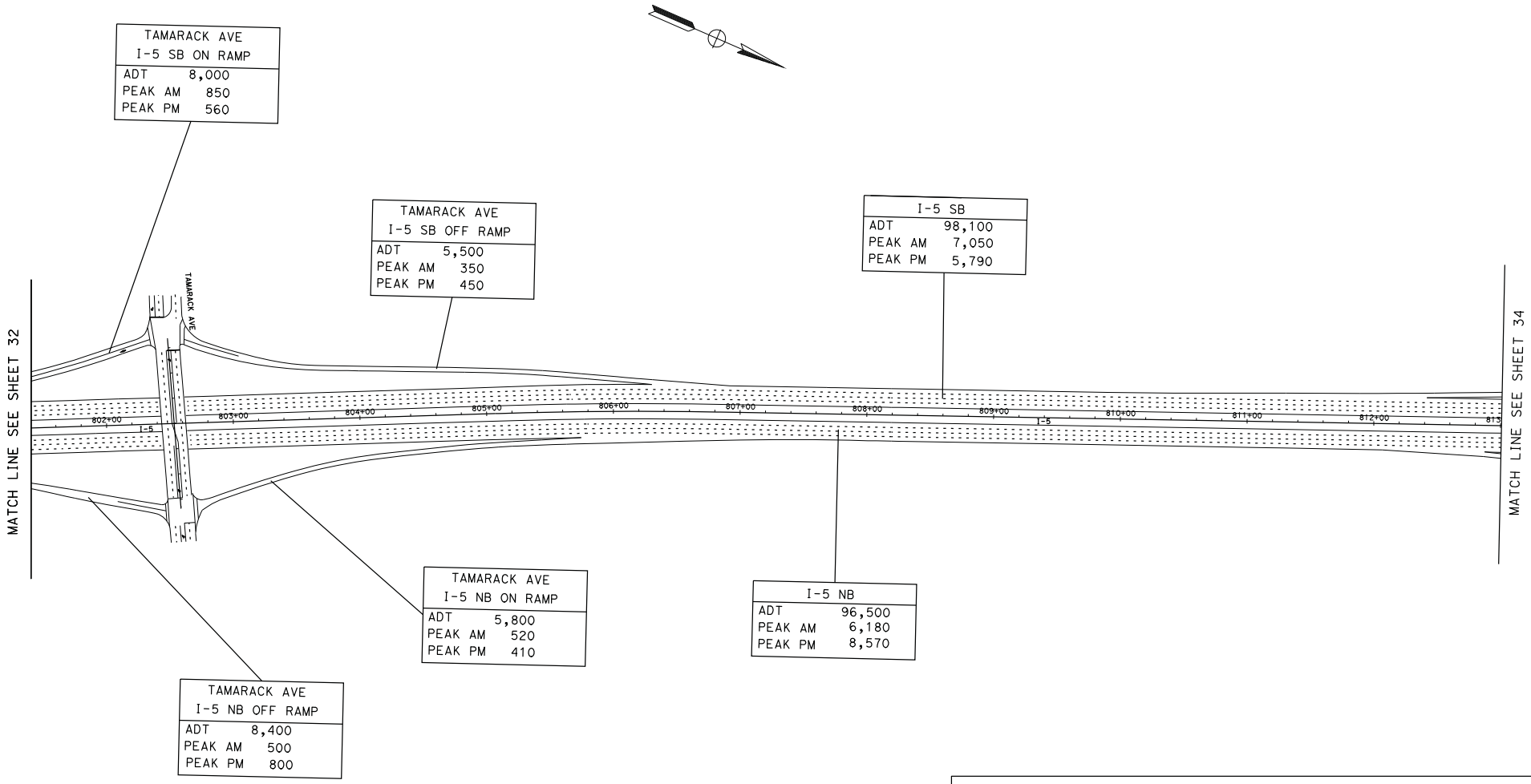
11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXISTING TRAFFIC - 2006
EXHIBIT A

DGN FILE =>existing_32toTamarack.dgn DATE PLOTTED =>25-AUG-2008



11-SD-5
K.P. R54.9 to R87.9
11-235800

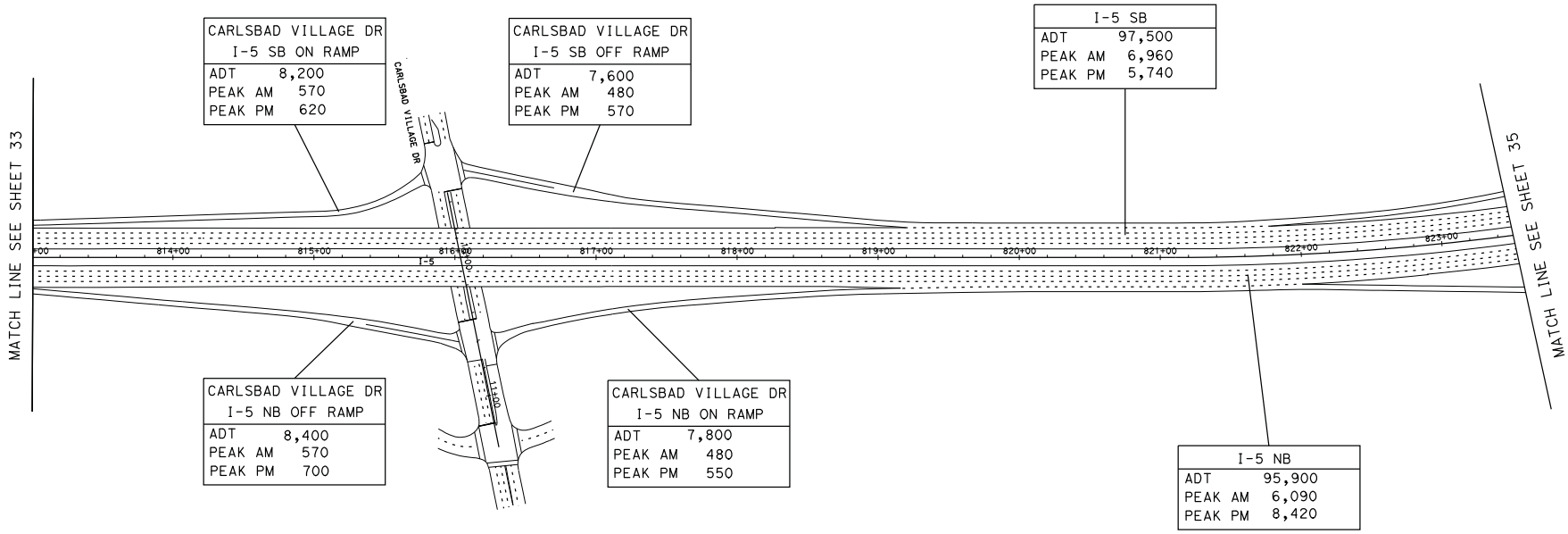
I-5 NORTHCOAST

TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXISTING TRAFFIC - 2006

EXHIBIT A

DGN FILE =>existing_33tamarack.dgn DATE PLOTTED => 25-AUG-2008



11-SD-5
K.P. R54.9 to R87.9
11-235800

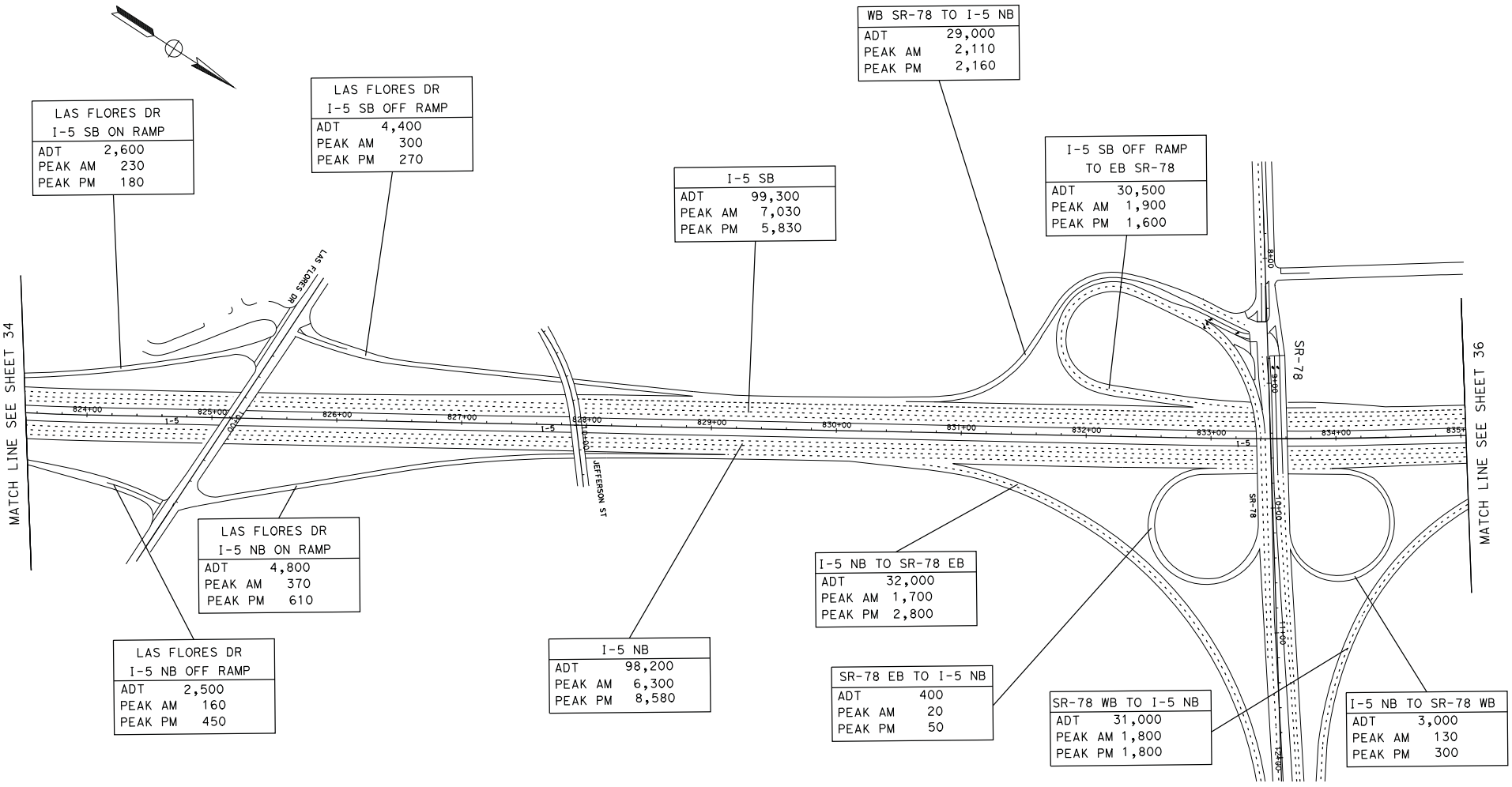
I-5 NORTHCOAST

TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXISTING TRAFFIC - 2006

EXHIBIT A

DGN FILE =>existing_34CarlsbadVD.dgn
DATE PLOTTED => 25-AUG-2008



11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

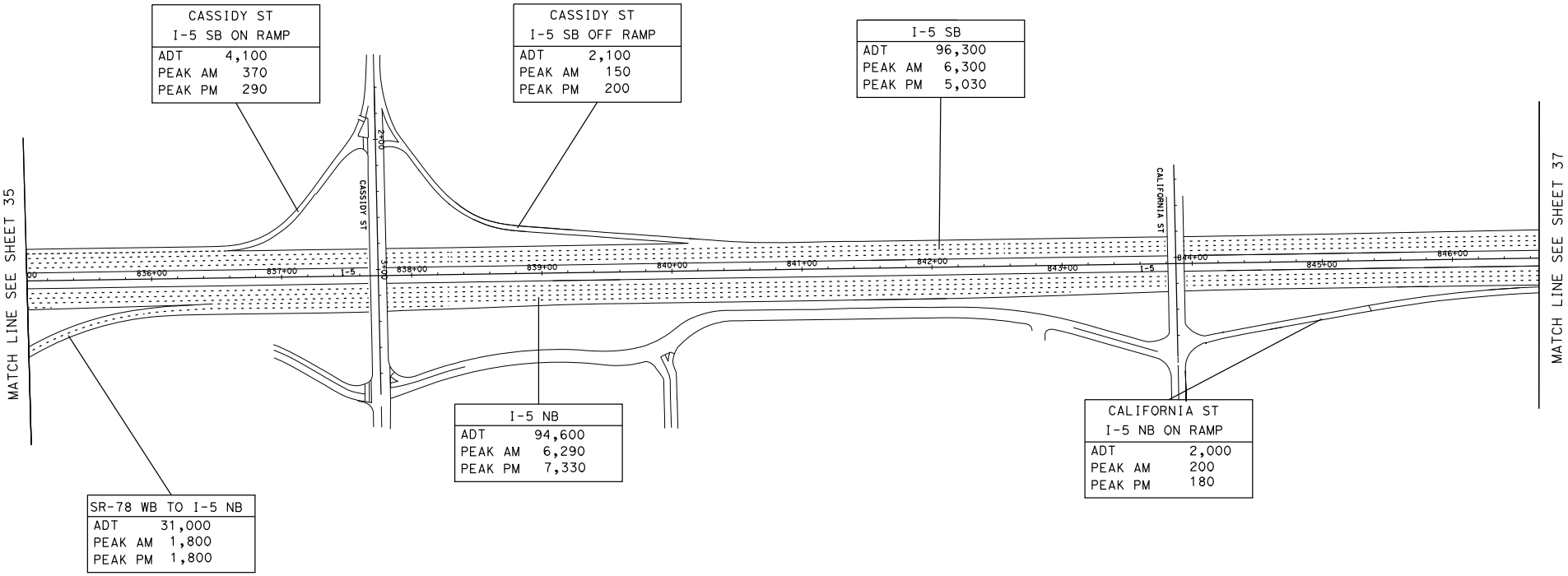
TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXISTING TRAFFIC - 2006

EXHIBIT A

DGN FILE =>existing_35LaFlores78.dgn

DATE PLOTTED => 25-AUG-2008



DATE PLOTTED =>25-AUG-2008

DGN FILE =>existing_36CassidyCal.dgn

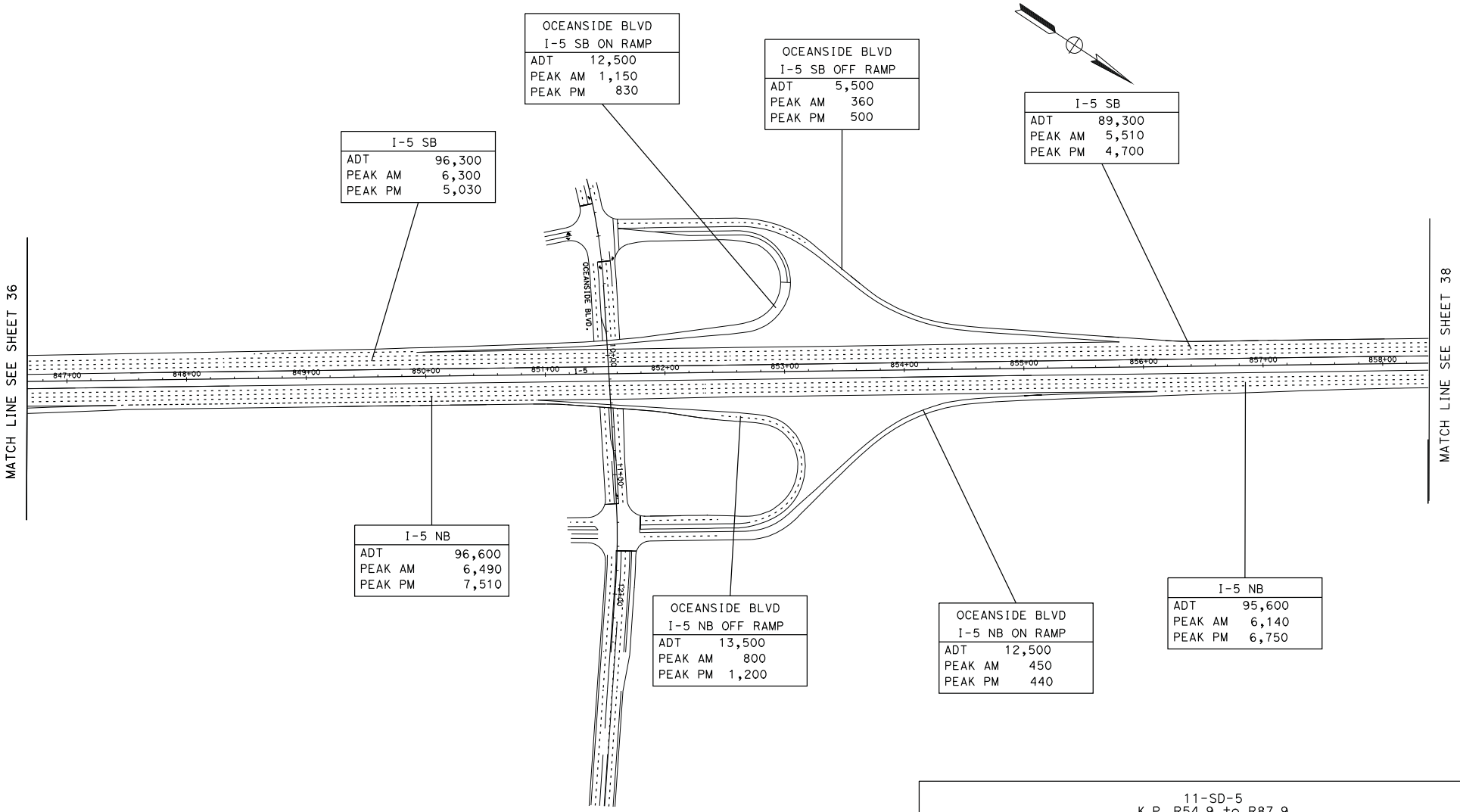
11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXISTING TRAFFIC - 2006

EXHIBIT A



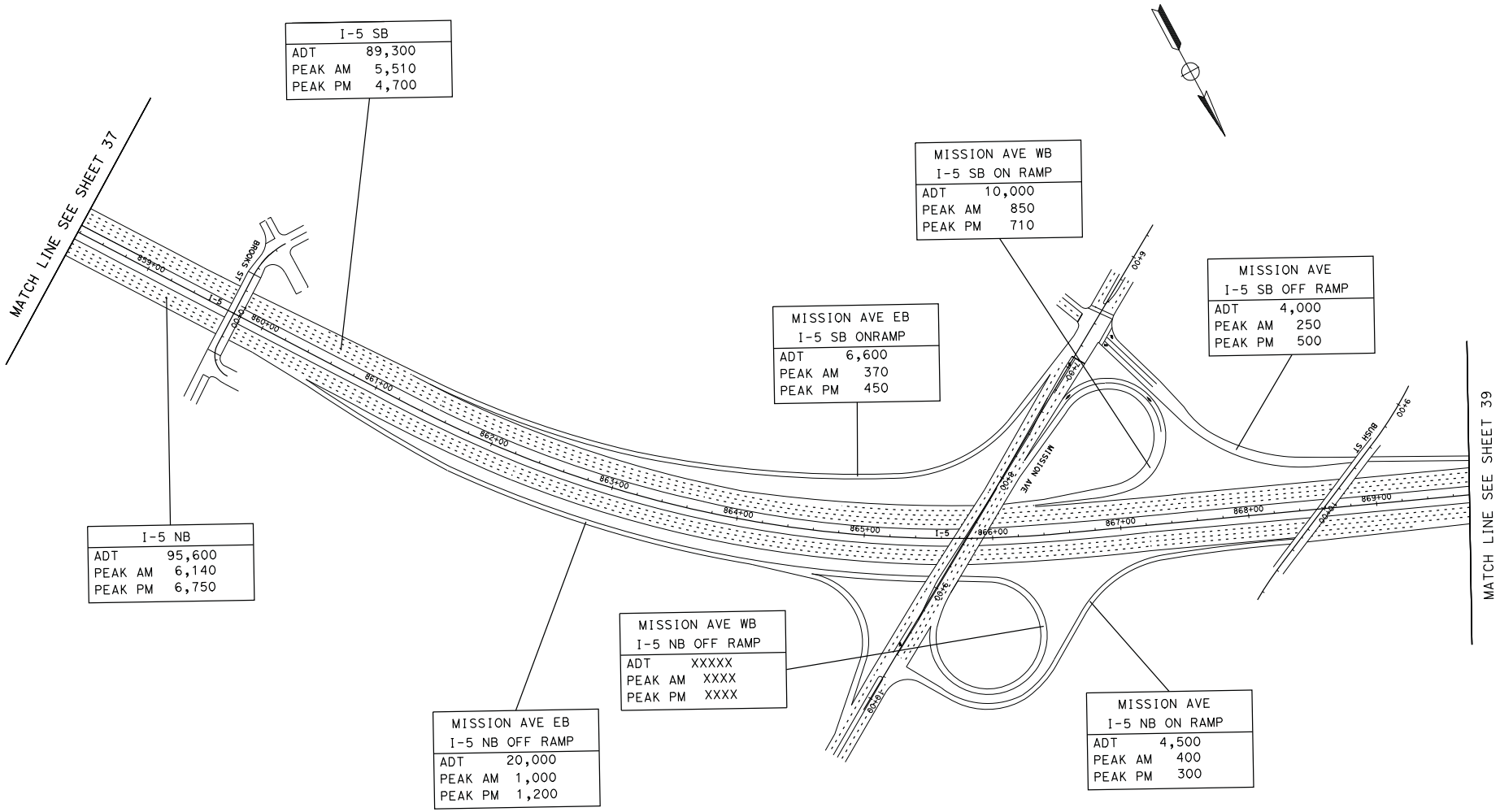
11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXISTING TRAFFIC - 2006
EXHIBIT A

DGN FILE =>existing_370oceanside.dgn
DATE PLOTTED =>25-AUG-2008



11-SD-5
K.P. R54.9 to R87.9
11-235800

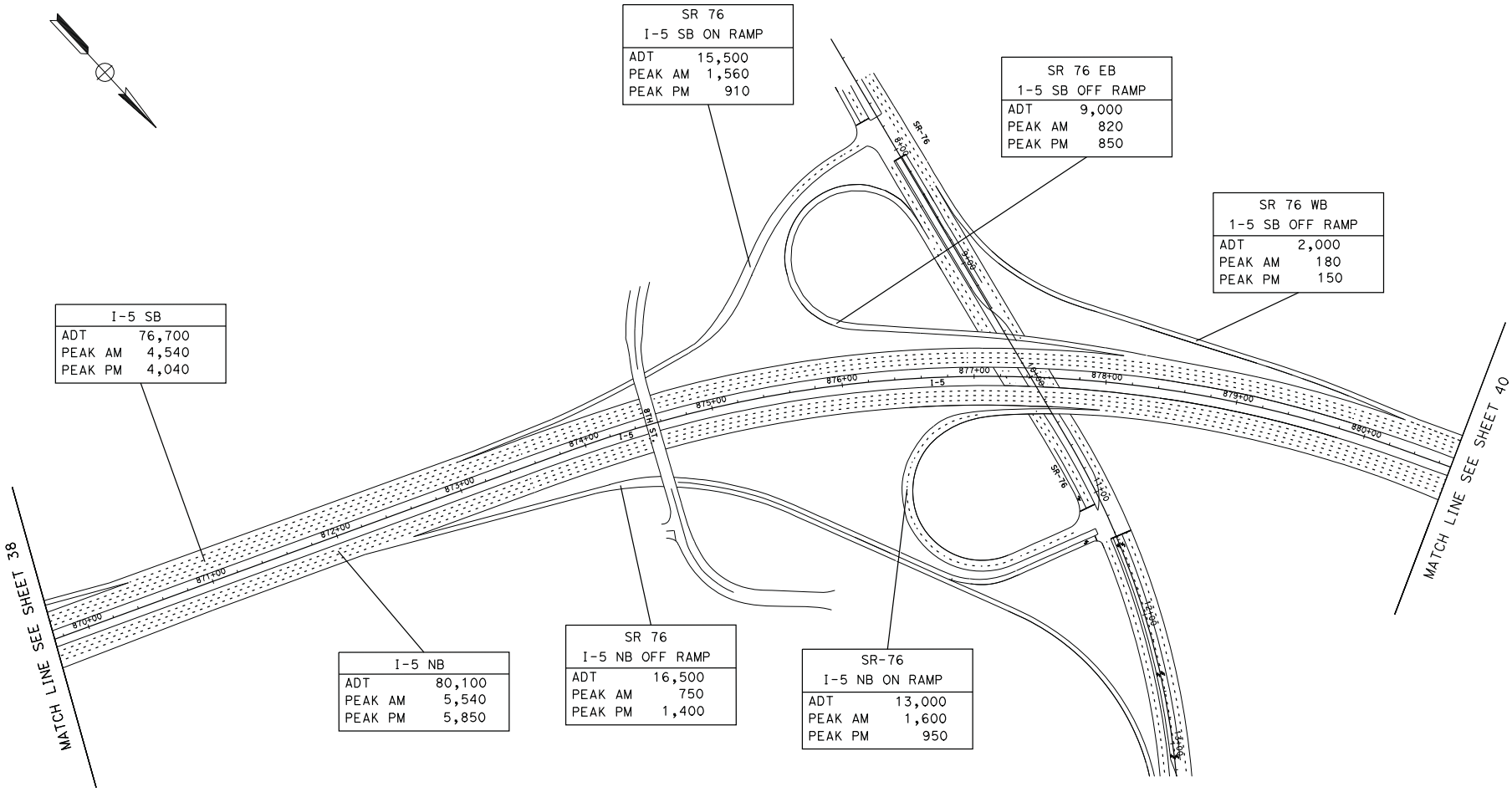
I-5 NORTHCOAST

TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXISTING TRAFFIC - 2006

EXHIBIT A

DGN FILE =>existing_38Mission.dgn
DATE PLOTTED => 25-AUG-2008



11-SD-5
K.P. R54.9 to R87.9
11-235800

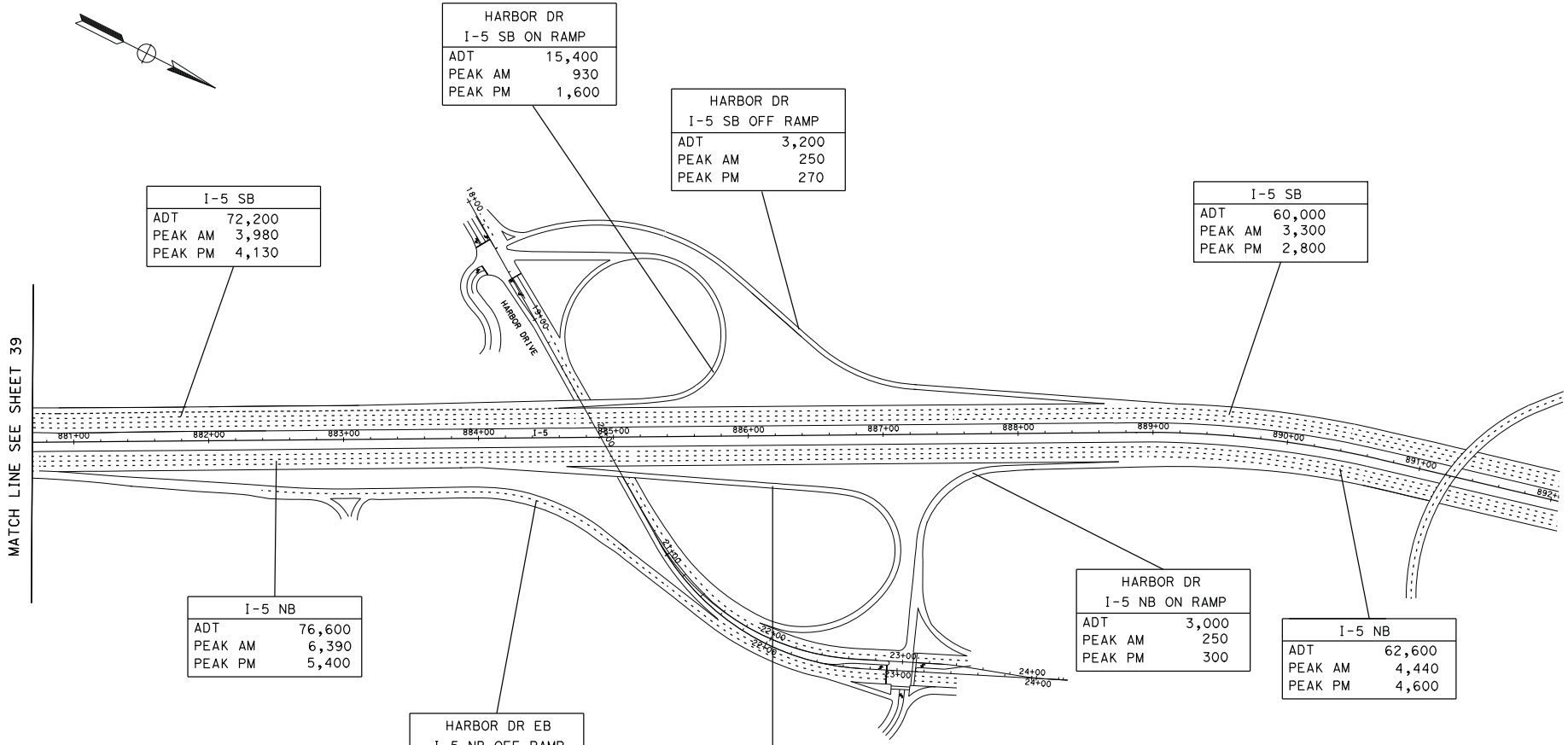
I-5 NORTHCOAST

TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXISTING TRAFFIC - 2006

EXHIBIT A

DGN FILE =>existing_39SR76.dgn
DATE PLOTTED => 25-AUG-2008



11-SD-5
K.P. R54.9 to R87.9
11-235800

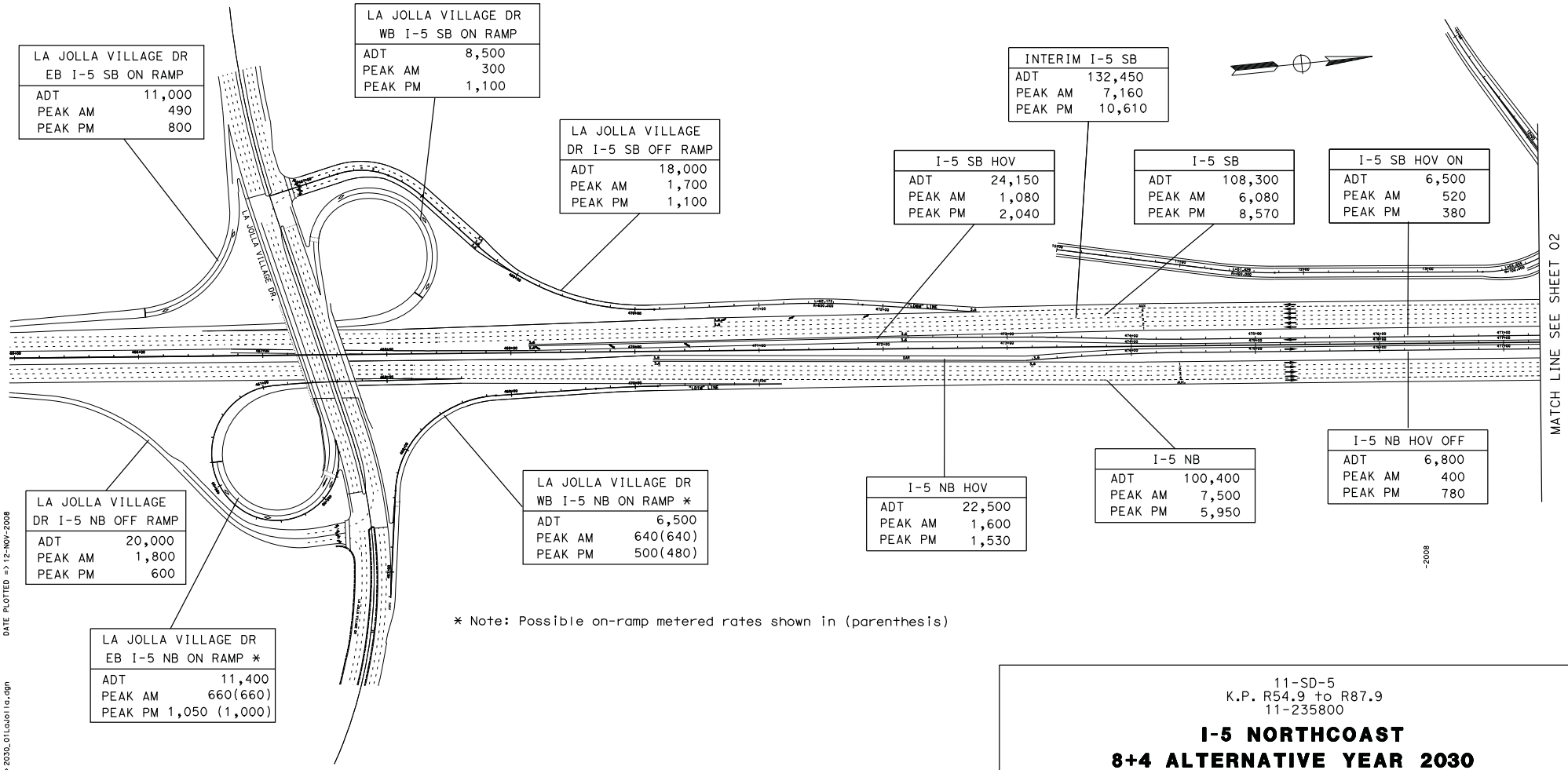
I-5 NORTHCOAST

TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXISTING TRAFFIC - 2006

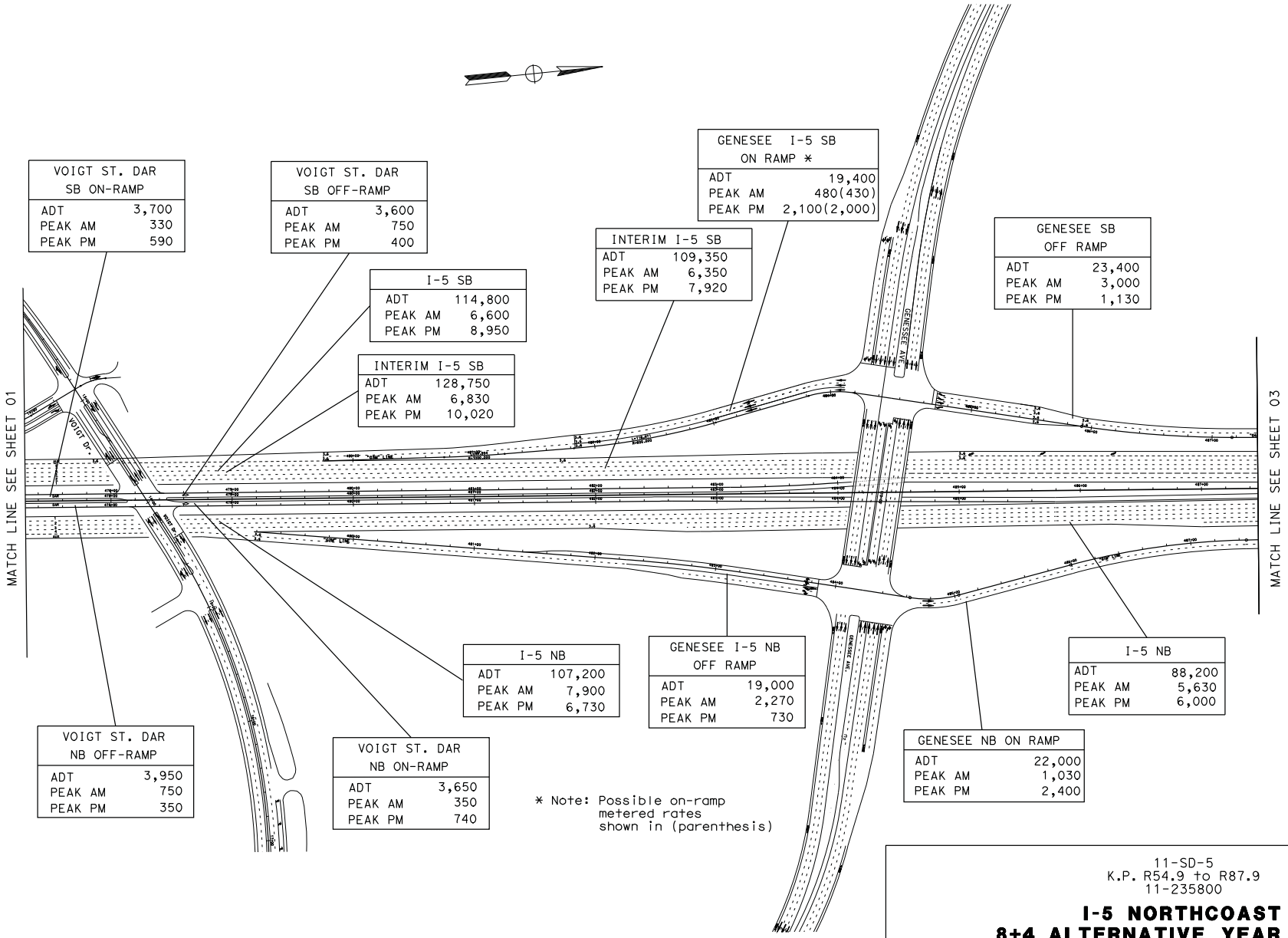
EXHIBIT A

DGN FILE =>existing_40harbor.dgn
DATE PLOTTED =>25-AUG-2008



11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST
8+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT B



VOIGT ST. DAR SB ON-RAMP	
ADT	3,700
PEAK AM	330
PEAK PM	590

VOIGT ST. DAR SB OFF-RAMP	
ADT	3,600
PEAK AM	750
PEAK PM	400

I-5 SB	
ADT	114,800
PEAK AM	6,600
PEAK PM	8,950

INTERIM I-5 SB	
ADT	128,750
PEAK AM	6,830
PEAK PM	10,020

INTERIM I-5 SB	
ADT	109,350
PEAK AM	6,350
PEAK PM	7,920

GENESEE I-5 SB ON RAMP *	
ADT	19,400
PEAK AM	480(430)
PEAK PM	2,100(2,000)

GENESEE SB OFF RAMP	
ADT	23,400
PEAK AM	3,000
PEAK PM	1,130

I-5 NB	
ADT	107,200
PEAK AM	7,900
PEAK PM	6,730

GENESEE I-5 NB OFF RAMP	
ADT	19,000
PEAK AM	2,270
PEAK PM	730

I-5 NB	
ADT	88,200
PEAK AM	5,630
PEAK PM	6,000

VOIGT ST. DAR NB OFF-RAMP	
ADT	3,950
PEAK AM	750
PEAK PM	350

VOIGT ST. DAR NB ON-RAMP	
ADT	3,650
PEAK AM	350
PEAK PM	740

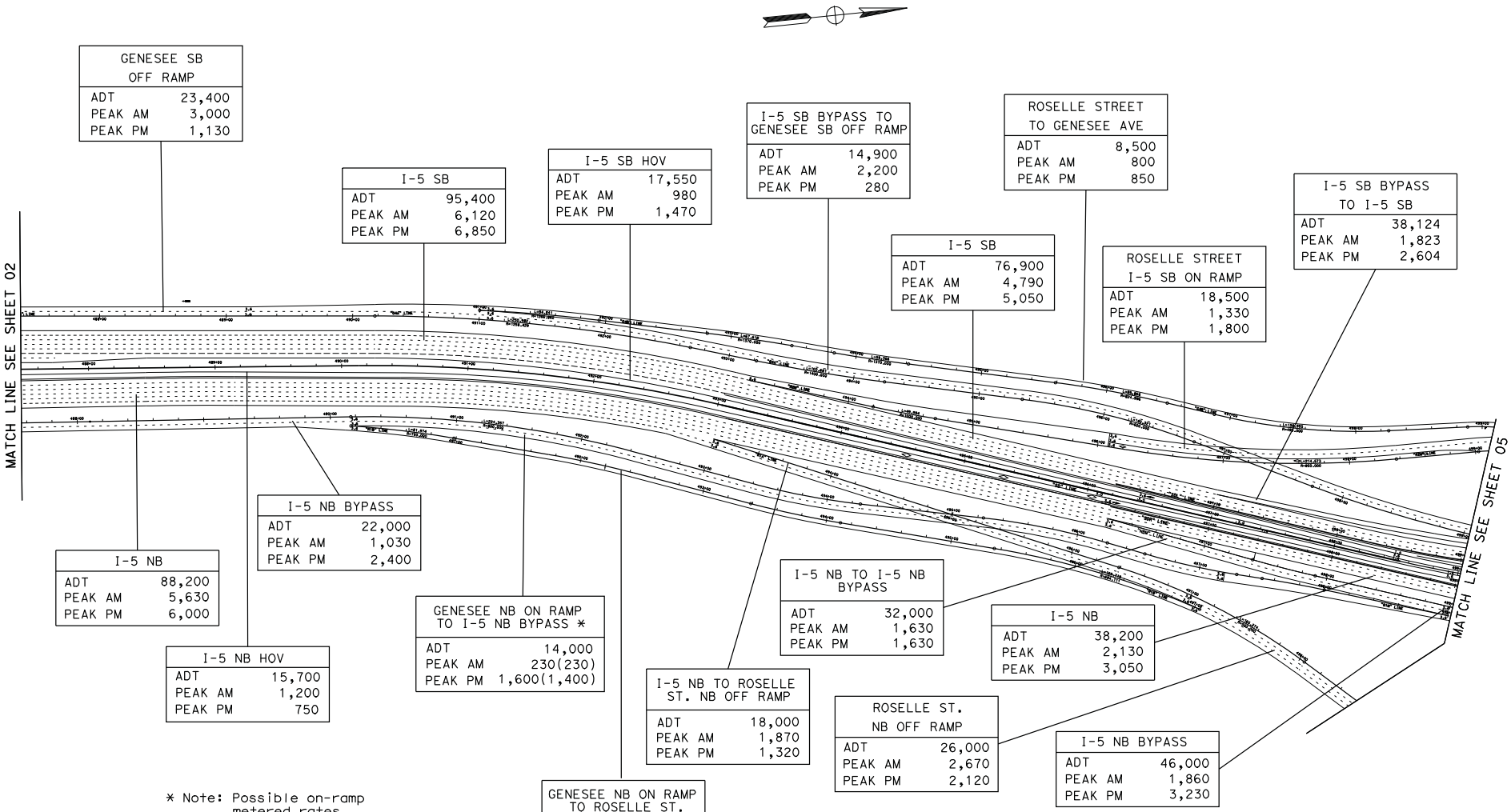
GENESEE NB ON RAMP	
ADT	22,000
PEAK AM	1,030
PEAK PM	2,400

* Note: Possible on-ramp metered rates shown in (parenthesis)

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST
8+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT B

DGN FILE => 2030_02genesee.dgn DATE PLOTTED => 12-NOV-2008

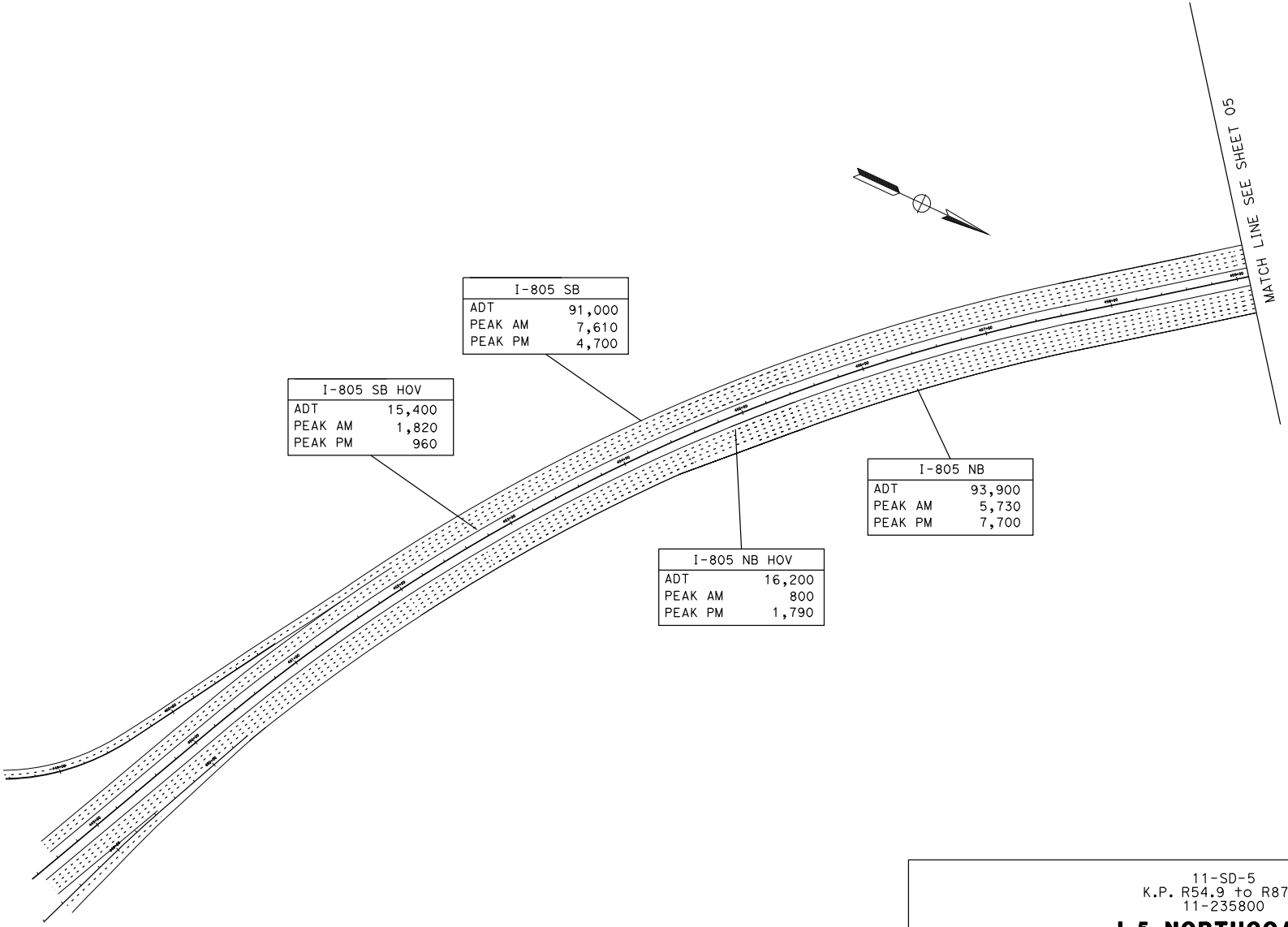


* Note: Possible on-ramp metered rates shown in (parenthesis)

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST
8+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT B

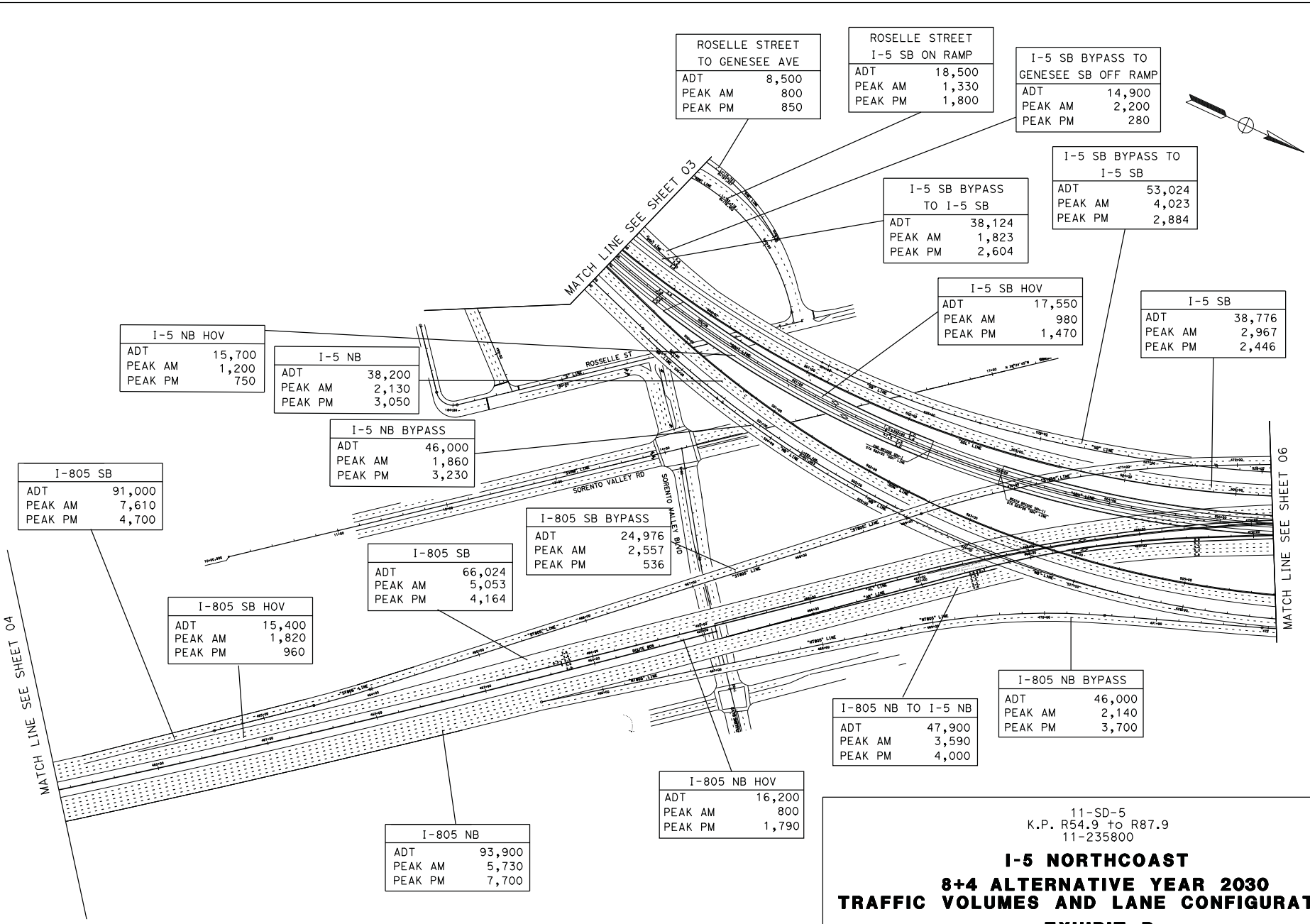
DATE PLOTTED => 12-NOV-2008
DGN FILE => 2030_03bypass.dgn



11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST
8+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT B

DGN FILE => 2030_04Lusk805.dgn
DATE PLOTTED => 12-NOV-2008



11-SD-5
K.P. R54.9 to R87.9
11-235800

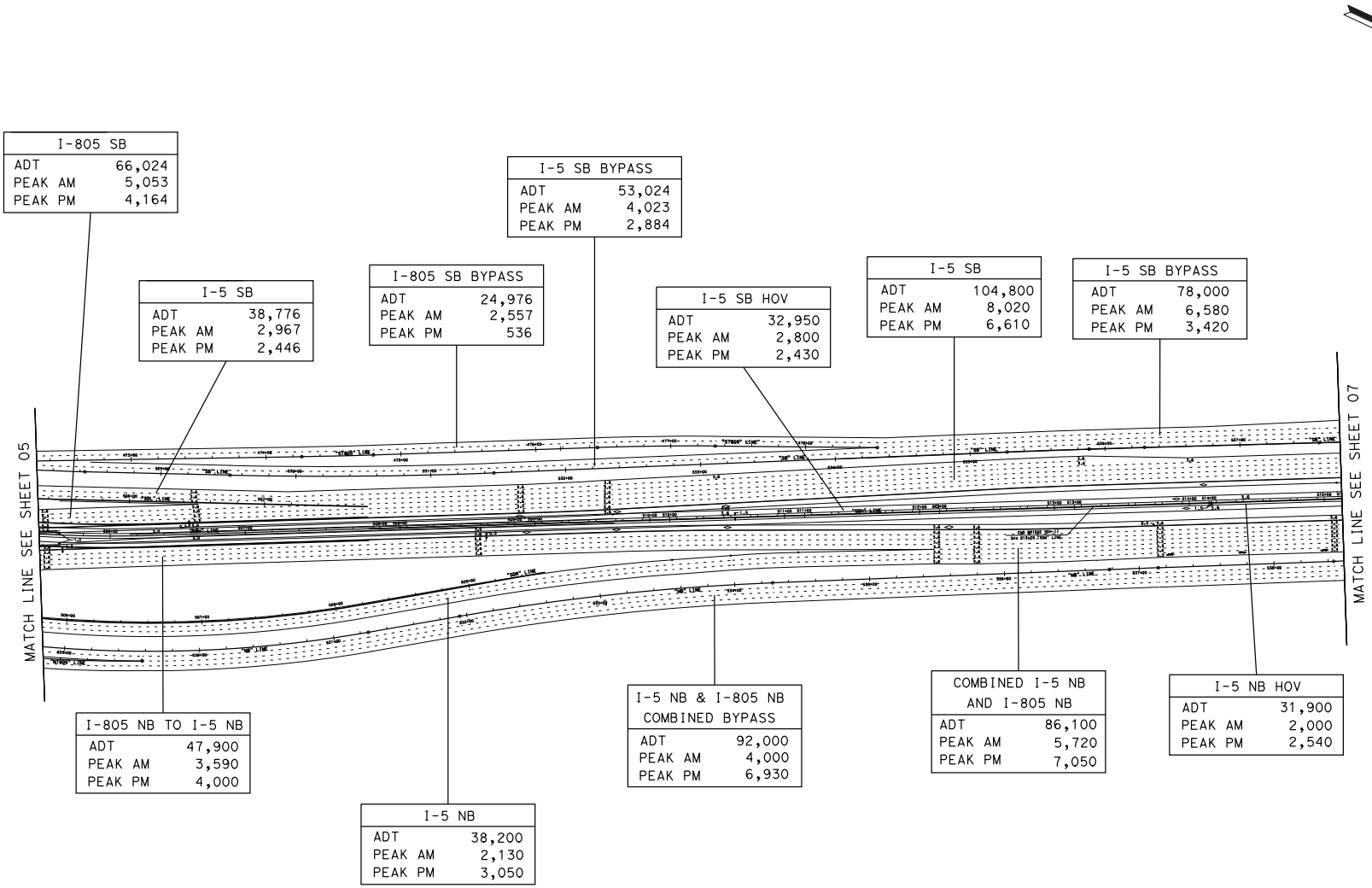
I-5 NORTHCOAST

8+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXHIBIT B

DATE PLOTTED => 12-NOV-2008

DGN FILE => 2030_05Merge5805.dgn

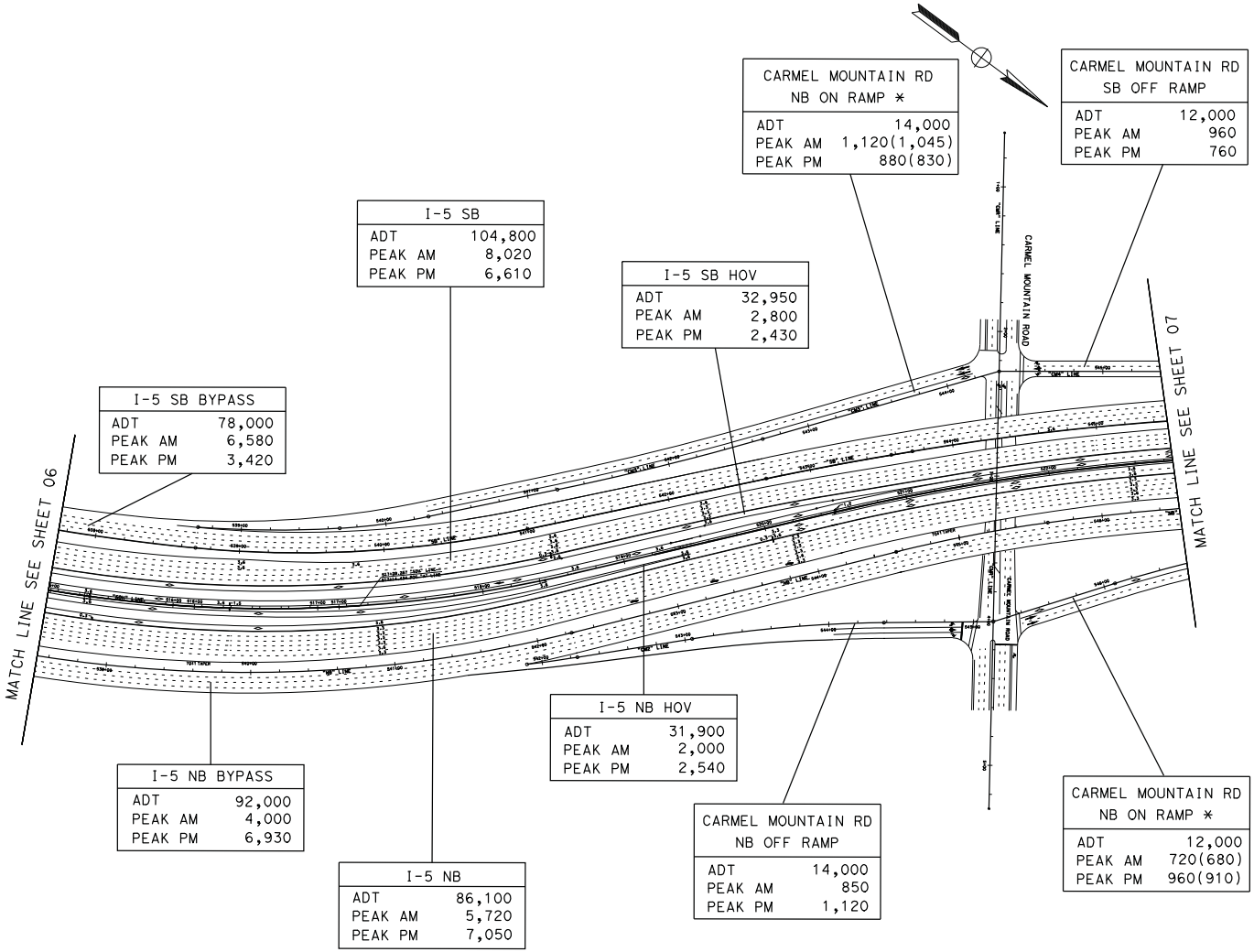


11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

8+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT B

DGN FILE => 2030_06DMHBypassSlipRmp.dgn DATE PLOTTED => 12-NOV-2008



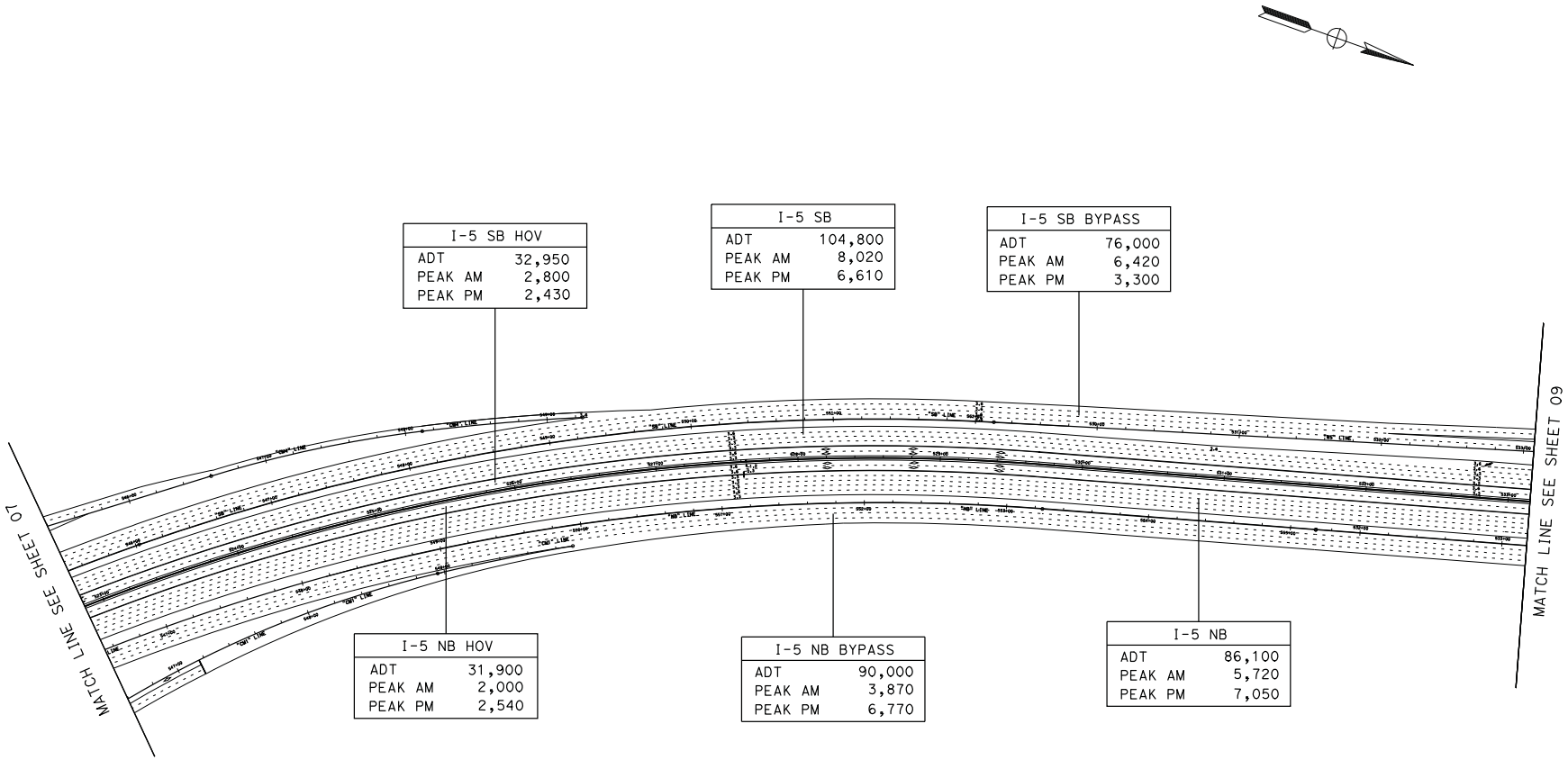
* Note: Possible on-ramp metered rates in (parenthesis)

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

8+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT B

DGN FILE => 2030_07CarmlMtnRd.dgn DATE PLOTTED => 12-NOV-2008

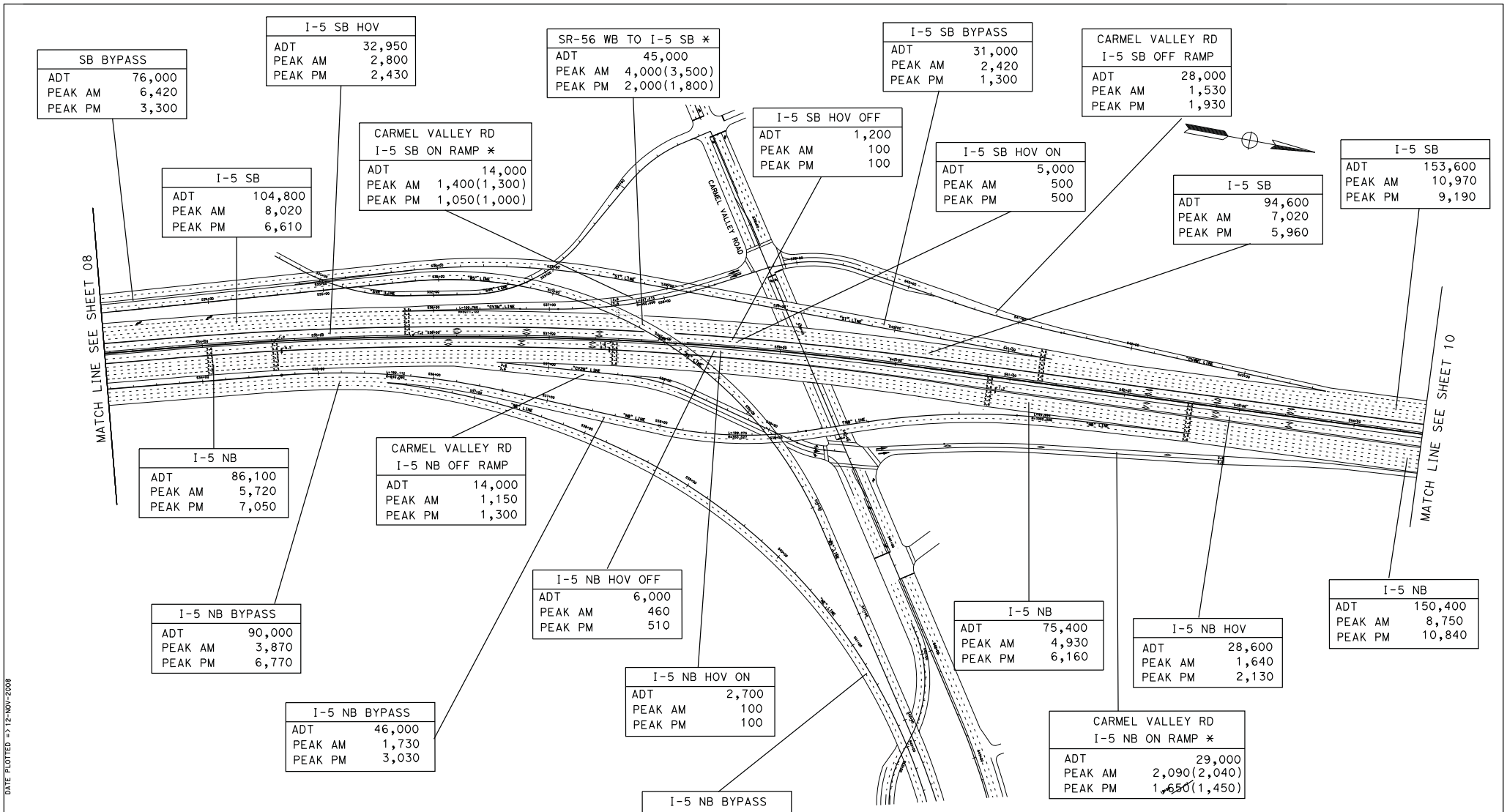


11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

8+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT B

DGN FILE => 2030_08to56CarmiVlyRd.dgn DATE PLOTTED => 12-NOV-2008



* Note: Possible on-ramp metered rates shown in (parenthesis)

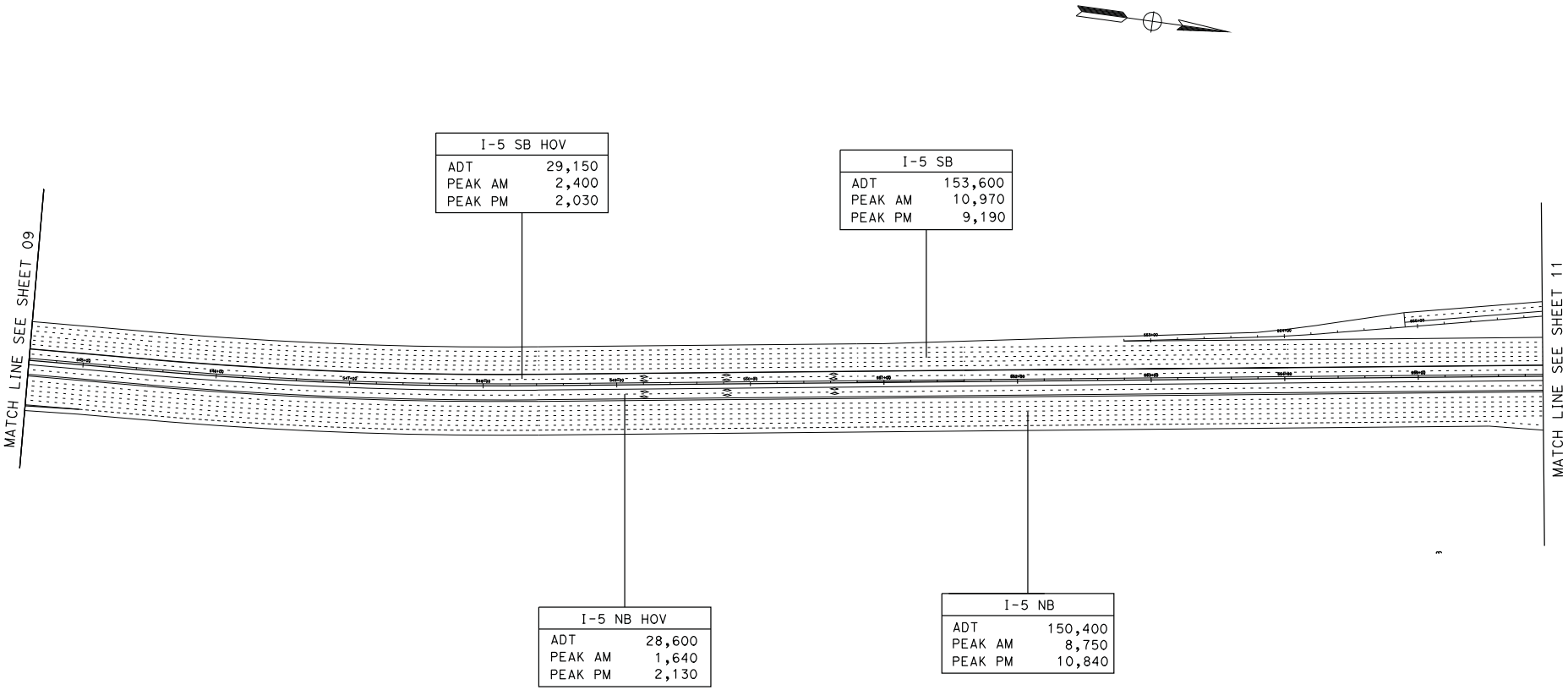
11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

8+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXHIBIT B

DGN FILE =>2030_09CarmlVly56.dgn DATE PLOTTED =>12-NOV-2008

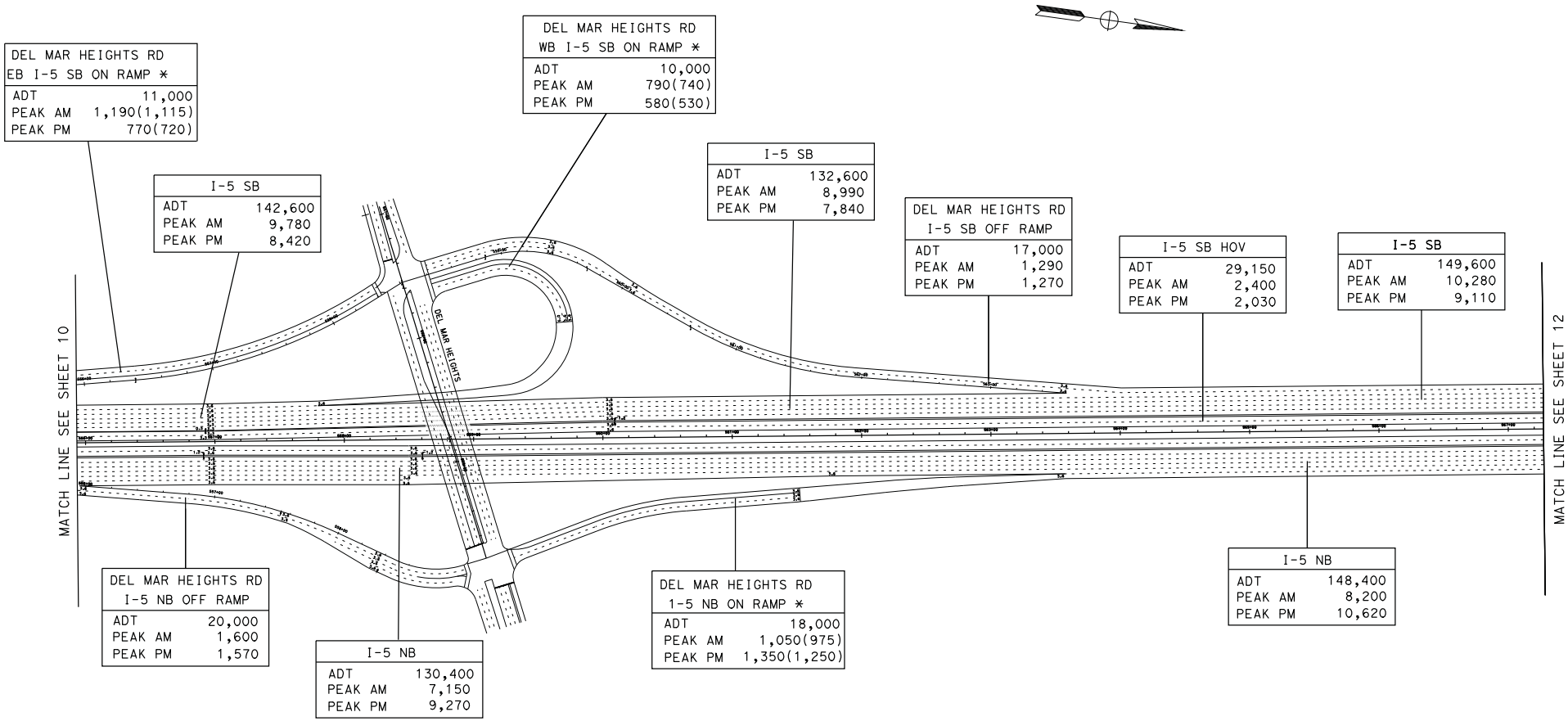


11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

8+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT B

DGN FILE => 2030_10toDelMarHts.dgn DATE PLOTTED => 12-NOV-2008



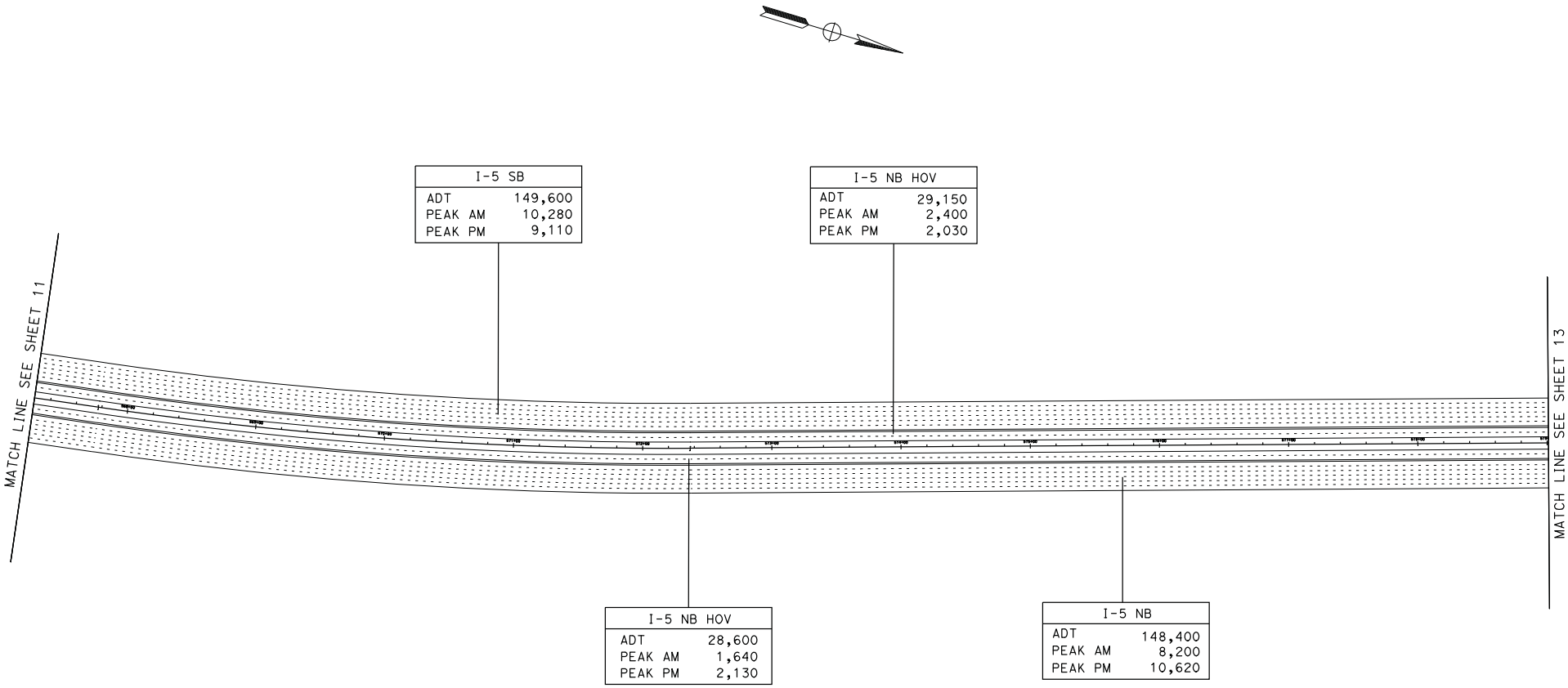
* Note: Possible on-ramp metered rates in (parenthesis)

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

8+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT B

DGN FILE =>2030_11DelMarHts.dgn DATE PLOTTED =>12-NOV-2008



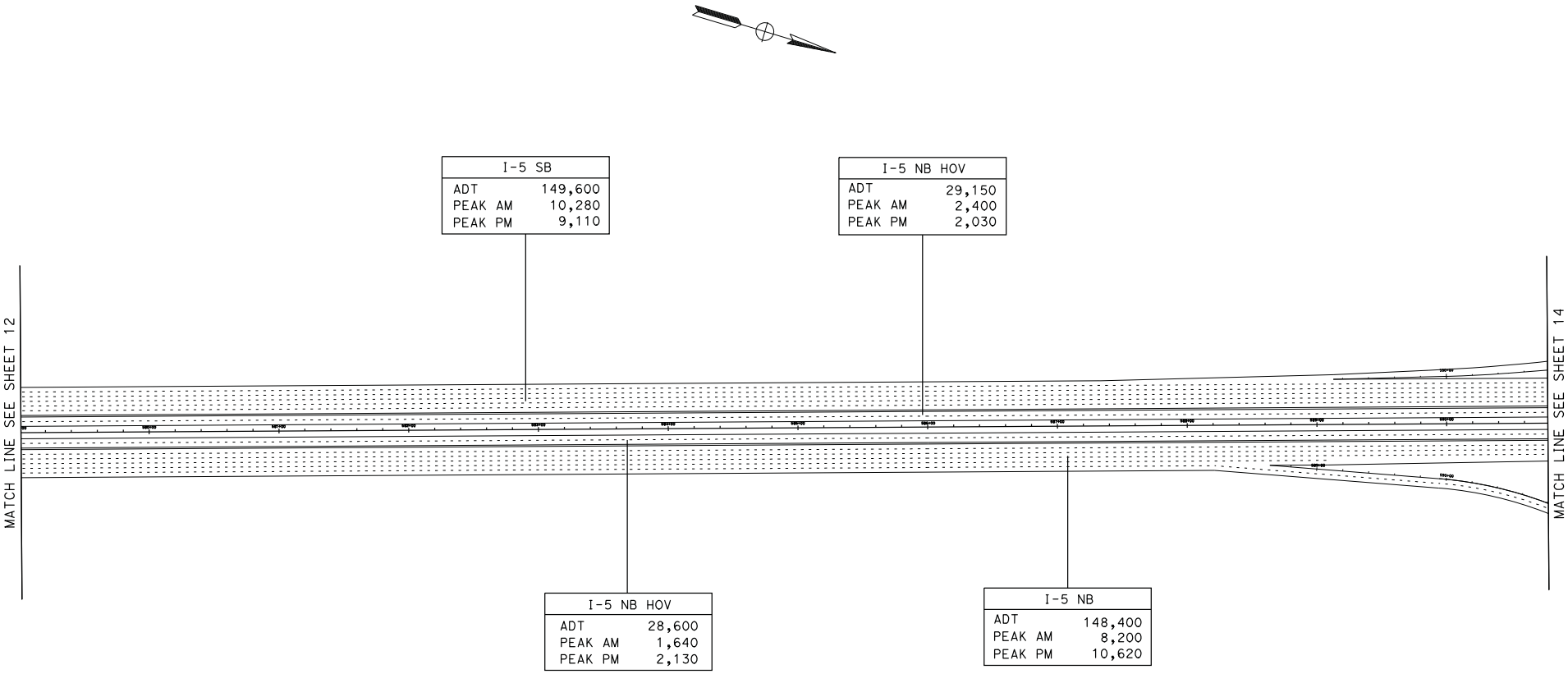
11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

8+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXHIBIT B

DGN FILE => 2030_12toViaDelaValle1.dgn DATE PLOTTED => 12-NOV-2008



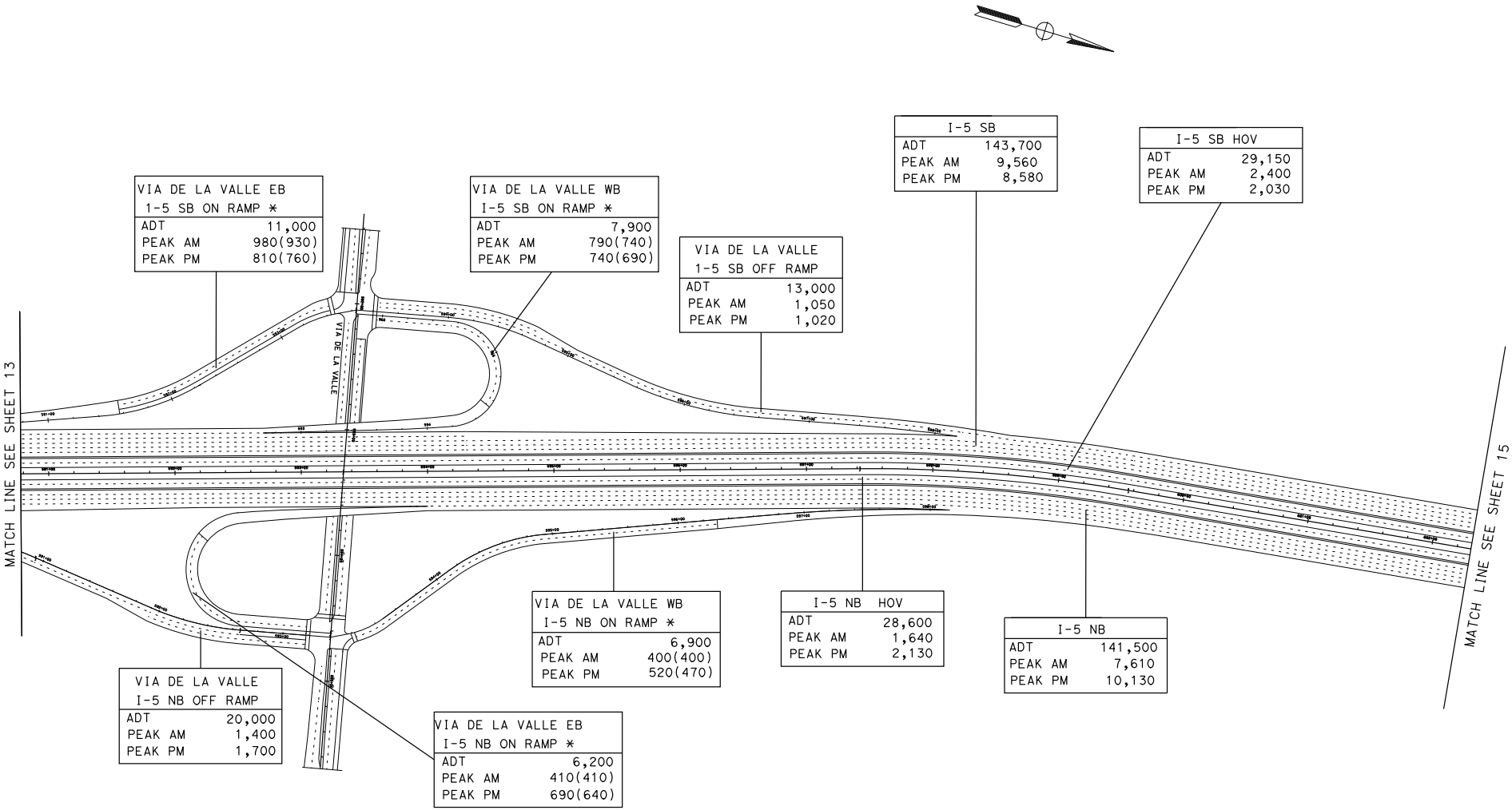
11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

8+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXHIBIT B

DGN FILE =>2030_13toViaDelaValle2.dgn DATE PLOTTED =>12-NOV-2008



* Note: Possible on-ramp metered rates shown in (parenthesis)

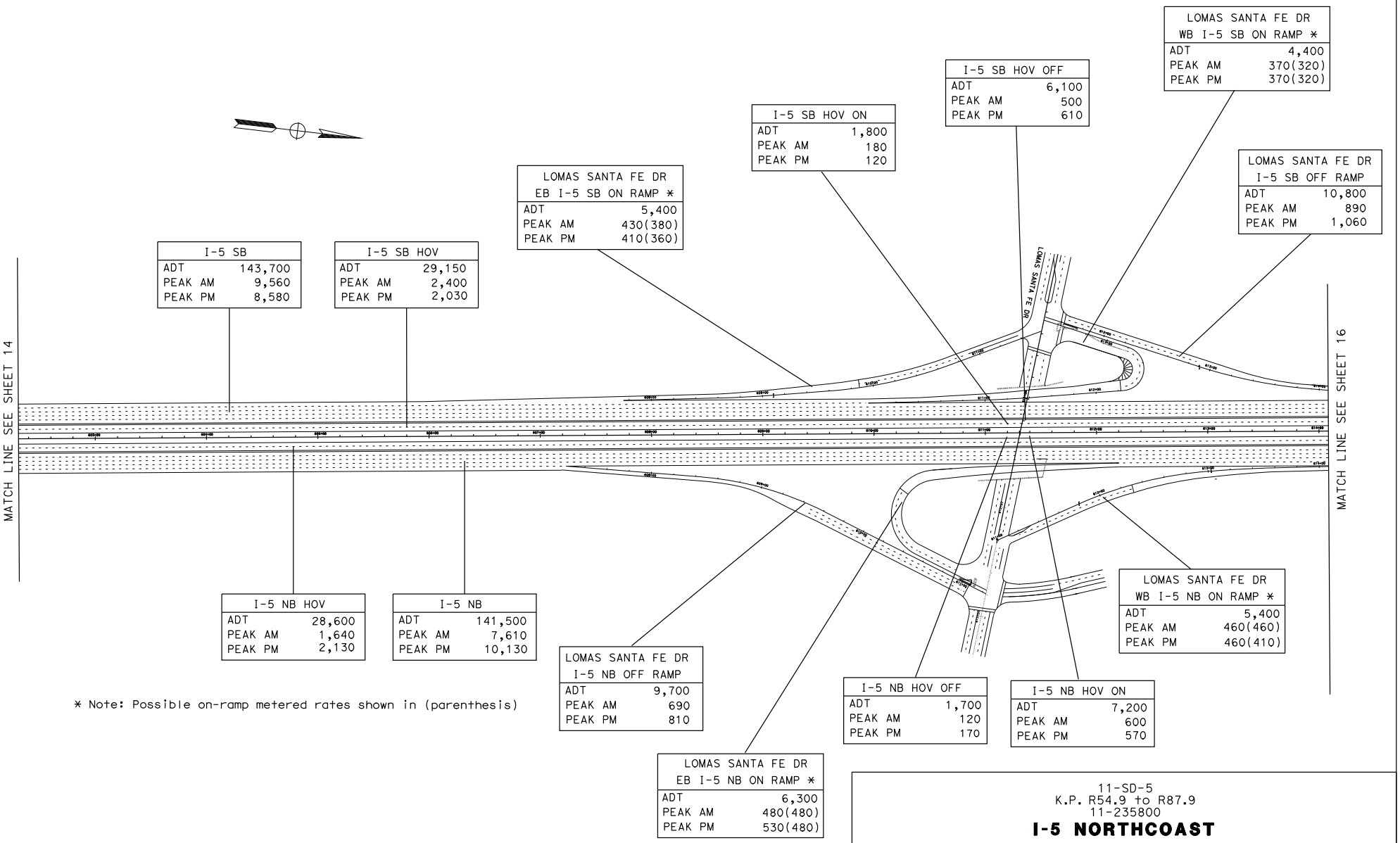
11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

8+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXHIBIT B

DGN FILE =>2030_14ViaDelaValle.dgn
DATE PLOTTED =>12-NOV-2008



* Note: Possible on-ramp metered rates shown in (parenthesis)

11-SD-5
K.P. R54.9 to R87.9
11-235800

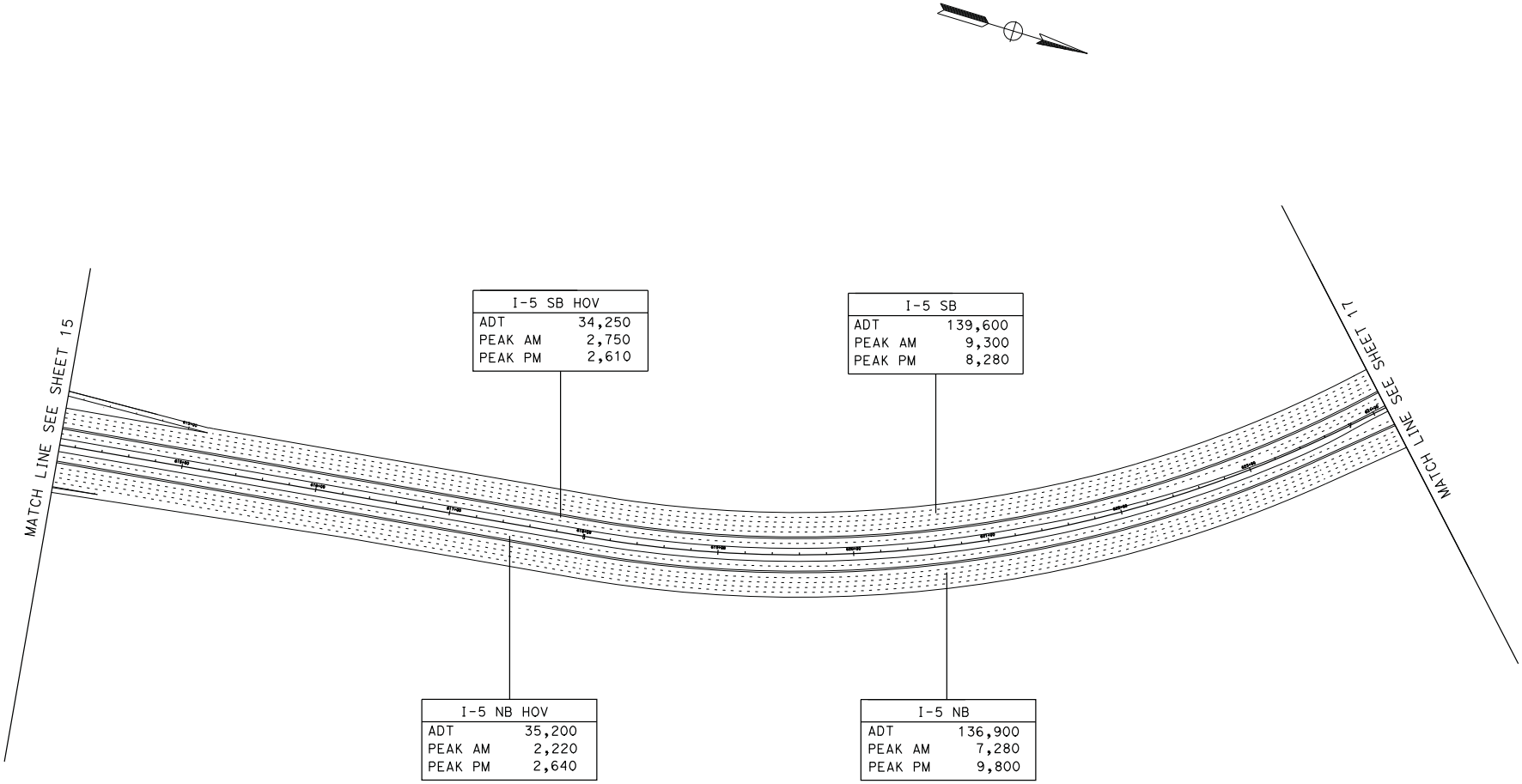
I-5 NORTHCOAST

8+4 ALTERNATIVE YEAR 2030

TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXHIBIT B

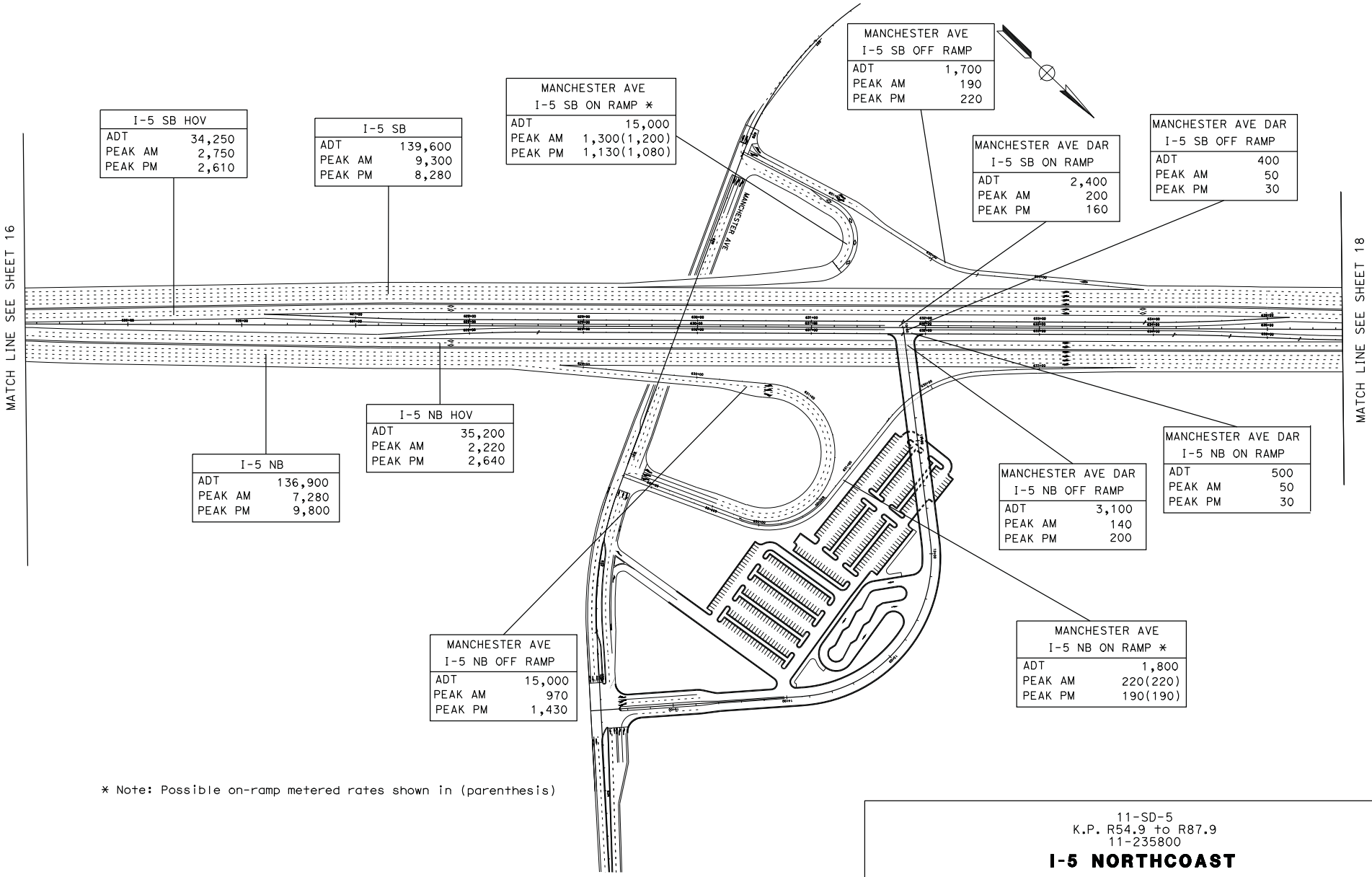
DGN FILE => 2030_15LomasStaFe.dgn DATE PLOTTED => 12-NOV-2008



11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST
8+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT B

DGN FILE => 2030_16toManchester.dgn DATE PLOTTED => 12-NOV-2008



* Note: Possible on-ramp metered rates shown in (parenthesis)

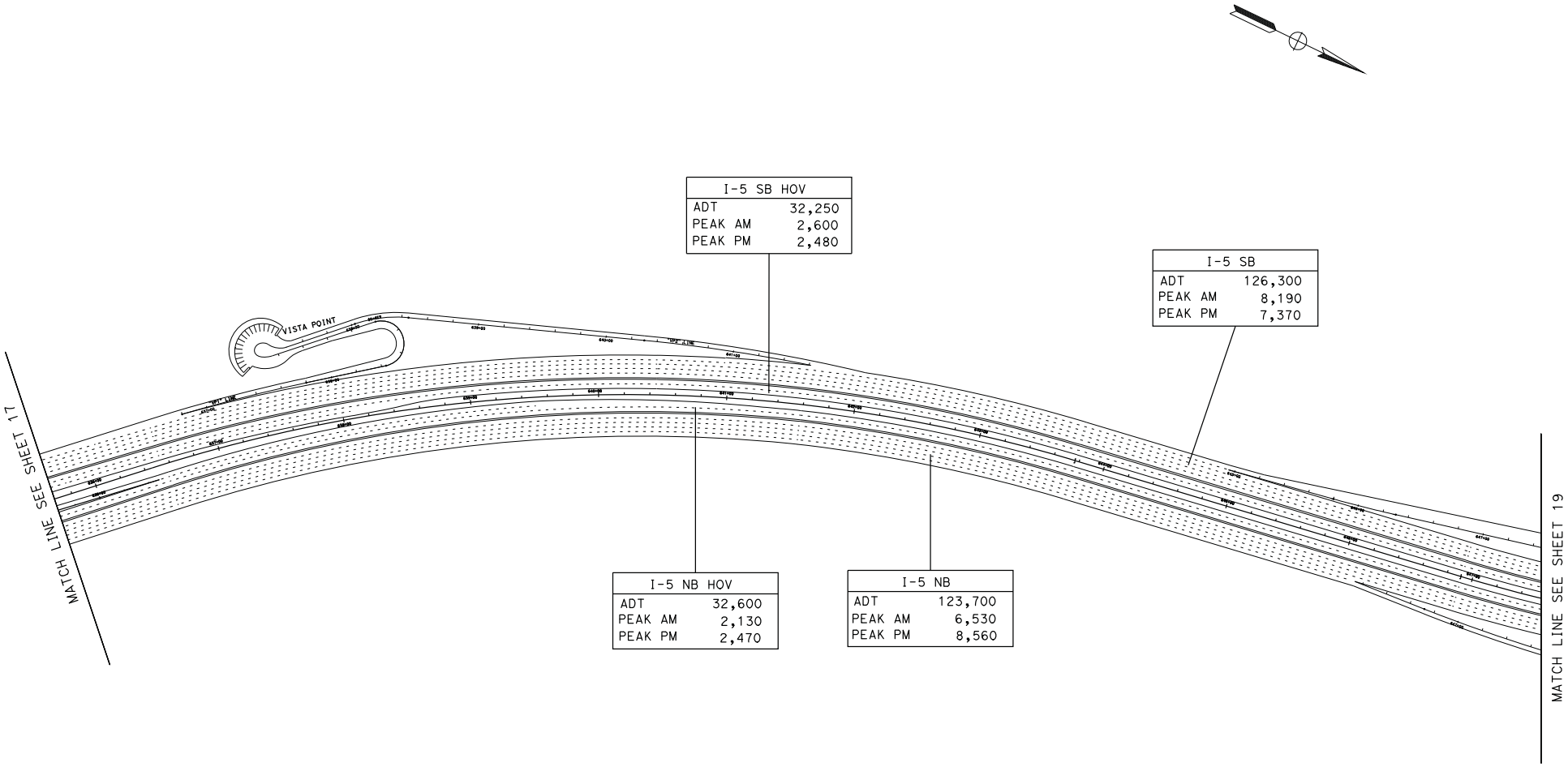
11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

8+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXHIBIT B

DGN FILE =>2030_17Manchester.dgn DATE PLOTTED =>12-NOV-2008



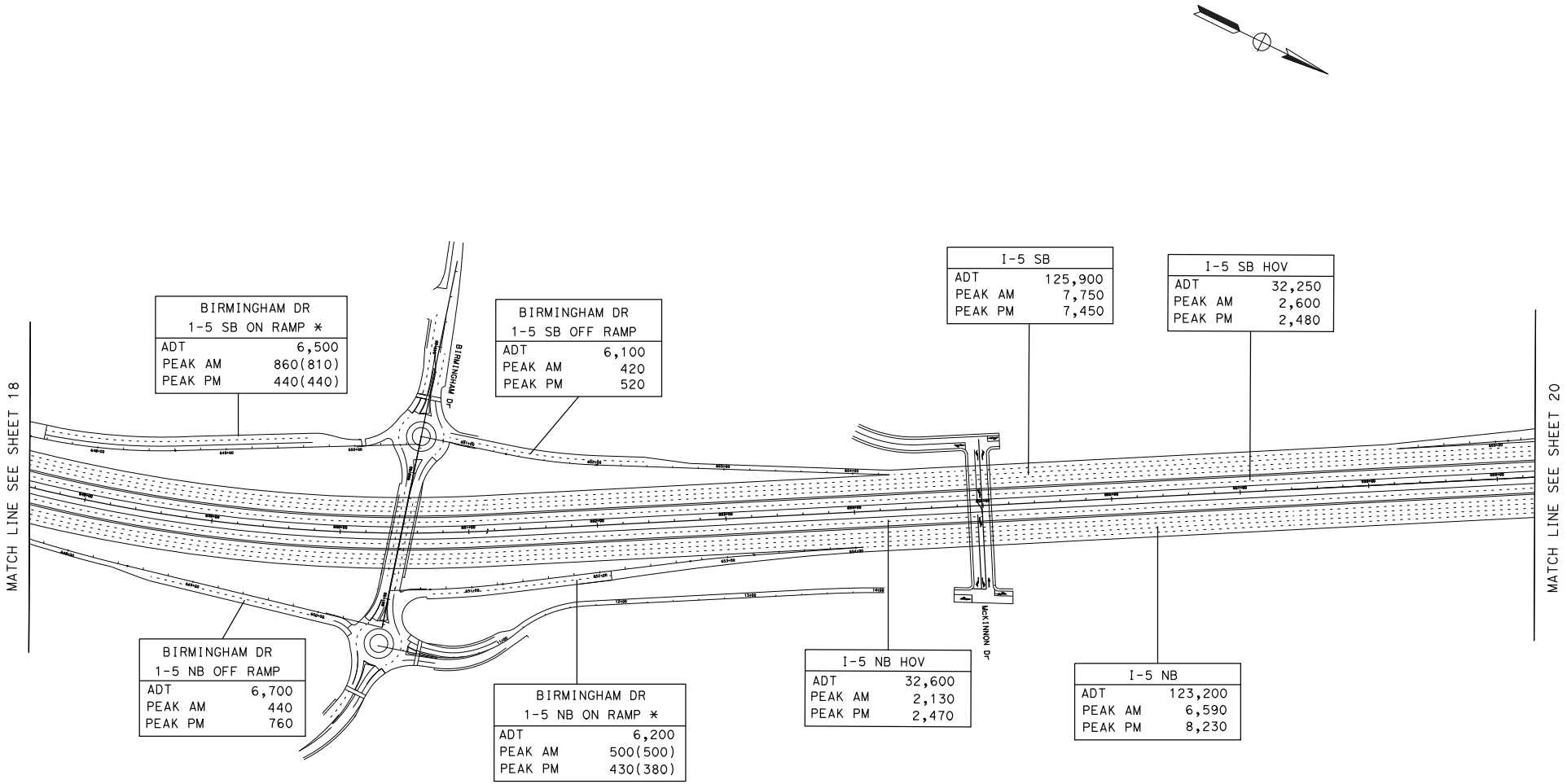
11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

8+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXHIBIT B

DGN FILE =>2030_18to81mingham.dgn DATE PLOTTED =>12-NOV-2008



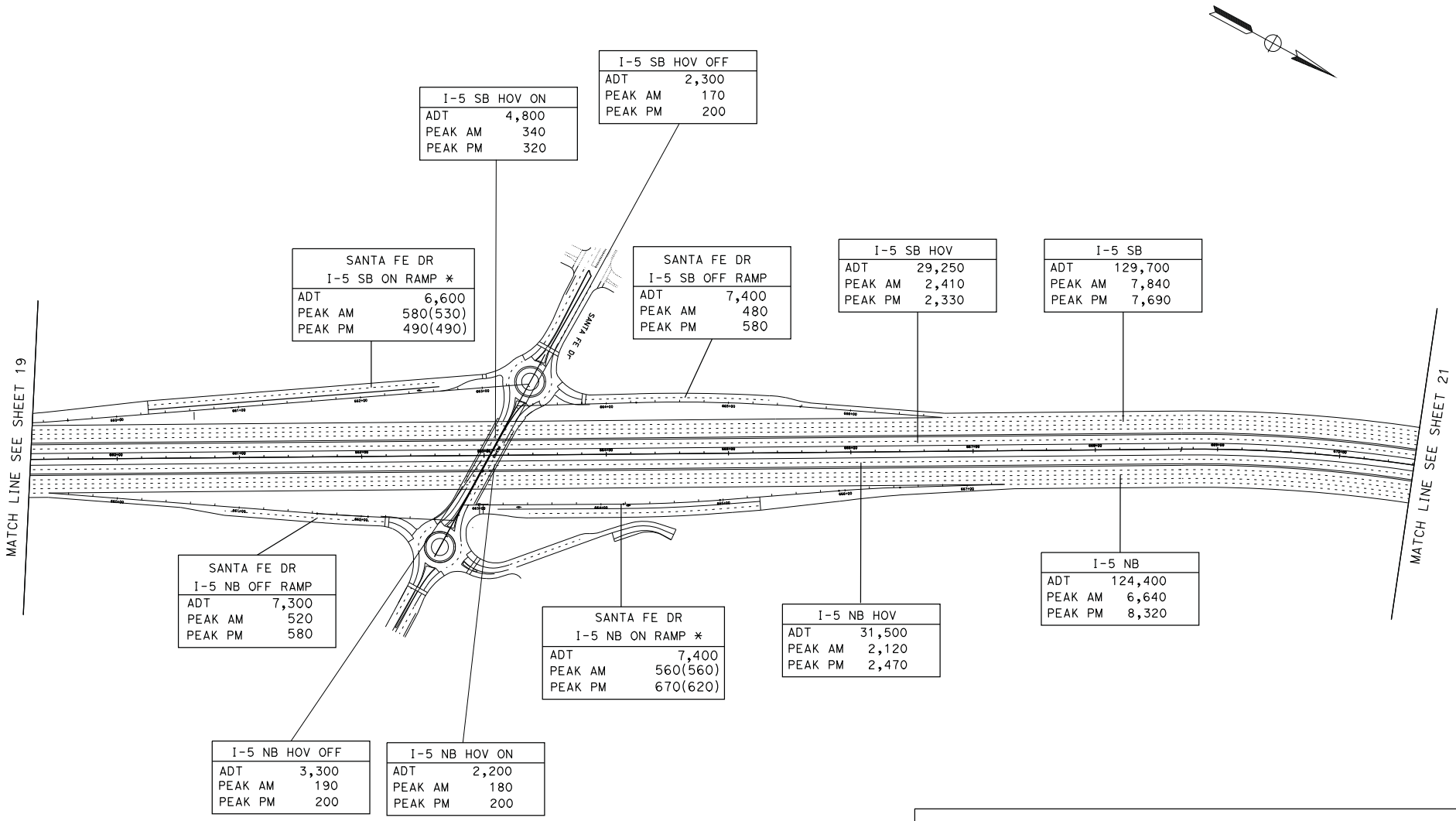
* Note: Possible on-ramp meter rates in (parenthesis)

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST
8+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXHIBIT B

DGN FILE => 2030_198birmingham.dgn DATE PLOTTED => 12-NOV-2008

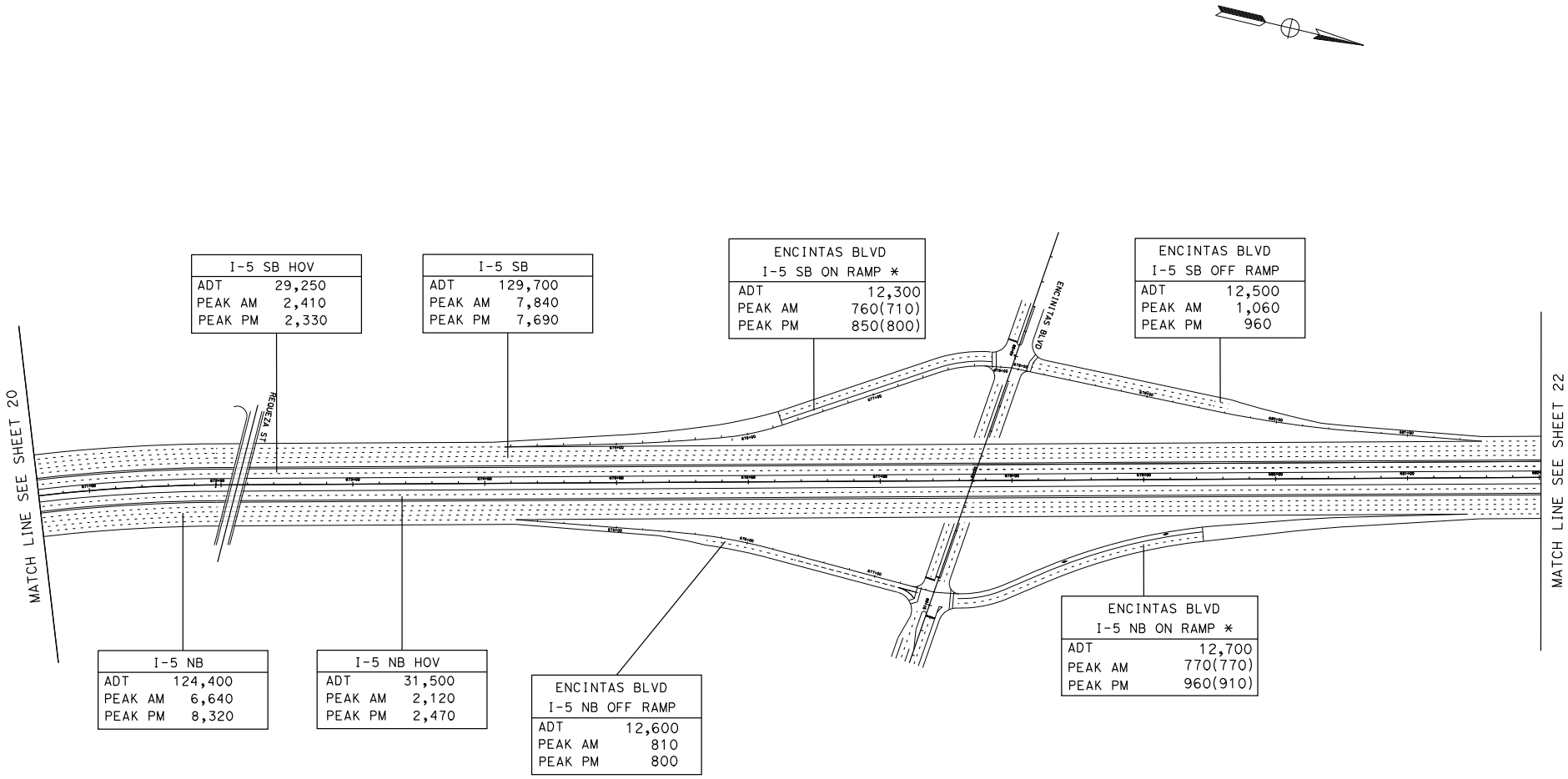


* Note: Possible on-ramp metered rates in (parenthesis)

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST
8+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT B

DGN FILE =>2030_20SantaFeDr.dgn DATE PLOTTED =>12-NOV-2008

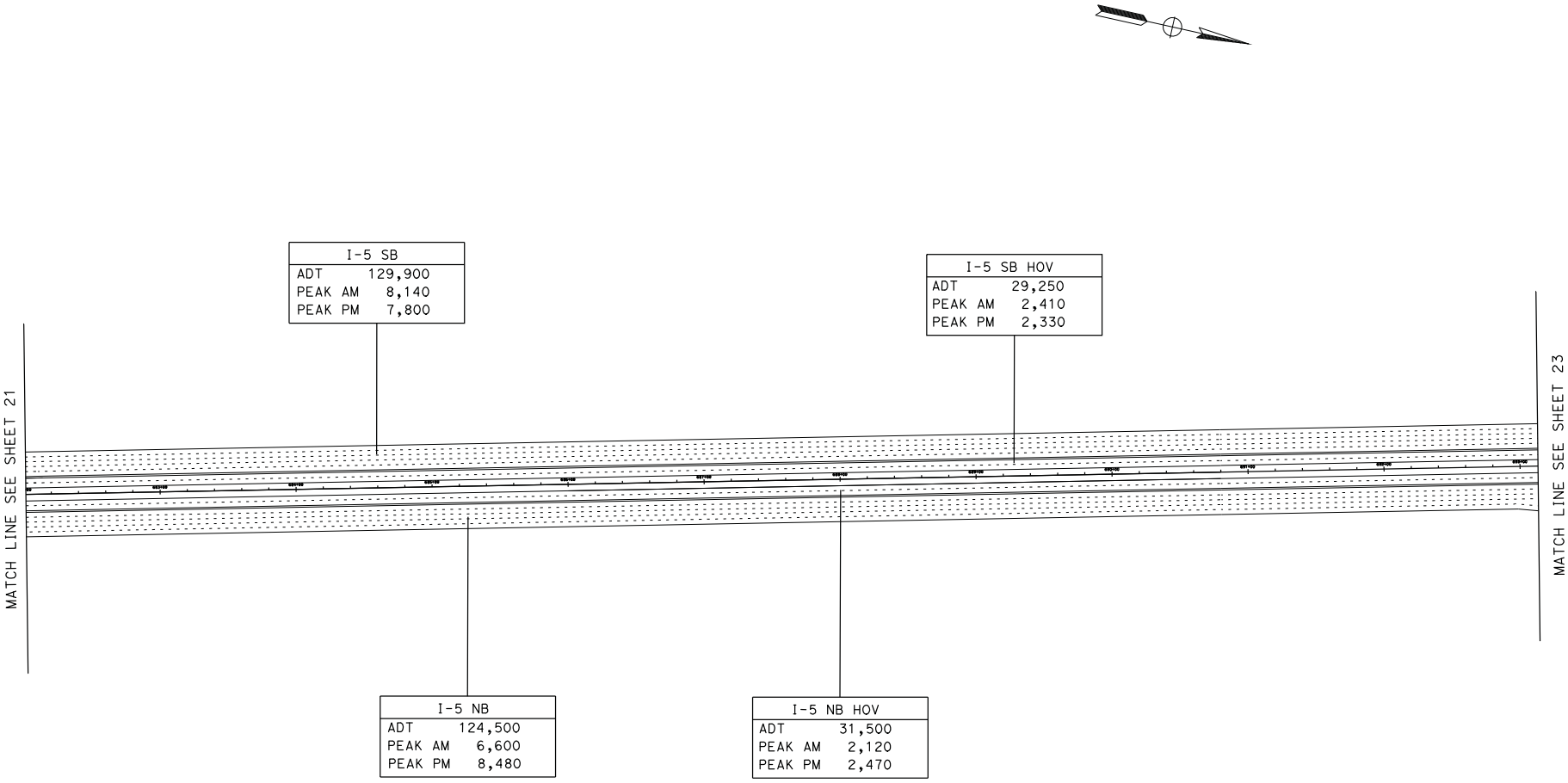


* Note: Possible on-ramp metered rates shown in (parenthesis)

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST
8+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT B

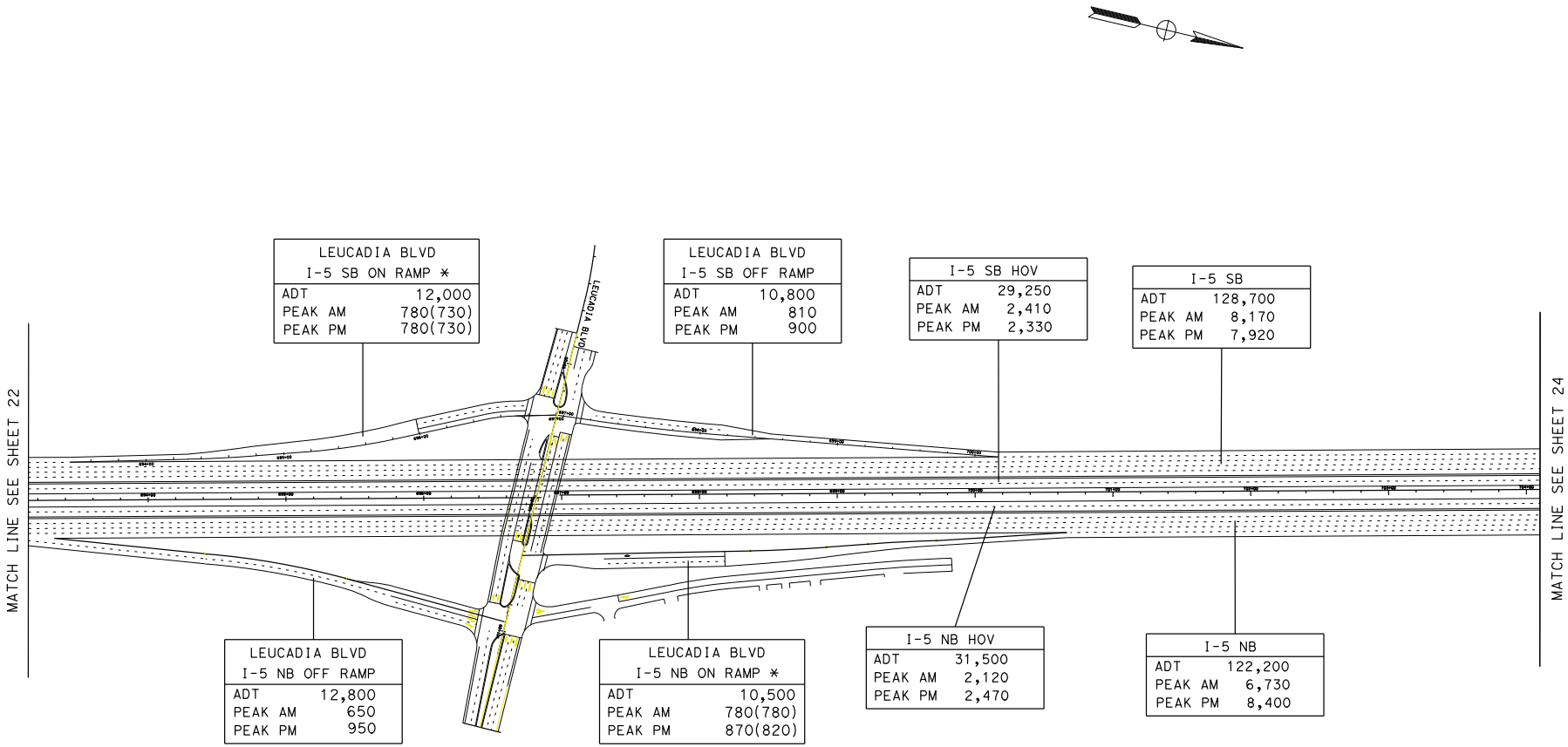
DGN FILE => 2030_21Encinitas.dgn
DATE PLOTTED => 12-NOV-2008



11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST
8+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT B

DGN FILE =>2030_22toLeucadia.dgn
DATE PLOTTED =>12-NOV-2008



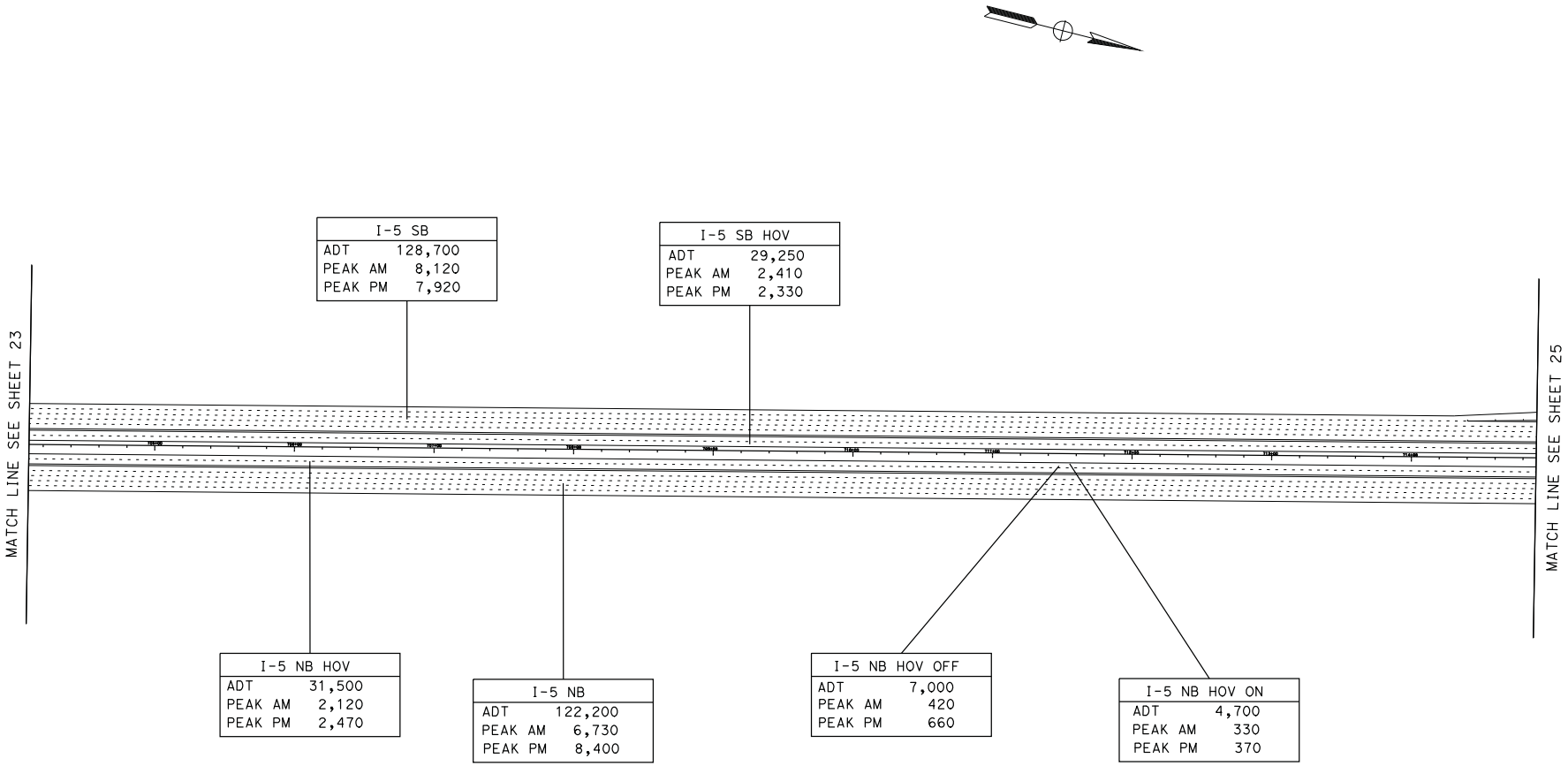
* Note: Possible on-ramp metered rates shown in (parenthesis)

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

8+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT B

DGN FILE =>2030_23Leucadia.dgn DATE PLOTTED =>12-NOV-2008



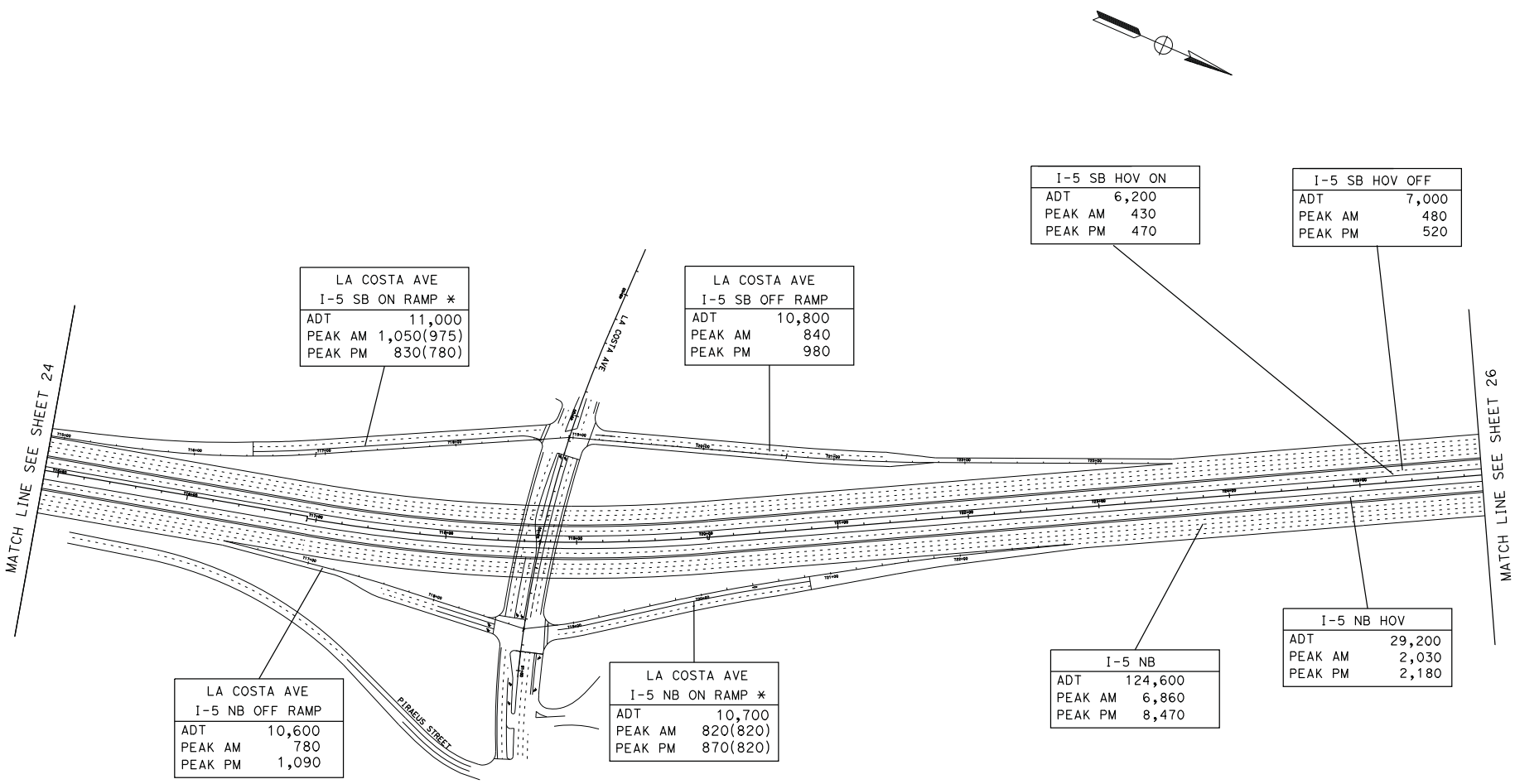
11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

8+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXHIBIT B

DGN FILE => 2030_24toLaCosta.dgn DATE PLOTTED => 12-NOV-2008



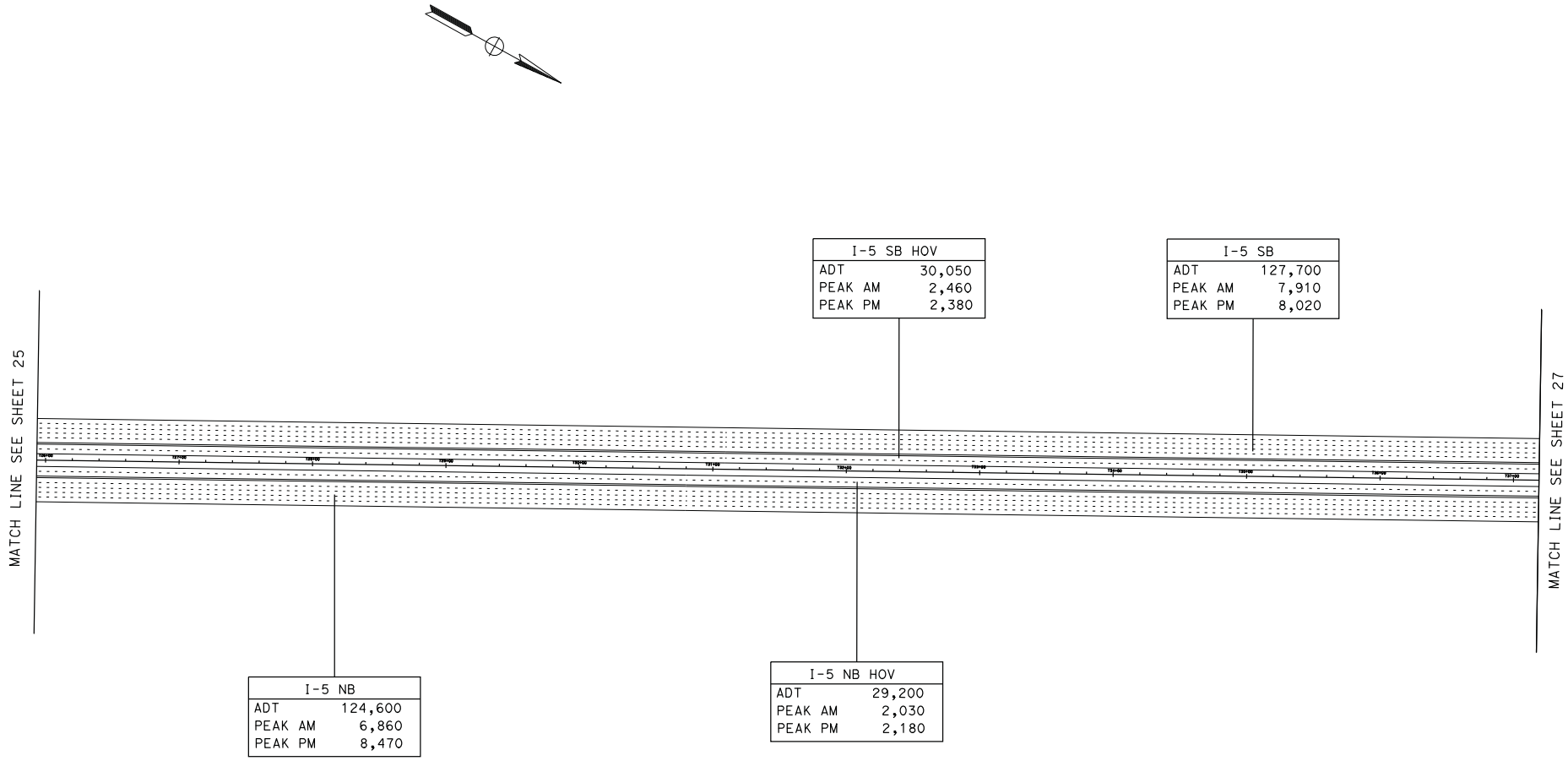
11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

8+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXHIBIT B

DGN FILE => 2030_25LaCosta.dgn
DATE PLOTTED => 12-NOV-2008

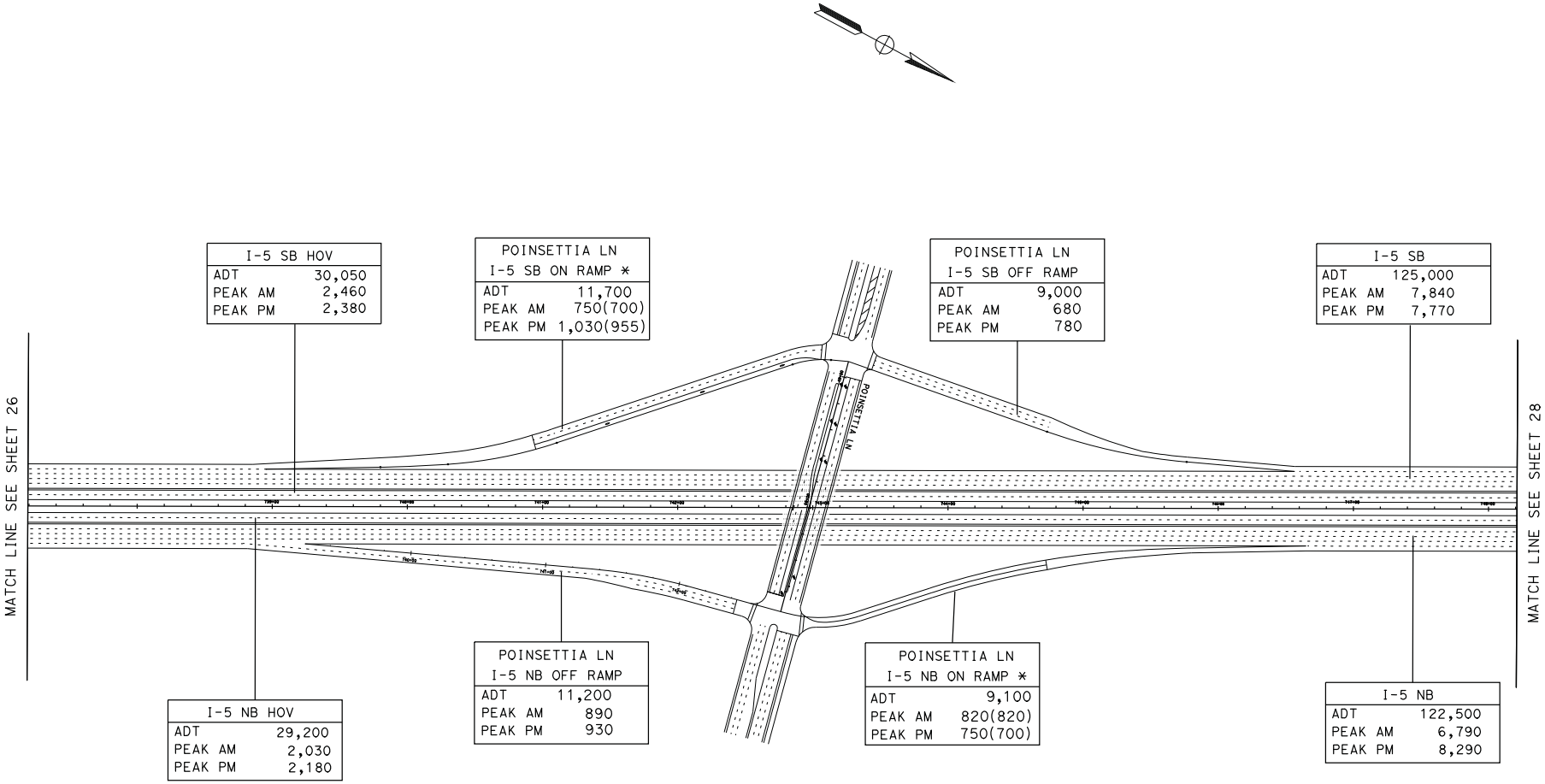


11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

8+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT B

DGN FILE =>2030_26toPolinset1a.dgn DATE PLOTTED =>12-NOV-2008



* Note: Possible on-ramp metered rates shown in (parenthesis)

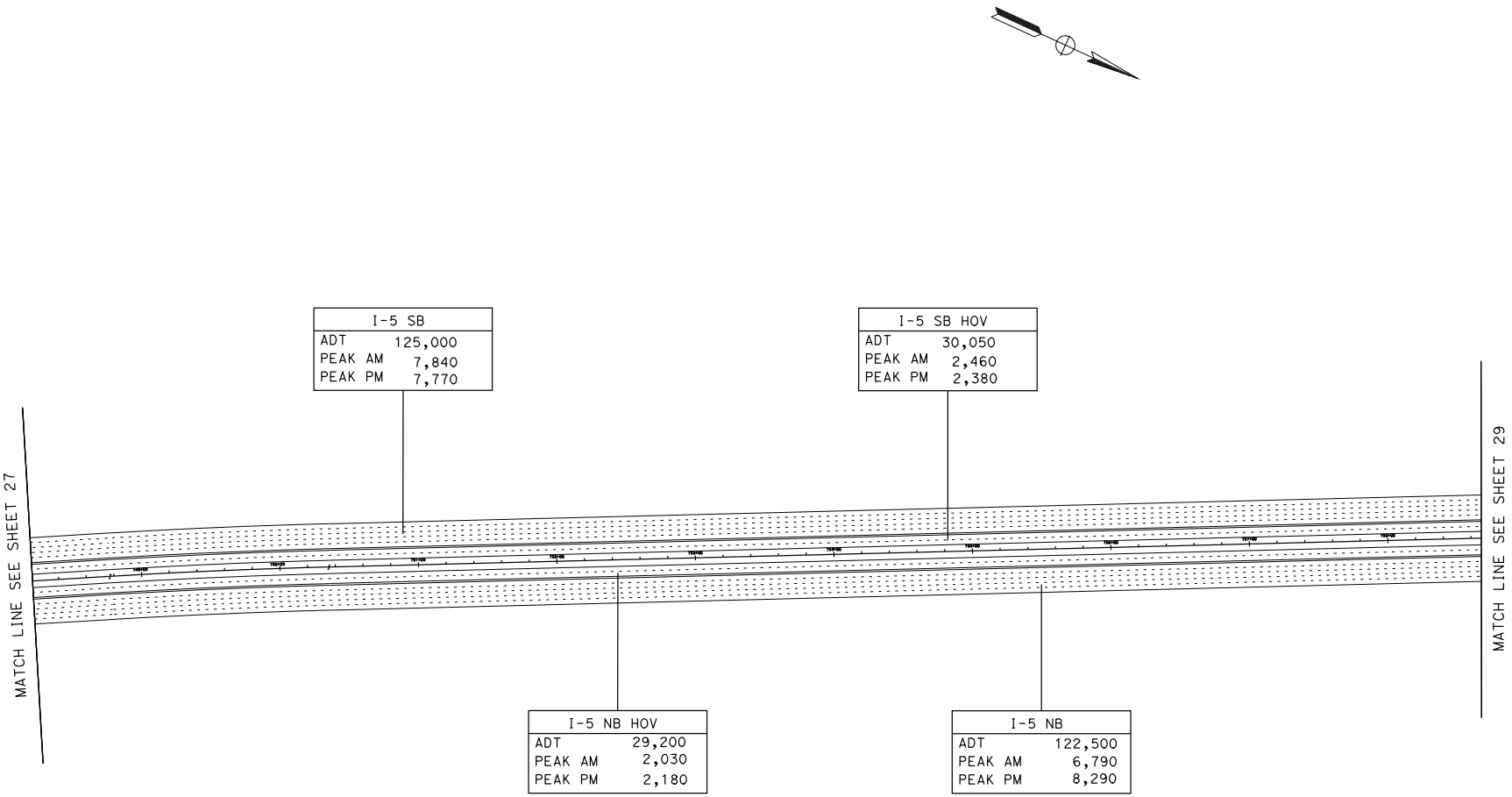
11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

8+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXHIBIT B

DGN FILE =>2030_27Poinsettia.dgn DATE PLOTTED =>12-NOV-2008

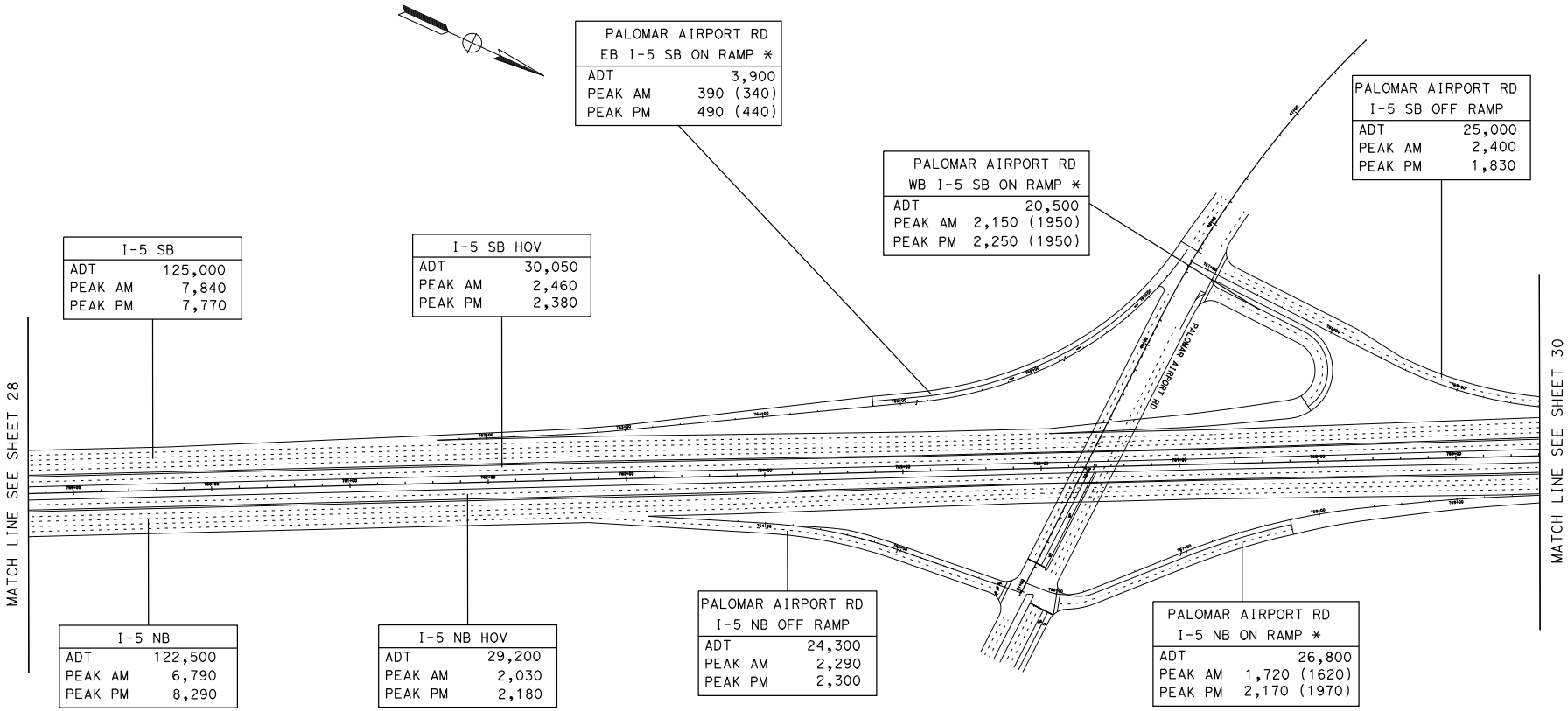


11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

8+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT B

DGN FILE => 2030_28toPalmrAptRd.dgn DATE PLOTTED => 12-NOV-2008



* Note: Possible on-ramp metered rates in (parenthesis)

11-SD-5
K.P. R54.9 to R87.9
11-235800

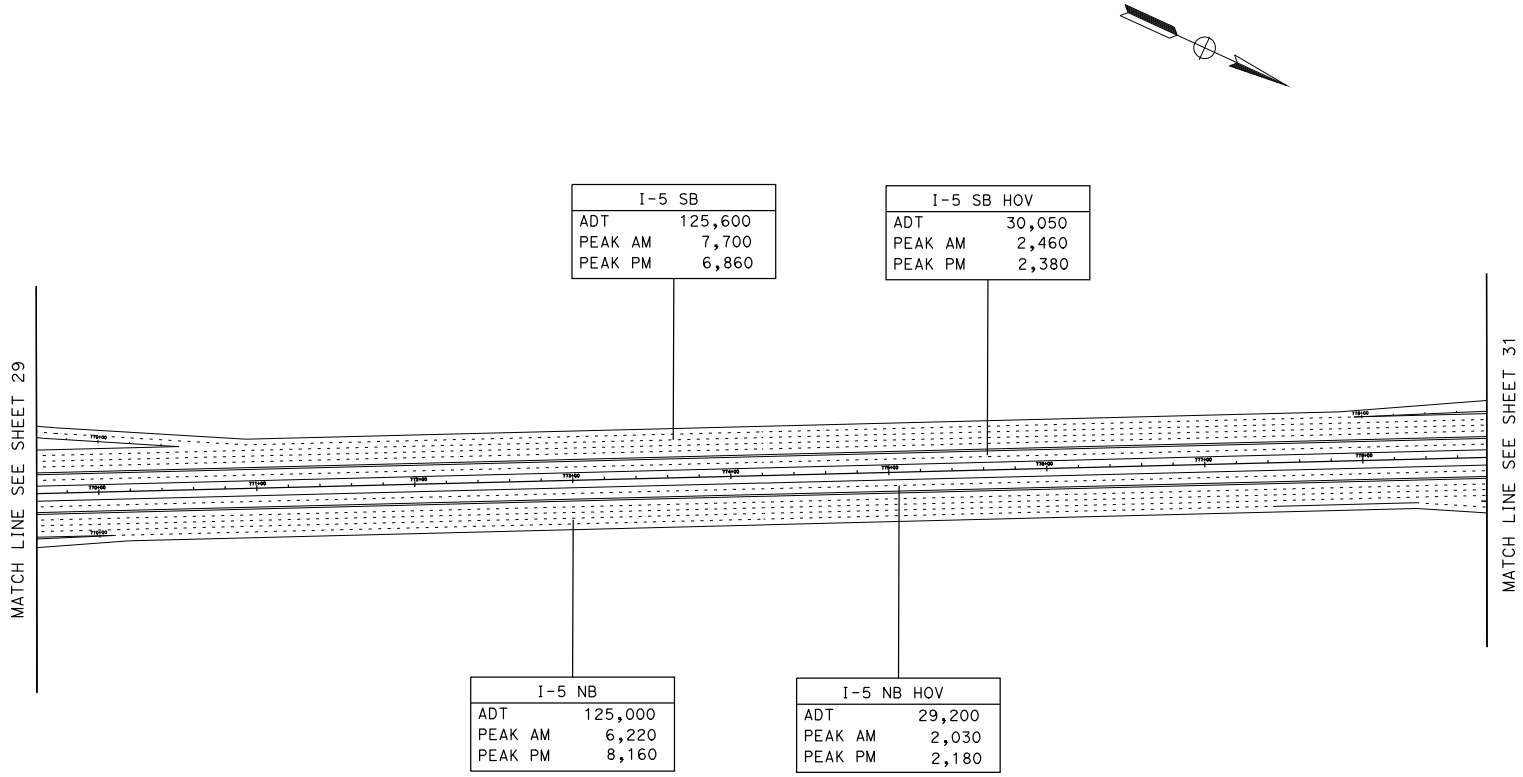
I-5 NORTHCOAST

8+4 ALTERNATIVE YEAR 2030

TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXHIBIT B

DGN FILE =>2030_29PalmrAptRd.dgn
DATE PLOTTED =>12-NOV-2008

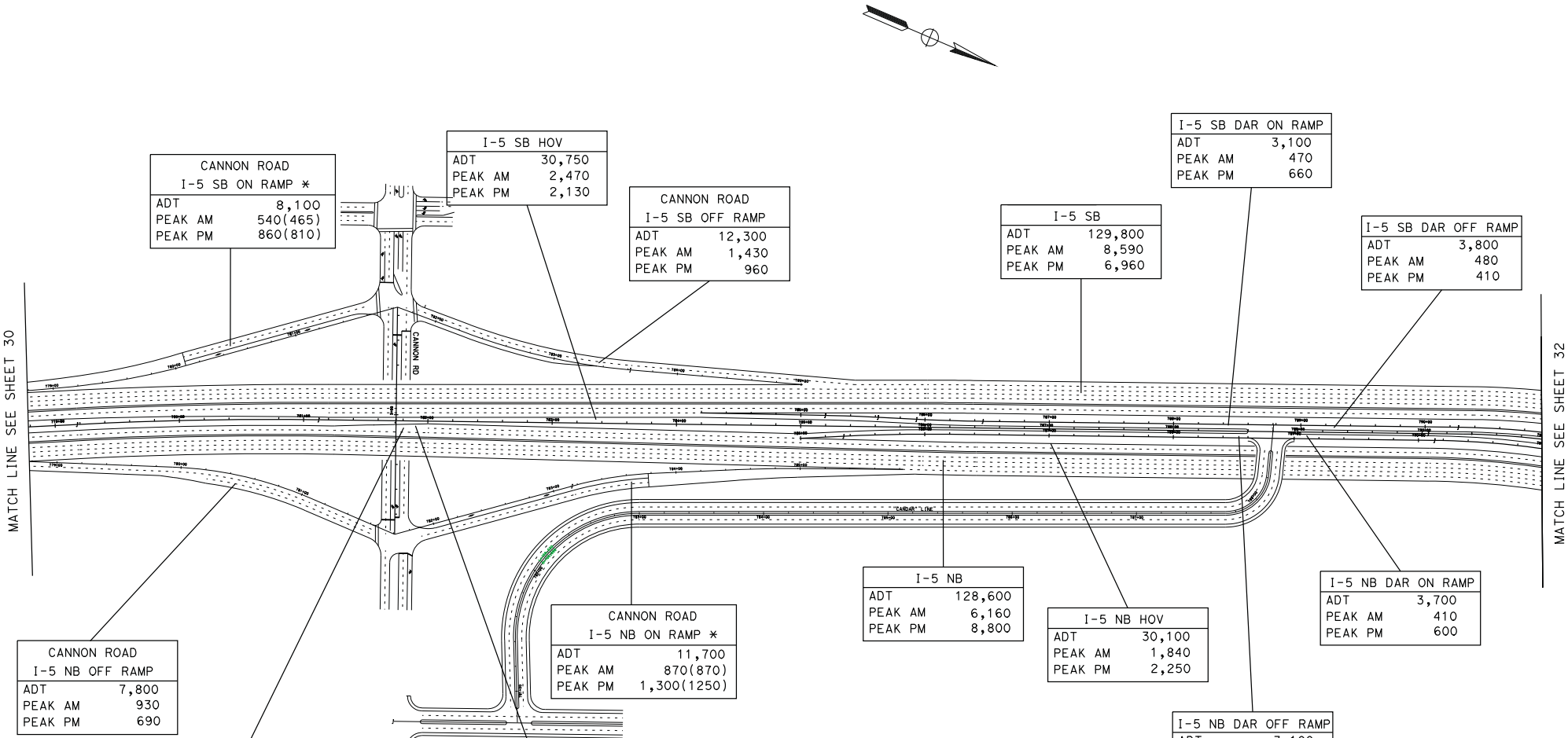


11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

8+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT B

DGN FILE => 2030_3otoCannon.dgn
DATE PLOTTED => 12-NOV-2008



CANNON ROAD I-5 SB ON RAMP *	
ADT	8,100
PEAK AM	540(465)
PEAK PM	860(810)

I-5 SB HOV	
ADT	30,750
PEAK AM	2,470
PEAK PM	2,130

CANNON ROAD I-5 SB OFF RAMP	
ADT	12,300
PEAK AM	1,430
PEAK PM	960

I-5 SB	
ADT	129,800
PEAK AM	8,590
PEAK PM	6,960

I-5 SB DAR ON RAMP	
ADT	3,100
PEAK AM	470
PEAK PM	660

I-5 SB DAR OFF RAMP	
ADT	3,800
PEAK AM	480
PEAK PM	410

CANNON ROAD I-5 NB OFF RAMP	
ADT	7,800
PEAK AM	930
PEAK PM	690

I-5 NB HOV ON	
ADT	5,100
PEAK AM	380
PEAK PM	470

I-5 NB HOV OFF	
ADT	4,800
PEAK AM	380
PEAK PM	500

CANNON ROAD I-5 NB ON RAMP *	
ADT	11,700
PEAK AM	870(870)
PEAK PM	1,300(1250)

I-5 NB	
ADT	128,600
PEAK AM	6,160
PEAK PM	8,800

I-5 NB HOV	
ADT	30,100
PEAK AM	1,840
PEAK PM	2,250

I-5 NB DAR ON RAMP	
ADT	3,700
PEAK AM	410
PEAK PM	600

I-5 NB DAR OFF RAMP	
ADT	3,100
PEAK AM	600
PEAK PM	500

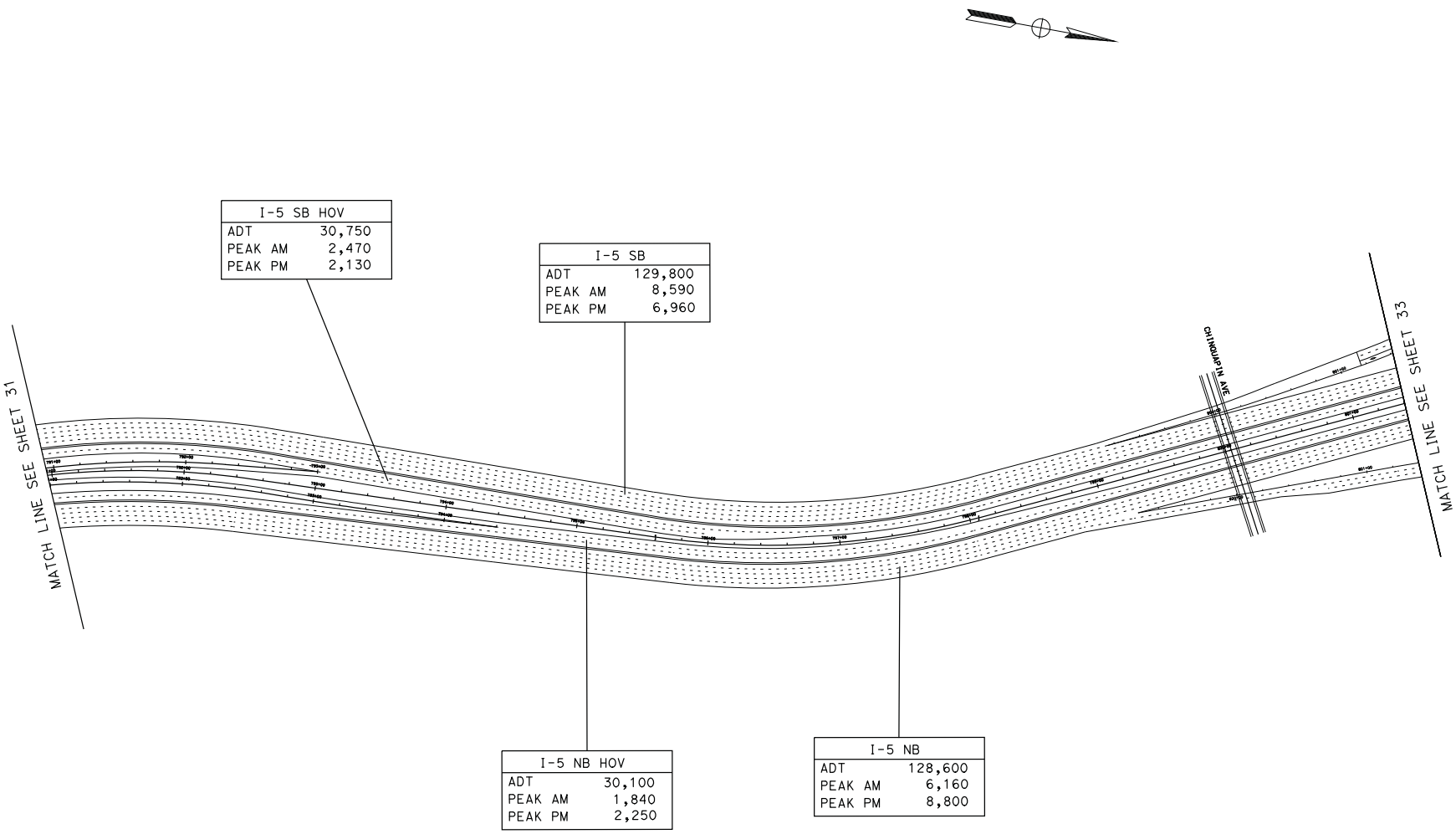
* Note: Possible on-ramp metered rates in (parenthesis)

DATE PLOTTED =>12-NOV-2008

DGN FILE =>2030_31Cannon.dgn

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST
8+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT B

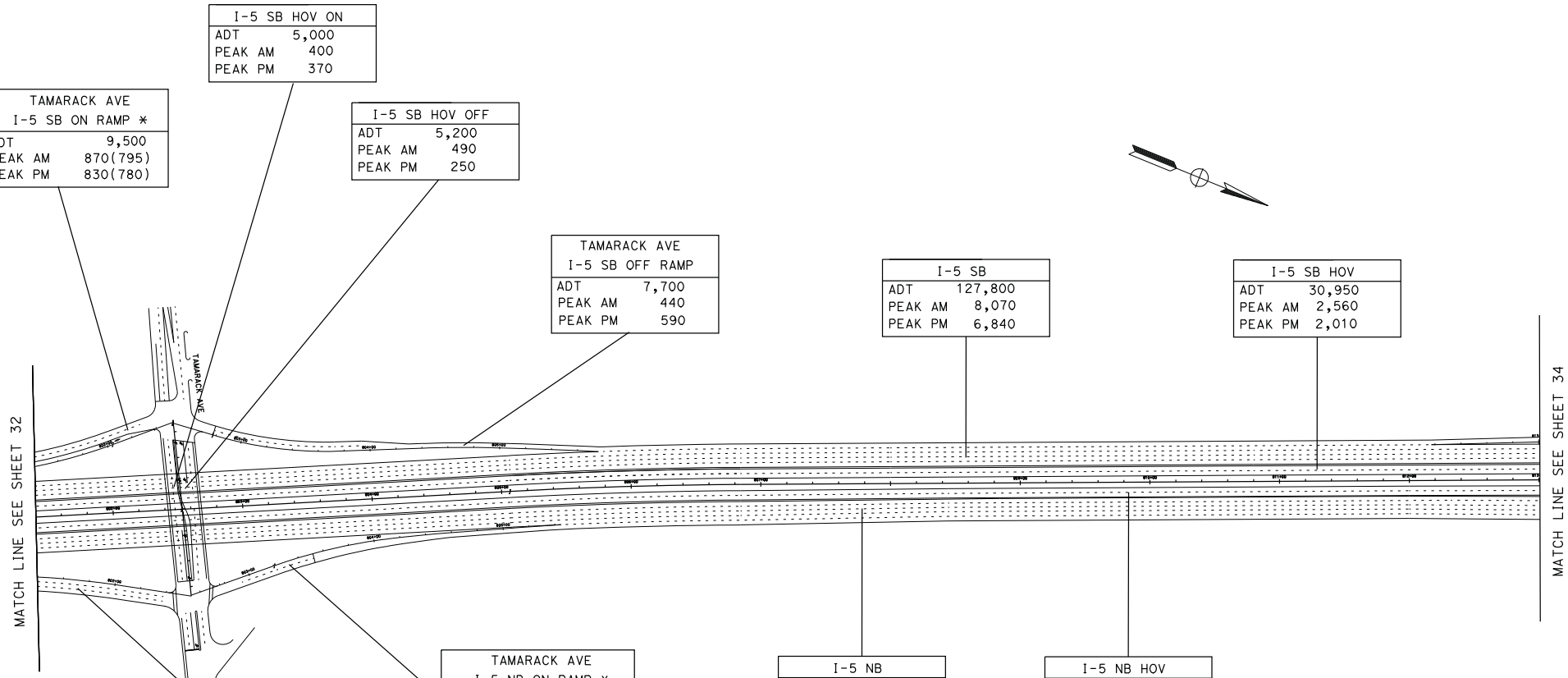


11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

8+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT B

DGN FILE =>2030_32toTamarack.dgn
DATE PLOTTED =>12-NOV-2008



TAMARACK AVE I-5 SB ON RAMP *	
ADT	9,500
PEAK AM	870(795)
PEAK PM	830(780)

I-5 SB HOV ON	
ADT	5,000
PEAK AM	400
PEAK PM	370

I-5 SB HOV OFF	
ADT	5,200
PEAK AM	490
PEAK PM	250

TAMARACK AVE I-5 SB OFF RAMP	
ADT	7,700
PEAK AM	440
PEAK PM	590

I-5 SB	
ADT	127,800
PEAK AM	8,070
PEAK PM	6,840

I-5 SB HOV	
ADT	30,950
PEAK AM	2,560
PEAK PM	2,010

TAMARACK AVE I-5 NB ON RAMP *	
ADT	7,800
PEAK AM	530(530)
PEAK PM	640(590)

I-5 NB	
ADT	126,800
PEAK AM	5,980
PEAK PM	8,560

I-5 NB HOV	
ADT	30,100
PEAK AM	1,840
PEAK PM	2,250

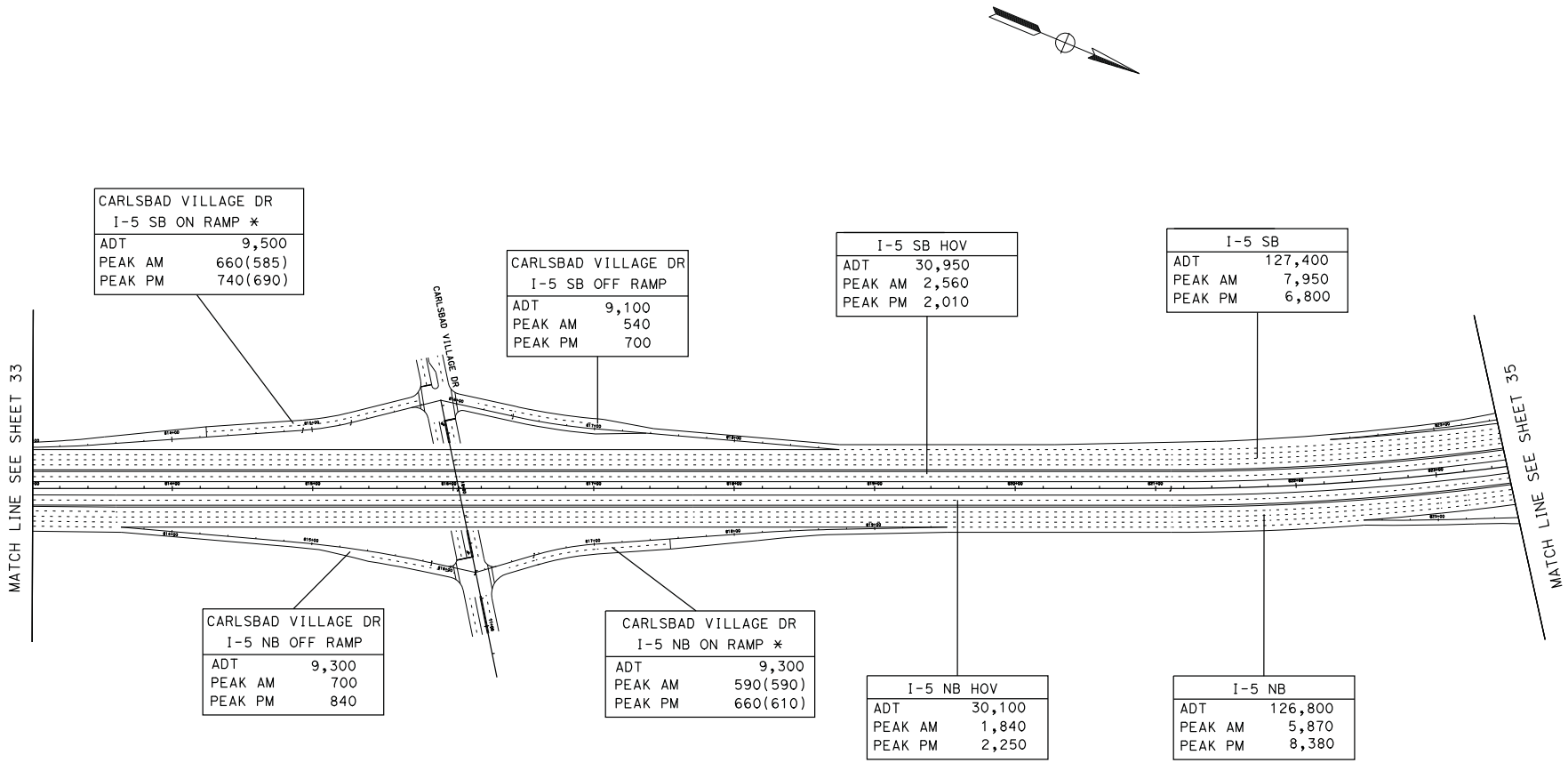
TAMARACK AVE I-5 NB OFF RAMP	
ADT	9,600
PEAK AM	710
PEAK PM	880

* Note: Possible metered rates shown in (parenthesis)

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST
8+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT B

DGN FILE =>2030_33Tamarack.dgn
DATE PLOTTED =>12-NOV-2008



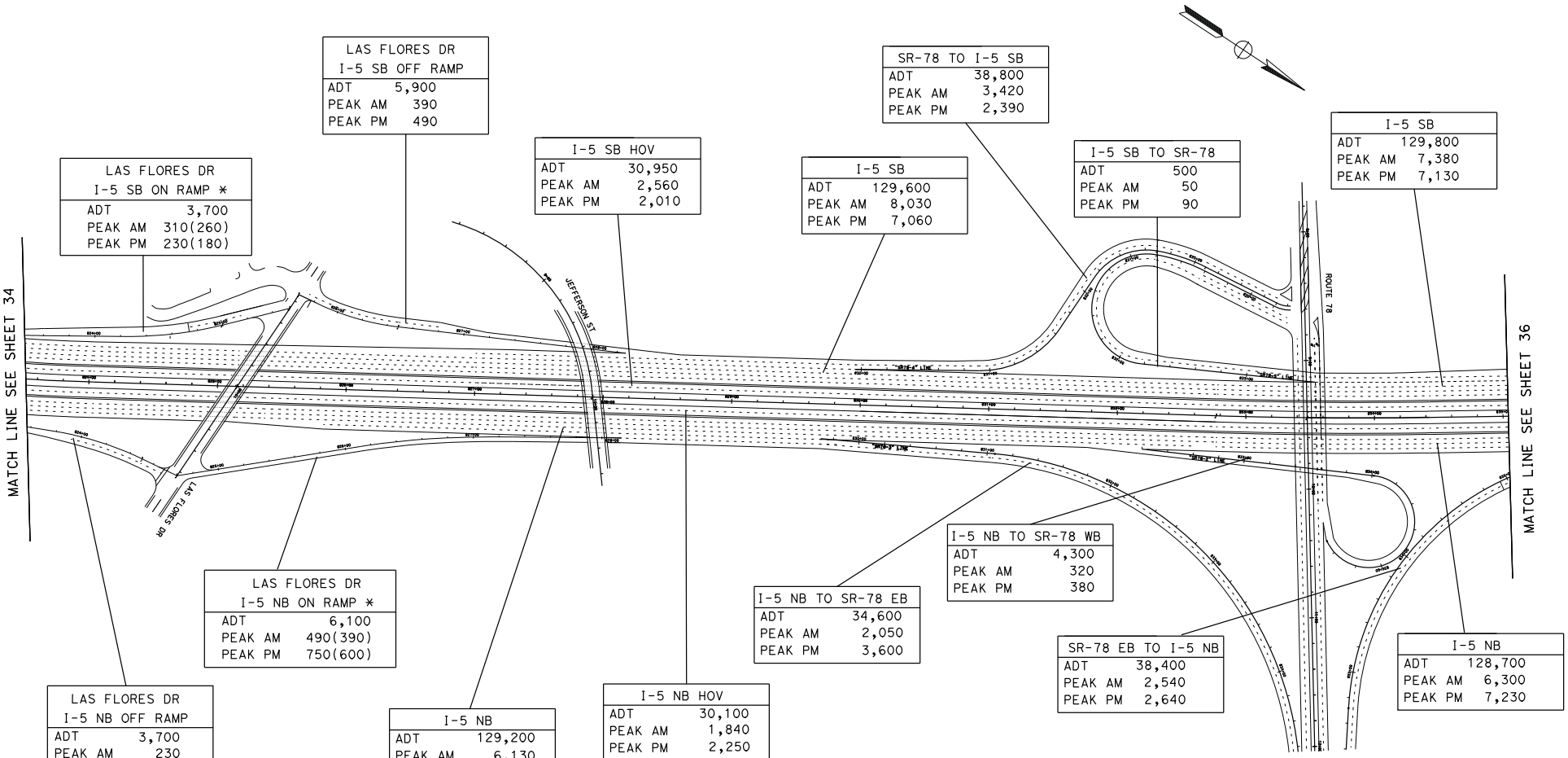
* Note: Possible metered rates shown in (parenthesis)

DGN FILE => 2030_34CarlsbadVD.dgn DATE PLOTTED => 12-NOV-2008

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

8+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT B

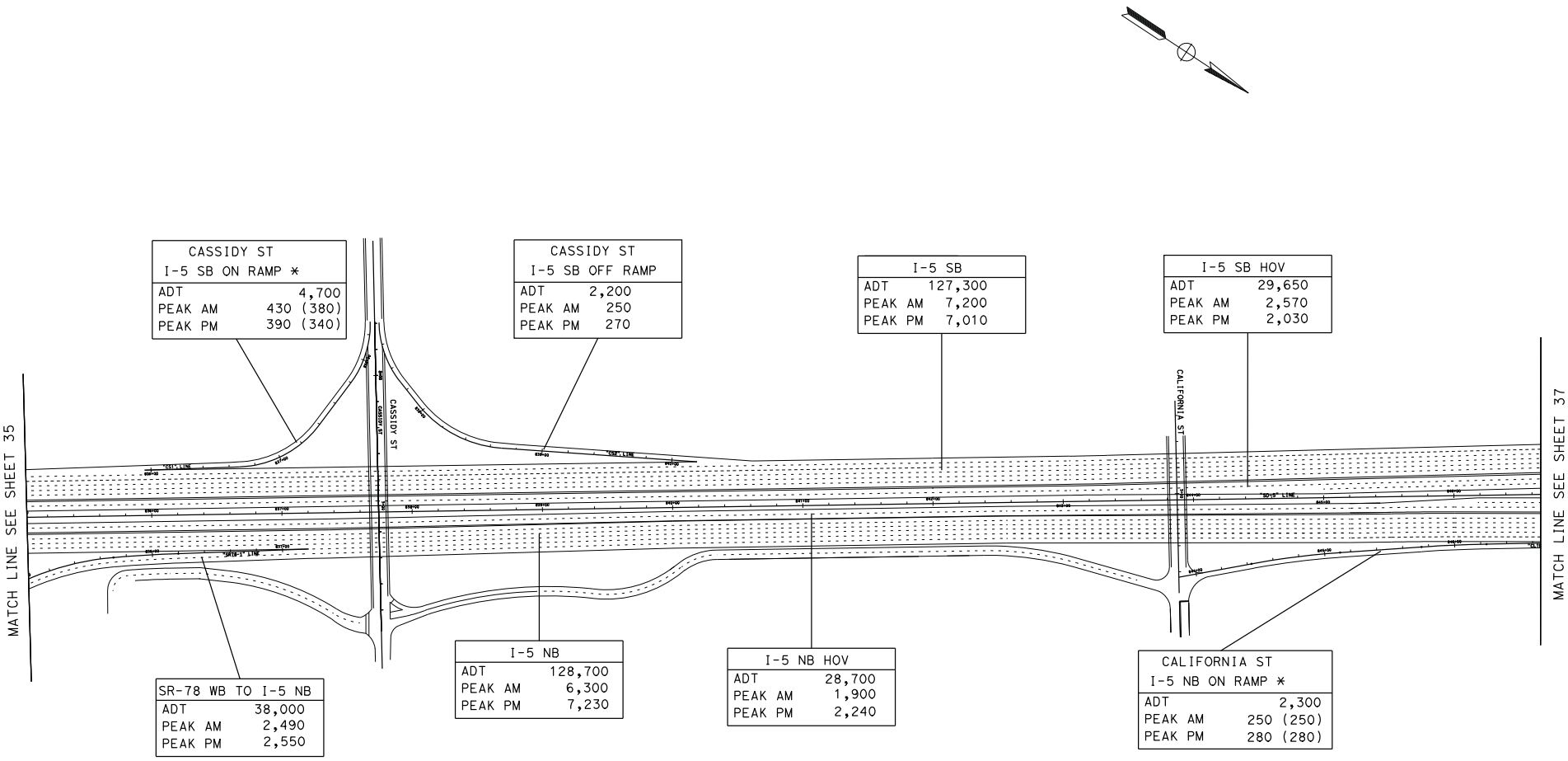


* Note: Possible on-ramp metered rates shown in (parenthesis)

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST
8+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT B

DGN FILE =>2030_35LasFlores78.dgn
DATE PLOTTED =>12-NOV-2008



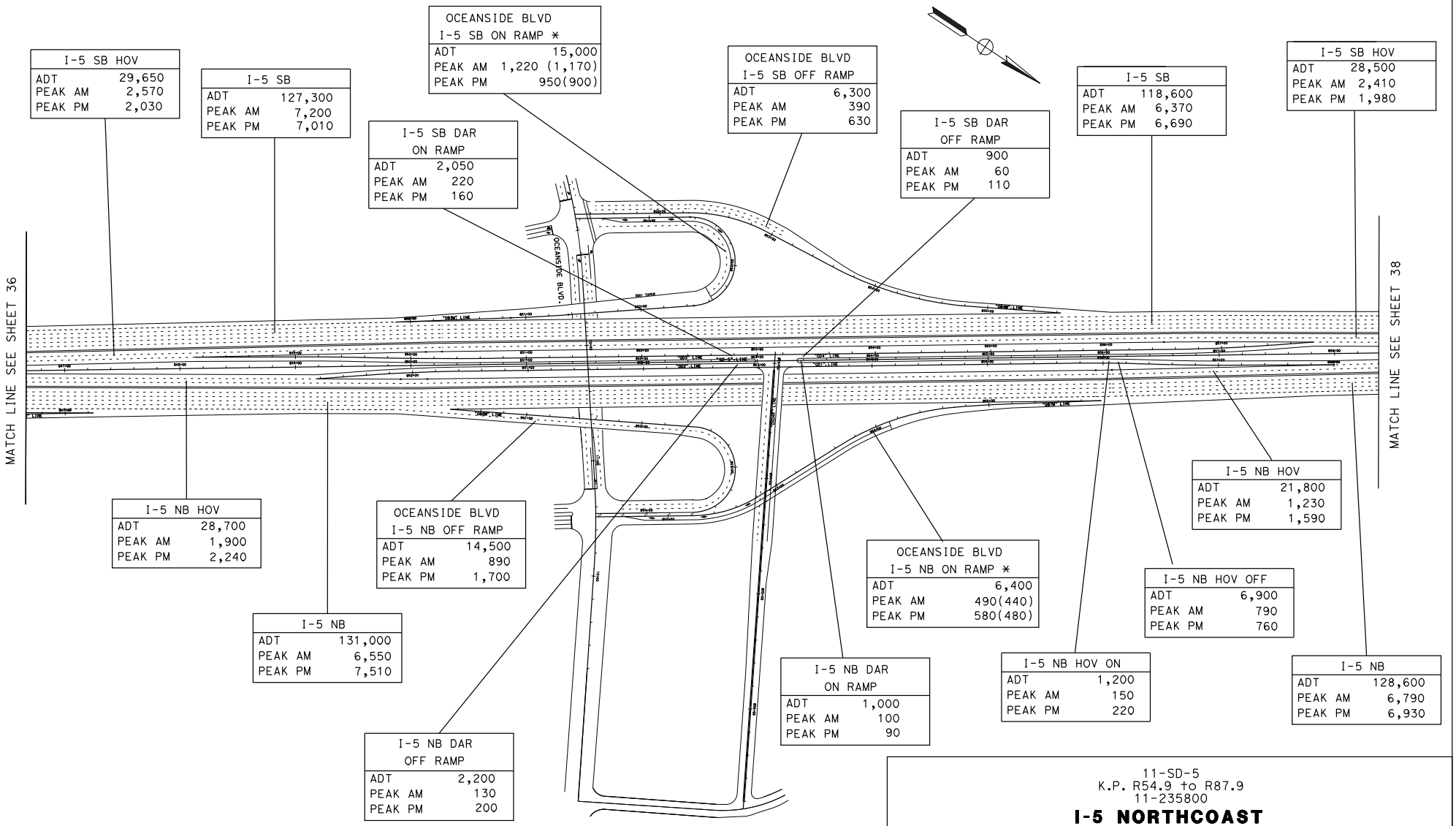
* Note: Possible on-ramp metered rates shown in (parenthesis)

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

8+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT B

DGN FILE => 2030_36CassidyCA.dgn
DATE PLOTTED => 12-NOV-2008



* Note: Possible on-ramp metered rates shown in (parenthesis)

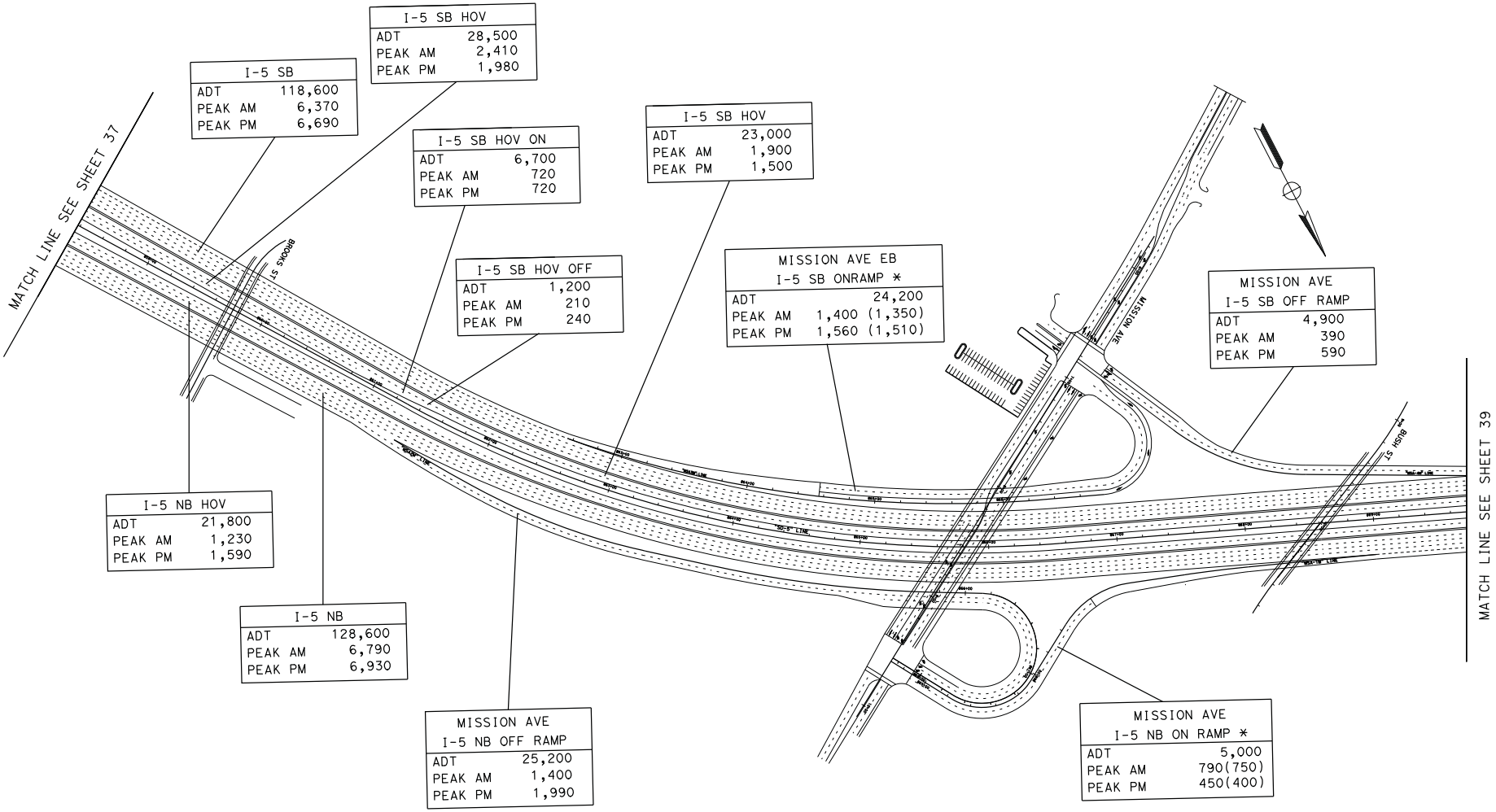
11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

8+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXHIBIT B

DGN FILE => 2030_370Oceanside.dgn
DATE PLOTTED => 12-NOV-2008

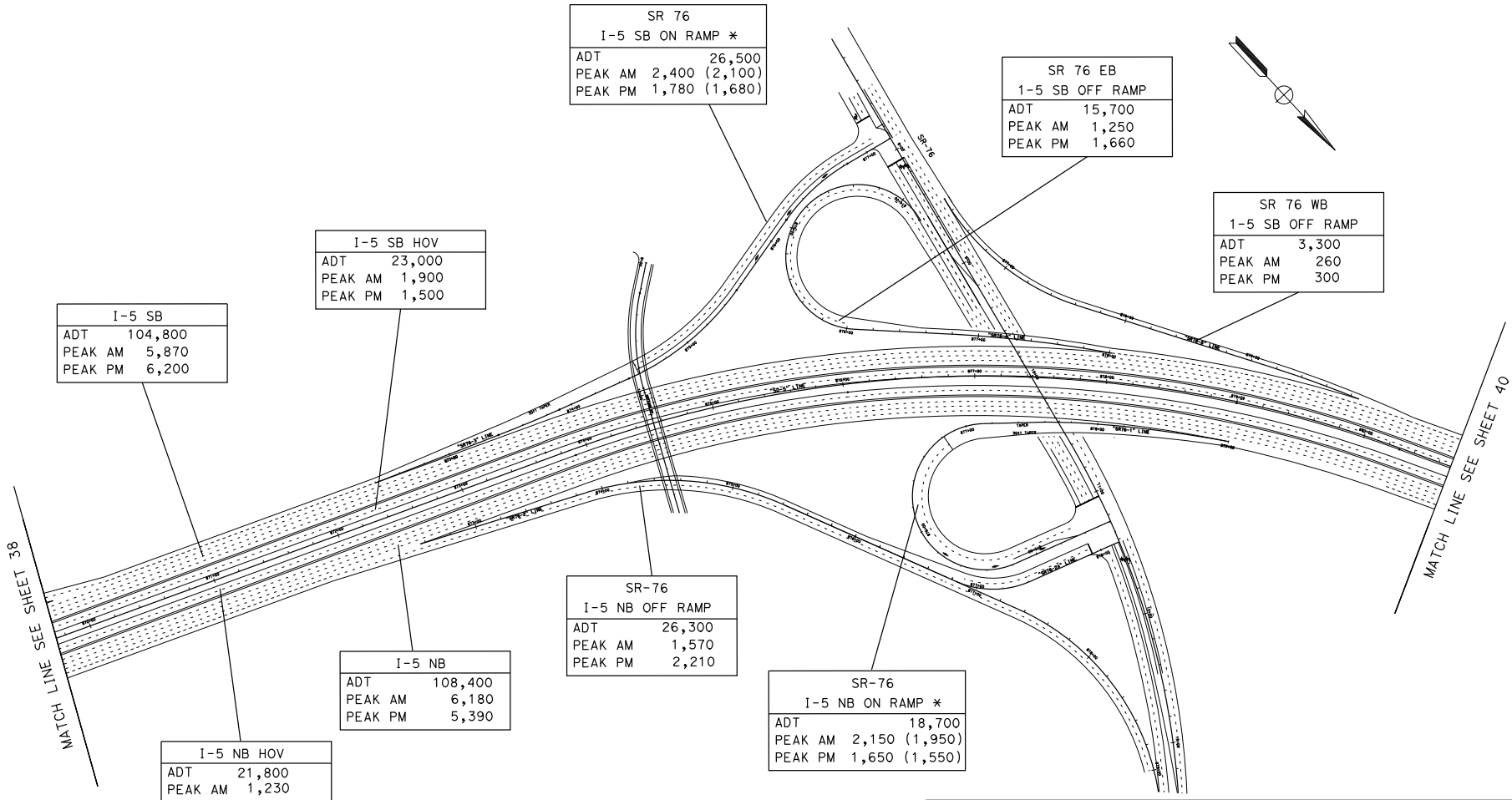


* Note: Possible on-ramp metered rates shown in (parenthesis)

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST
8+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT B

DATE PLOTTED => 12-NOV-2008
DGN FILE => 2030_38Mission.dgn

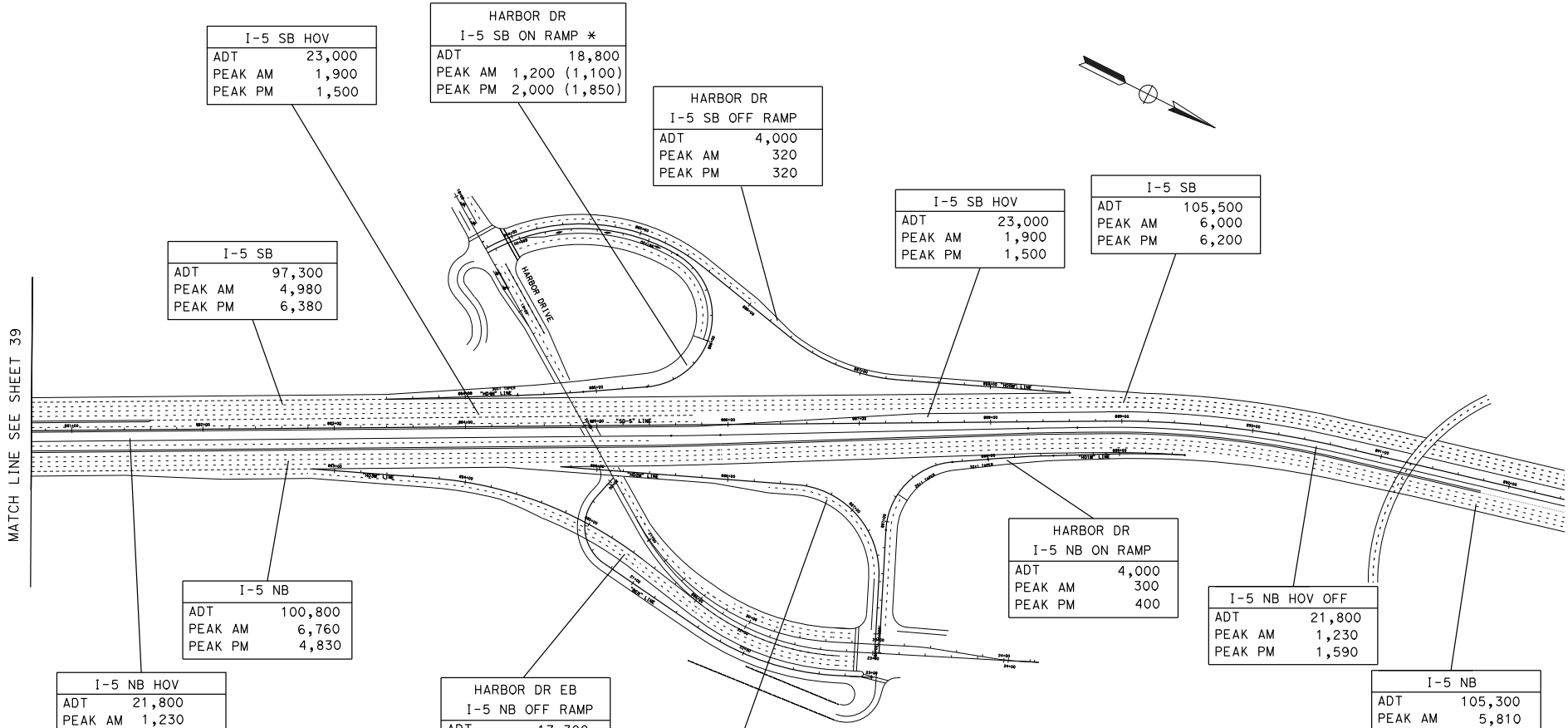


* Note: Possible on-ramp metered rates shown in (parenthesis)

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST
8+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT B

DGN FILE =>2030_39Rte76.dgn
DATE PLOTTED =>12-NOV-2008



* Note: Possible on-ramp metered rates shown in (parenthesis)

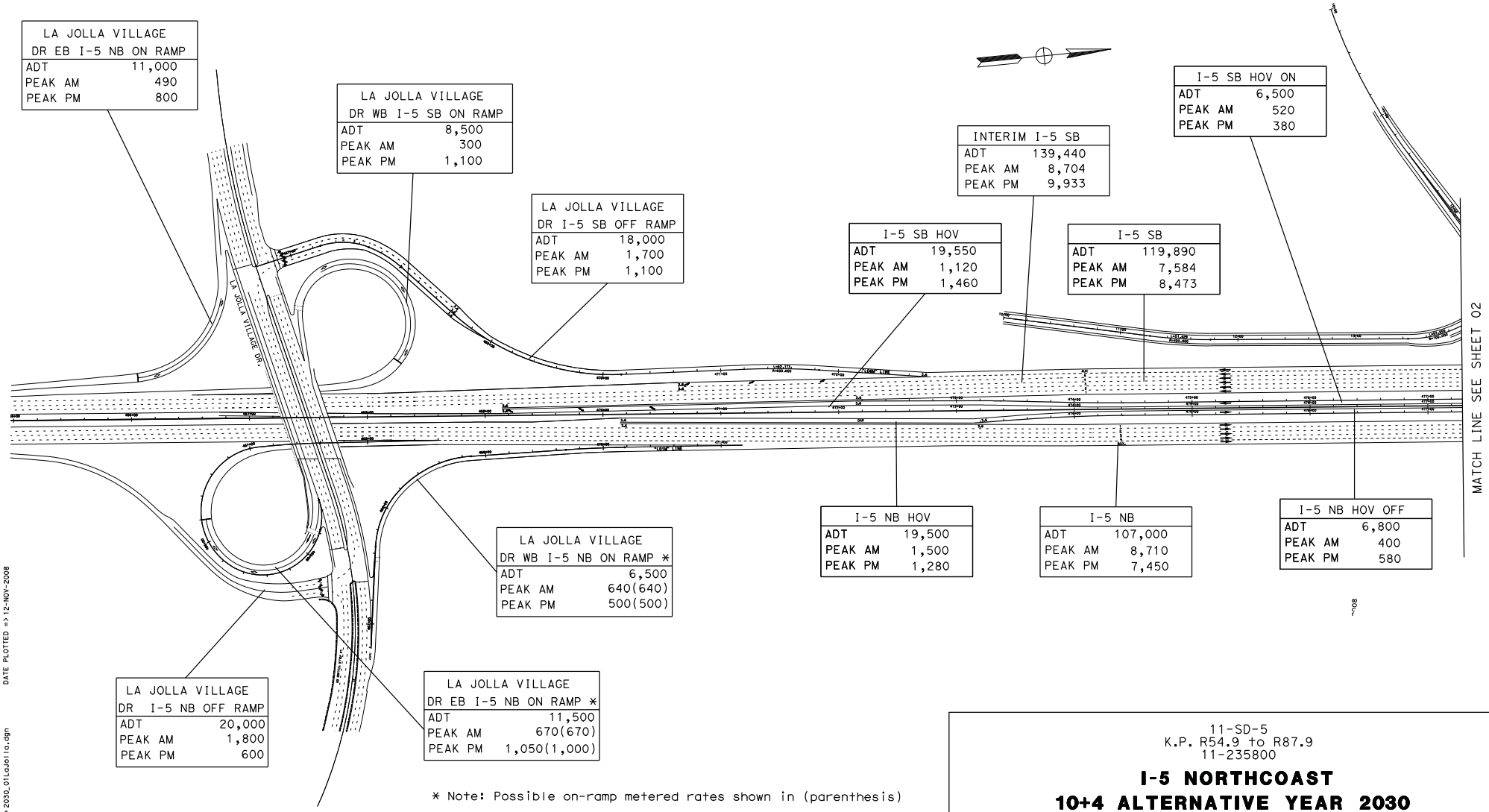
11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

8+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXHIBIT B

DGN FILE => 2030_40HarborDr.dgn
DATE PLOTTED => 12-NOV-2008

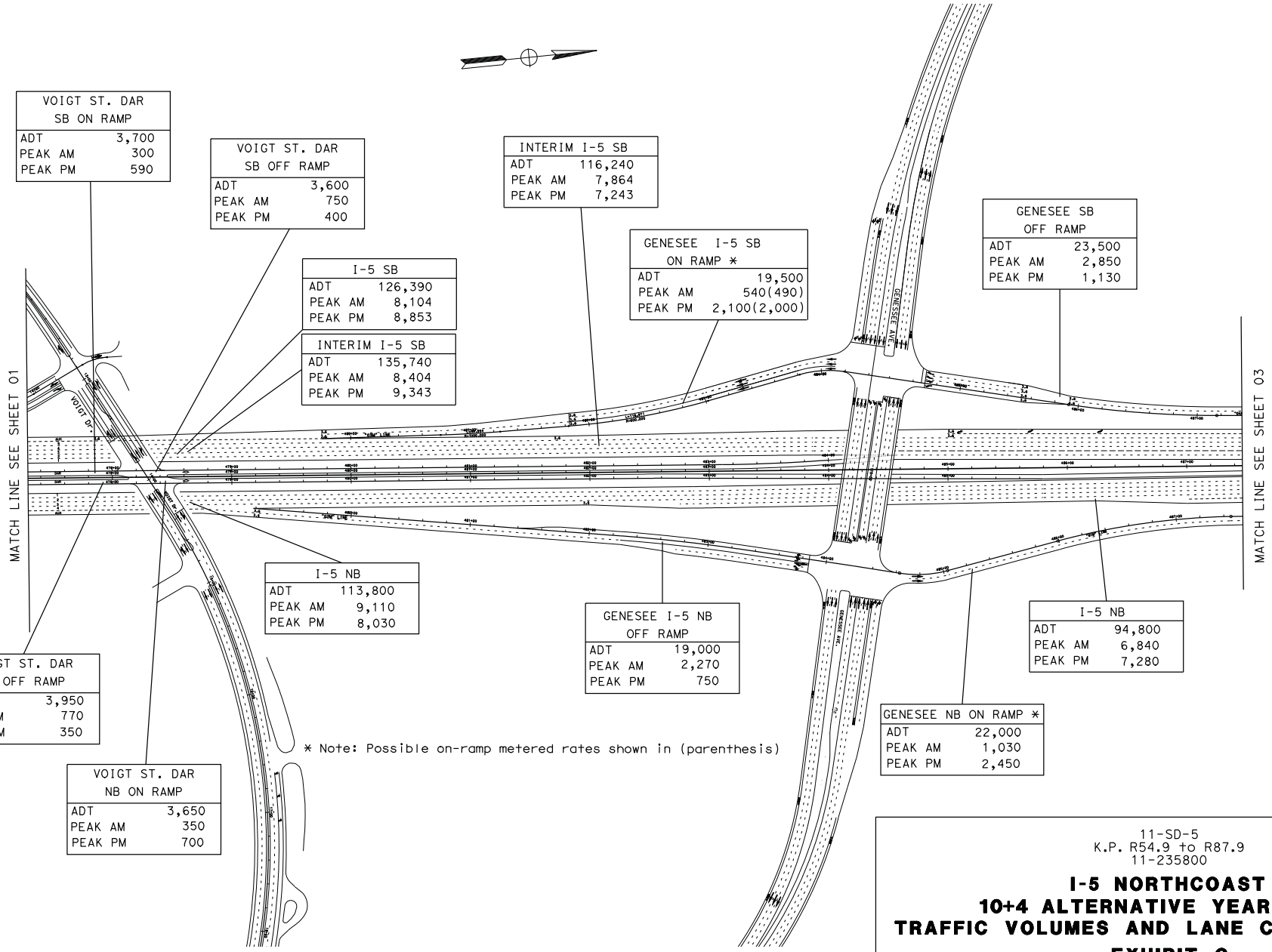


* Note: Possible on-ramp metered rates shown in (parenthesis)

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST
10+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT C

DGN FILE => 2030_01LaJolla.dgn
DATE PLOTTED => 12-NOV-2008



VOIGT ST. DAR SB ON RAMP	
ADT	3,700
PEAK AM	300
PEAK PM	590

VOIGT ST. DAR SB OFF RAMP	
ADT	3,600
PEAK AM	750
PEAK PM	400

I-5 SB	
ADT	126,390
PEAK AM	8,104
PEAK PM	8,853

INTERIM I-5 SB	
ADT	135,740
PEAK AM	8,404
PEAK PM	9,343

INTERIM I-5 SB	
ADT	116,240
PEAK AM	7,864
PEAK PM	7,243

GENESEE I-5 SB ON RAMP *	
ADT	19,500
PEAK AM	540(490)
PEAK PM	2,100(2,000)

GENESEE SB OFF RAMP	
ADT	23,500
PEAK AM	2,850
PEAK PM	1,130

I-5 NB	
ADT	113,800
PEAK AM	9,110
PEAK PM	8,030

GENESEE I-5 NB OFF RAMP	
ADT	19,000
PEAK AM	2,270
PEAK PM	750

I-5 NB	
ADT	94,800
PEAK AM	6,840
PEAK PM	7,280

VOIGT ST. DAR NB OFF RAMP	
ADT	3,950
PEAK AM	770
PEAK PM	350

VOIGT ST. DAR NB ON RAMP	
ADT	3,650
PEAK AM	350
PEAK PM	700

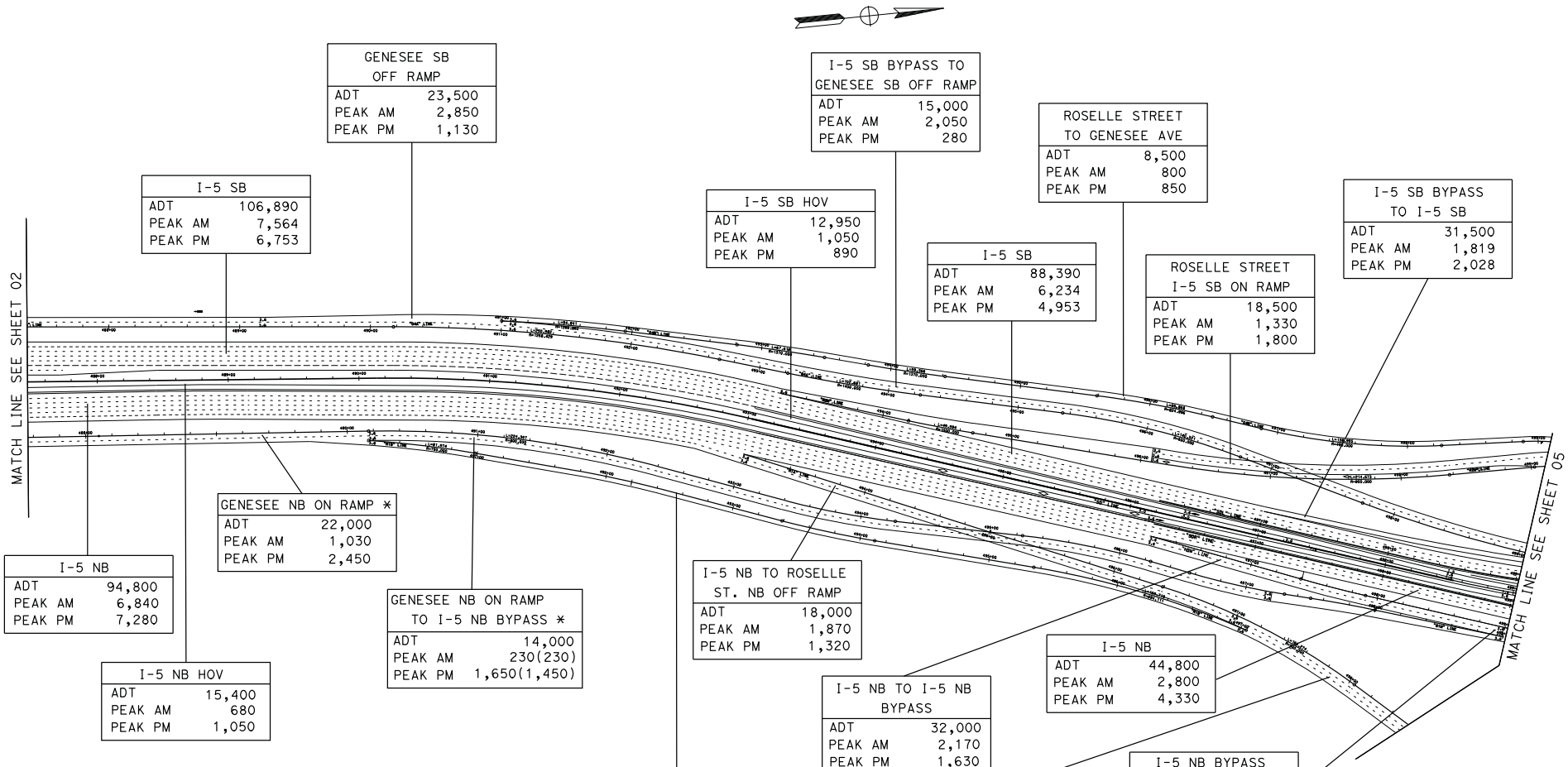
GENESEE NB ON RAMP *	
ADT	22,000
PEAK AM	1,030
PEAK PM	2,450

* Note: Possible on-ramp metered rates shown in (parenthesis)

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST
10+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT C

DGN FILE => 2030_02genesee.dgn DATE PLOTTED => 12-NOV-2008



GENESEE SB OFF RAMP	
ADT	23,500
PEAK AM	2,850
PEAK PM	1,130

I-5 SB	
ADT	106,890
PEAK AM	7,564
PEAK PM	6,753

I-5 SB BYPASS TO GENESEE SB OFF RAMP	
ADT	15,000
PEAK AM	2,050
PEAK PM	280

ROSELLE STREET TO GENESEE AVE	
ADT	8,500
PEAK AM	800
PEAK PM	850

I-5 SB HOV	
ADT	12,950
PEAK AM	1,050
PEAK PM	890

I-5 SB BYPASS TO I-5 SB	
ADT	31,500
PEAK AM	1,819
PEAK PM	2,028

I-5 SB	
ADT	88,390
PEAK AM	6,234
PEAK PM	4,953

ROSELLE STREET I-5 SB ON RAMP	
ADT	18,500
PEAK AM	1,330
PEAK PM	1,800

GENESEE NB ON RAMP *	
ADT	22,000
PEAK AM	1,030
PEAK PM	2,450

I-5 NB	
ADT	94,800
PEAK AM	6,840
PEAK PM	7,280

I-5 NB TO ROSELLE ST. NB OFF RAMP	
ADT	18,000
PEAK AM	1,870
PEAK PM	1,320

GENESEE NB ON RAMP TO I-5 NB BYPASS *	
ADT	14,000
PEAK AM	230(230)
PEAK PM	1,650(1,450)

I-5 NB	
ADT	44,800
PEAK AM	2,800
PEAK PM	4,330

I-5 NB HOV	
ADT	15,400
PEAK AM	680
PEAK PM	1,050

I-5 NB TO I-5 NB BYPASS	
ADT	32,000
PEAK AM	2,170
PEAK PM	1,630

I-5 NB BYPASS	
ADT	46,000
PEAK AM	2,400
PEAK PM	3,280

ROSELLE ST. NB OFF RAMP	
ADT	26,000
PEAK AM	2,670
PEAK PM	2,120

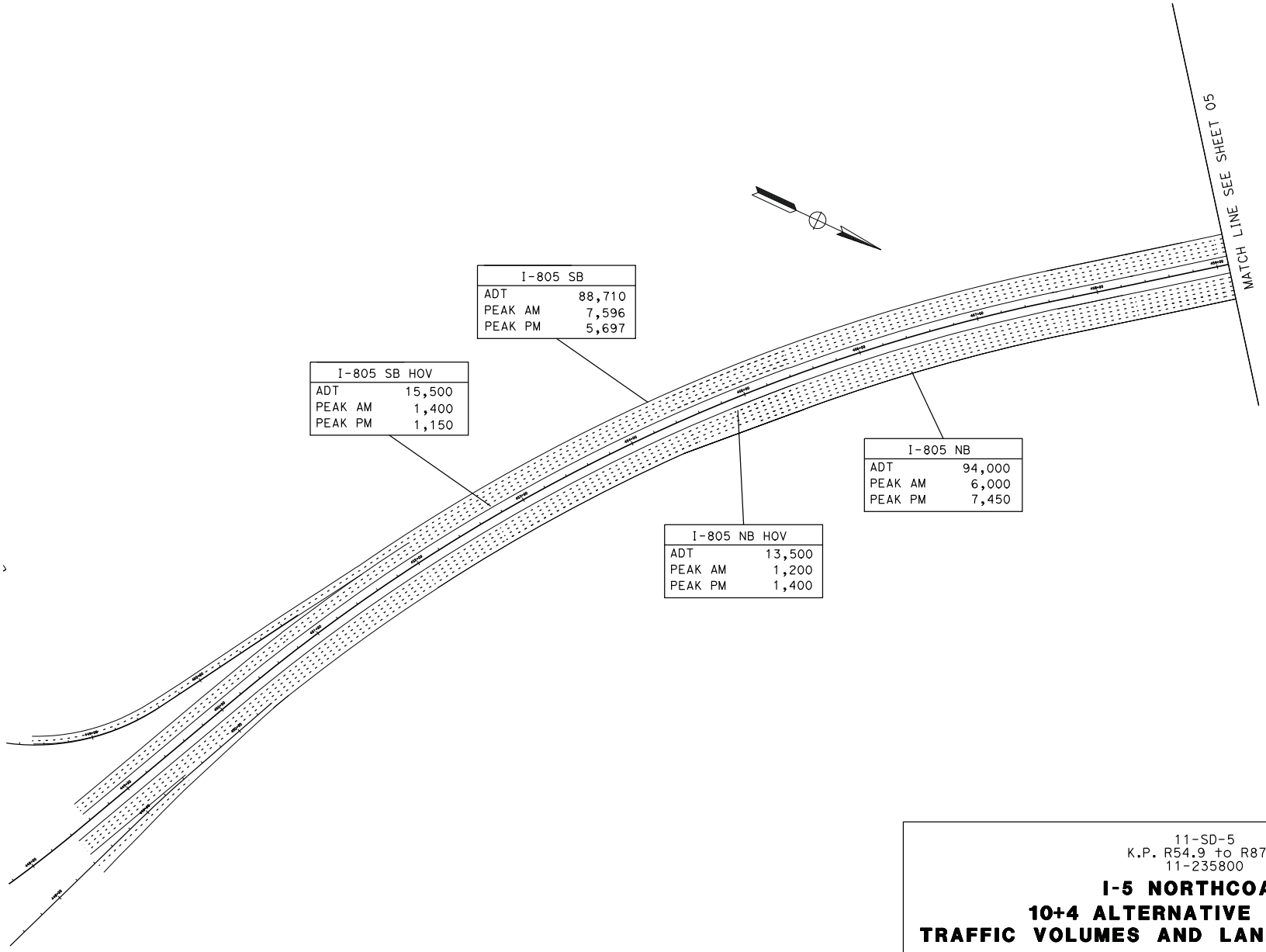
GENESEE NB ON RAMP TO ROSELLE ST.	
ADT	8,000
PEAK AM	800
PEAK PM	800

* Note: Possible on-ramp metered rates shown in (parenthesis)

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST
10+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT C

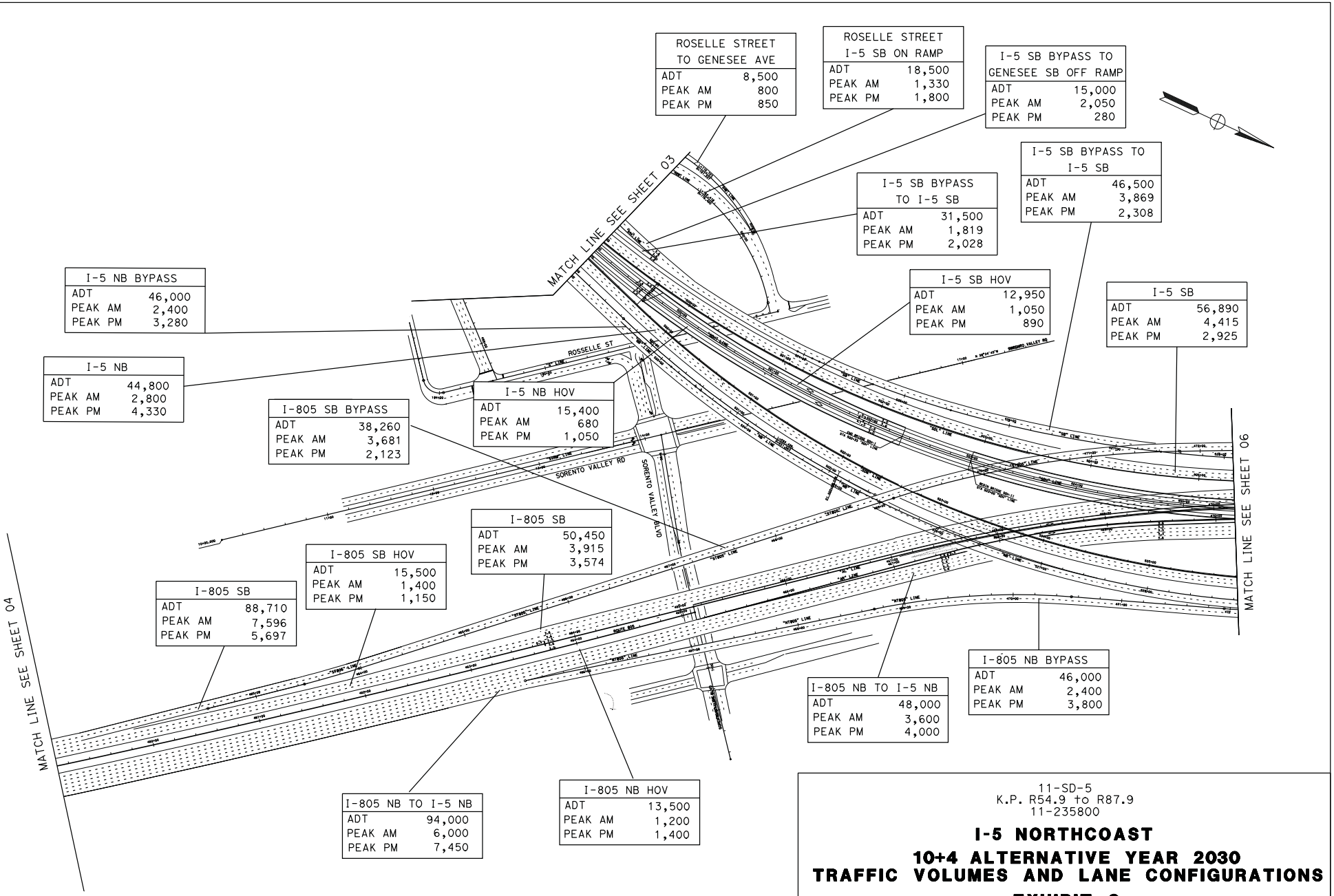
DATE PLOTTED => 12-NOV-2008
DGN FILE => 2030_03Bypass.dgn



11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST
10+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT C

DGN FILE => 2030_04Lusk805.dgn
DATE PLOTTED => 12-NOV-2008



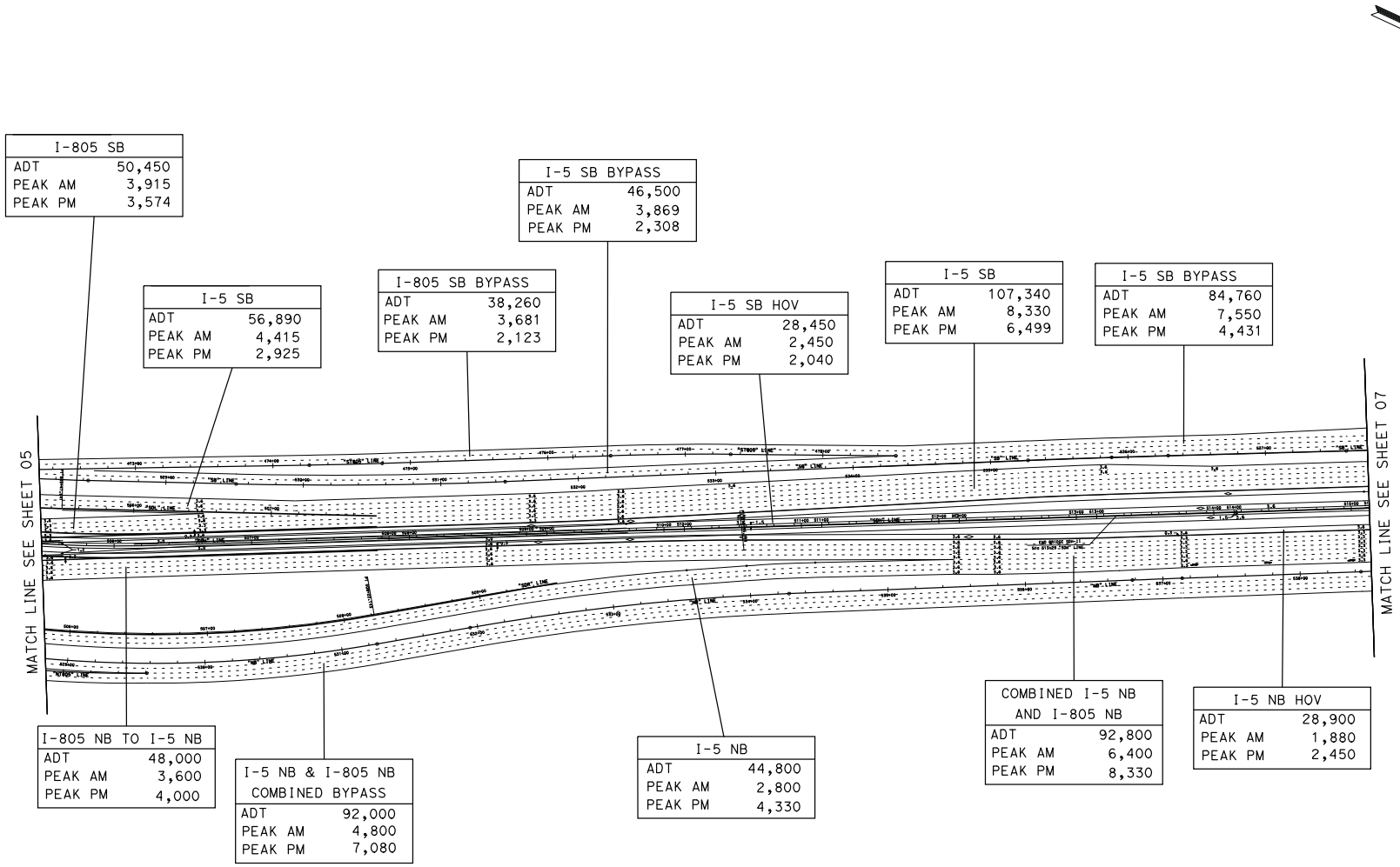
11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

10+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXHIBIT C

DGN FILE =>2030_05Merge5805.dgn
DATE PLOTTED =>12-NOV-2008

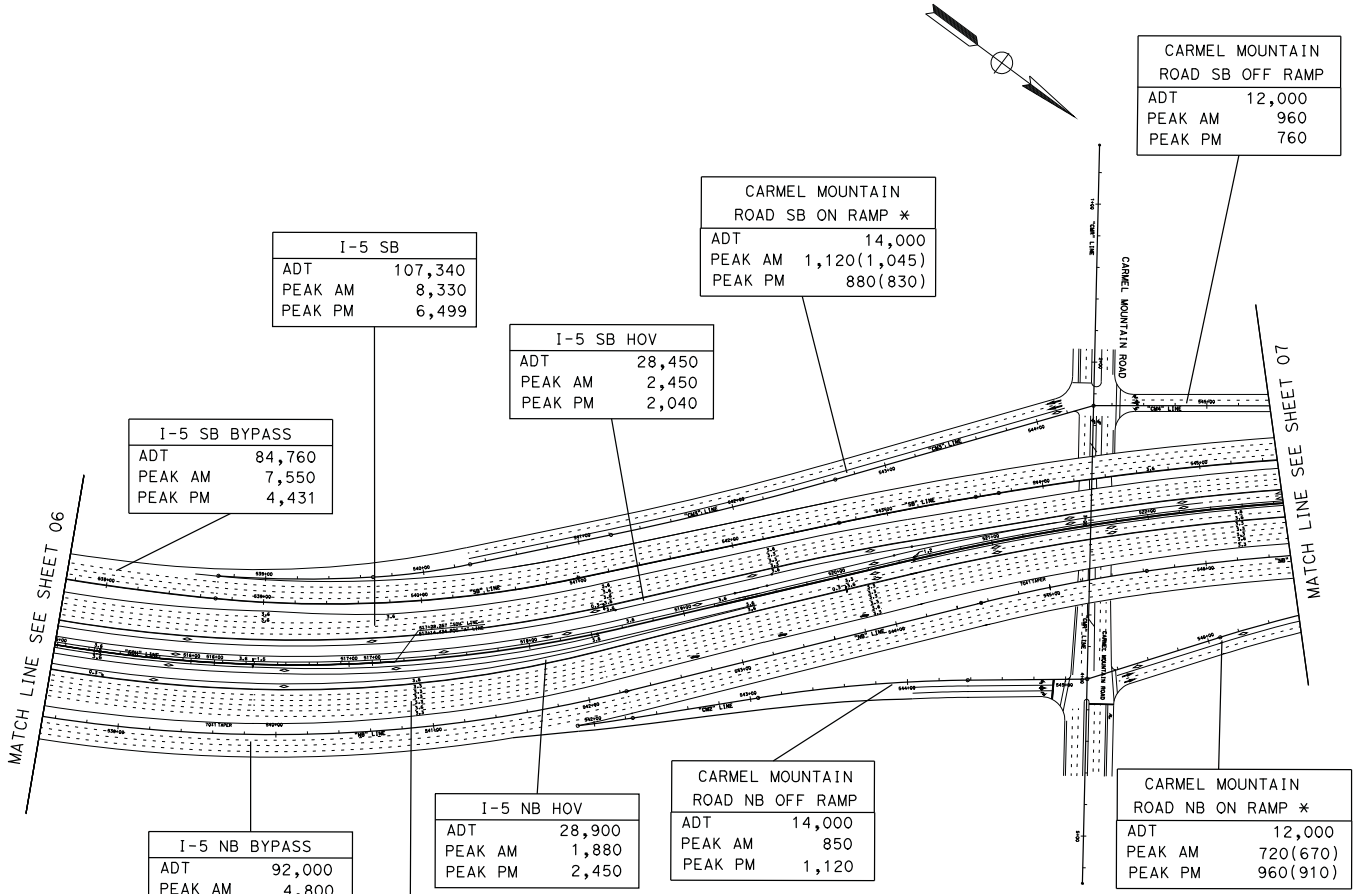


11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

10+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT C

DGN FILE => 2030_06DMHBypassSlipRmp.dgn DATE PLOTTED => 12-NOV-2008



I-5 SB	
ADT	107,340
PEAK AM	8,330
PEAK PM	6,499

I-5 SB BYPASS	
ADT	84,760
PEAK AM	7,550
PEAK PM	4,431

I-5 SB HOV	
ADT	28,450
PEAK AM	2,450
PEAK PM	2,040

CARMEL MOUNTAIN ROAD SB ON RAMP *	
ADT	14,000
PEAK AM	1,120(1,045)
PEAK PM	880(830)

CARMEL MOUNTAIN ROAD SB OFF RAMP	
ADT	12,000
PEAK AM	960
PEAK PM	760

I-5 NB BYPASS	
ADT	92,000
PEAK AM	4,800
PEAK PM	7,080

I-5 NB	
ADT	92,800
PEAK AM	6,400
PEAK PM	8,330

I-5 NB HOV	
ADT	28,900
PEAK AM	1,880
PEAK PM	2,450

CARMEL MOUNTAIN ROAD NB OFF RAMP	
ADT	14,000
PEAK AM	850
PEAK PM	1,120

CARMEL MOUNTAIN ROAD NB ON RAMP *	
ADT	12,000
PEAK AM	720(670)
PEAK PM	960(910)

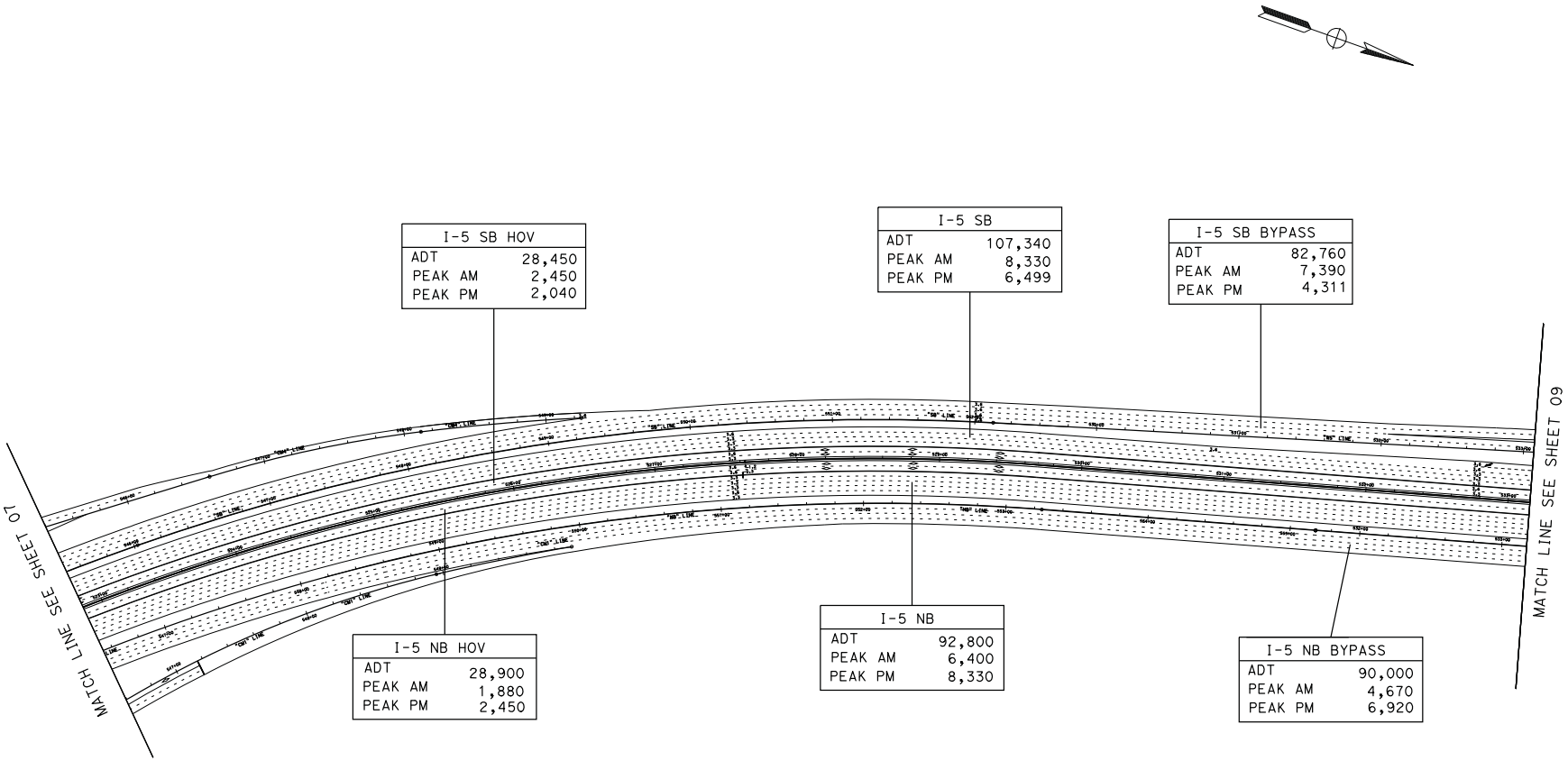
* Note: Possible on-ramp metered rates shown in (parenthesis)

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

10+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT C

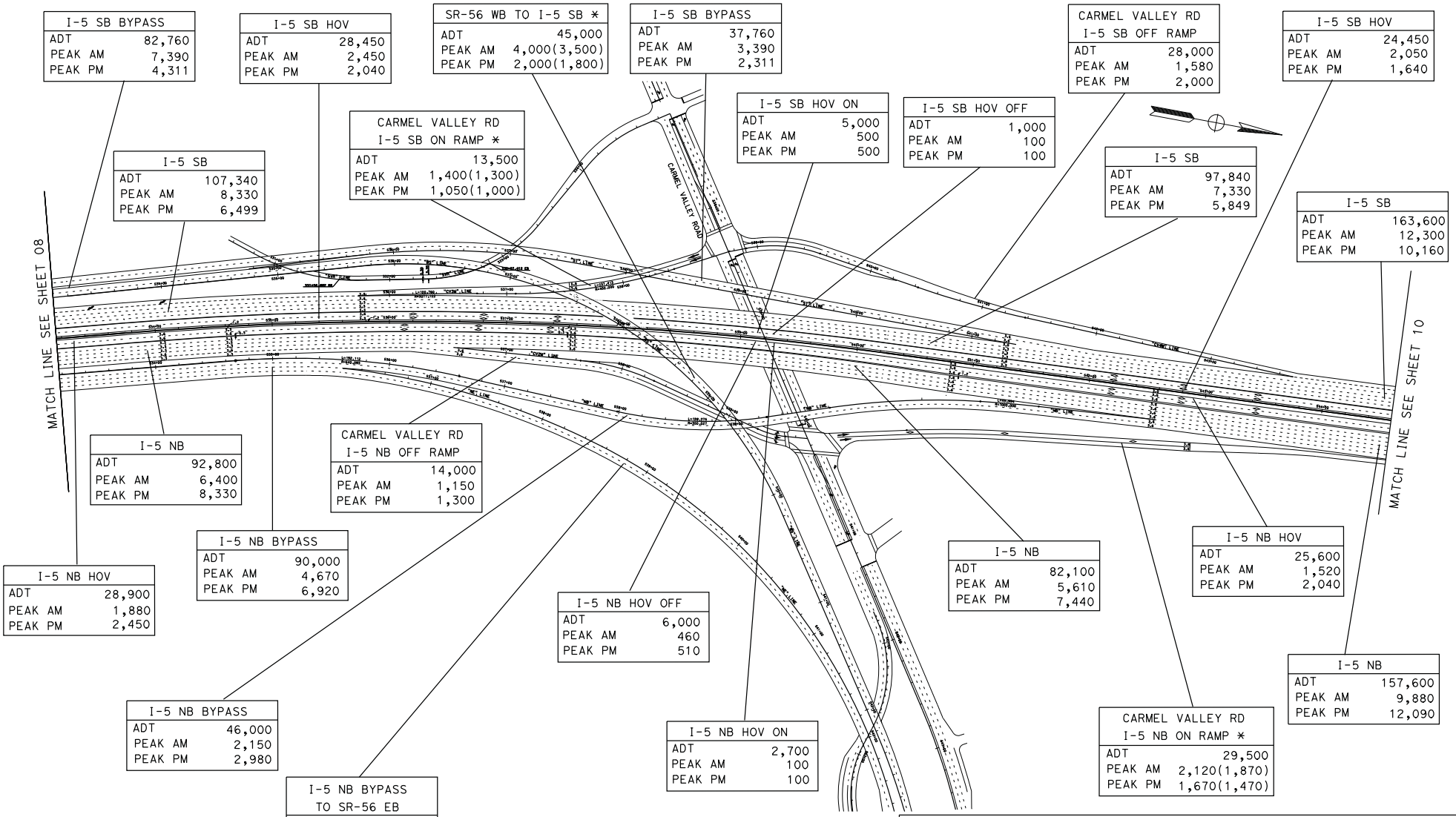
DGN FILE => 2030_07CarmelMtnRd.dgn DATE PLOTTED => 12-NOV-2008



11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST
10+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT C

DGN FILE => 2030_08to56CarmiVlyRd.dgn DATE PLOTTED => 12-NOV-2008

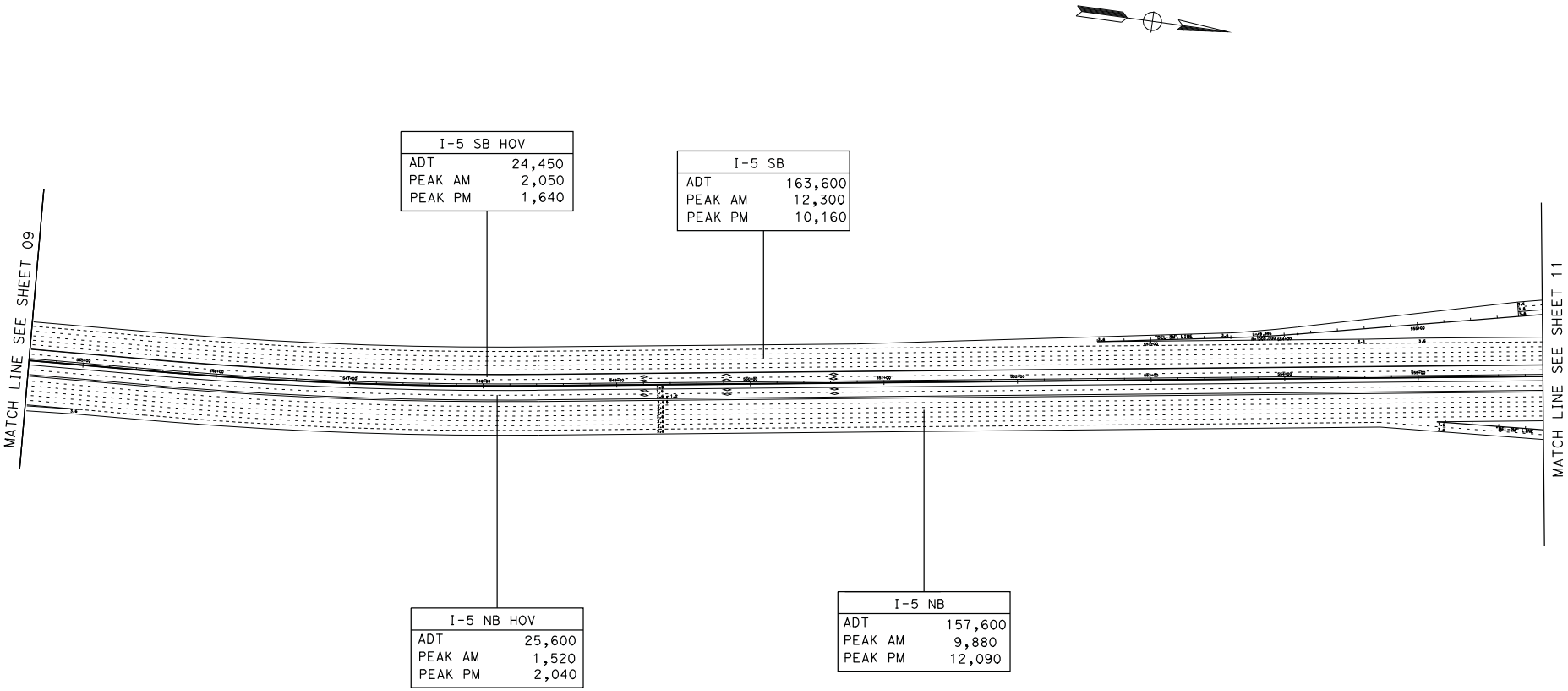


* Note: Possible on-ramp metered rates shown in (parenthesis)

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST
10+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT C

DGN FILE =>2030_09CarmlVly56.dgn DATE PLOTTED =>12-NOV-2008

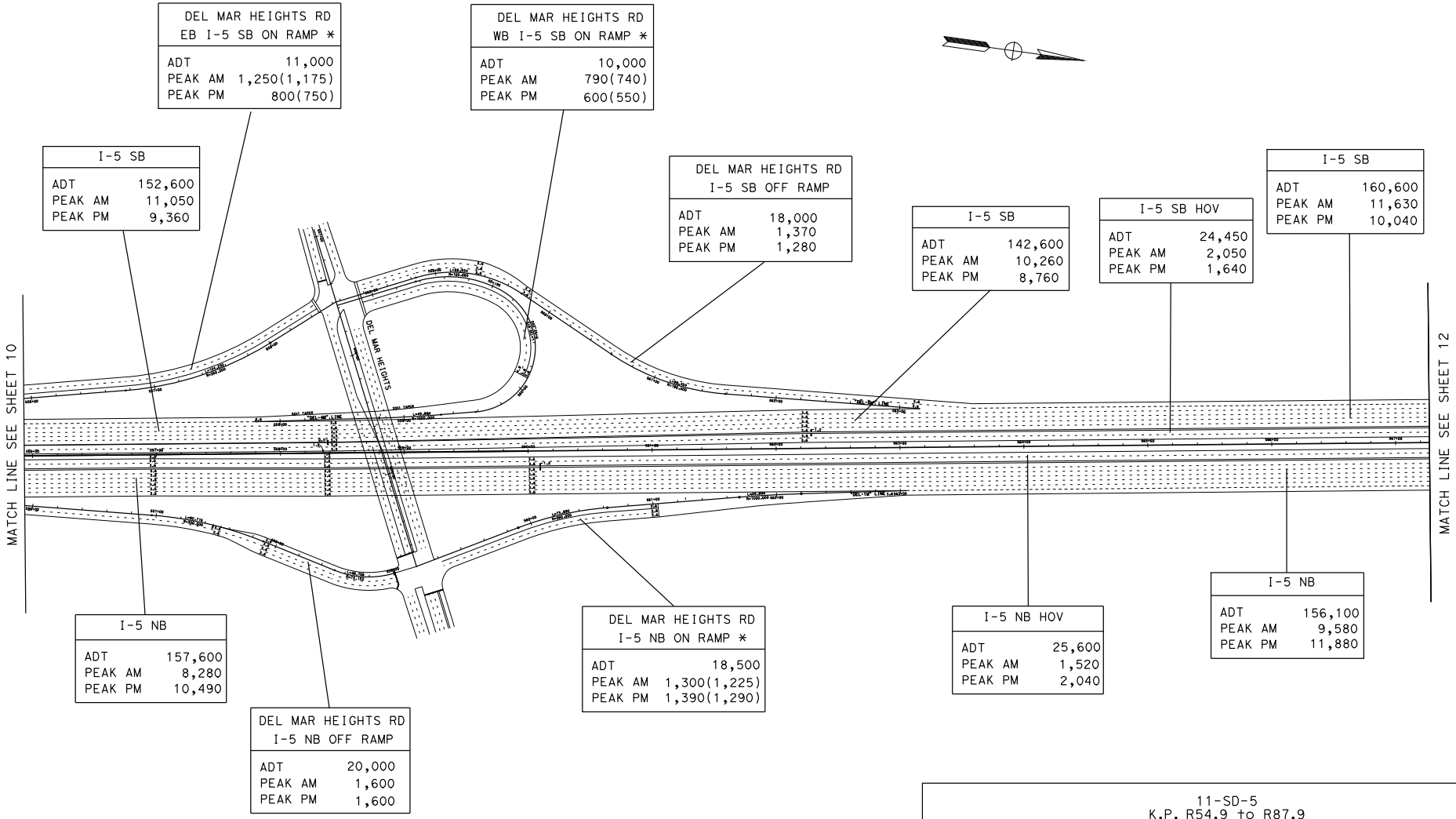


11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

10+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT C

DGN FILE =>2030_10toDelMarHts.dgn DATE PLOTTED =>12-NOV-2008



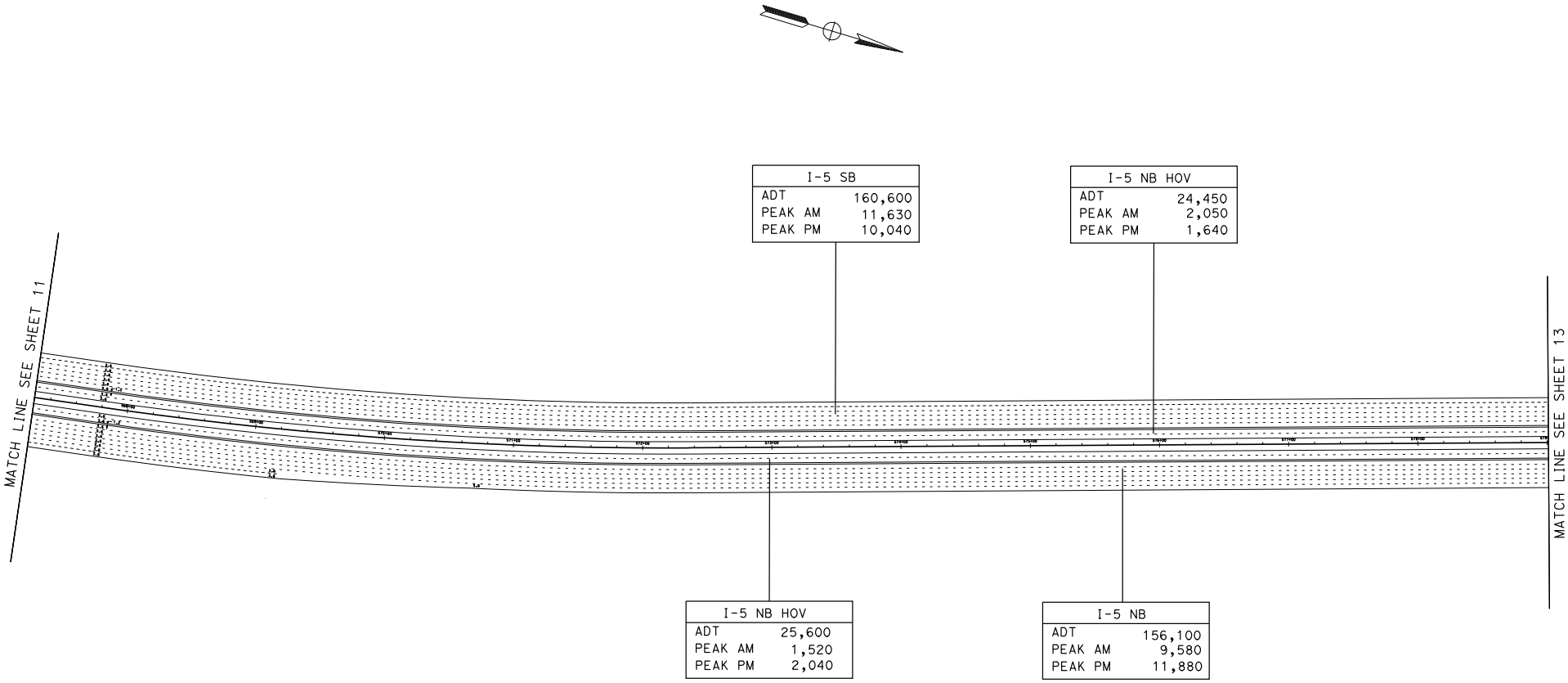
* Note: Possible on-ramp metered rates shown in (parenthesis)

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

10+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT C

DGN FILE => 2030_11DelMarHts.dgn DATE PLOTTED => 12-NOV-2008



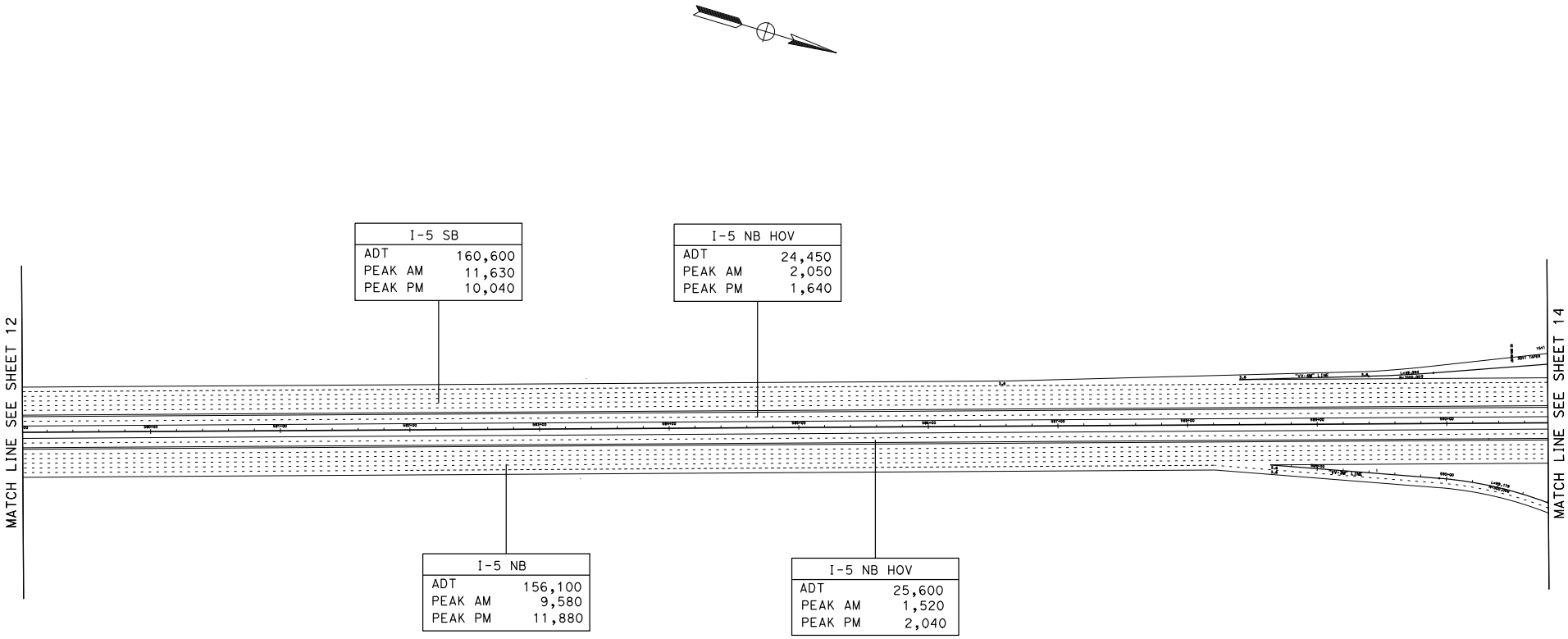
11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

10+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXHIBIT C

DGN FILE => 2030_12toViaDelaValle1.dgn DATE PLOTTED => 12-NOV-2008



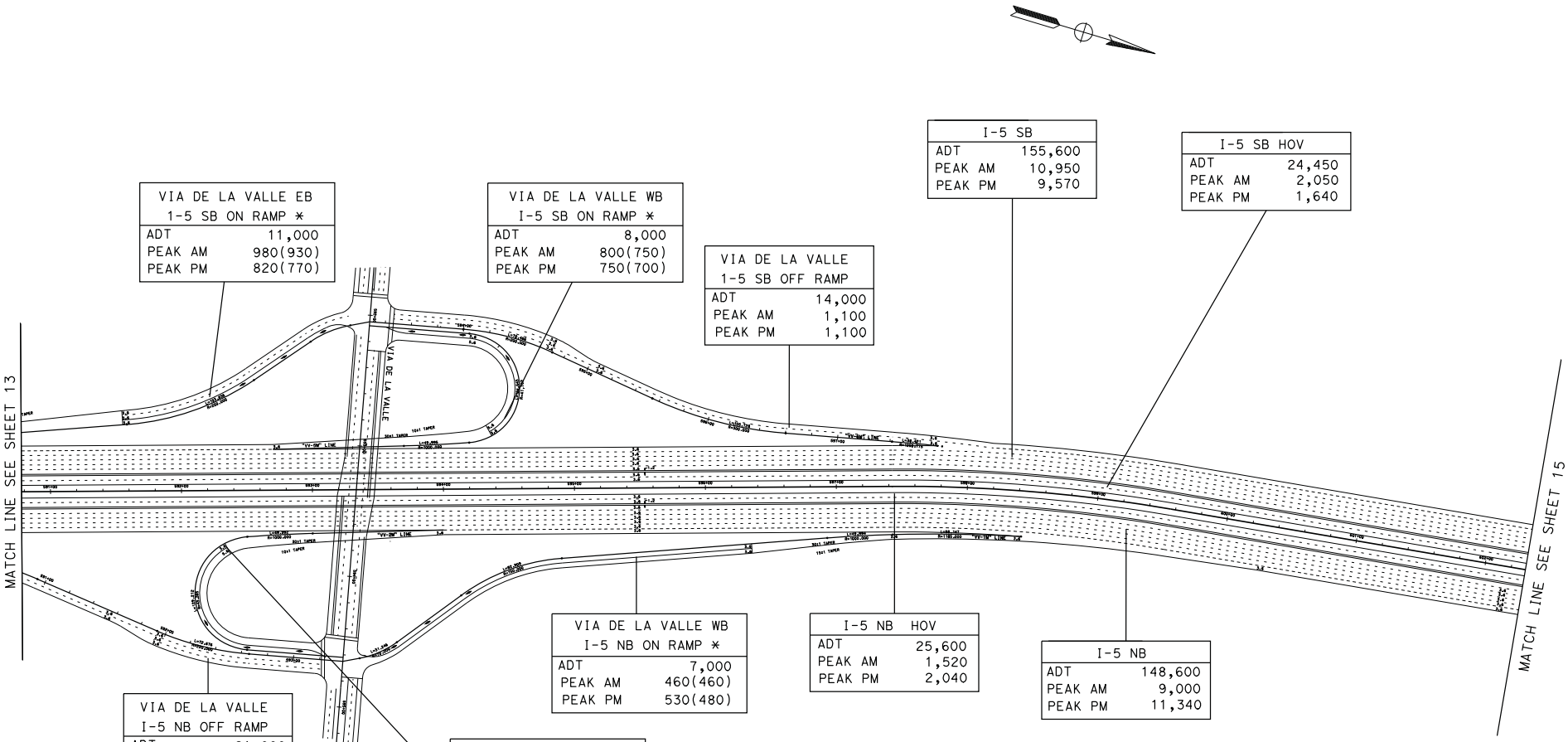
11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

10+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXHIBIT C

DGN FILE =>2030_13toVlaDelaValle2.dgn DATE PLOTTED =>12-NOV-2008

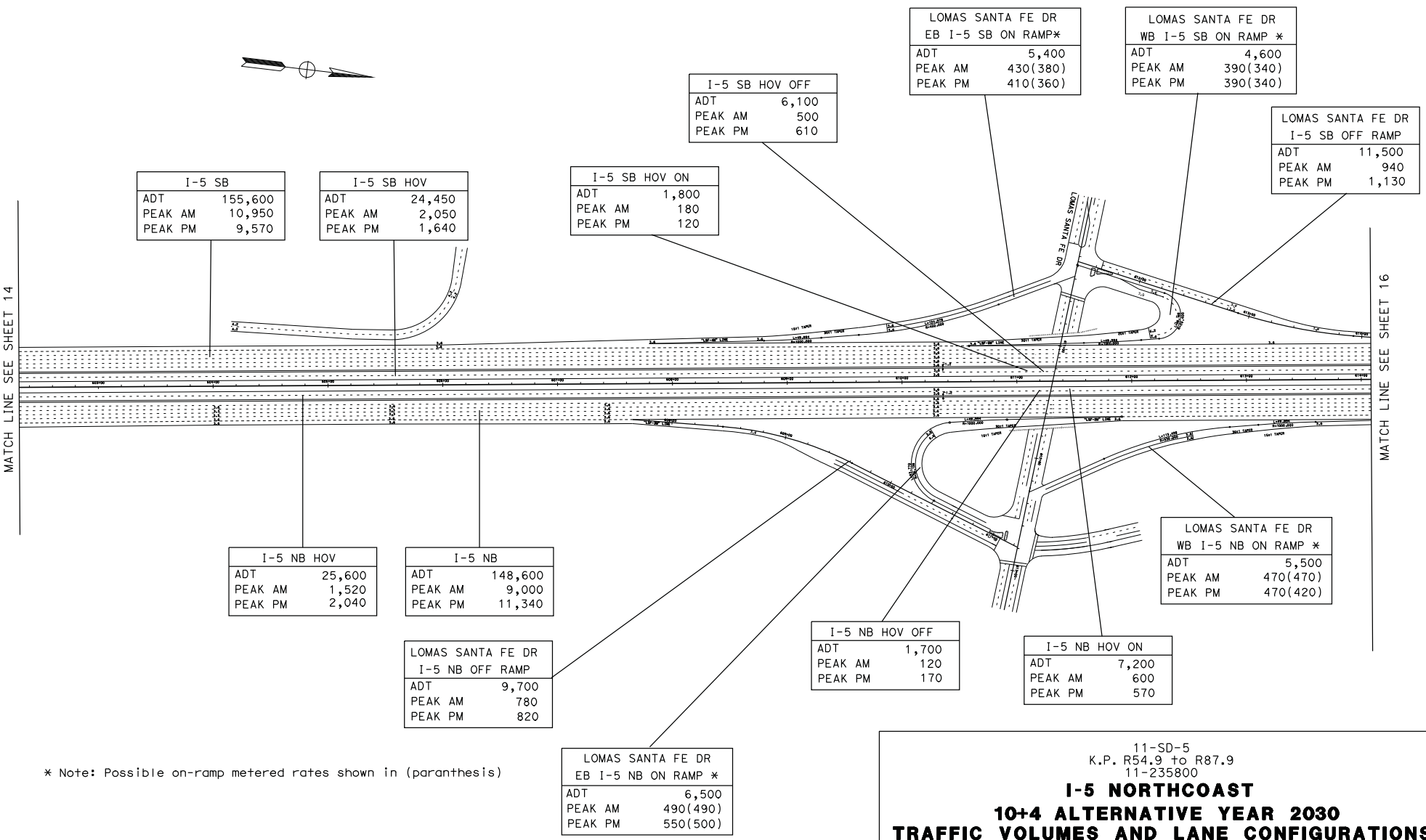


* Note: Possible on-ramp metered rates shown in (parenthesis)

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST
10+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT C

DGN FILE =>2030_14ViaDelaValle.dgn DATE PLOTTED =>12-NOV-2008

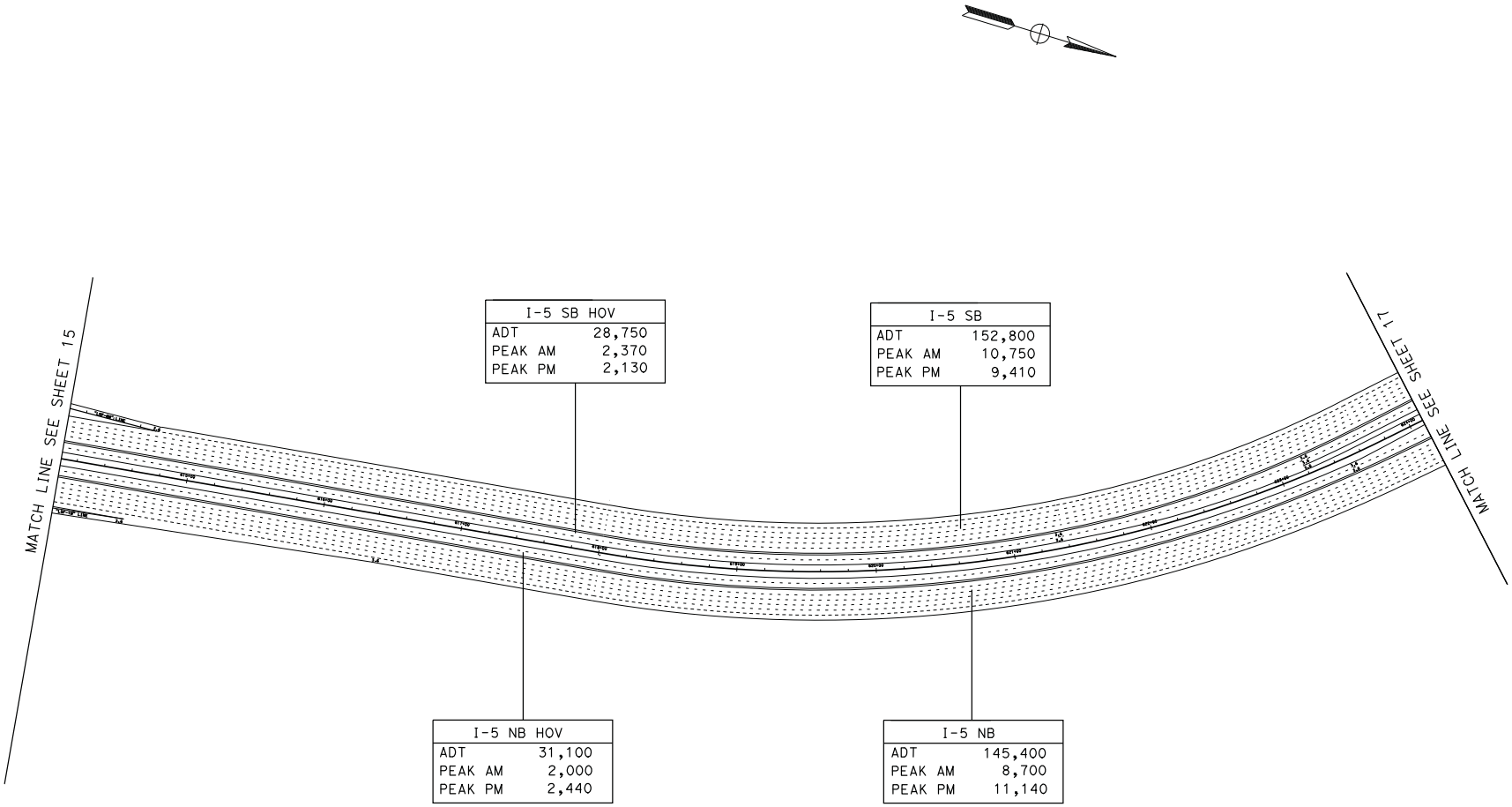


* Note: Possible on-ramp metered rates shown in (paranthesis)

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST
10+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT C

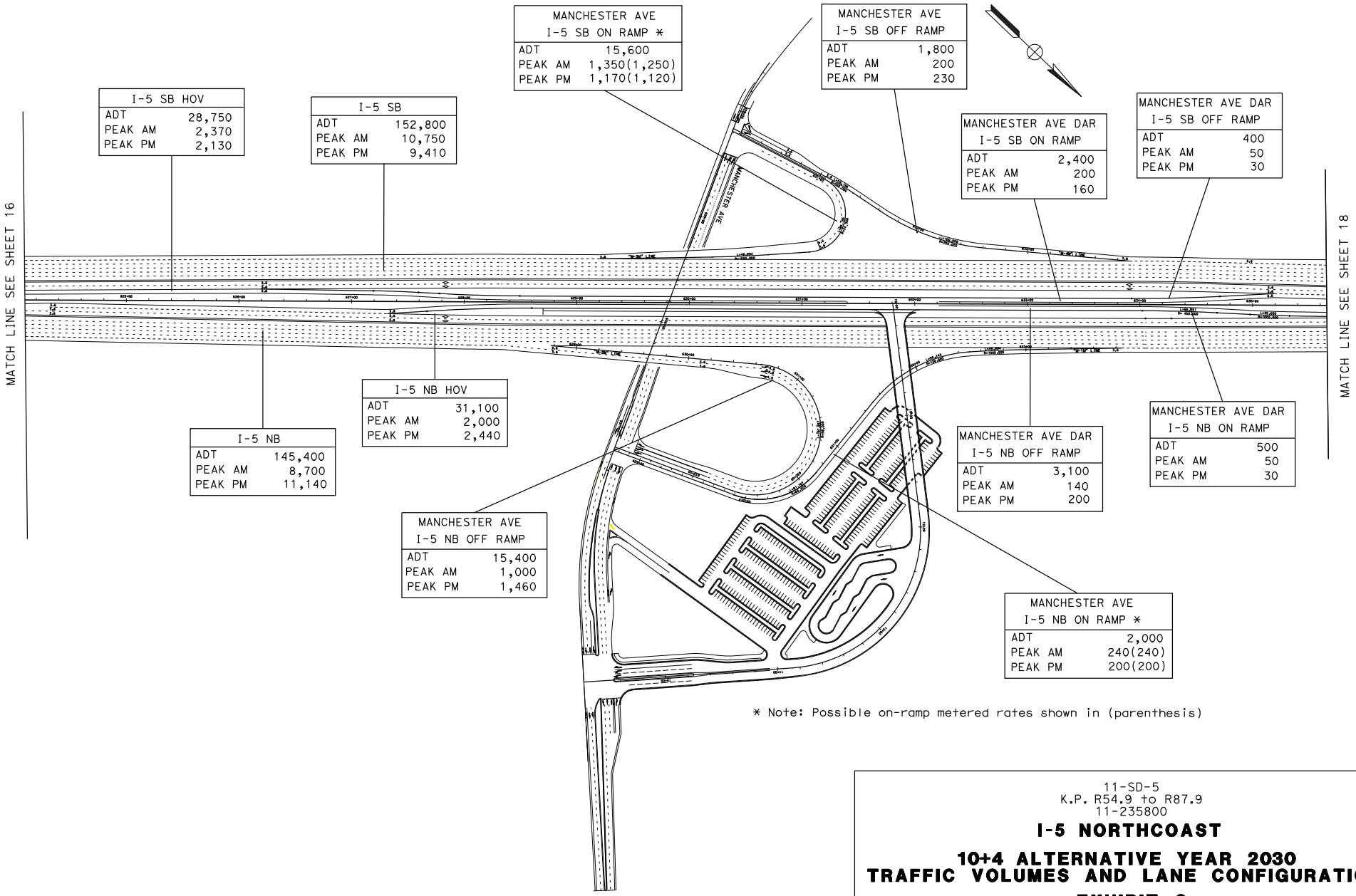
DGN FILE => 2030_15LomasStaFe.dgn DATE PLOTTED => 12-NOV-2008



11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST
10+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT C

DGN FILE =>2030_16toManchester.dgn DATE PLOTTED =>12-NOV-2008



* Note: Possible on-ramp metered rates shown in (parenthesis)

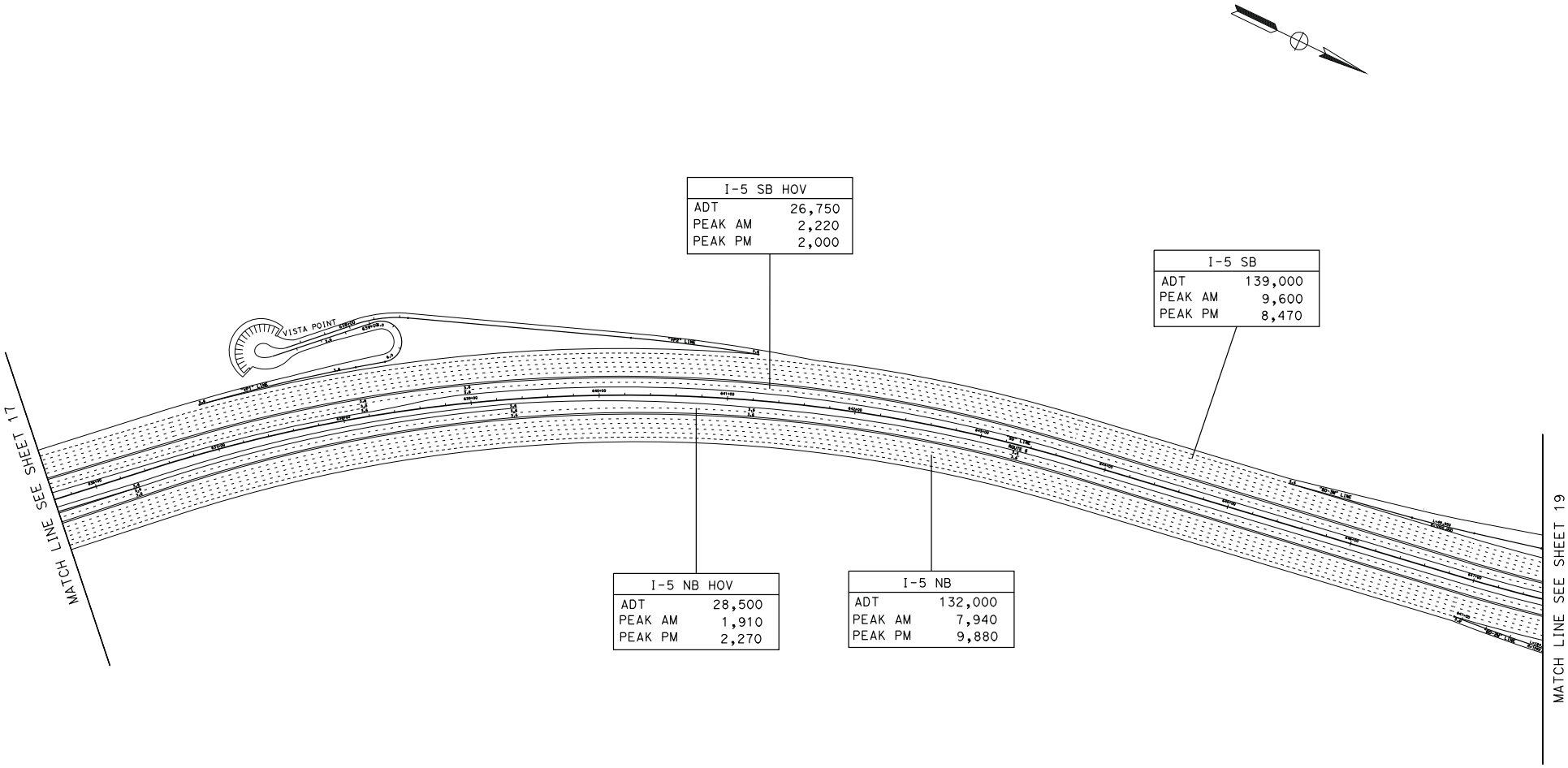
11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

10+4 ALTERNATIVE YEAR 2030 TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXHIBIT C

DGN FILE =>2030_17Manchester.dgn DATE PLOTTED =>12-NOV-2008



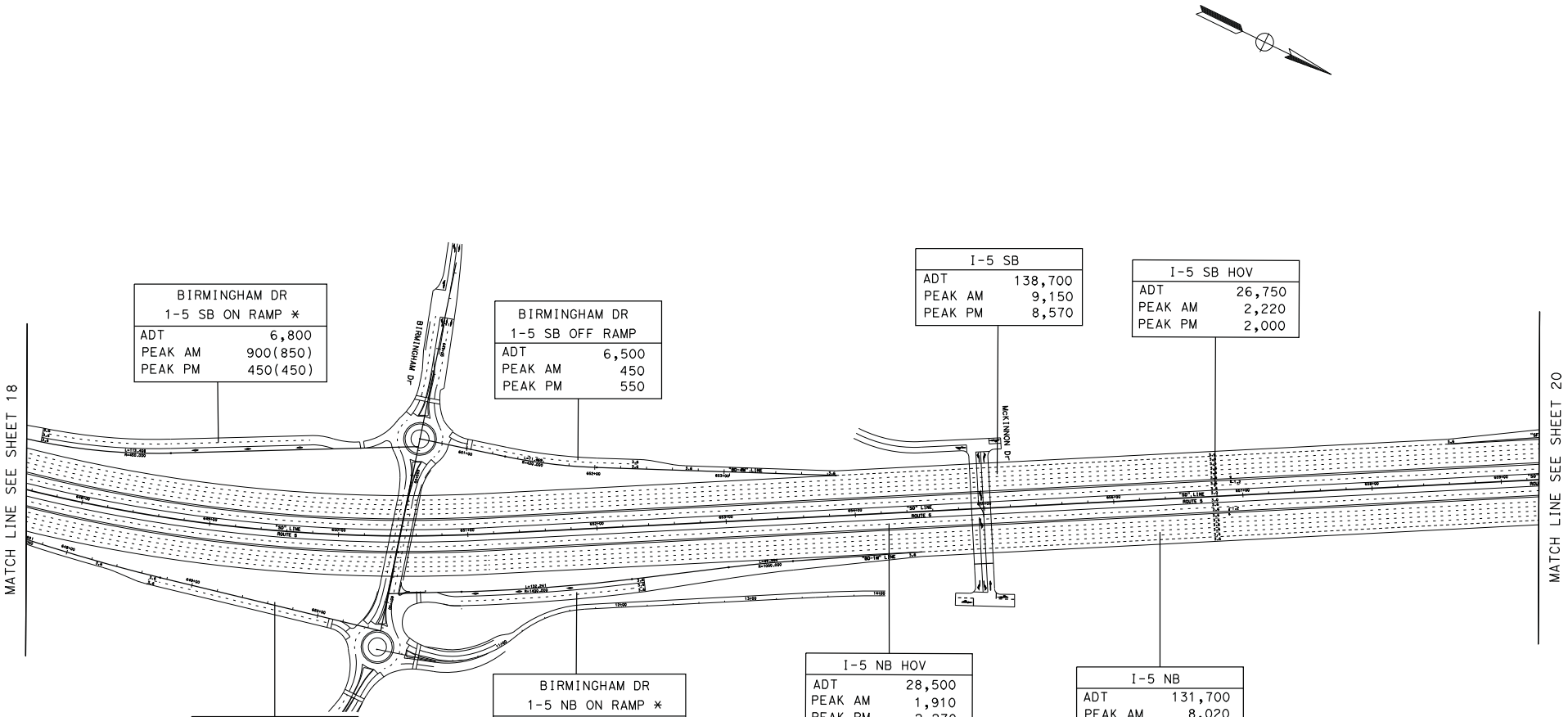
11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

10+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXHIBIT C

DGN FILE =>2030_18to81mingham.dgn DATE PLOTTED =>12-NOV-2008



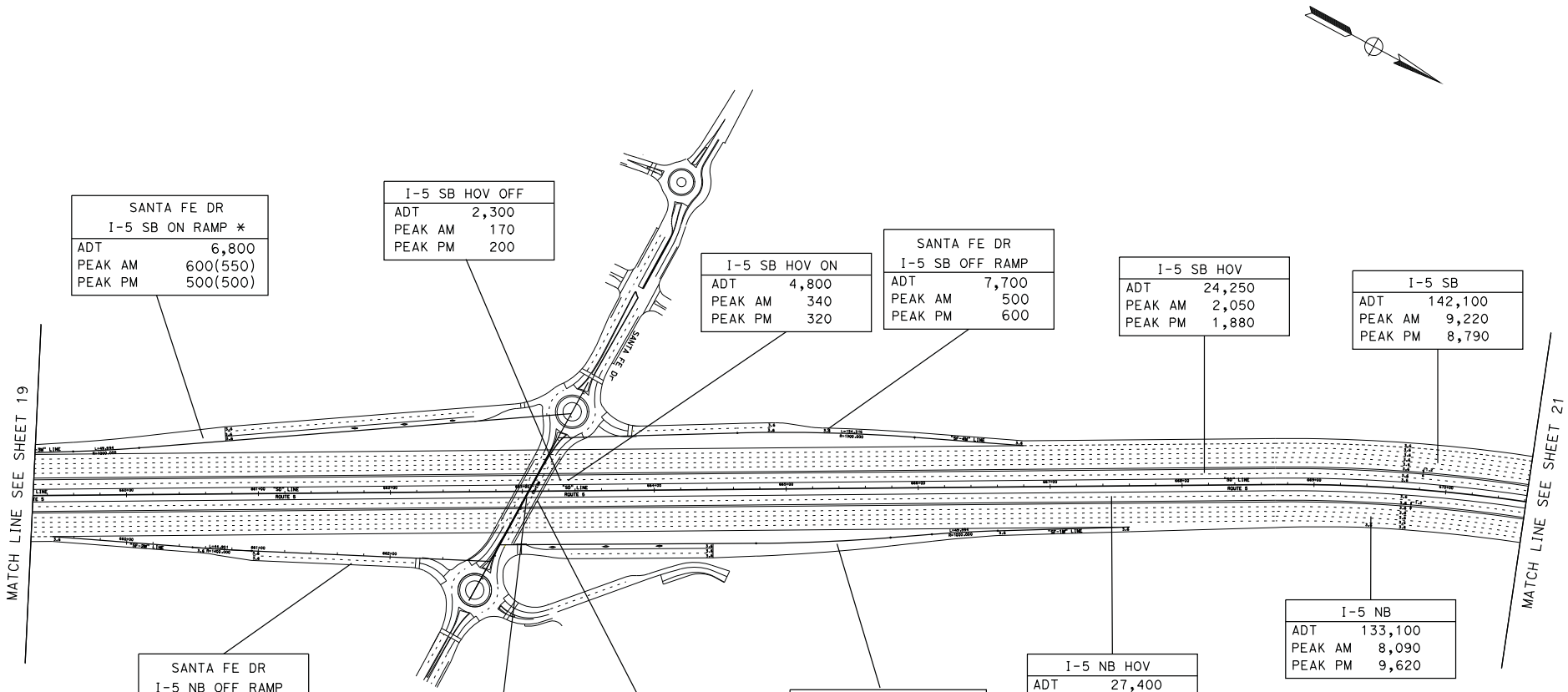
* Note: Possible on-ramp metered rates shown in (parenthesis)

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST
10+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXHIBIT C

DGN FILE =>2030_198birmingham.dgn DATE PLOTTED =>12-NOV-2008



SANTA FE DR I-5 SB ON RAMP *	
ADT	6,800
PEAK AM	600(550)
PEAK PM	500(500)

I-5 SB HOV OFF	
ADT	2,300
PEAK AM	170
PEAK PM	200

I-5 SB HOV ON	
ADT	4,800
PEAK AM	340
PEAK PM	320

SANTA FE DR I-5 SB OFF RAMP	
ADT	7,700
PEAK AM	500
PEAK PM	600

I-5 SB HOV	
ADT	24,250
PEAK AM	2,050
PEAK PM	1,880

I-5 SB	
ADT	142,100
PEAK AM	9,220
PEAK PM	8,790

SANTA FE DR I-5 NB OFF RAMP	
ADT	7,500
PEAK AM	530
PEAK PM	600

I-5 NB HOV ON	
ADT	2,200
PEAK AM	180
PEAK PM	200

I-5 NB HOV OFF	
ADT	3,300
PEAK AM	190
PEAK PM	200

SANTA FE DR I-5 NB ON RAMP *	
ADT	7,800
PEAK AM	590(590)
PEAK PM	700(650)

I-5 NB HOV	
ADT	27,400
PEAK AM	1,990
PEAK PM	2,270

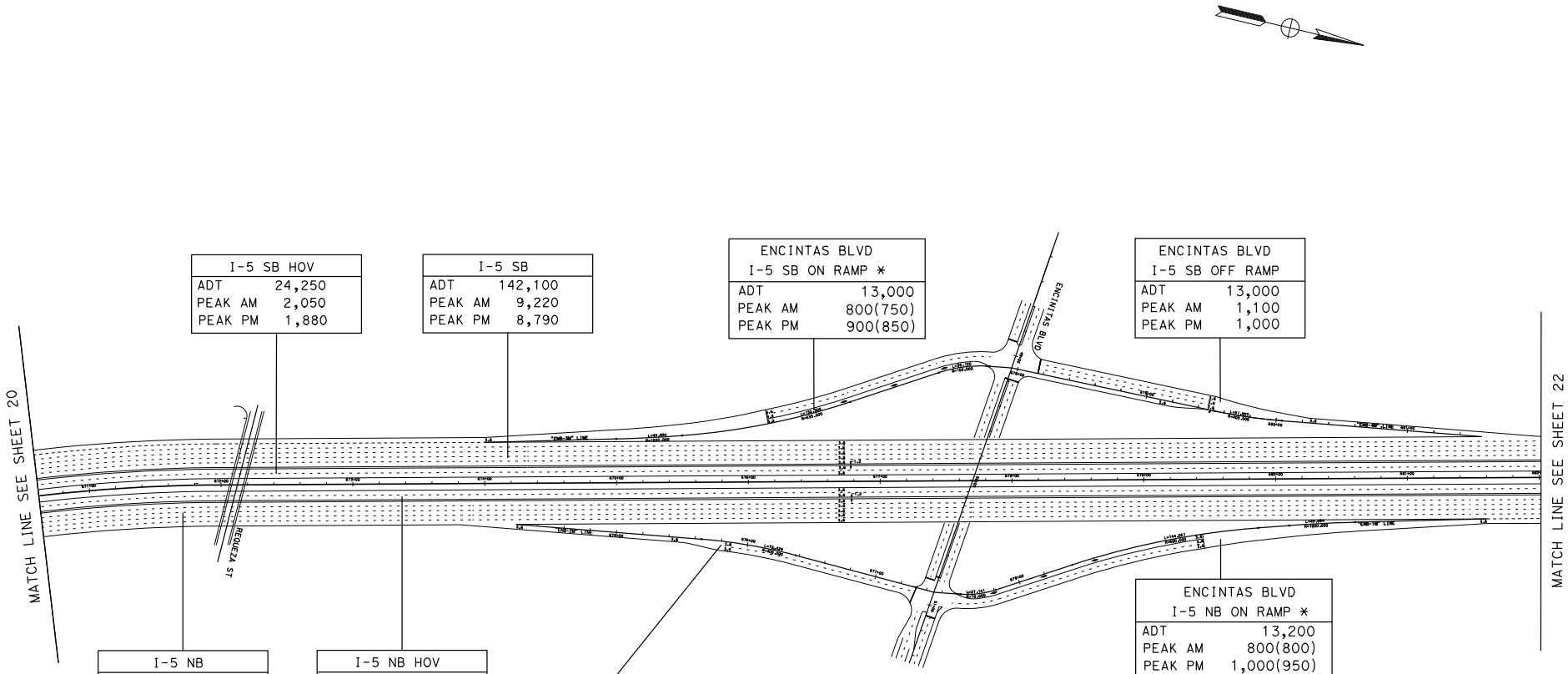
I-5 NB	
ADT	133,100
PEAK AM	8,090
PEAK PM	9,620

* Note: Possible on-ramp metered rates shown in (parenthesis)

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST
10+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT C

DGN FILE =>2030_20SantaFeDr.cgn
DATE PLOTTED =>12-NOV-2008



* Note: Possible on-ramp metered rates shown in (parenthesis)

11-SD-5
K.P. R54.9 to R87.9
11-235800

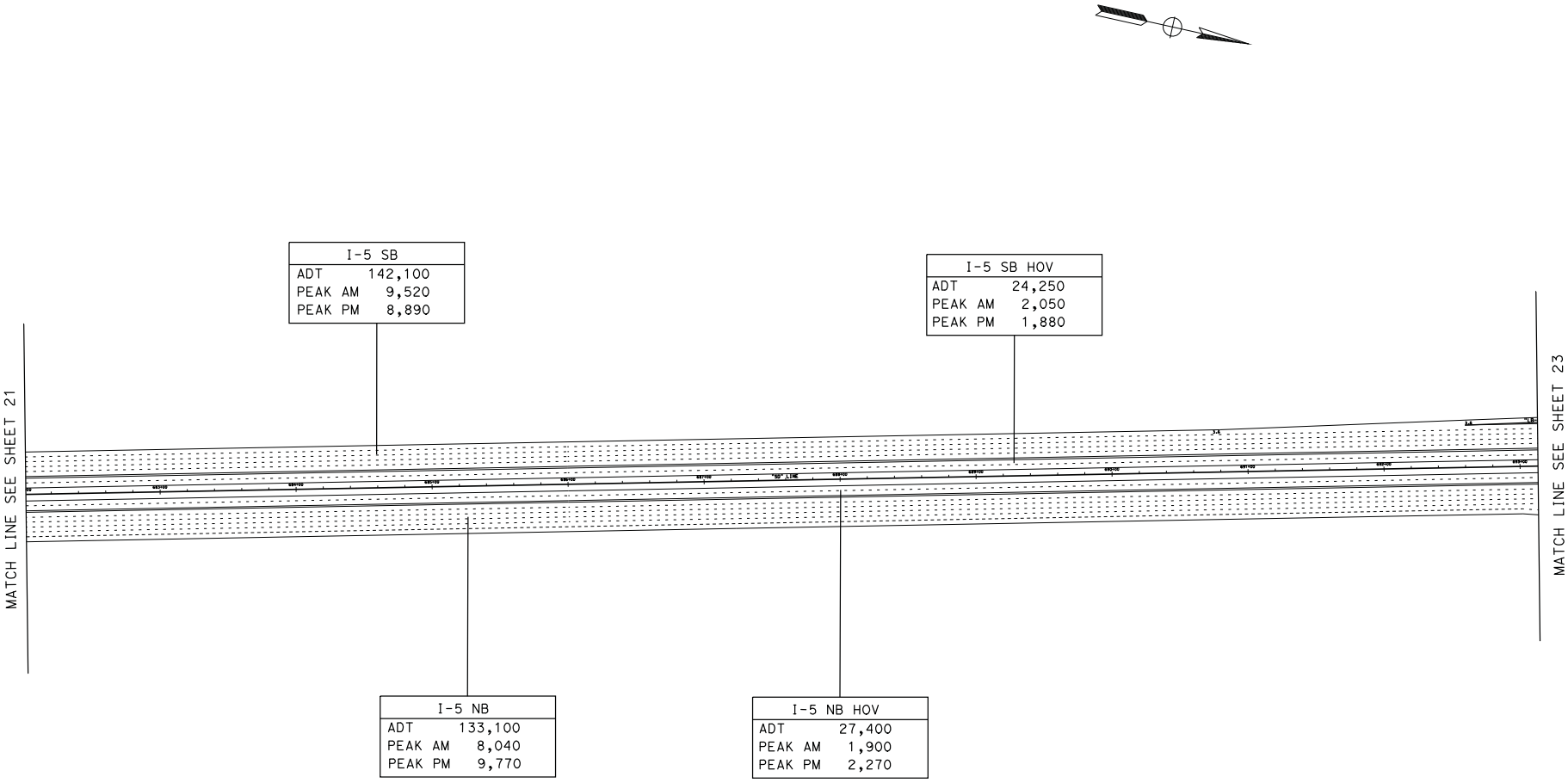
I-5 NORTHCOAST

10+4 ALTERNATIVE YEAR 2030

TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXHIBIT C

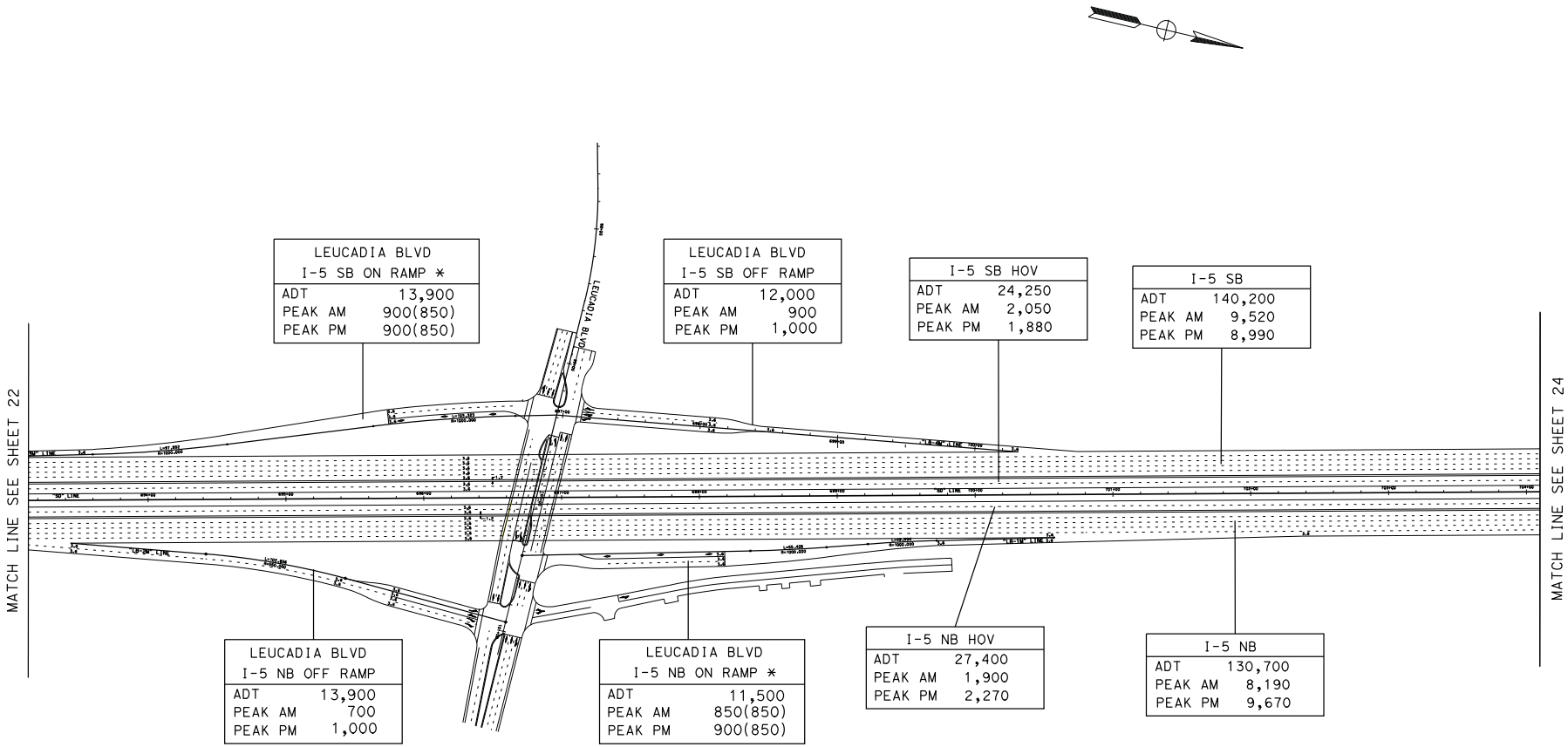
DGN FILE => 2030_21Encinitas.dgn
DATE PLOTTED => 12-NOV-2008



11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST
10+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT C

DGN FILE => 2030_22toLeucadia.dgn DATE PLOTTED => 12-NOV-2008



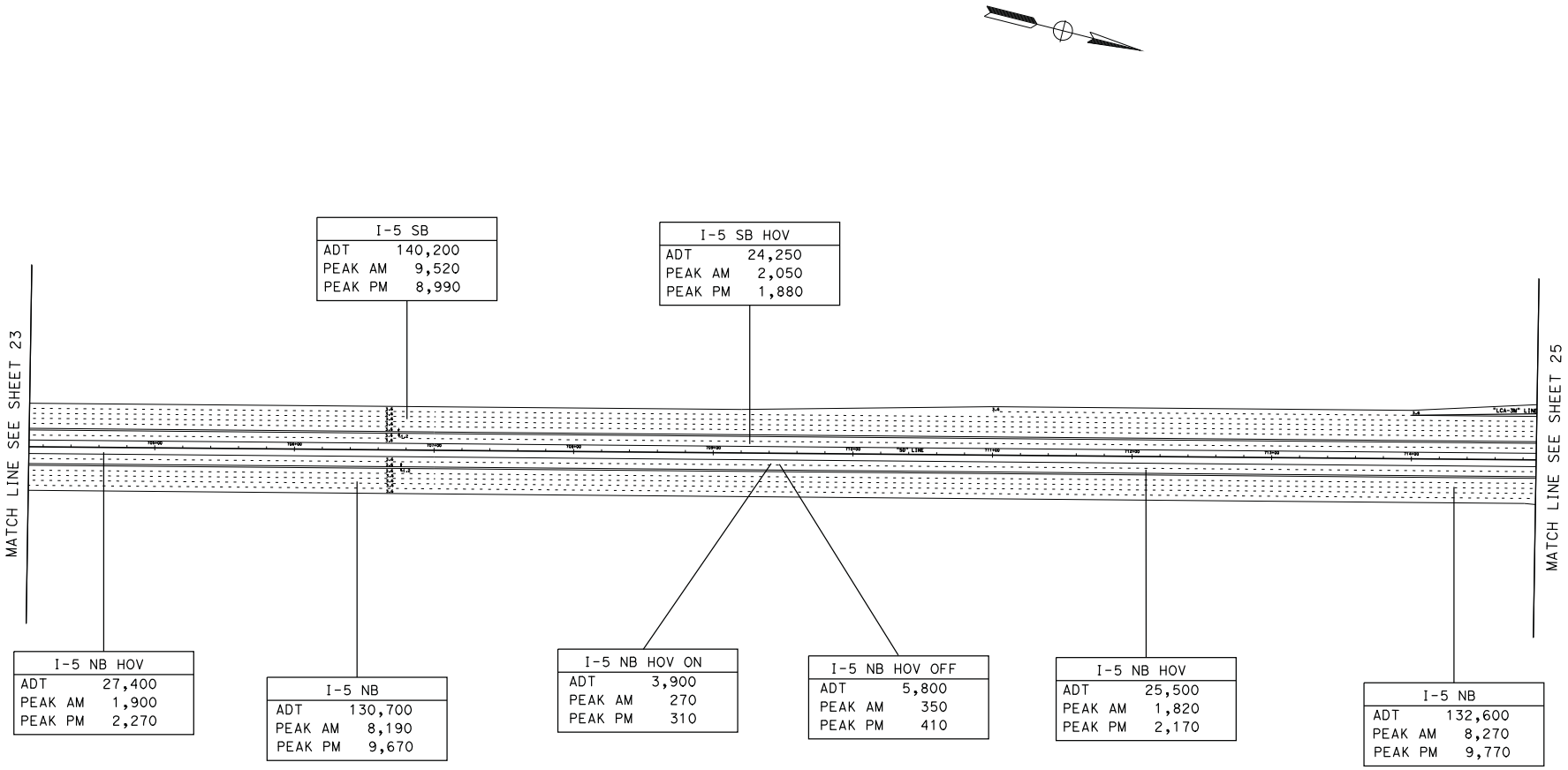
* Note: Possible on-ramp metered rates shown in (parenthesis)

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

10+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT C

DGN FILE =>2030_23Leucadia.dgn DATE PLOTTED =>12-NOV-2008



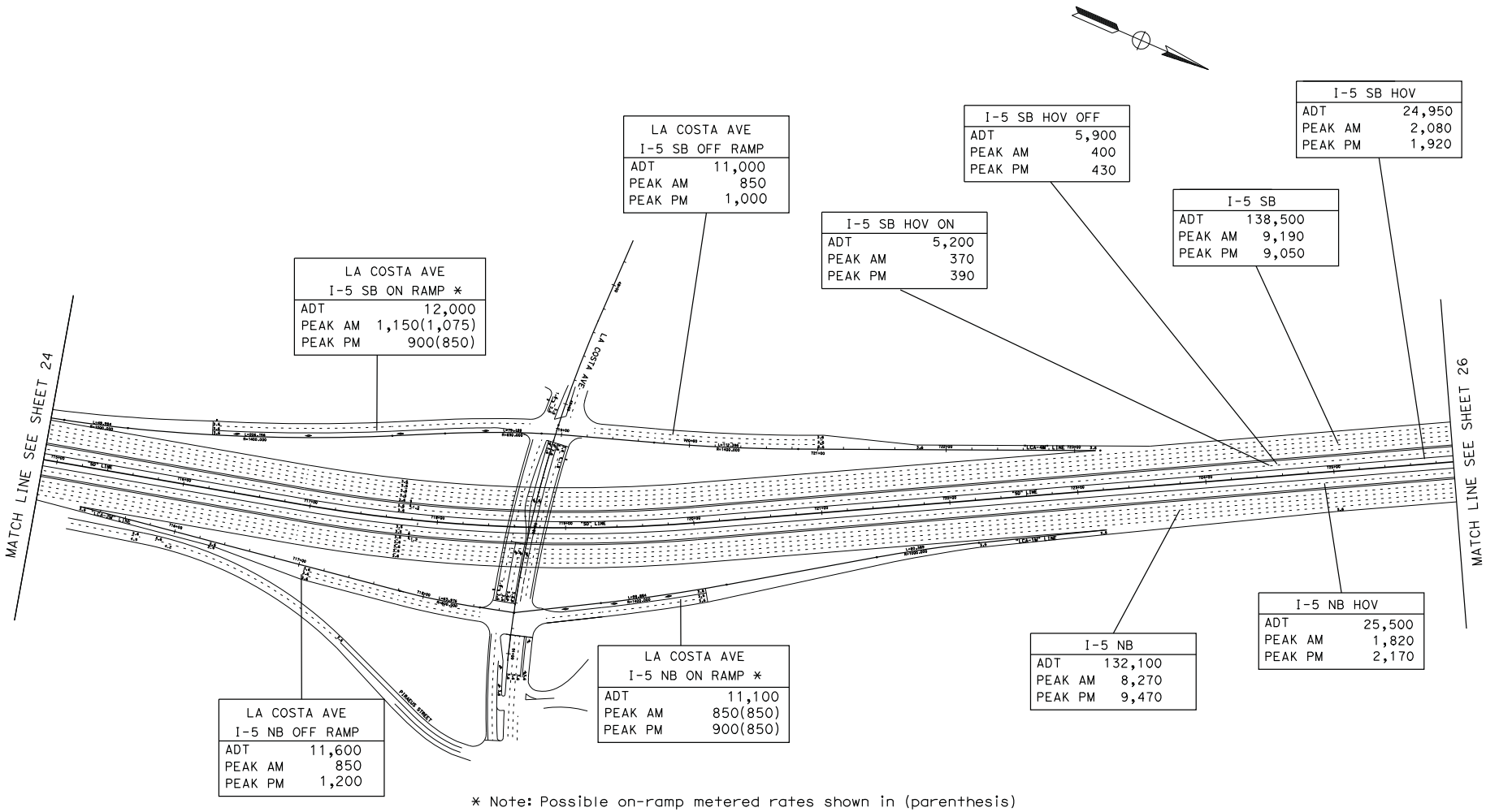
11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

10+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXHIBIT C

DGN FILE => 2030_24toLaCosta.dgn
DATE PLOTTED => 12-NOV-2008



* Note: Possible on-ramp metered rates shown in (parenthesis)

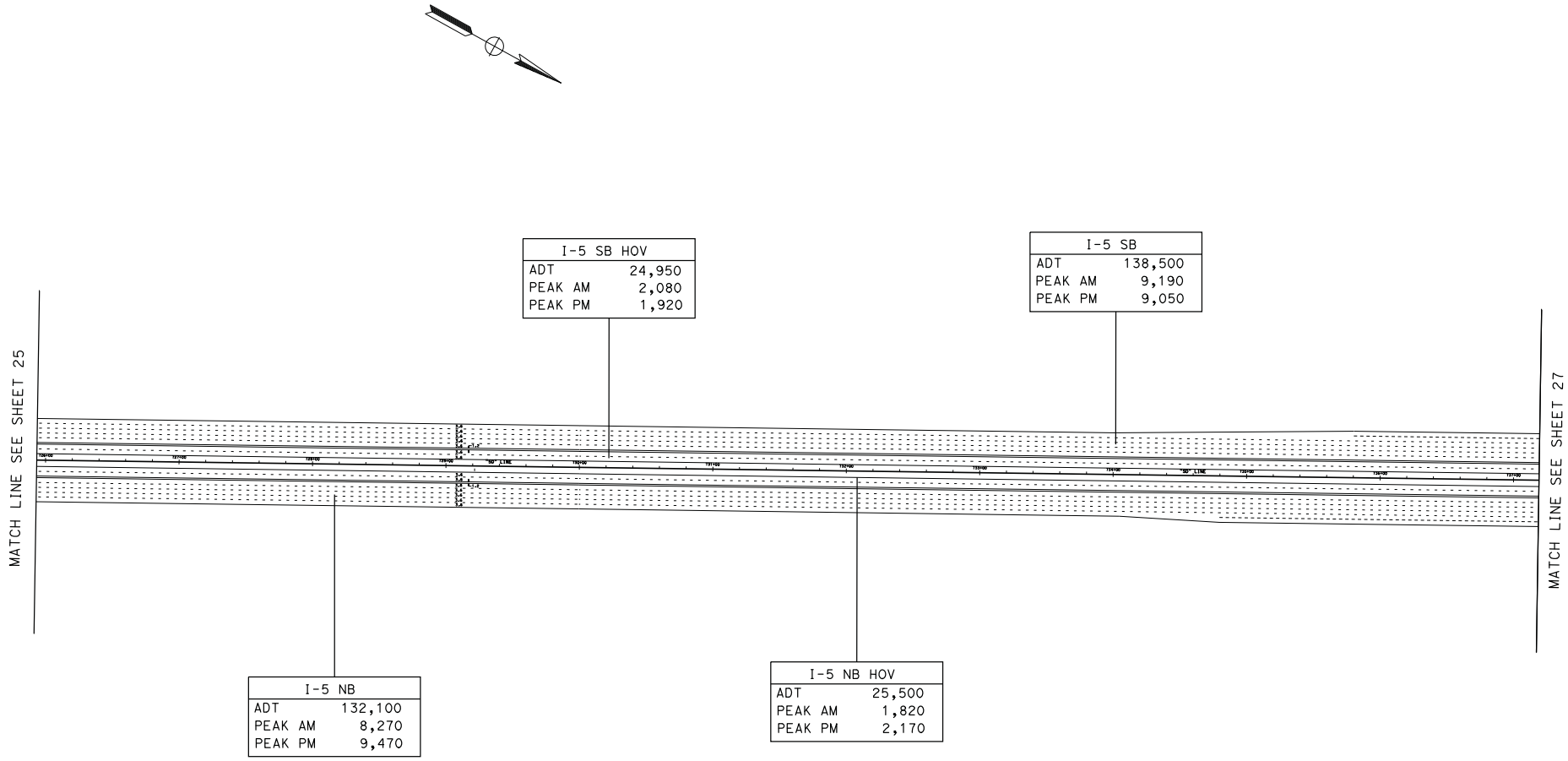
11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

10+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXHIBIT C

DGN FILE => 2030_25LaCosta.dgn
DATE PLOTTED => 12-NOV-2008



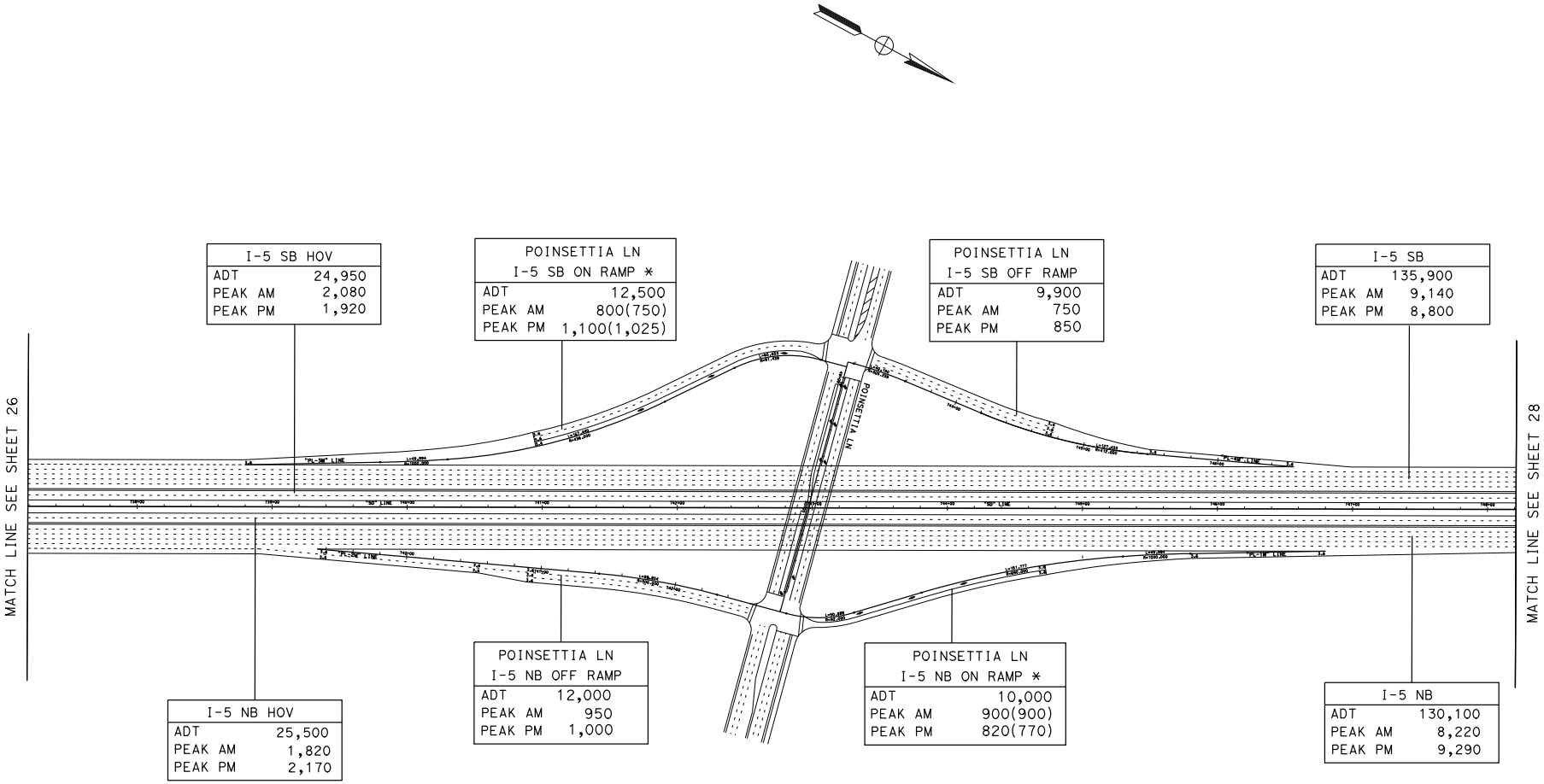
11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

10+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXHIBIT C

DGN FILE =>2030_26toPoinsettia.dgn DATE PLOTTED =>12-NOV-2008



* Note: Possible on-ramp metered rates shown in (parenthesis)

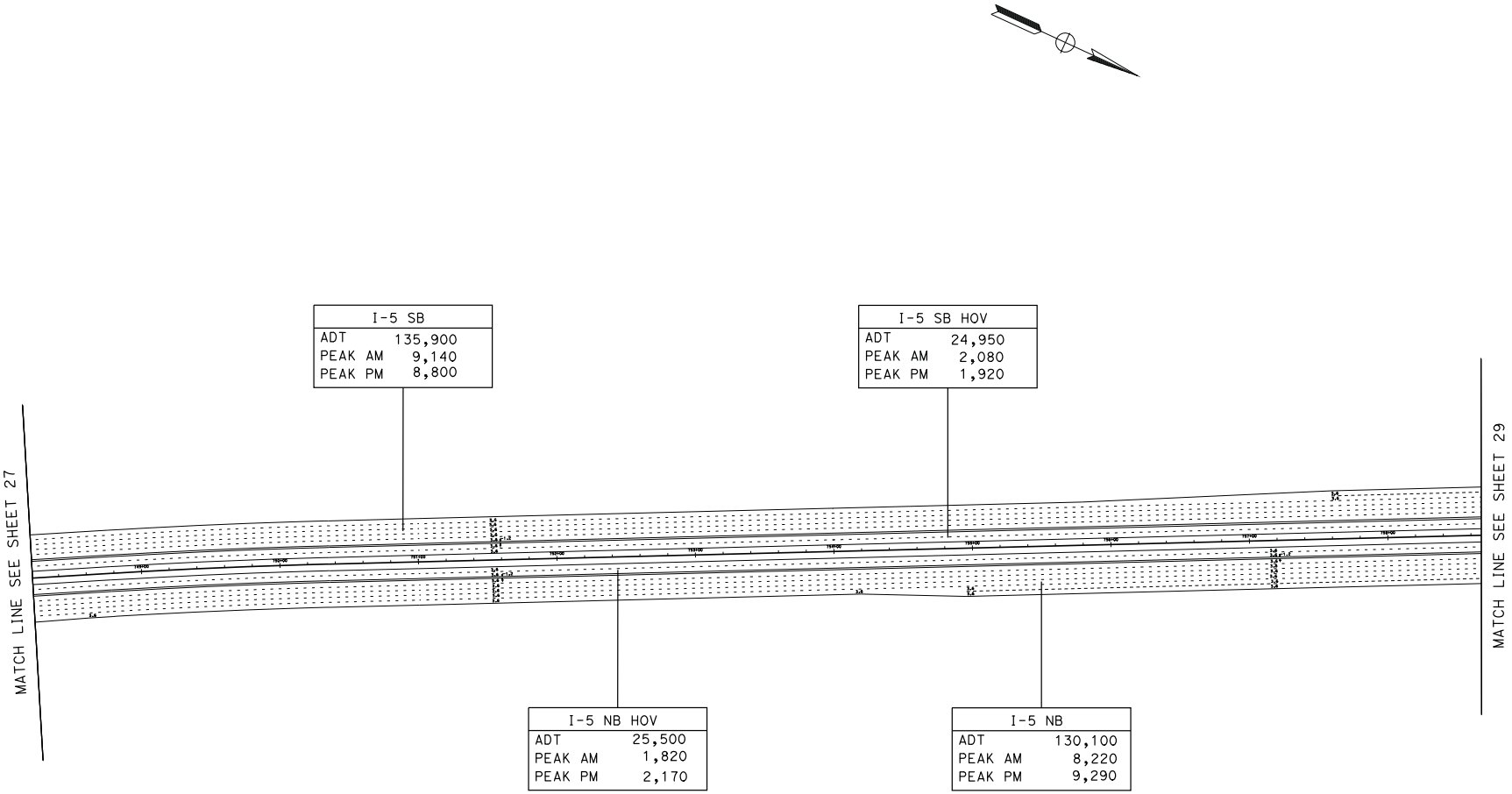
11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

10+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXHIBIT C

DGN FILE => 2030_27Poinsettia.dgn
DATE PLOTTED => 12-NOV-2008

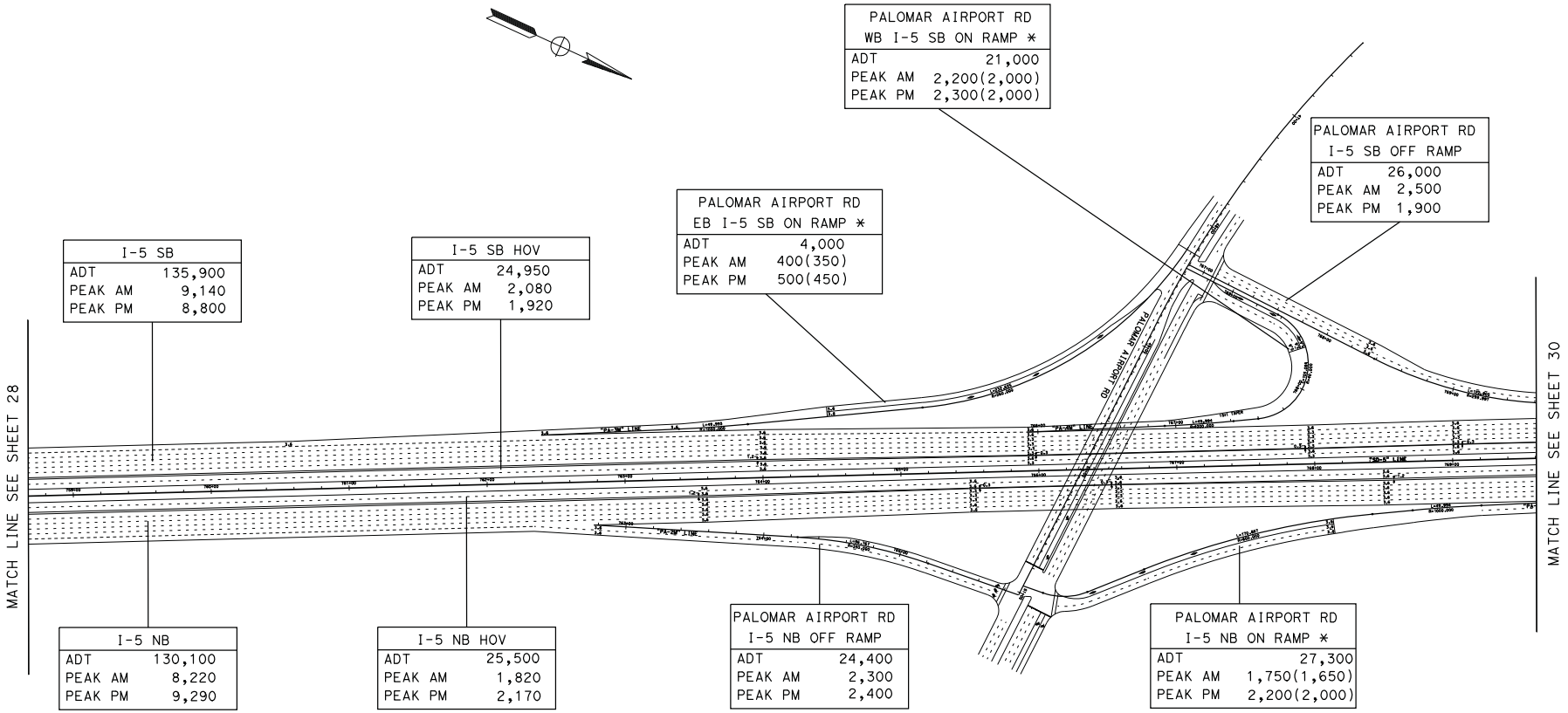


11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

10+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT C

DGN FILE => 2030_28toPalmrAptRd.dgn DATE PLOTTED => 12-NOV-2008



* Note: Possible on-ramp metered rates shown in (parenthesis)

11-SD-5
K.P. R54.9 to R87.9
11-235800

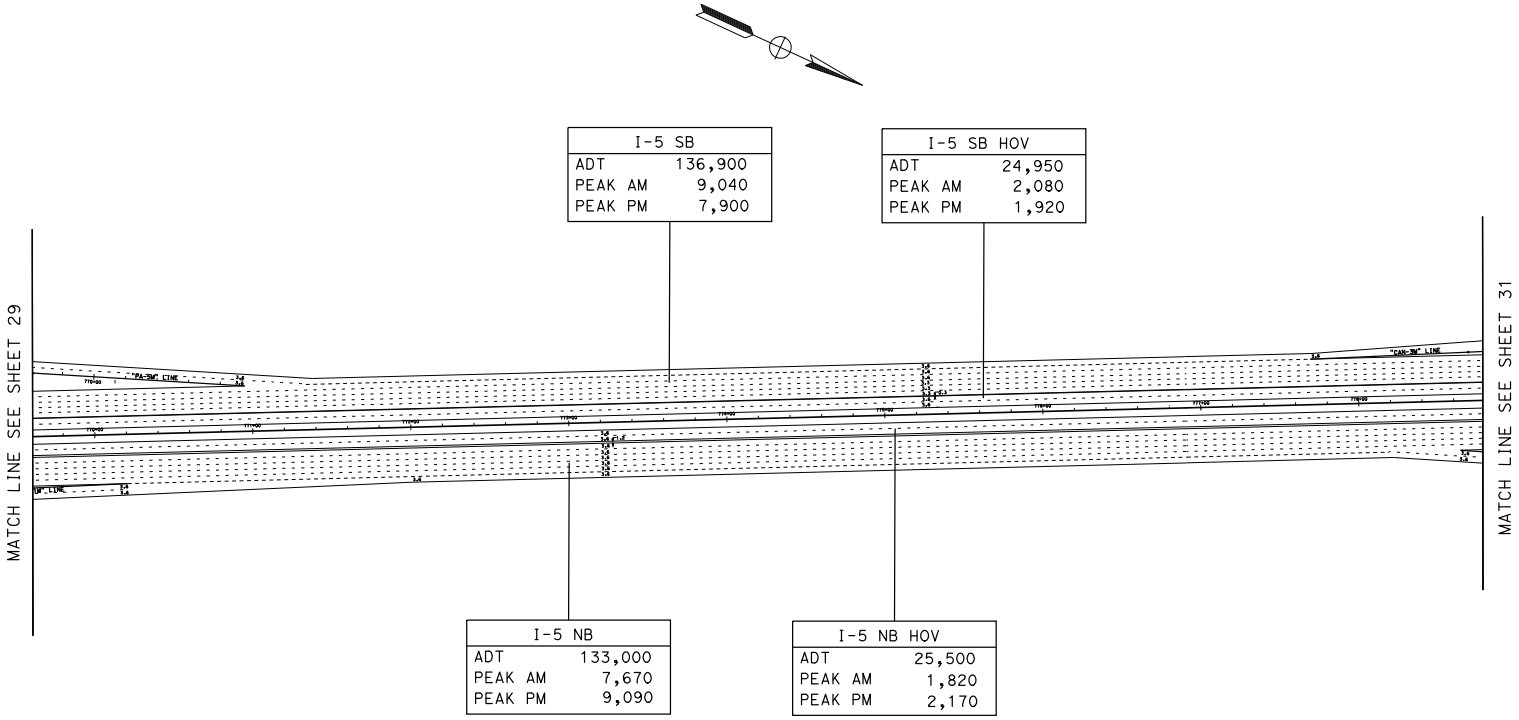
I-5 NORTHCOAST

10+4 ALTERNATIVE YEAR 2030

TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXHIBIT C

DGN FILE =>2030_29PalmrAptRd.dgn
DATE PLOTTED =>12-NOV-2008

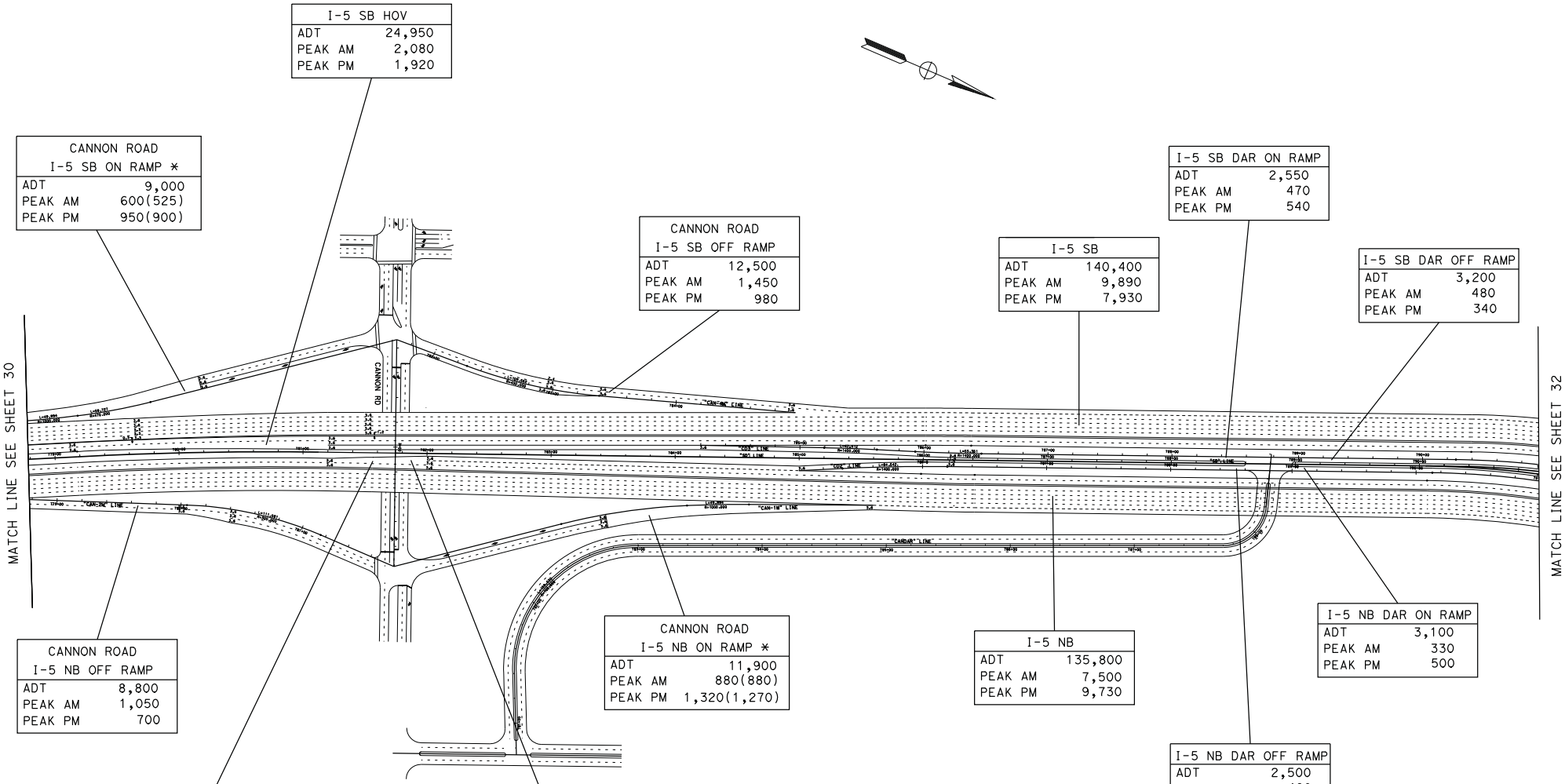


11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

10+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT C

DGN FILE => 2030_3otoCannon.dgn
DATE PLOTTED => 12-NOV-2008



I-5 SB HOV	
ADT	24,950
PEAK AM	2,080
PEAK PM	1,920

CANNON ROAD I-5 SB ON RAMP *	
ADT	9,000
PEAK AM	600(525)
PEAK PM	950(900)

CANNON ROAD I-5 SB OFF RAMP	
ADT	12,500
PEAK AM	1,450
PEAK PM	980

I-5 SB	
ADT	140,400
PEAK AM	9,890
PEAK PM	7,930

I-5 SB DAR ON RAMP	
ADT	2,550
PEAK AM	470
PEAK PM	540

I-5 SB DAR OFF RAMP	
ADT	3,200
PEAK AM	480
PEAK PM	340

CANNON ROAD I-5 NB OFF RAMP	
ADT	8,800
PEAK AM	1,050
PEAK PM	700

CANNON ROAD I-5 NB ON RAMP *	
ADT	11,900
PEAK AM	880(880)
PEAK PM	1,320(1,270)

I-5 NB	
ADT	135,800
PEAK AM	7,500
PEAK PM	9,730

I-5 NB DAR ON RAMP	
ADT	3,100
PEAK AM	330
PEAK PM	500

I-5 NB DAR OFF RAMP	
ADT	2,500
PEAK AM	480
PEAK PM	450

I-5 NB HOV ON	
ADT	4,300
PEAK AM	320
PEAK PM	400

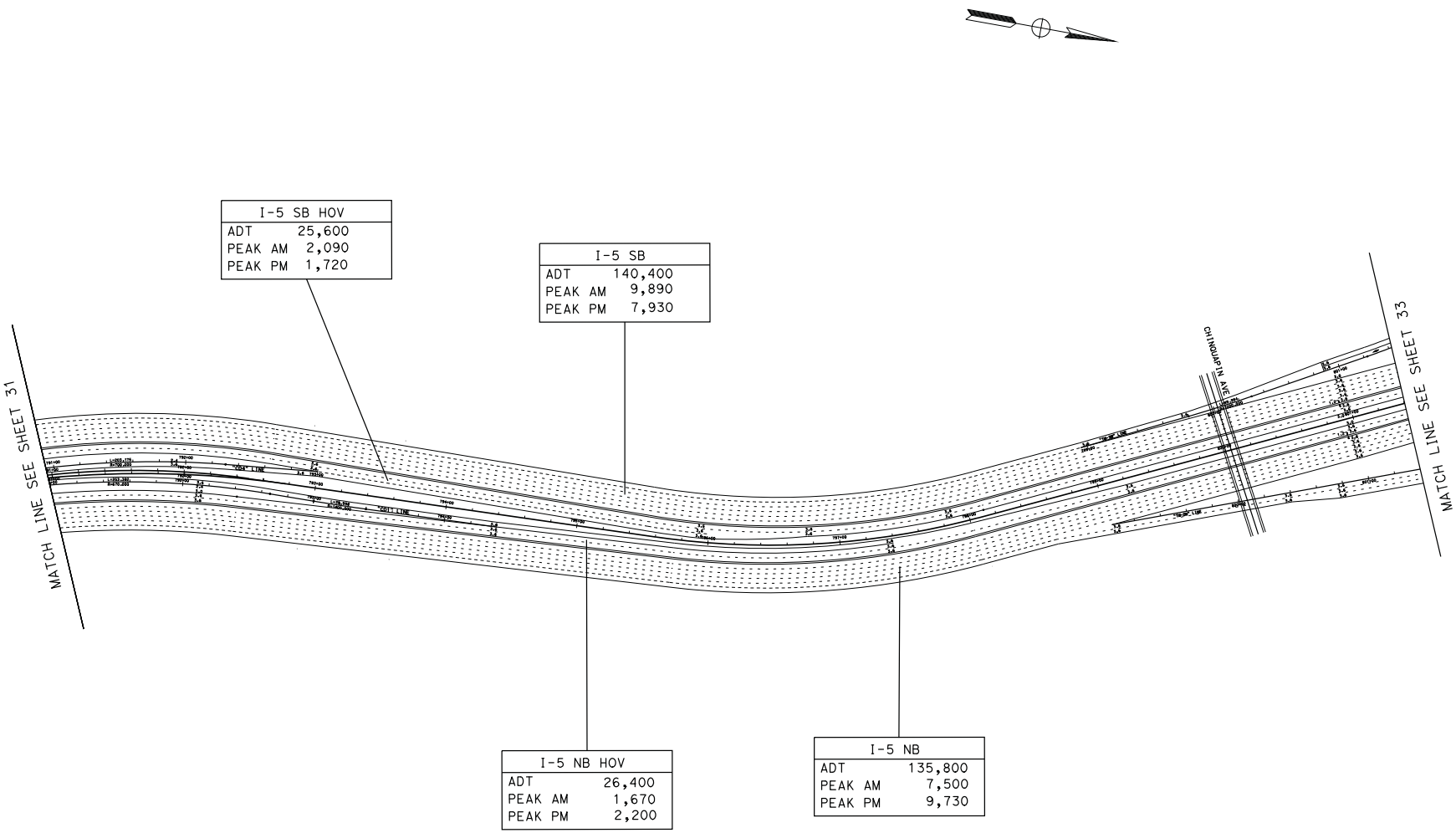
I-5 NB HOV OFF	
ADT	4,000
PEAK AM	320
PEAK PM	420

* Note: Possible on-ramp metered rates shown in (parenthesis)

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST
10+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT C

DATE PLOTTED =>12-NOV-2008
DGN FILE =>2030_31Cannon.dgn

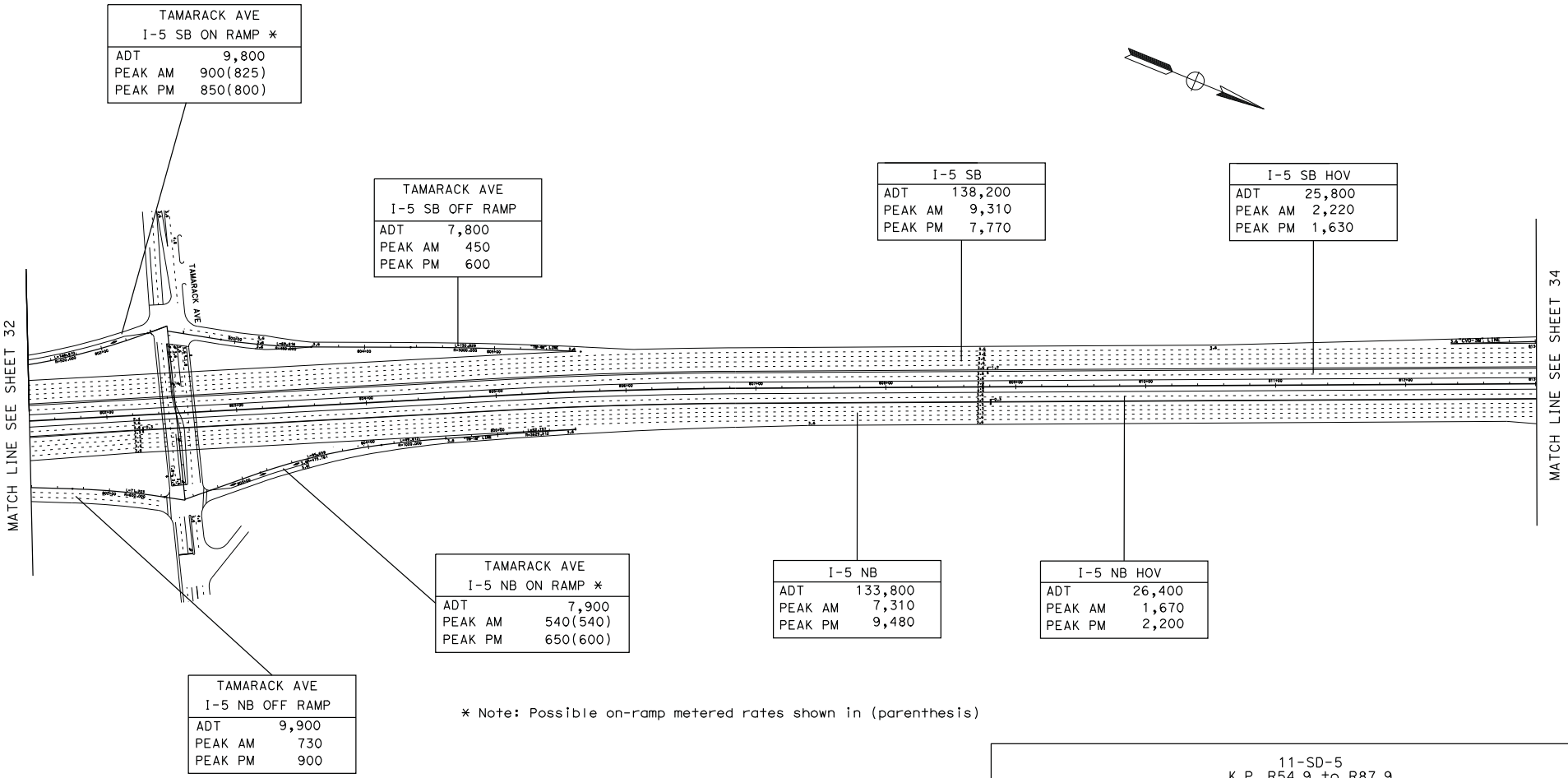


11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

10+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT C

DGN FILE => 2030_32toTamarack.dgn
DATE PLOTTED => 12-NOV-2008

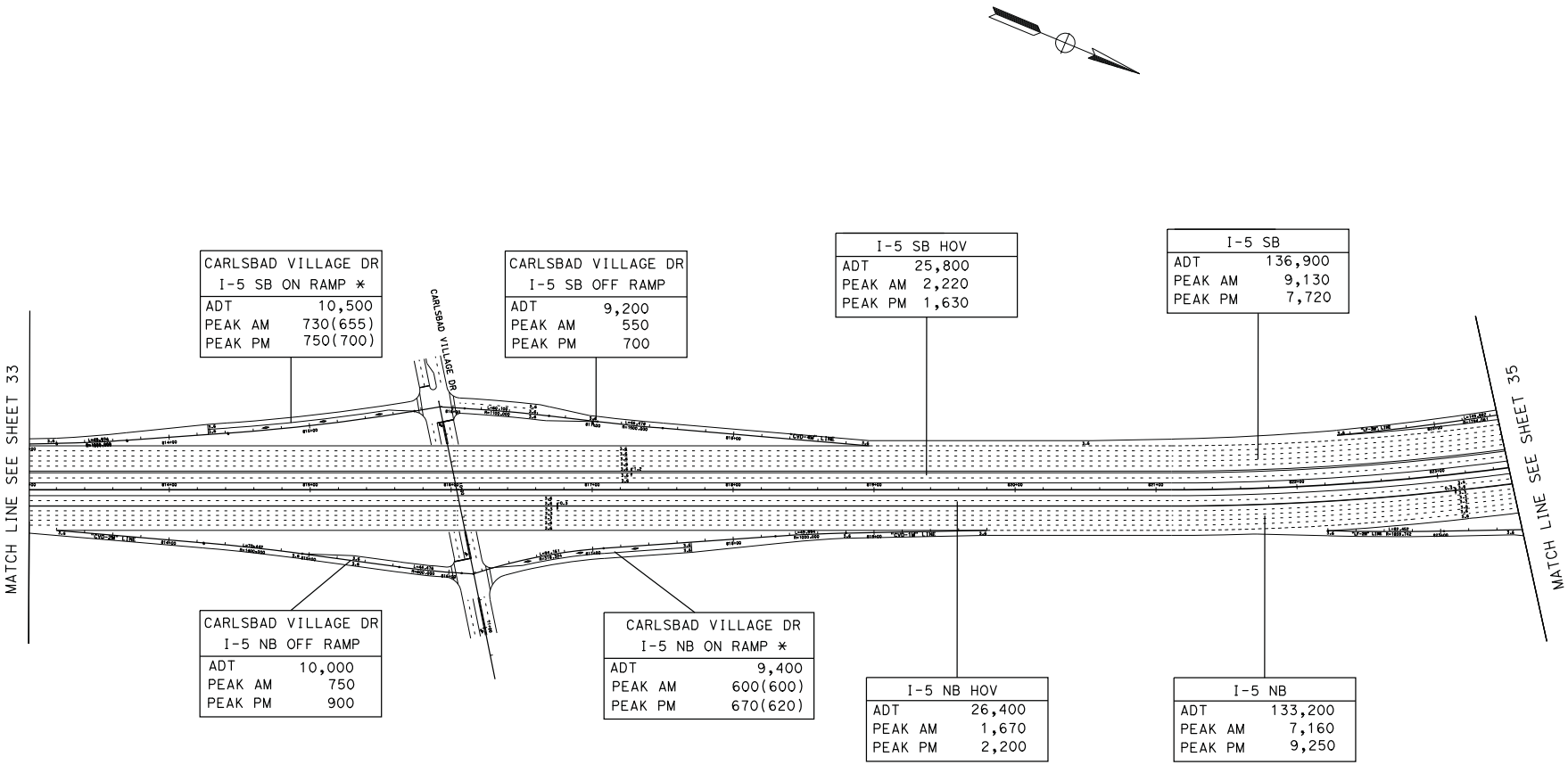


* Note: Possible on-ramp metered rates shown in (parenthesis)

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST
10+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT C

DGN FILE =>2030_33Tamarack.dgn
DATE PLOTTED =>12-NOV-2008



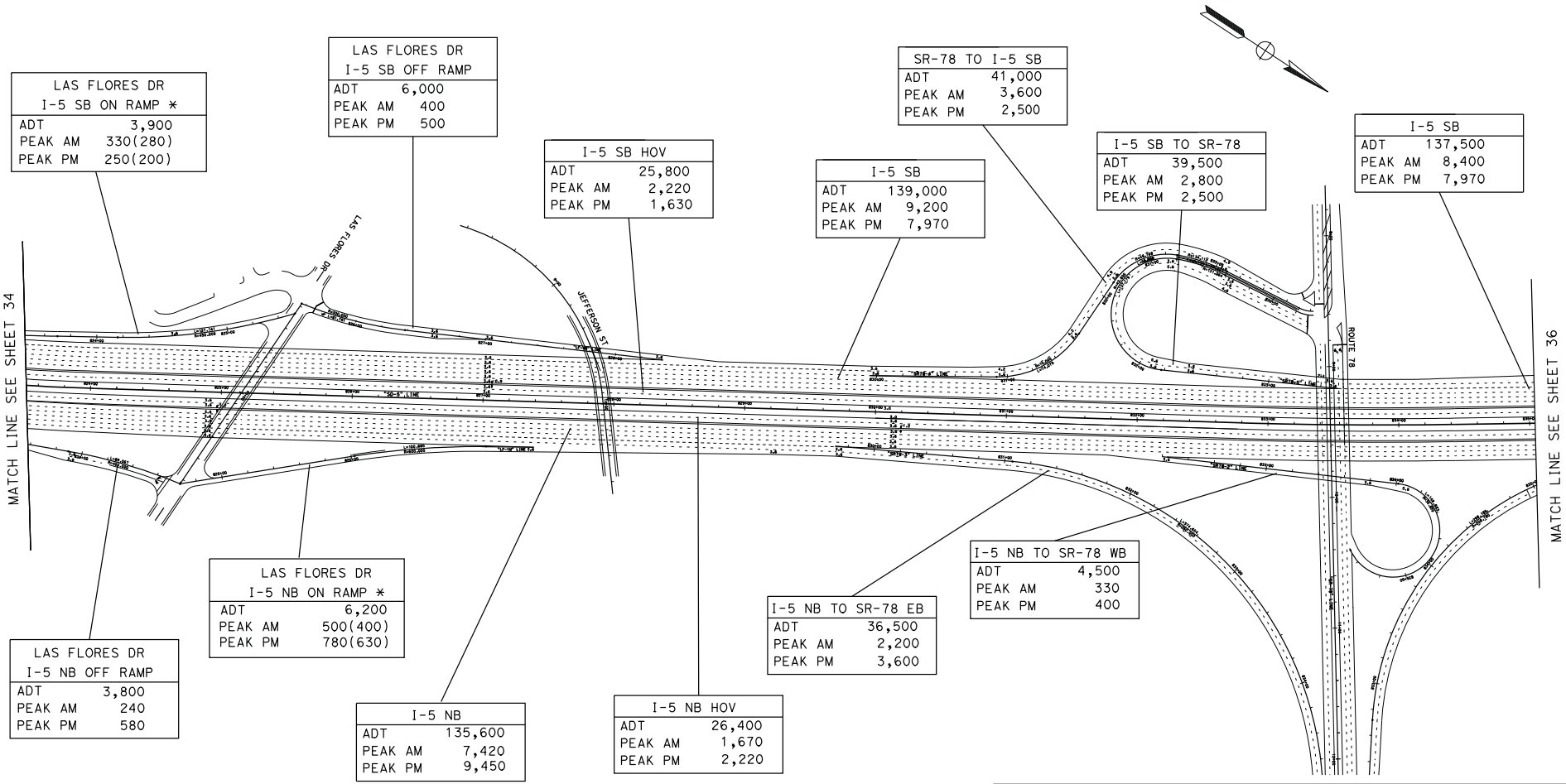
* Note: Possible on-ramp metered rates shown in (parenthesis)

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

10+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT C

DGN FILE => 2030_34CarlsbadVD.dgn DATE PLOTTED => 12-NOV-2008



LAS FLORES DR I-5 SB ON RAMP *	
ADT	3,900
PEAK AM	330(280)
PEAK PM	250(200)

LAS FLORES DR I-5 SB OFF RAMP	
ADT	6,000
PEAK AM	400
PEAK PM	500

I-5 SB HOV	
ADT	25,800
PEAK AM	2,220
PEAK PM	1,630

I-5 SB	
ADT	139,000
PEAK AM	9,200
PEAK PM	7,970

SR-78 TO I-5 SB	
ADT	41,000
PEAK AM	3,600
PEAK PM	2,500

I-5 SB TO SR-78	
ADT	39,500
PEAK AM	2,800
PEAK PM	2,500

I-5 SB	
ADT	137,500
PEAK AM	8,400
PEAK PM	7,970

LAS FLORES DR I-5 NB ON RAMP *	
ADT	6,200
PEAK AM	500(400)
PEAK PM	780(630)

LAS FLORES DR I-5 NB OFF RAMP	
ADT	3,800
PEAK AM	240
PEAK PM	580

I-5 NB	
ADT	135,600
PEAK AM	7,420
PEAK PM	9,450

I-5 NB HOV	
ADT	26,400
PEAK AM	1,670
PEAK PM	2,220

I-5 NB TO SR-78 EB	
ADT	36,500
PEAK AM	2,200
PEAK PM	3,600

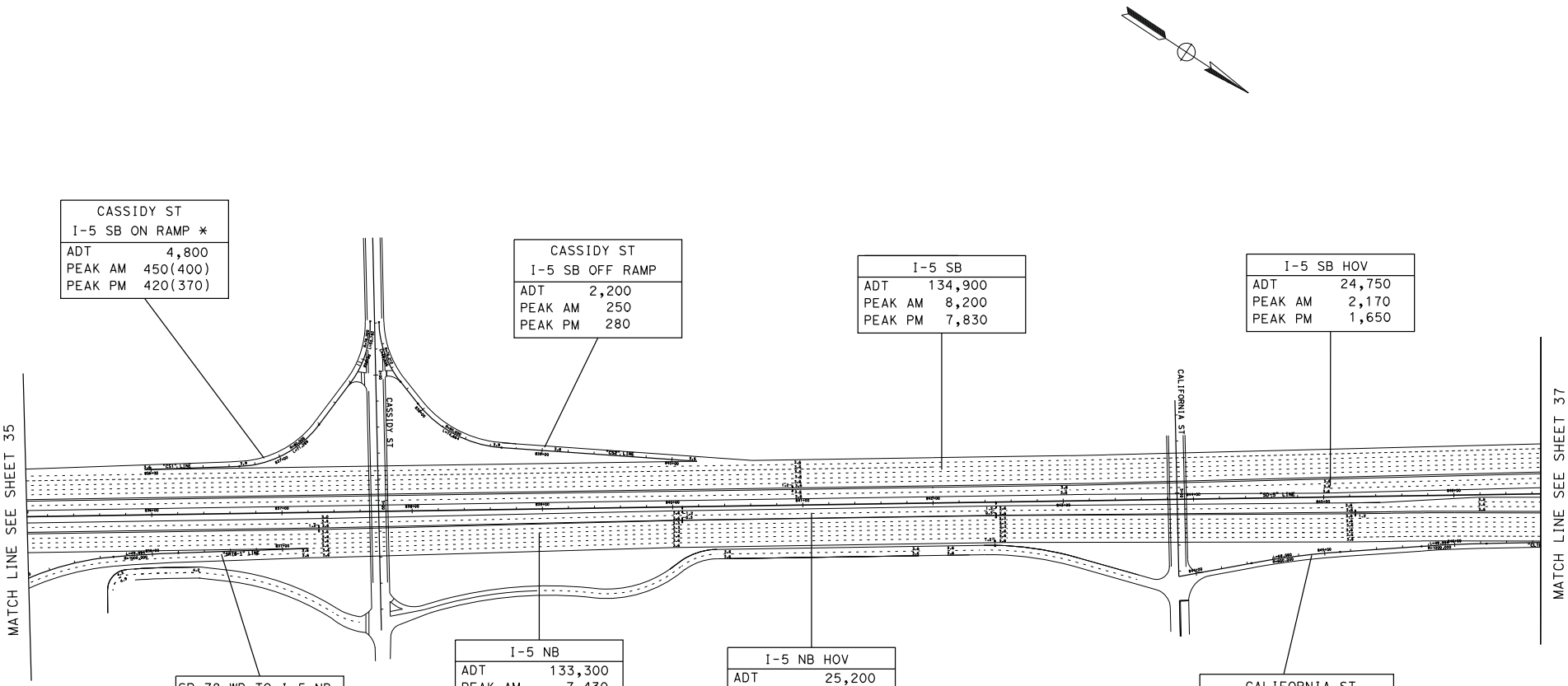
I-5 NB TO SR-78 WB	
ADT	4,500
PEAK AM	330
PEAK PM	400

* Note: Possible on-ramp metered rates shown in (parenthesis)

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST
10+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT C

DGN FILE => 2030_35LasFlores78.dgn
DATE PLOTTED => 12-NOV-2008

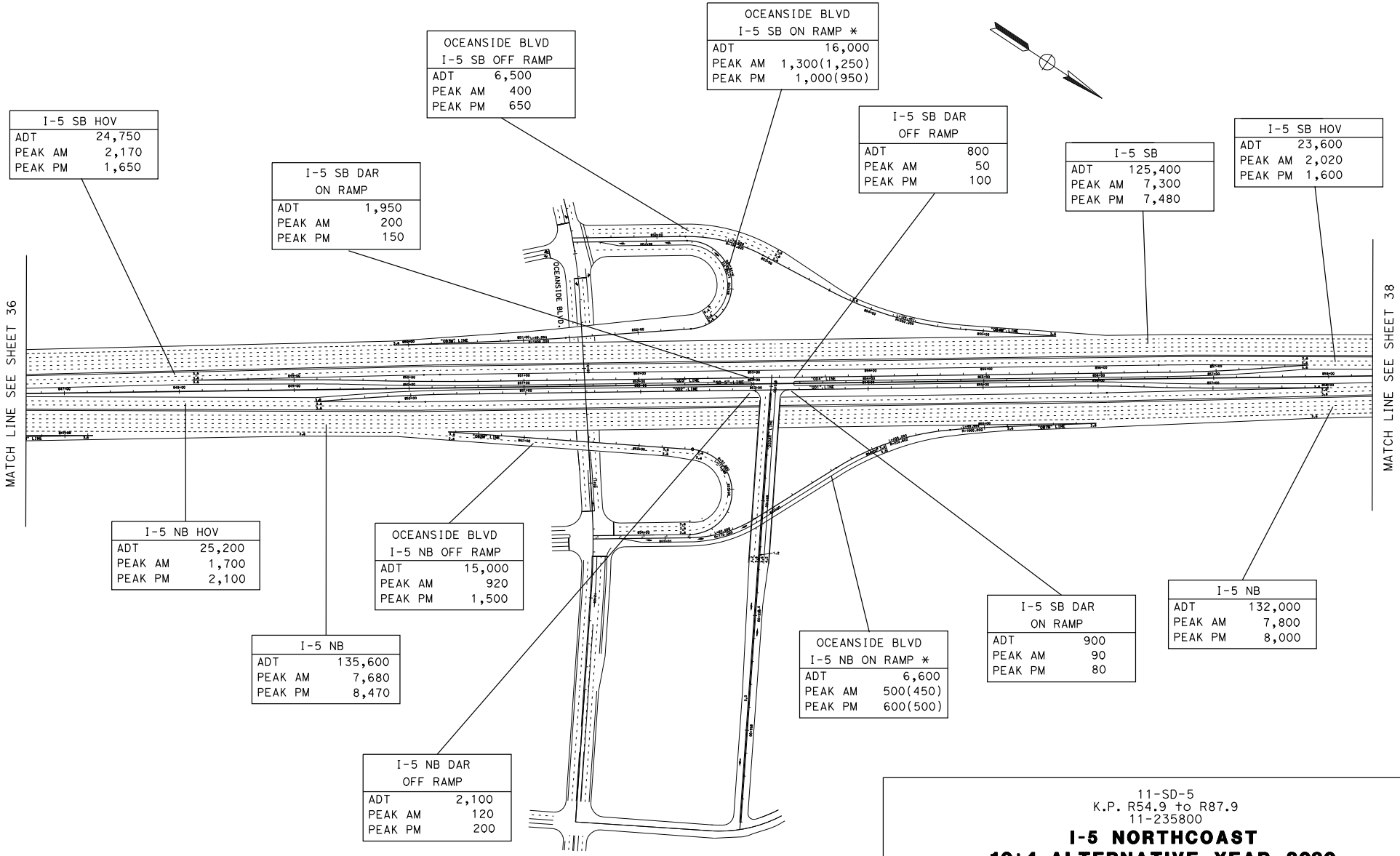


* Note: Possible on-ramp metered rates shown in (parenthesis)

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST
10+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT C

DGN FILE => 2030_36CassidyCA.dgn
DATE PLOTTED => 12-NOV-2008

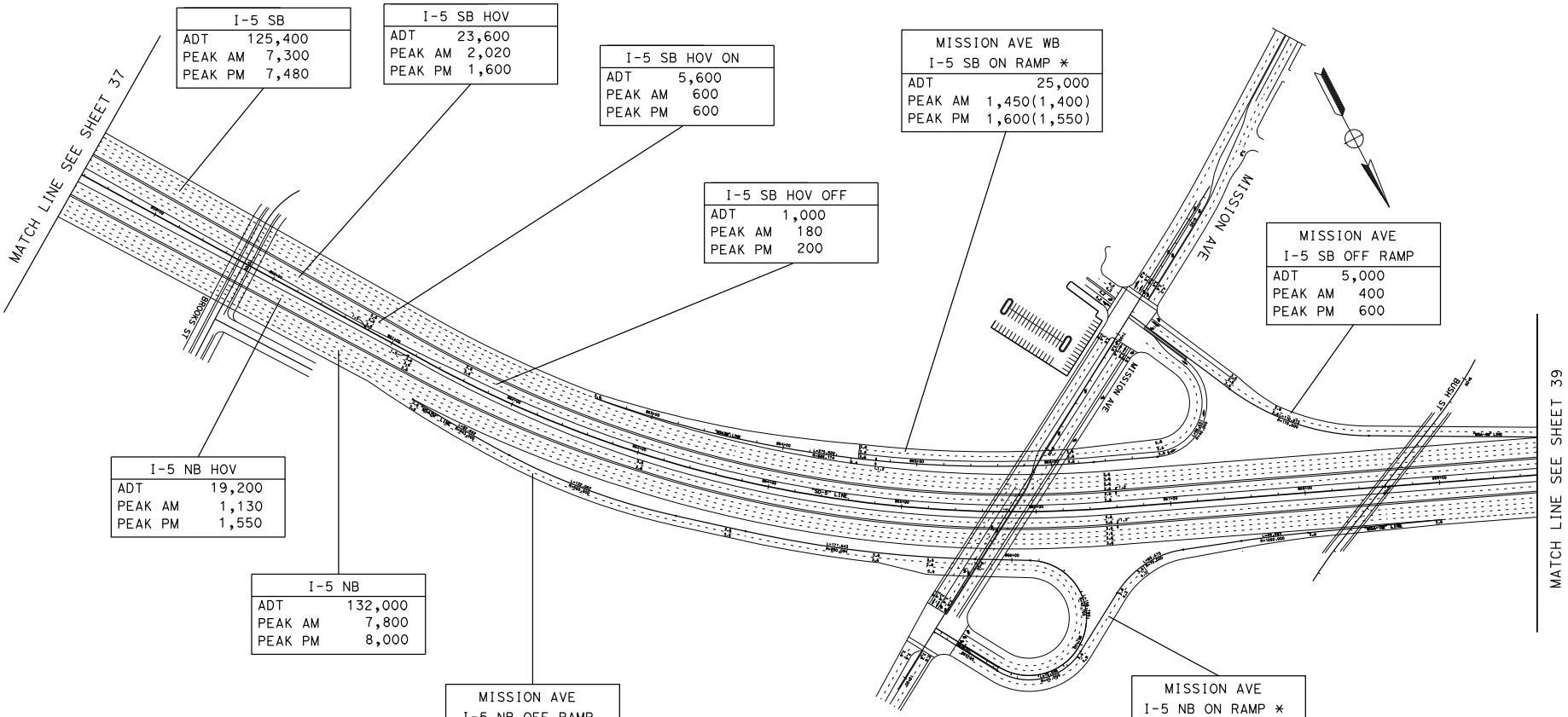


* Note: Possible on-ramp metered rates shown in (parenthesis)

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST
10+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT C

DGN FILE => 2030_370Oceanside.dgn
DATE PLOTTED => 12-NOV-2008



I-5 SB	
ADT	125,400
PEAK AM	7,300
PEAK PM	7,480

I-5 SB HOV	
ADT	23,600
PEAK AM	2,020
PEAK PM	1,600

I-5 SB HOV ON	
ADT	5,600
PEAK AM	600
PEAK PM	600

MISSION AVE WB I-5 SB ON RAMP *	
ADT	25,000
PEAK AM	1,450(1,400)
PEAK PM	1,600(1,550)

I-5 SB HOV OFF	
ADT	1,000
PEAK AM	180
PEAK PM	200

MISSION AVE I-5 SB OFF RAMP	
ADT	5,000
PEAK AM	400
PEAK PM	600

I-5 NB HOV	
ADT	19,200
PEAK AM	1,130
PEAK PM	1,550

I-5 NB	
ADT	132,000
PEAK AM	7,800
PEAK PM	8,000

MISSION AVE I-5 NB OFF RAMP	
ADT	26,000
PEAK AM	1,420
PEAK PM	2,050

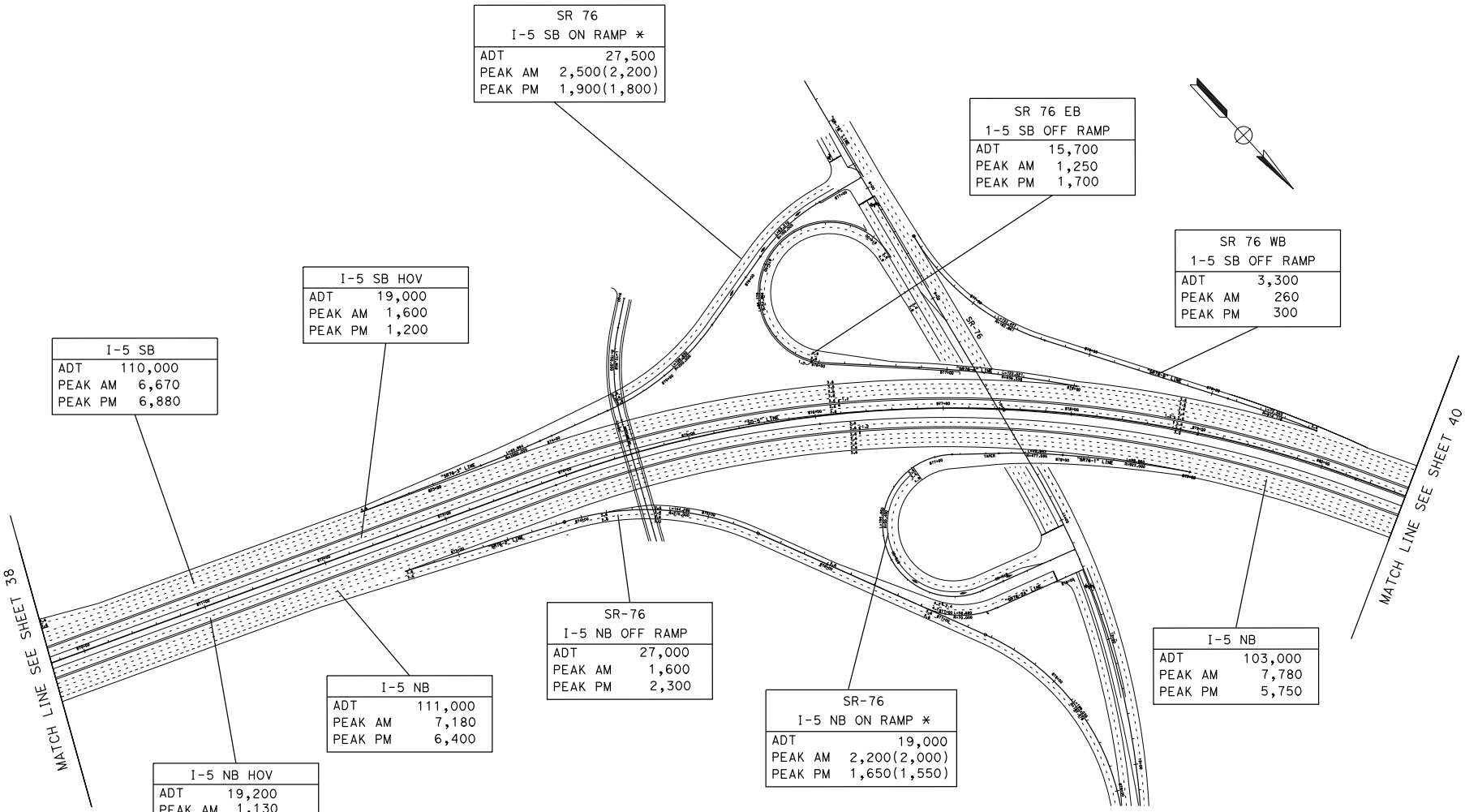
MISSION AVE I-5 NB ON RAMP *	
ADT	5,000
PEAK AM	800(750)
PEAK PM	450(400)

* Note: Possible on-ramp metered rates shown in (parenthesis)

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST
10+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT C

DATE PLOTTED => 12-NOV-2008
DGN FILE => 2030_38Mission.dgn

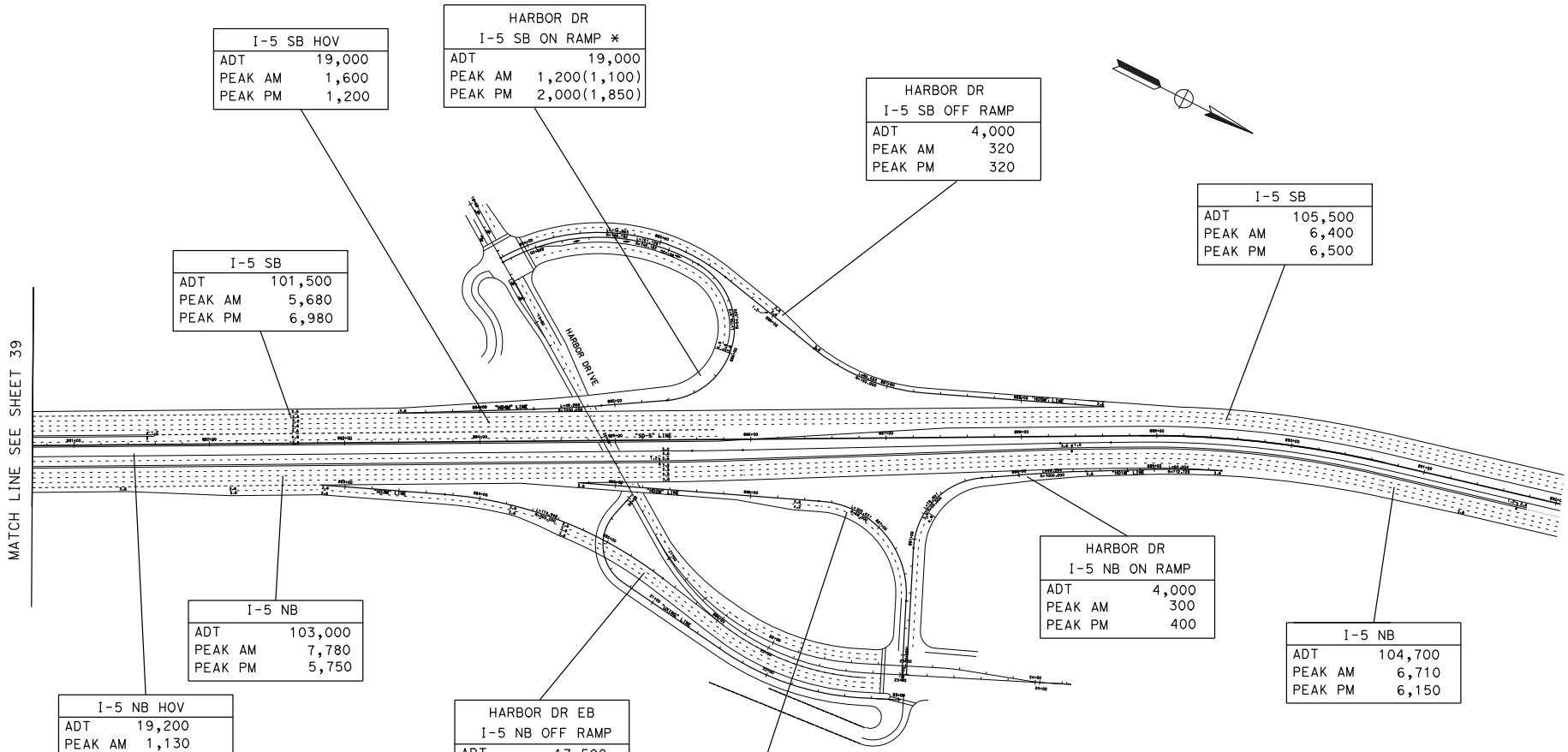


* Note: Possible on-ramp metered rates shown in (parenthesis)

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST
10+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS
EXHIBIT C

DGN FILE =>2030_39Rte76.dgn
DATE PLOTTED =>12-NOV-2008



* Note: Possible on-ramp metered rates shown in (parenthesis)

11-SD-5
K.P. R54.9 to R87.9
11-235800

I-5 NORTHCOAST

10+4 ALTERNATIVE YEAR 2030
TRAFFIC VOLUMES AND LANE CONFIGURATIONS

EXHIBIT C

DGN FILE => 2030_40HarborDr.dgn
DATE PLOTTED => 12-NOV-2008