FEHR PEERS

Memorandum

Date: April 6, 2020, *revised May 29, 2020*

To: The Carlsbad WestOaks Project Owner, LLC

From: Katy Cole and Cecily Taylor, Fehr & Peers

Subject: West Oaks SB 743 Vehicle Miles Traveled (VMT) Analysis

SD20-0345

This memorandum presents the California Environmental Quality Act (CEQA) Senate Bill (SB) 743 Vehicle Miles Traveled (VMT) analysis for the proposed West Oaks residential development project (the "project") located in Carlsbad, California. The VMT analysis was conducted consistent with methodologies included in the city's draft *VMT Analysis Guidelines,* currently in preparation. The analysis is also consistent with the *Technical Advisory on Evaluating Transportation Impacts in CEQA* prepared by the Governor's Office of Planning and Research (OPR), December 2018 (OPR Technical Advisory), and is consistent with the *Guidelines for Transportation Impact Studies in the San Diego Region* prepared by the Institute of Transportation Engineers (ITE), San Diego, May 2019 (ITE San Diego Region Guidelines).

The proposed project is located within the City of Carlsbad on West Oaks Way, immediately south of Palomar Airport Road and approximately 0.4 mile east of College Boulevard/Aviara Parkway. The project site is approximately 12 acres and would consist of 192 residential units, comprised of 42 affordable housing units and 150 market-rate units.

This memo is organized into the following sections:

1. **Summary of Conclusions:** Presents key findings and is followed by detailed technical analysis in the subsequent sections.
2. **SB 743 Background:** Provides background information regarding SB 743 and the related revisions to the California Environmental Quality Act (CEQA) Guidelines, including current status.
3. **Guidelines for Performing SB 743 Analysis:** Provides a summary of the draft Carlsbad VMT Analysis Guidelines, as well as the OPR Technical Advisory and the ITE San Diego Region Guidelines.

4. **Project VMT Analysis**: Provides the analysis of the project's impacts relative to VMT pursuant to SB 743, and includes the baseline VMT, the project's land-use generated VMT, and the impact analysis for each project land use.

1. Summary of Conclusions

The City of Carlsbad is currently preparing guidelines for conducting VMT analyses in compliance with SB 743. Fehr & Peers has been retained by the City to provide the technical assistance necessary for the preparation of the guidelines and, accordingly, Fehr & Peers is fully knowledgeable of the methodology presently proposed by the City in its draft guidelines and the analysis presented here is based on that methodology. Although the guidelines have not yet been published and adopted by the City, the proposed methodology is consistent with the recommendations presented in the OPR Technical Advisory and the ITE San Diego Region Guidelines and it is anticipated that the guidelines will remain largely unchanged from their present form.

Preliminarily, as a residential project, the analysis presented here utilizes a significance threshold of 15% below the City of Carlsbad average VMT/Capita, which is consistent with both the OPR Technical Advisory and ITE Guidelines. Under this threshold, if the project's VMT/Capita is *15% or more* below the City's average VMT/Capita, the project's impacts would be less than significant; conversely, if the project's VMT/Capita is *less than 15%* below the City's average VMT/Capita, the impact would be considered significant. The City of Carlsbad average VMT/Capita is 22.52.

Because the project would generate fewer than 2,400 trips, the project's VMT/Capita may be assumed to be equal to that of the surrounding traffic analysis zone (TAZ). In this case, the project would be located in a TAZ that has an average VMT/Capita of 22.05. Thus, for purposes of this analysis, the starting point for determining the project's VMT/Capita is 22.05. To this number, an adjustment is then made to account for the TDM Program to be implemented by the project, which would reduce project-generated VMT by 14.4% (see *West Oaks TDM Strategies for VMT Reduction Evaluation,* Fehr & Peers, revised May 29, 2020). Accounting for the 14.4% reduction in project-generated VMT attributable to the TDM Program, the project would generate **18.87 VMT/Capita** (22.05 * (1 - 14.4%) = 18.87). This amount is **16.2% below** the citywide average (1 - (18.87 / 22.52) = 16.2%). Accordingly, the project's VMT/Capita of 18.87 would be below the significance threshold and, therefore, the project would have a less than significant impact relative to VMT.

2. SB 743 Background

On September 27, 2013, Governor Jerry Brown signed SB 743 into law, starting a process that fundamentally changed the way transportation impact analysis is to be conducted under CEQA. Within the State's CEQA Guidelines, these changes include elimination of auto delay, Level of Service (LOS), and similar measurements of vehicular roadway capacity and traffic congestion as the basis for determining significant impacts. In December 2018, new CEQA Guidelines implementing SB 743 (Section 15064.3), along with the OPR Technical Advisory, were finalized and made effective. Guidelines Section 15064.3, and the associated OPR Technical Advisory, provide that use of *automobile* Vehicle Miles Traveled, or VMT, is the preferred CEQA transportation metric, and correspondingly eliminate auto delay/LOS as the metric for assessing significant impacts under CEQA statewide. Under Section 15064.3, statewide application of the new VMT metric is required beginning on July 1, 2020; however, prior to that time, compliance with the new metric is at the discretion of the lead agency.

To facilitate SB 743 VMT analyses, SANDAG has prepared preliminary screening maps that compare VMT/Capita and VMT/Employee at the census tract level to the region's baseline VMT/Capita and VMT/Employee. These maps were produced using the most recent base year (2012) Series 13 SANDAG Travel Demand Model. Jurisdictions within San Diego County are in the process of developing requirements for compliance with SB 743, and the ITE San Diego Region Guidelines specifically recommend using the SANDAG regional travel demand model for SB 743 VMT analysis (and to produce corresponding screening maps) and suggest that individual jurisdictions customize various aspects of the methodology for specific application within their jurisdiction.

The City of Carlsbad is currently preparing its own guidelines for VMT analysis in compliance with SB 743. Fehr & Peers is assisting City staff in this effort and, as a result, is fully knowledgeable of the methodology the City is considering in its guidelines. Although the draft guidelines have not been published or officially approved at this time, the proposed methodology is consistent with the recommendations presented in the OPR Technical Advisory and similar to the recommendations in the ITE San Diego Region Guidelines; the Carlsbad methodology differs from the ITE San Diego Region Guidelines only in that Carlsbad has developed its own maps providing these VMT efficiencies at the traffic analysis zone level, rather than recommending use of the above-referenced SANDAG VMT screening maps.

In summary, while not required by CEQA at this time, this memo presents an evaluation of the potential SB 743 VMT-related impacts of the project consistent with and based on the planned City of Carlsbad guidelines, and consistent with the OPR Technical Advisory and the ITE San Diego Region Guidelines.

3. Guidelines for Performing SB 743 Analysis

As referenced above, CEQA Guidelines Section 15064.3, "Determining the Significance of Transportation Impacts," was added to the State's CEQA Guidelines in response to SB 743 and implements the law's requirements. Section 15064.3 states that, "Generally, vehicle miles traveled (VMT) is the most appropriate measure of a project's potential transportation impacts," and defines VMT as "the amount and distance of automobile travel attributable to a project." The CEQA Guidelines are accompanied by the OPR Technical Advisory, which includes specifications for how to estimate and forecast VMT. For most projects with multiple land uses, such as residential, commercial, etc., the OPR Technical Advisory suggests that automobile VMT associated with each land use should be quantified.

While the CEQA Guidelines themselves do not establish a significance threshold, the OPR Technical Advisory does provide a recommended threshold of significance for residential and office land uses, stating that, "OPR finds, absent any more project-specific information to the contrary, that per capita (for residential) or per employee (for office) VMT 15% below that of existing development may be a reasonable threshold." The draft City of Carlsbad guidelines will also provide for a threshold of 15% below the citywide average.

Methodology & Definitions

Neither the CEQA Guidelines, nor the OPR Technical Advisory, require that a specific methodology be used when calculating VMT. In essence, the CEQA Guidelines defer to a local agency's professional judgment supported by substantial evidence when deciding how best to model VMT, stating that, "A lead agency's evaluation of the vehicle miles traveled with a project is subject to a rule of reason."

Environmental documents prepared under CEQA are required to include project VMT estimates when addressing analysis of multiple resource areas; including air quality, greenhouse gas emissions, and energy, with varying metrics used for each (e.g., total VMT, average daily VMT, etc.). Thus, VMT is presented in numerous different forms depending on the analysis being conducted. The following definitions describe how VMT is referred to, calculated, and accounted for differently throughout the CEQA document, including how it would be referred to in connection with the SB 743 VMT analysis.

Vehicle Miles of Travel (VMT): Serves as a measure of network use or efficiency. VMT can be calculated by multiplying all vehicle trips generated by their associated trip lengths or by

multiplying traffic volumes on roadway links by the associated trip distance of each link. VMT is often estimated for a typical weekday.

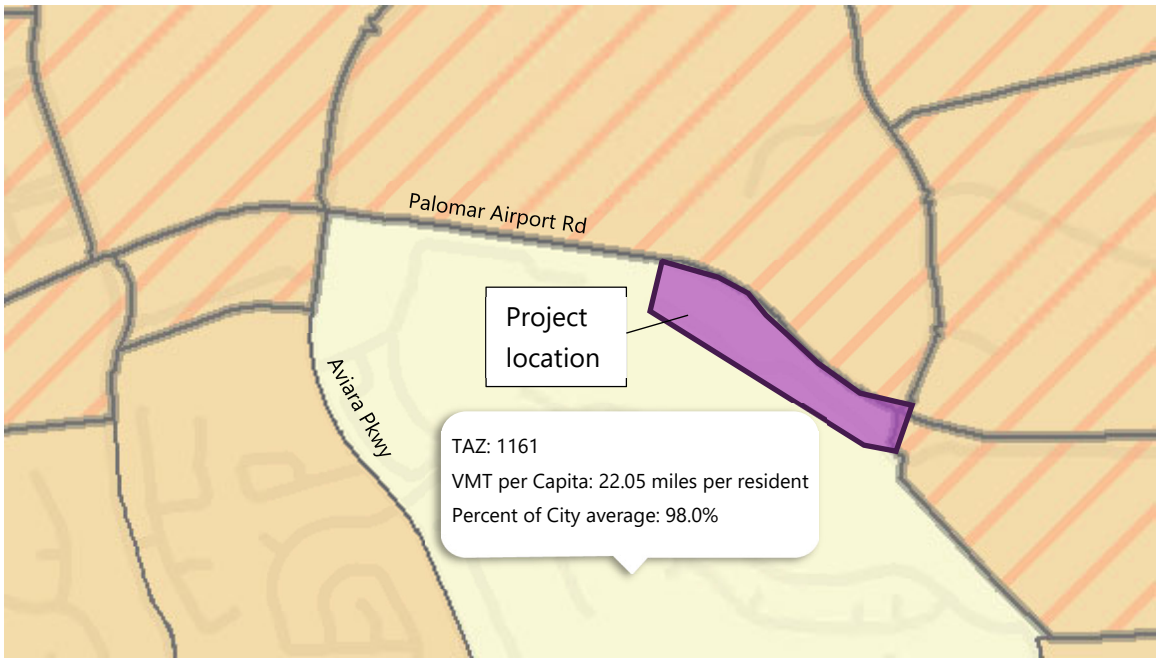
VMT Per Capita: Includes all vehicle-based person trips grouped and summed to the home location of individuals who are drivers or passengers on each trip. VMT Per Capita, or per resident, includes home-based and non-home-based trips. The VMT for each home is then summed for all homes in a particular TAZ and divided by the population of that TAZ to arrive at VMT/Capita.

Total Project VMT: Is the sum of the distance for all trips generated by all vehicle types and trip purposes (home-based work, home-based other, non-home-based, etc.) for all uses within the project site. *To be distinguished from VMT/capita, this is the number used to evaluate a project's potential GHG and Air Quality Impacts*.

As mentioned above, the City of Carlsbad is currently preparing draft guidelines for performing VMT analysis per SB 743, and the proposed methodology is consistent with the OPR Technical Advisory and the ITE San Diego Region Guidelines. The methodology and analysis as applied to the West Oaks residential project is as follows:

- Step 1: The anticipated daily trip generation of the project is determined. Per the *Transportation Impact Analysis*, (Linscott Law & Greenspan, October 2019) and SANDAG's *(Not So) Brief Guide of Vehicular Traffic Generation Rates for the San Diego Region* (2002), the West Oaks project is anticipated to generate six daily trips per dwelling unit, or (6 * 192) = 1,152 total daily trips.
- Step 2: Residential projects generating less than 2,400 daily trips may use City of Carlsbad VMT/capita maps and presume that the project will generate the same VMT/capita as the surrounding uses. Per the map reproduced in **Figure 1**, the West Oaks project is located in a TAZ that has an average VMT/Capita of **22.05**.

Figure 1: VMT/Capita at Project Site



Source: Excerpt from the draft Carlsbad VMT/Capita Map produced by Fehr & Peers

- Step 3: If the project includes a TDM Program as part of the project (i.e., as a project feature), the quantified effectiveness, or VMT reduction, of the TDM Program is to be applied in calculating the project's VMT/Capita. In this case, the project includes the West Oaks TDM Program, which would result in a 14.4% reduction in project-generated VMT (see the separate memorandum *West Oaks TDM Strategies for VMT Reduction Evaluation* , Fehr & Peers, revised May 29, 2020). Accounting for the TDM Program, the project would generate **18.87** VMT/Capita (22.05 * (1 - 14.4%) = 18.87).
- Step 4: Calculate the percentage the project's VMT/Capita is above or below the citywide average. In this case, the project VMT/Capita would be 16.2% below the citywide average (1 - (18.87 / 22.52) = 16.2%).
- Step 5: The project results are compared to the threshold. A significant impact is identified if the project's VMT/Capita is less than 15% below the citywide average. In this case, the West Oaks project-generated VMT is below this threshold and, therefore, the project's impacts relative to VMT are less than significant.

In conclusion, following the methodology that the City of Carlsbad presently is considering in its draft SB 743 implementation guidelines, the West Oaks project would generate 18.87 VMT/capita, which is 16.2% below the citywide average. Accordingly, the project would have a less than significant impact.

FEHR PEERS

Memorandum

Date: April 3, 2020, *revised May 29, 2020*

To: The Carlsbad WestOaks Project Owner, LLC

From: Katy Cole and Cecily Taylor, Fehr & Peers

Subject: West Oaks TDM Strategies for VMT Reduction Evaluation

SD20-0345

This memorandum presents the Travel Demand Management (TDM) strategies for the West Oaks residential development project that have an associated quantified level of effectiveness (i.e., those strategies that would result in a quantifiable reduction in Vehicle Miles of Travel (VMT)). Each of the proposed TDM strategies presented here is evaluated by comparing the strategy to standards developed by the California Air Pollution Control Officers Association (CAPCOA) and other case studies to determine the VMT reduction expected due to implementation of the TDM strategies.

In addition to the TDM strategies presented in this memorandum, the project will also implement TDM strategies to meet the requirements of a Tier 2 TDM plan as described in the City of Carlsbad's TDM Handbook; these requirements and the related TDM strategies, are addressed in the *Transportation Impact Analysis* (Linscott Law & Greenspan, October 2019 ("TIA")). The Tier 2 TDM Plan strategies identified in the TIA are complementary to, and to a certain extent overlap with, the strategies presented in this memo; no additional VMT reduction is attributed to these strategies. The Tier 2 strategies and the strategies presented in this memo collectively comprise the project's TDM Program strategies that will be implemented as part of the project.

This memo is organized into the following sections:

1. **Project Description** – Provides a brief description of the land uses proposed as part of the West Oaks Project, a summary of the transportation setting, and a summary of the elements included in the West Oaks TDM Program that would result in a quantifiable VMT reduction.
2. **Methodology** – Describes the overall methodology used to estimate the VMT reduction associated with those TDM strategies that would result in a VMT reduction.

3. **TDM Strategies** – Provides a detailed description of each proposed TDM strategy that would result in a VMT reduction, and supporting elements required to ensure that the strategy is effective.
4. **Evaluation of TDM Strategies** – Provides detailed calculations to determine the effectiveness of those TDM strategies that would result in a VMT reduction.
5. **TDM Strategies Metrics and Targets** – Provides performance metrics to ensure that the Project sponsor is implementing the TDM strategies that would result in VMT reduction.

1. Project Description

Land Uses and Transportation Setting

The proposed West Oaks development project (Project) is located within the City of Carlsbad on West Oaks Way, immediately south of Palomar Airport Road and approximately 0.4 mile east of College Boulevard/Aviara Parkway. The approximately 12-acre Project would consist of 192 residential units, comprised of 42 affordable housing units and 150 market-rate units.

Palomar Airport Road provides the primary east-west access for the site, including a connection to Interstate 5 for north-south regional access. College Boulevard/Aviara Parkway, El Camino Real, and Melrose Drive provide local north-south arterial connectivity within the City of Carlsbad and adjacent municipalities.

Transit service within the study area is provided by the North County Transit District (NCTD). NCTD BREEZE Bus Route 445 provides local transit bus service near the project with stops at the corner of Palomar Airport Road and Palomar Oaks Way. BREEZE Route 445 provides limited commute service between the Project and Palomar College, and also connects to COASTER commuter rail service at the Carlsbad Poinsettia Station. The Project site also lies within the service area of the Carlsbad Connector, a shuttle service that connects the Carlsbad Poinsettia Station to adjacent areas; the Connector was a pilot program and it is unknown whether this service will continue in the future.

Overview of the TDM Program

TDM strategies have been used for over 30 years to reduce single-occupant vehicle trips. The West Oaks TDM Program would work to reduce the Project's impacts on the surrounding street network through the following: land use strategies that create an environment which promotes alternative mode choice; school bus and school carpool programs for students; and commute/ travel services, including the promotion of SANDAG's iCommute program and the *City of Carlsbad Citywide Transportation Demand Management Plan* (approved February 26, 2019; "City TDM Plan").

Based on its location, the West Oaks project is expected to add traffic to Palomar Airport Road between Interstate-5 and College Boulevard and, accordingly, is required to implement TDM strategies per the Mobility Element of the City of Carlsbad General Plan (Policy 3-P.11). In response, the proposed project includes a TDM Program that will be implemented as part of the project, as a project design feature. The Program will include City Tier 2 TDM plan strategies as described in the City of Carlsbad's TDM Handbook, as well as the strategies evaluated here. Thus, the TDM Program is made up of TDM strategies to meet the City's Tier 2 TDM plan requirements,

as well as additional TDM strategies that together would result in VMT reduction. The strategies related to the Tier 2 TDM plan requirements are discussed in the *Transportation Impact Analysis* (Linscott Law & Greenspan, October 2019), and the additional TDM strategies are presented in this memorandum.

A detailed description of each of the TDM strategies that would result in a quantifiable VMT reduction is presented in subsequent sections of this memorandum. As an overview, in addition to the Tier 2 strategies, the West Oaks TDM Program would include the following VMT reduction strategies:

- **LAND USE STRATEGIES**
  - Affordable Housing

- **TRAVEL & COMMUTE SERVICES FOR RESIDENTS**

  Neighborhood/Site Enhancements
  - Pedestrian Network Improvements
  - Electric Bike-Share Program
  - Car-Share Program

  Commute Trip Reduction Strategies
  - TDM Program Marketing
  - Carpool and Vanpool Support
  - School Pool Program

- **PARKING POLICIES/PRICING**
  - Unbundled Parking

2. Methodology

Fehr & Peers worked with the CAPCOA to develop the transportation section of the report *Quantifying Greenhouse Gas Mitigation Measures* (CAPCOA Report). This report is now used as a set of guidelines for quantifying the environmental benefits of Greenhouse Gas mitigation measures, such as the Project's TDM strategies for VMT reduction. The CAPCOA guidelines were developed by conducting a comprehensive literature review of studies documenting the effects of TDM strategies on reducing VMT. The CAPCOA Report quantifies VMT reduction for various TDM strategies, including strategies implemented for a single development site, a larger activity center (e.g. business park), or an entire residential neighborhood.

TDM Effectiveness Quantification

To determine the amount of VMT reduction that would be attributable to the West Oaks TDM strategies for VMT reduction, Fehr & Peers compared the strategies to CAPCOA standards. Detailed calculations for each TDM strategy are described in the section *Evaluation of Recommended TDM Program Strategies*. For each strategy that is based on the CAPCOA Report, the related CAPCOA strategy code (e.g., CAPCOA TRT-6 or SDT-3) is provided.

VMT Modeling Data

The San Diego Association of Governments (SANDAG) Series 13 travel demand model provides information on estimated VMT and vehicle trips throughout the San Diego region based on locations of housing, employment, and the transportation network. According to the SANDAG Series 13 model, the proposed Project is located in an area that generates 22.05 VMT/capita. This estimate is used as a preliminary estimate of Project VMT generation prior to any reductions associated with the TDM Program.

3. TDM Program

The proposed Project would include a robust TDM Program that would reduce West Oak's impacts on the surrounding street network while striving to achieve citywide air quality/ greenhouse gas reduction goals. The TDM strategies for VMT reduction are organized into the following four main types of strategies:

- **LAND USE STRATEGIES –** The Project will provide 42 affordable housing units, which provide greater opportunity for lower income families to live closer to jobs centers and achieve jobs/housing match near transit, and allow a greater number of families to be accommodated within a given building footprint.
- **TRAVEL & COMMUTE SERVICES FOR RESIDENTS** – These strategies will provide residents with travel options other than private auto for trips to destinations outside of the Project area:

  Neighborhood/Site Enhancements
  - The Project will develop a pedestrian network that provides accommodations on-site as well as convenient pedestrian access to Palomar Airport Road (see related Tier 2 strategy).
  - The Project will implement an electric bike-share program to link the Project to local Carlsbad destinations and reduce motorized vehicle trips. The electric bike-share program would provide for the availability of 8 electric bikes for the exclusive use of project residents to provide sustainable transportation as a substitute for individual vehicle ownership/use.
  - The Project will coordinate with a car-share organization or implement a similar property-run program to provide one car-share station within the Project, available to residents on an on-demand basis.

  Commute Trip Reduction Strategies
  - The Project will promote and advertise various transportation options, including promoting information and resources regarding the City TDM Plan, as well as SANDAG's iCommute program, which provides support to commuters through a variety of TDM strategies, such as carpool matching services, vanpool, and other services (see related Tier 2 strategies.
  - The Project will promote formal and/or informal networks among residents for carpool/vanpool purposes.
  - The Project will coordinate and implement a school pool program for students.

- **PARKING POLICIES/PRICING** – These strategies allow residents to save money if they do not own a car, decreasing the number of auto trips to and from the Project.
    - Parking in all residential buildings will be "unbundled" from units, such that residents will have to request a parking space separate from their apartment/ condominium unit and pay for that parking space separately. This would require complementary management of off-site parking to be an effective mitigation measure.

Transportation Coordinator

To ensure the TDM Program strategies are implemented and effective, a Transportation Coordinator (likely as part of a homeowner's association or property management company) shall be established to monitor the Program (see related Tier 2 strategy). To fill the position, a staff member or consultant will be designated to serve as the on-site Transportation Coordinator for residents. Coordinators are responsible for developing, marketing, implementing, and evaluating TDM Programs; a dedicated coordinator on staff makes the TDM Program more robust, consistent, and reliable. Additionally, residents and employees would have a designated point of contact for questions about TDM strategies, which would allow them to easily stay informed regarding various TDM functions and eligibility.

It is anticipated that the Transportation Coordinator role would require approximately 8-10 hours per month.

The Transportation Coordinator's duties would include, but not be limited to, the following:

- Conduct transportation alternatives orientation for new residents
- Assist with rideshare matching for residents commuting from their homes
- Provide information on transit, bicycling, and walking to and from the Project
- Act as source of information regarding the TDM Program, including compliance with regulatory requirements and new potential TDM benefits
- Coordinate TDM Program monitoring (administer surveys and coordinate data collection)

Monitoring

Monitoring is necessary to ensure that the Project is implementing the TDM Program consistent with the analysis presented in this memorandum. Monitoring and reporting will be completed according to the requirements of the City of Carlsbad's TDM Handbook. Monitoring would start within 12 months of the community reaching 75% occupancy or within 18 months of initial occupancy, whichever occurs first. As part of the monitoring process, the Transportation Coordinator would collect biannual data for many of the TDM strategies (refer to **Table 2: TDM**

Strategies Performance Metrics and Targets) and adjust TDM strategies as necessary to respond to user demand. The Transportation Coordinator would submit a monitoring report to the City of Carlsbad every two years to document the implementation of the TDM Program, including strategies to meet the Tier 2 TDM plan requirements. As provided in the City's TDM Handbook, the City will provide a survey template and specific instructions to facilitate and standardize data collection and reporting.

Table 2: TDM Strategies Performance Metrics and Targets summarizes the applicable performance metrics and targets for each strategy identified for implementation herein. Performance metrics have been established to ensure implementation of the VMT reduction strategies consistent with the analysis presented in this evaluation.

4. Evaluation of Recommended TDM Strategies

As previously explained, CAPCOA standards were utilized to determine the VMT reduction anticipated to be achieved by implementation of each VMT reduction strategy addressed in this memo. A detailed description of that analysis is presented in this section. **Table 1: TDM Strategies for VMT Reduction Analysis Summary** presents a summary of the evaluation. The table lists and describes each VMT reduction strategy, the applicable CAPCOA reference standard, and the projected VMT reduction based on application of the CAPCOA equations. As shown on the table, the total VMT reduction that would be achieved with implementation of the TDM strategies for VMT reduction would be **14.4%**.

Survey Data Used in Analysis

The CAPCOA guidance and VMT reduction equations include variables related to the community population, work-related VMT, and school-related VMT. Fehr & Peers utilized the National Household Travel Survey Data (**Appendix A**) to develop estimates for these variables as follows:

- *Community Population*: The Project proposes the construction of 192 multi-family dwelling units. Based on the number of 1-, 2-, and 3-bedroom households, the proposed Project would accommodate a population ranging from approximately 350 to 450 residents.
- *Residential-Based Work VMT*: It is necessary to understand the amount of VMT that is due to residents of the proposed project traveling to work outside the project. Conservatively, we estimate that all of the residents work outside of the proposed Project area. The 2009 National Household Travel Survey (summary provided in **Appendix A**) provides information on trip purpose and indicates that 25% of home-based trips are work related. Therefore 25% of the overall VMT is home-based work related.
- *Residential-Based School VMT*: It is necessary to understand the amount of VMT attributable to residents of the proposed project traveling to schools. The 2009 National Household Travel Survey (summary provided in the **Appendix A**) provides information on trip purpose and suggests that approximately 10% of home-based trips are school related. Therefore, 10% of the overall VMT is home-based school related.
- *Other VMT*: Some TDM strategies would apply to all other travel made by project residents, rather than only residential-based work or residential-based school trips

described above. This travel would include, for example, shopping, recreation/ entertainment, or visiting trips, and would make up the balance of the VMT, or 65%.

Individual Strategy Effectiveness

Land Use Strategies

Affordable Housing (LUT-6)

Affordable housing provides a greater opportunity for lower-income families to live closer to job centers and achieve job/housing matches near transit, and also allows a greater number of families to be accommodated within a given building footprint. Those who live in affordable housing have lower levels of auto ownership, making them more likely to use alternative modes of transportation for their commutes.

The CAPCOA Report provides the following equation to calculate the VMT reduction percentage associated with affordable housing:

> % VMT Reduction = (4% reduction in vehicle trips per affordable unit) * (% of project units that are affordable)

Of the 192 planned units at West Oaks, 42 are proposed as affordable, resulting in a 22% proportion of affordable units (42 affordable units/192 total units = 22%). Applying the CAPCOA formula, this mix results in a VMT reduction of approximately **0.9%** (= 4% * 22%).

Travel & Commute Services for Residents

Neighborhood/Site Enhancements

This category includes Pedestrian Network Improvements and an Electric Bike-Share Program to connect residents to local destinations.

Pedestrian Network Improvements (SDT-1)

Network improvements include the development of a pedestrian network that provides accommodations on site as well as convenient pedestrian access to Palomar Airport Road on both the east and west sides of the Project. The pedestrian improvements encourage people to walk instead of drive by minimizing barriers to pedestrian access and interconnectivity. CAPCOA estimates a VMT reduction of 0-2% based on the land use context and the extent of pedestrian accommodations. The land uses within one-half mile of the project include:

- Various commercial businesses/employment opportunities;
- Banks (Comerica Bank and First Choice Bank);
- Hotels (Fairfield Inn & Suites and Home2 Suites by Hilton);

- 24 Hour Fitness gym;
- Bus stops serving NCTD BREEZE Bus Route 445;
- Hidden Valley Trail hiking path; and
- ampm gas station convenience store.

Given the suburban context of the Project, the nearby attractions, and the facilities provided both on site as well as connections off site, CAPCOA would indicate a 2% reduction. However, to the extent the nearby pedestrian destinations are relatively limited in scope, a VMT reduction of approximately **1%** is more appropriate.

Electric Bike-Share Program (TRT-12, SDT-3)

Electric bike sharing provides residents the option of biking to and from their destinations instead of driving. The electric motor allows for longer travel and travel on steeper inclines than a standard bicycle would comfortably allow. Placed strategically and regularly throughout the development, electric bikes would provide further support for the existing bike network as more people would have access to bicycles. This measure would also complement the unbundled parking measure (described later) by providing residents with an option for independent travel that does not require access to a car.

While CAPCOA does not attribute VMT reductions to bike-sharing programs specifically (CAPCOA TRT-12), CAPCOA does address VMT reductions related to providing a Neighborhood Electric Vehicle (NEV) Network (CAPCOA SDT-3). In this case, the West Oaks electric bike-share program would combine a bike-share program with electric bikes, which is a type of electric vehicle akin to the NEV program considered by CAPCOA.

CAPCOA recognizes a VMT reduction attributable to NEV use and ownership that also includes a travel network to accommodate NEV use, including features such as charging facilities, striping, signage, and educational tools (CAPCOA SDT-3). The forecast VMT reductions are calculated based on market penetration levels (i.e., percent of households with access to a NEV) and an average reduction in total VMT per NEV household of 12.7%. According to CAPCOA, the following is the equation to be applied in determining VMT reduction for an electric vehicle network:

> % VMT Reduction = (Percent Market Penetration * 12.7%)

As to West Oaks, with 8 electric bicycles provided, there would be 1 electric bicycle per 24 households (192 households / 8 bicycles = 24 households per bicycle) or a 0.04 market penetration rate (8 bicycles / 192 households = 0.04). Under the CAPCOA NEV formula, this would result in a VMT reduction of approximately **0.5%** (0.04 * 12.7% = 0.53%).

Car-Share Program (TRT-9)

Car-share programs are membership-based programs that provide members access to a shared fleet of vehicles (CAPCOA TRT-9). Cost is generally based on a per-mile or hourly basis. There are three common categories of car-share programs: transit station-based, employer-based, or residential-based/citywide. Each of these programs has slightly different uses. Transit station-based car-share generally is intended to close the "last-mile" gap by allowing users to drive from the transit station to their final destination. Employer-based car-share programs can provide transit/bike/walk commuters with an opportunity to conduct business/day trips while also providing a guaranteed ride home. Residential-based/citywide car-share programs generally replace entire home-based trips. At West Oaks, this measure would also complement the unbundled parking measure (described later) by providing residents with an option for independent travel that does not require owning a car.

The CAPCOA methodology calculates the reduction in overall VMT attributable to car-share programs as follows:

> % VMT Reduction = (% reduction in car-share member annual VMT) * (number of car-share members per shared car) * (deployment level based on urban or suburban context)

As to West Oaks, which is suburban in context, the calculations for % VMT reduction are as follows:

- % reduction in car-share member annual VMT = 37% (CAPCOA page 246)
- Number of car-share members per shared car = 20 (CAPCOA page 246)
- Deployment level (suburban context) = 1 shared car / 2,000 population (CAPCOA page 246)
- *% VMT Reduction = 37% * 20 * (1 / 2,000) = 0.4%*

Implementing a car-share program for the West Oaks Project that provides at least one car per 2,000 residents would result in a **0.4%** VMT reduction. As described previously, the Project population estimate is 452. Accordingly, the Project will ensure that one (1) car is provided for on-demand use by residents.

Commute Trip Reduction Strategies

This category includes TDM Program marketing, carpool and vanpool support, and school pool support to increase awareness and encourage residents to shift their travel mode from driving alone.

TDM Program Marketing (TRT-7)

To ensure that residents are aware of all alternative transportation mode options available, "new resident" information packets will be distributed to all new residents. A website also will be created with the same information so that this information is always accessible. These sources will include information regarding the bike-share kiosks, the car-share program, carpool and vanpool support, the City TDM Plan, iCommute, transit service, and all other alternative transportation options.

The continued expansion and utilization of iCommute, SANDAG's TDM Program, would also support the successful dispensation of transportation choice information. As additional resources become available through the City TDM Plan, additional information regarding those resources will be available as well. Using "new resident" information packets, a transportation information website, the City TDM Plan, and iCommute to dispense transportation information falls under CAPCOA standard TRT-7: Commute Trip Reduction Marketing. This strategy focuses on reducing the commute trips of the residents of West Oaks. The CAPCOA Report provides the following equation to calculate the VMT reduction percentage associated with TDM program marketing:

> % VMT Reduction = (% reduction in commute trips) * (% population eligible) * (adjustment from commute VT (vehicle trips) to VMT) * (% home-based work VMT)

- % reduction in vehicle trips = 4% (CAPCOA page 241)
- % population eligible = 50% (CAPCOA suggests an eligibility rate of 20-100%; for West Oaks 50% is used)
- Adjustment from VT to VMT = 1.0 (CAPCOA page 241)
- % home-based work VMT = 25%
- *% VMT Reduction = 4% * 50% * 1.0 * 25% = 0.5%*

By utilizing progressive and effective strategies to spread information, implementation of a TDM marketing program is expected to result in a **0.5%** VMT reduction.

Carpool and Vanpool Support (TRT-3, TRT-11)

Promoting both new and existing rideshare options to residents reduces single-occupancy vehicle trips and associated VMT. The CAPCOA Report identifies the establishment of ridesharing programs (CAPCOA TRT-3) as reducing VMT by increasing carpooling and vanpooling. Expanding iCommute, the TDM Program for the San Diego region (operated by SANDAG and the 511 Transportation Information Service) also would contribute to VMT reductions. iCommute assists users in setting up carpools and vanpools, planning transit trips, and promoting alternative mode choices, such as biking. Expanding this service to the West Oaks development area would make it more convenient for residents to use alternative modes of transportation.

While the TDM Program marketing measure also referred to promoting the City TDM Plan and iCommute, the reduction captured by marketing relates to increased awareness of alternative commute options and available resources. In contrast, the reduction captured by the carpool and vanpool support strategies relates to the availability of each rideshare program. While iCommute provides information about commute options and available resources, it also provides both carpool and vanpool matching services. Promoting iCommute would provide West Oaks residents with all described services. As carpool and vanpool resources are made available through the City TDM Plan, information regarding those resources will be made available as well. Each of these TDM strategies is distinct with its own VMT reduction attributes.

As to the West Oaks site, which is designated as Suburban in context, VMT reduction is calculated based on CAPCOA standards TRT-3 and TRT-11. The TRT-3 strategy is only applicable to home-based work VMT generated by the proposed Project site. The focus of this standard is to reduce commute trips for residents through promoting iCommute. The following is the CAPCOA equation to calculate the VMT reduction attributable to ridesharing support features:

> % VMT Reduction = (% reduction in commute VMT) * (% employees eligible) * (% home-based work VMT)

- % reduction in commute VMT = 5% (CAPCOA page 228)
- % employees eligible = 50% (CAPCOA suggests an eligibility rate of 20-100%; for West Oaks 50% is used)
- % home-based work VMT = 25%
- *% VMT Reduction = 5% * 50% * 25% = 0.6%*

Based on the projected population demographics and development characteristics of the West Oaks Project, a 0.6% VMT reduction is estimated to result from promoting iCommute's carpool support program. As carpool and vanpool resources become available through the City TDM Plan, those resources will be made available to West Oaks residents as well.

The TRT-11 strategy is intended for employer-sponsored vanpool programs. However, similar to the calculation above, commute trips for residents could be reduced through promoting iCommute. The following is the CAPCOA equation to calculate the VMT reduction attributable to the vanpool program.

> % VMT Reduction = (% shift in vanpool mode share of commute trips) * (% employees eligible) * (adjustments from vanpool mode share to commute VMT) * (% home-based work VMT)

- % shift in vanpool mode share = 10% (CAPCOA suggests a range of 2-20%; for West Oaks 5% is used)

- % employees eligible = 50% (CAPCOA suggests an eligibility rate of 20-100%; for West Oaks 20% is used)
- Adjustments from vanpool mode share to commute VMT = 0.67 (CAPCOA page 254)
- % home-based work VMT = 25%
- *% VMT Reduction = 5% * 20% * 0.67 * 25% = 0.2%*

Based on the projected population demographics and development characteristics of the West Oaks Project, a 0.2% VMT reduction is estimated to result from promoting iCommute's vanpool support program, which is distinct from the other iCommute strategies as stated above and, therefore, results in VMT reductions additional to the other strategies. As vanpool resources become available through the City TDM Plan, those resources will be made available to West Oaks residents as well.

The combined reduction of both programs is calculated by multiplying the reductions, resulting in a combined **0.8%** reduction (1 - (1 - 0.6%) * (1 - 0.2%) = 0.8%).

School Pool Support (TRT-10)

CAPCOA TRT-10 states that the implementation of a school pool program involves the coordination and planning of parents to transport students to off-site public or private schools, or to schools where students cannot walk or bike but do not meet the requirements for bussing. The degree to which the school pool program would reduce school VMT (i.e., those vehicles miles generated by student travel to and from a school) ranges from 7.2% to 15.8%, depending on the number of families participating in the program. The range of family participation in a school pool program according to CAPCOA TRT-10 is between 16% and 35%.

Based on the CAPCOA methodology, the reduction in school VMT after the implementation of a school pool program is calculated as follows:

> % Reduction in School VMT = participation rate of families * 45% (CAPCOA TRT-10 adjustment to convert from participation to daily VMT to annual school VMT) * % of home-based school VMT

- Participation rate of families = 16% (CAPCOA TRT-10 indicates that typical participation rates are 16-35%; for a moderate implementation 16% is suggested)
- % of home-based school VMT outside the Project site = 10%
- %VMT Reduction = 16% * 45% * 10% = 0.7%

Based on this methodology provided by CAPCOA and the calculations, the calculated VMT reduction for the implementation of a school pool program is **0.7%**, the percentage which has been applied to the overall VMT reduction calculation.

Parking Policies/Pricing

Unbundled Parking (PDT-2)

CAPCOA PDT-2 states that unbundling parking costs from property costs (that is, charging for a parking space separate from and in addition to rent) will remove a financial burden from those who do not wish to use a parking space. The VMT reductions associated with unbundling parking range from 2.6% to 13.0%, depending on the project context and the monthly cost for parking; the greater the additional cost or price differential, the greater the forecast participation and corresponding VMT reduction. The West Oaks project proposes to charge residents an additional $100 month per parking space.

According to CAPCOA, the following equation is to be applied in determining the VMT reduction associated with unbundled parking:

> % VMT Reduction = (change in vehicle cost) * (elasticity of vehicle ownership with respect to total vehicle cost) * (adjustment from vehicle ownership to VMT)

- Change in vehicle cost = $100 monthly parking cost [West Oaks charge] * 12 months / $4,000 = 30%
    - $4,000 represents the annual cost to operate a vehicle (CAPCOA page 211); this cost includes, for example, registration, insurance, and maintenance costs)
- Elasticity of vehicle ownership with respect to total vehicle cost = 0.4 (CAPCOA page 211; this factor accounts for how people change their decision to own a vehicle based on changes in the cost of ownership)
- Adjustment from vehicle ownership to VMT = 85% (CAPCOA page 211)
- % VMT Reduction = 30% * 0.4 * 85% = 10.2%

Applying this methodology to the West Oaks project, the calculated VMT reduction associated with the unbundled parking program is **10.2%**. It is noted that the elasticity of vehicle ownership (i.e., an individual's tendency to own or not own a vehicle as the cost of ownership increases) has been confirmed by global trends based on changes in fuel prices (Goodwin, Dargay and Hanly, 2003; Johansson and Schipper, 1997). Furthermore, a recent study using nationwide data from the American Housing Survey found that in those instances in which parking is included with the cost of the housing unit (i.e., bundled parking) households are 60% *less* likely to give up vehicle ownership than households with unbundled parking (Manville 2017). Additionally, public housing

residents (and, therefore, affordable housing residents in general) appear to be even more responsive than non-public housing residents to the idea of abandoning vehicle ownership: such households with bundled parking are 25% to 40% more likely to have a vehicle than housing units without bundled parking; in other words, including parking in the cost of housing has the effect of serving as an incentive to facilitate vehicle ownership. This trend held true even among residential properties that were surrounding by single-family land uses, indicating that unbundling parking does make a difference in car ownership even in a suburban context.

Achieving the calculated level of VMT reduction in all cases requires complementary management of potentially available alternative off-site parking to prevent residents from accessing free parking by parking their vehicles on public streets or nearby private properties. Specific to the proposed project, we note that potentially available alternative parking is limited in that there are no residential streets in the area, parking is not permitted on Palomar Airport Road in the project vicinity, and there is a limited number of commercial businesses with adjoining parking facilities in the area.

Nonetheless, to manage this potentiality, the TDM Coordinator's tasks would include monitoring parking and keeping a record of any complaints received from neighboring businesses related to West Oaks residents parking in their lots. If there appear to be regular violations, the TDM Coordinator will coordinate with the neighboring businesses to determine an appropriate response, such as installing signage to discourage residents from parking in those lots, such as "Private Parking – Violators Will Be Towed At Owner's Expense."

With implementation of the Unbundled Parking strategy, CAPCOA data show that the car ownership rate at the West Oaks apartments would be lower as compared to the overall region. The expected car ownership in West Oaks can be estimated from the first two factors in the CAPCOA calculation presented above: change in vehicle cost and the elasticity of vehicle ownership due to vehicle cost. By multiplying these two factors, the data show a resulting 12% reduction in car ownership for the West Oaks project (30% * 0.4 = 12%). As shown below, this reduction is not expected to result in an entirely car-free environment at West Oaks and, instead, would result through a combination of car ownership scenarios, including certain households choosing to share one car rather than each individual having their own car. This behavioral change would result through the financial incentive provided through the unbundled parking measure and the associated cost of a parking space.

This reduction in car ownership can be illustrated as follows. According to 2018 American Community Survey data, rental households in San Diego County have an average car ownership rate of 1.6 cars per household. A 12% reduction in ownership would mean that the West Oaks apartments would have an average car ownership rate of 1.4 cars per household (1.6 * (1 - 12%) = 1.4). Thus, the reduction assumes ownership of at least one vehicle per household, although it is possible there will be some households that choose not to own a car at all. Nonetheless, even

allowing for every household to own at least one car, the forecast car ownership rate, and related VMT reduction, could be achieved.

Based on the project's proposed mixture of 96 studio and one-bedroom apartments, and 96 two or more bedroom units, we project the following breakdown of car ownership at the West Oaks project by unit type, comparing a "no unbundled parking" scenario with an "unbundled parking" scenario:

Car Ownership by Unit Type: Without Unbundled Parking

Type of Unit (count)	Households with One Car (% of Unit Type)	Households with Two Cars (% of Unit Type)	Car Ownership Rate
Studios and One-Bedroom Units (96 total)	63 units (66%)	33 units (34%)	1.3 cars/ household
Two- or More Bedroom Units (96 total)	6 (6%)	90 (94%)	1.9 cars/ household
Total (192)	69 (36%)	123 (64%)	1.6 cars/ household

Car Ownership by Unit Type: With Unbundled Parking

Type of Unit (count)	Households with One Car (% of Unit Type)	Households with Two Cars (% of Unit Type)	Car Ownership Rate
Studios and One-Bedroom Units (96 total)	86 units (90%)	10 units (10%)	1.1 cars/ household
Two- or More Bedroom Units (96 total)	23 (24%)	73 (76%)	1.7 cars/ household
Total (192)	109 (57%)	83 (43%)	1.4 cars/ household

Therefore, based on the CAPCOA calculations and supported by iCommute, the City TDM Plan, or employer programs for access to worksites, as well as the mobility alternatives provided by the electric bike-share and car-share strategies, 40 additional project households are expected to share one privately-owned car with implementation of the unbundled parking strategy as

compared to a bundled parking scenario. As such, the successful implementation of the program requires only a reduction in overall car ownership by project households rather than any individual household entirely foregoing such ownership.

As a final supporting measure for unbundled parking, the Project will also provide a business center within the project with amenities such as a printer and fax machine (see related Tier 2 strategy). This business center is expected to attract people who work from home, who would be more like to forgo car ownership.

TDM Effectiveness Quantification Summary

Based on the methodology outlined in the CAPCOA Report, when determining the overall VMT reduction, the VMT reduction separately calculated for each of the individual strategies (within their overall TDM strategy category) should be dampened, or diminished, according to a multiplicative formula to account for the fact that some of the strategies may be redundant or applicable to the same populations. The multiplicative equation to accomplish this adjustment is as follows:

> Overall % VMT Reduction = 1 - (1 - A) * (1 - B) * (1 - C) * (1 - D) * …
>
> Where A, B, C, D, … = individual mitigation strategy reduction percentages

For example, if two strategies were proposed with corresponding VMT reductions of 20% and 10%, the equation would be [1 - (1 - 20%) * (1 - 10%)] or [1 - (80% * 90%)], which equates to a 28% reduction rather than the 30% reduction that would otherwise be seen with a direct sum. In this scenario, the overall VMT reduction was calculated as a dampened, or diminished, total according to the equation above, which produces a conservative overall estimate.

Moreover, several categories of VMT reduction strategies have maximum VMT reduction caps and reduction factors, as outlined where applicable in the individual TDM strategies. CAPCOA methodologies sometimes result in VMT reductions that are unreasonably large given the context of an individual project, so the CAPCOA Report offers category maximums and reductions to normalize the results.

The following is a summary of the VMT reductions attributed to each of the individual strategies (organized in their respective TDM strategy categories as required in the CAPCOA methodology):

- **LAND USE STRATEGIES**
    - Affordable Housing: 0.9%

- **TRAVEL & COMMUTE SERVICES FOR RESIDENTS**

  Neighborhood/Site Enhancements: 1.9%
  - Pedestrian Network Improvements: 1.0%
  - Electric Bike-Share Program: 0.5%
  - Car-Share Program: 0.4%
  - **Category % VMT Reduction** = 1 - (1 - 1.0%) * (1 - 0.5%) * (1 - 0.4%) = **1.9%**

  Commute Trip Reduction Strategies: 2.0%
  - TDM Program Marketing: 0.5%
  - Carpool and Vanpool Support: 0.8%
  - School Pool Program: 0.7%
  - **Category % VMT Reduction** = 1 - (1 - 0.5%) * (1 - 0.8%) * (1 - 0.7%) = **2.0%**
- **PARKING POLICIES/PRICING**
  - Unbundled Parking: 10.2%

The overall VMT reduction is calculated using the multiplicative formula to account for the fact that some of the strategies may be redundant or applicable to the same populations:

Overall VMT Reduction: *1 – (1 – 0.9%) * (1 – 1.9%) * (1 – 2.0%) * (1 – 10.2%) =* ***14.4%***

Table 1: TDM Strategies for VMT Reduction Analysis Summary, provides a summary of the TDM Strategies quantification described above relative to the CAPCOA standards to determine the VMT reduction that would be achieved by each individual strategy. **Table 2: TDM Strategies Performance Metrics and Targets** sets forth the applicable performance metrics and targets for each strategy identified for implementation in this memorandum. The purpose of the performance metrics collectively is to ensure implementation of the VMT reduction strategies consistent with the analysis presented in this evaluation.

Table 1: TDM Strategies for VMT Reduction Analysis Summary

West Oaks TDM Measure	Required Elements for TDM Measure Effectiveness	CAPCOA Reference[1]	Individual Strategy VMT Reduction	Combined Strategy VMT Reduction
Land Use Strategies				
Incorporate Affordable Housing	Provide affordable housing land uses, which provide greater opportunity for lower income families to live closer to jobs centers and achieve job/housing matches near transit, and also allow a greater number of families to be accommodated within a given building footprint.	LUT-6: Integrate Affordable and Below Market Rate Housing	0.9%	**0.9%**
Travel and Commute Services for Residents				
Neighborhood/Site Enhancements				
Pedestrian Network Improvements	Develop a pedestrian network that provides accommodations on site as well as supplemental pedestrian access to Palomar Airport Road.	SDT-1: Provide Pedestrian Network Improvements	1.0%	**1.9%**
Electric Bike-Share Program	Implement an electric bike-share program to link the Project to local Carlsbad destinations and reduce motorized vehicle trips. The electric bike-share program would provide at least 8 electric bikes within the Project to promote sustainable transportation.	TRT-12: Implement Bike-Sharing Programs SDT-3: Neighborhood Electric Vehicle Network	0.5%	
Car-Share Program	Coordinate with a car-share organization or implement a similar property-run program to provide one car-share station within the Project, available to residents on an on-demand basis.	TRT-9: Implement Car-Sharing Program	0.4%	

Table 1: TDM Strategies for VMT Reduction Analysis Summary

West Oaks TDM Measure	Required Elements for TDM Measure Effectiveness	CAPCOA Reference[1]	Individual Strategy VMT Reduction	Combined Strategy VMT Reduction
Commute Trip Reduction Strategies				
TDM Program Marketing	Promote and advertise various transportation options, including promoting information and resources regarding the City of Carlsbad Citywide TDM Plan, as well as SANDAG's iCommute program, which provides support to commuters through a variety of TDM strategies, such as carpool matching services, vanpool, and other services.	TRT-7: Commute Trip Reduction Marketing	0.5%	**2.0%**
Carpool and Vanpool Support	Promote formal and/or informal networks among residents for carpool/vanpool purposes.	TRT-3: Provide Ridesharing Programs TRT-11: Provide Sponsored Vanpool	0.8%	
School Pool Program	Coordinate and implement a school pool program for students.	TRT-10: Implement a School Pool Program	0.7%	
Parking Policies/Pricing				
Unbundled Parking	Unbundle parking from units in all residential buildings, such that residents will have to request a parking space separate from their apartment/ condominium units and pay for that parking space separately. This would require complementary management of off-site parking to be an effective mitigation measure.	PDT-2: Unbundle Parking Costs from Property Cost	10.2%	**10.2%**
			VMT REDUCTION PRE-ADJUSTMENT	**15.0%**
			OVERALL VMT REDUCTION (multiplicative dampened formula applied)	**14.4%**

Source: Fehr & Peers, 2020.
Notes: [1] **CAPCOA Designations: LUT**: Land Use/Location; **SDT**: Neighborhood/Site Design; **TRT**: Trip Reduction Programs; **PDT**: Parking Policies/Pricing

Table 2: TDM Strategies Performance Metrics and Targets

West Oaks TDM Measure	Description	Performance Measure & Target	Collection Method & Frequency	When Target Should Be Met
Land Use Strategies				
Incorporate Affordable Housing	Provide affordable housing land uses, which provide greater opportunity for lower income families to live closer to jobs centers and achieve job/housing matches near transit, and also allow a greater number of families to be accommodated within a given building footprint.	Full build-out of 42 planned affordable housing units	Field verification once after build-out of all development	Build-out of all development
Travel and Commute Services for Residents				
Neighborhood/Site Enhancements				
Pedestrian facilities and connections	Develop a pedestrian network that provides accommodations on site as well as supplemental pedestrian access to Palomar Airport Road.	Full build-out of planned pedestrian and network that provides internal pedestrian facilities that connect off-site	Field verification once after build-out of all development	Build-out of all development
Electric Bike-Share Program	Implement an electric bike-share program to link the Project to local Carlsbad destinations and reduce motorized vehicle trips. The electric bike-share program would provide at least 8 electric bikes within the Project to promote sustainable transportation.	Establish bike-share program with 8 electric bicycles.	Transportation Coordinator Reports & Resident Surveys biannually after full build-out of all development	Build-out of all development
Car-Share Program	Coordinate with a car-share organization or implement a similar property-run program to provide one car-share station within the Project, available to residents on an on-demand basis.	Establish at least one (1) shared car station.	Transportation Coordinator Reports & Resident Surveys biannually after full build-out of all development	Build-out of all development
Commute Trip Reduction Strategies				
TDM Program Marketing	Promote and advertise various transportation options, including promoting information and resources regarding the City of Carlsbad Citywide TDM Plan, as well as SANDAG's iCommute program, which provides support to commuters through a variety of TDM strategies such as carpool matching services, vanpool, and other services.	Create materials and distribute on a quarterly basis in the property management newsletters.	Transportation Coordinator Reports & Resident Surveys biannually after full build-out of all development	Build-out of all development
Carpool and Vanpool Support	Promote formal and/or informal networks among residents for carpool purposes.	Expansion of iCommute service area to include Project and development of ridesharing system. As carpool and vanpool resources are available through the City TDM Plan, those will be applied as well.	Transportation Coordinator Reports & Resident Surveys biannually after full build-out of all development	Build-out of all development
School Pool Program	Coordinate and implement a school pool program for students.	Program implemented and 16% of students utilizing program	Transportation Coordinator Reports & Resident Surveys biannually after full build-out of all development	Build-out of all development
Parking Policies/Pricing				
Unbundled Parking	Unbundle parking from units in all residential buildings, such that residents will have to request a parking space separate from their apartment/condominium units and pay for that parking space separately. This would require complementary management of off-site parking to be an effective mitigation measure.	All parking will be unbundled, and coordination with the City of Carlsbad will be done to identify appropriate complementary off-site parking management.	Transportation Coordinator Reports biannually after full build-out of all development	Build-out of all development

Source: Fehr & Peers, 2020.

FEHR PEERS

CARLSBAD WEST OAKS PARKING MANAGEMENT PLAN

Date: July 15, 2019, revised April 3, 2020

To: The Carlsbad WestOaks Project Owner, LLC

From: Madison Roberts and Cecily Taylor, Fehr & Peers

Subject: Carlsbad West Oaks Parking Management Plan

SD18-0273

This memorandum presents the parking management plan for the proposed Carlsbad West Oaks development (hereinafter referred to as the Project) located at the southwest corner of Palomar Oaks Way and West Oaks Way in the City of Carlsbad. This Parking Management Plan has been prepared in the context of the Project's site plan.

PARKING FACILITIES

The Project will provide a total of 384 parking spaces within the various surface parking areas of the site as shown on the site plan provided in **Attachment A**. The site will consist of 306 resident-only parking spaces, most of which will be located within parking stalls adjacent to or near each of the development's nine residential buildings. In addition, the parking area will include 78 guest parking spaces. The site will include nine (9) accessible parking spaces of which six (6) will be van accessible spaces.

The City of Carlsbad Municipal Code (Section 22.44.060) requires that resident parking must be located within 150 feet from the main multiple-family dwelling building entrance and guest parking must be located within 300 feet from the building it is meant to serve. All parking spaces assigned to the project's market-rate residential buildings are able to meet these requirements. However, due the shape and size of the project site, 41 spaces assigned to the affordable residential buildings must be located more than 300 feet from the building. These spaces will be designated as guest parking and will not be explicitly assigned to residents of the affordable residentials buildings. These spaces exceed both of the requirements listed above. As stated in the *Carlsbad West Oaks Parking Assessment* prepared by Fehr & Peers, residents of affordable housing are less likely to own more than one vehicle and the parking requirements for this type of development is reduced in many cities in San Diego County. Overall, the proximity of parking for the affordable residential units is

not expected to cause unforeseen issues and meets the needs of the project. Additionally, ample sidewalks will be provided for the guests to travel from their vehicle to the residential unit they are visiting.

PARKING MANAGEMENT PLAN

This Parking Management Plan has been developed for the Carlsbad West Oaks Residential Development and applies to all residents, guests, and invitees within the community. All vehicles located within the Project site, whether standing or parked, are subject to the laws of the State of California and the City of Carlsbad, and also to the rules set in this parking management plan. Owners and residents are responsible for the actions of their tenants, guests, and invitees. Any vehicle in violation of the aforementioned rules and policies shall be subject to towing and/or ticketing.

A. GENERAL PARKING RULES & POLICIES

1. A copy or summary of this plan shall be provided by owner(s) to tenant(s) at time of lease signing.
2. A copy of this Plan shall be included as an attachment to the Covenants, Conditions & Restrictions (CC&Rs) for the project.
3. Vehicles shall park only in designated parking spaces. All vehicles must be in accordance with the specific regulations governing such parking locations.
4. All parking spaces will be clearly marked with appropriate signs and pavement markings including space number and allowed user type (e.g. resident or guest)
5. Any vehicle parked in any driveway, fire lane, or area designated for emergency services (e.g. red curb) is subject to ticketing/towing by the City of Carlsbad or other private enforcement entity.
6. It is the responsibility of all residents to comply with these guidelines and to instruct their guests and invitees to comply as well.
7. It is strictly prohibited to double park.
8. Parking spaces are not to be used for storage of any type.
9. It is prohibited to park vehicles in a manner which may obstruct access to any waste collection areas.
10. No Person may repair, maintain or restore any vehicle in the Community and no Person may carry on in any portion of the Community any vehicle repair, maintenance or restoration business.

11. The Project's on-site property manager, maintenance staff, and/or Home Owners Association (HOA) will be the primary contact and responsible for all parking monitoring and enforcement matters.
12. The Project will contract towing services with a locally based and licensed towing company.
13. The Project will include signs at all driveway entrances to the site clearly informing drivers that their vehicles will be towed at the vehicle owner's expense if they are found to be in violation of the rules and policies of Parking Management Plan. The signs must be at least 17 inches by 22 inches in size with one inch letters. The signs will contain the name and telephone number of all towing companies the property owner has granted "general authorization" to tow vehicles from the lot and also telephone number for local law enforcement.
14. Consistent with the City of Carlsbad Ordinance No. CS-349, 10% of the parking spaces provided for the project (39 spaces) will be capable, ready, or installed with electronic vehicle (EV) charging stations and will be located on-site as indicated on **Attachment A**. 50% of these spaces (20 spaces) will include an installed EV charging station, and the remaining 19 capable or ready spaces will be designated for EV use only at a future date if it is determined that additional charging stations are warranted.

B. RESIDENT ONLY PARKING SPACES

1. The resident lease agreements will include an explanation of parking plans, restrictions, and enforcement policies. All parking spaces will be leased separately from the residences at additional cost.
2. Two- and three-bedroom units may lease two (2) resident parking spaces. The lease of a third parking space is subject to parking space availability and will be leased on a first-come, first-serve basis.
3. Affordable one-bedroom units may lease one (1) resident parking space per unit. The lease of a second or third parking space is subject to parking space availability and will be leased on a first-come, first-serve basis.
4. Market one-bedroom units may lease between one (1) and two (2) resident parking spaces per unit. The lease of a second or third parking space is subject to parking space availability and will be leased on a first-come, first-serve basis.
5. The remaining unallocated resident parking spaces will be made available to tenants for lease as additional parking spaces.
6. Unallocated resident parking spaces will not be made available as guest parking spaces.
7. Each residential unit parking stall will be assigned a number (or numbers), which will also be indicated on the resident parking permit(s).
8. All resident parking spaces shall be marked as "Resident Parking Only," and each space will be uniquely numbered.

9. Anyone wishing to use the resident parking spaces must display a valid permit. Permits are non-transferable and must only be displayed in the authorized vehicle.

C. VAN ACCESSIBLE / ADA PARKING REQUIREMENTS

1. The Project shall provide at least eight (8) accessible parking spaces in full compliance with California Building Code Sec. 1129B.1.
2. Each parking space reserved for persons with disabilities will be identified by a reflectorized sign permanently posted immediately adjacent to and visible from each space, consisting of the International Symbol of Accessibility in white on a dark blue background.
3. Van-accessible spaces shall have an additional sign stating "Van-Accessible" mounted below the symbol of accessibility.

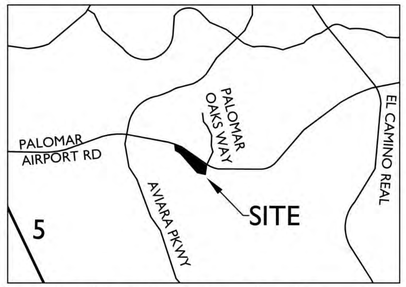
D. GUEST PARKING

1. In order to prevent residents from utilizing guest parking spaces, guest parking passes will be issued via the leasing office/property manager.
2. Guest parking will be allowed by permit only and will be available on a first come first serve basis. Vehicles parked in guest parking spaces without guest parking permits shall be subject to the enforcement measures as identified in Section E of this Parking Management Plan.
3. Vehicles will not be allowed to park in guest parking spaces for more than 24 hours. Vehicles parked in guest parking spaces for longer than 24 hours shall be subject to the enforcement measures as identified in Section E of this Parking Management Plan.
4. Three (3) guest parking spaces adjacent to the leasing/property manager's office (including one (1) ADA van-accessible space) shall be reserved for potential residents when the office is open. Signage shall be provided indicating that these three spaces are reserved for the leasing/property manager's office during office hours. Additionally, these spaces will be time restricted to 2 hours during the leasing/property manager's office hours to ensure these spaces are being used by office visitors during leasing/property manager's office hours.
5. The Project will allocate one guest parking space for use by a United States Postal Service (USPS) vehicle as shown on the parking space assignment plan provided in **Attachment A**. During the hours from 8:00 AM to 5:00 PM on Monday through Saturday this space will be reserved for USPS vehicle parking only; then the space will function as guest parking from 5:00 PM to 8:00 AM on Monday through Saturday and all day on Sunday.

E. PARKING VIOLATION PENALTIES

1. ***Fire Lane / Fire Hydrant Violation Penalties***: These vehicles are subject to immediate ticketing and/or towing by the City of Carlsbad Police and/or Fire Marshall at the expense and risk of the vehicle owner.
2. ***Parking in Undesignated Locations Penalties:*** These vehicles are subject to immediate ticketing and/or towing as initiated by the HOA and/or Property Management at the expense and risk of the vehicle owner.
3. ***Resident Only Parking Space Violation Penalties:*** Vehicles in violation of the resident-only parking guidelines are subject to immediate ticketing and/or towing as initiated by the HOA and/or Property Management and/or the assignee of the resident only parking space. The towing is at the expense and risk of the vehicle owner.
4. ***Guest Parking Space Violation Penalties:*** When a vehicle is parked in violation of the Guest parking space regulations, the HOA and/or Property Management will either (1) place a warning notice directly on the vehicle, or (2) send the owner of the vehicle a warning letter. The warning notice is a final notice that the vehicle in violation will be towed if it is not removed from the parking space within seventy-two (72) hours of the warning. Any vehicle which has received a notice of violation may be towed without warning if it is ever again parked in violation of the Guest parking space regulations. All tows will be at the risk and expense of the vehicle owner.

Appendix A: Parking Distribution Plan



VICINITY MAP (NOT TO SCALE)

N

LEGEND

BUILDING NUMBER — 7
BUILDING TYPE — B

Leasing Office Spaces (Time Restricted - 2 Hours from 8 am to 5 pm, Guest Parking Permitted from 5 pm to 8 am)

ADA Parking Spaces (2 Spaces provided for Guests, 1 Provided for Leasing Office)

Required	Provided
6 ADA	3 ADA
2 Van Accessible	6 Van Accessible

USPS Space (Guest Parking Permitted from 5 pm to 8 am and All Day Sundays)

E 20 Installed EV Charging Stations (SDGE Turn Key Model Dual Chargers)

E 20 Ready/Capable EV Spaces

REQUIRED PARKING DISTRIBUTION PER BUILDING

BUILDING	RESIDENT	GUEST	TOTAL
AFFORDABLE (BUILDING #1 & #2)	42 SPACES	40.5 SPACES*	82.5 SPACES
BUILDING #3 - WEST	21 SPACES	3 SPACES	24 SPACES
BUILDING #3 - EAST / BUILDING #4 - WEST	33 SPACES	4.5 SPACES	37.5 SPACES
BUILDING #4 - EAST	21 SPACES	3 SPACES	24 SPACES
BUILDING #5 - WEST	21 SPACES	3 SPACES	24 SPACES
BUILDING #5 - EAST / BUILDING #6 - WEST	42 SPACES	6 SPACES	48 SPACES
BUILDING #6 - EAST / BUILDING #7 - WEST	42 SPACES	6 SPACES	48 SPACES
BUILDING #7 - EAST / BUILDING #8 - WEST	42 SPACES	6 SPACES	48 SPACES
BUILDING #9 - WEST	21 SPACES	3 SPACES	24 SPACES
BUILDING #9 - EAST	21 SPACES	3 SPACES	24 SPACES
TOTAL	306 SPACES	78 SPACES	384 SPACES

PARKING REQUIRED

MARKET RATE

72 X 1.5 =	108 SP
78 X 2.0 =	156 SP
GUEST	
150 X .25 =	37.5 SP
SUBTOTAL	301.5 SP

AFFORDABLE

24 X 1.5 =	36 SP
18 X 2.0 =	36 SP
GUEST	
42 X .25 =	10.5 SP
SUBTOTAL	82.5 SP
TOTAL REQUIRED	384 SP
(192 COVERED)	

PARKING PROVIDED

MARKET RATE

PERPENDICULAR	285 SP
PARALLEL	16 SP
SUBTOTAL	301 SP

AFFORDABLE

PERPENDICULAR	54 SP
PARALLEL	29 SP
SUBTOTAL	83 SP*
TOTAL	384 SP
(203 COVERED)	

*AFFORDABLE CONCESSION:
42 SP < 150' WALKING DISTANCE
41 SP > 300' WALKING DISTANCE

CARLSBAD, CA

WEST OAKS

PARKING DISTRIBUTION PLAN

THE CARLSBAD WESTOAKS PROJECT OWNER, LLC
2235 Encinitas Blvd., Suite 216
Encinitas, CA 92024
(760)944-7511

Revision 6:	12-19-2018	Revision 13:	
Revision 5:	06-27-2018	Revision 12:	
Revision 4:	05-01-2018	Revision 11:	
Revision 3:	03-28-2018	Revision 10:	
Revision 2:	08-14-2017	Revision 9:	
Revision 1:	03-30-2017	Revision 8:	
Original Date:	08-22-2016	Revision 7:	04-08-2019

APRIL 8, 2019

SCALE: 0 60 120 180

N

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A-SP4

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engineers

LOCAL MOBILITY ANALYSIS

WEST OAKS

Carlsbad, California
December 23, 2020

LLG Ref. 3-16-2672

Prepared by:
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EXECUTIVE SUMMARY

The West Oaks Project ("Project") proposes the development of 192 multifamily dwelling units. The Project is located on West Oaks Way, south of Palomar Airport Road and west of Palomar Oaks Way in the City of Carlsbad.

The Project study area includes one (1) intersection along Palomar Airport Road and the project access at West Oaks Way. The transportation analyses for the Project were conducted in accordance with the *City of Carlsbad Transportation Impact Analysis (TIA) Guidelines*. The following scenarios are evaluated in this report:

- Existing
- Existing + Project
- Existing + Cumulative
- Existing + Cumulative + Project
- Year 2035
- Year 2035 + Project

The gross Project trip generation was calculated using SANDAG's *Not So Brief Guide of Vehicular Traffic Generation Rates for the San Diego Region* (April 2002). The Project is calculated to generate 1,152 daily trips with 92 trips (18 inbound / 74 outbound) in the AM peak hour and 104 trips (73 inbound / 31 outbound) during the PM peak hour.

This report evaluated the effect of the Project on the Existing, Existing + Cumulative, and Year 2035 baselines using the two distinct analyses. Intersection queueing and multi-modal level of service (MMLOS) were evaluated to meet the requirements of City of Carlsbad TIA Guidelines. Vehicle miles traveled (VMT) analysis was conducted by Fehr & Peers and is provided under separate cover.

Based on City of Carlsbad Mobility Element policy requirements, the Project will be required to prepare a Transportation Demand Management (TDM) plan and implement Transportation System Management (TSM) strategies due to the Project adding traffic to a street segment that is exempt from LOS standards. MMLOS analysis identified deficiencies in the existing pedestrian and transit environments in the Project area and improvements are identified to achieve acceptable levels of service.

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1.0 INTRODUCTION

1.1 Project Description

The Project site is west of Palomar Oaks Way, south of Palomar Airport Road, and proposes to develop 192 multi-family residential units both north and south of West Oaks Way. West Oaks Way is a local road terminating in a cul-de-sac west of Palomar Oaks Way that is constructed but not open to traffic, with a gate and temporary barrier erected at its intersection with Palomar Oaks Way.

Project access is proposed via West Oaks Way from Palomar Oaks Way. A roundabout control is proposed for the project access intersection at West Oaks Way/ Palomar Oaks Way. Onsite pedestrian and bicycle circulation is proposed to connect with the existing pedestrian sidewalk on the south side of Palomar Airport Road at both the east and west ends of West Oaks Way. At the west end of West Oaks Way, a new emergency vehicular access bridge to Palomar Airport Road is proposed which will provide bicycle and pedestrian connectivity at the west end of the site. Bicycle racks and lockers are also proposed.

Figure 1–1 shows the vicinity map. ***Figure 1–2*** shows a more detailed Project area map. ***Figure 1–3*** shows the Project site plan.

1.2 Project Impact Analyses

Analysis is based on the *City of Carlsbad Transportation Impact Analysis Guidelines (April 2018)*, which outlines evaluation of facilities based on their typologies, and defines analysis methodologies, and other necessary considerations. Analysis required per these guidelines may include roadway segment analysis, signalized intersection analysis (queuing at turn lanes), and multimodal level of service (LOS).

Analysis of the project's transportation impacts under CEQA is based on vehicle miles traveled (VMT) and is provided under separate cover. Senate Bill (SB) 743, (2013), created a process to change the way that transportation impacts are analyzed under CEQA. Specifically, SB 743 required the Governor's Office of Planning and Research (OPR) to amend the CEQA Guidelines to provide an alternative to LOS for evaluating transportation impacts. The law requires that those alternative criteria "promote the reduction of greenhouse gas emissions, the development of multimodal transportation networks, and a diversity of land uses" (New Public Resources Code Section 21099(b)(1).) and directed OPR to study alternative metrics including but not limited to "vehicle miles traveled, vehicle miles traveled per capita, automobile trip generation rates, or automobile trips generated." (Ibid.) Since ratification of the amendment to the CEQA guidelines utilizing VMT as the

efficiency metric for which project impacts are evaluated, auto delay is no longer be considered a significant impact under CEQA. (Id. at subd. (b)(2).)

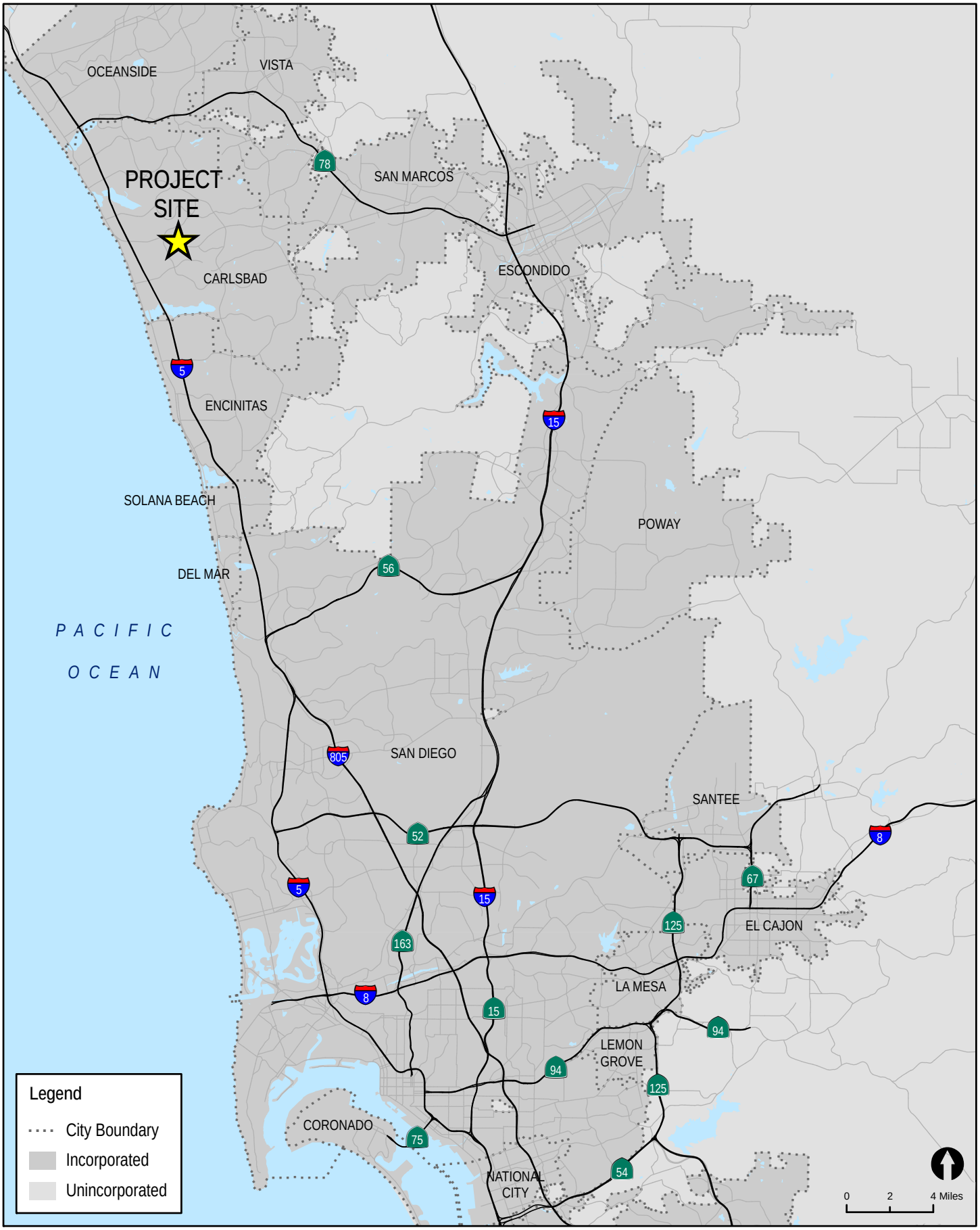

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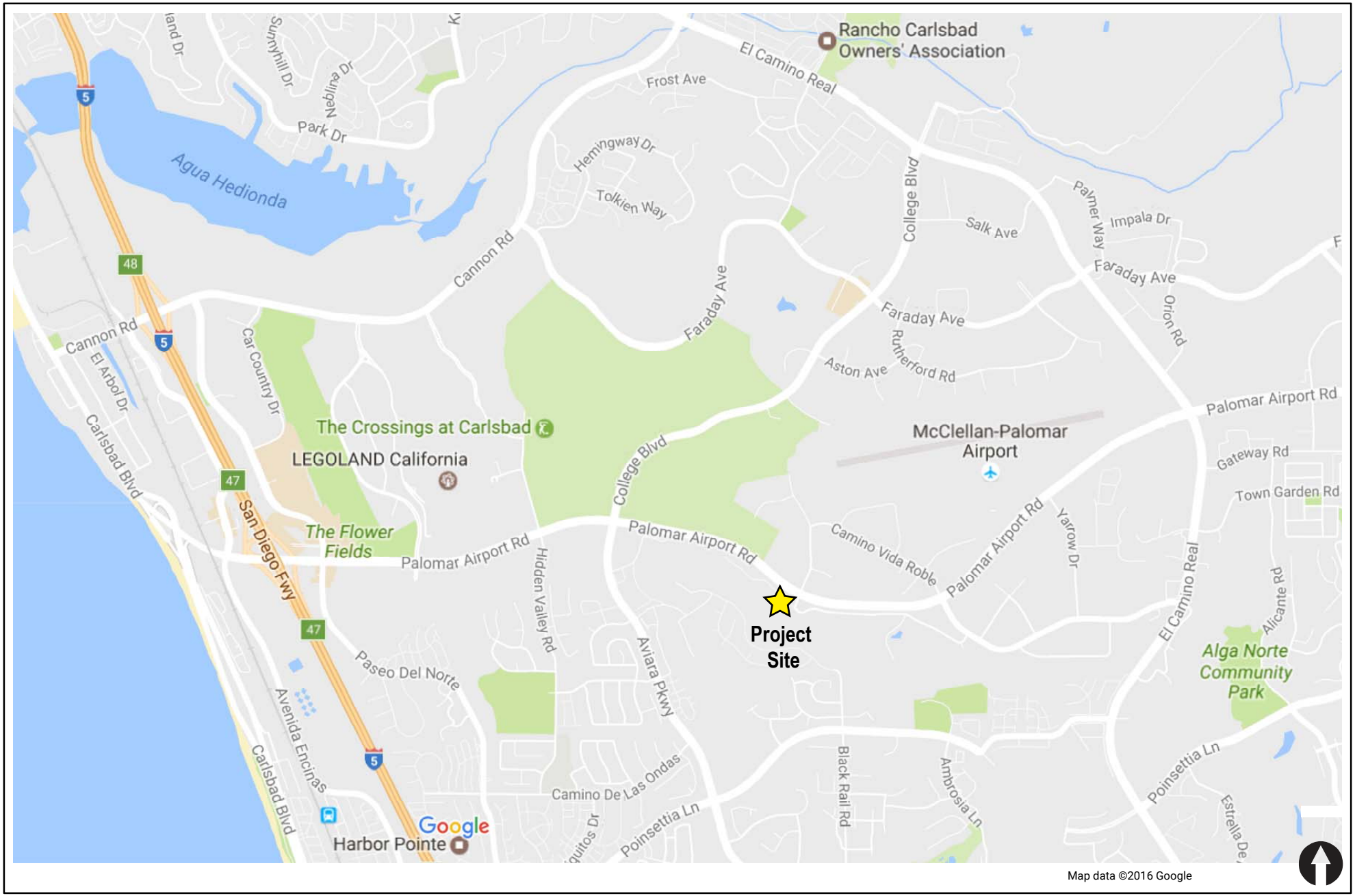
Figure 1-1

Vicinity Map

West Oaks Property



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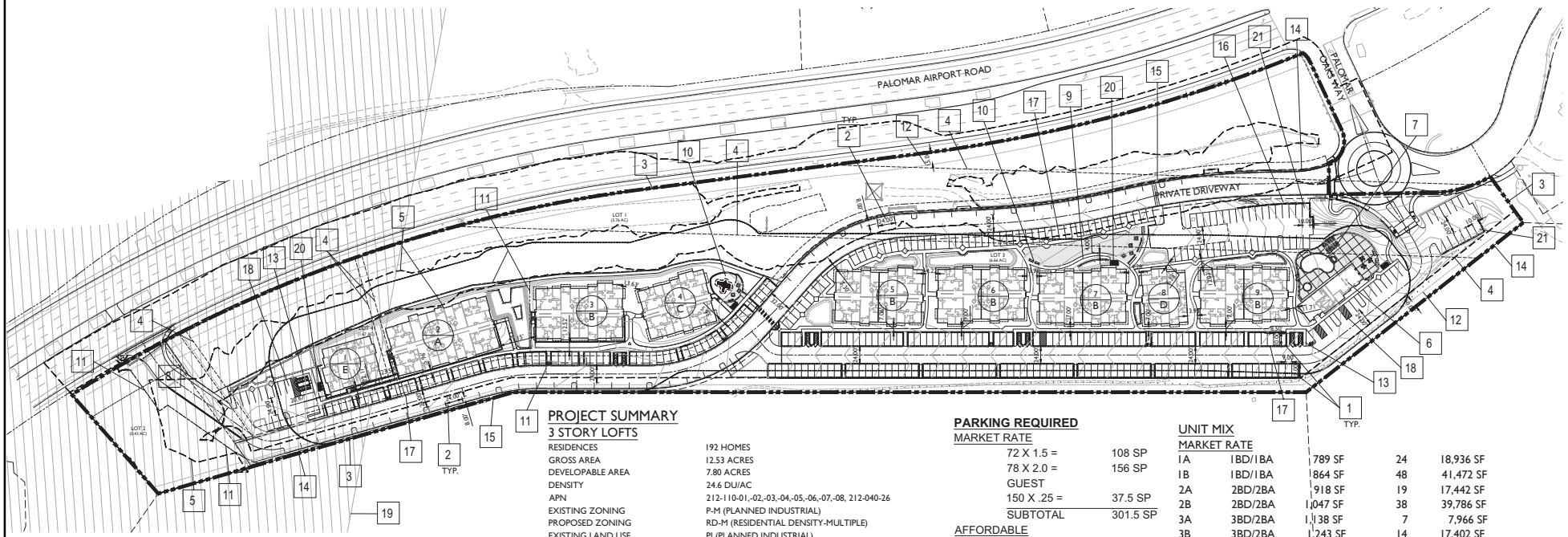
Date: 12/09/16

Figure 1-2

Project Area Map

WEST OAKS PROPERTY



PROJECT SUMMARY

3 STORY LOFTS

RESIDENCES	192 HOMES
GROSS AREA	12.53 ACRES
DEVELOPABLE AREA	7.80 ACRES
DENSITY	24.6 DU/AC
APN	212-110-01,-02,-03,-04,-05,-06,-07,-08, 212-040-26
EXISTING ZONING	P-M (PLANNED INDUSTRIAL)
PROPOSED ZONING	RD-M (RESIDENTIAL DENSITY-MULTIPLE)
EXISTING LAND USE	PI (PLANNED INDUSTRIAL)
PROPOSED LAND USE	R-30 (RESIDENTIAL)
LOCAL COASTAL PROGRAM	MELLO II SEGMENT
LOTS PROPOSED	4 LOTS
UNDEVELOPABLE AREA	4.73 AC
PARKING	384 SPACES
BLDG COVERAGE	12.8%
LANSCAPE AREA	23%
STORAGE	18,000 CUBIC FEET
WATER & SEWER DISTRICT	CARLSBAD MUNICIPAL WATER DISTRICT
SCHOOL DISTRICT	CARLSBAD UNIFIED SCHOOL DISTRICT
DRAINAGE DISCHARGE	73 CFS
MASTER DRAINAGE BASIN	ENCINAS

LEGAL DESCRIPTION:

LOTS 1 THROUGH 7 OF CARLSBAD TRACT NO. 82-04 PALOMAR OAKS. IN THE CITY OF CARLSBAD, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO MAP THEREOF NO. 11358, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY, OCTOBER 23, 1985.

IN ADDITION, THAT PORTION OF THAT CERTAIN PARCEL OF LAND SHOWN AND DESIGNATED AS "DESCRIPTION NO. 3, 78.07 ACRES" ON RECORD OF SURVEY MAP NO. 5715, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY, DECEMBER 19, 1960, BEING A PORTION OF LOT "G" OF THE RANCHO AGUA HEDIONDA, IN THE CITY OF CARLSBAD, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO MAP NO. 823, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY, NOVEMBER 16 1896.

PARKING REQUIRED

MARKET RATE		
	72 X 1.5 =	108 SP
	78 X 2.0 =	156 SP
	GUEST	
	150 X .25 =	37.5 SP
	SUBTOTAL	301.5 SP
AFFORDABLE		
	24 X 1.5 =	36 SP
	18 X 2.0 =	36 SP
	GUEST	
	42 X .25 =	10.5 SP
	SUBTOTAL	82.5 SP
TOTAL REQUIRED		384 SP
		(192 COVERED)

PARKING PROVIDED

MARKET RATE		
	PERPENDICULAR	285 SP
	PARALLEL	16 SP
	SUBTOTAL	301 SP
AFFORDABLE		
	PERPENDICULAR	54 SP
	PARALLEL	29 SP
	SUBTOTAL	83 SP*
TOTAL		384 SP
		(203 COVERED)

*AFFORDABLE CONCESSION:
42 SP < 150' WALKING DISTANCE
41 SP > 300' WALKING DISTANCE

UNIT MIX

MARKET RATE				
1A	1BD/1BA	789 SF	24	18,936 SF
1B	1BD/1BA	864 SF	48	41,472 SF
2A	2BD/2BA	918 SF	19	17,442 SF
2B	2BD/2BA	1,047 SF	38	39,786 SF
3A	3BD/2BA	1,138 SF	7	7,966 SF
3B	3BD/2BA	1,243 SF	14	17,402 SF
	SUBTOTAL		150	143,004 SF
AFFORDABLE				
	1BD/1BA	550 SF	24	13,200 SF
	2BD/2BA	750 SF	12	9,000 SF
	3BD/2BA	1,020 SF	6	6,120 SF
	SUBTOTAL		42	28,320 SF
TOTAL			192	171,324 SF

BUILDING MIX / COVERAGE AREA

			GROSS SF	OCC. / CONST.
BLDG A	10,235 GSF	1	10,235 GSF	R-2/ VA
BLDG B	8,652 GSF	5	43,260 GSF	R-2 / VA
BLDG C	6,564 GSF	1	6,564 GSF	R-2 / VA
BLDG D	4,291 GSF	1	8,582 GSF	R-2 / VA
BLDG E	4,291 GSF	1	8,582 GSF	R-2 / VA
LEASING	2,705 GSF	1	2,705 GSF	B / VB
TOTAL		11	71,346 GSF	

TRASH ENCLOSURES

1 BIN/10 DU = 20 BINS FOR 200 DU
4 BINS PER ENCLOSURE = 5 TOTAL TRASH ENCLOSURES

LEGEND

BUILDING NUMBER — 7
BUILDING TYPE — B

SITE PLAN KEYNOTES

1	TYP. PARKING STALL(9' X 19' or 8.5' X 20')	11	LOT LINE
2	PARALLEL PARKING STALL(8' X 24')	12	SETBACK LINE
3	PROPERTY LINE	13	TRASH ENCLOSURE
4	SDG&E EASEMENT	14	SITE FENCE
5	RIPARIAN BUFFER	15	EXISTING RETAINING WALL
6	REC / LEASING BUILDING	16	PROPOSED RETAINING WALL
7	POOL	17	CARPORTS
8	EMERGENCY ACCESS	18	ACCESSIBLE PARKING STALL
9	HARDSCAPE PATHWAYS	19	AIRPORT SAFETY ZONE
10	REC AREA	20	BIKE RACK
		21	10' WIDE STALL NEXT TO WALLS

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Date: 05/02/19

Figure 1-3

Site Plan

WEST OAKS PROPERTY

2.0 ANALYSIS APPROACH & METHODOLOGY

As discussed in *Section 1.2* above, two distinct analyses are provided to address both the City's Growth Management Plan relative to multi-modal transportation and the needs of other technical analyses required by CEQA. Each of these approaches evaluates components of the transportation system but uses different methodologies. The following is a discussion of these methodologies.

2.1 Auto Analysis per City TIA Guidelines

The following summarizes the evaluation methodologies to be used per the *City of Carlsbad Transportation Impact Analysis Guidelines*, consistent with the City's adopted Growth Management Plan.

2.1.1 *Study Area*

Per the City of Carlsbad TIA Guidelines, the study area shall include the following:

Intersections

- All signalized intersections within 0.25 miles of a project access point serving vehicles will be included in the study area. Additional intersections within 0.25 to 0.5 miles from the project access points may also be added to the study area the discretion of the City Engineer / City Traffic Engineer.
- Unsignalized intersections located along corridors subject to Auto MMLOS within the project study area may require a traffic signal warrant analysis. A warrant analysis is required if:
    - The unsignalized intersection provides direct access to the project site, or
    - The unsignalized intersection provides direct access to a cumulative project considered in the Transportation Impact Analysis
    - The unsignalized intersection has been identified by the City as a potential signalized intersection.

  A warrant analysis is not required for right turn in/right turn out only intersections or driveways that are physically restricted by a raised center median.

Street Segments

- Non-freeway roadway segments that are subject to Auto MMLOS Criteria and expected to experience an increase in project traffic equal to 50 or more peak hour trips in either direction of travel.

Freeway Mainline Segments

- Freeway mainline segments where the project adds 50 or more peak hour trips in either direction of travel.

Freeway Ramps

- Freeway entrance and exit ramps where the proposed project will add 20 or more peak-hour trips and/or cause any traffic queues to exceed ramp storage capacities.

Based on these guidelines, the following auto facilities are included in the study area for analysis:

Intersections

- Palomar Airport Road / Palomar Oaks Way (signalized)

2.1.2 *Signalized Intersection Methodology*

The City of Carlsbad's published TIA Guidelines state that all signalized intersections within the study area are subject to the signalized intersection analysis. The analysis will address the adequacy of turn lanes at a signalized intersection to serve the existing, forecast and project queues. As stated previously, all signalized intersection within 0.25 miles of the project auto access driveway or intersection shall be evaluated if the project adds trips to the left turn or right turning movements at the intersection. The signalized study area will be based on trip generation and trip assignment for the project. Analyses will be based on the following criteria:

- ***Left turn queue assessment***: Compare the left turn volume with the length of the left turn pocket(s). A general rule of thumb of one foot per left turning vehicle per lane may be used for this analysis.
- ***Left turn volume***: If the left turn volume exceeds 250 vehicles per hour, a second left turn lane is recommended.
- ***Right turn volume***: If the right turn volume exceeds 150 vehicles per hour, a dedicated right turn lane is recommended.

2.1.3 *Roadway Segment Level of Service Methodology*

The City of Carlsbad's published TIA Guidelines state that roadways within the Project study area subject to Auto MMLOS standards shall be evaluated using the most current version of the Highway Capacity Manual, as outlined in the City's General Plan Mobility Element (2015). Roadway Capacity Tables derived from the Highway Capacity Manual were developed specifically for each roadway subject to vehicular level of service in the City of Carlsbad. The specific capacity calculated for each roadway accounts for key geometric and operational factors including number of lanes, type of facility, intersection cycle length, distance between intersections, and other factors related to lane capacity and signal operations. The capacity for each roadway segment was calculated using the ARTPLAN software, which was developed using the capacity calculations outlined in the HCM. The ARTPLAN software package is used nationally as a planning tool, but alternative methods can be used to calculate roadway segment capacity.

The *City of Carlsbad Segment LOS Capacity Threshold* table provides the directional capacity for each roadway segment subject to MMLOS analysis in the General Plan Mobility Element. To evaluate the operating conditions along a study corridor, peak hour volumes are compared to the Roadway Capacity Tables to determine the segment operating conditions. The LOS for each segment is reported for all study scenarios in the TIA.

2.2 Multimodal Level of Service Analysis

The City of Carlsbad requires multimodal level of service (MMLOS) evaluation for pedestrian, bicycle, and transit/rideshare users of the public roadway system. The City organizes the street network by a system of "typologies", as defined by the *City of Carlsbad Mobility Element*. Depending on the typology, different streets may require different MMLOS evaluations. For each roadway user set (pedestrian, bicycle, transit), general criteria groups have been identified. ***Table 2–1*** shows a summary of the criteria for each roadway user set.

TABLE 2–1
MULTIMODAL LEVEL OF SERVICE CRITERIA

Roadway Users		
Pedestrian	***Bicycle***	***Transit/Ridesharing***
Accessibility & Functionality	Street Characteristics	Access
Street Characteristics	Facility (each side of street)	Connectivity
Crossing Characteristics	Bikeway Design	Transit Priority
Other Elements	Connectivity/Contiguity	Service
–	Adjacent Vehicle Parking	Amenities
–	Other Elements.	Bicycle Accommodations
–	–	Available Mobility Services

Source: City of Carlsbad. MMLOS Tool (March 2020).

Each roadway's typography is evaluated for the set of roadway users based on sub-criteria, which is assigned "typology points". The following represents examples of sub-criteria within the "Transit and Ridesharing" general criteria group with corresponding points assigned:

- *Access – "ADA compliant sidewalk or path to transit stops in both directions" (15 points assigned)*
- *Connectivity – "Multiple transit routes on segment" (10 points assigned)*
- *Transit Priority – "Dedicated right of way" (5 points assigned)*
- *Service – "Commute shuttle service provided during the morning and afternoon commute periods" (10 points assigned)*
- *Amenities – "Covered bus stops" (5 points assigned)*
- *Bicycle Accommodations – "Bike parking available at the bus stop" (5 points assigned)*
- *Available Mobility Services – "On demand rideshare services available" (10 points assigned)*

The MMLOS analysis evaluates each of the sub-criteria, totals the points for the subject street typology, and compares the points to the City's MMLOS Point System and LOS Rating, shown in ***Table 2–2***. This table assigns a qualitative LOS to several ranges of points.

TABLE 2–2
MMLOS POINT SYSTEM & LOS RATING

Point Score	*LOS*
90-100	A
80-90	B
70-80	C
60-70	D
50-60	E
0-50	F

Source: City of Carlsbad. MMLOS Tool (March 2020).

The City's Mobility Element calls for each street typology to achieve LOS D or better operations for each mode subject to level of service standards.

2.2.1 *Study Area*

The following roadways in the study area was identified for MMLOS evaluation:

- ***Palomar Airport Road*** is identified in the Mobility Element as an "Arterial Street". Based on the City's criteria for MMLOS evaluation, it is subject to the following MMLOS "LOS D Standards" and corresponding analyses:
    - Transit/Ridesharing
- ***Palomar Oaks Way*** is identified in the Mobility Element as a Local/Neighborhood Road south of Palomar Airport Road. Based on the City's criteria for MMLOS evaluation it is subject to the following MMLOS "LOS D Standards" and corresponding analyses:
    - Pedestrian MMLOS Criteria
    - Bicycle MMLOS Criteria

Pedestrian

Palomar Oaks Way: Palomar Airport Road to West Oaks Way (west side only)

The project site fronts Palomar Oaks Way, a Local/Neighborhood Street. These streets are subject to Pedestrian LOS analysis for the side of the street on which the project is located.

Bicycle

Palomar Oaks Way: Palomar Airport Road to West Oaks Way (both directions)

The project site is located on Palomar Oaks Way, a Local/Neighborhood Street. These streets are subject to Bicycle LOS analysis for both directions of travel.

Transit

Palomar Airport Road: NCTD Route 445

Palomar Airport Road is an Arterial Street subject to Transit LOS. The following transit stop pairs are located within ½ mile walking distance of the Project site:

- Palomar Airport Road / Palomar Oaks Way

Figure 2–1 shows the MMLOS study area.

2.3 City of Carlsbad Growth Management Plan Performance Standards

The City of Carlsbad Growth Management Program "Citywide Facilities and Improvements Plan (last amended August 22, 2017)" states that the performance standard for the circulation system is as follows:

> *Implement a comprehensive livable streets network that serves all users of the system – vehicles, pedestrians, bicycles, and public transit. Maintain LOS D or better for all modes that are subject to this multi-modal level of service (MMLOS) standard, as identified in Table 3-1 of the General Plan Mobility Element, excluding LOS exempt intersections and streets approved by the City Council.*

Thus, the Growth Management Plan's standard for all non-exempt street system facilities is LOS D. To comply with the Growth Management Program, all roadway facilities identified as not meeting the performance standard (LOS D) in the existing conditions scenario must be fully mitigated regardless of the project impact to that facility, or the project must request an exemption from the LOS D standard according to the Mobility Element Implementing Policy 3-P.9.

The project causes a significant impact to a transportation facility in the study area if one or more of the following criteria is met:

- The roadway facility is projected to exceed the LOS D standard and the project's traffic meets or exceeds the thresholds listed in ***Table 2–3***; or
- A ramp meter delay exceeds 15 minutes and the project's traffic meets or exceeds the thresholds listed in *Table 2–3*; or
- The addition of project results in a change in LOS from acceptable (LOS D or better) to deficient (LOS E or F) on a roadway segment, freeway segment or ramp; or
- The project results in a change in conditions on a roadway segment, freeway segment or ramp that exceeds the allowable thresholds (outlined in *Table 2–3*) for locations operating at a deficient LOS without the project (baseline conditions).

TABLE 2–3
MEASURE OF SIGNIFICANT PROJECT TRAFFIC IMPACTS – ROADWAYS SUBJECT TO THE VEHICLE MMLOS STANDARD

Auto Facility Subject to MMLOS Thresholds	Threshold of Significance
Roadway Segment	Any trip added to a segment forecast to operate at deficient LOS requires project mitigation; Project mitigation will be determined based on project contribution to the identified impact.
Freeway Segment	1% increase in V/C or 1 mph decrease in speed
Ramp Meter	2-minute increase

Source: Table 6 – Carlsbad TIA Guidelines (FINAL), April 2018.

The project can have either a direct or cumulative impact as follows:

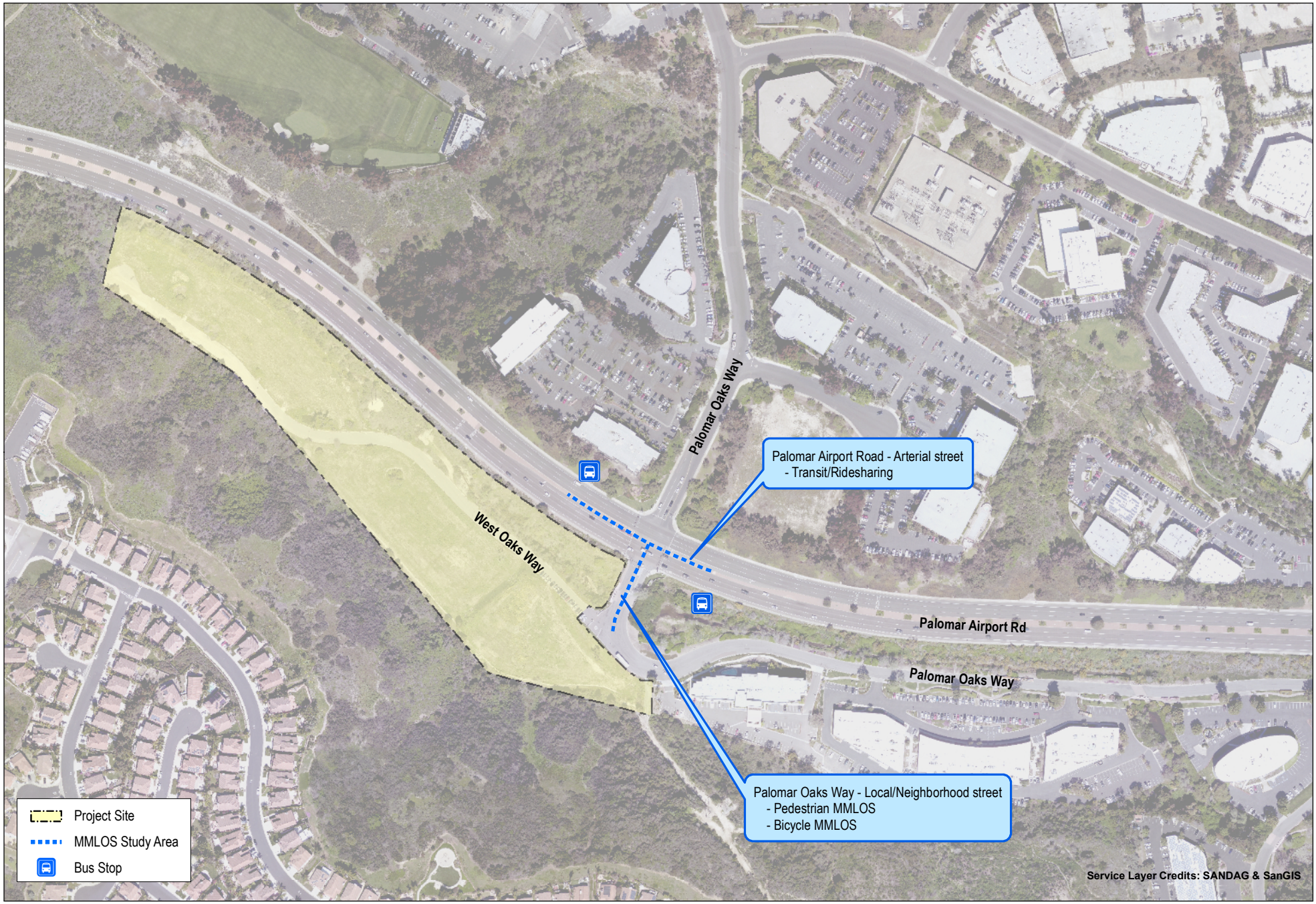
- **Direct Impacts**: any significant impact identified under existing conditions. Direct effects shall be fully offset by the project.
- **Cumulative Impacts:** any significant impact identified under Cumulative and Horizon Year conditions. Cumulative effects may be offset through fair share contribution. Projects identified for fair share contribution should be included in the City's Capital Improvement Program (CIP) or Transportation Impact Fee (TIF) program.

Any roadway section that is identified as having a significant impact must either:

- Mitigate the traffic performance to pre-project conditions, or
- Request LOS exemption from City Council for the LOS standard and identify feasible TSM & TDM mitigation

Because of the qualitative nature of the MMLOS methodology, a project impact is significant if an existing pedestrian, bicycle or transit facility is determined to not meet the LOS D standard regardless of the forecasted number of project trips expected to use the facility. An impact occurs and is deemed significant if:

- An existing facility in the project study area does not meet the pedestrian, bicycle or transit LOS standard, or
- The project causes a standard facility to become substandard (e.g., removal of an existing bike lane or bus stop, or blocking pedestrian access), or
- A gap is identified in or directly adjacent to the study area related to pedestrian, bicycle or transit service to the project site.



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Date: 9/16/19

Figure 2-1

MMLOS Study Area

WEST OAKS PROPERTY

3.0 EXISTING CONDITIONS

This section presents existing transportation conditions for street system components identified for analysis.

3.1 Existing Street Network

The following is a description of the major roadways within the study area. ***Figure 3–1*** illustrates existing conditions in the study area in terms of traffic lanes and intersection controls.

Palomar Airport Road is classified as an Arterial Street on the *City of Carlsbad Mobility Element*. Within the study area, Palomar Airport Road is a six-lane divided roadway with Class II bicycle lanes in both directions of travel. The posted speed limit is 35 to 55 mph. On-street parking is not allowed.

Palomar Oaks Way is classified as a Local/Neighborhood Street on the *City of Carlsbad Mobility Element*. Palomar Oaks Way is a private street open to public circulation, and currently constructed as a two-lane undivided roadway. On-street parking is prohibited and there are no bicycle lanes or bus stops.

West Oaks Way is classified as a Local/Neighborhood Street the *City of Carlsbad Mobility Element*. West Oaks Way is constructed as a two-lane undivided roadway but is currently gated and not open to general traffic.

3.2 Existing Traffic Volumes

AM/PM peak hour intersection counts at all study area intersections were commissioned on Wednesday, November 30, 2016 while schools in the area were in session. Peak hour roadway segments volumes were derived from these counts as needed. As noted above, West Oaks Way is constructed but not open to traffic and Palomar Oaks Way / West Oaks Way is not an existing operational intersection. Existing trips on Palomar Oaks Way for analysis of "with Project" scenarios were taken from the count conducted at the adjacent intersection.

Figure 3–2 shows the Existing Traffic Volumes. ***Appendix A*** contains the unadjusted count sheets.

3.3 Existing Transit Conditions

Map and schedule for the local serving Route 445 bus service are included in ***Appendix B***.

Route 445 provides limited service between the Carlsbad Poinsettia COASTER station and Palomar College. There are three eastbound departures and four westbound departures during the peak commute hours, Monday through Friday only. In additional to the COASTER at Poinsettia Station, Route 445 connects with Routes 304, 305, 347, and the SPRINTER at Palomar College. The nearest stop pairing to the Project site is located at Palomar Airport Road / Palomar Oaks Way.

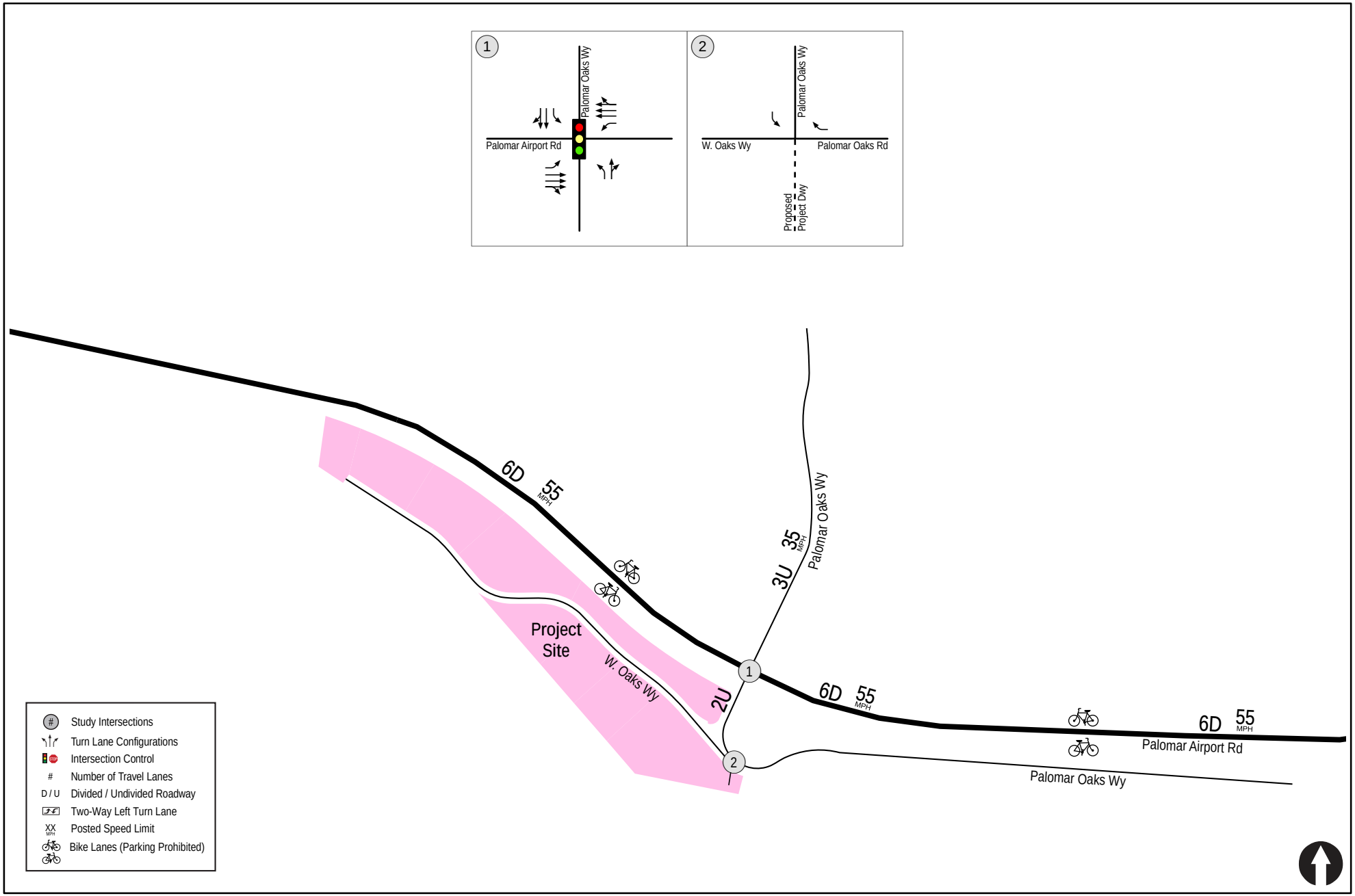

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Figure 3-1

Existing Conditions Diagram

WEST OAKS PROPERTY

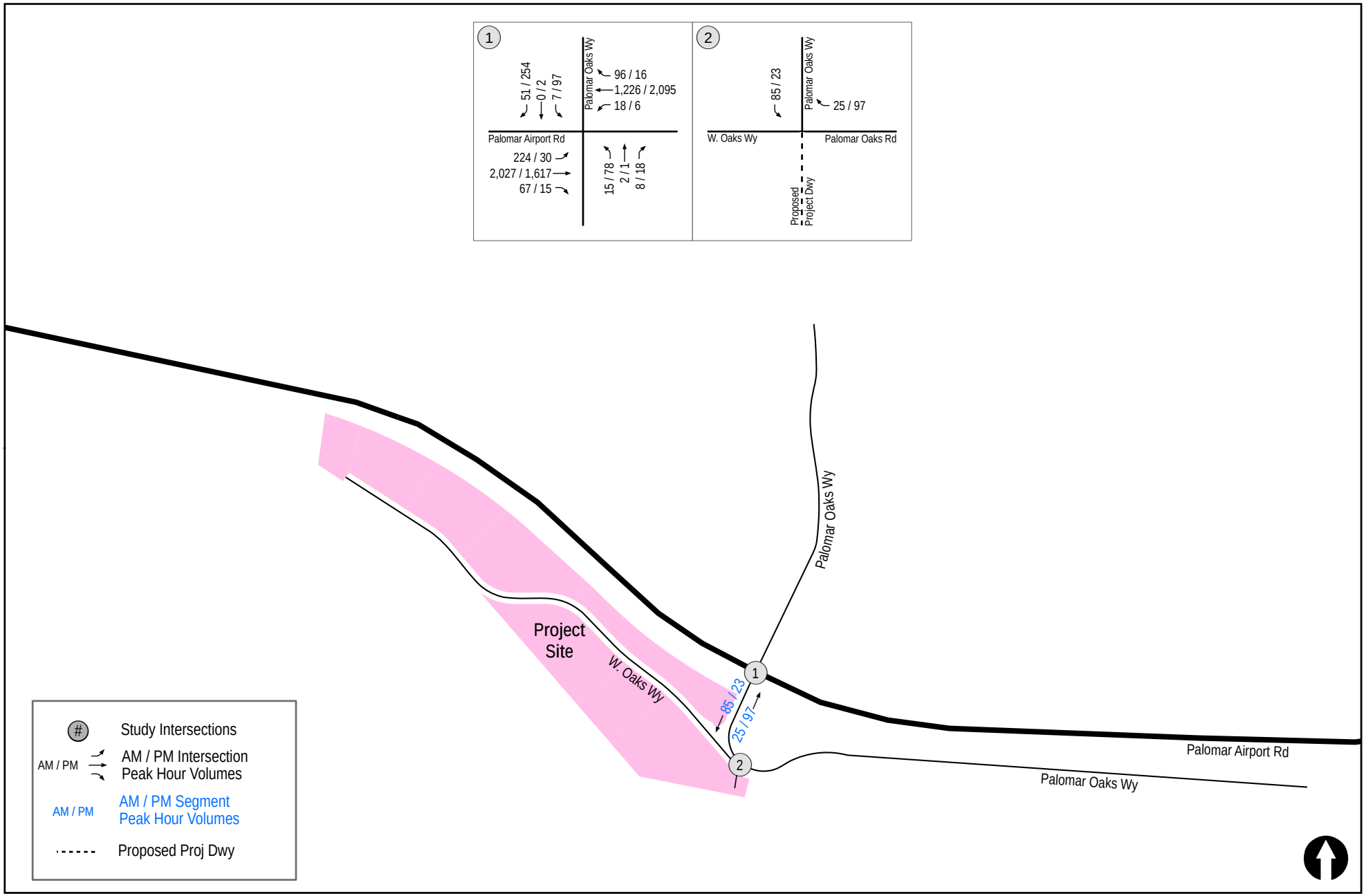

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Figure 3-2

Existing Traffic Volumes

WEST OAKS PROPERTY

4.0 PROPOSED PROJECT

4.1 Trip Generation

The Project proposes the construction of 192 multi-family residential dwelling units. Trip generation estimates for the proposed project were based on the SANDAG's *Brief Guide of Vehicular Traffic Generation Rates for the San Diego Region* (April 2002). Based on the Project's density, the SANDAG "Apartment" rate for multi-family units more than 20 DU/ acre was used.

Table 4–1 tabulates the Project traffic generation. The Project is calculated to generate 1,152 ADT with 18 inbound / 74 outbound trips during the AM peak hour and 73 inbound / 31 outbound trips during the PM peak hour.

TABLE 4–1
PROJECT TRIP GENERATION SUMMARY

Land Use	Quantity	Daily Driveway Trips (ADT)		AM Peak Hour					PM Peak Hour				
		Rate	Volume	Rate	In:Out Split	Volume In	Volume Out	Volume Total	Rate	In:Out Split	Volume In	Volume Out	Volume Total
Apartment [a]	192 DU	6/DU	1,152	8%	20:80	18	74	92	9%	70:30	73	31	104

Source: *SANDAG (Not So) Brief Guide of Vehicular Traffic Generation Rates for the San Diego Region (April 2002).*

Footnotes:

a. Apartment rate applied to "any multi-family units more than 20 units/acre".

General Notes:

1. ADT = Average Daily Trips

4.2 Trip Distribution

Project traffic was distributed to the street system based on discussions with City staff, using existing traffic counts and other factors such as project access, the proximity of the project to Interstate 5, and potential recreation and retail opportunities.

4.3 Trip Assignment

The Project traffic generation in *Table 4–1* was assigned to the street system based on the trip distribution presented in ***Figure 4–1.*** The resulting assignment of AM/PM peak hour Project volumes is shown on ***Figure 4–2***. Existing + Project traffic volumes are presented on ***Figure 4–3***.

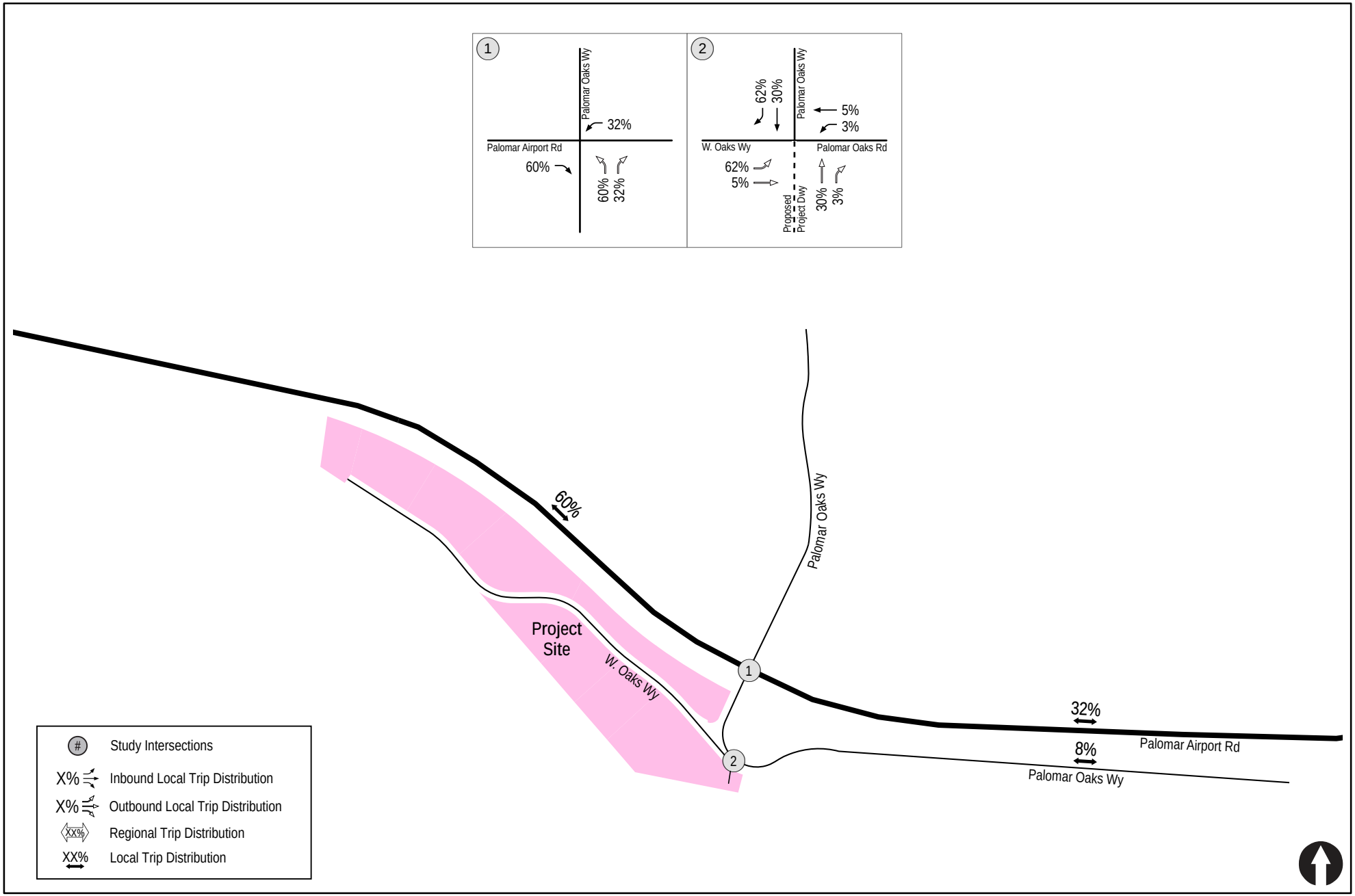

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Figure 4-1

Project Traffic Distribution

WEST OAKS PROPERTY

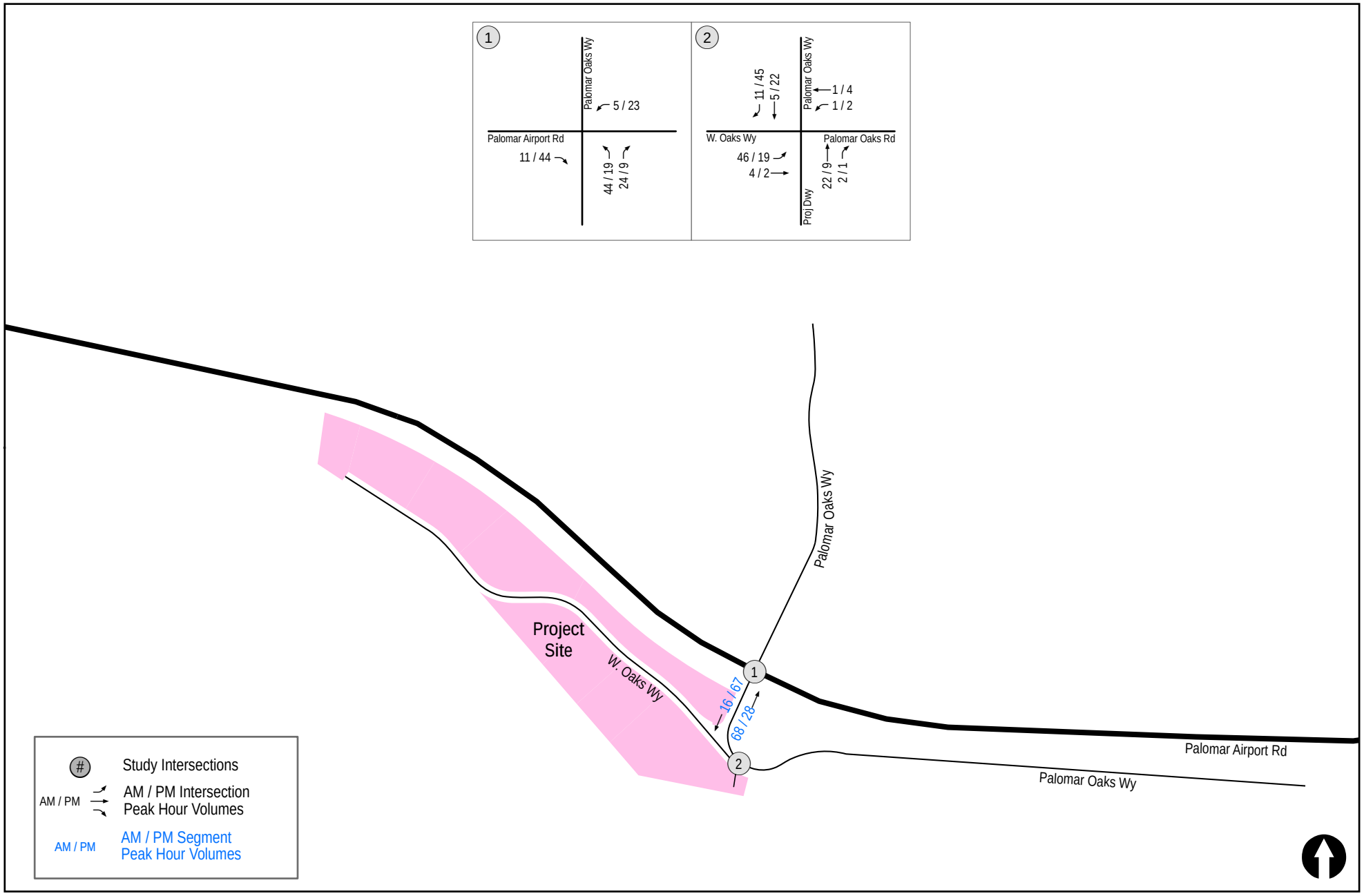

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Figure 4-2

Project Traffic Volumes

WEST OAKS PROPERTY

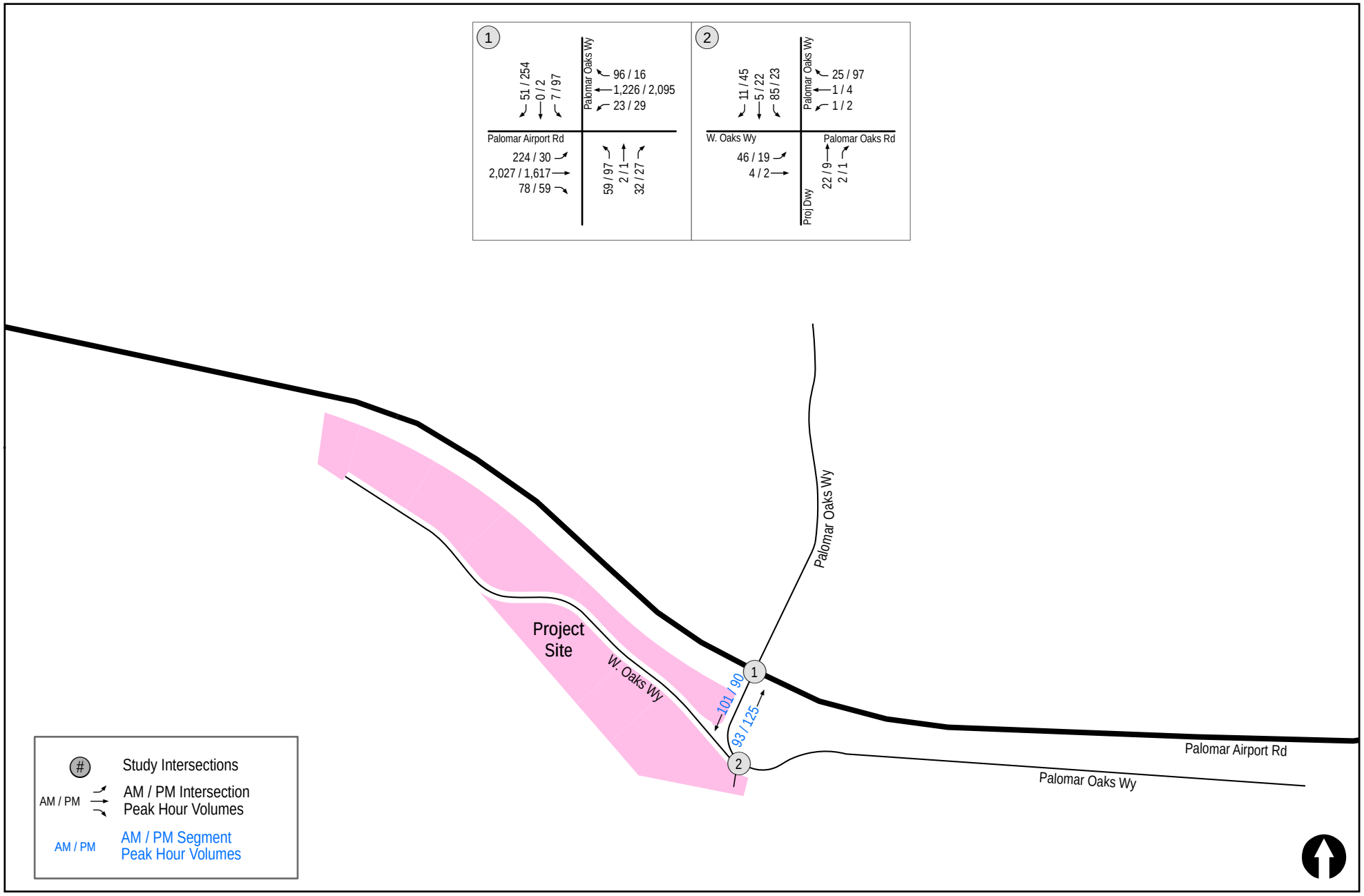

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Figure 4-3

Existing + Project Traffic Volumes

WEST OAKS PROPERTY

5.0 CUMULATIVE CONDITIONS

5.1 Cumulative Projects

To determine Near-Term (Existing + Cumulative) conditions, LLG coordinated with the City of Carlsbad to identify approved or pending projects that will add traffic to the Project study area in the near-term (Project opening day) condition. The following thirteen (13) cumulative projects were identified for inclusion in Near-Term conditions. ***Table 5–1*** lists and describes each cumulative project.

Figure 5–1 shows the total cumulative projects peak hour traffic volumes. ***Figure 5–2*** shows the peak hour traffic volumes for the "Existing + Cumulative Projects" scenario. ***Figure 5–3*** shows the peak hour traffic volumes for the "Existing + Cumulative Projects + Project" scenario.

Individual cumulative project assignments completed by LLG based on available information, as well as supporting information, including cumulative project trip generation and distribution, where available, is included in ***Appendix C***.

TABLE 5–1
CUMULATIVE PROJECTS LIST

Project Name	Description
Robertson Ranch West Village	308 single-family and 322 multi-family dwelling units, 9 acres commercial, 5 acres community facilities
Cantarini Ranch [a, b]	105 single-family and 81 multi-family dwelling units
Holly Springs [a, b]	43 single family dwelling units
Encinas Creek Apartments [a, b]	127 apartments
Quarry Creek	119 single family, 537 multi-family dwelling units
Dos Colinas [a, b]	228 retirement community units, 8 congregate care units, 29 multi-family dwelling units
Bressi Ranch Hotels	239 business hotel rooms
La Costa Town Square	284,400 sf of community shopping center, 129 condo dwelling units, 64 single family dwelling units, 55,000 sf office
Westin Hotel & Timeshare	71 hotel units and 36 timeshare units
Uptown Bressi	90,267 sf commercial buildings and 125 residential units
Aviara Apartments	329-unit apartment complex
Legoland Hotel Phase 2	250-room resort hotel
Marja Acres [a]	252 condos, 46 senior units, 6,000 sf retail, 4,000 sf restaurant

Footnotes:

a. Cumulative project was evaluated and is not expected to contribute a measurable number of trips to the Project study area.

b. Cumulative project requires construction of College Boulevard extension between Cannon Road and El Camino Real.

5.2 Network Conditions

No improvements or changes to study area street facilities are assumed for Near-Term (Existing + Cumulative) conditions. Some of the cumulative projects listed above will require the construction of the planned College Boulevard extension between Cannon Road and El Camino Real. This planned network improvement is located approximately three miles from the Project study area and is anticipated to primarily affect local traffic patterns in the vicinity of College Boulevard, El Camino Real, and Cannon Road. The College Boulevard extension is not expected to have a notable effect on traffic patterns within the study area.

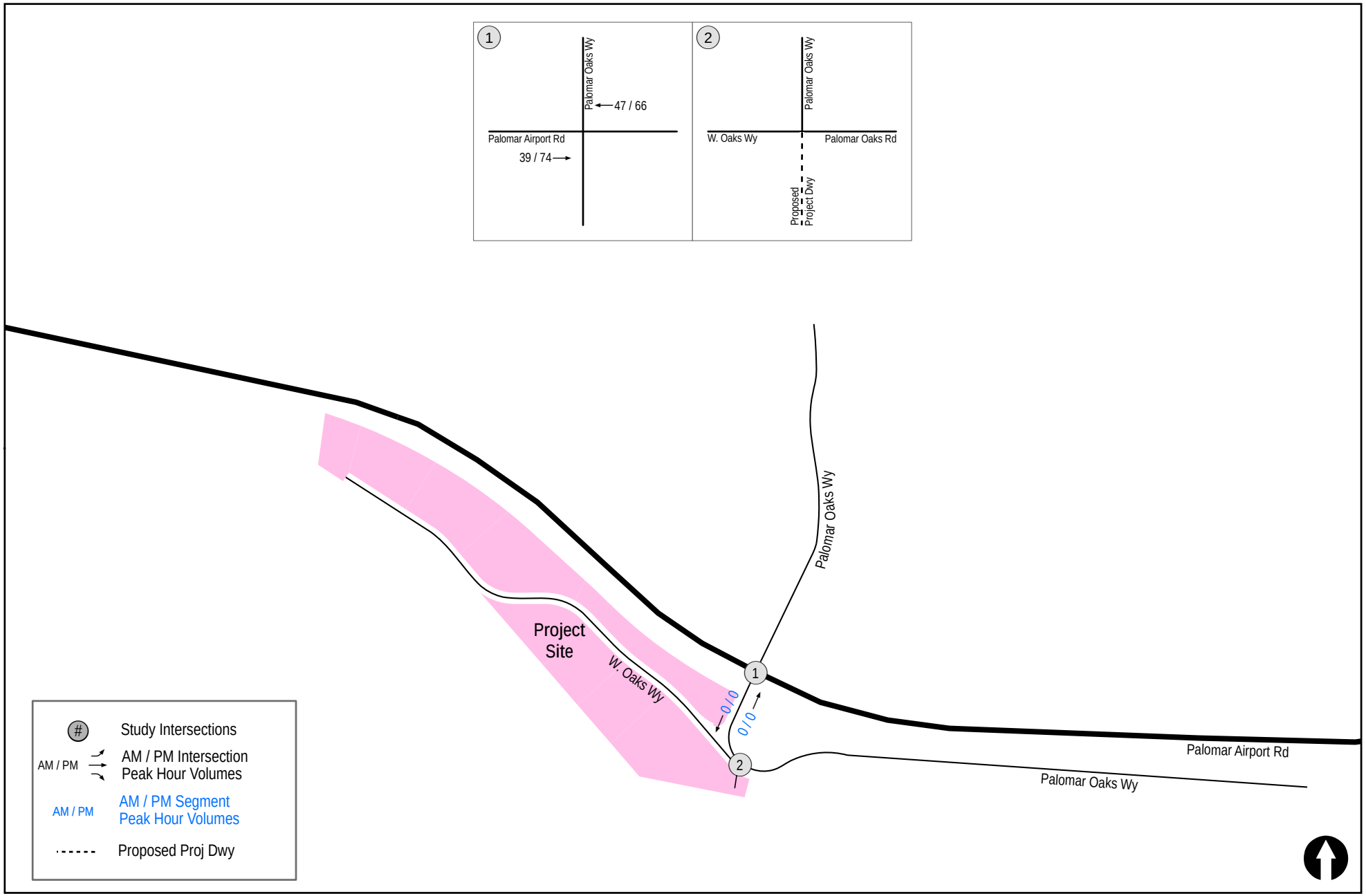

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Figure 5-1

Cumulative Projects Traffic Volumes

WEST OAKS PROPERTY

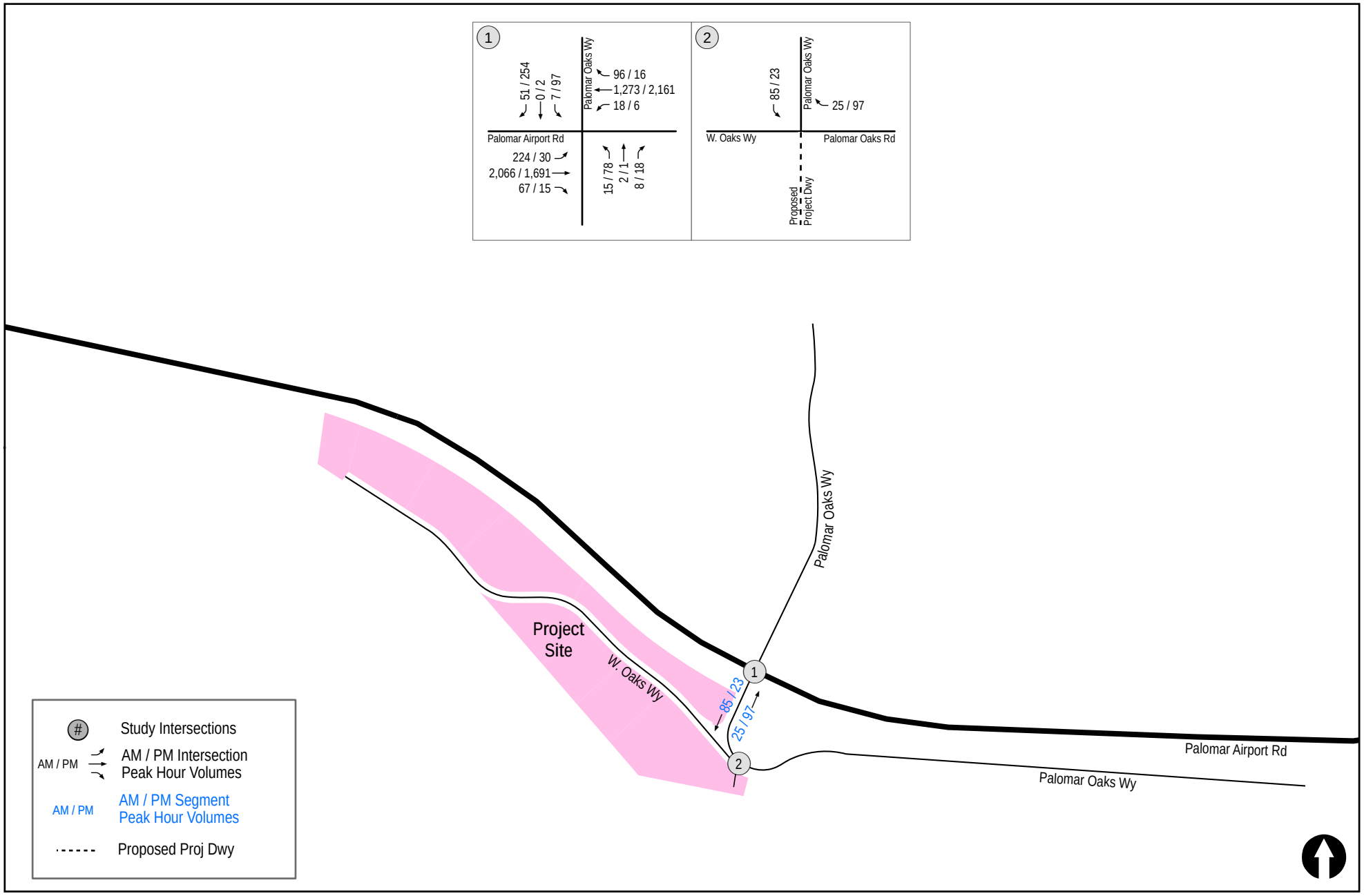

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Figure 5-2

Existing + Cumulative Projects Traffic Volumes

WEST OAKS PROPERTY

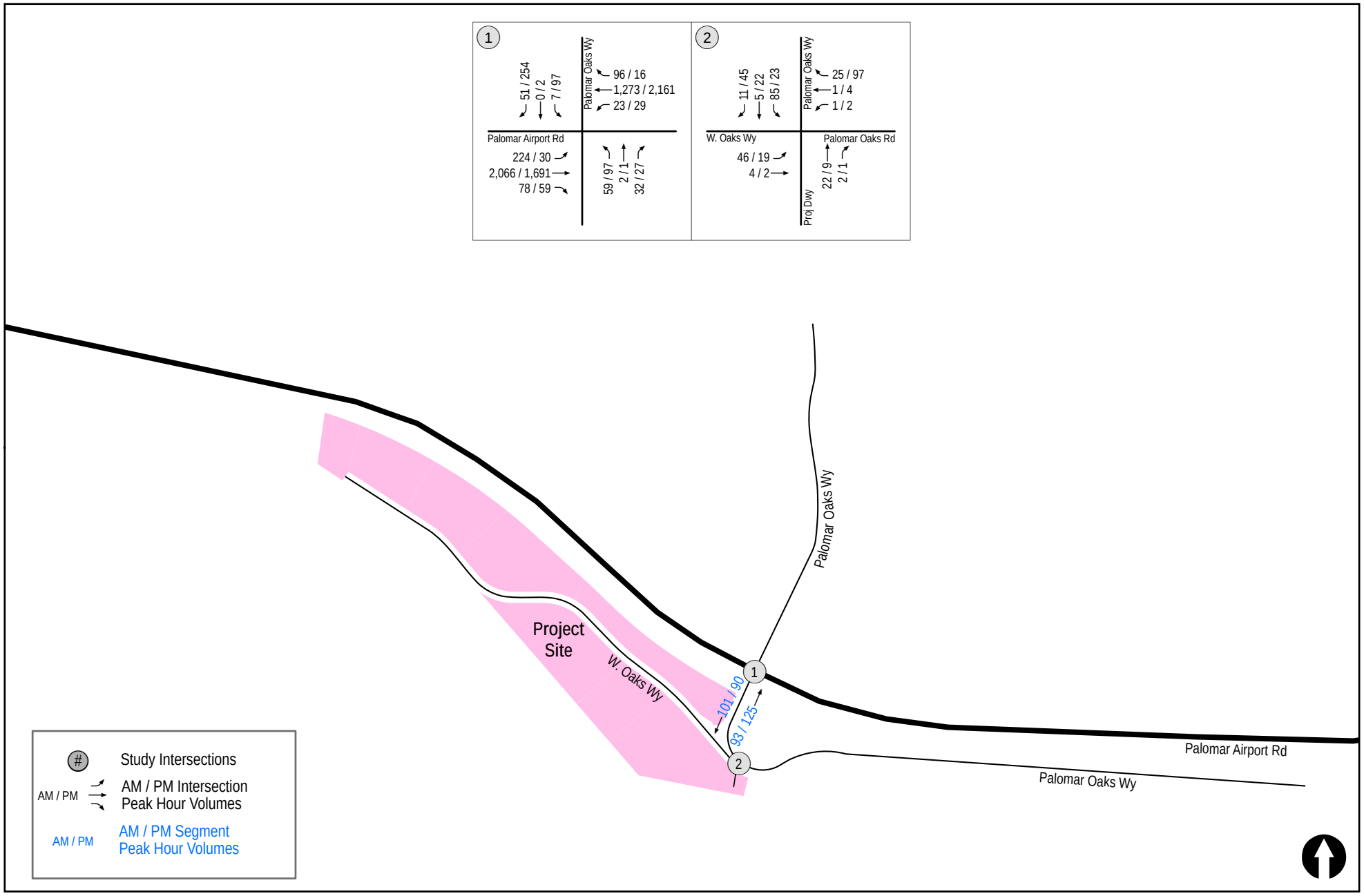

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Figure 5-3

Existing + Cumulative Projects + Project Traffic Volumes

WEST OAKS PROPERTY

6.0 YEAR 2035 CONDITIONS

6.1 Year 2035 Traffic Volumes

Year 2035 traffic volumes along the Palomar Airport Road corridor were forecasted based on the SANDAG Series 12 Traffic Forecast Model developed by Fehr & Peers for use in the Agua Hedionda South Shore Specific Plan traffic study. LLG confirmed with City staff that this model generally contains the most up to date land use forecast within the City of Carlsbad. As the study area for the Agua Hedionda South Shore Specific Plan overlaps with the Project, Year 2035 peak hour volumes were taken directly from the Transportation Impact Analysis, also prepared by Fehr & Peers. These volumes exclude the proposed Agua Hedionda plan itself, which was rejected by ballot measure within the City of Carlsbad. Year 2035 volumes on West Oaks Way and Palomar Oaks Way, south of Palomar Airport Road, were not included in the Agua Hedionda South Shore Specific Plan. These were estimated based on regional growth along Palomar Airport, applied to existing volumes on West Oaks Way.

Figure 6–1 shows the Year 2035 traffic volumes and ***Figure 6–2*** shows the Year 2035 + Project traffic volumes.

Appendix D contains the excerpts from the Fehr & Peers study depicting Year 2035 traffic volumes.

6.2 Year 2035 Roadway Network

The City's planned circulation system includes the following roadway improvements that are expected to be completed by the Year 2035. Although they are not within the Project study area and do not affect the intersection or roadway geometry of study area facilities, they are noted for the broader effect on forecasted traffic volumes for Year 2035.

- College Boulevard Extension – connect roadway from El Camino Real to Cannon Road
- Poinsettia Lane Extension – connect roadway between Cassia Road and El Camino Real
- El Camino Real Widening at Cannon Road – widen intersection to include three northbound through lanes and a separate northbound right-turn lane

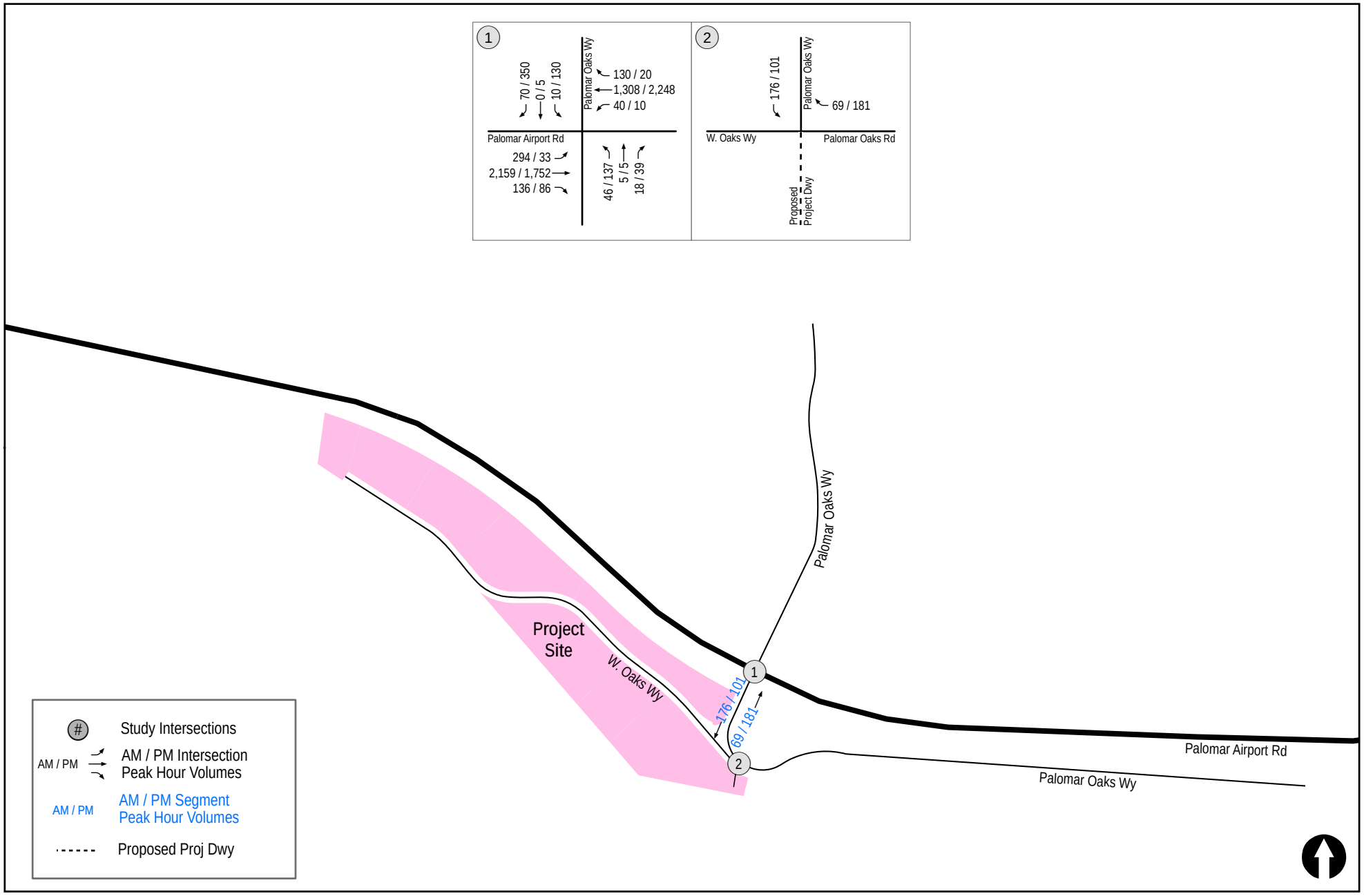

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Figure 6-1

Year 2035 Traffic Volumes

West Oaks Property

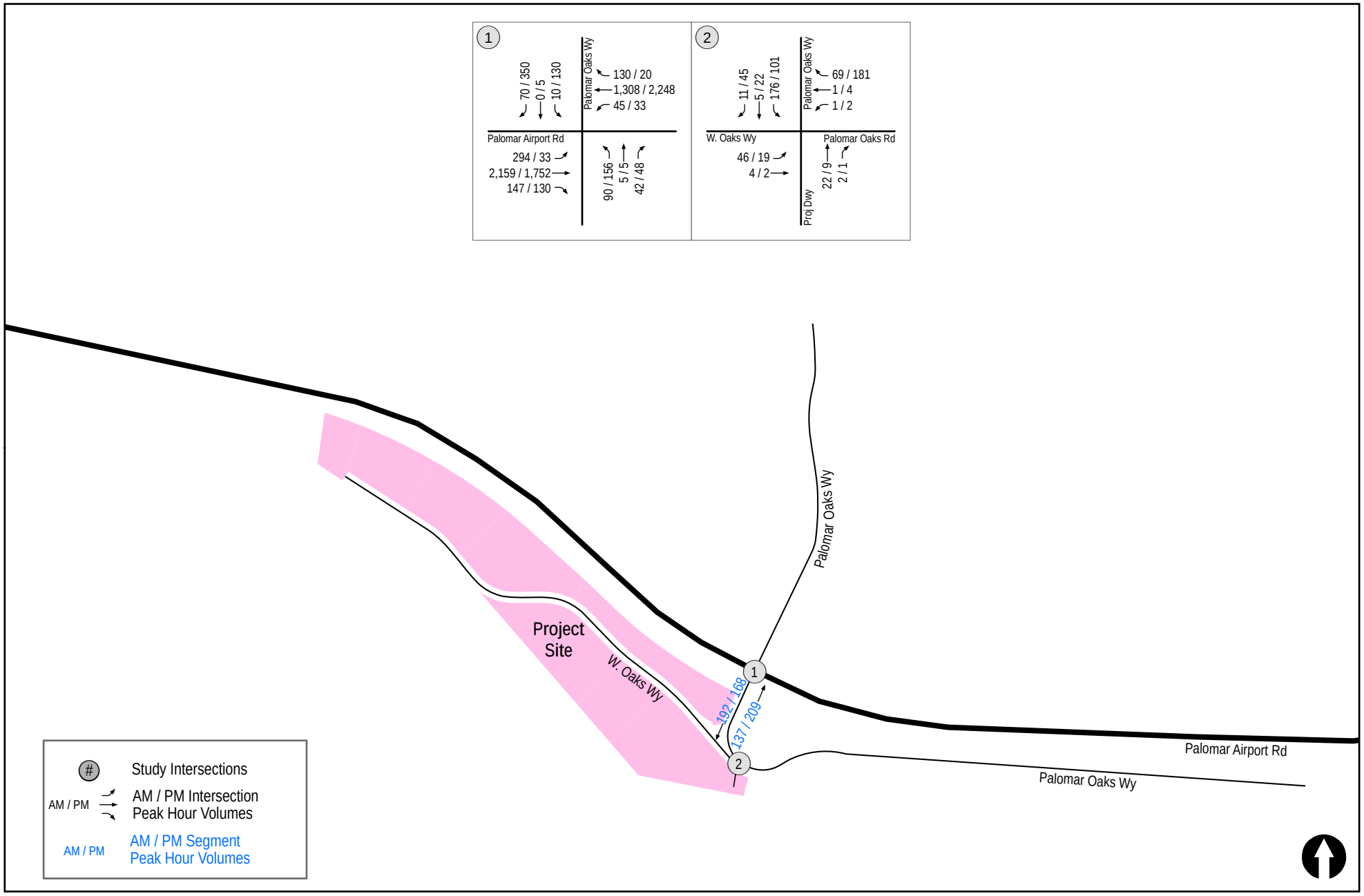

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Figure 6-2

Year 2035 + Project Traffic Volumes

WEST OAKS PROPERTY

7.0 AUTO ANALYSIS PER CITY TIA GUIDELINES

7.1 Background

Based on the approach and methodologies described in *Section 2.1*, the following is an evaluation of the one (1) signalized intersection. No roadway segments subject to Auto MMLOS experienced an increase in Project traffic of 50 peak hour trips in either direction of travel. Performance standards and thresholds are based on the City's TIA Guidelines as discussed in *Section 2.4*.

7.2 Analysis of Existing + Project Conditions

7.2.1 *Signalized Intersection Analysis*

Table 7–1 shows the queue lengths under Existing and Existing + Project conditions at study area intersections, for the applicable left-and-right turning movements on Palomar Airport Road at Palomar Oaks Way.

As shown in *Table 7–1*, the maximum right turn volumes on Palomar Airport Road at Palomar Oaks Way are less than the 150 peak hour trip threshold for consideration of a dedicated right-turn lane (see *Section 2.1.2*).

The left turn queues on Palomar Airport Road at Palomar Oaks Way are accommodated within the existing turn pockets and the volumes are less than the 250 peak hour trip threshold for consideration of a second left turn lane.

TABLE 7–1
EXISTING CONDITIONS
SIGNALIZED INTERSECTION ANALYSIS

Signalized Intersection	Movement	Turn Lanes	Pocket Length (feet)	Peak Hour	Existing		Existing + Project	
					Turn Volume	Queue Length (feet)	Turn Volume	Queue Length (feet)
Palomar Airport Road / Palomar Oaks Way	WBR	—	—	AM	96	—	96	—
				PM	16	—	16	—
	WBL	1	250	AM	18	18	23	23
				PM	6	6	29	29
	EBR	—	—	AM	67	—	78	—
				PM	15	—	59	—
	EBL	1	290	AM	224	224	224	224
				PM	30	30	30	30

7.3 Analysis of Cumulative Conditions

7.3.1 *Signalized Intersection Analysis*

Table 7–2 shows the queue lengths under Existing + Cumulative and Existing + Cumulative Projects + Project conditions at study area signalized intersections for the applicable left-and-right turning movements.

As shown in *Table 7–2*, the maximum right turn volumes on Palomar Airport Road at Palomar Oaks Way are less than the 150 peak hour trip threshold for consideration of a dedicated right-turn lane (see *Section 2.1.2*).

The left turn queues on Palomar Airport Road at Palomar Oaks Way are accommodated within the existing turn pockets and the volumes are less than the 250 peak hour trip threshold for consideration of a second left turn lane.

TABLE 7–2
CUMULATIVE CONDITIONS
SIGNALIZED INTERSECTION ANALYSIS

Signalized Intersection	Movement	Turn Lanes	Pocket Length (ft)	Peak Hour	Existing + Cumulative Projects		Existing + Cumulative Projects + Project	
					Turn Volume	Queue Length	Turn Volume	Queue Length
Palomar Airport Road / Palomar Oaks Way	WBR	—	—	AM	96	—	96	—
				PM	16	—	16	—
	WBL	1	250	AM	18	18	23	23
				PM	6	6	29	29
	EBR	—	—	AM	67	—	78	—
				PM	15	—	59	—
	EBL	1	290	AM	224	224	224	224
				PM	30	30	30	30

7.4 Analysis of Year 2035 Conditions

7.4.1 *Signalized Intersection Analysis*

Table 7–3 shows the queue lengths under Year 2035 and Year 2035 + Project conditions at study area signalized intersections for the applicable left-and-right turning movements.

As shown in *Table 7–3*, the maximum right-turn volumes on Palomar Airport Road at Palomar Oaks Way are less than the 150 peak hour trip threshold for consideration of a dedicated right-turn lane (see *Section 2.1.2*).

The westbound left turn queues on Palomar Airport Road at Palomar Oaks Way are accommodated within the existing turn pocket and the volumes are less than the 250 peak hour trip threshold for consideration of a second left turn lane.

The eastbound left turn volume is forecast to be 294 trips during the AM peak hour. Based on the 250 peak hour trip threshold, a second left turn lane should be considered. The queue assessment also indicates that the AM peak hour queue may exceed the available storage.

The Project does not add traffic to this turning movement; therefore, this operational deficiency is not a Project impact. An additional eastbound left turn lane does not appear feasible as there is only one receiving lane on northbound Palomar Oaks Way. If a second left turn lane is not feasible, consideration should be given to extending the turn pocket to accommodate the peak hour queues under future conditions.

TABLE 7–3
YEAR 2035 CONDITIONS
SIGNALIZED INTERSECTION ANALYSIS

Signalized Intersection	Movement	Turn Lanes	Pocket Length (ft)	Peak Hour	Year 2035		Year 2035 + Project	
					Turn Volume	Queue Length	Turn Volume	Queue Length
Palomar Airport Road / Palomar Oaks Way	WBR	—	—	AM	130	—	130	—
				PM	20	—	20	—
	WBL	1	250	AM	40	40	45	45
				PM	10	10	33	33
	EBR	—	—	AM	136	—	147	—
				PM	86	—	130	—
	EBL	1	290	AM	**294**	**294**	**294**	**294**
				PM	33	33	33	33

General Note:

- **BOLD** and shading indicates that calculated queue exceeds available storage.

7.5 MMLOS Analysis

The existing multi-modal facilities (i.e., pedestrian, bicycle, and transit facilities) in the vicinity of the Project site were evaluated using the City of Carlsbad's MMLOS Tool (March 2020). The MMLOS study area was selected based on the City's scoping requirements and the street typology of the roadway, which indicates which modes are subject to LOS standards on that facility type. ***Table 7–4*** summarizes the MMLOS analysis results, which are discussed in further detail below.

7.5.1 *Pedestrian LOS*

Palomar Oaks Way from Palomar Airport Road to West Oaks Way was evaluated for Pedestrian and Bicycle MMLOS criteria. This segment fails to achieve acceptable LOS D or better under existing conditions without the Project on Pedestrian criteria for the west (southbound) side of the street adjacent to the Project's frontage. There are no pedestrian facilities on the east (northbound) side, which is not required to be analyzed under City guidelines. The existing sidewalk on the west side of Palomar Oaks Way terminates north of West Oaks Way and does not connect to the existing sidewalk adjacent to the Fairfield Inn to the east/south, nor provide ramps or crosswalks at West Oaks Way. The ramp on the southwest corner of Palomar Airport Road and Palomar Oaks Way is not ADA compliant. Street lighting is currently not provided south of Palomar Airport Road.

The Project will provide an ADA compliant concrete walkway along its frontage, connecting the gap in existing walkway. Curb ramps and crosswalks will be provided on the west and south sides of the proposed roundabout. With these improvements, this section of Palomar Oaks Way will achieve a satisfactory LOS B on pedestrian criteria.

7.5.2 *Bicycle LOS*

Palomar Oaks Way is a Local/Neighborhood road on the City of Carlsbad Mobility Element. This roadway does not have signing or striping associated with a Class III bicycle route. However, the Mobility Element acknowledges that "local streets help complete the bicycle network" and "may be fully adequate for safe and efficient bicycle travel, where signing and pavement marking for bicycle use may be unnecessary" (p. 3-20). The existing traffic on Palomar Oaks Way is less than 1,500 ADT and the speed limit is 25 mph. This segment of Palomar Oaks Way achieves acceptable Bicycle LOS B or better for both directions of travel.

7.5.3 *Transit LOS*

Per City of Carlsbad TIA Guidelines, all existing transit lines and stops within ½ mile of the Project site are included in the study area. Based on these criteria, Route 445, serving the Poinsettia COASTER station and Palomar College via Palomar Airport Road was evaluated for Transit LOS.

The nearest stops to the Project site are located at Palomar Airport Road / Palomar Oaks Way. Based on the City Transit & Ridesharing MMLOS criteria, both directions of travel currently fail to meet MMLOS standards as they do not meet minimum amenity requirements. Additionally, there is a gap in the pedestrian path to the transit stops, as described above.

At least two amenities per stop are required for the transit stop to obtain an acceptable level of service and one of those amenities must be a bench. The westbound stop is located directly adjacent to a streetlight, which counts as one amenity. Therefore, a bench will also be provided at the westbound stop. There is no lighting or other amenities at the eastbound stop. A bench and trash can

will be provided at the eastbound stop to meet requirements. With the improvements provided, both stops will attain acceptable LOS C.

TABLE 7–4
MMLOS ANALYSIS

Location	Direction	Without Project		With Project	
		Total Score	LOS	Total Score	LOS
Pedestrian LOS					
Palomar Oaks Way: Palomar Airport Road to West Oaks Way (west side only)	SB	25	F*	80	B
Bicycle LOS					
Palomar Oaks Way: Palomar Airport Road to West Oaks Way	NB	90	A	90	A
	SB	85	B	85	B
Transit LOS					
Palomar Airport Road / Palomar Oaks Way (Route 445)	EB	45	F*	72	C
	WB	50	E*	75	C

General Note:

1. * indicates the lack of an essential feature

Appendix E contains the MMLOS analysis results.

7.6 TDM/TSM Requirements

The City of Carlsbad's TDM ordinance applies only to non-residential development. However, when any new development adds traffic to street facilities that are exempt from the LOS standard, the development is required to implement transportation demand management (TDM) and transportation systems management (TSM) strategies based on Mobility Element policy 3-P.11. The threshold for requiring TDM/TSM measures is 110 ADT or 11 peak hour trips added to an exempt street segment. The Project will add more than 110 ADT / 11 peak hour trips to Palomar Airport Road between I-5 and College Boulevard, which is exempt from Auto LOS standards, and is thus required to implement TDM/TSM measures.

7.6.1 *Transportation Demand Management (TDM)*

Based on its location, the West Oaks project is expected to add traffic to Palomar Airport Road between Interstate 5 and College Boulevard in excess of the City's minimum threshold of 11 peak hour trips and, accordingly, is required to implement TDM strategies per the Mobility Element of the City of Carlsbad General Plan (Policy 3-P.11). To comply with the Mobility Element Policy 3-P.11, the project will prepare the equivalent of a site-specific Tier 2 TDM plan (Parts 1 & 2). The proposed project also includes a TDM program that will be implemented as part of the project, as a project design feature. (See Project Description and *West Oaks TDM Program – VMT Reduction Evaluation* (Fehr & Peers, June 2020). The TDM strategies, services, and policies identified in the

VMT Reduction Evaluation memo, along with the Tier 2 TDM strategies listed below, collectively comprise the Project's TDM program that will be implemented as part of the Project.

TDM is the concept of using policies, strategies, and programmatic measures to encourage a shift away from single-occupancy vehicle (SOV) trips toward alternative travel options, such as walking, biking, transit, and ridesharing to reduce traffic and parking issues. TDM efforts try to get people to drive alone less, and instead, walk, bike, ride transit or carpool more. TDM is strategically implemented through the Citywide TDM Plan, including the TDM program which offers assistance & resources to businesses & development.

A Tier 2 plan consists of implementation of TDM strategies totaling nine (9) points. Specific to the proposed project, four (4) points would be achieved through three required measures (designation of a transportation coordinator, promotion of one Citywide TDM event per year, and distribution of a Citywide TDM Plan flyer to new tenants). The other five (5) points would be achieved through site-specific measures, with a minimum of four points required through infrastructure strategies.

The following additional TDM strategies are included in the project's TDM program and would achieve the five (5) additional points needed to meet the City's Tier 2 TDM requirements:

1. Public bike parking (bike racks) – 1 point
2. Bench, trash can addition or improvements – 1 point
3. On-site amenities (business center) – 2 points
4. Bicycle and pedestrian connections (sidewalk improvement) – 1 point

With implementation of the project's TDM program, the project would meet and exceed all City requirements relative to TDM.

7.6.2 *Transportation Systems Management (TSM)*

To meet the requirements of the Mobility Element policy, as part of the Project, the developer will pay for the installation of one traffic signal controller. This payment is a feature of the Project.

7.7 TIA Guidelines – Findings and Conclusions

Based on the City's TIA Guidelines presented in *Section 2.4.1*, the following findings and conclusions are noted.

The Project adds 44 directional peak hour trips to Palomar Airport Road, which has previously been classified as exempt from Auto LOS standards due to failing street segment Levels of Service. As such, the Project is required to implement TDM and TSM measures based on Section 8.1 of the City of Carlsbad Transportation Impact Analysis Guidelines and Mobility Element policy 3-P.11. To satisfy these requirements, as part of the Project, a TDM plan consistent with Tier 2 requirements will be implemented. Additionally, as part of the Project, the developer will pay for the installation of one traffic signal controller.

All turning movements evaluated at Palomar Airport Road / Palomar Oaks Way indicate that existing and future queueing can be accommodated in existing turn pockets, with the exception of the eastbound left-turn from Palomar Airport Road to northbound Palomar Oaks Way under long-term forecast Year 2035 conditions.

The Project does not add traffic to this turning movement; therefore, this operational deficiency is not a Project impact. An additional eastbound left turn lane does not appear feasible as there is only one receiving lane on northbound Palomar Oaks Way. If a second left turn lane is not feasible, consideration should be given to extending the turn pocket to accommodate the peak hour queues under future conditions.

Pedestrian and transit deficiencies were identified in the MMLOS analysis and improvements will be required to attain acceptable levels of service.

8.0 PROJECT ACCESS ALTERNATIVE

8.1 Roundabout (Proposed)

Project access will be via W. Oaks Way, which is the existing west leg of the Palomar Oaks Way/ W. Oaks Way unsignalized tee-intersection. Currently, this west leg is closed via a physical barricade, and the balance of the intersection functions as a defacto curve. The Project proposes to control the tee-intersection with a roundabout. This would be a one-lane roundabout with an approximate inscribed diameter of 100'. Each of the four legs would provide a single lane entry, with design speeds of 25 MPH. A second Project access driveway will form the south leg of the intersection. ***Table 8–1*** presents the near-term and long-term "plus Project" peak hour level of service results with the proposed roundabout control.

TABLE 8–1
"PLUS PROJECT" INTERSECTION OPERATIONS
PROPOSED ROUNDABOUT CONTROL

Intersection	Control Type	Peak Hour	Existing + Cumulative + Project		Year 2035 + Project	
			Delay [a]	LOS [b]	Delay	LOS
2. Palomar Oaks Way/ West Oaks Way [c]	Roundabout	AM PM	3.3 3.3	A A	3.7 3.8	A A

Footnotes:

a. Average delay expressed in seconds per vehicle.

b. Level of Service.

c. Intersection does not exist without Project. West Oaks Way is constructed but not open to traffic.

UNSIGNALIZED

DELAY/LOS THRESHOLDS

Delay	LOS
0.0 ≤ 10.0	A
10.1 to 15.0	B
15.1 to 25.0	C
25.1 to 35.0	D
35.1 to 50.0	E
≥ 50.1	F

As shown in *Table 8–1*, the roundabout would provide LOS A during peak periods. Based on these results, no queuing issues would occur with peak southbound traffic from Palomar Airport Road to Palomar Oaks Way. The maximum AM southbound volumes would be 192 vehicles in one hour (Year 2035 + Project), which averages 3.2 vehicles/minute.

Intersection LOS worksheets for the roundabout are provided in ***Appendix F***.

Installation of a roundabout at this intersection provides a range of benefits and is consistent with the goals and policies of the City of Carlsbad Mobility Element, which suggests the use of "innovative design solutions" such as roundabouts to meet mobility, efficiency, connectivity, and safety goals of the transportation system. As compared to the all-way stop-control alternative, discussed below, a roundabout minimizes both overall vehicular delay and prevents unnecessary stops for vehicles on Palomar Oaks Way. This may reduce noise and air quality impacts and fuel consumption by reducing the number of acceleration/deceleration cycles and as such is consistent with the City's Climate Action Plan. The roundabout also provides positive geometric features to manage vehicle

speeds as they transition from the higher speed arterial on Palomar Airport Road to the lower speed Palomar Oaks Way.

8.2 All-Way Stop Control (Alternative)

All-way stop-control at Palomar Oaks Way / West Oaks Way was considered as an alternative to the roundabout, although the minor street volumes from the Project would not meet minimum volume warrants. However, the primary movements through the intersection are to/from the adjacent north and east legs, and providing stops signs only on the Project driveways (west and south legs) would be unconventional and not recommended. All-way stop-control of the intersection control would provide a single lane at each approach. ***Table 8–2*** shows a summary of the all-way stop control operations for the same "plus Project" conditions shown above in *Table 8–1* for the roundabout alternative.

TABLE 8–2
"PLUS PROJECT" INTERSECTION OPERATIONS
ALTERNATIVE ALL-WAY STOP CONTROL

Intersection	Control Type	Peak Hour	Existing + Cumulative + Project		Year 2035 + Project	
			Delay [a]	LOS [b]	Delay	LOS
2. Palomar Oaks Way/ West Oaks Way [c]	AWSC [d]	AM PM	7.7 7.3	A A	8.4 8.2	A A

Footnotes:

a. Average delay expressed in seconds per vehicle.
b. Level of Service.
c. Intersection does not exist without Project. West Oaks Way is constructed but not open to traffic.
d. AWSC – All-Way Stop Control.

UNSIGNALIZED

DELAY/LOS THRESHOLDS

Delay	LOS
0.0 ≤ 10.0	A
10.1 to 15.0	B
15.1 to 25.0	C
25.1 to 35.0	D
35.1 to 50.0	E
≥ 50.1	F

This table shows that the all-way stop control alternative would also provide a Level of Service of A during both peak hours in both the near-term and long-term conditions with Project traffic volumes. All-way stop control LOS calculations are shown in ***Appendix G.***

8.3 Summary

The Project proposes to serve the Palomar Oaks Way/ West Oaks Way intersection with a roundabout. This results in LOS A operations during peak hours for both near-term and long-term "plus Project" volumes conditions. The proposed roundabout assumes an inscribed diameter of approximately 100-feet. Splitters and lane deflection would be required on each leg, which would result in crosswalks being set back on these legs from the circulatory roadway. Bicycle circulation

through the roundabout would occur in the circulatory roadway with bicyclists needing to "take the lane" through the circulatory roadway.

The alternative intersection control evaluated is a conventional all-way stop-control. This allows for a smaller intersection footprint as compared to the roundabout and provides positive stop control on all approaches for each vehicle. This intersection control also results in LOS A operations during both peak hours for both near-term and long-term "plus Project" volumes conditions. No queuing issues would occur during the AM peak hour with southbound entering vehicles from Palomar Airport Road stopping at Palomar Oaks Way. Pedestrians will have ADA-compliant service at the intersection curb returns, and bicycles will circulate within the roadway. This control type would not meet minimum volume warrants but would still be recommended as compared to only providing stop-control on the adjacent driveway legs.

End of Report

LINSCOTT
LAW &
GREENSPAN
engineers

TECHNICAL APPENDICES
WEST OAKS

Carlsbad, California
December 23, 2020

LLG Ref. 3-16-2672

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APPENDIX A

EXISTING TRAFFIC COUNT SHEETS

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Turn Count Summary

Accurate Video Counts Inc
info@accuratevideocounts.com
(619) 987-5136

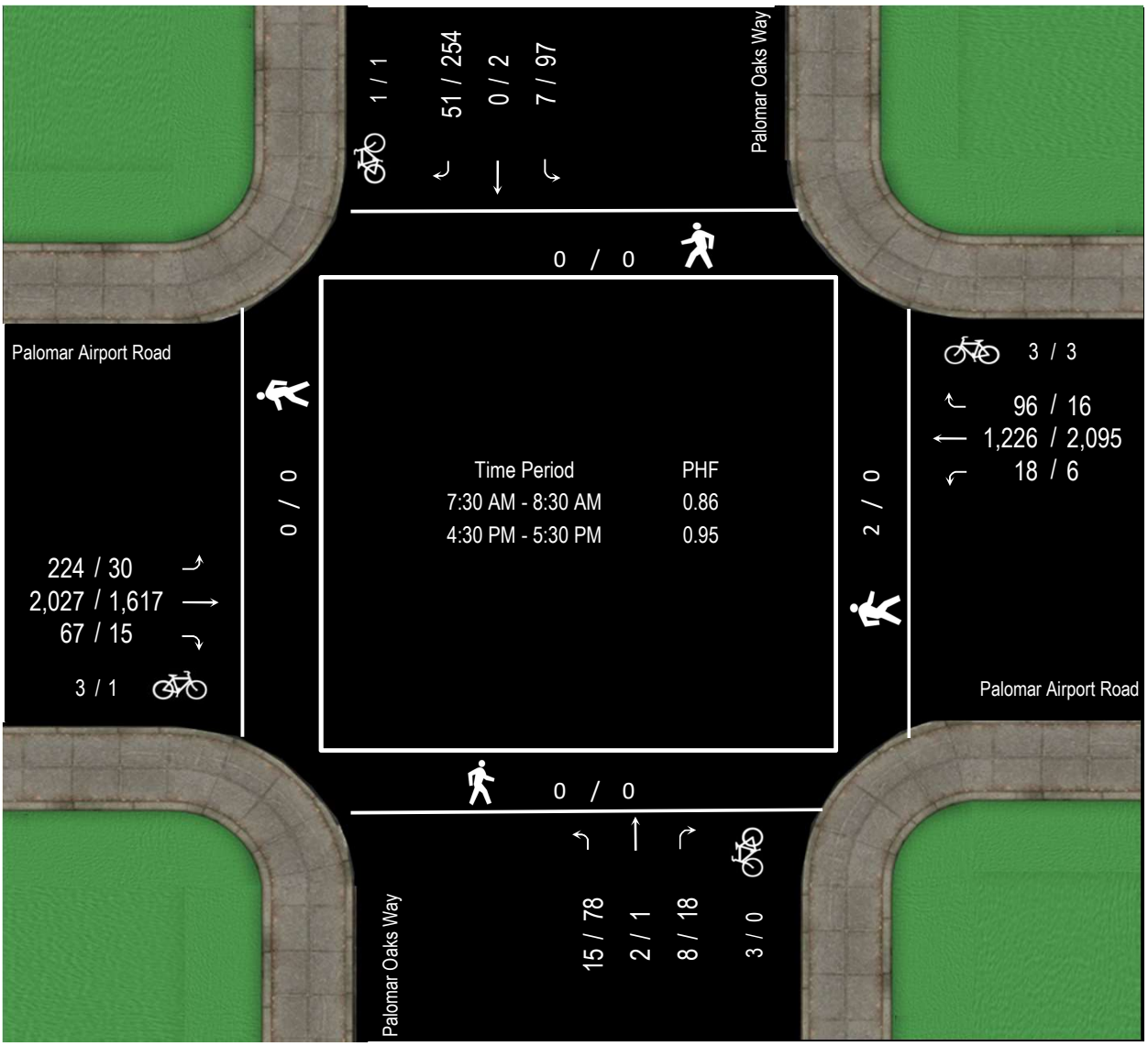
Location: Palomar Airport Road @ Palomar Oaks Way

Date of Count: *Wednesday, November 30, 2016*

Analysts: *LV/CD*

Weather: *Sunny*

AVC Proj No: *16-0598*



LINSCOTT LAW & GREENSPAN engineers

Vehicular Count

Accurate Video Counts Inc
info@accuratevideocounts.com
(619) 987-5136

AVC

Location: Palomar Airport Road @ Palomar Oaks Way

AM Period (7:00 AM - 9:00 AM)													
	Southbound			Westbound			Northbound			Eastbound			
	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	TOTAL
7:00 AM	7	0	4	16	234	6	3	1	4	10	274	41	600
7:15 AM	9	0	1	21	234	3	3	1	1	10	369	46	698
7:30 AM	8	0	2	19	279	3	2	0	5	10	460	44	832
7:45 AM	12	0	2	28	334	9	1	1	4	21	601	79	1,092
8:00 AM	20	0	2	24	299	3	3	1	4	19	515	56	946
8:15 AM	11	0	1	25	314	3	2	0	2	17	451	45	871
8:30 AM	12	0	5	25	280	3	2	1	1	8	438	53	828
8:45 AM	8	2	5	22	312	2	1	2	3	11	401	45	814
Total	87	2	22	180	2,286	32	17	7	24	106	3,509	409	6,681

AM Intersection Peak Hour : **7:30 AM - 8:30 AM** Intersection PHF : **0.86**

	Southbound			Westbound			Northbound			Eastbound			TOTAL
	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	
Volume	51	0	7	96	1,226	18	8	2	15	67	2,027	224	3,741
PHF	0.64	#####	0.88	0.86	0.92	0.50	0.67	0.50	0.75	0.80	0.84	0.71	0.86
Movement PHF		0.66			0.90			0.78			0.83		0.86

PM Period (4:00 PM - 6:00 PM)													
	Southbound			Westbound			Northbound			Eastbound			
	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	TOTAL
4:00 PM	69	0	22	3	470	1	4	0	18	3	390	12	992
4:15 PM	49	2	13	4	457	1	3	2	9	3	332	13	888
4:30 PM	70	0	23	4	533	2	7	0	16	3	410	8	1,076
4:45 PM	63	2	19	6	476	3	3	1	20	3	428	9	1,033
5:00 PM	90	0	32	4	554	1	7	0	24	6	390	9	1,117
5:15 PM	31	0	23	2	532	0	1	0	18	3	389	4	1,003
5:30 PM	30	0	16	0	396	1	4	0	11	1	340	5	804
5:45 PM	24	0	9	1	380	3	1	0	12	2	314	6	752
Total	426	4	157	24	3,798	12	30	3	128	24	2,993	66	7,665

PM Intersection Peak Hour : **4:30 PM - 5:30 PM** Intersection PHF : **0.95**

	Southbound			Westbound			Northbound			Eastbound			TOTAL
	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	
Volume	254	2	97	16	2095	6	18	1	78	15	1617	30	4229
PHF	0.71	0.25	0.758	0.667	0.945	0.5	0.643	0.25	0.813	0.625	0.945	0.833	0.95
Movement PHF		0.72			0.95			0.78			0.94		0.95

APPENDIX B

TRANSIT SCHEDULES

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445

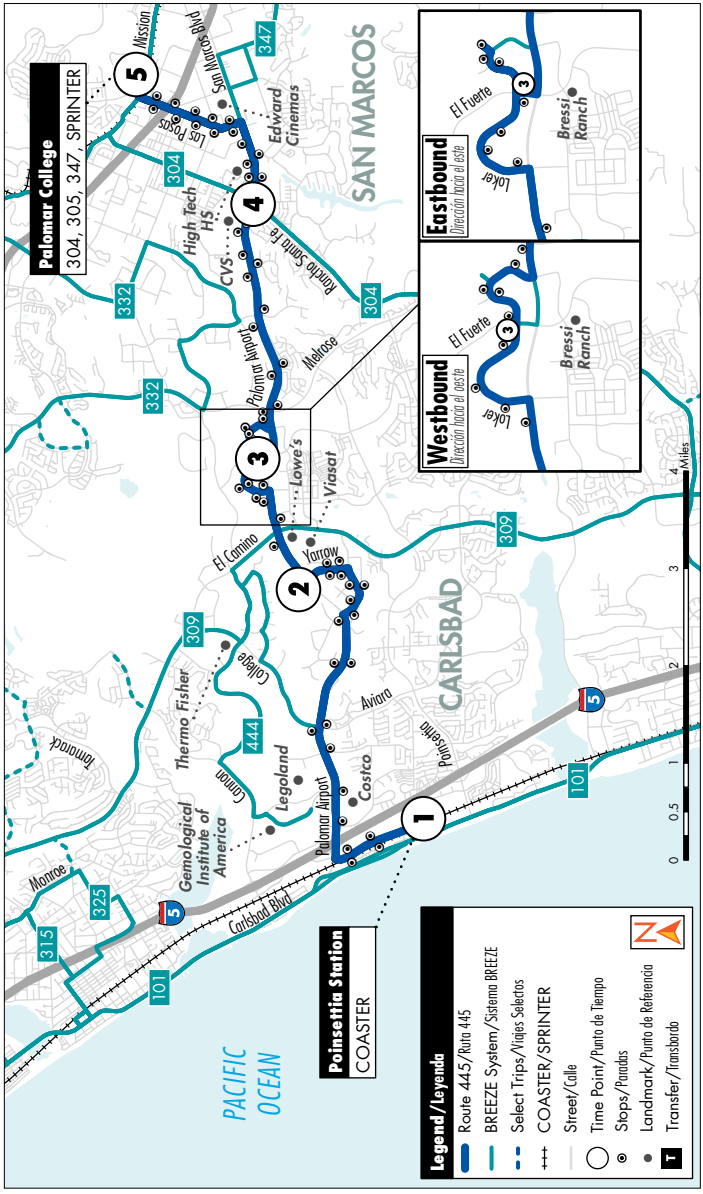
Carlsbad Poinsettia COASTER Connection to Palomar College

Conexión 445 Carlsbad Poinsettia COASTER a Palomar College

M-F
L-V

Destinations/Destinos

- McClellan Palomar Airport
- Palomar College
- San Marcos High School
- High Tech High School – North County
- Carlsbad Poinsettia COASTER Station



445 Carlsbad Poinsettia COASTER Connection to Palomar College

Conexión 445 Carlsbad Poinsettia COASTER a Palomar College

See pg. 6 for Holiday schedules/Ver pág. 244 para obtener los horarios de días festivos

Monday - Friday
Eastbound to Palomar College
Lunes a Viernes • Dirección hacia el este a Palomar College

ARRIVING SB COASTER **From Oceanside** *Llegada SB COASTER desde Oceanside*	**ARRIVING** NB COASTER **From San Diego** *Llegada NB COASTER desde San Diego*	Carlsbad Poinsettia Station	Palomar Airport Rd. & Yarrow Dr.	Loker Ave. & El Fuerte St.	San Marcos Blvd. & Rancho Santa Fe Rd.	Palomar College Transit Center
COASTER	COASTER	1	2	3	4	5
6:42	7:09	7:14	7:29	7:37	7:49	8:03a
7:49	8:36	8:41	8:56	9:02	–	–
–	–	–	–	–	3:45	3:57p
3:43	2:48	4:03	4:16	4:23	4:36	4:49

Monday - Friday
Westbound to Carlsbad Poinsettia Station
Lunes a Viernes • Dirección hacia el oeste a la Estación Carlsbad Poinsettia

Palomar College Transit Center	San Marcos Blvd. & Rancho Santa Fe Rd.	Loker Ave. & El Fuerte St.	Palomar Airport Rd. & Yarrow Dr.	Carlsbad Poinsettia Station	**DEPARTING** NB COASTER **To Oceanside** *SALIDA NB COASTER a Oceanside*	**DEPARTING** SB COASTER **To San Diego** *SALIDA SB COASTER a San Diego*
5	4	3	2	1	COASTER	COASTER
6:36	6:45	6:53	7:00	7:16a	7:09	7:26a
7:36	7:50	8:00	8:07	8:22	8:36	9:47
8:01	8:15	–	–	–	–	–
4:29	4:38	4:46	4:53	5:10p	5:14	5:21p
5:04	5:13	5:20	5:27	5:43	5:46	5:51

Route 445 does not operate on Saturdays, Sundays, or holidays.
La Ruta 445 no opera los sábados, domingos o en días festivos.

Please note, BREEZE "school tripper" bus service only runs while High Tech High is in session for in-person learning and are subject to change based on bell times. NCTD will update trip planning applications and GoNCTD.com when this service returns.

Tenga en cuenta que el servicio de autobús "school tripper" del BREEZE solo funciona mientras High Tech High se encuentre abierta para clases presenciales y está sujeto a cambios en función de los horarios de entrada y salida. El NCTD actualizará las aplicaciones de planificación de viaje y GoNCTD.com cuando el servicio se reanude.

* **Bus may wait up to ten minutes for a late arriving COASTER train.**
El autobús puede esperar hasta diez minutos en caso que un tren COASTER esté atrasado.

APPENDIX C

CUMULATIVE PROJECT TRAFFIC VOLUMES & INFORMATION

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INTERSECTION	DIRECTION	TOTAL CUMULATIVE						Agua Hedionda NT Projects [1]						Westin Hotel LLG #2418					
		Ram	Rpm	Tam	Tpm	Lam	Lpm	Ram	Rpm	Tam	Tpm	Lam	Lpm	Ram	Rpm	Tam	Tpm	Lam	Lpm
7 Palomar Airport Rd / Palomar Oaks Way	Sb	0	0	0	0	0	0												
	Wb	0	0	47	66	0	0			26	25					3	4		
	Nb	0	0	0	0	0	0												
	Eb	0	0	39	74	0	0			18	28					2	4		
8 Palomar Oaks Way / W Oaks Way	Sb	0	0	0	0	0	0			0	0					0	0		
	Wb	0	0	0	0	0	0												
	Nb	0	0	0	0	0	0			0	0					0	0		
	Eb	0	0	0	0	0	0												

1. Includes the following developments
Robertson Ranch
Cantarini Ranch
Holly Springs
Quarry Creek
Dos Colinas
North 40
Bressi Ranch Hotels
La Costa Town Square

INTERSECTION	DIRECTION	Uptown Bressi						Legoland Hotel 2						Marja Acres					
		Ram	Rpm	Tam	Tpm	Lam	Lpm	Ram	Rpm	Tam	Tpm	Lam	Lpm	Ram	Rpm	Tam	Tpm	Lam	Lpm
7 Palomar Airport Rd / Palomar Oaks Way	Sb							0	0	0	0	0	0						
	Wb			15	34			0	0	3	3	0	0						
	Nb							0	0	0	0	0	0						
	Eb			17	38			0	0	2	4	0	0						
														No trips to study area					
8 Palomar Oaks Way / W Oaks Way	Sb			0	0					0	0								
	Wb																		
	Nb			0	0					0	0								
	Eb																		

1. Includes the following developments
Robertson Ranch
Cantarini Ranch
Holly Springs
Quarry Creek
Dos Colinas
North 40
Bressi Ranch Hotels
La Costa Town Square

4 PROJECT DESCRIPTION

Merlin Entertainment Group operates LEGOLAND California and LEGOLAND Hotel in the City of Carlsbad. Merlin Entertainment Group is proposing to construct a 250 room hotel on the existing parking lot adjacent to the Sea Life Aquarium. The project site plan is provided in **Figure 4-1a** and **Figure 4-1b.**

Parking for the new LEGOLAND Hotel will be provided in a dedicated parking lot located within the existing ADA parking lot. The existing ADA parking lot will be relocated. A detailed assessment of existing hotel parking demand determined sufficient capacity is available to meet the future demand of the new hotel. Details of the parking assessment is provided in Chapter 9 of this report. Access to the new hotel will be provided either through the main park gates from LEGOLAND Drive or through the hotel access road off The Crossings. Parking and circulation patterns for the new hotel are illustrated in **Figure 4-2.**

4.1 Trip Generation

To determine the trips forecast to be generated by the proposed hotel land use, SANDAG trip generations rates (April 2002) were utilized in accordance with SANTEC/ITE Traffic Study Guidelines. **Table 4-1** represents the trip generation rates used for the proposed hotel and summarizes the forecast generated by the proposed project.

As shown on Table 4-1, a typical 250 room resort hotel is forecast to generate approximately 2,000 daily trips, which includes approximately 100 AM peak hour trips and approximately 140 PM peak hour trips.

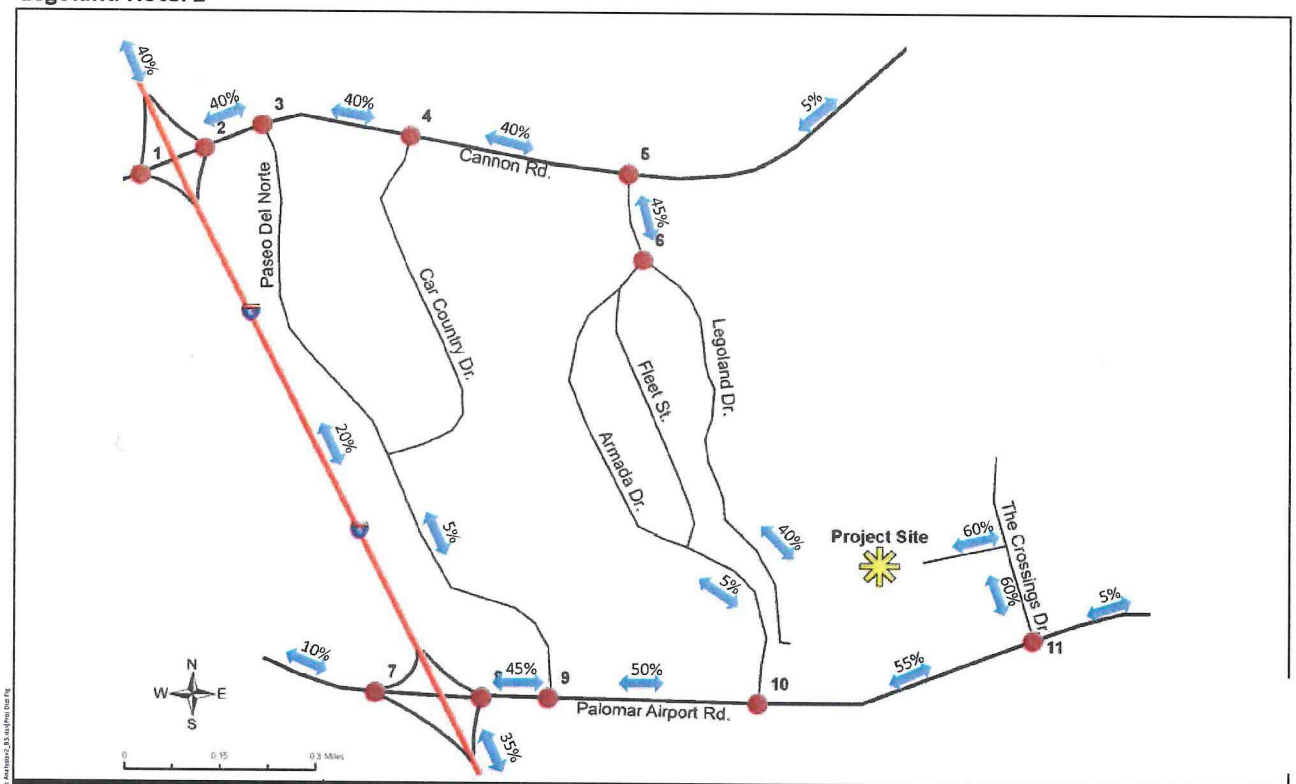
TABLE 4-1: FORECAST PROJECT GENERATED TRIPS

	Daily Trips	AM Peak Hour (7:30 to 8:30)			PM Peak Hour (4:15-5:15)		
		Total	Inbound	Outbound	Total	Inbound	Outbound
Trip Rates							
Resort Hotel	8/Room	5%	60%	40%	7%	40%	60%
Forecast Trips							
250 Room Resort Hotel	2,000	100	60	40	140	56	84

Source: *SANDAG "Not so Brief Guide" – April 2002*

It should be noted that co-locating the hotel on site with the theme park will result in lower trip generation rates than similar resort hotels in the Carlsbad area. Guests of the LEGOLAND Hotel choose to stay at the resort for the convenience and LEGOLAND experience. Therefore, most visitors do not leave the hotel or park during the day to travel to other destinations. The presence of the hotel also reduces the number of park trips as those who would typically choose to stay at other hotels in the area choose to stay at the LEGOLAND Hotel instead.

Legoland Hotel 2



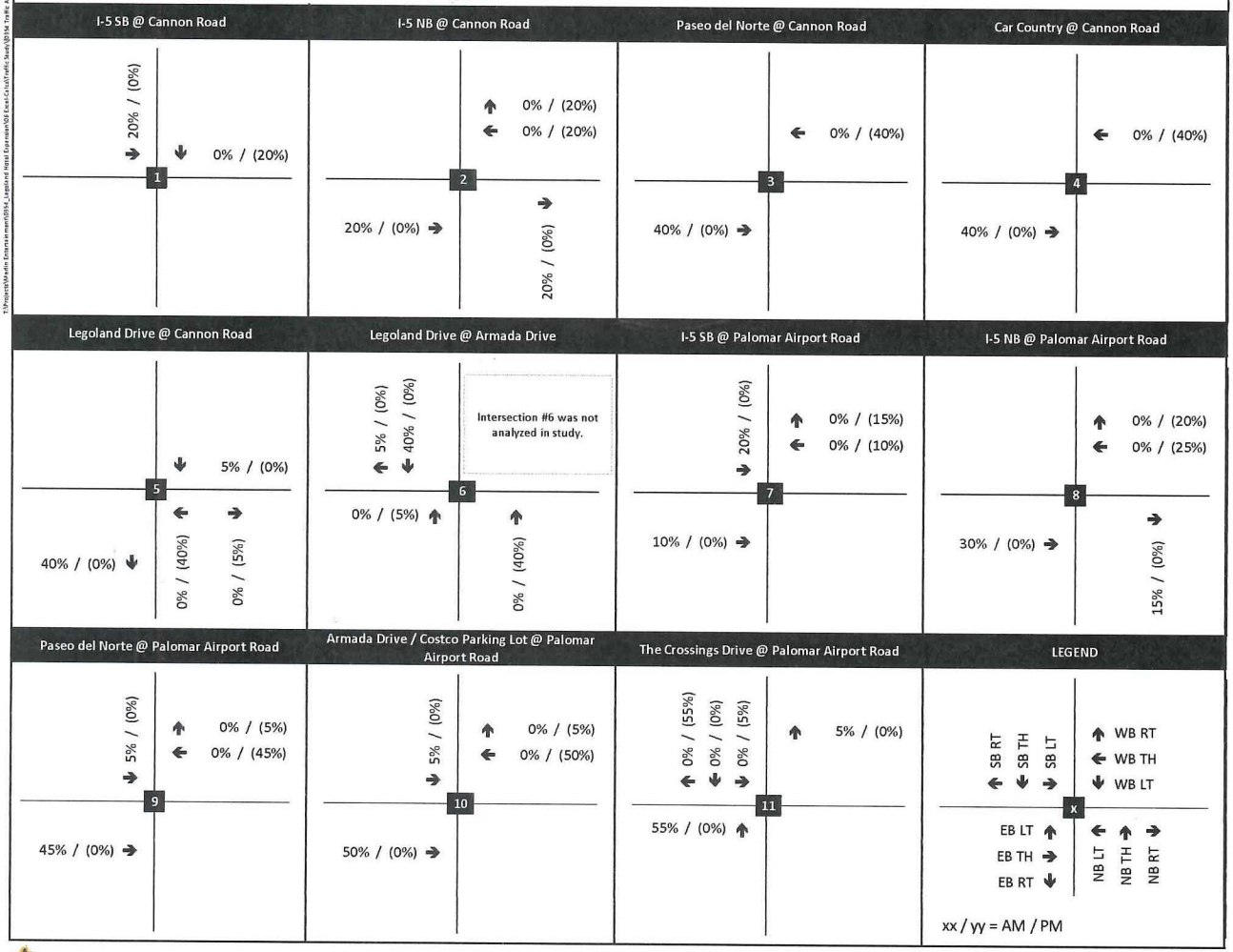


Figure 4-3
Project Trip Distribution

TABLE 3-1

Project Trip Generation Table

PROPOSED RESIDENTIAL

Use	Amount	Trip Rate*	ADT	AM						PM					
				Peak %	Vol.	In %	Out%	In	Out	Peak %	Vol.	In %	Out%	In	Out
Condominiums	125 DU	8 /DU	**1,000**	8%	**80**	20% : 80%		**16**	**64**	10%	**100**	70% : 30%		**70**	**30**

*Sandag Traffic Generation Rates, April 2002

Note:
DU= Dwelling Unit
ADT = Average Daily Traffic

PROPOSED RETAIL

Use	Amount	Trip Rate*	ADT	AM						PM					
				Peak %	Vol.	In %	Out%	In	Out	Peak %	Vol.	In %	Out%	In	Out
Community Shopping Center	100,174 KSF	80 /KSF	**8,014**	4%	**321**	60% : 40%		**192**	**128**	10%	**801**	50% : 50%		**401**	**401**
Retail Total			**8,014**		**321**			**192**	**128**		**801**			**401**	**401**

*Sandag Traffic Generation Rates, April 2002

Note:
KSF=1,000 Square Feet

COMBINED TRIP GENERATION

Project	**ADT**	**AM**					**PM**				
			Vol.		**In**	**Out**		**Vol.**		**In**	**Out**
TOTAL PROPOSED RESIDENTIAL	**1,000**		**80**		**16**	**64**		**100**		**70**	**30**
TOTAL PROPOSED RETAIL	**8,014**		**321**		**192**	**128**		**801**		**401**	**401**
COMBINED TOTAL	**9,014**		**401**		**208**	**192**		**901**		**471**	**431**

FIGURE 3-2

Project Distribution Percentages

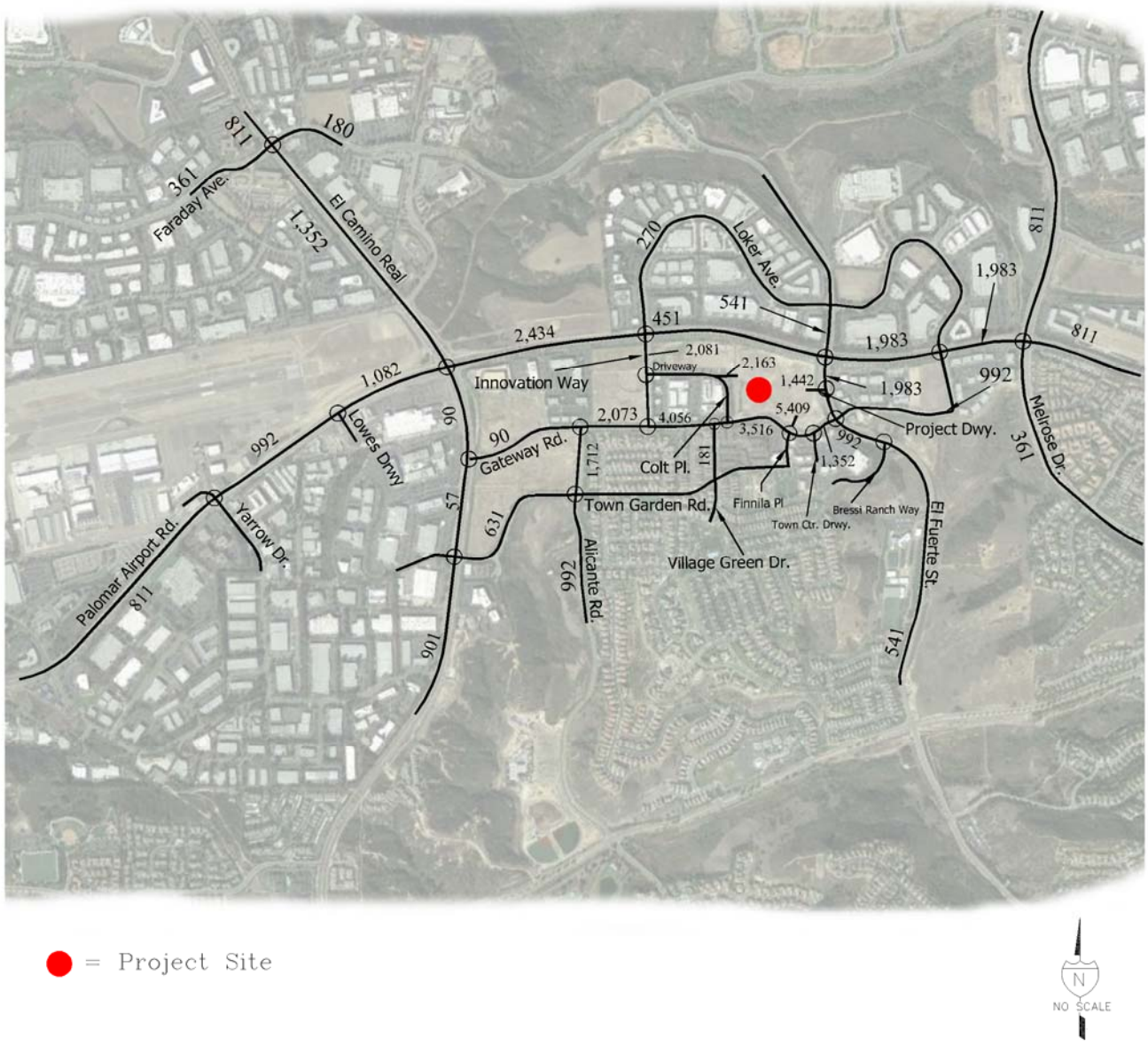


FIGURE 3-3

Project Only Average Daily Traffic

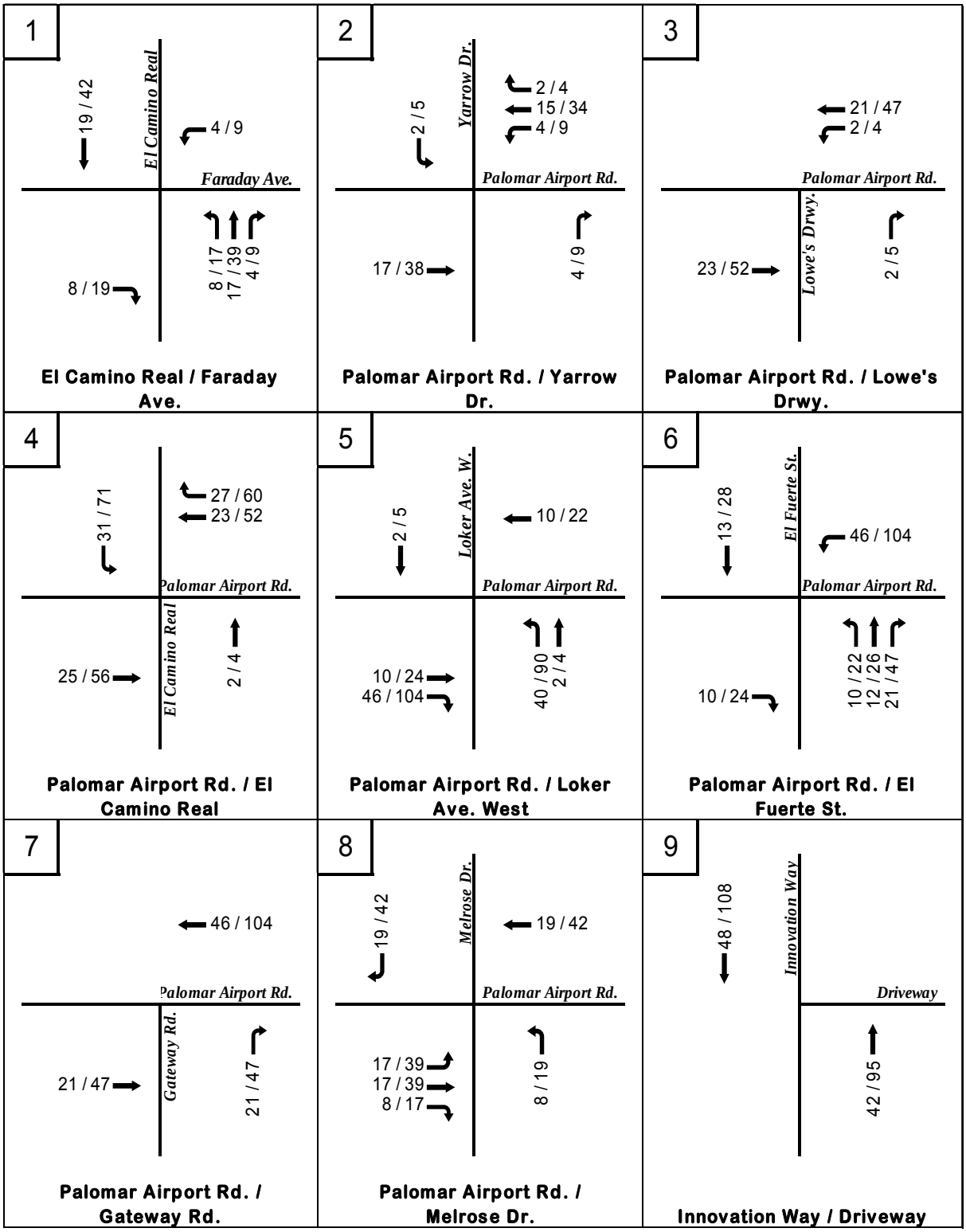


FIGURE 3-4

Project Only AM / PM Peak Hour Traffic

APPENDIX D

YEAR 2035 TRAFFIC VOLUME DATA

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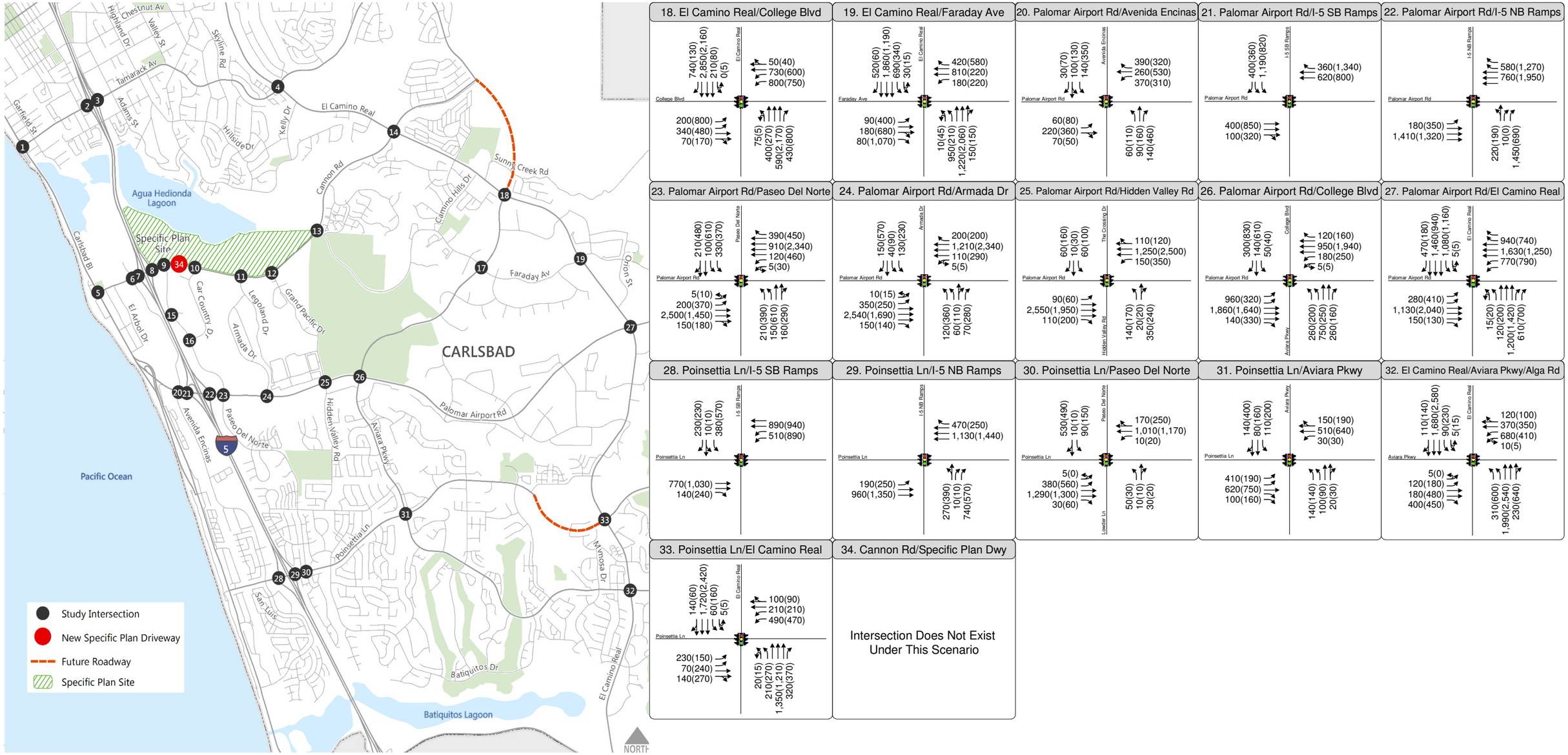

18. El Camino Real/College Blvd

19. El Camino Real/Faraday Ave

20. Palomar Airport Rd/Avenida Encinas

21. Palomar Airport Rd/I-5 SB Ramps

22. Palomar Airport Rd/I-5 NB Ramps

23. Palomar Airport Rd/Paseo Del Norte

24. Palomar Airport Rd/Armada Dr

25. Palomar Airport Rd/Hidden Valley Rd

26. Palomar Airport Rd/College Blvd

27. Palomar Airport Rd/El Camino Real

28. Poinsettia Ln/I-5 SB Ramps

29. Poinsettia Ln/I-5 NB Ramps

30. Poinsettia Ln/Paseo Del Norte

31. Poinsettia Ln/Aviara Pkwy

32. El Camino Real/Aviara Pkwy/Alga Rd

33. Poinsettia Ln/El Camino Real

34. Cannon Rd/Specific Plan Dwy

Intersection Does Not Exist Under This Scenario

Figure 13
Peak Hour Traffic Volumes and Lane Configurations
2035 No Specific Plan Conditions

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APPENDIX E
MMLOS RESULTS

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ROADWAY INFO

Roadway Name	Palomar Oaks Way
From	Palomar Airport Road
To	West Oaks Way
Street Typology from Mobility Element	Local/Neighborhood
Average Daily Traffic (ADT) volume (2-way total)	1,210

PEDESTRIAN

NB SCORE | LOS	SB SCORE | LOS
0 | F	0 | F

May require improvements and upgrades to fully support CAP goals!

	Roadway Direction	
	NB	SB
* Do pedestrian crossings appear consistent with the CA MUTCD?		No
* Minimum Sidewalk Unobstructed Width in Feet (Minimum ADA unobstructed width requirement is 4'):		0
* Do sidewalks appear to meet ADA requirements (e.g., cross-slope and trip hazards)?		No
* Do ramps and landings appear to meet ADA requirements?		No
* Do the street light locations appear adequate?		No
Speed limit (miles per hour - mph):	25 mph or lower	25 mph or lower
Number of Through Lanes:		2
Are there 3 lanes or less to be crossed without pedestrian refuge? (Include turn lanes in count)		Yes
Width (ft.) of landscaped buffer between pedestrian facility and vehicle travel way:		0' to 2'
Does on-street parking or a bike lane provide 6' or more buffer between pedestrians and vehicle travel way?		No
Any apparent sight distance issues at intersections and pedestrian crossings?		No
Are there any permanent speed control devices installed?		No
Are there traffic calming measures that reduce crossing width (e.g., bulbouts, chokers, right-turn median island)?		No
Do crosswalks appear to be high visibility?		No
Are there intersection enhancements provided for pedestrians (e.g., pedestrian signal phasing, countdown heads)?		No
Are there Rectangular Rapid Flashing Beacons (RRFBs) at street crossings?		No
Is there pedestrian scale lighting?		No
Do active building frontages appear to be present on 80% of street curb line?		No
Does the street furniture appear to be oriented towards businesses or attractions?		No
Do the street trees appear to provide shade over more than 50% of the sidewalk length?		No

* *Indicates an essential feature that strongly supports and promotes the goals identifed in the Climate Action Plan (CAP).*

Project: West Oaks
Segment: Palomar Oaks Way From Palomar Airport Road To West Oaks Way
Scenario: Without Project
By: LLG

Pedestrian MMLOS Criteria			NB	SB
	Criteria	Points	Points Assigned	Points Assigned
Accessibility and functionality	* **Essential Features (Criteria must be met):** Sidewalk or path meets ADA unobstructed width requirements	15	0	0
	* **Essential Features (Criteria must be met):** Sidewalk width meets minimum width for typology according to the Mobility Element (or 5' if unspecified)	10	0	0
	Sidewalk width exceeds minimum width for typology according to the Mobility Element (or 6' if unspecified)	5	0	0
	* **Essential Features (Criteria must be met):** Ramps and landings within segment meet ADA requirements	10	0	0
	* **Essential Features (Criteria must be met):** Sidewalk segments meet ADA requirements (cross-slope and trip hazards)	10	0	0
	Sidewalk width meets recommended width for typology according to the Mobility Element (or 8' if unspecified)	10	0	0
Street characteristics	3 lanes or less to be crossed without pedestrian refuge	10	0	10
	On-street parking or bike lane provides 6' or more buffer between pedestrians and vehicle travel way	5	0	0
	Landscaping 2' to 5' wide provides 'buffer' between pedestrians and vehicle travel way	5	0	0
	Landscaping greater than 5' wide provides 'buffer' between pedestrians and vehicle travel way	10	0	0
	Less than 3,000 vehicles per lane per day	5	0	5
	Speed limit 30 mph or less	5	5	5
	No apparent sight distance issues at intersections and pedestrian crossings	5	0	5
	Permanent speed control devices installed on segments posted as approved by the City Traffic Engineer	5	0	0
Crossing characteristics	* **Essential Features (Criteria must be met):** Crosswalks are marked according to CA MUTCD guidelines	10	0	0
	Crosswalk is high visibility (i.e., continental markings per the CA MUTCD)	5	0	0
	Traffic calming measures that reduce crossing width (pedestrian refuge, bulbouts, chokers, right-turn median island)	10	0	0
	Presence of intersection enhancements for pedestrians (pedestrian-friendly signal phasing, pedestrian countdown heads, signage, etc.)	10	0	0
	RRFBs at uncontrolled crossings if warranted	5	0	0
Other Elements	* **Essential Features (Criteria must be met):** Street light locations appear adequate	10	0	0
	Active building frontages on 80% of street curbline (pedestrian attracting frontages such as active storefronts and recreational spaces)	5	0	0
	Street trees provide shade over more than 50% of sidewalk length	5	0	0
	Street furniture oriented toward businesses or attractions	5	0	0
	Pedestrian scale lighting	5	0	0
	Total Score:		**5**	**25**
	Pedestrian LOS:		**F**	**F**
	All Essential Feature Criteria Met?		**No**	**No**

ROADWAY INFO

Roadway Name	Palomar Oaks Way
From	Palomar Airport Road
To	West Oaks Way
Street Typology from Mobility Element	Local/Neighborhood
Average Daily Traffic (ADT) volume (2-way total)	1,210

PEDESTRIAN

NB SCORE | LOS	SB SCORE | LOS
0 | F	80 | B

May require improvements and upgrades to fully support CAP goals!

	Roadway Direction	
	NB	SB
* Do pedestrian crossings appear consistent with the CA MUTCD?		No
* Minimum Sidewalk Unobstructed Width in Feet (Minimum ADA unobstructed width requirement is 4'):		5
* Do sidewalks appear to meet ADA requirements (e.g., cross-slope and trip hazards)?		Yes
* Do ramps and landings appear to meet ADA requirements?		Yes
* Do the street light locations appear adequate?		Yes
Speed limit (miles per hour - mph):	25 mph or lower	25 mph or lower
Number of Through Lanes:		2
Are there 3 lanes or less to be crossed without pedestrian refuge? (Include turn lanes in count)		Yes
Width (ft.) of landscaped buffer between pedestrian facility and vehicle travel way:		0' to 2'
Does on-street parking or a bike lane provide 6' or more buffer between pedestrians and vehicle travel way?		No
Any apparent sight distance issues at intersections and pedestrian crossings?		No
Are there any permanent speed control devices installed?		No
Are there traffic calming measures that reduce crossing width (e.g., bulbouts, chokers, right-turn median island)?		No
Do crosswalks appear to be high visibility?		No
Are there intersection enhancements provided for pedestrians (e.g., pedestrian signal phasing, countdown heads)?		No
Are there Rectangular Rapid Flashing Beacons (RRFBs) at street crossings?		No
Is there pedestrian scale lighting?		No
Do active building frontages appear to be present on 80% of street curb line?		No
Does the street furniture appear to be oriented towards businesses or attractions?		No
Do the street trees appear to provide shade over more than 50% of the sidewalk length?		No

* *Indicates an essential feature that strongly supports and promotes the goals identifed in the Climate Action Plan (CAP).*

Project: West Oaks
Segment: Palomar Oaks Way From Palomar Airport Road To West Oaks Way
Scenario: With Project
By: LLG

Pedestrian MMLOS Criteria			NB	SB
	Criteria	Points	Points Assigned	Points Assigned
Accessibility and functionality	* **Essential Features (Criteria must be met):** Sidewalk or path meets ADA unobstructed width requirements	15	0	15
	* **Essential Features (Criteria must be met):** Sidewalk width meets minimum width for typology according to the Mobility Element (or 5' if unspecified)	10	0	10
	Sidewalk width exceeds minimum width for typology according to the Mobility Element (or 6' if unspecified)	5	0	0
	* **Essential Features (Criteria must be met):** Ramps and landings within segment meet ADA requirements	10	0	10
	* **Essential Features (Criteria must be met):** Sidewalk segments meet ADA requirements (cross-slope and trip hazards)	10	0	10
	Sidewalk width meets recommended width for typology according to the Mobility Element (or 8' if unspecified)	10	0	0
Street characteristics	3 lanes or less to be crossed without pedestrian refuge	10	0	10
	On-street parking or bike lane provides 6' or more buffer between pedestrians and vehicle travel way	5	0	0
	Landscaping 2' to 5' wide provides 'buffer' between pedestrians and vehicle travel way	5	0	0
	Landscaping greater than 5' wide provides 'buffer' between pedestrians and vehicle travel way	10	0	0
	Less than 3,000 vehicles per lane per day	5	0	5
	Speed limit 30 mph or less	5	5	5
	No apparent sight distance issues at intersections and pedestrian crossings	5	0	5
	Permanent speed control devices installed on segments posted as approved by the City Traffic Engineer	5	0	0
Crossing characteristics	* **Essential Features (Criteria must be met):** Crosswalks are marked according to CA MUTCD guidelines	10	0	0
	Crosswalk is high visibility (i.e., continental markings per the CA MUTCD)	5	0	0
	Traffic calming measures that reduce crossing width (pedestrian refuge, bulbouts, chokers, right-turn median island)	10	0	0
	Presence of intersection enhancements for pedestrians (pedestrian-friendly signal phasing, pedestrian countdown heads, signage, etc.)	10	0	0
	RRFBs at uncontrolled crossings if warranted	5	0	0
Other Elements	* **Essential Features (Criteria must be met):** Street light locations appear adequate	10	0	10
	Active building frontages on 80% of street curbline (pedestrian attracting frontages such as active storefronts and recreational spaces)	5	0	0
	Street trees provide shade over more than 50% of sidewalk length	5	0	0
	Street furniture oriented toward businesses or attractions	5	0	0
	Pedestrian scale lighting	5	0	0
		Total Score:	**5**	**80**
		Pedestrian LOS:	**F**	**B**
		All Essential Feature Criteria Met?	**No**	**Yes**

ROADWAY INFO

Roadway Name	Palomar Oaks Way
From	Palomar Airport Road
To	West Oaks Way
Street Typology from Mobility Element	Local/Neighborhood
Average Daily Traffic (ADT) volume (2-way total)	1,210

BICYCLE

NB SCORE | LOS	SB SCORE | LOS
90 | A	85 | B

May require improvements and upgrades to fully support CAP goals!

	Roadway Direction	
	NB	SB
* Do the roadway pavement conditions appear to be good (e.g., no pot holes)?	Yes	Yes
* Does bike facility on roadway appear to be free of obstructions (e.g., drainage grates)?	Yes	Yes
* Does the bicycle facility appear to meet MUTCD signing and striping design guidelines?		
Is on-street parking provided?	No	Parallel parking
Speed limit (miles per hour - mph):	25 mph or lower	25 mph or lower
Does the bikeway on the study segment and side streets meet and/or exceed the Bicycle Master Plan?	Both	Both
Is there enhanced bicycle detection or video detection provided at intersections?	No	No
Any bicycle racks are provided along segment?	No	No
Bicycle Facility Provided:		

* *Indicates an essential feature that strongly supports and promotes the goals identifed in the Climate Action Plan (CAP).*

Project: West Oaks
Segment: Palomar Oaks Way From Palomar Airport Road To West Oaks Way
Scenario: Without Project
By: LLG

Bicycle MMLOS Criteria			NB	SB
Criteria		**Points**	**Points Assigned**	**Points Assigned**
Street Characteristics	Speed limit is ≤ 25 mph	25	25	25
	Speed limit is 30 mph	15	0	0
	Speed limit is 35 mph	10	0	0
	Street with ADT < 3,000	15	15	15
	Street with ADT between 3,000 and 6,000	10	0	0
Facility	Class I facility (off-street path), Class IV (cycle track), or multiuse path	25	0	0
	Class II facility that meets minimum width of 5' (on-street bicycle lanes)	15	0	0
	Bike lane buffer (2' min) is provided	5	0	0
	Class III facility (bike route designated by signage or paint only)	5	0	0
	Additional traffic calming/speed management features have been applied to Class III facility (i.e. a bike boulevard)	10	0	0
Bikeway Design	Bikeway meets or exceeds the Bicycle Master Plan	25	25	25
	Bike lane (including buffer) is at least 8' wide from face of curb	10	0	0
	Bicycle facilities with signing and striping meet design guidelines D	10	0	0
	Good pavement condition for bikeway (no visible potholes)	10	10	10
	Free of infrastructure that obstructs bike facility (e.g. grates)	5	5	5
Connectivity/ Contiguity	Bikeways on side streets are consistent with Bicycle Master Plan along segment	5	5	5
	Bike lanes are striped continuously on all approaches to and departures from intersections, without dropping at turn lanes or driveways	5	0	0
Adjacent Vehicle Parking	No on-street parking and speed limit is 25 or 30 mph	5	5	0
	Back-in angled parking	5	0	0
	Parallel parking with door-side buffered bike lane	5	0	0
Other Elements	Enhanced bicycle detection or video detection is provided at intersections	5	0	0
	Bicycle racks are provided along segment	5	0	0
	Total Score:		**90**	**85**
	Bike LOS:		**A**	**B**

ROADWAY INFO

Roadway Name	Palomar Airport Road
From	College Boulevard
To	Palomar Oaks Way
Street Typology from Mobility Element	Arterial
Average Daily Traffic (ADT) volume (2-way total)	38,882

TRANSIT

EB SCORE | LOS	WB SCORE | LOS
0 | F	0 | F

May require improvements and upgrades to fully support CAP goals!

	Roadway Direction	
	EB	**WB**
* **Transit stop amenities available:**	☐ Bench ☐ Trash Cans ☐ Covered Bus Stop ☐ Well-lit Stops ☐ Stop located within a block of commercial users	☐ Bench ☐ Trash Cans ☐ Covered Bus Stop ☑ Well-lit Stops ☐ Stop located within a block of commercial users
Do the sidewalks or path to the transit stop appear to be ADA compliant?	No	No
Do multiple transit routes stop on the study segment?	No	No
Do any of the routes provide a direct link to a COASTER station or mobility hub?	Yes	Yes
Do any of the routes provide a single transfer to reach a COASTER station or mobility hub?	No	No
* **Closest distance to existing transit stop:**	<= 1/4 mile walk to bus only	<= 1/4 mile walk to bus only
What type of transit priority is present?	None present	None present
Headways between 6:30-8:30 am and 4-6 pm on weekdays:	None of the above	None of the above
Is there commute shuttle service provided during the morning and afternoon commute periods?	No	No
On weekends, are the headways no more than 1 hour headways between 9 am-5 pm?	No	No
Is there bike parking available at the bus stop?	No	No
Is the bus stop within 1/4 mile of a bike repair shop?	No	No
* **Is area governed by an adopted TDM ordinance that will promote ridesharing and/or the use of non-auto modes?**	No	No

*

*

* *Indicates an essential feature that strongly supports and promotes the goals identifed in the Climate Action Plan (CAP).*

Project: West Oaks
Segment: Palomar Airport Road From College Boulevard To Palomar Oaks Way
Scenario: without Project
By: LLG

Transit & Ridesharing MMLOS Criteria			EB	WB
Criteria		Points	Points Assigned	Points Assigned
Transit Stop Located Within 1/2 Mile Walk from Subject Site or Roadway Segment				
Access	No greater than 1/4 mile walk to the nearest transit stop	50 (rail/bus) 30 (bus)	30	30
	No greater than 1/2 mile walk to the nearest transit stop	30 (rail/bus) 20 (bus)	0	0
	No greater than 1 mile bicycle ride to the nearest transit stop	5	0	0
	ADA compliant sidewalk or path to transit stops in both directions	15	0	0
Connectivity	Multiple transit routes stop on segment	10	0	0
	Route provides a direct link to a COASTER station or mobility hub	15	15	15
	Route provides for a single transfer to reach a COASTER station or mobility hub	5	0	0
Transit priority	Dedicated right of way	5	0	0
	Transit priority during peak hours	5	0	0
Service	Headways of- 15 minutes between 6:30-8:30 am and 4-6 pm on weekdays	15	0	0
	Headways of 30 minutes between 6:30-8:30 am and 4-6 pm on weekdays	5	0	0
	Headways of 1 hour between 6:30-8:30 am and 4-6 pm on weekdays	2	0	0
	Commute shuttle service provided during the morning and afternoon commute periods	10	0	0
	No more than 1 hour headways between 9 am and 5 pm on weekends	5	0	0
Amenities	Covered bus stops	5	0	0
	Bench	10	0	0
	Well-lit stop that provides a sense of security	5	0	5
	Trash cans	2	0	0
	Bus stop located within a block of commercial services	5	0	0
Bicycle Accommodations	Bike parking available at the bus stop	5	0	0
	Bus stop within 1/4 mile of a bike repair shop	5	0	0
No Transit Stop Located Within 1/2 Mile Walk from Subject Site or Roadway Segment				
Available Mobility Services	Area governed by an adopted TDM ordinance that will promote ridesharing and/or the use of non-auto modes	60	0	0
	On demand rideshare services available	60	0	0
	Segment within FLEX service area	60	0	0
		Total Score:	**45**	**50**
		Transit LOS:	**F**	**E**

ROADWAY INFO

Roadway Name	Palomar Airport Road
From	College Boulevard
To	Palomar Oaks Way
Street Typology from Mobility Element	Arterial
Average Daily Traffic (ADT) volume (2-way total)	38,882

TRANSIT

	SCORE | LOS 72 | C	SCORE | LOS 75 | C
	Roadway Direction	
* Transit stop amenities available:	☑ Bench ☑ Trash Cans ☐ Covered Bus Stop ☐ Well-lit Stops ☐ Stop located within a block of commercial users	☑ Bench ☐ Trash Cans ☐ Covered Bus Stop ☑ Well-lit Stops ☐ Stop located within a block of commercial users
Do the sidewalks or path to the transit stop appear to be ADA compliant?	Yes	Yes
Do multiple transit routes stop on the study segment?	No	No
Do any of the routes provide a direct link to a COASTER station or mobility hub?	Yes	Yes
Do any of the routes provide a single transfer to reach a COASTER station or mobility hub?	No	No
* Closest distance to existing transit stop:	<= 1/4 mile walk to bus only	<= 1/4 mile walk to bus only
What type of transit priority is present?	None present	None present
Headways between 6:30-8:30 am and 4-6 pm on weekdays:	None of the above	None of the above
Is there commute shuttle service provided during the morning and afternoon commute periods?	No	No
On weekends, are the headways no more than 1 hour headways between 9 am-5 pm?	No	No
Is there bike parking available at the bus stop?	No	No
Is the bus stop within 1/4 mile of a bike repair shop?	No	No
* Is area governed by an adopted TDM ordinance that will promote ridesharing and/or the use of non-auto modes?	No	No

*

*

* *Indicates an essential feature that strongly supports and promotes the goals identifed in the Climate Action Plan (CAP).*

Project: West Oaks
Segment: Palomar Airport Road From College Boulevard To Palomar Oaks Way
Scenario: with Project
By: LLG

Transit & Ridesharing MMLOS Criteria			0	0
Criteria		**Points**	**Points Assigned**	**Points Assigned**
Transit Stop Located Within 1/2 Mile Walk from Subject Site or Roadway Segment				
Access	No greater than 1/4 mile walk to the nearest transit stop	50 (rail/bus) 30 (bus)	30	30
	No greater than 1/2 mile walk to the nearest transit stop	30 (rail/bus) 20 (bus)	0	0
	No greater than 1 mile bicycle ride to the nearest transit stop	5	0	0
	ADA compliant sidewalk or path to transit stops in both directions	15	15	15
Connectivity	Multiple transit routes stop on segment	10	0	0
	Route provides a direct link to a COASTER station or mobility hub	15	15	15
	Route provides for a single transfer to reach a COASTER station or mobility hub	5	0	0
Transit priority	Dedicated right of way	5	0	0
	Transit priority during peak hours	5	0	0
Service	Headways of- 15 minutes between 6:30-8:30 am and 4-6 pm on weekdays	15	0	0
	Headways of 30 minutes between 6:30-8:30 am and 4-6 pm on weekdays	5	0	0
	Headways of 1 hour between 6:30-8:30 am and 4-6 pm on weekdays	2	0	0
	Commute shuttle service provided during the morning and afternoon commute periods	10	0	0
	No more than 1 hour headways between 9 am and 5 pm on weekends	5	0	0
Amenities	Covered bus stops	5	0	0
	Bench	10	10	10
	Well-lit stop that provides a sense of security	5	0	5
	Trash cans	2	2	0
	Bus stop located within a block of commercial services	5	0	0
Bicycle Accommodations	Bike parking available at the bus stop	5	0	0
	Bus stop within 1/4 mile of a bike repair shop	5	0	0
No Transit Stop Located Within 1/2 Mile Walk from Subject Site or Roadway Segment				
Available Mobility Services	Area governed by an adopted TDM ordinance that will promote ridesharing and/or the use of non-auto modes	60	0	0
	On demand rideshare services available	60	0	0
	Segment within FLEX service area	60	0	0
		Total Score:	**72**	**75**
		Transit LOS:	**C**	**C**

APPENDIX F

HCM ANALYSIS WORKSHEETS – ROUNDABOUT ACCESS ALTERNATIVE

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Intersection	
Intersection Delay, s/veh	3.3
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	54	29	26	109
Demand Flow Rate, veh/h	55	30	26	111
Vehicles Circulating, veh/h	100	75	149	2
Vehicles Exiting, veh/h	13	100	6	103
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	3.3	3.1	3.3	3.3
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	55	30	26	111
Cap Entry Lane, veh/h	1246	1278	1185	1377
Entry HV Adj Factor	0.980	0.966	0.982	0.981
Flow Entry, veh/h	54	29	26	109
Cap Entry, veh/h	1222	1235	1164	1351
V/C Ratio	0.044	0.023	0.022	0.081
Control Delay, s/veh	3.3	3.1	3.3	3.3
LOS	A	A	A	A
95th %tile Queue, veh	0	0	0	0

Intersection	
Intersection Delay, s/veh	3.3
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	23	111	11	98
Demand Flow Rate, veh/h	23	113	11	100
Vehicles Circulating, veh/h	51	31	48	6
Vehicles Exiting, veh/h	54	28	26	138
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	2.9	3.4	2.9	3.3
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	23	113	11	100
Cap Entry Lane, veh/h	1310	1337	1314	1371
Entry HV Adj Factor	0.998	0.982	0.982	0.975
Flow Entry, veh/h	23	111	11	98
Cap Entry, veh/h	1308	1312	1290	1338
V/C Ratio	0.018	0.085	0.008	0.073
Control Delay, s/veh	2.9	3.4	2.9	3.3
LOS	A	A	A	A
95th %tile Queue, veh	0	0	0	0

Intersection	
Intersection Delay, s/veh	3.7
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	54	77	26	208
Demand Flow Rate, veh/h	55	78	26	212
Vehicles Circulating, veh/h	201	75	250	2
Vehicles Exiting, veh/h	13	201	6	151
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	3.7	3.3	3.6	3.9
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	55	78	26	212
Cap Entry Lane, veh/h	1124	1278	1069	1377
Entry HV Adj Factor	0.980	0.987	0.982	0.981
Flow Entry, veh/h	54	77	26	208
Cap Entry, veh/h	1102	1262	1050	1350
V/C Ratio	0.049	0.061	0.024	0.154
Control Delay, s/veh	3.7	3.3	3.6	3.9
LOS	A	A	A	A
95th %tile Queue, veh	0	0	0	1

Intersection	
Intersection Delay, s/veh	3.8
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	23	203	11	183
Demand Flow Rate, veh/h	23	207	11	186
Vehicles Circulating, veh/h	138	31	135	6
Vehicles Exiting, veh/h	54	115	26	232
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	3.2	4.0	3.1	3.8
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	23	207	11	186
Cap Entry Lane, veh/h	1199	1337	1202	1371
Entry HV Adj Factor	0.998	0.980	0.982	0.981
Flow Entry, veh/h	23	203	11	183
Cap Entry, veh/h	1197	1311	1181	1346
V/C Ratio	0.019	0.155	0.009	0.136
Control Delay, s/veh	3.2	4.0	3.1	3.8
LOS	A	A	A	A
95th %tile Queue, veh	0	1	0	0

APPENDIX G

HCM ANALYSIS WORKSHEETS – ALL-WAY STOP ACCESS ALTERNATIVE

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Intersection	
Intersection Delay, s/veh	7.7
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	46	4	0	1	1	25	0	22	2	85	5	11
Future Vol, veh/h	46	4	0	1	1	25	0	22	2	85	5	11
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	50	4	0	1	1	27	0	24	2	92	5	12
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	7.8	6.9	7.3	7.9
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	0%	92%	4%	84%
Vol Thru, %	92%	8%	4%	5%
Vol Right, %	8%	0%	93%	11%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	24	50	27	101
LT Vol	0	46	1	85
Through Vol	22	4	1	5
RT Vol	2	0	25	11
Lane Flow Rate	26	54	29	110
Geometry Grp	1	1	1	1
Degree of Util (X)	0.03	0.066	0.03	0.128
Departure Headway (Hd)	4.113	4.377	3.663	4.201
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	861	809	960	849
Service Time	2.183	2.453	1.751	2.25
HCM Lane V/C Ratio	0.03	0.067	0.03	0.13
HCM Control Delay	7.3	7.8	6.9	7.9
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.1	0.2	0.1	0.4

Intersection	
Intersection Delay, s/veh	7.3
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	19	2	0	2	4	97	0	9	1	23	22	45
Future Vol, veh/h	19	2	0	2	4	97	0	9	1	23	22	45
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	21	2	0	2	4	105	0	10	1	25	24	49
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	7.6	7.1	7.3	7.4
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	0%	90%	2%	26%
Vol Thru, %	90%	10%	4%	24%
Vol Right, %	10%	0%	94%	50%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	10	21	103	90
LT Vol	0	19	2	23
Through Vol	9	2	4	22
RT Vol	1	0	97	45
Lane Flow Rate	11	23	112	98
Geometry Grp	1	1	1	1
Degree of Util (X)	0.013	0.028	0.111	0.107
Departure Headway (Hd)	4.185	4.393	3.579	3.927
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	849	810	993	909
Service Time	2.24	2.448	1.631	1.966
HCM Lane V/C Ratio	0.013	0.028	0.113	0.108
HCM Control Delay	7.3	7.6	7.1	7.4
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0	0.1	0.4	0.4

Intersection	
Intersection Delay, s/veh	8.4
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	46	4	0	1	1	69	0	22	2	176	5	11
Future Vol, veh/h	46	4	0	1	1	69	0	22	2	176	5	11
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	50	4	0	1	1	75	0	24	2	191	5	12
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8.1	7.3	7.6	8.9
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	0%	92%	1%	92%
Vol Thru, %	92%	8%	1%	3%
Vol Right, %	8%	0%	97%	6%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	24	50	71	192
LT Vol	0	46	1	176
Through Vol	22	4	1	5
RT Vol	2	0	69	11
Lane Flow Rate	26	54	77	209
Geometry Grp	1	1	1	1
Degree of Util (X)	0.032	0.072	0.085	0.251
Departure Headway (Hd)	4.403	4.746	3.964	4.331
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	816	759	908	818
Service Time	2.415	2.75	1.969	2.416
HCM Lane V/C Ratio	0.032	0.071	0.085	0.256
HCM Control Delay	7.6	8.1	7.3	8.9
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.1	0.2	0.3	1

Intersection	
Intersection Delay, s/veh	8.2
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	19	2	0	2	4	181	0	9	1	101	22	45
Future Vol, veh/h	19	2	0	2	4	181	0	9	1	101	22	45
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	21	2	0	2	4	197	0	10	1	110	24	49
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	7.9	7.9	7.6	8.6
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	0%	90%	1%	60%
Vol Thru, %	90%	10%	2%	13%
Vol Right, %	10%	0%	97%	27%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	10	21	187	168
LT Vol	0	19	2	101
Through Vol	9	2	4	22
RT Vol	1	0	181	45
Lane Flow Rate	11	23	203	183
Geometry Grp	1	1	1	1
Degree of Util (X)	0.014	0.03	0.216	0.218
Departure Headway (Hd)	4.542	4.763	3.831	4.294
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	790	755	941	824
Service Time	2.558	2.771	1.834	2.384
HCM Lane V/C Ratio	0.014	0.03	0.216	0.222
HCM Control Delay	7.6	7.9	7.9	8.6
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0	0.1	0.8	0.8