

TRAFFIC IMPACT ANALYSIS
SOUTHBAY PAVILION THEATRE EXPANSION
Carson, California
April 22, 2013

Prepared for:

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TRAFFIC IMPACT ANALYSIS
SOUTHBAY PAVILION THEATRE EXPANSION PROJECT
Carson, California
April 22, 2013

1.0 INTRODUCTION

This traffic impact analysis addresses the potential traffic impacts associated with the proposed SouthBay Pavilion Theatre Expansion Project (hereinafter referred to as Project) in the City of Carson, California. The proposed Project includes the development of a new 57,352 square-foot (SF) movie theater with 14 screens and 2,474 seats in place of 41,433 SF of floor area that is now occupied by a Chuck E. Cheese's and New Millennium Secondary School. The project site is located on the southeast corner of Avalon Boulevard and Del Amo Boulevard at SouthBay Pavilion, an existing regional mall with approximately 1,013,023 SF of floor area anchored by Target, IKEA, Sears, and JCPenney. In addition, the mall includes a mix of 83 specialty stores and restaurants, including Old Navy, Chuck-E-Cheese's, Children's Place, Foot Action and Daniel's Jewelry.

This report documents the findings and recommendations of a traffic impact analysis and parking assessment conducted by Linscott, Law & Greenspan, Engineers (LLG) to determine the potential impacts associated with the proposed Project. The traffic analysis evaluates the existing operating conditions at seven (7) key study intersections within the project vicinity, estimates the trip generation potential of the proposed Project, and forecasts future operating conditions without and with the proposed Project. Where necessary, intersection improvements/mitigation measures are identified.

This traffic report satisfies the traffic impact requirements of the City of Carson as well as the State of California Department of Transportation (Caltrans) *Guide for the Preparation of Traffic Impact Studies*. In addition, the report is consistent with the most current *Congestion Management Program (CMP) for Los Angeles County*. The Scope of Work for this traffic study, which is included in **Appendix A**, was developed in conjunction with City of Carson Public Works Department staff.

The project site has been visited and an inventory of adjacent area roadways and intersections was performed. Existing peak hour traffic information has been collected at seven (7) key study intersections for use in the preparation of intersection level of service calculations. Information concerning cumulative projects (planned and/or approved) in the vicinity of the proposed Project has been researched at the City of Carson. Based on our research, there are twelve (12) cumulative projects within the vicinity of the subject site. These twelve (12) planned and/or approved cumulative projects were considered in the cumulative traffic analysis for this project.

This traffic report analyzes existing and future weekday PM peak hour and Friday PM peak hour traffic conditions for a near-term (Year 2015) traffic setting upon completion of the proposed Project. Peak hour traffic forecasts for the Year 2015 horizon year have been projected by

increasing existing traffic volumes by an annual growth rate of 1.0% per year and adding traffic volumes generated by twelve (12) cumulative projects.

1.1 Study Area

The seven (7) key study intersections selected for evaluation in this report provide both regional and local access to the study area. They consist of the following:

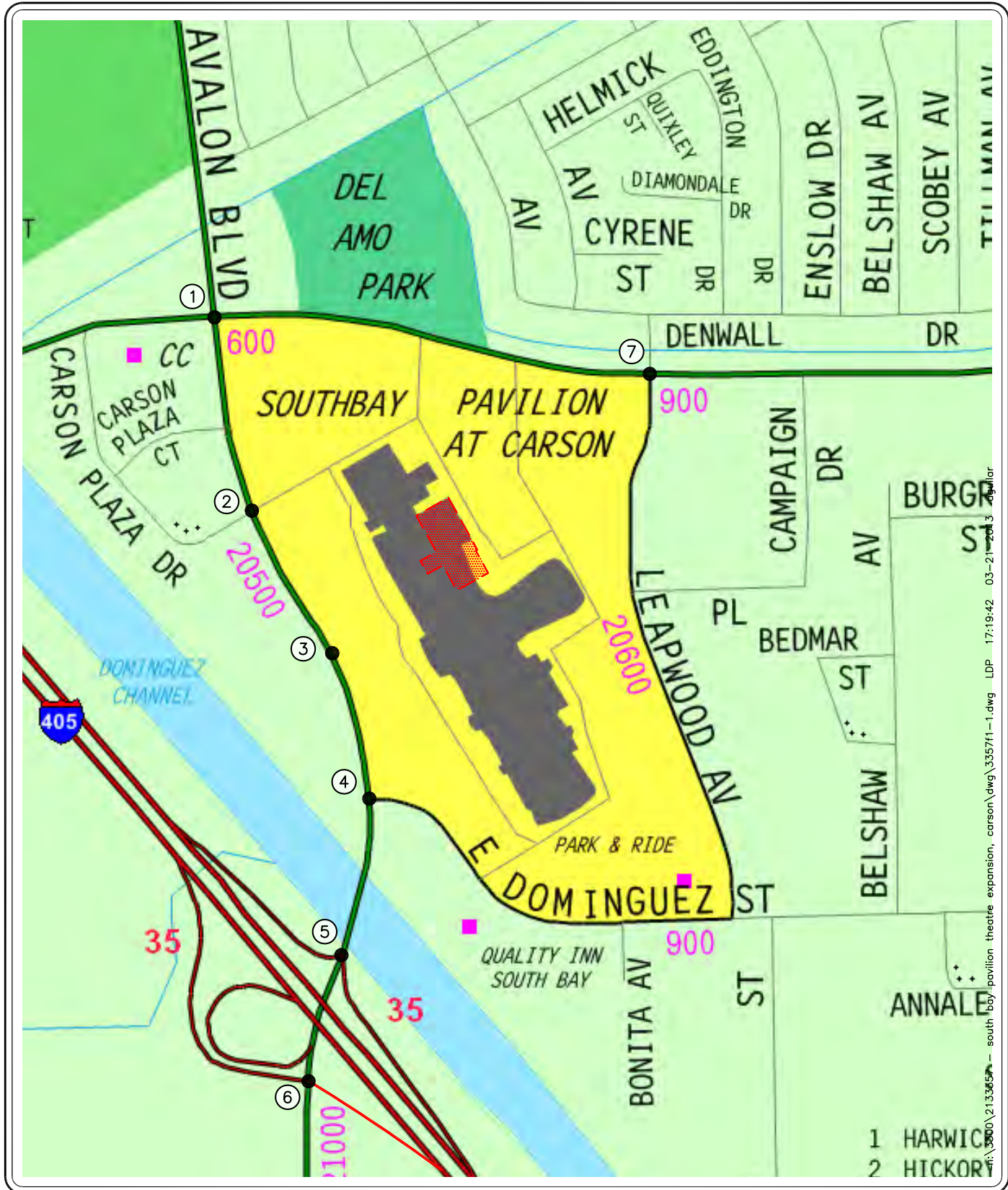
Key Study Intersections

1. Avalon Boulevard at Del Amo Boulevard
2. Avalon Boulevard at Carson Plaza Drive
3. Avalon Boulevard at Carson Mall
4. Avalon Boulevard at Dominquez Street
5. Avalon Boulevard at I-405 NB Ramps
6. Avalon Boulevard at I-405 SB Ramps
7. Leapwood Avenue at Del Amo Boulevard

Figure 1-1 presents a Vicinity Map, which illustrates the general location of the proposed Project and depicts the study locations and surrounding street system. The Level of Service (LOS) investigations at these key locations were used to evaluate the potential traffic-related impacts associated with area growth, cumulative projects and the proposed Project. When necessary, this report recommends intersection improvements that may be required to accommodate future traffic volumes and restore/maintain an acceptable Level of Service and/or mitigate the impact of the project.

Included in this Traffic Impact Analysis are:

- Existing traffic counts,
- Estimated project traffic generation/distribution/assignment,
- Estimated cumulative project traffic generation/distribution/assignment,
- Weekday PM peak hour and Friday PM capacity analyses for existing conditions,
- Weekday PM peak hour and Friday PM peak hour capacity analyses for existing plus project conditions,
- Weekday PM peak hour and Friday PM peak hour capacity analyses for future (Year 2015) conditions without and with project traffic,
- Pedestrian, Transit and Bicycle connectivity,
- Caltrans Analysis,
- Planned and/or Recommended Improvements,
- Congestion Management Program (CMP) Analysis, and
- Parking Requirements.



NO SCALE

SOURCE: THOMAS BROS.
KEY



= STUDY INTERSECTION



= PROJECT SITE

FIGURE 1-1

VICINITY MAP

SOUTHBAY PAVILION THEATRE EXPANSION, CARSON

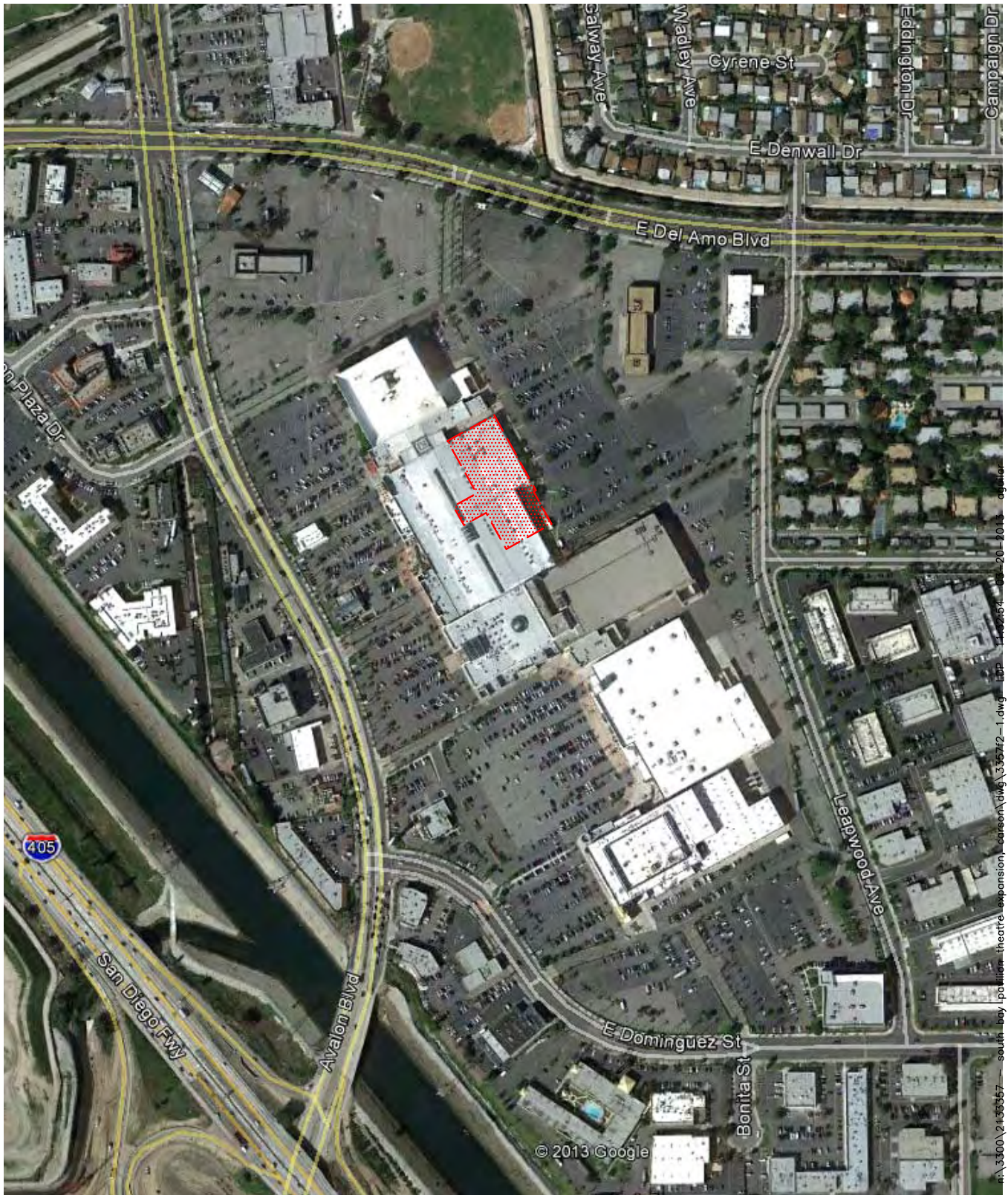
2.0 PROJECT DESCRIPTION

The project site is located on the southeast corner of Avalon Boulevard and Del Amo Boulevard at SouthBay Pavilion in the City of Carson, California. SouthBay Pavilion is an existing regional mall with approximately 1,013,023 square-feet (SF) of floor area anchored by Target, IKEA, Sears and JCPenney. In addition, the mall includes a mix of 83 specialty stores and restaurants, including Old Navy, Chuck-E-Cheese's, Children's Place, Foot Action and Daniel's Jewelry. *Figure 2-1* presents an aerial depiction of the existing site.

Figure 2-2 presents the proposed site plan for the proposed Project. Review of the proposed site plan indicates the proposed Project includes the development of a new 57,352 SF movie theater with 14 screens and 2,474 seats in place of 41,433 SF of floor area that is now occupied by Chuck E. Cheese's and New Millennium Secondary School. Parking for the Project will be provided via the existing surplus for the entire SouthBay Pavilion, which totals 4,640 spaces. *Figure 2-3* presents the proposed site layout.

2.1 Site Access

As shown in *Figure 2-2*, there are multiple ingress and egress locations for SouthBay Pavilion; however primary Project access is expected to occur at the signalized driveways along Avalon Boulevard at Carson Plaza Drive and Carson Mall. Project related activity at the other driveways is expected to be nominal.



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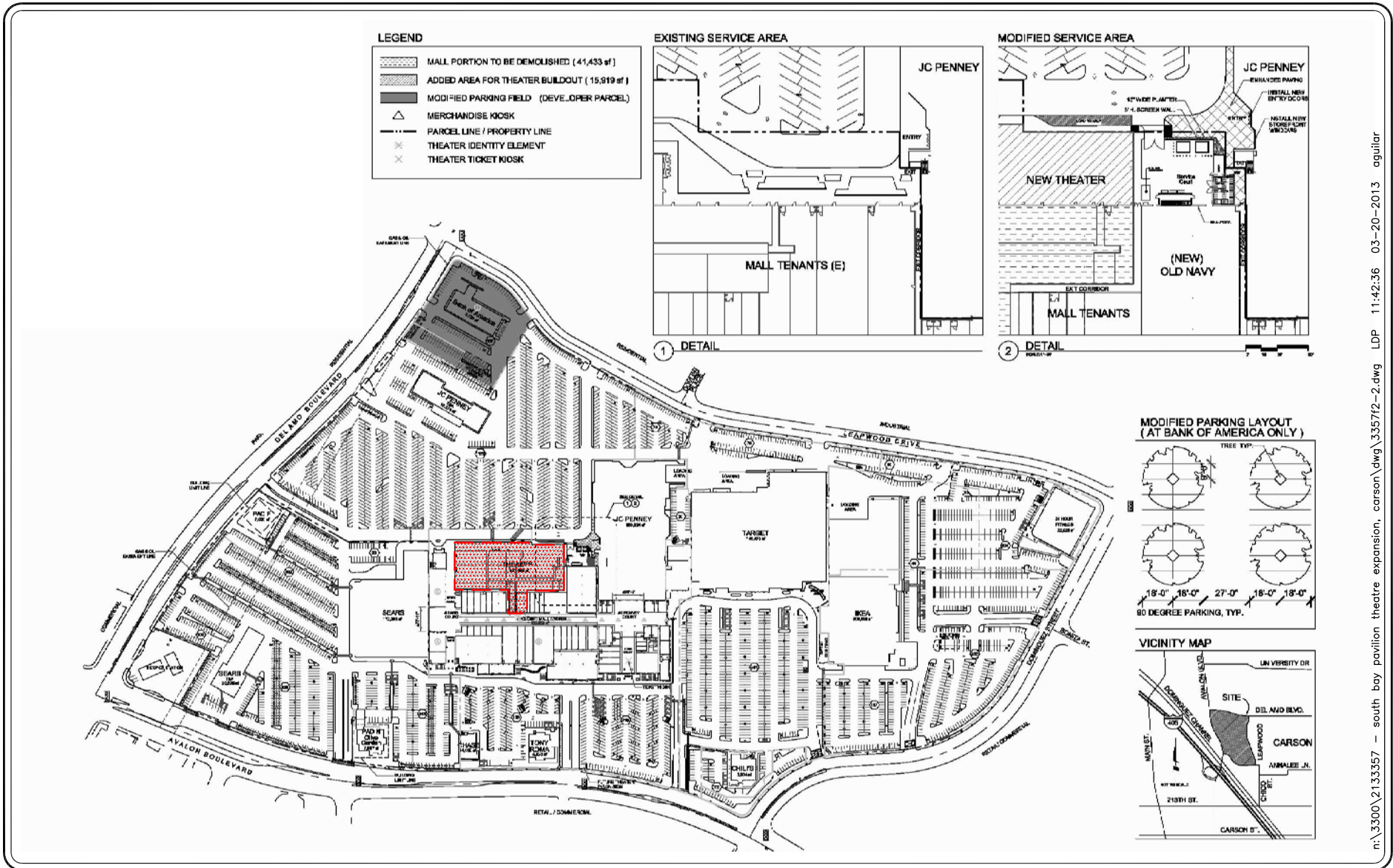
SOURCE: GOOGLE EARTH

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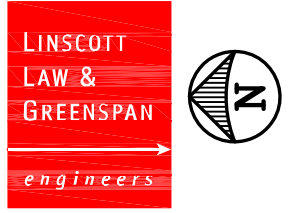
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FIGURE 2-1

EXISTING AERIAL SITE PLAN
SOUTHBAY PAVILION THEATRE EXPANSION, CARSON



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SOURCE: PERKOWITZ & RUTH ARCHITECTS


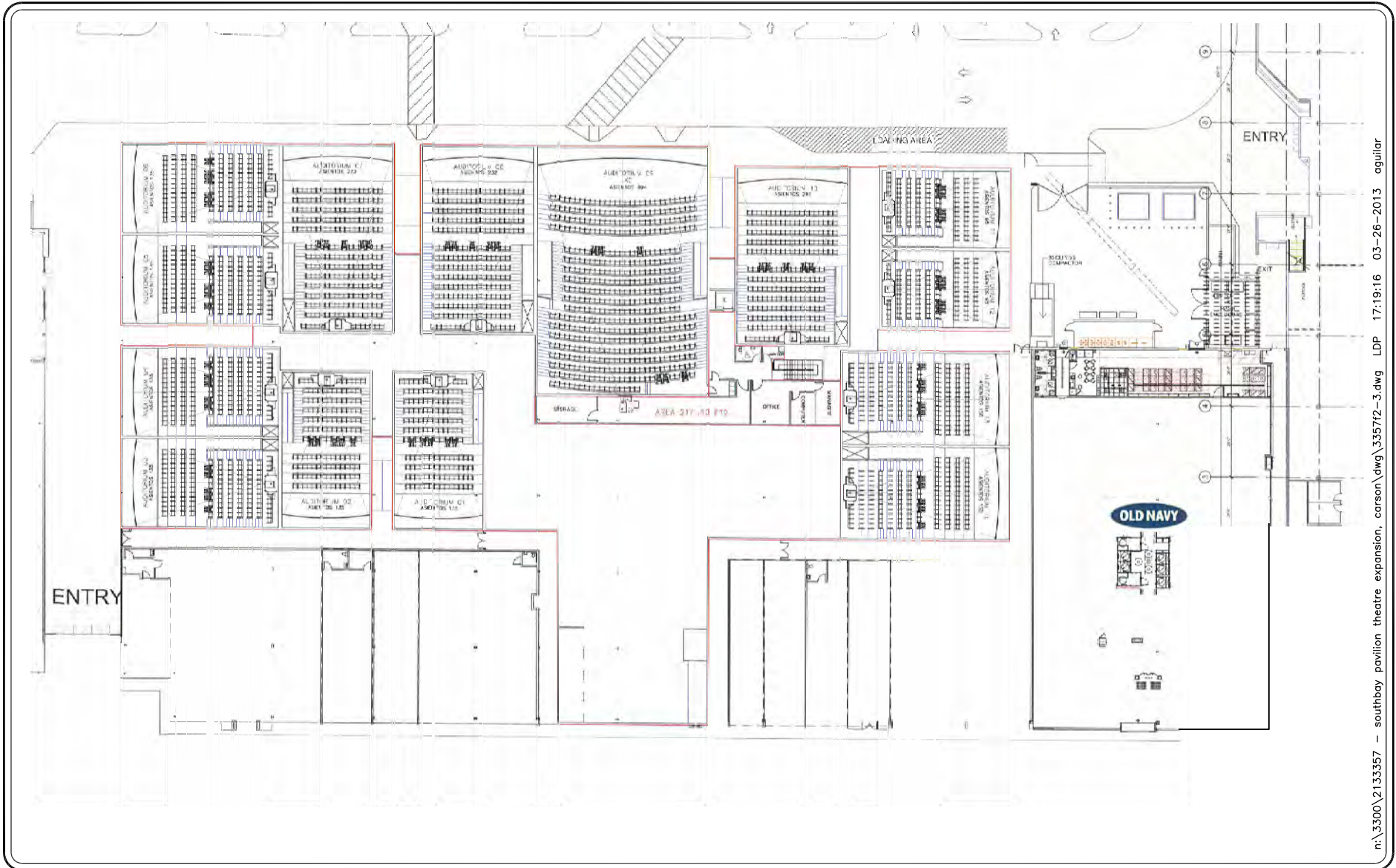
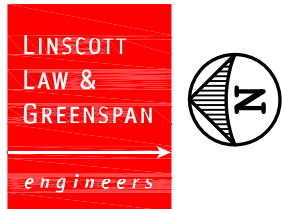
KEY
 = PROJECT SITE

FIGURE 2-2

PROPOSED SITE PLAN SOUTHBAY PAVILION THEATRE EXPANSION, CARSON



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SOURCE: PERKOWITZ & RUTH ARCHITECTS

FIGURE 2-3

PROPOSED SITE LAYOUT
SOUTHBAY PAVILION THEATRE EXPANSION, CARSON

3.0 EXISTING CONDITIONS

3.1 Existing Street System

The principal local network of streets serving the proposed Project includes Avalon Boulevard, Del Amo Boulevard, Dominguez Street, and Leapwood Avenue. Interstate 405 provides regional access to the Project site. The following discussion provides a brief synopsis of these key area streets. The descriptions are based on an inventory of existing roadway conditions.

Avalon Boulevard is a six-lane, divided roadway west of the project site and is oriented in the north-south direction. The posted speed limit along Avalon Boulevard is 40 miles per hour (mph). On-street parking is not permitted along this roadway in the vicinity of the proposed project. Traffic signals control the study intersections of Avalon Boulevard at Del Amo Boulevard, Carson Plaza Drive, Carson Mall, Dominguez Street, I-405 NB, and I-405 SB Ramps. It should be noted that the I-405 interchange has recently be upgraded with planned improvements.

Del Amo Boulevard is a four-lane, divided roadway north of the project site and is oriented in the east-west direction. The posted speed limit along Del Amo Boulevard is 45 miles per hour (mph). On-street parking is not permitted along this roadway in the vicinity of the proposed project. Traffic signals control the study intersections of Del Amo Boulevard at Leapwood Avenue.

Dominguez Street is generally a four-lane, divided roadway located south of the project site and is oriented in the east-west direction. The prima facie speed limit along Dominguez Street is 25 miles per hour (mph). On-street parking is not permitted along this roadway in the vicinity of the proposed project.

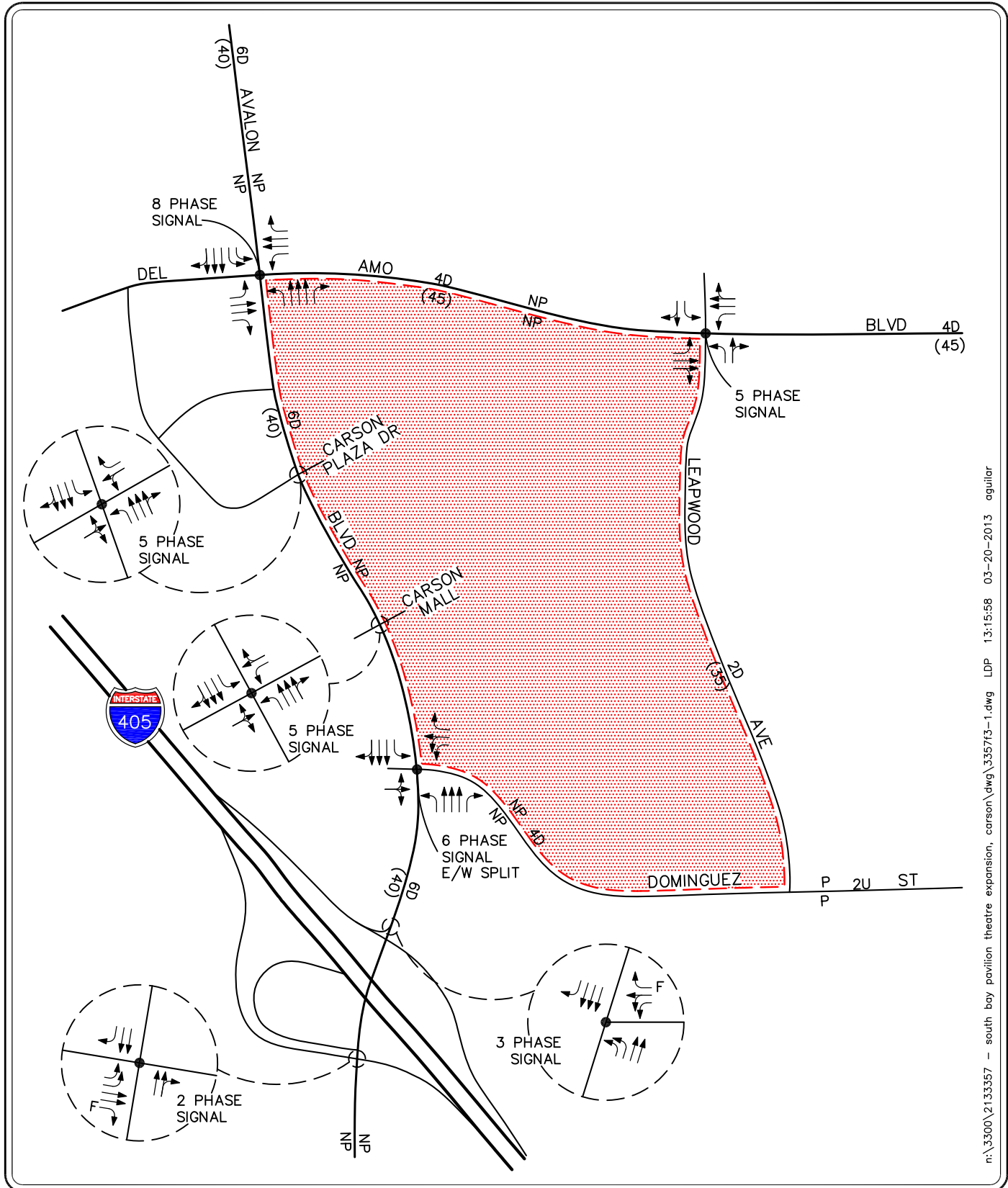
Leapwood Avenue is a two-lane, divided roadway east of the project site and is oriented in the north-south direction. The posted speed limit along Leapwood Avenue is 35 miles per hour (mph). On-street parking is not permitted along this roadway in the vicinity of the proposed project.

Figure 3-1 presents an inventory of the existing roadway conditions for the arterials and intersections evaluated in this report. This figure identifies the number of travel lanes for key arterials, as well as intersection configurations and controls for the key area study intersections.

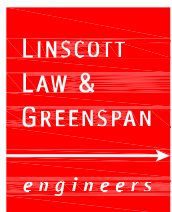
3.1.1 Existing Public Transit

Multiple transit providers and routes traverse the project frontage. The multitude of transit option allows patrons a wide selection to travel to and from the site outside of the typical vehicle mode. The following transit routes are identified below which have stops within close proximity to the site:

- Metro (Line 45, 205, 246), Carson Circuit Cal State Dominguez Hills Route (Carson Circuit Route A), Carson Circuit Keystone Route (Carson Circuit Route B), Carson Circuit Scottsdale Route (Carson Circuit Route C), Carson Circuit Metro Blue Line 1 (Carson Circuit Route D), Carson Circuit Del Amo Route (Carson Circuit Route E), Carson Circuit Civic Center Route (Carson Circuit Route F), Carson Circuit Metro Blue Line 2 (Carson Circuit Route G), Carson Circuit Hemmingway Park (Carson Circuit Route H)



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- KEY**
- ← = APPROACH LANE ASSIGNMENT
 - = TRAFFIC SIGNAL, F = FREE-RIGHT
 - P = PARKING, NP = NO PARKING
 - U = UNDIVIDED, D = DIVIDED
 - 2 = NUMBER OF TRAVEL LANES
 - (XX) = POSTED SPEED LIMIT (MPH)
 - [Red Hatched Box] = PROJECT SITE

FIGURE 3-1

EXISTING ROADWAY CONDITIONS AND INTERSECTION CONTROLS
 SOUTHBAY PAVILION THEATRE EXPANSION, CARSON

Bus stops are located on the corners of Avalon Boulevard at Del Amo Boulevard, Avalon Boulevard at Carson Mall and Leapwood Avenue at Del Amo Boulevard.

3.1.2 Existing Bicycle Facilities

The Carson General Plan presents the bicycle paths throughout Carson. Within the vicinity of the Project, the Dominguez Channel is designated as a Class I bicycle facility, while Del Amo Boulevard and Leapwood Avenue are designated as Class II bicycle facilities.

A Class I facility has a dedicated path for use by bicycles and pedestrians only, while, a Class II facility utilizes signage and pavement markings on the roadway to identify lanes for use by bicycles.

3.1.3 Existing Pedestrian Walkways

Sidewalks are currently present along all streets bordering the project site including Avalon Boulevard, Del Amo Boulevard, Leapwood Avenue, and Dominguez Street. Generally, sidewalks are present on all major streets located within the vicinity of the project site. All study intersections provide crosswalks and ADA ramps for pedestrian use.

3.2 Existing Traffic Volumes

Seven (7) key study intersections have been identified as the locations at which to evaluate existing and future traffic operating conditions. Some portion of potential project-related traffic will pass through each of these intersections, and their analysis will reveal the expected relative impacts of the project. These key intersections were selected for evaluation based on discussions with City of Carson staff and in consideration of Los Angeles County CMP requirements.

Existing Weekday PM peak hour and Friday PM peak hour traffic volumes for the seven (7) key study intersections evaluated in this report were obtained from manual peak hour turning movement counts conducted by National Data and Surveying Services (NDS) in February 2013. **Figures 3-2** and **3-3** illustrate the existing Weekday PM peak hour and Friday PM peak hour traffic volumes at the seven (7) key study intersections evaluated in this report, respectively. **Figures 3-2** and **3-3** also present the existing average daily traffic volumes for the 4 key roadway segments in the vicinity of the proposed project. **Appendix B** contains the detailed peak hour count sheets for the key intersections evaluated in this report.

3.3 Existing Intersection Conditions

Existing Weekday PM peak hour and Friday PM peak hour operating conditions for the seven (7) key study intersections were evaluated using the *Intersection Capacity Utilization (ICU)* methodology for signalized intersections.

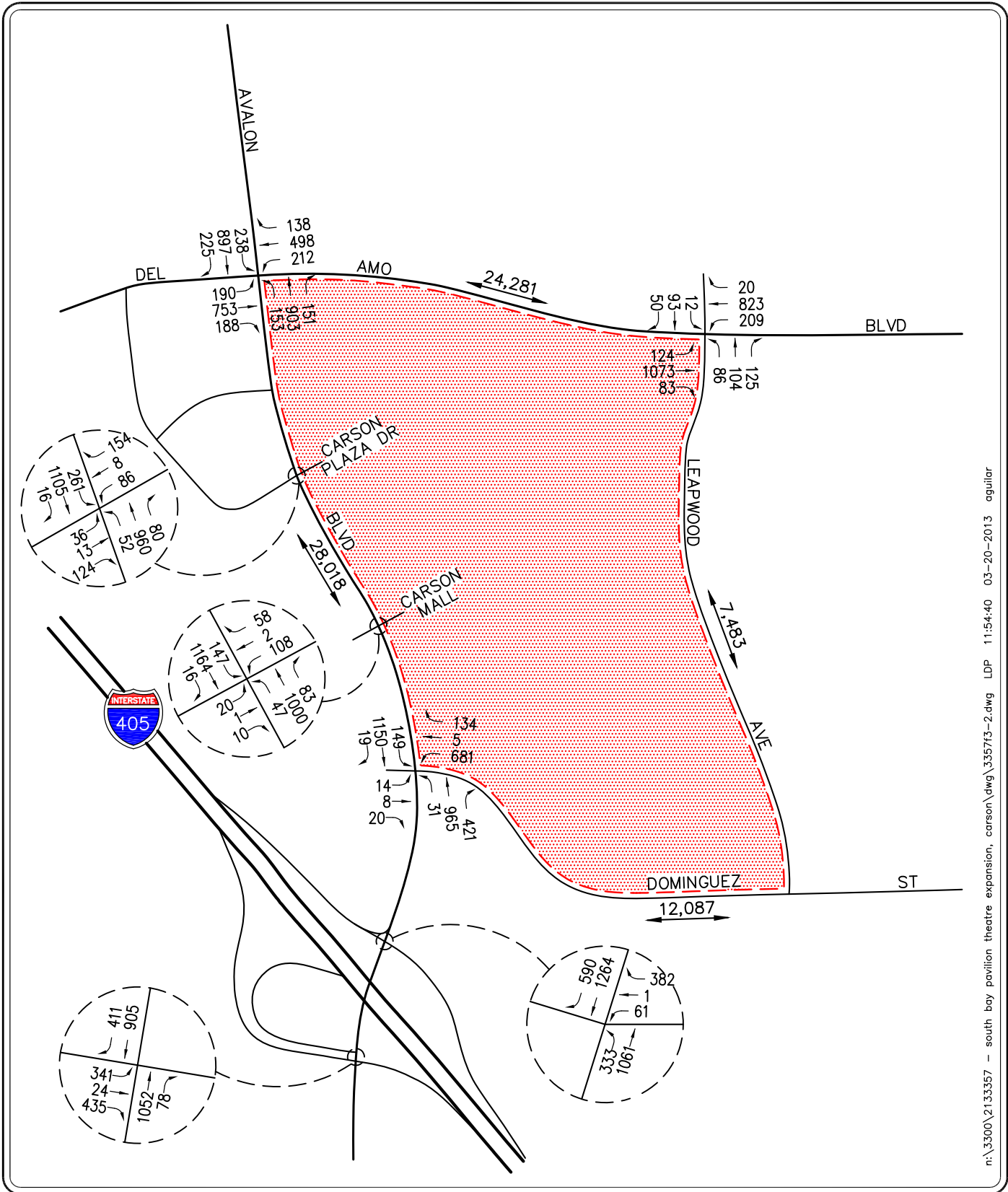
3.3.1 Intersection Capacity Utilization (ICU) Method of Analysis (Signalized Intersections)

In conformance with the City of Carson and LA County CMP requirements, existing Weekday PM peak hour and Friday PM peak hour operating conditions for the key signalized study intersections were evaluated using the Intersection Capacity Utilization (ICU) method. The ICU technique is intended for signalized intersection analysis and estimates the volume to capacity (V/C) relationship for an intersection based on the individual V/C ratios for key conflicting traffic movements.

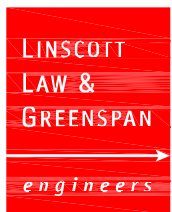
The ICU numerical value represents the percent signal (green) time, and thus capacity, required by existing and/or future traffic. It should be noted that the ICU methodology assumes uniform traffic distribution per intersection approach lane and optimal signal timing.

Per City of Carson and LA County CMP, the ICU calculations use a lane capacity of 1,600 vehicles per hour (vph) for left-turn, through, and right-turn lanes, and dual left turn capacity of 2,880 vph. A clearance adjustment factor of 0.10 was added to each Level of Service calculation.

The ICU value translates to a Level of Service (LOS) estimate, which is a relative measure of the intersection performance. The ICU value is the sum of the critical volume to capacity ratios at an intersection; it is not intended to be indicative of the LOS of each of the individual turning movements. The six qualitative categories of Level of Service have been defined along with the corresponding ICU value range and are shown in **Table 3-1**.



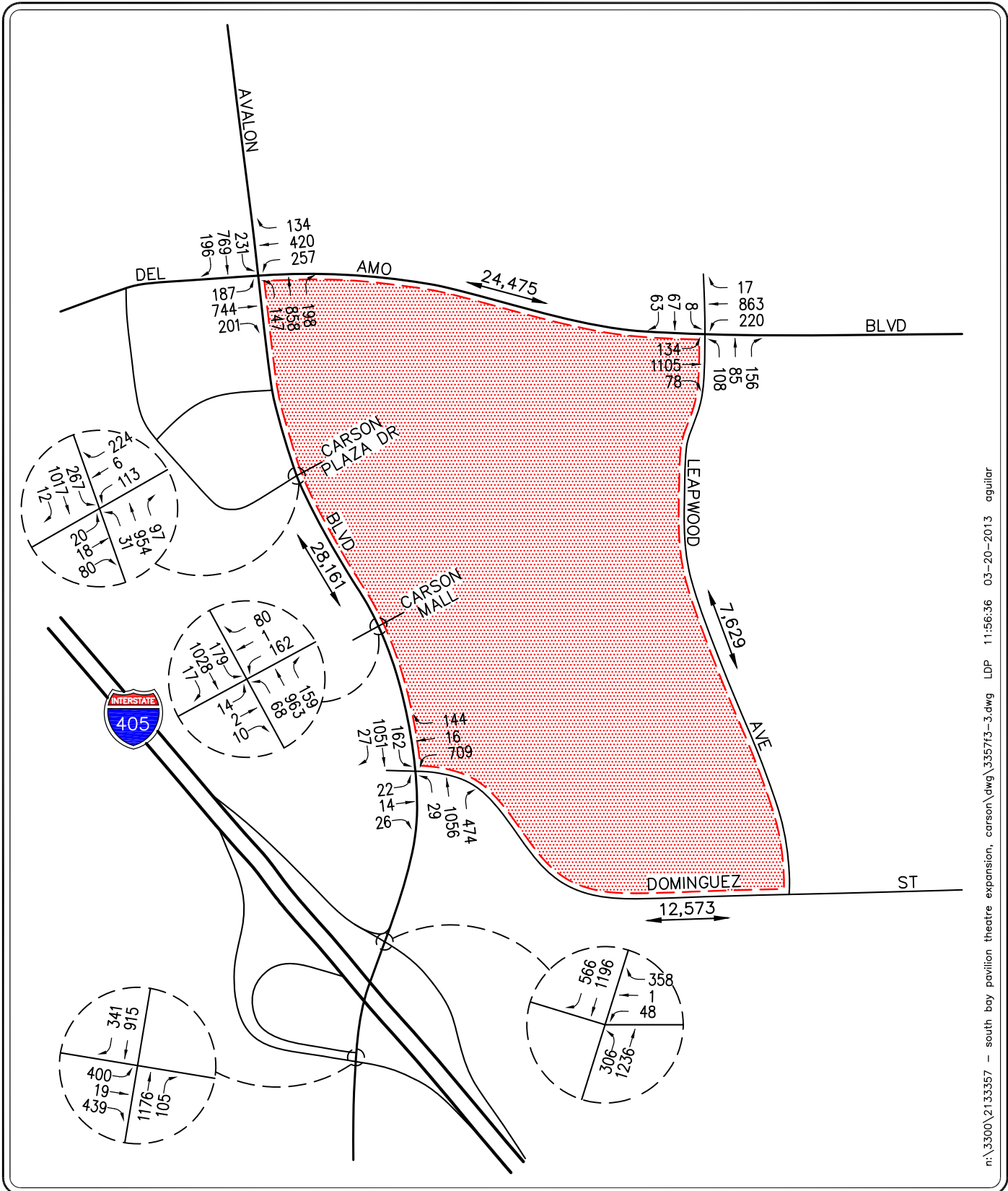
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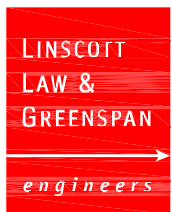
KEY
 XX,XXX = DAILY TRAFFIC VOLUMES
 [Red Hatched Box] = PROJECT SITE

FIGURE 3-2

EXISTING WEEKDAY PM PEAK HOUR AND DAILY TRAFFIC VOLUMES
 SOUTHBAY PAVILION THEATRE EXPANSION, CARSON



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KEY
 XX,XXX = DAILY TRAFFIC VOLUMES
 [Red Hatched Box] = PROJECT SITE

FIGURE 3-3

EXISTING FRIDAY PM PEAK HOUR AND DAILY TRAFFIC VOLUMES
 SOUTHBAY PAVILION THEATRE EXPANSION, CARSON

TABLE 3-1
LEVEL OF SERVICE CRITERIA FOR SIGNALIZED INTERSECTIONS

Level of Service (LOS)	Intersection Capacity Utilization Value (V/C)	Level of Service Description
A	≤ 0.60	EXCELLENT. No vehicle waits longer than one red light, and no approach phase is fully used.
B	0.60 – 0.70	VERY GOOD. An occasional approach phase is fully utilized; many drivers begin to feel somewhat restricted within groups of vehicles.
C	0.70 – 0.80	GOOD. Occasionally drivers may have to wait through more than one red light; backups may develop behind turning vehicles.
D	0.80 – 0.90	FAIR. Delays may be substantial during portions of the rush hours, but enough lower volume periods occur to permit clearing of developing lines, preventing excessive backups.
E	0.90 – 1.00	POOR. Represents the most vehicles intersection approaches can accommodate; may be long lines of waiting vehicles through several signal cycles.
F	> 1.00	FAILURE. Backups from nearby locations or on cross streets may restrict or prevent movement of vehicles out of the intersection approaches. Potentially very long delays with continuously increasing queue lengths.

3.3.2 Level of Service Criteria

According to City of Carson criteria, LOS D is the minimum acceptable condition that should be maintained during the peak commute hours on all intersections within the City of Carson.

3.4 Existing Level of Service Results

Table 3-2 summarizes the existing peak hour service level calculations for the seven (7) key study intersections based on existing traffic volumes and current street geometry. Review of *Table 3-2* indicates that all of the seven (7) key study intersections currently operate at an acceptable level of service during the Weekday PM peak hours and Friday PM peak hours.

Appendix C presents the ICU/LOS calculations for the seven (7) key study intersections for the Weekday PM peak hours and Friday PM peak hours.

TABLE 3-2
EXISTING PEAK HOUR LEVELS OF SERVICE

Key Intersections	Minimum Acceptable LOS	Jurisdiction	Time Period	Control Type	ICU	LOS
1. Avalon Boulevard at Del Amo Boulevard	D	Weekday PM	Weekday PM	8 Phase	0.797	C
		Friday PM	Friday PM	Signal	0.786	C
2. Avalon Boulevard at Carson Plaza Drive	D	Weekday PM	Weekday PM	5 Phase	0.642	B
		Friday PM	Friday PM	Signal	0.638	B
3. Avalon Boulevard at Carson Mall	D	Weekday PM	Weekday PM	5 Phase	0.504	A
		Friday PM	Friday PM	Signal	0.563	A
4. Avalon Boulevard at Dominguez Street	D	Weekday PM	Weekday PM	6 Phase	0.697	B
		Friday PM	Friday PM	Signal	0.763	C
5. Avalon Boulevard at I-405 NB Ramps	D	Weekday PM	Weekday PM	3 Phase	0.604	B
		Friday PM	Friday PM	Signal	0.502	A
6. Avalon Boulevard at I-405 SB Ramps	D	Weekday PM	Weekday PM	2 Phase	0.572	A
		Friday PM	Friday PM	Signal	0.639	B
7. Leapwood Avenue at Del Amo Boulevard	D	Weekday PM	Weekday PM	5 Phase	0.743	C
		Friday PM	Friday PM	Signal	0.756	C

Notes:

- ICU = Intersection Capacity Utilization
- LOS = Level of Service, please refer to *Tables 3-1* for the LOS definitions
- **BOLD ICU/LOS** indicates unacceptable service level

4.0 TRAFFIC FORECASTING METHODOLOGY

In order to estimate the traffic impact characteristics of the proposed Project, a multi-step process has been utilized. The first step is trip generation, which estimates the total arriving and departing traffic on a peak hour and daily basis. The traffic generation potential is forecast by applying the appropriate vehicle trip generation equations or rates to the project development tabulation.

The second step of the forecasting process is trip distribution, which identifies the origins and destinations of inbound and outbound project traffic. These origins and destinations are typically based on demographics and existing/anticipated travel patterns in the study area.

The third step is traffic assignment, which involves the allocation of project traffic to study area streets and intersections. Traffic assignment is typically based on minimization of travel time, which may or may not involve the shortest route, depending on prevailing operating conditions and travel speeds. Traffic distribution patterns are indicated by general percentage orientation, while traffic assignment allocates specific volume forecasts to individual roadway links and intersection turning movements throughout the study area.

With the forecasting process complete and project traffic assignments developed, the impact of the proposed Project is isolated by comparing operational (LOS) conditions at selected key intersections using expected future traffic volumes with and without forecast project traffic. The need for site-specific and/or cumulative local area traffic improvements can then be evaluated and the significance of the project's impacts identified.

5.0 PROJECT TRAFFIC CHARACTERISTICS

5.1 Project Traffic Generation

The trip generation potential of the proposed Project has been estimated using trip rates/equations for ITE Land Use 445: Multiplex Movie Theatre and ITE Land Use 820: Shopping Center as contained in the 9th Edition of the *Trip Generation*, published by the Institute of Transportation Engineers (ITE), [Washington, D.C., 2012] which is located in **Table 5-1**.

As shown in the middle portion of **Table 5-2**, the proposed Project is forecast to generate approximately 4,354 daily trips, with 25 trips (12 inbound, 13 outbound) produced during the weekday AM peak hour, 198 trips (71 inbound, 127 outbound) produced during the weekday PM peak hour, and 247 trips (148 inbound, 99 outbound) produced during the Friday PM peak hour.

The lower portion of **Table 5-2** presents a comparison between the existing and proposed trip generation. The “net” trip generation potential totals 3,698 weekday daily trips, with 10 trips (3 inbound, 7 outbound) produced during the Weekday AM peak hour, 135 trips (41 inbound, 94 outbound) produced during the weekday PM peak hour, and 184 trips (118 inbound, 66 outbound) produced during the Friday PM peak hour. Please note that to provide a conservative forecast, no adjustment to the trip generation potential of the proposed theatre to account for internal capture between the existing retail uses was made. It is very likely, for example, that patrons of the proposed theatre may also visit other existing uses on-site, such as the restaurants or retail shops, without leaving the site.

TABLE 5-1
PROJECT TRAFFIC GENERATION RATES/EQUATIONS¹

ITE Land Use Code	Time Period	Rates/Equations	Percent Entering	Percent Exiting
<ul style="list-style-type: none"> ▪ 820: Shopping Center ² (TE/1,000 SF) 	Daily	$LN(T) = 0.65 LN(X) + 5.83$	50%	50%
	AM Peak Hour	$LN(T) = 0.61 LN(X) + 2.24$	62%	38%
	PM Peak Hour	$LN(T) = 0.67 LN(X) + 3.31$	48%	52%
	Friday Peak Hour	$LN(T) = 0.67 LN(X) + 3.31$	48%	52%
<ul style="list-style-type: none"> ▪ 445: Multiplex Movie Theatre ³ (TE/Seat) 	Daily	$T = 1.76 (X)$	50%	50%
	AM Peak Hour	$T = 0.01 (X)$	50%	50%
	PM Peak Hour	$T = 0.08 (X)$	36%	64%
	Friday Peak Hour	$T = 0.10 (X)$	60%	40%

Notes:

TE/1,000 SF = Trip ends per 1,000 square feet of development

TE/1,000 SF = Trip ends per seat

¹ Source: *Trip Generation Manual*, 9th Edition, Institute of Transportation Engineers (ITE), Washington, D.C. (2012).

² No data is provided for a Friday PM peak hour therefore, the weekday PM peak hour trip generation was assumed.

³ Daily and AM peak hour trip generation rates from ITE Land Use: 443: Movie Theater without Matinee since these rates are not available for ITE Land Use 445: Multiplex Movie Theatre.

TABLE 5-2
PROJECT TRAFFIC GENERATION FORECAST

Project Description	Daily 2-Way	AM Peak Hour			PM Peak Hour			Friday PM Peak Hour		
		Enter	Exit	Total	Enter	Exit	Total	Enter	Exit	Total
<i>Existing Development</i>										
• SouthBay Pavilion (1,013,023 SF)	30,591	396	244	640	1,356	1,471	2,827	1,356	1,471	2,827
Pass-By Reduction ⁴	<u>-6,118</u>	<u>-40</u>	<u>-24</u>	<u>-64</u>	<u>-271</u>	<u>-294</u>	<u>-565</u>	<u>-271</u>	<u>-294</u>	<u>-565</u>
SouthBay Pavilions Existing Traffic Generation Potential	24,473	356	220	576	1,085	1,177	2,262	1,085	1,177	2,262
<i>Proposed Project</i>										
• Cinemark (57,352 SF/14 Screens/2,474 Seats)	4,354	12	13	25	71	127	198	148	99	247
• SouthBay Pavilion (971,590 SF)	<u>29,771</u>	<u>386</u>	<u>238</u>	<u>624</u>	<u>1,319</u>	<u>1,430</u>	<u>2,749</u>	<u>1,319</u>	<u>1,430</u>	<u>2,749</u>
Subtotal	34,125	398	251	649	1,390	1,557	2,947	1,467	1,529	2,996
Pass-By Reduction ⁴	<u>-5,954</u>	<u>-39</u>	<u>-24</u>	<u>-63</u>	<u>-264</u>	<u>-286</u>	<u>-550</u>	<u>-264</u>	<u>-286</u>	<u>-550</u>
The South Bay Pavilion Total Traffic Generation Potential	28,171	359	227	586	1,126	1,271	2,397	1,203	1,243	2,446
SouthBay Pavilion Net Additional Traffic Generation Potential	3,698	3	7	10	41	94	135	118	66	184

⁴ Pass-by trips are trips made as intermediate stops on the way from an origin to a primary trip destination. Pass-by trips are attracted from traffic passing the site on adjacent streets (i.e. Del Amo Boulevard and Avalon Boulevard), which contain direct access to the generator. The *Trip Generation Manual*, 9th Edition, Institute of Transportation Engineers (ITE), Washington, D.C. (2012), *Volume 1: User's Guide and Handbook* recommends a pass-by reduction factor of 20% for the PM peak hour. The PM peak hour pass-by percentage (T) was calculated based on the following equation: $\ln(T) = -0.29\ln(X) + 5.00$, where X = gross leasable area. The same factor was used to estimate the daily and Friday PM peak hour pass-by percentage. The AM peak hour pass-by percentage was estimated to be 10%.

5.2 Project Traffic Distribution and Assignment

Figure 5-1 illustrates the general, directional traffic distribution pattern for the proposed Project. Project traffic volumes both entering and exiting the project site have been distributed and assigned to the adjacent street system based on the following considerations:

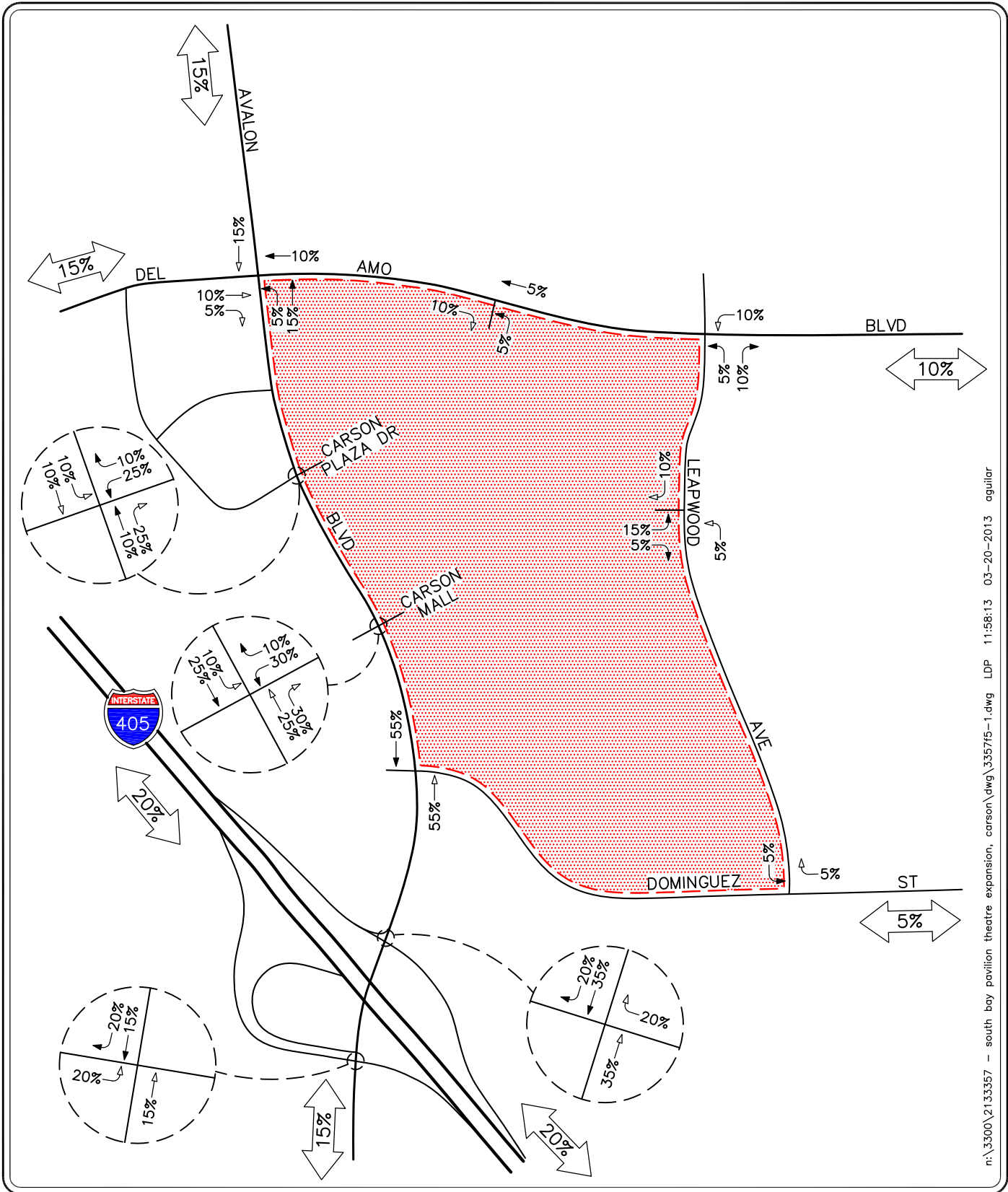
- location of site access points in relation to the surrounding street system,
- the site's proximity to major traffic carriers and regional access routes,
- physical characteristics of the circulation system such as lane channelization and presence of traffic signals that affect travel patterns, and
- presence of traffic congestion in the surrounding vicinity.

The anticipated Weekday PM peak hour and Friday PM peak hour traffic volumes associated with the proposed Project are presented in *Figures 5-2* and *5-3*, respectively. The traffic volume assignments presented in *Figures 5-2* and *5-3* reflect the traffic distribution characteristics shown in *Figure 5-1* and the traffic generation forecast presented in *Table 5-2*. *Figures 5-2* and *5-3* also present the project daily traffic volumes for the 4 key roadway segments in the vicinity of the proposed project.

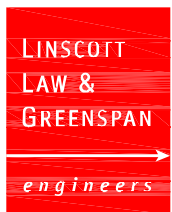
5.3 Existing Plus Project Traffic Conditions

The existing plus project traffic conditions have been generated based upon existing conditions and the estimated project traffic. These forecast traffic conditions have been prepared pursuant to the California Environmental Quality Act (CEQA) guidelines, which require that the potential impacts of a Project be evaluated upon the circulation system as it currently exists. This traffic volume scenario and the related intersection capacity analyses will identify the roadway improvements necessary to mitigate the direct traffic impacts of the Project, if any.

Figures 5-4 and *5-5* present projected Weekday PM peak hour and Friday PM peak hour traffic volumes at the seven (7) key study intersections with the addition of the trips generated by the proposed Project to existing traffic volumes, respectively. *Figures 5-4* and *5-5* also present the existing plus project average daily traffic volumes for the 4 key roadway segments in the vicinity of the proposed project.



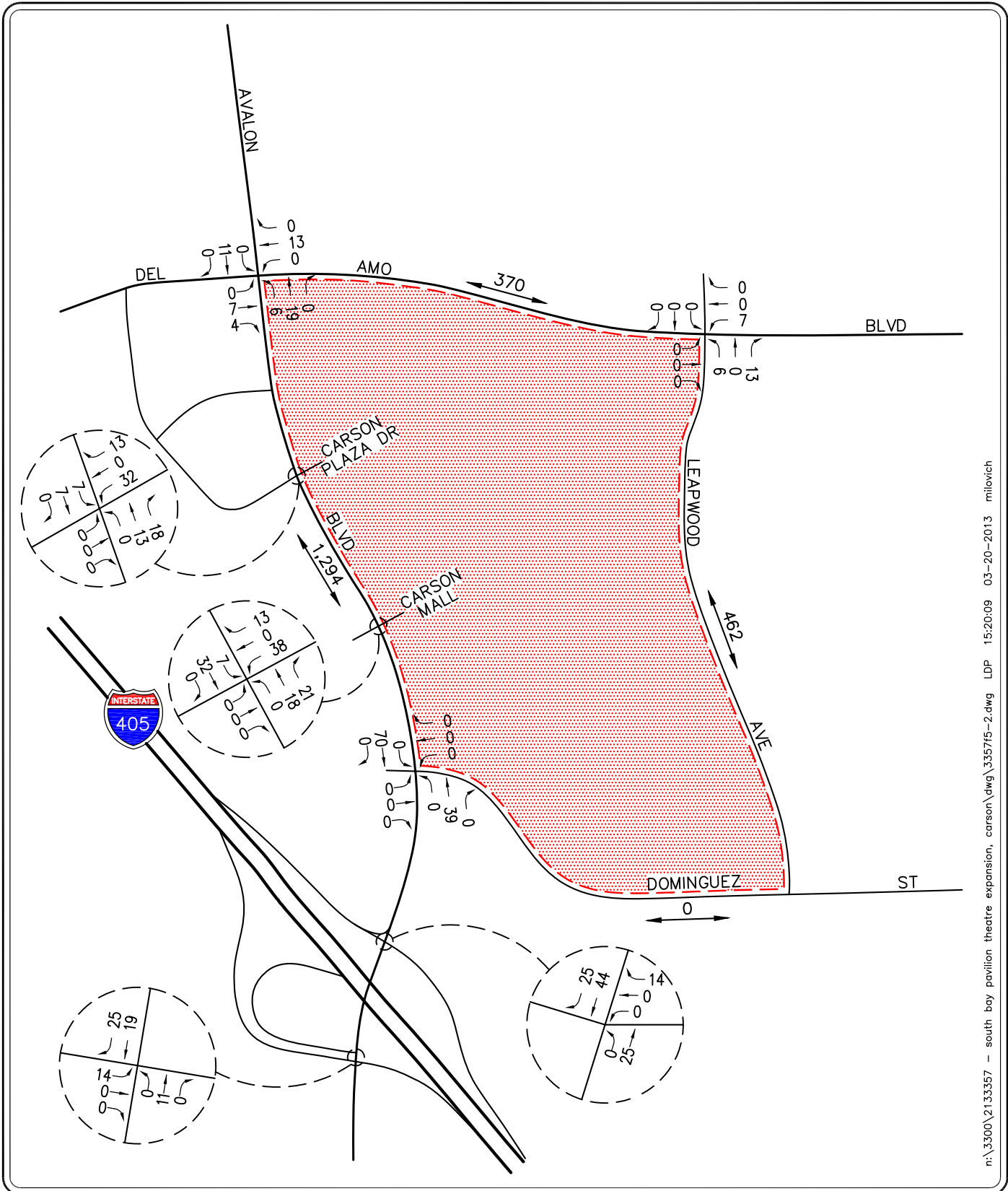
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KEY
 ← = INBOUND PERCENTAGE
 → = OUTBOUND PERCENTAGE
 [Red Hatched Box] = PROJECT SITE

FIGURE 5-1

PROJECT DISTRIBUTION PATTERN
 SOUTHBAY PAVILION THEATRE EXPANSION, CARSON



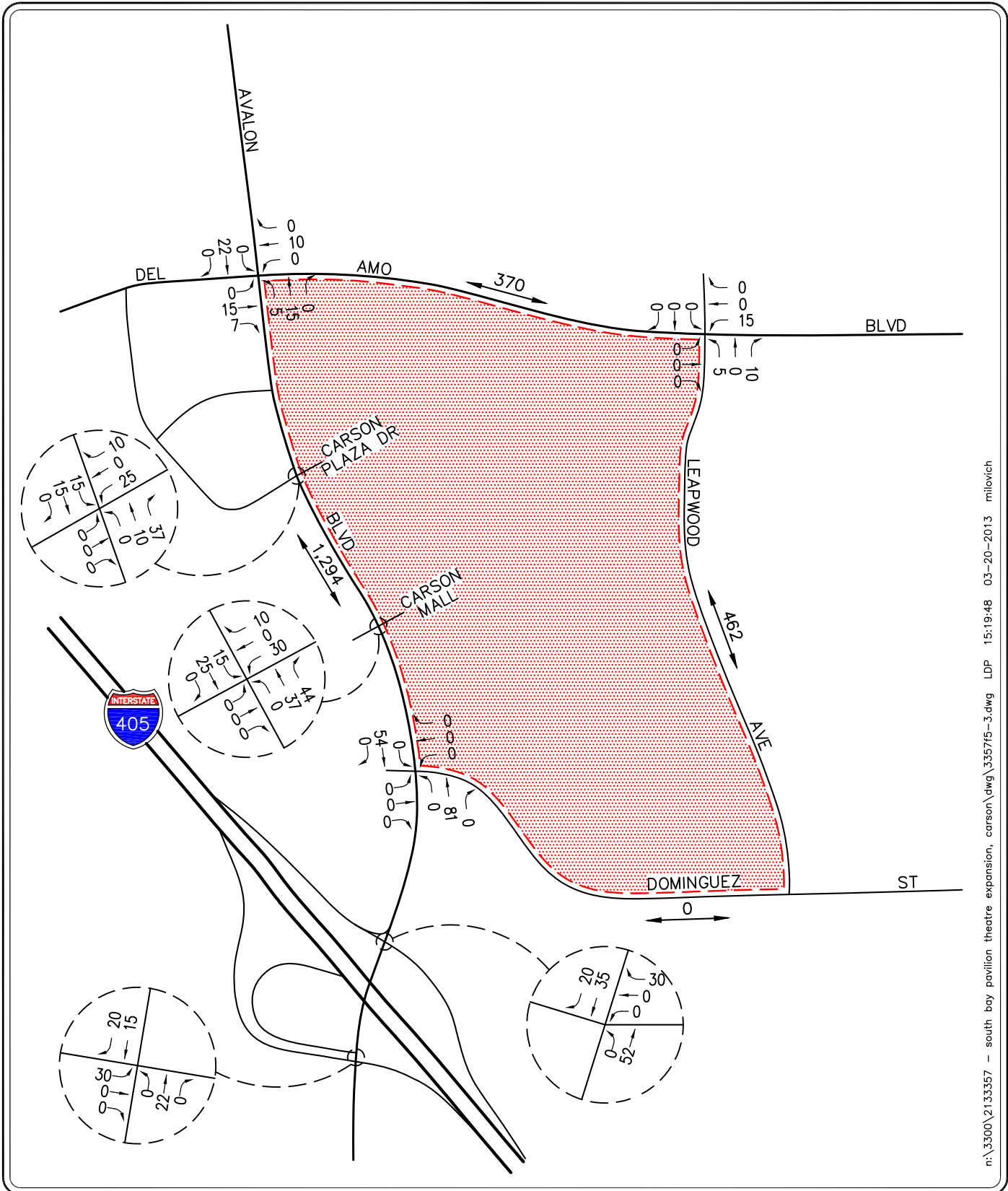
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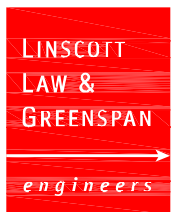
KEY
 XX,XXX = DAILY TRAFFIC VOLUMES
 [Red shaded area] = PROJECT SITE

FIGURE 5-2

WEEKDAY PM PEAK HOUR AND DAILY PROJECT TRAFFIC VOLUMES
 SOUTHBAY PAVILION THEATRE EXPANSION, CARSON



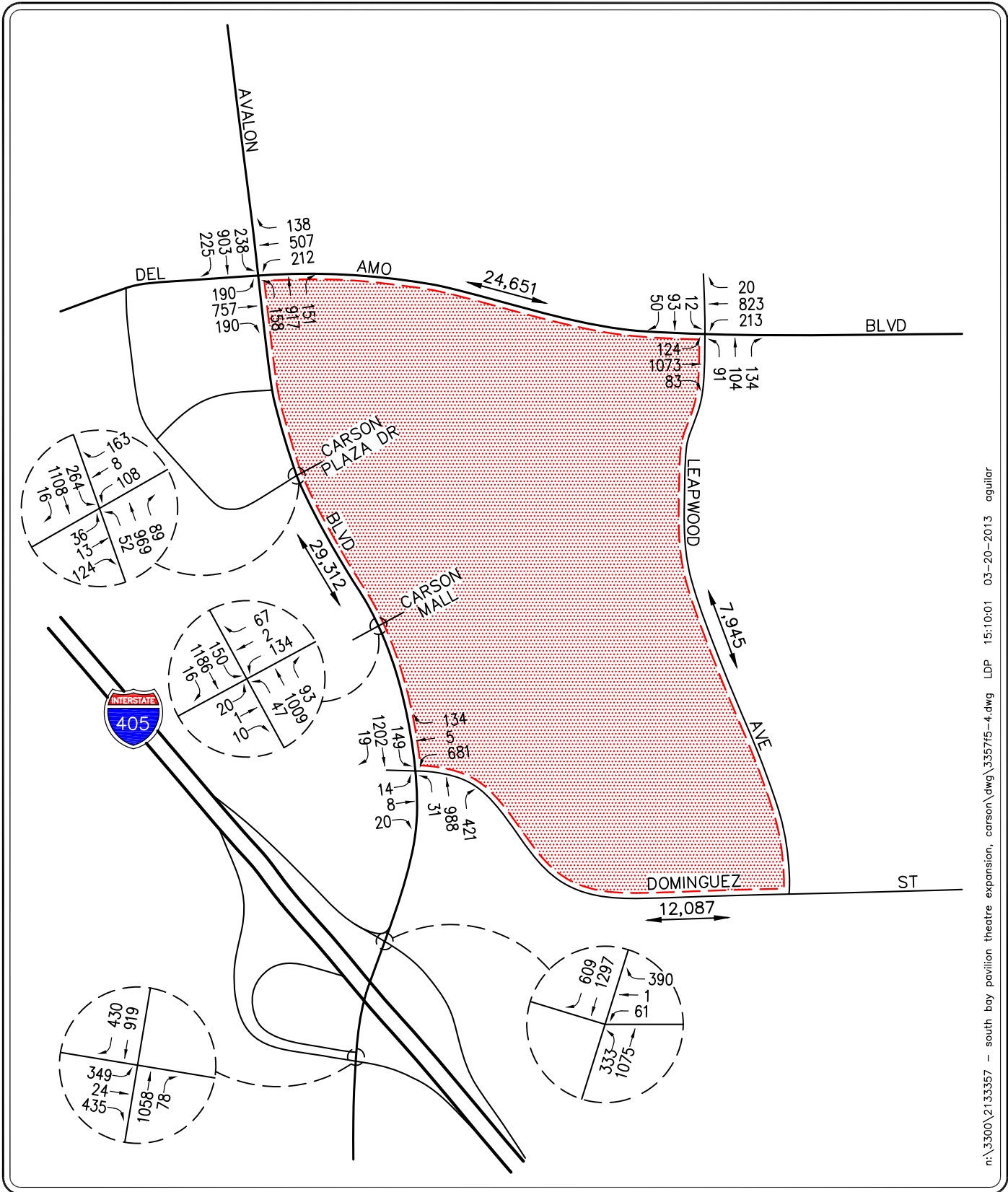
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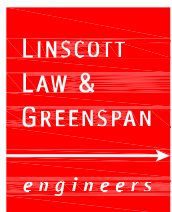
KEY
 XX,XXX = DAILY TRAFFIC VOLUMES
 = PROJECT SITE

FIGURE 5-3

FRIDAY PM PEAK HOUR AND DAILY PROJECT TRAFFIC VOLUMES
 SOUTHBAY PAVILION THEATRE EXPANSION, CARSON



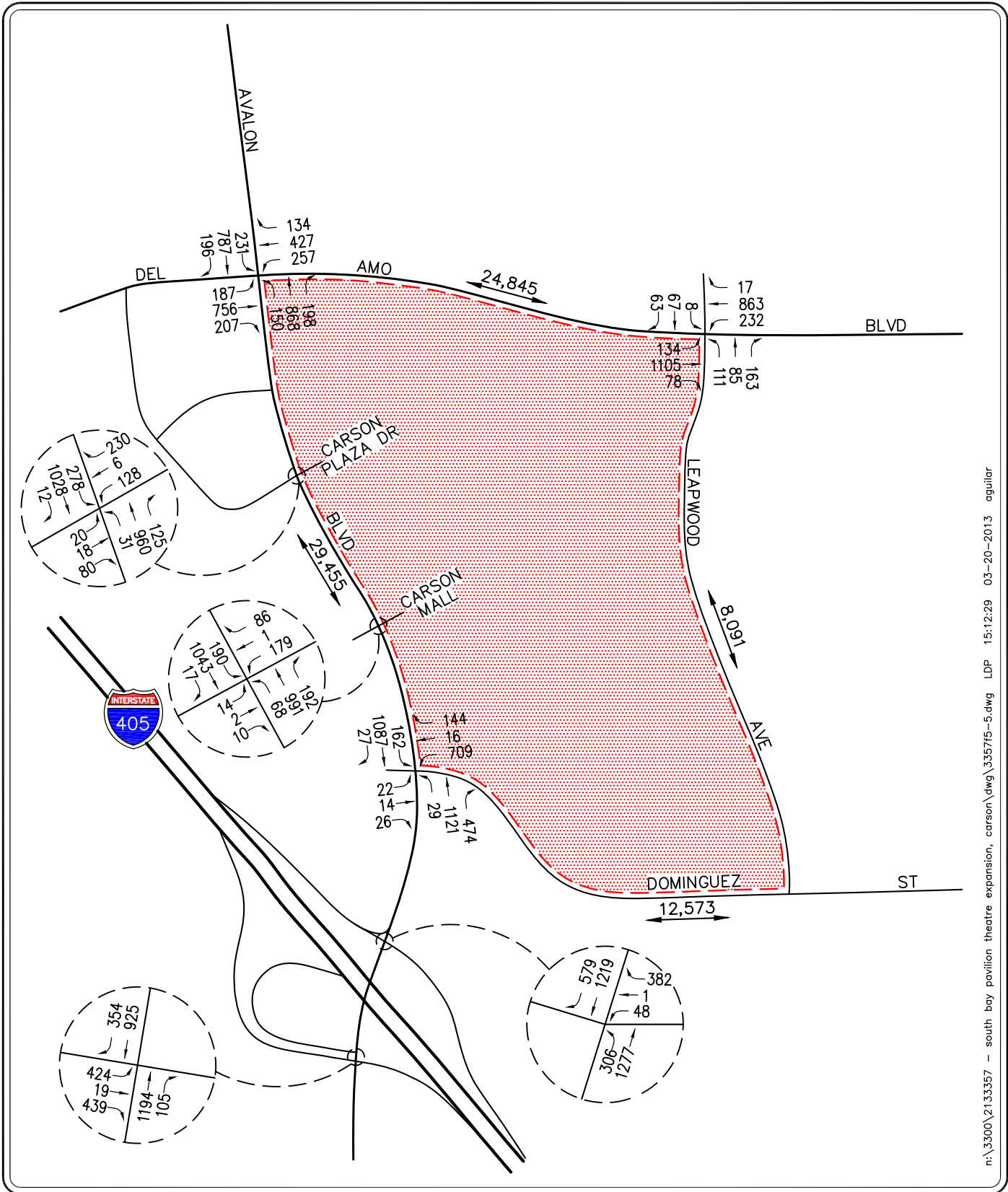
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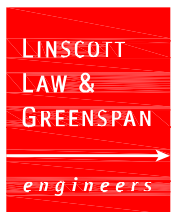
KEY
 XX,XXX = DAILY TRAFFIC VOLUMES
 [Red Hatched Box] = PROJECT SITE

FIGURE 5-4

EXISTING PLUS PROJECT WEEKDAY PM PEAK HOUR AND DAILY TRAFFIC VOLUMES
 SOUTHBAY PAVILION THEATRE EXPANSION, CARSON



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KEY
 XX,XXX = DAILY TRAFFIC VOLUMES
 [Red Hatched Box] = PROJECT SITE

FIGURE 5-5

EXISTING PLUS PROJECT FRIDAY PM PEAK HOUR AND DAILY TRAFFIC VOLUMES
 SOUTHBAY PAVILION THEATRE EXPANSION, CARSON

6.0 FUTURE TRAFFIC CONDITIONS

6.1 Ambient Traffic Growth

Horizon year, background traffic growth estimates have been calculated using an ambient growth factor. The ambient traffic growth factor is intended to include unknown and future cumulative projects in the study area, as well as account for regular growth in traffic volumes due to the development of projects outside the study area. The future growth in traffic volumes has been calculated at one percent (1.0%) per year. Applied to the Year 2013 existing traffic volumes, this factor results in a 2.0% growth in existing volumes to the near-term horizon year 2015.

6.2 Cumulative Projects Description and Location

In order to make a realistic estimate of future on-street conditions prior to implementation of the proposed Project, the status of other known development projects (cumulative projects) in the vicinity of the proposed Project has been researched at the City of Carson. With this information, the potential impact of the proposed Project can be evaluated within the context of the cumulative impact of all ongoing development. Based on our research, there are twelve (12) cumulative projects in the City of Carson within the vicinity of the subject site that have either been built, but not yet fully occupied, or are being processed for approval. These twelve (12) cumulative projects have been included as part of the cumulative background setting.

Table 6-1 provides the location and a brief description for each of the twelve (12) cumulative projects. *Figure 6-1* graphically illustrates the location of the cumulative projects. These cumulative projects are expected to generate vehicular traffic, which may affect the operating conditions of the key study intersections.

6.3 Cumulative Projects Trip Generation and Assignment

Table 6-2 summarizes the trip generation potential for all twelve (12) cumulative projects. As shown, the cumulative projects are forecast to generate a total of 77,340 daily trips, with 3,297 trips (1,764 inbound and 1,533 outbound) forecast during the AM peak hour and 6,550 trips (3,260 inbound and 3,290 outbound) forecast during the PM peak hour. It should be noted that the *Shell Specific Plan* project was considered to be included for analysis. However, it is not expected to be completed until after Year 2015. Thus, it was not included in this study. For the purposes of this study the Friday PM peak hour cumulative projects trip generation is expected to be equal to the Weekday PM peak hour cumulative projects trip generation.

The Weekday PM peak hour and Friday PM peak hour traffic volumes associated with the twelve (12) cumulative projects in the Year 2015 are presented in *Figures 6-2* and *6-3*, respectively. *Figures 6-2* and *6-3* also present the cumulative project average daily traffic volumes for the 4 key roadway segments in the vicinity of the proposed project.

6.4 Year 2015 Cumulative Traffic Volumes

Figures 6-4 and *6-5* present the Year 2015 Weekday PM peak hour and Friday PM peak hour cumulative traffic volumes at the seven (7) key study intersections, respectively. Please note that the cumulative traffic volumes represent the accumulation of existing traffic, ambient growth traffic and cumulative projects traffic. *Figures 6-4* and *6-5* also present the average daily traffic volumes for Year 2015 cumulative traffic conditions at the 4 key roadway segments in the vicinity of the proposed project.

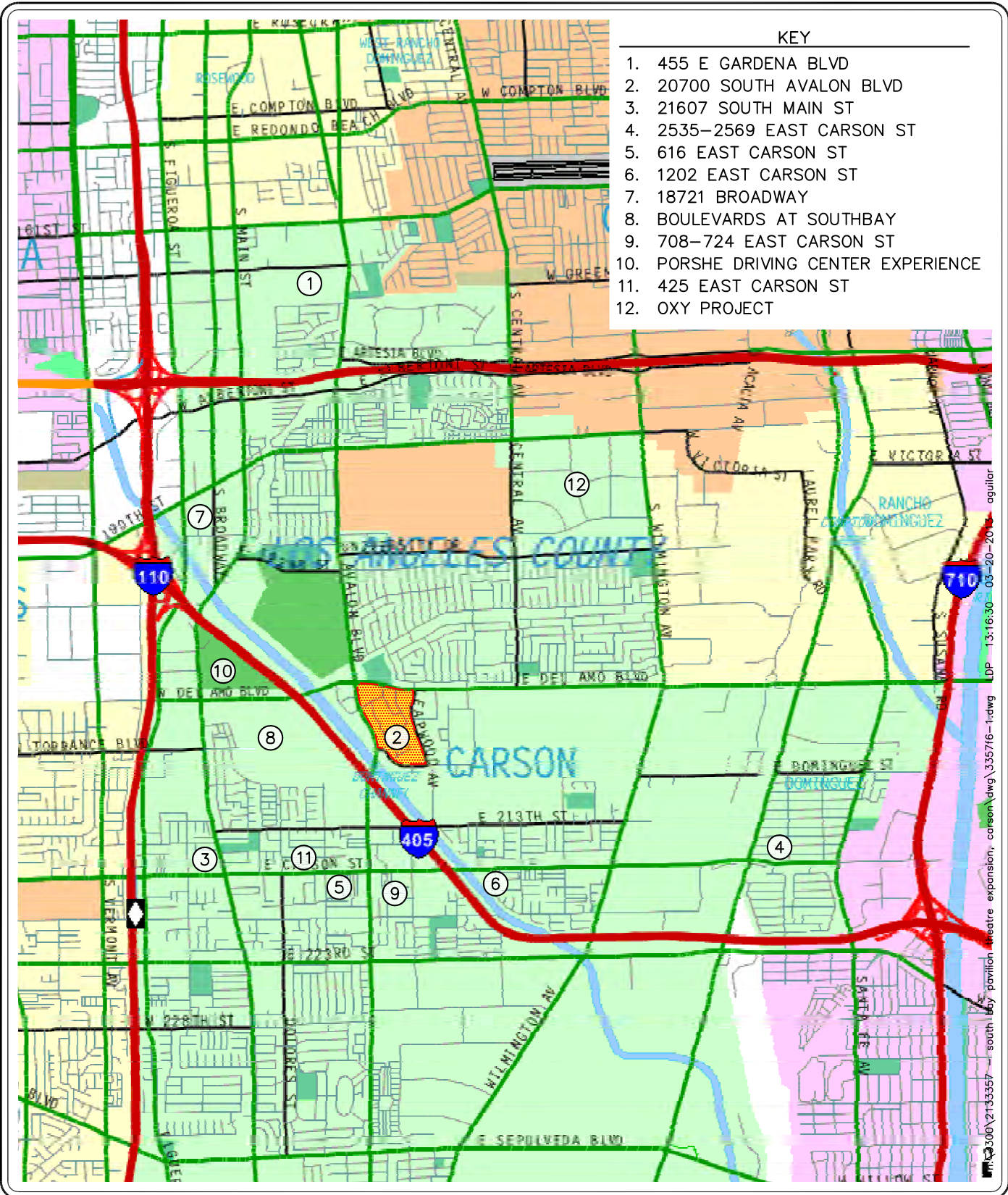
Figures 6-6 and *6-7* illustrate the Year 2015 forecast Weekday PM peak hour and Friday PM peak hour traffic volumes with the inclusion of the trips generated by the proposed Project, respectively. *Figures 6-6* and *6-7* also present the average daily traffic volumes for Year 2015 cumulative plus Project traffic conditions at the 4 key roadway segments in the vicinity of the proposed Project.

TABLE 6-1
LOCATION AND DESCRIPTION OF CUMULATIVE PROJECTS⁵

No.	Cumulative Project ⁶	Jurisdiction	Location/Address	Description
1.	455 E Gardena Blvd	Gardena	455 E Gardena Blvd	230,000 SF research development
2.	20700 South Avalon Blvd	Carson	20700 South Avalon Blvd	14,000 SF high turn-over sit-down restaurant
3.	21607 South Main St	Carson	21607 South Main St	3,675 SF retail
4.	2535-2569 East Carson St	Carson	2535-2569 East Carson St	12 DU single family
5.	616 East Carson St	Carson	616 East Carson St	137 DU condominium/townhomes, 15 DU condominiums, and 13,000 SF retail
6.	1202 East Carson St	Carson	1202 East Carson St	3,825 SF of new car sales
7.	18721 Broadway	Gardena	18721 Broadway	41,500 SF general light industrial
8.	Boulevards at SouthBay	Carson	Boulevards at SouthBay	3,500 SF general light industrial and 2,000,000 SF mixed use
9.	708-724 East Carson St	Carson	708-724 East Carson St	150 DU condominiums and 13,000 SF retail
10.	Porsche Driving Center Experience	Carson	East of Main Street south of I-405 Freeway	65,000 SF operations building and 6.43 acres of driving course facilities
11.	425 East Carson Street	Carson	425 East Carson Street	40 DU affordable housing units
12.	Oxy Project	Carson	1450-1480 Charles Willard Street	200 wells

⁵ Source: *Porsche Driving Center Experience Project* dated August 16, 2012 prepared by RBF Consulting.

⁶ It should be noted that the *Shell Specific Plan* project was considered for analysis. However, this project is not expected to be completed until after Year 2015. Thus, it was not included in this study.



KEY

1. 455 E GARDENA BLVD
2. 20700 SOUTH AVALON BLVD
3. 21607 SOUTH MAIN ST
4. 2535-2569 EAST CARSON ST
5. 616 EAST CARSON ST
6. 1202 EAST CARSON ST
7. 18721 BROADWAY
8. BOULEVARDS AT SOUTHBAY
9. 708-724 EAST CARSON ST
10. PORSCHE DRIVING CENTER EXPERIENCE
11. 425 EAST CARSON ST
12. OXY PROJECT

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NO SCALE

SOURCE: THOMAS BROS.
KEY

- # = LOCATION OF RELATED PROJECT
- [Red shaded area] = PROJECT SITE

FIGURE 6-1

CUMULATIVE PROJECTS LOCATION MAP
SOUTHBAY PAVILION THEATRE EXPANSION, CARSON

**TABLE 6-2
CUMULATIVE PROJECTS TRAFFIC GENERATION FORECAST⁷**

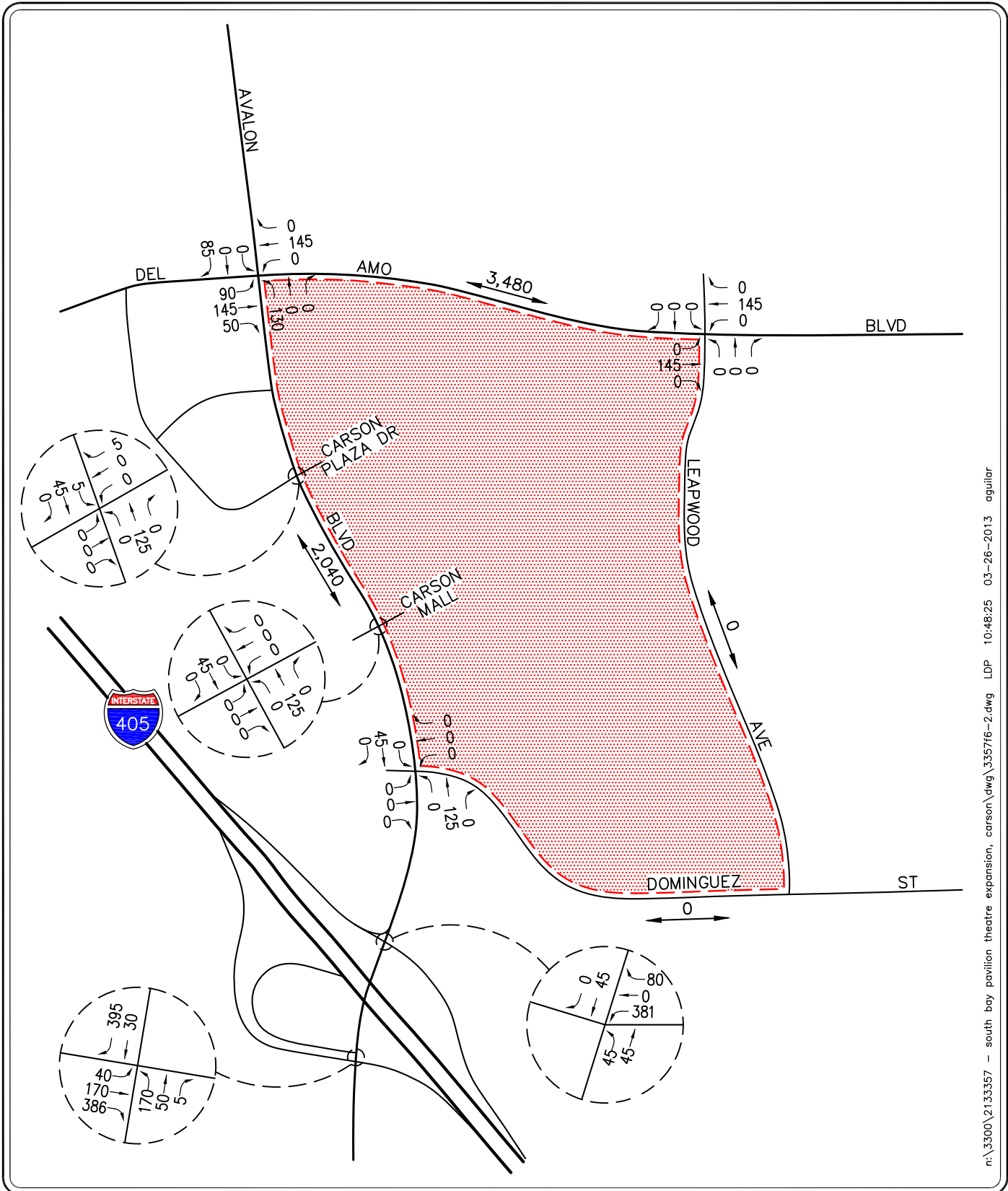
No.	Cumulative Project Description	Daily	AM Peak Hour			PM Peak Hour		
		Two-Way	In	Out	Total	In	Out	Total
1.	455 E Gardena Blvd	1,865	232	48	280	37	209	246
2.	20700 South Avalon Blvd	1,718	84	77	161	52	42	94
3.	21607 South Main St	154	2	1	3	5	5	10
4.	2535-2569 East Carson St	115	2	7	9	8	4	12
5.	616 East Carson St	1,481	21	64	85	74	45	119
6.	1202 East Carson St	128	6	2	8	4	6	10
7.	18721 Broadway	159	24	7	31	11	20	31
8.	Boulevards at SouthBay	68,990	1,271	1,245	2,516	2,956	2,810	5,766
9.	708-724 East Carson St	2,060	28	67	95	87	62	149
10.	Porsche Driving Center Experience	438	91	0	91	12	80	92
11.	425 East Carson Street ⁸	232	3	15	18	14	7	21
12.	Oxy Project	Nom.	Nom.	Nom.	Nom.	Nom.	Nom.	Nom.
TOTAL CUMULATIVE PROJECT TRIPS		77,340	1,764	1,533	3,297	3,260	3,290	6,550

Notes:

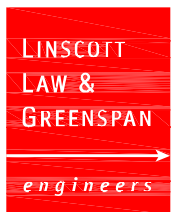
Nom. = Nominal

⁷ Source: *Porsche Driving Center Experience Project* dated August 16, 2012 prepared by RBF Consulting.

⁸ Source: *Trip Generation Manual*, 9th Edition, Institute of Transportation Engineers (ITE), Washington, D.C. (2012).



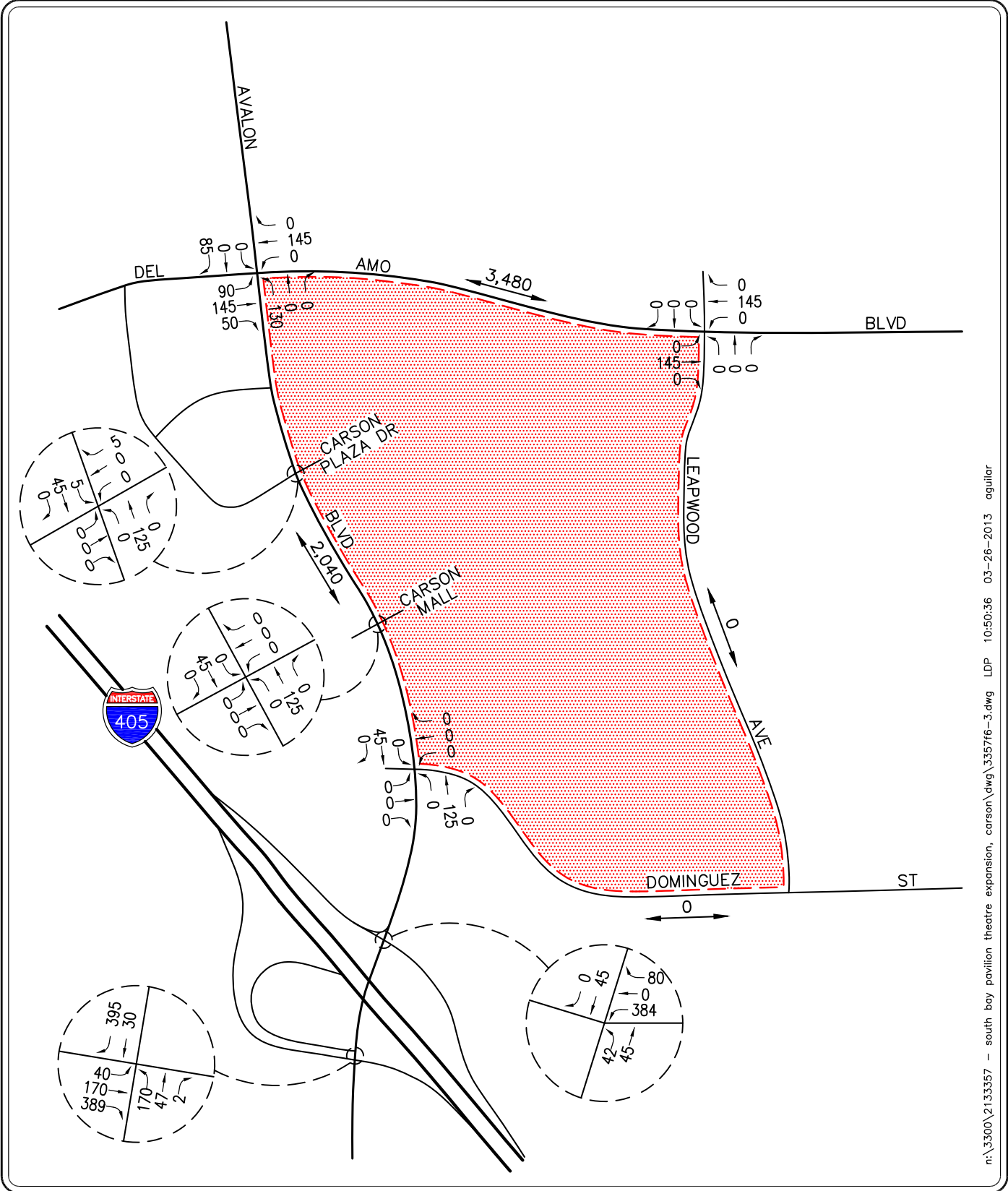
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KEY
 XX,XXX = DAILY TRAFFIC VOLUMES
 [Red shaded area] = PROJECT SITE

FIGURE 6-2

WEEKDAY PM PEAK HOUR AND DAILY CUMULATIVE PROJECT TRAFFIC VOLUMES
 SOUTHBAY PAVILION THEATRE EXPANSION, CARSON



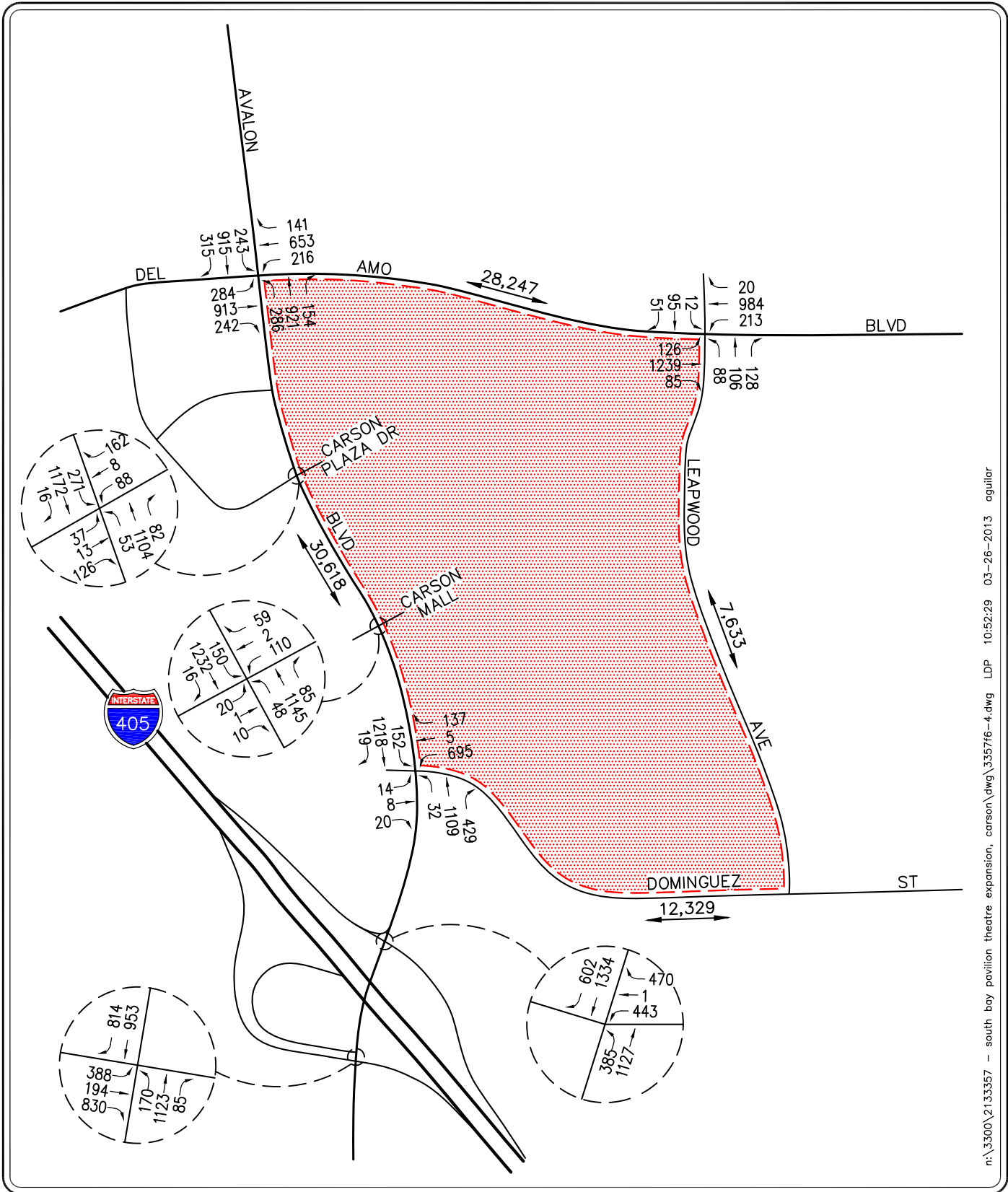
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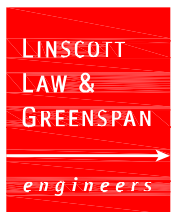
KEY
 XX,XXX = DAILY TRAFFIC VOLUMES
 = PROJECT SITE

FIGURE 6-3

FRIDAY PM PEAK HOUR AND DAILY CUMULATIVE PROJECT TRAFFIC VOLUMES
 SOUTHBAY PAVILION THEATRE EXPANSION, CARSON



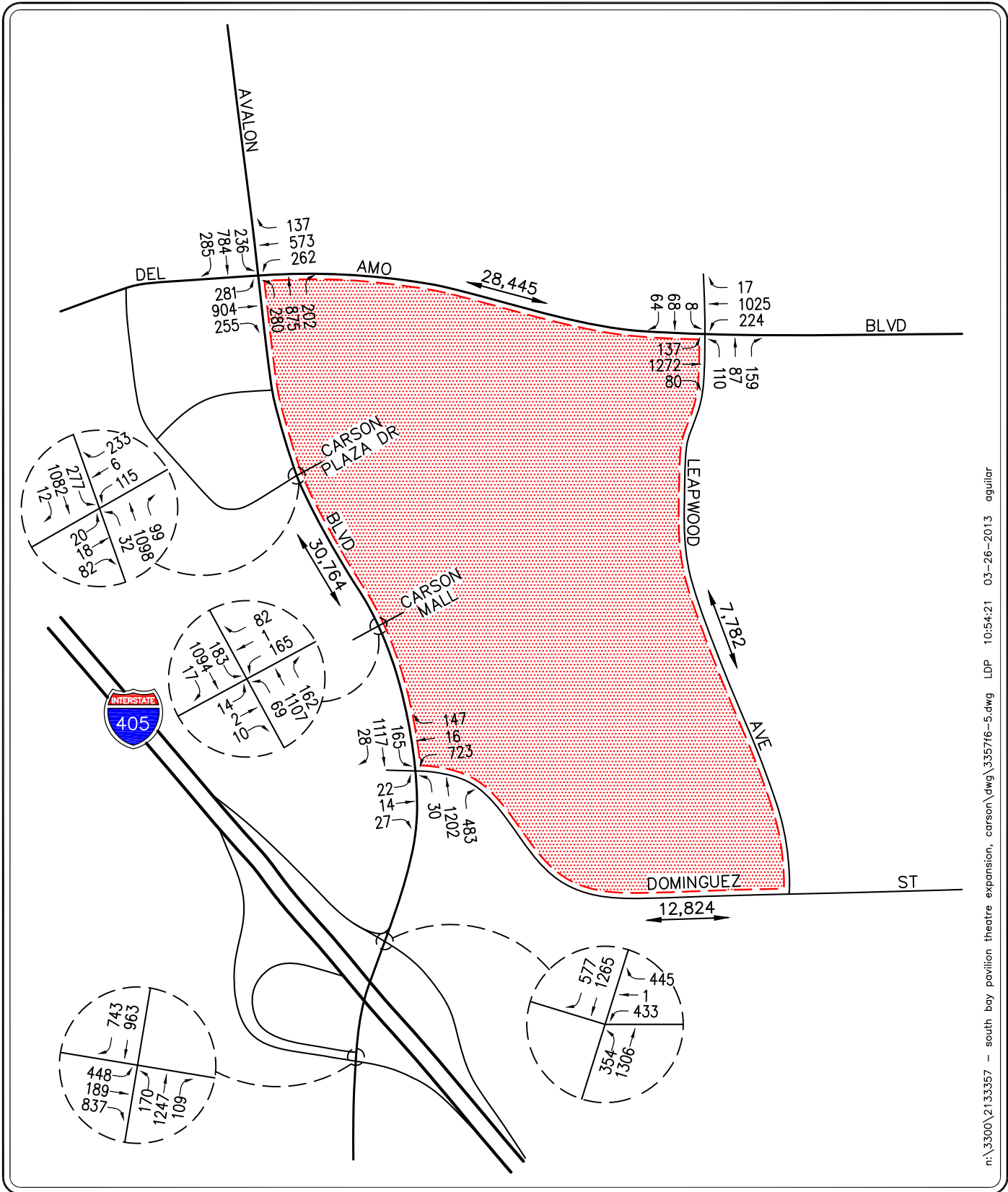
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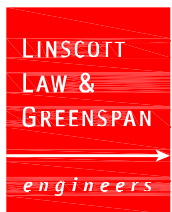
KEY
 XX,XXX = DAILY TRAFFIC VOLUMES
 [Red Hatched Box] = PROJECT SITE

FIGURE 6-4

YEAR 2015 CUMULATIVE WEEKDAY PM PEAK HOUR AND DAILY TRAFFIC VOLUMES
 SOUTHBAY PAVILION THEATRE EXPANSION, CARSON



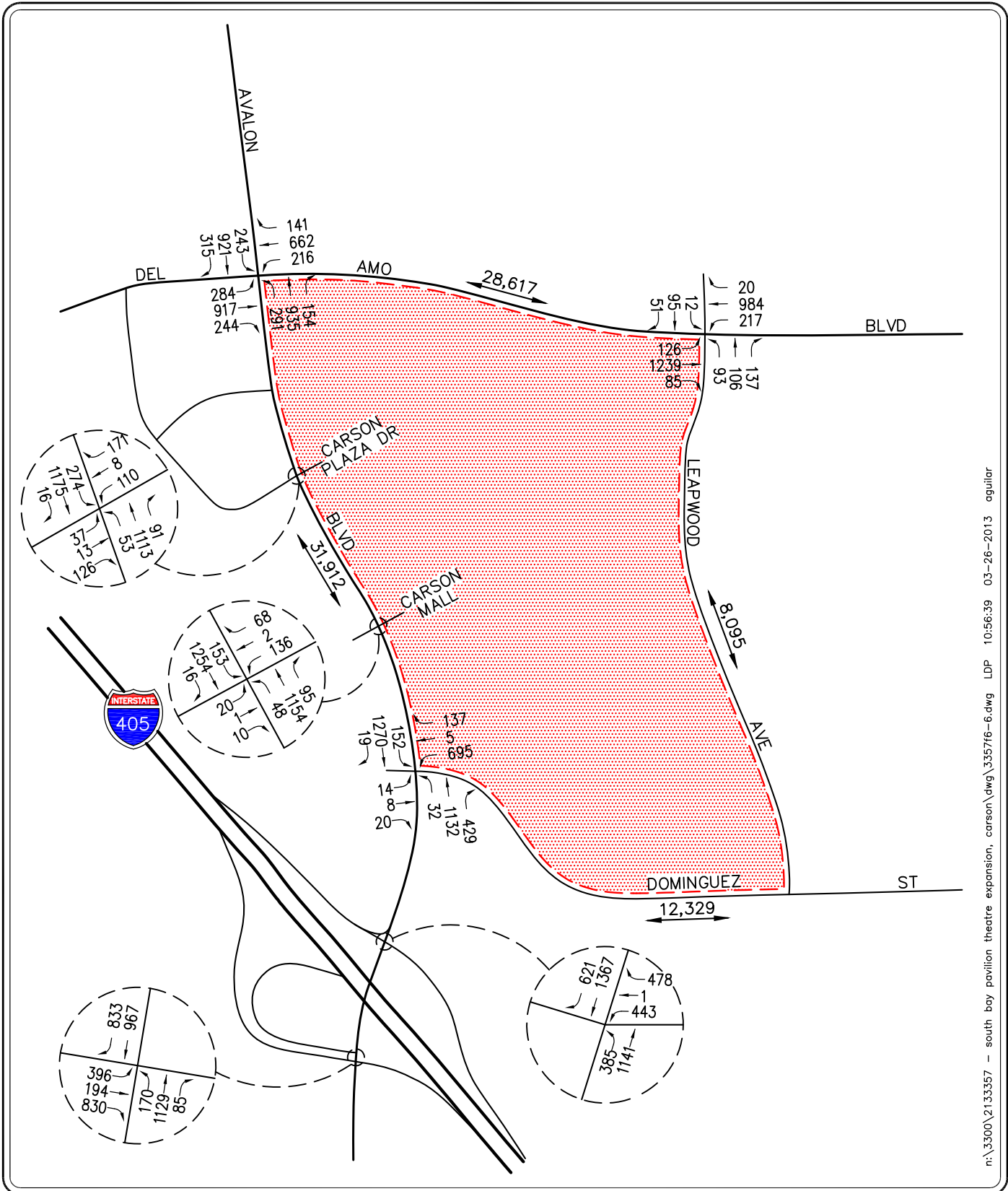
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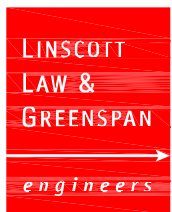
KEY
 XX,XXX = DAILY TRAFFIC VOLUMES
 [Red shaded area] = PROJECT SITE

FIGURE 6-5

YEAR 2015 CUMULATIVE FRIDAY PM
 PEAK HOUR AND DAILY TRAFFIC VOLUMES
 SOUTHBAY PAVILION THEATRE EXPANSION, CARSON



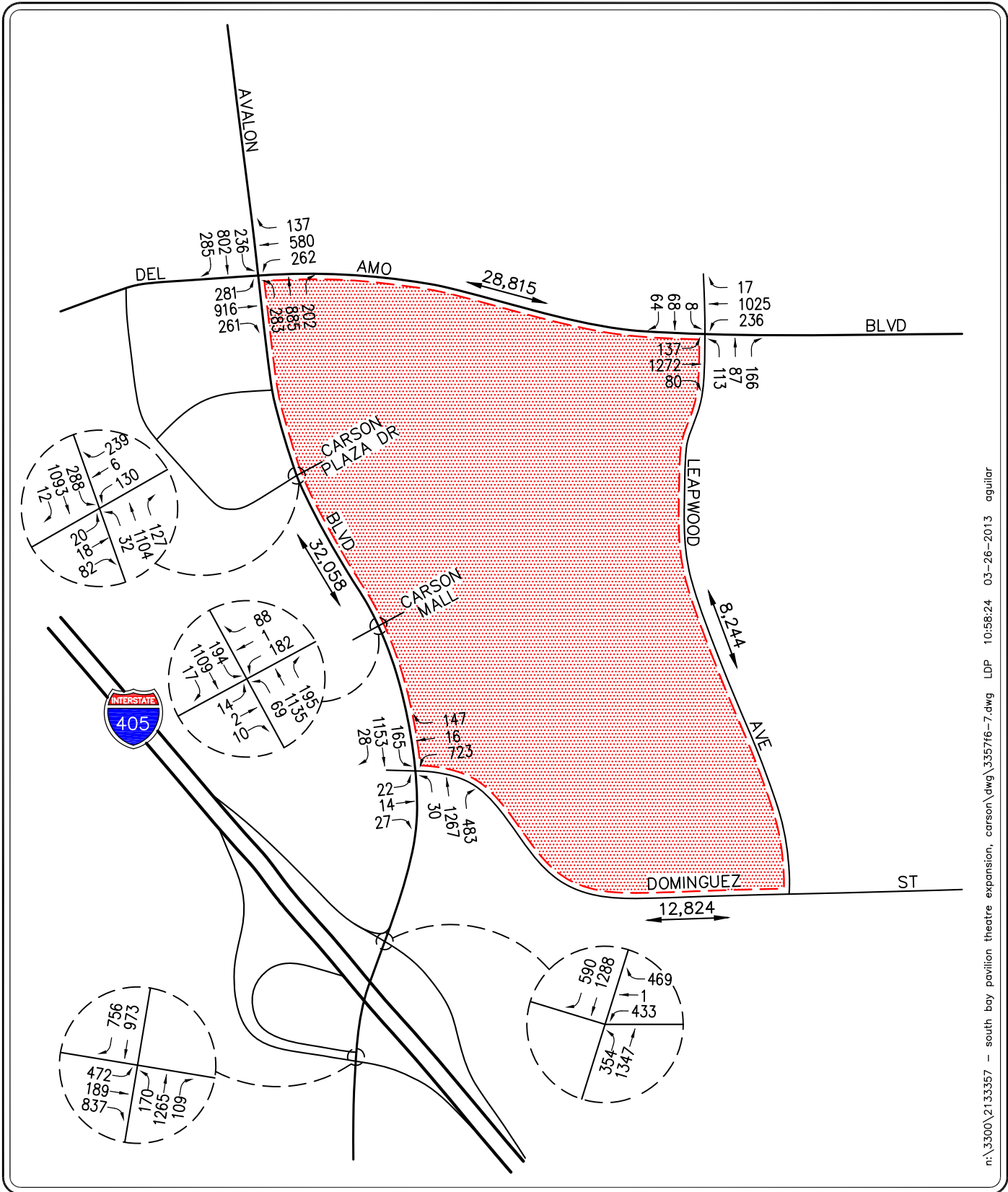
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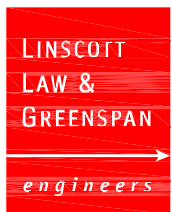
KEY
 XX,XXX = DAILY TRAFFIC VOLUMES
 [Red Hatched Box] = PROJECT SITE

FIGURE 6-6

YEAR 2015 CUMULATIVE PLUS PROJECT WEEKDAY PM PEAK HOUR AND DAILY TRAFFIC VOLUMES
 SOUTHBAY PAVILION THEATRE EXPANSION, CARSON



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KEY
 XX,XXX = DAILY TRAFFIC VOLUMES
 = PROJECT SITE

FIGURE 6-7

YEAR 2015 CUMULATIVE PLUS PROJECT FRIDAY PM PEAK HOUR AND DAILY TRAFFIC VOLUMES
 SOUTHBAY PAVILION THEATRE EXPANSION, CARSON

7.0 TRAFFIC IMPACT ANALYSIS METHODOLOGY

The relative impact of the proposed Project during the Weekday PM peak hour and Friday PM peak hour was evaluated based on analysis of future operating conditions at the seven (7) key study intersections without, then with the proposed Project. The previously discussed capacity analysis procedures were utilized to investigate the future volume-to-capacity relationships and service level characteristics at each study intersection. The significance of the potential impacts of the Project at each key intersection was then evaluated using the following traffic impact criteria.

7.1 Impact Criteria and Thresholds

Per City of Carson and LA CMP criteria, impacts to local and regional transportation systems are considered significant if:

- An undesirable peak hour Level of Service (LOS) (i.e. LOS E or F) at any of the key signalized intersections is projected. LOS D is the minimum acceptable condition that should be maintained during the peak commuter hour on all intersections within the City of Carson.
- The Project increases traffic demand at a key signalized study intersection by 0.020 or greater, where the final (future) LOS is deficient or adverse.

7.2 Traffic Impact Analysis Scenarios

Per the requirements of the City of Carson, the following scenarios are those for which volume/capacity calculations have been performed at the seven (7) key study intersections for existing plus project and near-term (Year 2015) traffic conditions:

- (a) Existing Traffic Conditions;
- (b) Existing Plus Project Traffic Conditions;
- (c) Scenario (B) with Improvements, if necessary;
- (d) Near-Term (Year 2015) Cumulative Traffic Conditions,
- (e) Near-Term (Year 2015) Cumulative plus Project Traffic Conditions; and
- (f) Scenario (E) with Improvements, if necessary.

8.0 PEAK HOUR INTERSECTION CAPACITY ANALYSIS

8.1 Existing Plus Project Traffic Conditions

Table 8-1 summarizes the peak hour level of service results at the seven (7) key study intersections for Existing plus Project traffic conditions. The first column (1) of ICU/LOS values in *Table 8-1* presents a summary of existing Weekday PM peak hour and Friday PM peak hour traffic conditions (which were also presented in *Table 3-2*). The second column (2) lists existing plus project traffic conditions. The third column (3) shows the increase in ICU value due to the added peak hour project trips and indicates whether the traffic associated with the Project will have a significant impact based on the LOS standards and significant impact criteria defined in this report. The fourth column (4) indicates the anticipated level of service with recommended improvements if needed.

8.1.1 Existing Traffic Conditions

As previously presented in *Table 3-2*, all of the seven (7) key study intersections currently operate at an acceptable level of service during the Weekday PM peak hour and Friday PM peak hours.

8.1.2 Existing Plus Project Traffic Conditions

Review of columns 2 and 3 of *Table 8-1* indicates that traffic associated with the proposed Project ***will not*** significantly impact any of the seven (7) key study intersections, when compared to the LOS standards and significant impact criteria specified in this report. The seven (7) key study intersections currently operate and are forecast to continue to operate at LOS D or better during the Weekday PM peak hour and Friday PM peak hours with the addition of Project generated traffic to existing traffic.

Appendix C presents the existing plus project ICU/LOS calculations for the seven (7) key study intersections for the Weekday PM peak hour and Friday PM peak hour.

**TABLE 8-1
EXISTING PLUS PROJECT PEAK HOUR INTERSECTION CAPACITY ANALYSIS**

Key Intersections	Minimum Acceptable LOS	Time Period	(1) Existing Traffic Conditions		(2) Existing Plus Project Traffic Conditions		(3) Project Significant Impact		(4) With Recommended Improvements	
			ICU	LOS	ICU	LOS	ICU Increase	Yes/No	ICU	LOS
1. Avalon Boulevard at Del Amo Boulevard	D	Weekday PM	0.797	C	0.803	D	0.006	No	--	--
		Friday PM	0.786	C	0.795	C	0.009	No	--	--
2. Avalon Boulevard at Carson Plaza Drive	D	Weekday PM	0.642	B	0.661	B	0.019	No	--	--
		Friday PM	0.638	B	0.654	B	0.016	No	--	--
3. Avalon Boulevard at Carson Mall	D	Weekday PM	0.504	A	0.526	A	0.022	No	--	--
		Friday PM	0.563	A	0.593	A	0.030	No	--	--
4. Avalon Boulevard at Dominguez Street	D	Weekday PM	0.697	B	0.697	B	0.000	No	--	--
		Friday PM	0.763	C	0.763	C	0.000	No	--	--
5. Avalon Boulevard at I-405 NB Ramps	D	Weekday PM	0.604	B	0.616	B	0.012	No	--	--
		Friday PM	0.502	A	0.514	A	0.012	No	--	--
6. Avalon Boulevard at I-405 SB Ramps	D	Weekday PM	0.572	A	0.576	A	0.004	No	--	--
		Friday PM	0.639	B	0.653	B	0.014	No	--	--
7. Leapwood Avenue at Del Amo Boulevard	D	Weekday PM	0.743	C	0.751	C	0.008	No	--	--
		Friday PM	0.756	C	0.775	C	0.019	No	--	--

8.2 Year 2015 Cumulative Traffic Analysis

Table 8-2 summarizes the peak hour level of service results at the seven (7) key study intersections for the Year 2015. The first column (1) of ICU/LOS values in *Table 8-2* presents a summary of existing Weekday PM peak hour and Friday PM peak hour traffic conditions (which were also presented in *Table 3-2*). The second column (2) lists projected 2015 cumulative conditions (existing traffic plus ambient growth traffic plus cumulative project traffic) based on existing and planned intersection geometry, but without any traffic generated from the proposed Project. The third column (3) presents future forecast traffic conditions with the addition of traffic generated by the proposed Project. The fourth column (4) shows the increase in ICU value due to the added peak hour project trips and indicates whether the traffic associated with the Project will have a significant impact based on the LOS standards and significant impact criteria defined in this report. The fifth column (5) indicates the anticipated level of service with recommended improvements if needed.

8.2.1 Year 2015 Cumulative Traffic Conditions

An analysis of future (Year 2015) cumulative traffic conditions indicates that the addition of ambient traffic growth and cumulative project traffic will cumulatively impact one (1) of the seven (7) key study intersections. The intersection of Avalon Boulevard/Del Amo Boulevard is forecast to continue to operate at unacceptable LOS E during the PM peak hour in the Year 2015. The remaining six (6) key study intersections are forecast to continue to operate at acceptable levels of service during the Weekday PM peak hour and Friday PM peak hours with the addition of ambient traffic growth and cumulative project traffic.

8.2.2 Year 2015 Cumulative Plus Project Traffic Conditions

Review of columns 3 and 4 of *Table 8-2* indicates that traffic associated with the proposed Project ***will not*** significantly impact any of the seven (7) key study intersections, when compared to the LOS standards and significant impact criteria specified in this report. Although the intersection of Avalon Boulevard/Del Amo Boulevard is forecast to operate at unacceptable LOS E during the Weekday PM peak hour and Friday PM peak hours with the addition of project traffic, the proposed Project is expected to add less than 0.020 to the ICU value. The remaining six (6) key study intersections are forecast to continue to operate at an acceptable LOS with the addition of Project generated traffic in the Year 2015.

As shown in column 5 of *Table 8-2*, the recommended improvements at the intersection of Avalon Boulevard/Del Amo Boulevard offset the cumulative impact at this location. Although the proposed Project does not have a significant impact under the “Year 2015 Cumulative Plus Project Peak Hour Intersection Capacity Analysis” at the key study intersection of Avalon Boulevard/Del Amo Boulevard, the proposed Project would be required to pay a proportional “fair-share” traffic impact fee towards the recommended improvements at the aforementioned key study intersection.

Appendix C presents the Year 2015 plus project ICU/LOS calculations for the seven (7) key study intersections for the Weekday PM peak hour and Friday PM peak hour.

TABLE 8-2
YEAR 2015 PEAK HOUR INTERSECTION CAPACITY ANALYSIS

Key Intersections	Minimum Acceptable LOS	Time Period	(1)		(2)		(3)		(4)		(5)	
			Existing Traffic Conditions		Year 2015 Cumulative Traffic Conditions		Year 2015 Cumulative Plus Project Traffic Conditions		Project Significant Impact		With Planned Improvements	
			ICU	LOS	ICU	LOS	ICU	LOS	ICU Increase	Yes/No	ICU	LOS
1. Avalon Boulevard at Del Amo Boulevard	D	Weekday PM	0.797	C	0.955	E	0.961	E	0.006	No	0.880 ⁹	D
		Friday PM	0.786	C	0.944	E	0.953	E	0.009	No	0.875	D
2. Avalon Boulevard at Carson Plaza Drive	D	Weekday PM	0.642	B	0.681	B	0.701	C	0.020	No	--	--
		Friday PM	0.638	B	0.681	B	0.693	B	0.012	No	--	--
3. Avalon Boulevard at Carson Mall	D	Weekday PM	0.504	A	0.538	A	0.560	A	0.022	No	--	--
		Friday PM	0.563	A	0.598	A	0.628	B	0.030	No	--	--
4. Avalon Boulevard at Dominguez Street	D	Weekday PM	0.697	B	0.708	C	0.708	C	0.000	No	--	--
		Friday PM	0.763	C	0.775	C	0.775	C	0.000	No	--	--
5. Avalon Boulevard at I-405 NB Ramps	D	Weekday PM	0.604	B	0.749	C	0.761	C	0.012	No	--	--
		Friday PM	0.502	A	0.644	B	0.657	B	0.013	No	--	--
6. Avalon Boulevard at I-405 SB Ramps	D	Weekday PM	0.572	A	0.850 ¹⁰	D	0.864	D	0.014	No	--	--
		Friday PM	0.639	B	0.679	B	0.693	B	0.014	No	--	--
7. Leapwood Avenue at Del Amo Boulevard	D	Weekday PM	0.743	C	0.801	D	0.809	D	0.008	No	--	--
		Friday PM	0.756	C	0.814	D	0.833	D	0.019	No	--	--

⁹ Recommended mitigation measures needed to offset the cumulative impact consist of an additional northbound left-turn lane along Avalon Boulevard.

¹⁰ Planned improvements at this intersection consist of the completion of the left-turn lane and protected phasing in the northbound direction along Avalon Boulevard.

9.0 STATE OF CALIFORNIA (CALTRANS) METHODOLOGY

In conformance with the current Caltrans *Guide for the Preparation of Traffic Impact Studies*, existing and projected peak hour operating conditions at the two (2) state-controlled study intersections within the study area have been evaluated using the *Highway Capacity Manual 2000* (HCM 2000 for signalized intersections) operations method of analysis. These state-controlled locations include the following two of seven study intersections:

5. Avalon Boulevard at I-405 NB Ramps
6. Avalon Boulevard at I-405 SB Ramps

Caltrans “endeavors to maintain a target LOS at the transition between LOS “C” and LOS “D” on State highway facilities”; it does not require that LOS “D” (shall) be maintained. However, Caltrans acknowledges that this may not always be feasible and recommends that the lead agency consult with Caltrans to determine the appropriate target LOS. For this analysis, LOS D is the target level of service standard and will be utilized to assess the project impacts at the state-controlled study intersections.

9.1 Highway Capacity Manual (HCM) Method of Analysis (Signalized Intersections)

Based on the HCM operations method of analysis, level of service for signalized intersections is defined in terms of control delay, which is a measure of driver discomfort, frustration, fuel consumption, and lost travel time. The delay experienced by a motorist is made up of a number of factors that relate to control, geometries, traffic, and incidents. Total delay is the difference between the travel time actually experienced and the reference travel time that would result during ideal conditions: in the absence of traffic control, in the absence of geometric delay, in the absence of any incidents, and when there are no other vehicles on the road.

In Chapter 16 of the HCM, only the portion of total delay attributed to the control facility is quantified. This delay is called *control delay*. Control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. In contrast, in previous versions of the HCM (1994 and earlier), delay included only stopped delay. Specifically, LOS criteria for traffic signals are stated in terms of the average control delay per vehicle. The six qualitative categories of Level of Service that have been defined along with the corresponding HCM control delay value range for signalized intersections are shown in *Table 9-1*.

9.2 Existing Plus Project Traffic Conditions

Table 9-2 summarizes the peak hour *Highway Capacity Manual 2000* level of service results at the two state-controlled study intersections within the study area for Existing plus Project traffic conditions. The first column (1) of HCM/LOS values in *Table 9-2* presents a summary of existing traffic conditions. The second column (2) presents existing plus project traffic conditions based on existing intersection geometry. The third column (3) indicates whether added peak hour Project trips will have a significant impact based on the significant impact criteria defined in this report.

9.2.1 Existing Traffic Conditions

All two state-controlled study intersections currently operate at an acceptable LOS C or better during the Weekday PM peak hours and Friday PM peak hours.

9.2.2 Existing Plus Project Traffic Conditions

Review of Columns 2 and 3 of *Table 9-2* indicates that traffic associated with the proposed Project ***will not*** significantly impact any of the two state-controlled study intersections, when compared to the LOS standards and significant impact criteria specified in this report. The two state-controlled study intersections are forecast to continue to operate at an acceptable LOS with the addition of Project generated traffic to existing traffic.

TABLE 9-1
LEVEL OF SERVICE CRITERIA FOR SIGNALIZED INTERSECTIONS (HCM METHODOLOGY)¹¹

Level of Service (LOS)	Control Delay Per Vehicle (seconds/vehicle)	Level of Service Description
A	≤ 10.0	<p>This level of service occurs when progression is extremely favorable and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.</p>
B	> 10.0 and ≤ 20.0	<p>This level generally occurs with good progression, short cycle lengths, or both. More vehicles stop than with LOS A, causing higher levels of average delay.</p>
C	> 20.0 and ≤ 35.0	<p>Average traffic delays. These higher delays may result from fair progression, longer cycle lengths, or both. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant at this level, though many still pass through the intersection without stopping.</p>
D	> 35.0 and ≤ 55.0	<p>Long traffic delays. At level D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high v/c ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.</p>
E	> 55.0 and ≤ 80.0	<p>Very long traffic delays. This level is considered by many agencies (i.e. SANBAG) to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are frequent occurrences.</p>
F	≥ 80.0	<p>Severe congestion. This level, considered to be unacceptable to most drivers, often occurs with over saturation, that is, when arrival flow rates exceed the capacity of the intersection. It may also occur at high v/c ratios below 1.0 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing factors to such delay levels.</p>

¹¹ Source: *Highway Capacity Manual 2000*, Chapter 16 (Signalized Intersections).

**TABLE 9-2
EXISTING PLUS PROJECT PEAK HOUR INTERSECTION CAPACITY ANALYSIS – CALTRANS**

Key Intersections	Minimum Acceptable LOS	Time Period	(1)		(2)		(3)
			Existing Traffic Conditions		Existing Plus Project Traffic Conditions		Significant Impact
			HCM (s/v)	LOS	HCM (s/v)	LOS	Yes/No
5. Avalon Boulevard at I-405 NB Ramps	D	Weekday PM	10.4	B	10.4	B	No
		Friday PM	28.5	C	30.7	C	No
6. Avalon Boulevard at I-405 SB Ramps	D	Weekday PM	11.9	B	12.0	B	No
		Friday PM	12.7	B	13.0	B	No

Notes:

- s/v = seconds per vehicle

9.3 Year 2015 Plus Project Traffic Conditions

Table 9-3 summarizes the peak hour *Highway Capacity Manual 2000* level of service results at the two state-controlled study intersections within the study area for the 2015 horizon year. The first column (1) of HCM/LOS values in **Table 9-3** presents a summary of existing traffic conditions. The second column (2) presents Year 2015 cumulative traffic conditions based on existing and planned intersection geometry, but without any Project generated traffic. The third column (3) presents future forecast traffic conditions with the addition of project traffic. The fourth column (4) indicates whether added peak hour Project trips will have a significant impact based on the significant impact criteria defined in this report.

9.3.1 Year 2015 Cumulative Traffic Conditions

An analysis of future (Year 2015) cumulative traffic conditions indicates that the addition of ambient traffic growth and cumulative projects traffic will not adversely impact any of the two state-controlled study intersections. The two state-controlled study intersections are forecast to operate at an acceptable LOS during the Weekday PM peak hour and Friday PM peak hours with the addition of ambient traffic growth and cumulative projects traffic.

9.3.2 Year 2015 Cumulative Plus Project Traffic Conditions

Review of Columns 3 and 4 of **Table 9-3** indicates that traffic associated with the proposed Project will not significantly impact any of the two state-controlled study intersections, when compared to the LOS standards and significant impact criteria specified in this report. The two state-controlled study intersections are forecast to continue to operate at an acceptable LOS D or better with the addition of project generated traffic in the Year 2015.

Appendix D presents the existing plus project and Year 2015 plus project HCM/LOS calculations for the two state-controlled study intersections.

**TABLE 9-3
YEAR 2015 PEAK HOUR INTERSECTION CAPACITY ANALYSIS – CALTRANS**

Key Intersections	Minimum Acceptable LOS	Time Period	(1) Existing Traffic Conditions		(2) Year 2015 Cumulative Traffic Conditions		(3) Year 2015 Cumulative Plus Project Traffic Conditions		(4) Significant Impact
			HCM (s/v)	LOS	HCM (s/v)	LOS	HCM (s/v)	LOS	Yes/No
			5. Avalon Boulevard at I-405 NB Ramps	D	Weekday PM Friday PM	10.4 28.5	B C	19.0 50.0	B D
6. Avalon Boulevard at I-405 SB Ramps	D	Weekday PM Friday PM	11.9 12.7	B B	16.7 ¹² 16.8	B B	17.0 17.2	B B	No No

Notes:

- s/v = seconds per vehicle

¹² Planned improvements at this intersection consist of the completion of the left-turn lane and protected phasing in the northbound direction along Avalon Boulevard.

10.0 AREA-WIDE TRAFFIC IMPROVEMENTS

For those intersections where projected traffic volumes are expected to result in poor operating conditions, this report identifies roadway improvements that change the intersection geometry to increase capacity. These capacity improvements involve roadway widening and/or restriping to reconfigure (add lanes) to specific approaches of a key intersection. The identified improvements are expected to: mitigate the impact of area-wide deficiencies and/or improve Levels of Service to an acceptable range. *Figure 10-1* illustrates the planned and recommended improvements.

10.1 Planned Improvements

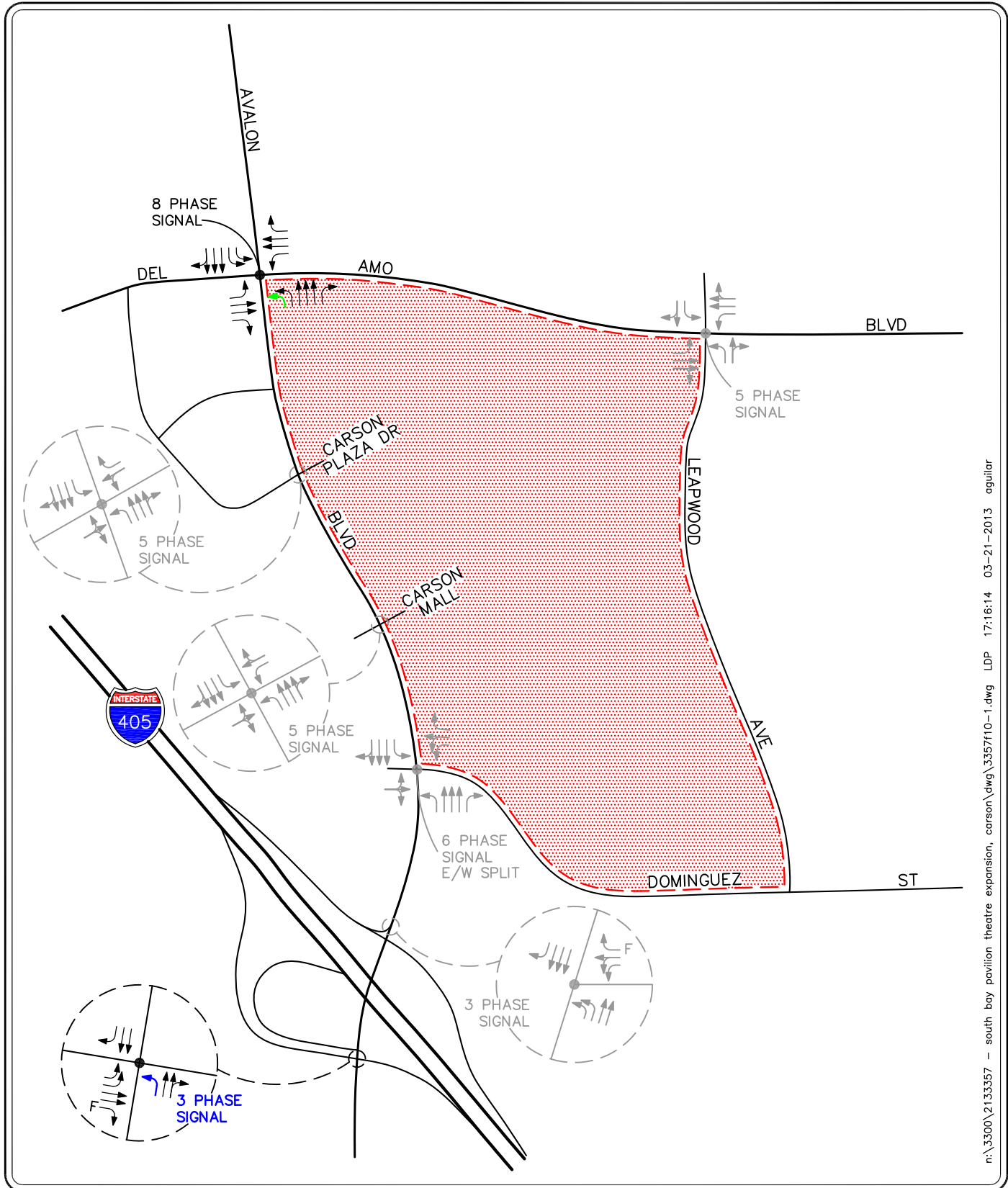
Based on research at the City of Carson and input from the City Traffic Engineer, the following planned improvements have been identified and are included in the Year 2015 cumulative conditions.

- **No. 6 – Avalon Boulevard at I-405 SB Ramps:** Construction has already been conducted to provide a northbound left-turn lane with protected phasing. During our field inventory this improvement was coned off and the protected phasing had not been turned on. It is assumed that under Year 2015 cumulative conditions this improvement will be operational.

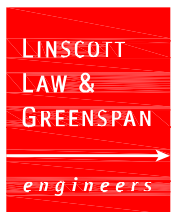
10.2 Recommended Cumulative Improvements

The results of Year 2015 cumulative conditions level of service analysis as summarized in *Table 8-2* indicates that the proposed Project will cumulatively impact one (1) of the seven (7) key study intersections. The following improvement is recommended to mitigate the cumulative impact:

- **No. 1 – Avalon Boulevard at Del Amo Boulevard:** Modify the existing median along Avalon Boulevard and restripe to provide a second northbound left-turn lane. Modify existing traffic accordingly to current City of Carson standards and design requirements.



n:\3300\2133357 - south bay pavilion theatre expansion, carson\dwg\3357f10-1.dwg LDP 17:16:14 03-21-2013 agular



- KEY**
- ← = PLANNED IMPROVEMENTS
 - ← = YEAR 2015 RECOMMENDED IMPROVEMENTS
 - = PROJECT SITE

FIGURE 10-1

YEAR 2015 RECOMMENDED IMPROVEMENTS
SOUTHBAY PAVILION THEATRE EXPANSION, CARSON

11.0 PROJECT-RELATED FAIR SHARE CONTRIBUTION

The transportation impacts associated with the development of the Project were determined based on the Year 2015 analysis. As summarized in *Tables 8-2*, the development of the Project is anticipated to contribute to one (1) cumulative impact in the Year 2015. As such, the Project may be expected to construct improvements and/or can be expected to pay a proportional “fair-share” of the improvement costs of the impacted intersections to mitigate the Project’s traffic impacts.

Table 11-1 presents the Weekday PM and/or Friday PM peak hour (time period impacted) percentage of traffic impact at the study intersections impacted by the Project for Year 2015 traffic conditions.

As presented in this *Table 11-1*, the first column (1) presents a total of all intersection peak hour movements for existing conditions. The second column (2) presents Year 2015 cumulative traffic conditions. The third column (3) presents Year 2015 traffic conditions with Project traffic. The fourth column (4) represents what percentage of total intersection peak hour traffic is Project-related traffic. Columns (5) and (6) present the cost of the recommended mitigation measures and the Project’s fair-share contribution.

Review of *Table 11-1* shows that the Project’s fair share contribution to offset all Year 2015 intersection cumulative impacts is **\$17,750.00**.

**TABLE 11-1
YEAR 2015 PROJECT FAIR SHARE COST CONTRIBUTION**

Key Intersections	Impacted Time Period	(1) Existing Traffic	(2) Year 2015 Traffic	(3) Year 2015 Plus Project	(4) Project Percent Increase	(5) Total Improvement Cost	(6) Project Fair Share Contribution
1. Avalon Boulevard at Del Amo Boulevard	Weekday PM Friday PM	4,546 4,342	5,283 5,074	5,323 5,130	5.1% 7.1%	\$250,000.00	\$17,750.00
Totals						\$250,000.00	\$17,750.00

Note:

- Project Percent Increase (4) = [Column (3) – Column (2)] / [Column (3) – Column (1)].

12.0 CONGESTION MANAGEMENT PROGRAM (CMP)

The Congestion Management Program (CMP) was created statewide as a result of Proposition 111 and has been implemented locally by the Los Angeles County Metropolitan Transportation Authority (LACMTA). The CMP for Los Angeles County requires that the traffic impact of individual development projects of potential regional significance be analyzed. A specific system of arterial roadways plus all freeways comprise the CMP system.

12.1 Traffic Impact Review

As required by the current *Congestion Management Program for Los Angeles County*, a review has been made of designated monitoring locations on the CMP highway system for potential impact analysis. Per CMP TIA criteria, the geographic area examined in the TIA must include the following, at a minimum:

- All CMP arterial monitoring intersections, including freeway on and off-ramp intersections, where the project will add 50 or more trips during either the AM or PM weekday peak hours.
- Mainline freeway-monitoring stations where the project will add 150 or more trips, in either direction, during the AM or PM weekday peak hours.

12.1.1 Intersections

The following CMP intersection monitoring location within the project study area has been identified:

- | | |
|--------------------|-------------------------------------|
| <u>CMP Station</u> | <u>Intersection</u> |
| No. 7 | Alameda Street at Del Amo Boulevard |

As stated earlier, the CMP guidelines require that arterial monitoring intersection locations must be examined if the proposed project will add 50 or more trips during either the AM or PM weekday peak hours (of adjacent street traffic) at CMP monitoring intersections. Based on the proposed project's trip generation potential, trip distribution and trip assignment, the Project ***will not*** add 50 or more trips at the identified CMP intersection during the Weekday PM peak hour or Friday PM peak hour. Therefore a CMP intersection traffic impact analysis is not required.

12.1.2 Freeways

The following CMP freeway monitoring location in the project vicinity has been identified:

- | | |
|--------------------|--------------------------------------|
| <u>CMP Station</u> | <u>Intersection/Jurisdiction</u> |
| No. 1067 | I-405, s/o Route 110 @ Carson Scales |

As stated earlier, the CMP TIA guidelines require that freeway monitoring locations must be examined if the proposed project will add 150 or more trips (in either direction) during either the AM or PM weekday peak periods. Based on the project's trip generation potential and distribution pattern, the proposed Project ***will not*** add more than 150 trips during the Weekday PM or Friday PM

peak hour at this CMP mainline freeway-monitoring location. Therefore, a CMP freeway traffic impact analysis is not required.

12.2 Transit Impact Review

As required by the current *Congestion Management Program for Los Angeles County*, a review has been made of the potential impacts of the project on transit service. As previously discussed, a number of transit services exist in the project area, necessitating the following transit impact review.

The project trip generation, as shown in *Table 5-2*, was adjusted by values set forth in the CMP (i.e., person trips equal 1.4 times vehicle trips, and transit trips equal 3.5 percent of the total person trips) to estimate project-related transit trip generation. Pursuant to the CMP guidelines, the proposed Project is forecast to generate 7 transit trips (2 inbound and 5 outbound) during the Weekday PM peak hour and 9 transit trips (6 inbound and 3 outbound) during the Friday PM peak hour. Over a 24-hour period the proposed Project is forecasted to generate 181 daily weekday transit trips.

It is anticipated that the extensive existing transit service in the project area would be able to accommodate the project generated transit trips.

13.0 PARKING REQUIREMENTS

To determine the number of parking spaces required for the proposed Project, the parking demand was calculated using the parking codes per *Chapter 1 - Zoning, Part 6 – General Development Standards, Item 9162.21 Parking Spaces Required* in the *City of Carson Municipal Code*. The following parking ratios were utilized:

- Theater = 1.0 spaces per 3 fixed seats
- Retail and General Commercial = 1.0 spaces per 300 SF gross floor area
- Food Service = 10.0 spaces per 1,000 SF gross floor area
- Office = 1.0 spaces per 300 SF gross floor area
- Medical-Dental Office¹³ = 4.27 spaces per 1,000 SF gross floor area
- Health Club = 1.0 spaces per 150 SF gross floor area

As mentioned previously, the total square footage for the entire site with the proposed expansion is 1,028,942 SF. The total site can then be broken into 57,352 SF of theatre use, 846,239 SF of retail use, 60,026 SF of food service use, 23,989 SF of office use, 8,415 SF of medical-dental office use and 32,921 SF of health club use.

Table 13-1 presents the direct application of the City's code to SouthBay Pavilion with the inclusion of the proposed expansion. Review of the lower portion of *Table 13-1* identifies that the SouthBay Pavilion with the inclusion of the proposed expansion will result in a total code parking requirement of 4,583 spaces. When compared against the proposed parking supply of 4,640 spaces the site is expected to have a surplus of 57 spaces. Therefore, the proposed parking supply can adequately accommodate the added demand from the proposed Project.

¹³ City Code does not have a parking ratio for medical-dental office, so the 85th percentile peak rate of 4.27 spaces per 1,000 SF was applied per the 4th Edition of *Parking Generation*, published by the Institute of Transportation Engineers (ITE) [Washington, D.C., 2010],.

**TABLE 13-1
CITY CODE PARKING REQUIREMENT**

Land Use	Size	City of Carson Code Parking Ratio¹⁴	Spaces Required
Theatre	57,352 ¹⁵ SF	1 spaces per 3 fixed seats	825
Retail	846,239 SF	1 spaces per 300 sf of GFA	2,821
Food Service	60,026 SF	10 spaces per 1,000 sf of GFA	601
Office	23,989 SF	1 spaces per 300 sf of GFA	80
Medical-Dental Office	8,415 SF	4.27 spaces per 1,000 sf of GFA	36
Health Club	32,921 SF	1 space per 150 sf of GFA	220
TOTAL:	1,028,942 SF	TOTAL:	4,583
A. TOTAL PARKING CODE REQUIREMENT			4,583
B. TOTAL PARKING PROVIDED			4,640
C. PARKING SURPLUS/DEFICIENCY (+/-) (B – A)			+57

¹⁴ Source: City of Carson Municipal Code.

¹⁵ As presented in Table 5-2 the theatre component is expected to have 2,474 seats.

14.0 SUMMARY OF FINDINGS AND CONCLUSIONS

- **Project Description** –The project site is located on the southeast corner of Avalon Boulevard and Del Amo Boulevard at SouthBay Pavilion in the City of Carson, California. SouthBay Pavilion is an existing regional mall with approximately 1,013,023 square-feet (SF) of floor area anchored by Target, IKEA, Sears and JCPenney. In addition, the mall includes a mix of 83 specialty stores and restaurants, including Old Navy, Chuck-E-Cheese’s, Children’s Place, Foot Action and Daniel’s Jewelry.

The proposed Project includes the development of a new 57,352 SF movie theater with 14 screens and 2,474 seats in place of 41,433SF of floor area that is now occupied by Chuck E. Cheese’s and New Millennium Secondary School. Parking for the Project will be provided via the existing surplus for the entire SouthBay Pavilion which totals 4,640 spaces.

- **Study Scope** – The seven (7) key study intersections selected for evaluation in this report provide both regional and local access to the study area. They consist of the following:

Key Study Intersections

- | | |
|---|---|
| 5. Avalon Boulevard at Del Amo Boulevard | 5. Avalon Boulevard at I-405 NB Ramps |
| 6. Avalon Boulevard at Carson Plaza Drive | 6. Avalon Boulevard at I-405 SB Ramps |
| 7. Avalon Boulevard at Carson Mall | 7. Leapwood Avenue at Del Amo Boulevard |
| 8. Avalon Boulevard at Dominquez Street | |

The analysis is focused on assessing potential traffic impacts during the morning and evening commute peak hours (between 7:00-9:00 AM, and 4:00-6:00 PM) on a typical weekday for Existing plus Project and Year 2015 plus Project traffic conditions.

Per the City of Carson requirements, LOS D is the minimum acceptable condition that should be maintained during the peak commute hours on all intersections.

- **Existing Traffic Conditions** – All of the seven (7) key study intersections currently operate at an acceptable level of service during the Weekday PM Peak Hour and Friday PM Peak Hours.
- **Project Trip Generation** – The proposed Project is forecast to generate approximately 4,354 daily trips, with 25 trips (12 inbound, 13 outbound) produced during the weekday AM peak hour, 198 trips (71 inbound, 127 outbound) produced during the weekday PM peak hour, and 247 trips (148 inbound, 99 outbound) produced during the Friday PM peak hour.

However, a comparison between the existing and proposed trips generation results in a “net” trip generation potential which totals 3,698 weekday daily trips, with 10 trips (3 inbound, 7 outbound) produced during the Weekday AM peak hour, 135 trips (41 inbound, 94 outbound) produced during the weekday PM peak hour, and 184 trips (118 inbound, 66 outbound) produced during the Friday PM peak hour.

- ***Cumulative Projects Traffic Characteristics*** – The twelve (12) cumulative projects are forecast to generate a total of 77,340 daily trips, with 3,297 trips (1,764 inbound and 1,533 outbound) forecast during the AM peak hour and 6,550 trips (3,260 inbound and 3,290 outbound) forecast during the PM peak hour.
- ***Existing Plus Project Traffic Conditions*** – The proposed Project **will not** significantly impact any of the seven (7) key study intersections, when compared to the LOS standards and significant impact criteria specified in this report.
- ***Year 2015 Cumulative Plus Project Traffic Conditions*** – The proposed Project **will not** significantly impact any of the seven (7) key study intersections, when compared to the LOS standards and significant impact criteria specified in this report. Although the intersection of Avalon Boulevard at Del Amo Boulevard is forecast to operate at unacceptable LOS E during the Weekday PM Peak Hour and Friday PM Peak Hours with the addition of project traffic, the proposed Project is expected to add less than 0.020 to the ICU value. The remaining six (6) key study intersections are forecast to continue to operate at an acceptable LOS with the addition of Project generated traffic in the Year 2015. The above notwithstanding, the project will be required to pay a fair share contribution.
- ***State of California (Caltrans) Methodology*** – The results of the “Existing Plus Project” and “Year 2015 Plus Project” traffic analysis using the State of California (Caltrans) Methodology indicates that traffic associated with the proposed Project **will not** significantly impact any of the two state-controlled study intersections, when compared to the LOS standards and significant impact criteria specified in this report. The two state-controlled study intersections are forecast to continue to operate at an acceptable LOS with the addition of project generated traffic to existing traffic. The two state-controlled study intersections are forecast to continue to operate at an acceptable LOS with the addition of project generated traffic in the Year 2015.
- ***Project-Related Fair Share Contribution*** – The mitigation needed to offset the cumulative impact at Avalon Boulevard at Del Amo Boulevard is to modify the median to allow for the construction an additional northbound left-turn lane and upgrade the traffic signal accordingly. The proposed Project will be required to pay a proportional “fair-share” towards the recommended improvement. This total improvements is expect to cost \$250,000.00, while the projects proportional share is expected to be ***\$17,750.00***
- ***Congestion Management Program (CMP)*** – The proposed Project does not meet the criteria requiring a CMP TIA. Thus, will not have any significant traffic impacts on the Congestion Management Program Highway System.
- ***Parking Requirements*** – Direct application of the City’s code to the proposed Project results in a total parking requirement of 4,583 spaces. When compared against the proposed parking supply of 4,640 spaces the site is expected to have a surplus of 57 spaces.